Rencontres du Vietnam 2006
Nanophysics: from fundamentals to applications

	Monday-7		Tuesday-8		Wednesday-9		Thursday-10		Friday-11		Saturday-12
	Van										
	Opening session		**2:Q-Detection and Noise**		**parallel sessions**		**4:Spintronics and Hybrids**		**8: Nanophysics in Asia**		**7:QHE and graphene**
			(Chair : T. Martin)				**(Chair : G. Faini)**		**(Chair : N.V. Hieu)**		**(Chair : D.C. Glattli)**
								08:00	Japan : Tadashi Itoh,	08:00	Walt de Heer
08:30		08:30	Moty Heiblum	08:30		08:30	Cristian Urbina	08:20	Taiwan : Maw-Kuen Wu		
					parallel sessions			08:40	Korea : Young Pak Lee	08:30	Francisco Guinea
09:00		09:00	Leonardo Di Carlo	09:00		09:00	Poul Eric Lindelof	09:00	Vietnam : Nguyen Xuan Phuc		
									discussion	09:00	Kostya Novoselov
09:30	coffee break	09:30	coffee break	09:30	coffee break	09:30	coffee break	09:30	coffee break		
	Key-notes						**.../...**		**5:Molecular electronics**	09:30	Hubert Heersche
			(Chair : M. Heiblum)				**(Chair : Y.P. Lee)**		**(chair : M.K. Wu)**		
10:00		10:00	Klaus Ensslin	10:00		10:00	Junsaku Nitta	10:00	Jan van Ruitenbeek	10:00	Bjorn Trauzettel
10:30		10:30	Toshimasa Fujisawa	10:30	**parallel sessions**	10:30	Rolf Haug	10:30	Felix von Oppen	10:30	**Closing session**
11:00		11:00	Yigal Meir	11:00		11:00	Marco Aprili	11:00	Alfredo Levy-Yeyati		
11:30	Klaus von Klitzing	11:30	Matthias Hettler	11:30		11:30	Georg Schmidt	11:30	Abraham Nitzan		
	lunch		lunch		lunch		lunch		lunch		
	1:Q-BITS		**3: Q-wires**		**7 parallel sessions**		**excursion**		**6:NEMS**		
	(Chair : K. Ensslin)		**(chair : H. Takayanagi)**						**(chair : J. van Ruitenbeek)**		
14:00	Hideaki Takayanagi	14:00	Leonid Glazman	14:00		14:00		14:00	Andrew Cleland	14:00	
14:30	Shen Tsai	14:30	Reinhold Egger	14:30	**parallel sessions**	14:30		14:30	Robert Shekhter	14:30	
15:00	Daniel Esteve	15:00	Christoph Strunk	15:00		15:00		15:00	Yaroslav Blanter	15:00	
15:30	coffee break	15:30	coffee break	15:30	coffee break	15:30	coffee break	15:30	coffee break	15:30	
			and dots						**and -Nano-Devices**		
	(Chair : L. Glazman)		**(chair : P. Lindelof)**						**(chair : D. Mailly)**		
16:00	Pertti Hakonen	16:00	Kensuke Kobayashi	16:00		16:00		16:00	Eyal Buks	16:00	
16:30	Keiji Ono	16:30	Achim Rosch	16:30	**parallel sessions**	16:30	city tour	16:30	Philippe Bois	16:30	
17:00	Lieven Vandersypen	17:00	Vladimir Kravtsov	17:00		17:00		17:00	Thierry Poiroux	17:00	
17:30	Boris Altshuler	17:30		17:30		17:30		17:30		17:30	
					Conference dinner		**Puppet show**		**Hanoi Opera**		

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	PS1/2		PS3		PS4		PS5/7		PS6
	1:Q-BITS		**3: Q-Dots**		**4:Spintronics**		**5:Molecular electronics**		**6:Nano-Devices**
	(chair : D. Feinberg)		**(chair : C. Strunk)**		**(chair : J. Nitta)**		**(chair : A. Nitzan)**		**(chair : P. Dollfus)**
08:30	Yuriy Makhlin	08:30	Renaud Leturcq	08:30	Alexander Holleitner	08:30	Christian Romeike	08:30	Serge Ecoffey
09:00	Kouichi Semba	09:00	Arturo Tagliacozzo	09:00	Gen Tatara	09:00	Juan-Carlos Cuevas	09:00	Fabio Beltram
09:30	Ferdinando de Pasquale	09:30	Koji Ishibashi	09:30	Jörgen König	09:30	Shahal Ilani	09:30	Masayoshi Esashi
09:50	Laurent Lévy	09:50	Bernard Plaçais	09:50	David Sanchez	09:50		09:50	
10:10	coffee break	10:10	coffee break	10:10	coffee break	10:10	coffee break	10:10	coffee break
	(chair : D. Estève)		**(chair : Y. Meir)**		**(chair :A. Tagliacozzo)**		**(chair : R. Haug)**		**(chair : P. Dollfus)**
10:40	Rolf Brenner	10:40	Nguyen Van Hieu	10:40	Jung hoon Han	10:40	Nguyen Ai Viet	10:40	Do Van Nam
11:00	Hayato Nakano	11:10	Tadashi Itoh	11:00	Nguyen Quang Tuong	11:00	Thibaut Jonckheere	11:00	Marc Sanquer
11:20	Chia-Chu Chen			11:20	Nguyen Xuan Phuc	11:20	Steven R. Schofield	11:20	Shunri Oda
11:40	Andrew Ferguson	11:40	Satoshi Moriyama	11:40	Giancarlo Faini	11:40	Ken-Ichiro Imura	11:40	Fabio Pistolesi
12:00	Khalil Harrabi	12:00	Nguyen Toan Thang	12:00	Carlos Egues	11:50	Zachary Keane	12:00	
12:20		12:20	Nguyen Tran Thuat	12:20		12:20	Andreas Johansson	12:10	
	lunch		lunch		lunch		lunch		lunch
	2:Q-Detection and Noise		**3: Q-Wires**		**4:Hybrids**		**7:QHE and graphene**		**6:NEMS**
	(chair : P. Roche)		**(chair : M. Sanquer)**		**(chair : M. Aprili)**		**(chair : F. Guinea)**		**(chair : A. Cleland)**
14:00	Frederic Pierre	14:00	Alex Hamilton	14:00	Young Pak Lee	14:00	Dror Orgad	14:00	Dae Man Kim
								14:20	Kang-Hun Ahn
14:30	Uri Gavish	14:30	Stefan Kettemann	14:30	Saburo Takahashi	14:30	Félicien Schopfer	14:40	Phan Ngoc Minh
14:50	Hee Chul Park	14:50				14:50	Alessandro Braggio	15:00	Yue-Min Wan
15:10	Yasuhiro Utsumi	15:00	Laurent Saminadayar	15:00	Yukio Tanaka	15:10	Adeline Crépieux	15:20	Vu Ngoc Tuoc
15:30	coffee break	15:30	coffee break	15:30	coffee break	15:30	coffee break	15:40	coffee break
	(chair : P. Hakonen)		**(chair : R. Egger)**		**(chair : C. Urbina)**		**(chair :A. Levy-Yeyati)**		**misc. 2 (chair : T. Itoh)**
16:00	Philippe Jacquod	16:00	Christophe Texier	16:00	Detlef Beckmann	16:00	Nguyen Thi Kim Thanh	16:00	Matthias Meschke
16:20	Jaeuk Kim	16:20	Jean-Eric Wegrowe	16:20		16:20	**miscellaneous 1**	16:20	Juhn-Jong Lin
16:40	Heung-Sun Sim	16:40	Nguyen Hong Quang	16:30	Lorenz Lechner	16:40	Le Dinh	16:40	Truong Viet Giang
17:00	Mukunda Das	17:00	Tran Phong Cong	16:50	Shiro Kawabata	17:00	Nguyen Anh Tuan	17:00	Hoang Ba Thang
17:20		17:20		17:10	Rosa Lopez	17:20	Hieu Chi Dam	17:20	Le Quang Anh Quoc
17:40		17:40		17:30	Nobuhiko Yokoshi	17:40		17:40	Tinh Bui Cong

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Nanophysics: from fundamentals to applications
List of participants

ahn	kang-hun	daejeon	korea	ahnkh@cnu.ac.kr	PS6.6	PS6	Nanomechanical Double Charge Shuttles; Symmetry-breaking electric current
al dughaim	mohammed	palaiseau cedex	france	mohammed.al-dughaim@polytechnique.edu	XXXXXX		
altshuler	boris	new york	usa	bla@phys.columbia.edu	???????	PS1	xxx
aprili	marco	orsay	france	aprili@lps.u-psud.fr	PS4.4	PS4	Ferromagnetic Josephson Junctions as classical spins
beckmann	detlef	karlsruhe	germany	detlef.beckmann@int.fzk.de	PS1.9	PS4	Experimental Evidence for Crossed Andreev Reflection
beltram	fabio	pisa	italy	beltram@sns.it	PS1.23	PS4	Surface acoustic waves for single-electron manipulation and single-photon generation
blanter	yaroslav	delft	the netherlands	blanter@tnntw14.tn.tudelft.nl	PS6.1	PS6	Single-electron tunneling with strong mechanical feedback
bois	philippe	palaiseau	france	philippe.bois@thalesgroup.com	PS2.8	PS6	Quantum Well Infrared Photodetectors: From Laboratory Objects to Products
braggio	alessandro	genova	italy	braggio@fisica.unige.it	PS7.2	PS7	Current moments of fractional Hall quasiparticles through an antidot
brenner	rolf	sydney	australia	rolf@phys.unsw.edu.au	PS3.13	PS1	Microwave and pulsed-gate measurements on two and four phosphorus donors ion-implanted into silicon
bui	cong tinh	hanoi	vietnam	buicongtinhk5@yahoo.com	PS6.11	PS6	MAGNETOELASTIC NANOSTRUCTURED FeCoSiB RIBBON FOR NOVEL GENERATION OF SENSITIVE STRAIN SENSORS
bui	dinh tu	hanoi	vietnam	buidinhtutb@yahoo.com	XXXXXX		
bui thi hoang lan	khanh	ho chi minh	vietnam	hlkhanh@phys.hcmuns.edu.vn	XXXXXX		
buks	eyal	haifa	israel	eyal@ee.technion.ac.il	PS2.19	PS6	xxxxx
chen	chia-chu	tainan	taiwan	chiachu@phys.ncku.edu.tw	PS1.17	PS1	Ground State Instabilites in Mono-mode Cavity.
chu viet	ha	thainguyen	vietnam	cvha@grad.iop.vast.ac.vn	XXXXXX		
cleland	andrew	santa barbara c	usa	cleland@physics.ucsb.edu	PS1.21	PS6	xxxxxx
crepieux	adeline	marseille	france	crepieux@cpt.univ-mrs.fr	PS2.7	PS7	Photo-assisted current and shot noise in the fractional quantum Hall regime
cuansing	eduardo	manila	philippines	cuansinge@dlsu.edu.ph	XXXXXX		
cuevas	juan carlos	madrid	spain	juancarlos.cuevas@uam.es	PS5.5	PS5	Ab initio description of the electronic transport in single-molecule junctions
dam	hieu chi	ishikawa	japan	dam@jaist.ac.jp	PS5.11	PS5	Structural and electronic properties of Pt nano clusters adsorbed on single wall carbon nanotube
dang	minh tuan	orsay	france	minhtuan@rub.u-psud.fr	XXXXXX	PS2	
das	mukunda	canberra	australia	mukunda.das@anu.edu.au	PS3.46	PS2	Quantum Transport in Mesoscopic Systems
~~de franceschi~~	~~silvano~~	~~trieste~~	~~italy~~	silvano@tasc.infm.it	~~PS3.43~~	~~PS3~~	~~Supercurrent transport in semiconductor quantum dots~~
de heer	walt	atlanta ga	usa	deheer@electra.physics.gatech.edu	PS3.27	PS7	Electronic confinement and coherence in patterned epitaxial graphene.
de pasquale	ferdinando	rome	italy	ferdinando.depasquale@roma1.infn.it	PS1.7	PS1	faithful state transfer through a quantum channel
di carlo	leonardo	cambridge	usa	dicarlo@physics.harvard.edu	PS2.10	PS2	Gate-tunable shot noise correlations in a double quantum dot with capacitive coupling
dinh nhu	thao	hue	vietnam	dnt811072@dng.vnn.vn	XXXXXX		
doan thi kim	dung	ho chi minh	vietnam	ioph@vast-hcm.ac.vn	XXXXXX		
dollfus	philippe	orsay	france	philippe.dollfus@ief.u-psud.fr	XXXXXX		
do	bang	hanoi	vietnam	bangdb@ims.vast.ac.vn	XXXXXX		
do	chung	hanoi	vietnam	chungdn295@yahoo.com	XXXXXX		
do	thi huong gi	hanoi	vietnam	giangdth@vnu.edu.vn	XXXXXX		
do	van nam	orsay	france	van-nam.do@ief.u-psud.fr	PS6.4	PS6	Influence of a magnetic field on the electronic transport in resonant tunneling diodes
do thi	anh thu	hanoi	vietnam	thudtat76@yahoo.com	XXXXXX		
ecoffey	serge	lausanne	switzerland	serge.ecoffey@epfl.ch	PS3.33	PS6	Hybrid Nanowire-MOS circuit architectures: from basic physics to digital and analog applications
egger	reinhold	dusseldorf	germany	egger@thphy.uni-duesseldorf.de	PS3.4	PS3	Transport properties of interacting disordered nanotubes
egues	carlos	basel	switzerland	egues@if.sc.usp.br	PS4.18	PS4	Spin orbit interaction in symmetric quantum wells: zitterbewegung and spin Hall effect
ensslin	klaus	zurich	switzerland	ensslin@phys.ethz.ch	PS2.5	PS2	Shot noise in quantum dots
esashi	masayoshi	sendai	japan	esashi@cc.mech.tohoku.ac.jp	??????	PS6	Application oriented Micro-Nano Electromechanical Systems
esteve	daniel	saclay	france	daniel.esteve@cea.fr	PS1.5	PS1	Current to frequency conversion with Bloch oscillations in a superconducting device
faini	giancarlo	marcoussis	france	giancarlo.faini@lpn.cnrs.fr	PS4.19	PS4	Large phase coherence effects in GaMnAs diluted ferromagnetic based nanostructures: towards a quantum spintronics.
feinberg	denis	grenoble	france	feinberg@grenoble.cnrs.fr	XXXXXX		
ferguson	andrew	sydney	australia	andrew.ferguson@unsw.edu.au	PS1.10	PS1	Microsecond resolution of quasiparticle tunnelling events in the thin-film single-Cooper pair-transistor
fujisawa	toshimasa	atsugi	japan	fujisawa@will.brl.ntt.co.jp	PS2.4	PS2	Counting statistics of single electron transport through a double quantum dot
garcia sanchez	daniel	barcelona	spain	daniel.garcia@uab.es	XXXXXX		
gavish	uri	innsbruck	austria	uri.gavish@uibk.ac.at	PS1.2	PS2	Minimization of Quantum Noise in Transistor Amplifiers

giang hong	thai	hanoi	vietnam	ghthais@yahoo.com	XXXXXX		
glattli	d. christian	saclay	france	christian.glattli@cea.fr	XXXXXX		
glazman	leonid	minneapolis	usa	glazman@umn.edu	PS3.41	PS3	DYNAMIC RESPONSE OF ONE-DIMENSIONAL INTERACTING FERMIONS
guinea	francisco	madrid	spain	paco.guinea@icmm.csic.es	???????	PS7	Novel transport properties and interaction defects in graphene and graphene multilayers.
hakonen	pertti	espoo	finland	pjh@boojum.hut.fi	PS1.15	PS1	Landau-Zener interferometry in a charge qubit
hamilton	alex	sydney	australia	alex.hamilton@unsw.edu.au	PS3.25	PS3	Ballistic transport and anisotropic Zeeman splitting in one-dimensional hole systems
han	jung hoon	suwon	korea	hanjh@skku.edu	PS4.7	PS4	Magnetism-induced electric polarization in a linear chain
harrabi	khalil	tsukuba	japan	khalil.harrabi@frl.cl.nec.co.jp	PS1.13	PS1	Discrimination between different sources of decoherence in flux qubit
haug	rolf	hannover	germany	haug@nano.uni-hannover.de	PS3.20	PS4	Spin effects in quantum dots
heersche	hubert	delft	the netherlands	hubert@qt.tn.tudelft.nl	PS5.6	PS7	Supercurrents in graphene
heiblum	moty	rehovot	israel	heiblum@wisemail.weizmann.ac.il	PS2.9	PS2	Entanglement, Dephasing, and Phase Recovery via Cross-Correlation Measurements of Electrons
hettler	matthias	karlsruhe	germany	hettler@int.fzk.de	PS2.15	PS2	Co-tunneling effects in transport through a quantum dot
hoang ba	thang	hanoi	vietnam	thang@physics.uc.edu	PS3.12	PS6	Imaging of intrinsic and defect-related photoluminescence from single CdS nanowires
holleitner	alexander	munich	germany	holleitner@lmu.de	PS1.6	PS4	Spin Relaxation in n-InGaAs Wires: Transition from two Dimensions to one Dimension
homma	koji	sendai	japan	s_sato@mems.mech.tohoku.ac.jp	XXXXXX		
ho truong	giang	hanoi	vietnam	giangims@yahoo.com.vn	XXXXXX		
ilani	shahal	ithaca	usa	si34@cornell.edu	PS5.3	PS5	Measuring the Quantum Capacitance of Individual Carbon Nanotubes
imura	ken ichiro	wako	japan	imura@riken.jp	PS5.8	PS5	Full counting statistics for molecular spintronics : an analytically solvable model in the incoherent tunneling regime
ishibashi	koji	saitama	japan	kishiba@riken.jp	PS3.8	PS3	Artificial atom in carbon nanotube quantum dots and its THz response
itoh	tadashi	osaka	japan	itoh@mp.es.osaka-u.ac.jp	PS3.40	PS6	Lasing and ultrafast decay of confined biexcitonic luminescence in semiconductor CuCl quantum dots
jacquod	philippe	tucson	usa	pjacquod@physics.arizona.edu	PS2.6	PS2	Shot-Noise in Semiclassical Chaotic Cavities
johansson	andreas	jyvaskyla	finland	andreas.johansson@phys.jyu.fi	P6.10		
jonckheere	thibaut	marseille	france	jonckhee@cpt.univ-mrs.fr	PS4.14	PS5	Controllable pi junction in a Josephson quantum-dot device with molecular spin
kamide	kenji	tokyo	japan	kamide@kh.phys.waseda.ac.jp	XXXXXX		
kawabata	shiro	enschede	the netherlands	s.kawabata@tnw.utwente.nl	PS1.12	PS4	Dissipative Quantum Mechanics of the d-wave Josephson Junctions
keane	zachary	houston	usa	zkkeane@rice.edu	PS5.7	PS5	Three-terminal devices to examine single-molecule conductance switching
kettemann	stefan	hamburg	germany	ketteman@physnet.uni-hamburg.de	PS3.39	PS3	Free Magnetic Moments and Dephasing in Disordered Quantum Wires
kim	dae-mann	seoul	korea	dmkim@kias.re.kr	PS1.1	PS6	Schottky Barrier in 1-Dimensioal nano FETs: Effect of Electrode Atomic Species
kim	jaeuk	daejon	south korea	jaeukkim@postech.ac.kr	PS3.3	PS2	Shot Noise Enhancement from Non-equilibrium Plasmons in Luttinger-Liquid Junctions
kobayashi	kensuke	kyoto	japan	kensuke@scl.kyoto-u.ac.jp	PS3.5	PS3	Mesoscopic Fano Effect in Quantum Hybrid Systems
koenig	juergen	bochum	germany	koenig@tp3.ruhr-uni-bochum.de	PS4.10	PS4	Interplay of Ferromagnetism and Coulomb Interaction in Quantum-Dot Spin Valves
kravtsov	vladimir	trieste	italy	kravtsov@ictp.trieste.it	PS3.7	PS3	Energy absorption in driven mesoscopic systems
lechner	lorenz	helsinki	finland	lorenz.lechner@boojum.hut.fi	PS3.29	PS4	Proximity-induced Superconductivity in a diffusive carbon MWNT
lee	youngpak	seoul	korea	yplee@hanyang.ac.kr	PS4.9	PS6	Spin-photonics and spin photonic crystals as emerging issues
le	dinh	hue	vietnam	dinhle52@gmail.com	PS3.23	PS5	Absorption of Light by Free Carriers in Rectangular Quantum Wires in the Presence of Laser Wave
le	quoc minh	hanoi	vietnam	lequocminh@ims.vast.ac.vn	XXXXXX		
le	thi trong tu	hanoi	vietnam	tuyenltt@ims.vast.ac.vn	XXXXXX		
le quang	anh quoc	cachan	france	lequang@lpqm.ens-cachan.fr	PS3.44	PS6	Lasing properties of PbSe quantum dots doped PMMA polymer for infrared optical amplification
le tien	hai	hanoi	vietnam	hailt_vn@yahoo.com	XXXXXX		
leturcq	renaud	zurich	switzerland	leturcq@phys.ethz.ch	PS3.14	PS3	Magnetic field asymmetry of the nonlinear transport in quantum rings
levy	laurent	grenoble	france	levy@grenet.fr	PS1.14	PS1	Coupled charge-phase qubits: a superconducting single electron transistor coupled to a SQUID
levy yeyati	alfredo	madrid	spain	a.l.yeyati@uam.es	XXXXXX	PS5	Interactions and non-local transport in hybrid nanostructures
lindelof	poul	copenhagen	denmark	lindelof@it.dk	PS3.9	PS4	Normal, superconducting and magnetic contacts to carbon nanotubes and InAs nanorods
lin	juhn-jong	hsinchu	taiwan	jjlin@mail.nctu.edu.tw	PS4.6	PS6	Logarithmic Zero-Bias Conductance Peaks in Sc/AlOx/Al Tunnel Junctions
lopez	rosa	palma de mallor	spain	rosa.lopez-gonzalo@uib.es	PS3.18	PS4	Josephson current through a Kondo molecule
luu anh	tuyen	ho chi minh	vietnam	tuyenluuanh@yahoo.com	XXXXXX		
luu tien	hung	vinh	vietnam	hungdhvinh@yahoo.com	XXXXXX		
mailly	dominique	marcoussis	france	dominique.mailly@lpn.cnrs.fr	XXXXXX		
makhlin	yuriy	chernogolovka	russia	makhlin@itp.ac.ru	PS1.18	PS1	Berry phase and decoherence
martin	thierry	marseille	france	martin@cpt.univ-mrs.fr	XXXXXX		
meir	yigal	beer sheva	israel	ymeir@bgu.ac.il	PS3.36	PS2	Noise and dephasing in quantum point contacts
meschke	matthias	espoo	finland	meschke@boojum.hut.fi	PS6.8	PS6	Observation of heat transport through a superconducting line
miyazaki	masaru	sendai	japan	s_sato@mems.mech.tohoku	XXXXXX		
moriyama	satoshi	wako	japan	satoshim@riken.jp	PS3.19	PS3	Investigation of total-spin state in single-wall carbon nanotube quantum dots

nakano	hayato	atsugi-shi	japan	nakano@will.brl.ntt.co.jp	PS2.13	PS1	Some theoretical aspects in Superconducting Flux-qubit systems
~~nghiem~~	~~diu~~	~~hanoi~~	~~vietnam~~	ntdiu@iop.vast.acv.vn	~~PS2.12~~	~~PS1~~	~~Exact solution of qubit decoherence models by a transfer matrix method~~
nguyen anh	tuan	hanoi	vietnam	tuanna@itims.edu.vn	PS4.17	PS5	TECHNOLOGIES, STRUCTURES, PHYSICAL PROPERTIES AND APPLICATIONS OF NANOSTRUCTURED MAGNETIC MATERIALS
nguyen ngoc	toan	hanoi	vietnam	nntoanims@yahoo.com	XXXXXX		
nguyen	ai viet	hanoi	vietnam	vieta@iop.vast.ac.vn	PS3.17	PS5	SIMPLE MODEL FOR NONLINEAR EXCITATIONS IN DNA NANO-WIRES
nguyen	ba an	hanoi	vietnam	nban@iop.vast.ac.vn	XXXXXX		
nguyen	bich ha	hanoi	vietnam	hantb@vnu.edu.vn	XXXXXX		
nguyen	ha hung chuo	hochiminh	vietnam	nhhchuong@gmail.com	XXXXXX		
nguyen	hai	hanoi	vietnam	nhhai@vnu.edu.vn	XXXXXX		
nguyen	hong quang	hanoi	vietnam	nhquang@iop.vast.ac.vn	PS3.32	PS3	On the effective mass of electron in nanocrystals and nanowires
nguyen	hung son	hanoi	vietnam	nhson@iop.vast.ac.vn	XXXXXX		
nguyen	hung	hanoi	vietnam	hung@iop.vast.ac.vn	XXXXXX		
nguyen	huu nha	ho chi minh	vietnam	nhnha@phys.hcmuns.edu.vn	XXXXXX		
nguyen	nang dinh	hanoi	vietnam	dinhnn@vnu.edu.vn	XXXXXX		
nguyen	quang anh	palaiseau	france	quang-anh.nguyen@polytechnique.org	XXXXXX		
nguyen	quang tuong	marcoussis	france	quang-tuong.nguyen@polytechnique.org	PS4.1	PS4	Evanescent states in semiconductors with inversion asymmetry and spin-orbit interaction
~~nguyen~~	~~thanh cuong~~	~~ishikawa~~	~~japan~~	ntcuong@jaist.ac.jp	~~XXXXXX~~		
nguyen	thanh huyen	hanoi	vietnam	nthuyen@iop.vast.ac.vn	XXXXXX		
nguyen	thi dinh	ha noi	vietnam	vietdinhph@yahoo.com	XXXXXX		
nguyen	thi huyen ng	hochiminh city	vietnam	nthngavllt@yahoo.com	XXXXXX		
nguyen	thi kim than	hanoi	vietnam	nkthanh@iop.vast.ac.vn	PS2.1	PS7	Quantum dot dephasing by fractional quantum Hall edge states
nguyen	tran thuat	palaiseau	france	tran-thuat.nguyen@polytechnique.edu	XXXXXX		
nguyen	trung hai	hochiminh	vietnam	trunghaisg@yahoo.com	XXXXXX		
nguyen	van anh	hanoi	vietnam	vananhndt@yahoo.com	XXXXXX		
nguyen	van hieu	hanoi	vietnam	nvhieu@iop.vast.ac.vn	PS3.35		Two-photon Rabi Oscillations of Biexciton in Semiconductor Quantum Dot. $
nguyen	van-lien	hanoi	vietnam	nvlien@iop.vast.ac.vn	XXXXXX		
nguyen	viet anh	albany	usa	anguyen@uamail.albany.edu	XXXXXX		
nguyen	vinh quang	hanoi	vietnam	nvquang@iop.vast.ac.vn	XXXXXX		
nguyen si	hieu	hanoi	vietnam	hieuns@ims.vast.ac.vn	XXXXXX		
nguyen thanh	nam	hanoi	vietnam	nam.nguyen-thanh@ief.u-psud.fr	XXXXXX		
nguyen thanh	tien	cantho	vietnam	nttien@ctu.edu.vn	XXXXXX		
nguyen thi	thuy diem	can tho	vietnam	nvquang@iop.vast.ac.vn	XXXXXX		
nguyen toan	thang	hanoi	vietnam	ntthang@iop.vast.ac.vn	PS3.24	PS3	TRANSPORT THROUGHT AN ASYMMETRICALLY COUPLED KONDO QUANTUM DOT
nguyen tri	lan	hanoi	vietnam	ntlan@iop.vast.ac.vn	XXXXXX		
nguyen trong	dung	hanoi	vietnam	dungntcdcn@yahoo.com	XXXXXX		
nguyen truong	luyen	hanoi	vietnam	xx@yy.zz	XXXXXX		
nguyen van chuc	chuc	hanoi	vietnam	chucnv@ims.vast.ac.vn	XXXXXX		
nguyen xuan	phuc	hanoi	vietnam	phucnx@ims.vast.ac.vn	XXXXXX		
nitta	junsaku	sendai	japan	nitta@material.tohoku.ac.jp	PS4.16	PS4	Spin interference in InGaAs 2DEG rings
nitzan	abraham	tel aviv	israel	nitzan@post.tau.ac.il	PS5.2	PS5	Inelastic effects in molecular conduction: inelastic spectra, resonant tunnelling and noise
novoselov	konstantin	manchester	united kingdom	kostya@manchester.ac.uk	PS7.1	PS7	QED in a Pencil Trace
oda	shunri	tokyo	japan	soda@pe.titech.ac.jp	PS3.42	PS6	Preparation, characterization and application of nanocrystalline silicon quantum dot devices
okubo	takashi	ishikawa	japan	okubo-t@jaist.ac.jp	XXXXXX		
ono	keiji	wako	japan	k-ono@riken.jp	PS3.30	PS1	Electrical manipulation of electron and nuclear spins in quantum dots
orgad	dror	jerusalem	israel	orgad@phys.huji.ac.il	PS7.5	PS7	orgad PS7.xxx*
park	hee chul	daejeon	korea	hc272@cnu.ac.kr	PS2.11	PS2	Stepwise noise power from periodically driven double quantum dots
pham	van hoi	hanoi	vietnam	hoipv@ims.vast.ac.vn	XXXXXX		
pham thai cuong	cuong	thai nguyen	vietnam	ptcuong_phys@yahoo.com	XXXXXX		
pham thu nga	nga	hanoi	vietnam	phtnga@ims.vast.ac.vn	XXXXXX		
phan	hong khoi	hanoi	vietnam	phkhoi@ims.vast.ac.vn	XXXXXX		
phan	ngoc minh	hanoi	vietnam	minhpn@ims.vast.ac.vn	PS6.18	PS6	Utilization of Individual Carbon Nanotube for Electron Field Emitters and Near-field Scanning Probes
pierre	frederic	marcoussis	france	frederic.pierre@lpn.cnrs.fr	??????	PS2	Emission and absorption asymmetry in the quantum noise of a Josephson junction
pistolesi	fabio	grenoble	france	fabio.pistolesi@grenoble.cnrs.fr	PS6.9	PS6	Current fluctuations for AC forced charge shuttle
placais	bernard	paris	france	bernard.placais@lpa.ens.fr	PS2.18	PS3	Single charge dynamics in a quantum coherent RC circuit
poiroux	thierry	grenoble	france	thierry.poiroux@cea.fr	PS6.13	PS6	MOS transistors for 32nm technology node and beyond: requirements, potential solutions and challenges

ritter	rogers	charlottesville	united states	rcr8r@virginia.edu	XXXXXX		
roche	patrice	saclay	france	patrice.roche@cea.fr	XXXXXX		
romeike	christian	aachen	german	romeike@physik.rwth-aachen.de	PS5.1	PS5	Kondo-transport spectroscopy of magnetic anisotropy of single molecule magnets
rosch	achim	cologne	germany	rosch@thp.uni-koeln.de	PS2.2	PS3	Universal dephasing rate due to diluted Kondo impurities
saminadayar	laurent	grenoble	france	saminadayar@grenoble.cnrs.fr	PS3.45	PS3	Dephasing in Kondo systems in the zero temperature limit
sanchez	david	palma de mallor	spain	david.sanchez@uib.es	PS4.5	PS4	Fano-Rashba effect in quantum wires
sanquer	marc	grenoble	france	marc.sanquer@cea.fr	PS3.26	PS6	Individual charge traps in silicon nanowires: location, spin and occupation number by Coulomb blockade spectroscopy
schmidt	georg	wГOrzburg	germany	schmidt@physik.uni-wuerzburg.de	PS1.19	PS4	Spin injection and spin transport in semiconductor nanostructures
schofield	steven	callaghan	australia	steven.schofield@newcastle.edu.au	PS5.12	PS5	Acetone on Si(001): A study for silicon-based molecular electronics
schopfer	felicien	trappes	france	felicien.schopfer@lne.fr	PS7.3	PS7	Recent developments in the metrological application of the quantum Hall effect
semba	koichi	atsugi	japan	semba@nttbrl.jp	PS1.16	PS1	Vacuum Rabi oscillations observed in a flux qubit LC-oscillator system
shah	wiqar hussai	islamabad	pakistan	wiqarhussain@yahoo.com	XXXXXX		
shekhter	robert	gothenburg	sweden	shekhter@fy.chalmers.se	PS6.2	PS6	Mechanically Assisted Single-Electronics
sim	heung-sun	daejeon	korea	hssim@kaist.ac.kr	PS1.3	PS2	Multiparticle Aharonov-Bohm effects
strunk	christoph	regensburg	germany	christoph.strunk@physik.uni-r.de	PS3.6	PS3	Band Structure and Quantum Interference in Multiwall Carbon Nanotubes
tagliacozzo	arturo	napoli	italy	arturo@na.infn.it	PS3.10	PS3	Spin excitations in a quantum dot with magnetic field and spin orbit coupling.
takahashi	saburo	sendai	japan	takahasi@imr.tohoku.ac.jp	PS4.12	PS4	Josephson current through a half-metallic ferromagnet
takayanagi	hideaki	tokyo	japan	h-taka@rs.kagu.tus.ac.jp	PS1.24	PS1	Readout of Flux Qubits
tanaka	yukio	nagoya	japan	ytanaka@nuap.nagoya-u.ac.jp	PS4.13	PS4	General theory of proximity effect in unconventional superconductor jucntions
tatara	gen	tokyo	japan	tatara@phys.metro-u.ac.jp	PS4.15	PS4	Theory of Threshold Current of Domain Wall Motion
texier	christophe	orsay	france	texier@lptms.u-psud.fr	PS3.28	PS3	Dephasing due to electron-electron interaction in a diffusive ring
tran cong	phong	hue	vietnam	congphong2000@yahoo.com	PS3.22	PS3	Parametric Resonance of Acoustic and Optical Phonons in a Cylindrical Quantum Wire
tran	kim anh	hanoi	vietnam	anhtk@ims.vast.ac.vn	XXXXXX		
tran van	thien	hochiminh	vietnam	tvthien@vnuhcm.edu.vn	XXXXXX		
trauzettel	bjorn	leiden	the netherlands	trauzettel@lorentz.leidenuniv.nl	PS2.3	PS7	Quantum-limited shot noise in graphene
trinh hai	dang	hanoi	vietnam	danghned03@yahoo.com	XXXXXX		
trinh	hoa	hochiminh	vietnam	thlang@phys.hcmuns.edu.vn	XXXXXX		
truong thi	ngoc chinh	tra vinh town	vietnam	truongngocchinh2003@yahoo.com	XXXXXX		
truong viet	giang	hue	vietnam	truonglt@dng.vnn.vn	PS4.8	PS6	Er3+, Yb3+ and Ce3+ - doped Y2O3 nanoparticles in PMMA polymeric host
tsai	jaw-shen	tsukuba	japan	tsai@frl.cl.nec.co.jp	PS1.22	PS1	Josephson Qubits with Controllable Couplings
urbina	cristian	saclay	france	cristian.urbina@cea.fr	PS3.11	PS4	Josephson effects through one atom
utsumi	yasuhiro	wako	japan	utsumi@riken.jp	PS2.17	PS2	Full Counting Statistics for a Single-Electron Transistor, Non-equilibrium Effects at Intermediate Conductance
vandersypen	lieven	delft	netherlands	l.m.k.vandersypen@tudelft.nl	PS1.4	PS1	Coherent rotation of a single electron spin in a quantum dot using magnetic resonance
van ruitenbeek	jan	leiden	the netherlands	ruitenbeek@physics.leidenuniv.nl	PS5.4	PS5	Quantum properties of atomic-sized conductors: Single atoms, chains of atoms, and molecules
von klitzing	klaus	stuttgart	germany	k.klitzing@fkf.mpg.de	PS7.4	KN	Nanoelectronics: from basic research to new applications
von oppen	felix	berlin	germany	vonoppen@physik.fu-berlin.de	PS5.9	PS5	Pair tunneling through single molecules
vu duc chinh	chinh	hanoi	vietnam	chinhvd@ims.vast.ac.vn	XXXXXX		
vu	ngoc tuoc	hanoi	vietnam	tuocvungoc@mail.hut.edu.vn	PS6.7	PS6	POSSIBLE SUPPRESSION THE DIRECT TUNNELING CURRENT IN NITRIDE HETEROSTRUCTURE DEVICE
wan	yue-min	kaohsiung	taiwan	ymwan@isu.edu.tw	PS6.3	PS6	Development of silicon-based single-electron transistor for room temperature operation
wegrowe	jean-eric	palaiseau	france	jean-eric.wegrowe@polytechnique.fr	PS3.1	PS3	CONDUCTANCE IN MULTIWALL CARBON NANOTUBES AND SEMICONDUCTOR NANOWIRES.
wu	kang-hun	tapei	taiwan			PS8	Nanophysics in Asia : taiwan
yamaguchi	tomohiro	saitama	japan	tyamag@riken.jp	XXXXXX		
yokoshi	nobuhiko	tokyo	japan	yokoshi@kh.phys.waseda.ac.jp	PS3.21	PS4	Voltage chacteristics of current and shot noise in Josephson junction through Tomonaga-Luttinger liquid

Rencontres du Vietnam 2006
Nanophysics: from fundamentals to applications
List of Abstracts

PS1: Quantum Information

PS1.1	kim	dae mann	dmkim@kias.re.kr
	Schottky Barrier in 1-Dimensioal nano FETs: Effect of Electrode Atomic Species		
	Schottky Barrier in 1-Dimensioal nano FETs: Effect of Electrode Atomic Species Dae Mann Kim*, P. Tarakeshwar* and J. J. Palacios **, *School of Computational Sciences, Korea Institute of Advanced Study, 207-43, Cheongyangni-2-dong, Dongdaemun-gu, Seoul 130-722, Korea **Departamento de Fvsica Aplicada, Universidad de Alicante, San Vicente del Raspeig, Alicante 03690, Spain A major thrust of research in nano electronic devices is currently being focused on 1-d field effect transistors such carbon nanotube (CNT) or molecular transistors. A rapid progress therein requires a clear understanding and controlled implementation of optimal Schottky contact between the electrode and CNT or molecules. In traditional devices it was sufficient to model the contact between two bulk systems, constituting the electrode and the semiconductor. Here the difference between two work functions involved played a key role for dictating the barrier potential for injected charge carriers to overcome. In 1-d nano devices, however, the contact is formed by the bulk electrode on the one hand and CNT or molecules on the other having the cross-sectional diameter of a few nm or less. In this case the work function difference alone is does not determine the contact potential. Rather the basic quantum surface chemistry entailed therein fundamentally affects both the barrier potential and the carrier transmission. These fundamental interface issues are addressed to in this talk, in comparison with the traditional Schottky contact. In so doing the extensive results obtained from the first principle computations are utilized.		
PS1.2	gavish	uri	gavish@wisemail.weizmann.ac.il
	Minimization of Quantum Noise in Transistor Amplifiers		
	General quantum restrictions on the noise performance of linear transistor amplifiers are used to construct a practical procedure for approaching experimentally the best-possible noise performance using only the knowledge of directly measurable quantities: the gain, (differential) conductance, and the output noise. Specific examples are discussed.		
PS1.3	sim	heung-sun	hssim@kaist.ac.kr
	Multiparticle Aharonov-Bohm effects		
	We investigate the quantum transport in a generalized N-particle Hanbury Brown–Twiss setup enclosing magnetic flux, and demonstrate that the Nth-order cumulant of current cross correlations exhibits Aharonov-Bohm oscillations, while there is no such oscillation in all the lower-order cumulants. The multiparticle interference results from the orbital Greenberger-Horne-Zeilinger entanglement of N indistinguishable particles. For sufficiently strong Aharonov-Bohm oscillations the generalized Bell inequalities may be violated, proving the N-particle quantum nonlocality.		
PS1.4	vandersypen	lieven	l.m.k.vandersypen@tudelft.nl
	Coherent rotation of a single electron spin in a quantum dot using magnetic resonance		
	The ability to control the quantum state of a single electron spin in a quantum dot is at the heart of recent developments towards a scalable quantum computer. In combination with the recently demonstrated exchange gate between two neighbouring spins, driven coherent single spin rotations would permit universal quantum operations. However, due to its tiny magnetic moment, it has thus far not been possible to rotate the electron spin while keeping it confined in a quantum dot. Here, we demonstrate the experimental realization of single electron spin rotations in a double quantum dot, by using magnetic resonance. First, we apply a continuous-wave oscillating magnetic field, generated on-chip, and observe electron spin resonance (ESR) in spin-dependent transport measurements through the two dots. Next, we coherently control the quantum state of the electron spin by applying short bursts of the oscillating field and observe about eight Rabi oscillations of the spin state during ! a microsecond burst. These results demonstrate the feasibility to operate single electron spins in a quantum dot as quantum bits.		

PS1.5	esteve	daniel	daniel.esteve@cea.fr
	Current to frequency conversion with Bloch oscillations in a superconducting device		
	Relating a nA current to a frequency with metrological accuracy would allow to probe the quantum metrology triangle that links time, voltage and current units. Bloch oscillations at frequency f , in a Josephson junction biased by a dc current I using a high impedance source Z>>h/e^2 , have been proposed for that purpose. We have performed an experiment that demonstrates Bloch oscillations in a quantronium device, and which is simpler to perform. A quantronium consists of a superconducting transistor in parallel with a single Josephson junction. We have applied a periodic triangular voltage signal to the gate capacitor of the transistor island, so that the gate current alternates between two opposite values +-I. When the minimum and maximum gate charges correspond to an integer value of Cooper pairs, and assuming the quantronium stays in its ground state, the circuit impedance is modulated at the Bloch frequency f=I/(2e) in the same way as for a pure dc current . When a smal! l microwave signal is sent into the device, the impedance modulation yields side-bands in the reflected signal which reveal the Bloch oscillations. We show that the amplitude of these Bloch side-bands is well accounted for by theory. We discuss how to perform the experiment with a true dc current, and its possible use for probing mesoscopic current fluctuations.		
PS1.6	holleitner	alexander	holleitner@lmu.de
	Spin Relaxation in n-InGaAs Wires: Transition from two Dimensions to one Dimension		
	For an efficient information processing scheme based upon the electron spin, it is important to explore carrier spin relaxation mechanisms in nanostructures as a function of dimensionality. In two and three dimensions, elementary rotations do not commute, with significant impact on the spin dynamics if the spin precession is induced by spin-orbit coupling. Spin-orbit coupling creates a randomizing momentum-dependent effective magnetic field; the corresponding relaxation process is known as the D'yakonov-Perel' mechanism. In an ideal one-dimensional system, however, all spin rotations are limited to a single axis, and the spin rotation operators commute. In the regime approaching the one-dimensional limit, a progressive slowing and finally a suppression of the D'yakonov-Perel' spin relaxation have been predicted. We report on spin dynamics of electrons in narrow two-dimensional n-InGaAs channels as a function of the wire width [1]. We find that electron-spin relaxation times ! increase with decreasing channel width, in accordance with recent theoretical predictions. Surprisingly, the suppression of the spin relaxation rate can be detected for widths that are an order of magnitude larger than the electron mean free path. We find the spin diffusion length and the wire width to be the relevant length scales for explaining the observed effects. We acknowledge financial support by AFOSR and ONR. [1] A.W. Holleitner, V. Sih, R.C. Myers, A.C. Gossard, and D.D. Awschalom, cond-mat/0602155.		
PS1.7	de pasquale	ferdinando	ferdinando.depasquale@roma1.infn.i
	faithful state transfer through a quantum channel		
	Quantum information and quantum communication require the ability of manipulating and transfer qubits in the space. Quantum state transfer (QST) can be realized by teleportation, using flying qubits or through quantum channels. When the information has to be processed in devices smaller than typical optical wavelengths for flying qubits, quantum channels are preferable [1]. They can be based on solid state devices or on confined radiation fields. The use of local excitations in quantum chains, first suggested by Bose [2], involves all the modes of the support and an optimization of the the interference is required for the state reconstruction. QST among optical cavities, as proposed by Cirac et al. some years ago [3], is possible due to the fact that each atom inside the cavity interacts only with a nearly monochromatic photon of the radiation field, and that photon can be transmitted unchanged to a distant site, before interacting with another atom in a second cavity. We study [4] the possibility of realizing perfect quantum state transfer in mesoscopic devices. We discuss the case of the Fano-Anderson model extended to two impurities. For a channel with an infinite number of degrees of freedom, we obtain coherent behavior in the case of strong coupling or in weak coupling off-resonance. For a finite number of degrees of freedom, coherent behavior is associated to weak coupling and resonance conditions. Finite temperature and disorder effects are discussed. [1] F. de Pasquale, G. Giorgi and S. Paganelli, Phys. Rev. Lett. 93, 120502 (2004). [2] S. Bose, Phys. Rev. Lett. 91, 207901 (2003). [3] J. I. Cirac, P. Zoller, H. J. Kimble, and H. Mabuchi, Phys. Rev. Lett. 78, 3221 (1997). [4] F. de Pasquale, G. Giorgi and S. Paganelli arXiv:quant-ph/0505205 (2005).		
PS1.8	nguyen	ai viet	vieta@iop.vast.ac.vn
	ON THE COUPLED QUANTUM DOT MODELS OF OPTICAL QUANTUM COMPUTERS		
	ON THE COUPLED QUANTUM DOT MODELS OF OPTICAL QUANTUM COMPUTERS T.T.T Van, V.T. Hoa, D.T. Nga, N. V. Thanh, and N.A. Viet Institute of Physics and Electronics, 10 Dao-tan, Ba-dinh, Hanoi, Vietnam ABSTRACT Optical schemes for quantum computations using excitons in coupled quantum dots are proposed recently in the last few years and have already attracted great interest. In this report, we have proposed a simple model using a Morse-type effective potential to describe exciton-exciton interactions, which allows simple way to calculate the Forster constant VF. We obtained an analytical expression the Forster energy transfer between a pair of spherical quantum dots and investigated its exciton effect. Comparison with result of the work of Lovett et al (Phys. Rev.B68, 205319 (2005)) where the Forster constant VF~(d)^(-3) with a singularity at zero inter-dot separation d, our calculated result didn't have singularity at any small value of d, so it could be applied also for investigation and designing models of optical quantum computers in the more practical case of smaller inter-dot separation. Key words: Quantum Information, Quantum Computing, Nano Physics, Nano Devices, Quantum Dots, Exciton Email: vieta@iop.vast.ac.vn		

PS1.9	beckmann	detlef	detlef.beckmann@int.fzk.de
	Experimental Evidence for Crossed Andreev Reflection		
	We report on conductance measurements on multiterminal superconductor nanostructures, where two ferromagnetic or normal-metal leads form tunnel contacts to a single superconductor. The focus is on transport at energies below the superconducting gap, and length scales below the coherence length. We observe a negative non-local resistance which can be interpreted in terms of crossed Andreev reflection, a process where an electron incident from one of the leads gets reflected as a hole into the other, thereby creating a pair of spatially separated, entangled particles.		
PS1.10	ferguson	andrew	andrew.ferguson@unsw.edu.au
	Microsecond resolution of quasiparticle tunnelling events in the thin-film single-Cooper pair-transistor		
	We present measurements of single-Cooper-pair-transistors (SCPTs) embedded in a radio-frequency (rf) tank circuit. Like the Cooper-pair box, the SCPT relies on the coherent tunnelling of Cooper-pairs and also suffers from quasiparticle poisoning [1], whereby the supercurrent is blocked every time a quasiparticle tunnels onto the island. An important innovation for our devices is that an ultra-thin aluminium film (10 nm) is used for the island while a thicker (30 nm) film is used for the leads. This results in a greater superconducting gap for the island than the leads, and reduces the poisoning effect, such that tunnelling of individual quasiparticles can be resolved [2]. Another recent experiment achieves a similar effect by oxygen-doping the aluminium films to achieve a difference in gaps between the island and leads [3]. We note that our ultra-thin films could also be applied to minimise the quasiparticle poisoning problem for superconducting qubits. When the SCPTs are biased on the 2e-periodic supercurrent peaks, fast two-level switching due to individual quasiparticle tunnelling events is observed. Analysing the statistics of the tunnelling events it is possible to determine time constants for the poisoning and un-poisoning events. We study these time constants as a function of temperature finding a decrease in poisoned (odd) state lifetime with increased temperature, consistent with thermal activation from a quasiparticle trap on the island. Additionally, at higher temperatures, the un-poisoned (even) state lifetime is seen to rapidly decrease due to the thermal creation of quasiparticles in the leads. From these measurements we determine the quasiparticle trap depth on the island and the effective quasiparticle temperature of the device leads. [1] R. M. Lutchyn, L. I. Glazman and A. I. Larkin, cond-mat/0603640 [2] A. J. Ferguson, N. A. Court, F. E. Hudson and R. G. Clark, cond-mat/0604403 [3] O. Naaman and J. Aumentado, cond-mat/0602004		
PS1.11	lévy	laurent	levy@grenet.fr
	Tunning dissipation: observation of the transtion from quantum to Zeno regime in a double-island superconducting circuit		
	A superconducting double-island can be viewed as a tunable qubit. When it is imbedded in a voltage biased circuit, the relaxation rate (dissipative transition) from the excited state to the ground state is inversely proportionnal to the voltage bias Vb. This bias can therefore be used to tune the dissipation of the external environment on the qubit. The effect of the Josephson junction coupling the double-island to the external circuit is also to establish coherence with the superconducting leads. When the relaxation rate from excited to ground state is weak compared to this Josephson coupling, quantum coherence does establish itself, and the tunnelling current through the structure is limited by the relaxation rate (inversely proportional to Vb) from excited to ground state, which acts as a bottleneck. At small bias, the relaxation rate can be increased so to exceed the quantum coupling provided by the Josephson junction: because of the strong dissipation quantum coherence with the superconducting leads can no longer establish itself and cooper pairs can no longer enter the double-island. This is the Zeno regime, which manifest itself by a sharp drop of the total tunneling current through the structure. We have observed experimentally this quantum to Zeno crossover and the evidences will be presented. At very low bias voltage, a Josephson component is also observed.		
PS1.12	kawabata	shiro	s.kawabata@tnw.utwente.nl
	Dissipative Quantum Mechanics of the d-wave Josephson Junctions		
	Since the experimental observations of the macroscopic quantum tunneling (MQT) in YBCO grain buondary [1] and the Bi2212 intrinsic Josephson junctions [2,3], a renewed interest has been aroused on the physics and the quantum-application of the d-wave superconductors. In this talk, I will discuss the dissipation effect due to the nodal quasiparticles[4] and the zero energy bound states (ZES)[5] on the MQT. In the c-axis junctions, it is believed that the nodal quasiparticle becomes a serious intrinsic source of dissipation. However, I have theoretically showed that the nodal-quasiparticle tunneling gives rise to a weak super-Ohmic dissipation and the suppression of the MQT due to the nodal-quasiparticle is very weak [4]. In fact, recently, Inomata et al.[2] and Jin et al. [3] have observed the MQT in the Bi2212 intrinsic junctions. They have reported that the effect of the nodal-quasiparticle on the MQT is negligibly small and the thermal-to quantum crossover temperature is relatively high ~1K in compared with the case of s-wave junctions. In the case of the in-plane junctions (the YBCO grain boundary junctions), the zero energy bound states (ZES) are formed near the interface between superconductor and the insulating barrier. The ZES are generated by the combined effect of multiple Andreev reflections and the sign change of the d-wave order parameter symmetry, and are bound states for the quasiparticle at the Fermi energy. We have showed that the ZES give rise to the Ohmic type dissipation so the MQT is strongly suppressed in compared with the c-axis junction cases [5]. I will also disscuss the MQT and the dissipation in the d-wave/s-wave junctions[6]. [1] T. Bauch et al., Phys. Rev. Lett. 94, 087003(2005), Science 311, 57 (2006). [2] K. Inomata, et al., Phys. Rev. Lett. 95, 107005(2005) [3] X. Y. Jin et al., Phys. Rev. Lett. 96, 177003 (2006) [4] S. Kawabata et al.,Phys. Rev. B 70, 132505 (2004). [5] S. Kawabata et al., Phys. Rev. B 72, 052506 (2005). [6] S. Kawabata, A .A. Golubov, H. Hilgenkamp, J. Kirtley, in preparation.		

PS1.13	harrabi	khalil	khalil.harrabi@frl.cl.nec.co.jp
	Discrimination between different sources of decoherence in flux qubit		
	K. Harrabi,1 F. Yoshihara,2 A. O. Niskanen,1, 3 Y. Nakamura,1, 2, 4 and J. S. Tsai1, 2, 4 1CREST-JST, Kawaguchi, Saitama 332-0012, Japan 2The Institute of Physical and Chemical Research (RIKEN), Wako, Saitama 351-0198, Japan 3VTT Technical Research Centre of Finland, Sensors, P.O. Box 1000, 02044 VTT, Finland 4NEC Fundamental and Environmental Research Laboratories, Tsukuba, Ibaraki 305-8501, Japan We have measured and studied the relaxation and the dephasing time in a flux qubit. The qubit consists of a superconducting loop interrupted by four Josephson junctions (three are identical and one is smaller). By varying two external parameters (the applied flux by an external coil, and the bias current of the SQUID serving as a readout device of the qubit state), we managed to deduce the contributions of the fluctuations in these parameters to the decoherence. When the qubit is biased at the optimal condition, the dephasing time measured with spin-echo technique had an exponential decay and was almost twice longer than the relaxation time (pure dephasing is negligible). However, if the biasing point is moved away from the degeneracy point (optimal value for the bias flux) while keeping the bias current at the optimum value, one can deduce the contribution of the flux noise which couples strongly to the qubit. The spin-echo decay followed a clear Gaussian function. The deph! asing rate extracted from both spin echo and free induction was perfectly fitted with a cos (ƒ¦) function (cos(ƒ¦)=ƒΓ/(ƒΆ2+ƒΓ2)1/2, where ƒΓ is the energy bias between the two states and ƒΆ is their energy splitting), which is a strong indication of the 1/f flux noise threading the qubit loop. The flux noise we measured had a typical value of the order of 10-6 ƒ³0/Hz1/2 at 1 Hz. For the second case when the flux bias is kept at the degeneracy point in order to minimize the flux contribution, and the current bias is shifted, the amount of noise introduced by the bias current was determined.		
PS1.14	lévy	laurent	levy@grenet.fr
	Coupled charge-phase qubits: a superconducting single electron transistor coupled to a SQUID		
	When placing an SET in parallel with a SQUID, a current loop is formed between the two elements and couples them. This coupling may be tuned by adjusting the flux through this loop. This circuit is therefore a good candidate for a two-qubits gate with adjustable coupling. The single electron transistor can be tuned using the gate voltage while the SQUID can be adjusted using alternatively bias current or flux. There is a charge and flux \"magic point\" in this circuit, where sensitivity to charge and flux noise is minimal. When the transistor junctions are symmetric, the coupling between the two qubits vanishes at this point. Intricating the two qubits states requires either to work with a dissymmetric transistor or to move away from the magic point. The energy levels of this two-qubit circuit have been mapped by rf spectroscopy, revealing the avoided level crossings and the special working points.		
PS1.15	hakonen	pertti	pjh@boojum.hut.fi
	Landau-Zener interferometry in a charge qubit		
	Landau-Zener (LZ) tunneling is a renowned quantum-mechanical phenomenon, taking place at the intersection of two energy levels that repel each other due to a weak interaction. The LZ theory, developed in the early 1930's in the context of slow atomic collisions and spin dynamics in time-dependent fields, demonstrated that transitions are possible between two approaching levels as a control parameter is swept across the point of minimum energy separation. The phase accumulated between the incoming and outgoing traversals varies with, e.g., the collision energy giving rise to Stueckelberg oscillations in the populations. Typically, the phase is large and rapidly varies with energy, which allows one to average over these fast oscillations, neglecting the interference. In quantum coherent systems, like superconducting qubits, this interference becomes essential and it has to be taken into account. We used a Cooper pair box (CPB) to obtain the first clear evidence of quantum interference associated with Landau-Zener tunneling in non-atomic systems. In our device, a beam is split at the charge degeneracy point into two partial waves, which interfere during subsequent passes through the degeneracy point, either destructively or constructively depending on the geometrical phase acquired by the waves between the passes. A continuous QND-type measurement of Josephson (quantum) capacitance, which provides minimal backaction to the qubit, allowed monitoring of the average level occupancies of the CPB and thereby the observation of the LZ interference. Simulations of spin dynamics in time-dependent magnetic field using Bloch equations with phenomenological relaxation parameters were employed for quantitative comparison with our measured data and good agreement was found.		

PS1.16	semba	kouichi	semba@will.brl.ntt.co.jp
	Vacuum Rabi oscillations observed in a flux qubit LC-oscillator system		
	K. Semba(1,2,*), J. Johansson(1,2), S. Saito(1,2), T. Meno(1,3), H. Tanaka(1,2), H. Nakano(1,2), M. Ueda(1,2,4), and H. Takayanagi(1,2) 1 NTT Basic Research Laboratories, NTT Corporation, Atsugi, Kanagawa 243-0198, Japan 2 CREST, Japan Sience and Technology Agency, Kawaguchi, 331-0012, Japan 3 NTT Advanced Technology Corp., NTT Corporation, Atsugi, Kanagawa 243-0198, Japan 4 Department of Physics, Tokyo Institute of Technology, Tokyo 152-8551, Japan * E-mail:semba@nttbrl.jp Superconducting circuit containing Josephson junctions is one of the promising candidates as a quantum bit (qubit) which is an essential ingredient for quantum computation [1]. A three-junction flux qubit [2] is one of such candidates. On the basis of fundamental qubit operations [3,4], the cavity QED like experiments are possible on a superconductor chip by replacing an atom with a flux qubit, and a high-Q cavity with a superconducting LC-circuit. By measuring qubit state just after the resonant interaction with the LC harmonic oscillator, we have succeeded in time domain experiment of vacuum Rabi oscillations, exchange of a single energy quantum, in a superconducting flux qubit LC harmonic oscillator coupled system [5]. The observed vacuum Rabi frequency 140 MHz is roughly 3x103 (1x107) times larger than that of Rydberg (ordinary) atom coupled to a single photon in a high-Q cavity [6]. This is the direct evidence that strong coupling condition can be rather easily establi! shed in the case of macroscopic superconducting quantum circuit, because of the huge number of condensed Cooper pairs in a super-current. We have also obtained evidence of level quantization of the superconducting LC circuit by observing the change in the quantum oscillation frequency when the LC circuit was not initially in the vacuum state. We are also considering this quantum LC oscillator as a quantum information bus by sharing it with many flux qubits, then spatially separated qubits can be controlled by a set of microwave pulses just like the method used in the quantum optics. [1] F. Wilhelm and K. Semba, in �gPhysical Realizations of Quantum Computing: Are the Divincenzo Criteria Fulfilled in 2004?�h, (World Scientific Publishing Company; April, 2006) [2] J. E. Mooij et al., Science 285, 1036 (1999). [3] T. Kutsuzawa et al., Appl. Phys. Lett. 87, 073501 (2005). [4] S. Saito et al., Phys. Rev. Lett. 96, 107001 (2006). [5] J. Johansson et al., Phys. Rev. Lett. 93, 127006 (2006). [6] J. M. Raimond, M. Brune, and S. Haroche, Rev. Mod. Phys. 73, 565 (2001).		
PS1.17	chen	chia-chu	chiachu@phys.ncku.eduy.tw
	Ground State Instabilites in Mono-mode Cavity.		
	It is shown that, by including the A^2 term in the hamiltonian, Quantum Phase Transition occurs in the large N limit where N is the number of atoms. Furthermore, for N=2, it can be shown that Ground State Instability always appears and its relation with entanglement is discussed.		
PS1.18	makhlin	yuriy	makhlin@itp.ac.ru
	Berry phase and decoherence		
	Recent progress in experiments with quantum-coherent nanocircuits allows more detailed analysis of decoherence phenomena. We analyze the Berry phase acquired by a quantum system and study the influence of a weakly coupled environment. Although for the coupled system and environment the spectrum may be gapless, the notions of adiabaticity and the Berry phase are still meaningful. However, the value of the Berry phase is modified by the environment, and the modification is geometric in its nature. For a quantum two-level system (`spin-half\'), we find its explicit form. Besides, we find geometric contributions to dephasing and relaxation. We derive and interprete these results using both quantum and classical description of the spin dynamics. We further analyze extensions to general multi-level systems. For higher spins, the evolution is more complex as additional Liouville degeneracies couple the dynamics of different off-diagonal entries of the density matrix, requiring furt! her analysis.		

PS1.19	schmidt	georg	gschmidt@physik.uni-wuerzburg.de
	Spin injection and spin transport in semiconductor nanostructures		
	Spin injection into semiconductors has been a topic of great interest during the past years. After its realization in 1999, various concepts have been tried more or less successfully in order to achieve high spin injection efficiencies at room temperature. One of the results of this research effort is a large progress in the fabrication of ferromagnetic semiconductors and a profound understanding of the properties of this special class of materials. However, besides their usefulness for spin injection experiments, the intrinsic properties of ferromagnetic semiconductors present also new possibilities for interesting transport studies. The large spin polarization of the carriers combined with the band structure of a semiconductor and a large spin orbit coupling result in transport properties which are highly anisotropic and much different from what is known from ferromagnetic metals. E.g. nanoconstrictions in thin (Ga,Mn)As layers can be used to trap domain walls and to investigate the resistance of the walls in a well controlled manner [1]. When these constrictions are made small enough, they can be completely depleted of carriers, yielding a lateral tunnel barrier. In this case the magnetoresistance of the nanoconstriction can be as high as 2000%. In a vertical geometry, when a single (Ga,Mn)As layer is combined with a tunnel barrier, momentum conservation can lead to a novel spin-valve like effect which is purely dependent on the anisotropy of the density of states which changes with a change of magnetization. This effect is of the order of a few % [2]. However, if this effect is used in a device with two magnetic layers and a crystalline tunnel barrier the magnetioresistance is strongly increased. A lower limit of the magnetoresistance of 150,000% has been measured [3], however the real effect is probably much larger. In the presentation various experiments and theoretical approaches will be presented. [1] C. R�ster, T. Borzenko, C. Gould, G. Schmidt, L.W. Molenkamp, X. Liu, T.J. Wojtowicz, J.K. Furdyna, Z.G. Yu, M.E. Flatt� Very large magnetoresistance in lateral ferromagnetic (Ga,Mn)As wires with nanoconstrictions Phys. Rev. Lett. 91 (21), 216602 (2003) [2] C. Gould, C. R�ster, T. Jungwirth, E. Girgis, G.M. Schott, R. Giraud, K. Brunner, G. Schmidt and L.W. Molenkamp Tunneling Anisotropic Magnetoresistance: A spin-valve like tunnel magnetoresistance using a single magnetic layer Phys. Rev. Lett. 93, 117203 (2004) [3] C. R�ster, C. Gould, T. Jungwirth, J. Sinova, G. M. Schott, R. Giraud, K. Brunner, G. Schmidt, and L.W. Molenkamp Very Large Tunneling Anisotropic Magnetoresistance in a (Ga,Mn)As stack Phys. Rev. Lett 94, 027203 (2005)		
PS1.20	sukhorukov	eugene	eugene.sukhorukov@physics.unige.ch
	Continuous quantum measurement from counting statistics point of view.		
	In my talk I will discuss the idea of continuous quantum measurement and its relation to full counting statistics. This novel formulation of the measurement process allows one to go beyond the linear response theory of the quantum detection. As a primary mesoscopic example of a quantum detector I will consider the quantum point contact (QPC) of arbitrary electron transparency and coupling strength to the measured system, and will reformulate conditions for the quantum-limited operation which prevent information loss through the scattering time and scattering phases. I will show that the phase information can be restored and used for the quantum-limited detection by inclusion of the QPC detector in the electronic Mach-Zehnder interferometer.		
PS1.21	cleland	andrew	anc@physics.ucsb.edu
	Achieving the quantum limit with a mechanical resonator		
	We are engaged in a project to investigate mechanical resonators in the single-phonon quantum regime. The key to achieving quantum control of a mechanical system is to use an extremely strong nonlinearity in either the resonator or in its measurement system, as with completely linear or weakly nonlinear systems the correspondence limit becomes difficult to avoid. We have chosen to develop a system based on a strongly nonlinear measurement system, using a linear mechanical resonator. We are coupling the highly nonlinear inductance of a Josephson phase qubit with a microwave frequency mechanical resonator, which we hope will enable us to demonstrate the coherent creation and manipulation of single phonons in the resonating element. The mechanical system is a novel type of high quality factor, GHz frequency piezoelectric resonator, which can have unprecedented quality factor in this frequency band. The quantum mechanical properties of the resonators, especially in the single-ph! onon regime, will be probed by the Josephson qubit, and we plan to measure the single phonon T1 decay and T2 coherence times. I will describe our progress to date in developing this unique system.		
PS1.22	tsai	jaw-shen	tsai@frl.cl.nec.co.jp
	Josephson Qubits with Controllable Couplings		
	Realization of practical quantum algorithms requires integration of a large number of quantum bits. By coupling Josephson charge qubits, we have so far demonstrated a conditional gate operation (controlled-NOT) [1]. In this CNOT gate, the coupling was achieved by a fixed electrostatic coupling, and the coupling strength could not be altered in this operation scheme. However, in order to achieve unconditional gate operations, a controllable coupling between qubits is desired. We have carried out several different schemes of controllable coupling experiments. Inductively coupled charge qubit [2] was fabricated and preliminary results showed features of controllable coupling. We have also integrated GaAs two-dimensional electron gas (2DEG) and aluminum qubits. Two charge qubits were fabricated on top of the mesa etched in 2DEG connected to the ground via a transistor. Clear dependence of coupling on depletion gate voltage of the transistor was observed in stability diagram. On! /off ratio about 10 of the coupling capacitance was obtained. We have also proposed a practical design for tunable coupling a pair of flux qubits via the quantum inductance of a third high-frequency qubit [3]. The design is particularly well suited for realizing microwave induced parametric coupling scheme. In this talk, the results of our analysis on dominating decoherence sources in charge qubits as well as flux qubits will also be presented		

PS1.23	beltram	fabio	beltram@sns.it
	Surface acoustic waves for single-electron manipulation and single-photon generation		
	Surface acoustic waves (SAWs) are attracting much interest in semiconductor community in view of the exploitation of their interaction properties with two-dimensional-electron-gases (2DEGs) embedded in piezoelectric semiconductor heterostructures. SAWs propagating through mesas containing high-quality 2DEGs indeed drive modifications on the 2DEG equilibrium state and acoustic waves propagating along piezoelectric substrates are accompanied by potential waves which can trap electrons in their minima and induce dc currents or voltages (acoustoelectric effect). We have integrated SAW-drive transport with an original planar p-n junction scheme within a modulation-doped single quantum well. I shall show the realization of high-performance SAW-driven planar LED and present their extension to the single-photon emission regime. Such devices have a great potential for the realization of GHz repetition rate single-photon sources suitable for free-space or guided communications. This same single-particle manipulation will be discussed in the context of solid-state qubit implementation. Recent theoretical proposal have highlighted the interest of such an approach within spin- or position-based encoding in variable coupling one-dimensional channels. Experimental results relative to a GaAs/AlGasAs implementation will presented. References: M. Cecchini et al. Appl. Phys. Lett. 82, 636 (2003), ibid. 85, 3020 (2004), ibid. 241107 (2005), 88, 212101 (2006) P. Pingue et al. Appl. Phys. Lett. 86, 052102 (2005).		
PS1.24	takayanagi	hideaki	h-taka@rs.kagu.tus.ac.jp
	Readout of Flux Qubits		
	In this talk, we report the observation of the readout of a superconducting flux qubit comprising three Josephson junction in a superconducting loop. We first talk about the observation of multiphoton transition between superposition states of macroscopically distinct states. The observed distinct resonant peaks and dips are attributed to situations, in which the effective energy separation between the ground and the first excited states matches an integer multiple of the RF photon energy. Based on this technique we have achieved multi-photon Rabi ocsillations up to four photons. The Rabi frequency as a function of microwave strength clearly showed Bessel-function dependnences Jn (n=1,2,3,4). We also have succeeded in parametric operations. By using two-frequency microwave pulses, we have observed Rabi oscillations stemming from parametric transitions between the ground state and first excited states when the sum or the difference of the two microwave frequencies matches the Larmor frequency of the qubit. Resonant microwave pulse methods induce coherent quantum oscillations between these macroscopic quantum states, e.g., Rabi oscillations or Ramsey fringes. We have observed Larmor precession (11.4 GHz) of a flux qubit with the phase shifted double pulse method. This new method provides an arbitrary unitary transformation of a single qubit with a rapid control (~10 GHz) of the flux qubit. Compared with the previous method (detuning one), the new method can save time for each quantum-gate operation and results in a 10-100 times faster gate operation than the previous one. The operation of a single qubit is almost accomplished for many types of solid state qubit. The next target is of course to achieve entangled state using coupled two qubits. It is very promising to analogically apply the so-called cavity QED to a superconducting device coupled with a microwave cavity. It is because we can use many sophisticated methods established in atom physics. We have achieved the coupling between the flux qubit and a LC-resonator (microwave cavity) and observed red and blue sideband resonance. We demonstrated Rabi oscillations at the red and blue sidebands. Moreover we have confirmed vacuum Rabi oscillations in time domain. These clearly indicate that entangle states are generated between two macroscopic quantum systems		

Rencontres du Vietnam 2006
Nanophysics: from fundamentals to applications
List of Abstracts

PS2: Quantum Detection and Noise

<table>
<tr><td>PS2.1</td><td>nguyen</td><td>thi kim tha</td><td>nkthanh@iop.vast.ac.vn</td></tr>
<tr><td></td><td colspan="3">Photo-assisted Andreev reflection as a probe of quantum noise</td></tr>
<tr><td></td><td colspan="3">Andreev reflection, which corresponds to the tunneling of two electrons from a metallic lead to a superconductor lead as a Cooper pair (or vice versa), can be exploited to measure high frequency noise. A detector is proposed, which consists of a normal lead--quantum dot-superconductor circuit, which is capacitively coupled to a mesoscopic circuit where noise is to be measured. A substantial DC current can flow in the detector circuit only if an appropriate photon is provided or absorbed by the mesoscopic circuit, which plays the role of an environment for the dot-superconductor junction.</td></tr>
<tr><td>PS2.2</td><td>rosch</td><td>achim</td><td>rosch@thp.uni-koeln.de</td></tr>
<tr><td></td><td colspan="3">alternatively: PS3 as we mainly discuss diffusive wires? Universal dephasing rate due to diluted Kondo impurities</td></tr>
<tr><td></td><td colspan="3">We calculate the dephasing rate due to magnetic impurities in a weakly disordered metal as measured in a weak localization experiment. If the density n_S of magnetic impurities is sufficiently low, the dephasing rate 1/tau_phi is a universal function, 1/tau_phi = (n_S/nu) f(T/T_K), where T_K is the Kondo temperature and nu the density of states. We show that the dephasing rate can be calculated from the inelastic cross section proportional to pi nu Im T- |pi nu T|^2, where T is the T-matrix which is evaluated numerically exactly using the numerical renormalization group. We also investigate how Kondo impurities affect Aharonov-Bohm oscillations in mesoscopic rings.</td></tr>
<tr><td>PS2.3</td><td>trauzettel</td><td>bjorn</td><td>trauzettel@lorentz.leidenuniv.nl</td></tr>
<tr><td></td><td colspan="3">Quantum-limited shot noise in graphene</td></tr>
<tr><td></td><td colspan="3">Two recent experiments [1,2] have discovered that the conductivity of graphene (a single atomic layer of carbon) tends to a minimum value of the order of the quantum unit e^2/h when the concentration of charge carriers tends to zero. This quantum-limited conductivity is an intrinsic property of two-dimensional Dirac fermions (massless excitations governed by a relativistic wave equation), which persists in an ideal crystal without any impurities. In the absence of impurity scattering, and at zero temperature, one might expect the electrical current to be noiseless. In contrast, we show that the minimum in the conductivity is associated with a maximum in the Fano factor (the ratio of noise power and mean current). [3] The Fano factor at zero carrier concentration takes on the universal value 1/3 for a wide and short graphene strip. This is three times smaller than the Poissonian noise in a tunnel junction and identical to the value in a disordered metal -- even though the classical dynamics in the graphene strip is ballistic. [1] K. S. Novoselov et al., Nature 438, 197 (2005). [2] Y. Zhang et al., Nature 438, 201 (2005). [3] J. Tworzydlo, B. Trauzettel, M. Titov, A. Rycerz, and C.W.J. Beenakker, cond-mat/0603315.</td></tr>
<tr><td>PS2.4</td><td>fujisawa</td><td>toshimasa</td><td>fujisawa@will.brl.ntt.co.jp</td></tr>
<tr><td></td><td colspan="3">Counting statistics of single electron transport through a double quantum dot</td></tr>
<tr><td></td><td colspan="3">Counting statistics of electron transport provides various information about interactions and correlations in mesoscopic systems. Here, we discuss counting statistics of single-electron tunneling in a double quantum dot (DQD). Individual electron tunneling events are recorded with a quantum point contact (PC) acting as a charge sensor. Forward and reverse tunneling events are detected in a real time scale, which allows us to perform statistical analysis on the transport through a DQD. Analyses in frequency and time domains as well as higher-order moments of noise reveal anti-bunching effect and sub-poissonian statistics of single electron transport. Moreover, the device works as a sensitive atto-ampare current meter by counting tunneling events.</td></tr>
</table>

PS2.5	ensslin	klaus	ensslin@phys.ethz.ch
	Shot noise in quantum dots		
	Current fluctuations in a semiconductor quantum dot are measured by using a quantum point contact as a charge detector, and counting electrons traveling through the quantum dot one by one. In addition to the shot noise, this method gives access to the full distribution of current fluctuations, known as full counting statistics. We demonstrate experimentally the suppression of the second moment (variance, related to the shot noise) and the third moment (skewness) in a tunable semiconductor quantum dot. The measruements are extended to the high-bias regime where more than one additional electron electron can occupy the dot at a given time. More complex counting signals are analyzed in view of several almost degenerate levels participating in the transport process. This work was done in collaboration with S. Gustavsson, R. Leturcq, B. Simovic, and T. Ihn.		
PS2.6	jacquod	philippe	pjacquod@physics.arizona.edu
	Shot-Noise in Semiclassical Chaotic Cavities		
	In the past two years, the trajectory-based semiclassical theory of transport has reached its level of maturity. Starting from the semiclassical approximation to Green\'s functions in term of a sum over classical scattering orbits, several works have successfully calculated quantum corrections to transport such as weak localization, coherent backscattering, and conductance fluctuations. So far, the emphasis has been put on (i) the universal regime, where random matrix theory results are expected to hold, and (ii) the deep semiclassical regime where one expects short-time classical corrections. I will discuss both these points, and illustrate them with a calculation of the zero-frequency shot-noise power through a ballistic chaotic cavity.		
PS2.7	crépieux	adeline	crepieux@cpt.univ-mrs.fr
	Photo-assisted current and shot noise in the fractional quantum Hall regime		
	The effect of an AC perturbation on the shot noise of a fractional quantum Hall fluid is studied both in the weak and the strong backscattering regimes. It is known that the zero-frequency current is linear in the bias voltage, while the noise derivative exhibits steps as a function of bias. In contrast, at Laughlin fractions, the backscattering current and the backscattering noise both exhibit evenly spaced singularities, which are reminiscent of the tunneling density of states singularities for quasiparticles. The spacing is determined by the quasiparticle charge e* and the ratio of the DC bias with respect to the drive frequency [1,2]. Photo-assisted transport can thus be considered as a probe for effective charges at such filling factors, and could be used in the study of more complicated fractions of the Hall effect. [1] A. Crıpieux, P. Devillard, and T. Martin, Phys. Rev. B 69, 205302 (2004). [2] A. Crıpieux, P. Devillard, and T. Martin, AIP Conference Proceedings 780, 488 (2005).		
PS2.8	bois	philippe	philippe.bois@thalesgroup.com
	Quantum Well Infrared Photodetectors: From Laboratory Objects to Products		
	Infrared detectors are a key point for a wide range of both military and commercial imaging applications (night and all-weather vision, air traffic control, security, medical,…). The related market is obviously highly competitive and, as a result, a detailed analysis of the cost to performance ratio is crucial for the optimization of equipment. The size of the focal planes is constrained by the evolution of the technology. Thermal imagers were first implemented using single detectors, then linear arrays were used and the new camera generation (third generation), is based on two dimensional arrays. This new generation of IR cameras is designed in a completely different way for example by avoiding the need for a mechanical scanner to form the image therefore optimizing the use of the photon flux incident on the camera. In addition, the ability to suppress mechanical parts simplifies the system, and reduces volume, weight and then cost. The price to pay is the need of a robust technology, allowing the fabrication of large staring arrays with a good yield for cost issues. The main advantage of this GaAs detector technology is that it is also used for other commercial devices. The duality of this QWIP technology has lead to important improvements over the last ten years and it reaches now an undeniable level of maturity. As a result, the processing of large substrates and a good characteristic uniformity, which are the key parameters for reaching high production yield, are already achieved. Concerning the defective pixels, the main common features are a high operability (above 99.9%) and a low number of clusters including 5 dead pixels at maximum. After ten years in Research, GaAs/AlGaAs Quantum Wells for infrared detection (QWIPs) exit the laboratories for production. Since 1995, the basic physics of the detection mechanisms in QWIPs is understood enough to establish modeling and optimization tools. In 1995, electro-optical performances were promising but operating temperature was still too cold to promote the development of that emergent technology. We focussed our R&D efforts to optimize our detectors as system cores, by taking into account the equipment manufacturer and end-user constraints, and achieved operating temperatures near 77K, allowing the reduction of both volume and power consumption and a improved reliability of the detection modules. We will illustrate the potential of our approach for QWIPs through features of Thales products for 3rd Gen. Thermal Imagers. Another advantage of this III-V technology is the versatility of the design and processing phases. This \"band-gap engineering\" allows customizing both the quantum structure and the pixel architecture in order to fulfill the requirements of any specific applications such as multispectral detection. The spectral response of QWIPs is intrinsically resonant but the quantum structure can be designed for a given detection wavelength window ranging from MWIR, LWIR to VLWIR.		

PS2.9	heiblum	moty	heiblum@wisemail.weizmann.ac.il
	Entanglement, Dephasing, and Phase Recovery via Cross-Correlation Measurements of Electrons		
	Interference of quantum particles is possible when their path cannot be determined - even in principle. Determination of particles' paths leads to suppression of the interference; causing classical behavior. We employ here a quantum 'which path' detector to perform accurate path determination in a two-path-electron-interferometer, leading to full suppression of the interference. After such dephasing process, we recover the original interference from the cross-correlation term of the interferometer and detector currents, by measuring the shot noise of the combined system. Under our measurement conditions approximately a single electron in the interferometer is accompanied by one in the detector - leading to the mutual entanglement of approximately pairs of electrons.		
PS2.10	dicarlo	leonardo	dicarlo@physics.harvard.edu
	Gate-tunable shot noise correlations in a double quantum dot with capacitive coupling		
	Collaborators: D. T. McClure, Y. Zhang, \\underline{L. DiCarlo}, H.-A. Engel, C. M. Marcus Department of Physics, Harvard University M. P. Hanson and A. C. Gossard Department of Materials, University of California, Santa Barbara Abstract: We present measurements of current noise auto- and cross- correlation in two capacitively coupled quantum dots in the Coulomb blockade regime. At finite bias, the cross-correlation is nonzero near a honeycomb vertex, with its sign tunable by plunger gate voltages. Noise in one dot can be made strongly super-Poissonian by tuning the rate of charge fluctuations in the other dot. Good agreement is found with a model of sequential tunneling through single-level dots with inter- dot capacitive coupling. We acknowledge support from NSF-NSEC, NSA/DTO and Harvard University.		
PS2.11	park	hee chul	hc272@cnu.ac.kr
	Stepwise noise power from periodically driven double quantum dots		
	We study noise properties at a periodically driven double quantum dot coupled to single metallic lead within the Floquet scattering matrix approach. The current noise is essentially due to two-particle exchange correlation which exists even in non-interacting electrons. Essential time scales characterizing the noise in driven nanostructures are the dwell time and the photon absorption/emission time. These time scales are significantly influenced by multi-particle exchange correlation. At low frequencies and temperatures, the non-equilibrium noise dominates the equilibrium Nyquist-Johnson noise. The non-equilibrium photo-assisted noise power shows stepwise behavior as the Fermi level increases, while the equilibrium noise shows peak structure where the plateau transition arises.		
PS2.12	nghiem	diu	ntdiu@iop.vast.ac.vn
	Exact solution of qubit decoherence models by a transfer matrix method		
	A new method for the solution of the behavior of an enesemble of qubits in a random time-dependent external field was found. In this method the forward evolution in time is governed by a transfer matrix whose eigenvalues determine the various decoherence times. The method provides an exact solution in cases where the noise is piecewise constant in time. It can apply to a realistic model of decoherence of electron spins in semiconductors as well. Results are obtained for the non-perturbative regimes of the models, and we see a transition from weak relaxation to overdamped behavior as a function of noise anisotropy.		
PS2.13	nakano	hayato	nakano@will.brl.ntt.co.jp
	Some theoretical aspects in Superconducting Flux-qubit systems		
	Some theoretical aspects in Superconducting Flux-qubit systems H. Nakano(1,2), H. Tanaka(1,2), K. Semba(1,2), M. Ueda(2,3), S. Saito(1,2), K. Kakuyanagi(1,2), and H. Takayanagi(2,4) 1 NTT Basic Research Laboratories, NTT Corporation, Atsugi-shi, Kanagawa 243-0198, Japan 2 CREST, Japan Science and Technology Agency, Kawaguchi-shi, Saitama 331-0012, Japan 3 Tokyo Institute of Technology, Meguro-ku, Tokyo 152-8551, Japan 4 Tokyo University of Science, Shinjuku-ku, Tokyo 162-8601, Japan Many experiments on superconducting qubits have been carried out successfully in this half decade. In particular, much attention is being paid for the interaction of the qubits with external superconducting circuits, such as, a SQUID as a probe, an LC resonator, and a Transmission line[1-4]. These external circuit themselves work as quantum systems. Therefore, we can observe various quantum natures of the interacting systems directly in the qubit-external circuit coupled systems. Principles in such phenomena are so simple that one can understand without detailed knowledge of individual systems. However, in order to deliberate the phenomena, for example, considering the measurement back action caused by the SQUID detection, a little theoretical background for such systems is required. We introduce some theoretical background of flux-qubit systems, which are not so often talked, and discuss some interesting consequences [5-7], such as, criterion distinguishing the back-action of the qubit measurement, effect on the measurement result of the nonlinearity in the qubit-SQUID coupling. [1] I. Chiorescu et al., Nature 431, 159 (2004). [2] A. Lupascu et al., Phys. Rev. Lett. 93, 177006 (2004) [3] A. Wallraff et al., Nature 431, 162 (2004). [4] J. Johansson et al., Phys. Rev. Lett. 96, 127006 (2006). [5] H. Nakano et al., cond-mat/0406622. [6] H. Takayanagi et al. p. 155 in �gQuantum Information and Decoherence in Nanosystems�h (Proc. of XXXIX th Rencontres de Moriond , 2004). [7] H. Nakano et al., presented at Int. symposiums, QIP (Herrsching, Germany, 2004) and MS+S2006 (Atsugi, Japan, 2006).		

PS2.15	hettler	matthias	hettler@int.fzk.de
	Co-tunneling effects in transport through a quantum dot		
	For a single level quantum dot coupled to ferromagnetic electrodes transport is sensitively dependent on the magnetic orientation and degree of polarization of the electrodes. If in addition a magnetic field leads to Zeemann split states on the quantum dot, the additional energy scale of inelastic co-tunneling processes comes into play. Co-tunneling processes strongly influence the transport not only in the Coulomb-blockade regime, but also around the resonances and above the sequential tunneling threshold, even at quite small dot-electrode coupling. In particular, the shot noise displays rich behaviour that can only be understood by dealing with sequential and co-tunneling processes on equal footing. We present a diagrammatic approach to this problem that is valid for for arbitrary Coulomb interaction and accounts for non-Markovian memory effects relevant to the shot noise[1]. We observe spin-accumulation and spin-inversion on the quantum dot and predict strongly non-monotonic behaviour of the shot noise with peaks and peak-dip features as well as various regimes where the noise is anomalously enhanced (super-Poissonian noise). [1] A. Thielmann, M. H. Hettler, J. Koenig, and G. Schoen, Phys. Rev. Lett. 95, 146806 (2005).		
PS2.17	utsumi	yasuhiro	utsumi@riken.jp
	Full Counting Statistics for a Single-Electron Transistor, Non-equilibrium Effects at Intermediate Conductance		
	Measurements of the average current and its fluctuation (noise) have been powerful tools to study the quantum transport in mesoscopic systems. Recently it became possible to measure the higher moment of the current fluctuations and the current distribution, the `full counting statistics\' (FCS) [1]. The FCS is attractive, since it would promote our understanding on nonequilibrium strongly-correlated systems. A basic example is a single-electron transistor (SET), a small metallic island couples with source and drain electrodes through tunnel junctions. Using the Schwinger-Keldysh approach, we evaluate the distribution of current through the SET in the regime where the tunnel conductance is large and thus quantum fluctuations of charge are promoted [2]. We show that in the Coulomb blockade regime, the current fluctuation follow the Poisson distribution governed by the cotunneling rate. In the regime where electrons tunnels one by one, the strong quantum fluctuations out of equ! ilibrium cause the lifetime broadening of the charge state as well as the renormalization of the tunnel conductance and the charging energy. We found that the lifetime broadening alters the current statistics qualitatively: It suppresses the large current fluctuations. [1] B. Reulet, et al., PRL. 91, 196601 (2003); Yu. Bomze et al., PRL. 95, 176601 (2005); S. Gustavsson et al., PRL. 96, 076605 (2006); T. Fujisawa, et al., Science 312, 1634 (2006) [2] Y. Utsumi, D. Golubev, G. Schoen; PRL. 96, 086803 (2006)		
PS2.18	placais	bernard	placais@lpa.ens.fr
	Single charge dynamics in a quantum coherent RC circuit		
	We have studied the charge dynamics on a nanosecond timescale of a fully quantum coherent RC circuit. We have demonstrated that the charge relaxation of a single mode conductor is half the resistance quantum, regardless of the mode transmission* and we have measured the dynamics of time-controlled single electron injection in the same circuit. The capacitor consists in a metallic gate on top of a dot in a 2D electron gas whose micron size is shorter than the coherence length. This quantum dot is connected to a reservoir by a Quantum Point Contact (QPC) whose transmission can be varied with gates. We measured the AC current response of this circuit to a voltage excitation at GHz frequencies. First I will focus on the linear regime, where the mean charge variation of the capacitance is much smaller than the electron charge. In this regime, we have performed phase resolved admittance measurements which allow to determine the capacitance and the charge relaxation resistance. As it was theoretically predicted more than ten years ago**, we have found that the charge relaxation resistance differs from the usual transport resistance given by the Landauer formula. In particular, the resistance of a single mode conductor is half the resistance quantum, regardless of the mode transmission. Then, I will shortly describe the non-linear regime. We have studied The AC current response to a square excitation with voltages on the order of the quantum dot charging energy. We observe current quantization corresponding to the injection of one electron per period of the excitation signal. The phase of the measured current yields the escape time of the electron as a function of the QPC transmission. * J. Gabelli et al., ScienceExpress RE1126940/BPO/PHYSICS, 13/07/06 ** M. Bóttiker et al., Phys. Rev Lett. 70, 4114 (1993) A. Prκtre et al., Phys. Rev. B. 54, 8130 (1996)		

PS2.19	buks	eyal	eyal@ee.technion.ac.il
	Novel Self-Sustained Oscillations and Giant Nonlinearity in Superconducting Resonators		
	We study microwave superconducting stripline resonators made of NbN on Sapphire substrate. A section of the resonator is made of a narrow (150 nm) and thin (8 nm) meander strip. A monochromatic wave at frequency close to one of the resonances is injected into the resonator and the reflected power off the resonator is measured. Novel, self-sustained oscillations of the reflected power, at frequencies of up to 60MHz are observed [1-2]. Near the onset of these oscillations the device exhibits a chaotic like behavior and is characterized by giant nonlinearity [3]. Intermodulation characterization performed in this region yields extremely high intermodulation gain (about 30dB), which is accompanied by a very strong noise squeezing (about 45dB squeezing factor) and period doubling of various orders [3]. We also study the response of the device to infrared (1550 nm wavelength) illumination impinging on the meander strip. To characterize the response time of the system we modulate t! he impinging optical power with a varying frequency. We observe extremely fast (modulation frequencies of up to 8GHz) [4] and sensitive (optical power below 100 fW) response near the onset of the self sustained oscillations [5]. To account for our findings we propose a theoretical model according to which the self-sustained oscillations originate by thermal instability in the meander strip [2]. A comparison to the experimental results yields a good quantitative agreement. These devices may serve as ultra-low noise amplifiers with possible applications in the field of quantum data processing. References: [1] Eran Arbel-Segev, Baleegh Abdo, Oleg Shtempluck, and Eyal Buks, ‘Novel Self-Sustained Modulation in Superconducting Stripline Resonators‘, arXiv: quant-ph/0607259. [2] Eran Arbel-Segev, Baleegh Abdo, Oleg Shtempluck, and Eyal Buks, ‘Thermal Instability and Self-Sustained Modulation in Superconducting NbN Stripline Resonators ‘, arXiv: quant-ph/0607261. [3] Eran Arbel-Segev, Baleegh Abdo, Oleg Shtempluck, and Eyal Buks, ‘Extreme Nonlinear Phenomena in NbN Superconducting Stripline Resonators ‘, arXiv: quant-ph/0607262. [4] Eran Arbel-Segev, Baleegh Abdo, Oleg Shtempluck, and Eyal Buks, ‘Towards Experimental Study of the Dynamical Casimir Effect‘, arXiv: quant-ph/0606099. [5] Eran Segev, Baleegh Abdo, Oleg Shtempluck, Eyal Buks, ‘Fast Resonance Frequency Modulation in Superconducting Stripline Resonator’ IEEE Trans. App. Supercond. (to be published), arXiv: cond-mat/0601190.		

PS3.1	wegrowe	jean-eric	jean-eric.wegrowe@polytechnique.fr
	CONDUCTANCE IN MULTIWALL CARBON NANOTUBES AND SEMICONDUCTOR NANOWIRES.		
	First measurements of the conductance of carbon nanotubes as a function of temperature and bias voltage have been performed some year’s ago, and exhibited surprising scaling properties. The measurements have been confirmed systematically for Multiwall carbon nanotubes (MWCNT) and extended to other kind of semiconducting nanowires (NW) [1]. In this study, a statistically significant amount of samples are measured. Multiwall carbon nanotubes and semiconductor nanowires are produced with a template synthesis method [2]. The scaling law of the conductance as a function of temperature and bias potential allows the power coefficient alpha to be defined, and associated to the nanoscopic characteristics (desorder) of all our samples [1]. This scaling behaviour has been described in terms of coulomb blockade (CB) effects. CB is due to the confinement of the electrons that are forced to enter in a constricted wire blocking each other due to coulomb interactions. The theoretical devel! opment of CB effects recently included the role of disorder in order to describe the inefficiency of the (dynamical) electronic screening due to the diffusion of both the electrons and the electromagnetic field [3,4]. On the other hand and in parallel, the crucial role of disorder is investigated by measuring the resistance as a function of the magnetic field. The magnetoresistance is due to another electron-electron interaction correction - the weak localization (WL) - that accounts for the quantum correction of the electronic Brownian motion when the electron interferes with itself. In this context, a well-defined parameter measures the disorder; namely the phase coherence length. Beyond weak localization, the presence of disorder leads also to weak to strong localization (SL) transition (or Mott transition) at low enough temperature (below 1K). In all samples, a similar behaviour is observed: CB regime and scaling law, together with WL, and destruction of the CB regime at very low temperature in the SL regime. The weak to strong transition is also evidenced as a function of the bias potential, with recovering the coulomb blockade regime at large enough bias. The activation energy is linked to the coherence length at the transition. We show that the coefficient alpha linked to the phase coherence length through a simple empirical law. Alpha is hence a measure of the disorder, as described in the context of non-conventional coulomb blockade theories [3,4]. However, the relation between CB and localisation effects is still unclear. How to correlate the different regimes? How do they co-exist? Is the disorder described in CB regime identical to that defined in the WL, or SL, regimes? What is the role of the transparency of the interface? Some surprising answers are obtained by studying the transport in the nanotunbes and nanowires with superconducting contacts. [1] Dayen J. -F., Wade T.L., Konczykowski M., Hoffer X. and Wegrowe J. -E., Phys. Rev. B, 72, 073402 [2] “Template synthesis of nanomaterials T. Wade, J.-E. Wegrowe, Eur. Phys. J. Appl. Phys. 29, 3 (2005) [3] Rollbuehler J. and Graber H., Phys. Rev. Lett. 87, 126804 (2001). [4] Egger R. Gogolin A. O., Phys. Rev. Lett. 87, 066401 (2001).		
PS3.2	wade	travis	travis.wade@polytechnique.fr
	Bi-directional alumina templates for ZnO nanowire field-effect transistors.		
	Porous alumina is commonly used as a template for nanowire synthesis. It is made by anodization of aluminum in acidic solutions, which forms a self-assembled, triangular network of nanometer diameter pores. This is because the pore diameter, distribution, and pore length can be tailored to suit the needs of the user by varying the anodization conditions: electrolyte, voltage, time, and temperature. The chosen pore size determines the resulting nanowire dimensions. Another reason is that once the nanowires have been made in the alumina template, they can be electrically contacted at the top and bottom of the membrane for physical measurements without the need for lithography. A third contact or electrode is needed. We have developed new 3D alumina templates that allow placement of a third electrode close enough to the nanowires for an electric-field effect. We start with an aluminum wire, which is anodized perpendicular to its axis to form an isolation layer onto which! a gate electrode is sputtered. Next, the wire is cut and anodized in the interior to form a network of pores parallel to the wire as a template for the synthesis of nanowires. The nanowires can be grown and contacted with the gate electrode already in place. This new template is interesting because it can be made totally in a basic chemistry lab without the need for an expensive clean room or lithography. Results of the structure as a ZnO nanowire transistor will be shown.		

PS3.3	kim	jaeuk	jaeukkim@postech.ac.kr
	Shot Noise Enhancement from Non-equilibrium Plasmons in Luttinger-Liquid Junctions		
	ABSTRACT: We consider a quantum wire double junction system with each wire segment described by a spinless Luttinger model, and study theoretically shot noise in this system in the sequential tunneling regime. We find that the non-equilibrium plasmonic excitations in the central wire segment [1] give rise to qualitatively different behavior compared to the case with equilibrium plasmons [2]. In particular, shot noise is greatly enhanced by them, and exceeds the Poisson limit. We show that the enhancement can be explained by the emergence of several current-carrying processes, and that the effect disappears if the channels effectively collapse to one due to, {\\em e.g.}, fast plasmon relaxation processes. References: [1] J. U. Kim, I. V. Krive and J. M. Kinaret, Phys. Rev. Lett. 90, 176401 (2003). [2] J. U. Kim, J. M. Kinaret, and M.-S. Choi, J. Phys.: Condens. Matter 17, 3815 (2005).		
PS3.4	egger	reinhold	egger@thphy.uni-duesseldorf.de
	Transport properties of interacting disordered nanotubes		
	Electronic transport in carbon nanotubes is often characterized by the combined importance of strong electron-electron interactions and of disorder. I will discuss two examples: (1) The interplay of disorder and interactions in multi-wall tubes can be described in an efficient way by field theory. Results for the crossover from the Luttinger liquid into the diffusive Altshuler-Aronov-dominated phase (as the disorder is increased) will be given, using the conductivity and the tunneling density of states as concrete examples [1]. (2) The linear conductance is even in a magnetic field B because of the fundamental Onsager symmetry. However, there are nonlinear terms in the I(V) characteristics that are linear in B and even in V. Such terms have attracted much attention recently, as they give direct clues about interactions and the chirality (handedness) of the medium. I discuss this question in the context of chiral nanotubes [2]. [1] C. Mora, R. Egger, and A. Altland, cond-mat/0602411. [2] A. De Martino, R. Egger, and A. Tsvelik, preprint.		
PS3.5	kobayashi	kensuke	kensuke@scl.kyoto-u.ac.jp
	Mesoscopic Fano Effect in Quantum Hybrid Systems		
	Fano effect [1], which arises from interference between a localized state and the continuum, embodies a fundamental aspect of quantum mechanics. We have realized a tunable Fano system in a quantum dot (QD) embedded in an Aharonov-Bohm ring [2], where, with the aid of the continuum, the localized state inside the QD acquires itinerancy over the system even in the Coulomb blockade. Our experiment was the first convincing demonstration of this effect in mesoscopic systems. We have revealed several new aspects of Fano physics, such as the complex Fano parameter, the behavior of the phase of electrons through a QD, and the Fano state in the dissipative regime. Fano effect was also realized in a single QD [3] and in a side-coupled QD [4] even in the presence of Kondo effect [5]. [1] U. Fano, Phys. Rev. 124, 1866(1961). [2] K. Kobayashi et al., Phys. Rev. Lett. 88, 256806 (2002); Phys. Rev. B 68, 235304 (2003). [3] H. Aikawa et al., J. Phys. Soc. Jpn. 73, L3235 (2004). [4] K. Kobayashi et al., Phys. Rev. B 70, 035319 (2004). [5] M. Sato et al., Phys. Rev. Lett. 95, 1066801 (2005).		
PS3.6	strunk	christoph	christoph.strunk@physik.uni-r.de
	Band Structure and Quantum Interference in Multiwall Carbon Nanotubes		
	Recent low temperature conductance measurements on multiwall carbon nanotubes in perpendicular and parallel magnetic field are reported. An efficient gating technique allows for a considerable tuning of the nanotube doping level. This enables us to study extensively the signature of nanotube bandstructure in electron quantum interference effects like weak localization, universal conductance fluctuations and the Aharonov-Bohm effect. We show that the weak localization is strongly suppressed at peaks at certain gate voltages which can be linked with the bottoms of one-dimensional electronic subbands. This assignment allows a detailed comparison of theoretical calculations with the experimental data. In agreement with the theory, we find clear indications for a pronounced energy dependence of the elastic mean free with a strong enhancement close to the charge neutrality point. In large parallel magnetic field, we observe a superposition of h/2e-periodic Altshuler-Aronov-Spiva! k oscillations and an additional h/e-periodic contribution. The latter contribution shows a diamond-like pattern in the B/Vgate-plane, which reflects the magnetic field dependence of the density of states of the outermost shell of the nanotube.		
PS3.7	kravtsov	vladimir	kravtsov@ictp.trieste.it
	Energy absorption in driven mesoscopic systems		
	We consider a quantum mesoscopic system (e.g. a quantum dot) subject to a time-dependent perturbation that breaks down energy conservation. For periodic and quasi-periodic perturbation we compute energy absorption rate averaged over period of oscillation as well as the entire electron energy distribution function. For quantum dots described by the time-dependent random matrix theory we analytically obtain the weak dynamic localization and discuss its implications for quantum dots in the Coulomb blockade regime. We also compute the probability of the multi-photon processes which result in the continuous-time random walk in the energy space with the variable size hopping and describe the quantum-to-classical crossover in this probability as the intensity of driving perturbation increases.		

PS3.8	ishibashi	koji	kishiba@riken.jp
	Artificial atom in carbon nanotube quantum dots and its THz response		
	We demonstrate that carbon nanotube quantum dots shows one-dimensional artificial atom behaviors, which includes clear confinment states, shell filling, and Zeeman splitting of the confined states. The level spacing and the charging energy for a single electron lie in the submillimeter to THz range, which is in contrast to standard semiconductor quantum dots, where they are in a microwave range. To demonstrate the unique energy scale, we show the THz photon assisted tunneling in carbon nanotube quantum dots.		
PS3.9	lindelof	poul erik	lindelof@it.dk
	Normal, superconducting and magnetic contacts to carbon nanotubes and InAs nanorods		
	Poul Erik Lindelof Nano-Science Center & Niels Bohr Institute University of Copenhagen 1-dimensional electronic wires like single wall carbon nanotubes and semiconducting nanorods can be ballistic over lengths in the μm range. Their 1-dimensional nature therefore gives rise to a particularly simple eigenenergy spectrum for short wires at low temperatures. Depending on the contact resistances the transport behaviour may be dominated by Coulomb blockade effects or by more or less perfect, matching transmission. These different regimes have been studied experimentally and the transmissions ranging from Coulomb blockade over co-tunneling (Kondo effect), to almost perfect conductance quantization will be reported. Particularly interesting are contacts with superconducting or magnetic properties giving rise to the Josephson effect or to spin valve behaviour. Examples of such proximity effects will be reported.		
PS3.10	tagliacozzo	arturo	arturo@na.infn.it
	Spin excitations in a quantum dot with magnetic field and spin orbit coupling. A.Tagliacozzo (1), B. Jouault (2) and P. Lucignano (1,3) (1) Universita' di Napoli "Federico II" and "Coherentia-INFM ", Dipartimento di Scienze Fisiche, Monte S.Angelo, 80126 Napoli (Italy) (2) Groupe d\'Etude des Semiconducteurs, Universite Montpellier II, 34095 Montpellier (France) (3) International School for Advanced Studies and "Democritos-INFM", Via Beirut 2-4, 34014 Trieste (Italy)		
	Correlations in a quantum dot are enhanced when strong electron-electron interactions make the spacing between energy levels narrower. By applying a magnetic field orthogonal to the dot, the total spin can be tuned through level crossings to higher angular momenta, as well as to higher total spin states. Full spin polarization can be shown by exact diagonalization results for few (N< 7) electrons[1]. A gate voltage induced spin–orbit interaction (Rashba coupling) turns the crossings into anticrossings and provides a spin texture in the low-energy excited states[2]. At full spin polarization, the first excited state (FES) is a collective spin excitation, with a spin density having a spin flipped at the origin with respect to the ground state. The piling up of a reversed spin density can be squeezed at the center of the dot by acting on the gate voltage. By increasing N, the anticrossings become less pronounced till a crossover takes place, eve! ntually resembling the dot to a quantum Hall ferromagnet (QHF) at filling close to one. The FES recalls the skyrmion, the Goldstone mode of the QHF. In the dot, the gap is finite and is tuned by the Rashba coupling.The crossover can be monitored by Far Infrared Radiation (FIR) and is quite sharp already at N= 5[2]. This opens up many exciting possibilities of manipulating the electron spin density in a quantum dot and of adding a Berry phase to the manybody wavefunction[4]. References : [1] P.Lucignano,B.Jouault,A.Tagliacozzo, \"Spin exciton in a quantum dot with spin-orbit coupling at high magnetic fields\" Phys.Rev. B69,045314 (2004) [2] P.Lucignano,B.Jouault,A.Tagliacozzo and B.L.Altshuler:\" Rashba control for the spin excitation of a fully spin polarized quantum dot\". Phys.Rev. B 71,121310(R) (2005) [3] P.Lucignano,B.Jouault,A.Tagliacozzo:\"Crossover of a quantum dot with spin orbit interaction in a high magnetic field to a quantum Hall ferromagnet\", HAIT Journal of Science and Engineering , vol 1, 601-625 (2004) [4] R. Capozza, D. Giuliano, P.Lucignano, A. Tagliacozzo,\"Quantum interference of electrons in a ring: tuning of the geometrical phase\", Phys. Rev. Lett. 95, 226803 (2005).		
PS3.11	urbina	cristian	urbina@cea.fr
	Josephson effects through one atom		
	The Josephson effects are one of the most striking signatures of extended quantum coherent states of matter, like superfluids, superconductors, and the more recently achieved atomic Bose-Einstein condensates. The Josephson effects appear when one creates a weak-link allowing particles to flow between two reservoirs of these quantum systems, thereby establishing phase coherence between them. Since their prediction by B. Josephson in 1962, these effects have been explored in great detail in superfluids and to some extent in Bose-Einstein condensates. Furthermore, in the field of superconductivity these effects have been observed in a variety of weak-links (tunnel junctions, proximity effect bridges, microbridges, point contactsβ€¦) which have lead to numerous applications (radiation detectors, magnetometers, voltage standardsβ€¦). Nevertheless, it was only in the 1990β€™s that a unifying picture, able to treat on the same footing all the different coupling structures, emerged in the framework of mesoscopic superconductivity. I will describe a series of experiments that we have carried out in order to explore the validity of this mesoscopic point of view of the Josephson effects. They are performed on the simplest of the weak links, namely one-atom contacts between two superconducting banks. Work done in collaboration with: B. Huard, M. Chauvin, M. L. Della Rocca, P. vom Stein, P. Joyez, H. Pothier and D. Esteve.		

PS3.12	hoang ba	thang	thang@physics.uc.edu
	Imaging of intrinsic and defect-related photoluminescence from single CdS nanowires Thang B. Hoang1,2, L.V. Titova2, J.M. Yarrison-Rice2, H.E. Jackson2 and L.M. Smith2 J.L. Lensch3 and L.J. Lauhon3 1 Institute of Material Sciences, Hanoi Vietnam 2 Department of Physics University of Cincinnati Cincinnati, OH USA 3Department of Materials Science and Engineering Northwestern University, Evanston, IL USA		
	We use spatially-resolved photoluminescence (PL) imaging [1] and time-resolved PL (TRPL) spectroscopy to study the optical properties of the two sets of CdS nanowires, grown by VLS technique with 20 nm and 50 nm gold catalysts [2]. Single nanowire samples from both sets (20 nm and 50 nm) of nanowires show room-temperature PL as a single featureless lineshape centered around 2.41 eV. However at low temperatures these same nanowires display a broad range of PL response. Some nanowires display strong and dominant emission near the band edge (NBE) at an energy corresponding to donor-bound exciton PL in bulk CdS (~2.52 to 2.54 eV). Other nanowires additionally show weak to dominant emission in a lower energy band which ranges from 2.4 to 2.5 eV which can be attributed to defect related emission. On top of this defect-related band strong and relatively sharp lines appear in some of the nanowires. Through correlation of PL imaging of single wires with AFM characterization of the same nanowires, we have shown that the sharp lines in the defect-related bands are spatially localized to points along the nanowire which appear to correspond to morphological irregularities such as sharp bends, kinks or lobes in the nanowire structure. In contrast, we have found that dominant NBE emission from nanowires most always is correlated with straight, uniform nanowire structure. We use temperature-dependent PL measurements and TRPL spectroscopy to elucidate the nature and properties of the intrinsic and defect related emission lines. While the sharp defect-related emission lines can be quite intense at low temperatures, they begin to weaken at about 30 K and completely disappear by 85 K. These defect-related emissions are also seen to have recombination lifetimes of 400 to 1000 ps which vary from peak to peak. Lifetimes of this order are characteristic of the bound exciton complexes in bulk CdS. The position of these lines as a function of temperature follow the band edge, also suggesting that these defects are not deep levels but probably result from excitons trapped at structural defects in the nanowires. Temperature dependent measurements of the NBE emission show that the energy position follows closely the temperature dependent CdS gap measured in bulk crystals. However, TRPL measurements of the NBE emission at all temperatures in all nanowires is extremely short-lived with a recombination lifetime less than 50 ps, nearly an order of magnitude less than observed for excitonic decays in bulk CdS. This indicates the presence of non-radiative recombination defects in the interior or at the surface of the nanowire. These results suggest strongly that suppression of these non-radiative defects should improve the quantum efficiency in these nanowires by over an order of magnitude. The authors acknowledge support of the NSF through DMR 0071797 and 0216374, and PRF through the ACS. JLL acknowledges the support of a NSF Graduate Fellowship. [1] K. P. Hewaparakrama, A. Wilson, S. Mackowski, H. E. Jackson, L. M. Smith, G. Karczewski, and J. Kossut, Appl. Phys. Lett. 85, 5463 (2004). [2] Y. Gu, E.-S. Kwak, J. L. Lensch, J. E. Allen, T. W. Odom, and L. J. Lauhon Appl. Phys. Lett. 87, 043111 (2005)		
PS3.13	brenner	rolf	rolf@phys.unsw.edu.au
	Microwave and pulsed-gate measurements on two and four phosphorus donors ion-implanted into silicon		
	We report on measurements carried out on devices that contain only two or four phosphorus donors in near-intrinsic silicon. Phosphorus ions were implanted through nanoscale apertures in PMMA and individually counted using on-chip single-ion detectors. Microwave or pulsed-voltage signals were applied to a surface gate to induce charge transfers between the donors which could be detected with a nearby radio-frequency single-electron transistor. Microwave excitation of a four-donor device revealed a striking characteristic of the charge transfer signal as a function of microwave frequency and power. We will offer an explanation for the observed effects that is consistent with multi-photon processes in the four-P-donor system. In another device containing only two P donors, gate pulses where applied to measure the decay rates of the two charge states of the system, which - as a function of pulse amplitude - exhibit oscillatory behaviour. This is consistent with coupling to phonon resonances due to the inter-donor spacing. The above experiments offer insights into the characteristic time and energy scales of few-donor systems in silicon, and are of relevance to Si:P architectures engineered for quantum information processing.		
PS3.14	leturcq	renaud	leturcq@phys.ethz.ch
	Magnetic field asymmetry of the nonlinear transport in quantum rings		
	R. Leturcq 1, R. Bianchetti 1, G. Gφtz 1, T. Ihn 1, K. Ensslin 1, D. C. Driscoll 1, A. C. Gossard 1 1 Solid State Physics Laboratory, ETH Zurich, 8093 Zurich, Switzerland 2 Materials Department, University of California, Santa Barbara, CA-93106, USA Since the discovery of the Aharonov-Bohm effect, ring structures have played a major role in the development of mesoscopic physics. Transport experiments in rings defined in metals and semiconductor heterostructures have been used to study the quantum coherence, as well as to measure directly the electronic quantum phase. While equilibrium properties of these systems are now well understood, many questions are still debated concerning the non-equilibrium properties, which govern the nonlinear transport. We have performed nonlinear transport measurements on rings defined by lithography in a two-dimensional electron gas. We observe magnetic field asymmetries of the nonlinear conductance, resulting from the non-validity of Onsager-Casimir relations out-of-equilibrium [1]. While general theoretical arguments can explain these experimental results, the microscopic origin of the nonlinear conductance is still a puzzle. In order to further understand the origin of this asymmetric nonlinear conductance, a third weakly coupled lead is used to measure the partial local density of states in the ring. In contrast to conventional tunneling experiments (e.g. scanning tunneling spectroscopy), which involves only two contacts, our three-terminal tunneling experiment is sensitive to the electronic phase of the electrons involved in the tunneling. This allows to measure the contribution of coherent electrons originating from each contact to the local density of states. [1] R. Leturcq, D. Sαnchez, G. Gφtz, T. Ihn, K. Ensslin, D. C. Driscoll and A. C. Gossard, Phys. Rev. Lett. (2006).		

<table>
<tr><td rowspan="3">PS3.15</td><td>nguyen</td><td>tran thuat</td><td>tran-thuat.nguyen@polytechnique.or</td></tr>
<tr><td colspan="3">Structural and optical characterization of silicon nanocrystals synthesized by plasma enhanced chemical vapor deposition</td></tr>
<tr><td colspan="3">Silicon nanocrystals have been growth suspending in the gaseous phase in a plasma enhanced chemical vapor deposition (PECVD) chamber by dissociating silane highly diluted in argon and hydrogen under high total pressure (>1800mTorr). The impact energy of nanocrystals to the substrate surface plays an important role in conserving the crystalline structure of nanocrystals formed in plasma phase. The impact energy is dissipated by collision with carrying gas (Ar and H2). Nanocrystals are collected only under pressure higher than 2800 mTorr. Square-wave modulated RF generator is used to control the size of nanocrystals. Reducing the plasma time-on leads to smaller nanocrystals’ size. The size effects and 0-D quantum confinement phenomenon are observed both in Raman crystalline peak of transversal optical mode (at 520cm-1) and the shift of photoluminescence (PL) peak. Strong PL intensity shows silicon nanocrystals as a good candidate for all-silicon optoelectronics applications.</td></tr>
<tr><td rowspan="3">PS3.17</td><td>nguyen</td><td>ai viet</td><td>vieta@iop.vast.ac.vn</td></tr>
<tr><td colspan="3">SIMPLE MODEL FOR NONLINEAR EXCITATIONS IN DNA NANO-WIRES</td></tr>
<tr><td colspan="3">SIMPLE MODEL FOR NONLINEAR EXCITATIONS IN DNA NANO-WIRES D.L. Hien, N.T. Nhan, N.V. Thanh, and N.A. Viet Institute of Physics and Electronics, 10 Daotan, Badinh, Hanoi, Vietnam ABSTRACT DNA molecule is a very special type of nano-wires with diameter approximately about 2nm. The separation of double helix structure of DNA into two single strands, which is an important starting points in informatics replication process of DNA to reproduce living matter. In this report we propose a new simple model for DNA-like nano-wires based on the combination of the two well-known models of DNA: the pendulum model of Englander (E), where the nonlinear excitations along DNA (x-direction) are well investigated (but without the temperature effects), and the Peyrard and Bishop (PB) microscopic model (in which the dynamics of the DNA thermal denaturation was explained by introducing Morse interaction potential depended on the transverse stretching y-direction). Using this improved model, we can study the temperature dependence behaviors of the nonlinear excitations in DNA nano-wires. Key words: Nano Physics, Nano Wires, Soft Condensed Matter, Bio-Physics, Biomolecules Email: vieta@iop.vast.ac.vn</td></tr>
<tr><td rowspan="3">PS3.18</td><td>rosa</td><td>lopez</td><td>rosa.lopez-gonzalo@uib.es</td></tr>
<tr><td colspan="3">Josephson current through a Kondo molecule</td></tr>
<tr><td colspan="3">We investigate transport of Cooper pairs through a double quantum dot (DQD) in the Kondo regime and coupled to superconducting leads. Within the non-perturbative slave boson mean-field theory we evaluate the Josephson current for two different configurations, the DQD coupled in parallel and in series to the leads. We find striking differences between these configurations in the supercurrent as a function of the ratio t/\\Gamma, where t is the interdot coupling and \\Gamma is the coupling to the leads: the critical current I_c decreases monotonously with t/\\Gamma for the parallel configuration whereas I_c exhibits a maximum at t/\\Gamma=1 in the serial case. These results demonstrate that a variation of the ratio t/\\Gamma enables to control the flow of supercurrent through the Kondo resonance of the DQD.</td></tr>
<tr><td rowspan="3">PS3.19</td><td>moriyama</td><td>satoshi</td><td>satoshim@riken.jp</td></tr>
<tr><td colspan="3">Investigation of total-spin state in single-wall carbon nanotube quantum dots</td></tr>
<tr><td colspan="3">Single-wall carbon nanotube (SWNT) forms one-dimensional quantum dots because of the small tube diameter, and may be used as a building block of quantum-dot based nanodevices [1]. The energy scales of a larger charging energy and a larger energy spacing of zero-dimensional confined states make it possible to realize the simple one-dimensional shell structures, a behavior for artificial atom. In this paper, we investigate total-spin state in single-wall carbon nanotube quantum dot by taking the ratio of the saturation current of the first step of Coulomb staircases for positive and negative bias. The current ratio reflects the total-spin transition that is increased or decreased when the dot is connected to strongly asymmetric tunnel barriers [2-4]. Our results indicate that total-spin state with and without magnetic fields can be traced by this technique. Single carbon-nanotube quantum dot were realized just by depositing metallic source and drain contacts on top of an individual SWNT using 50 keV electron beam lithography. The whole nanotube between the contacts demonstrated as a single-quantum-dot in our fabrication process. The distance between the contacts was designed to be 300 nm, and a heavily p-doped Si substrate was used for application of the gate voltage. Two- or four-electron shell structures have been observed at different gate voltage ranges. The two-electron shell structure originates from the twofold spin degeneracy, and the four-electron shell structure originates from the predicted twofold subband degeneracy in addition to the spin degeneracy. We carefully investigate the saturation current by using the measurements of Coulomb diamonds and Coulomb oscillations in magnetic fields from 0 to 10 T. The experimental results are consistent with the previous reports [4-6], and we find that total-spin transitions i! n magnetic fields, such as the high-spin states (S = 1), can be traced by this technique. In summary, we have carried out low-temperature transport measurements in individual SWNT quantum dots. Two- and four-electron shell structures regime have been observed, and we have determined the total-spin state and its magnetic field dependence by taking the ratio of the saturation current for positive and negative bias. This method can be useful to determine the total-spin transitions in quantum dots. References [1] K. Ishibashi et al., Appl. Phys. Lett., 79, 1864 (2001). D. Tsuya et al., Appl.Phys. Lett., 87, 153101 (2005). [2] H. Akera, Phys. Rev. B, 60, 10683 (1999). [3] T. Hayashi et al., Phys. Stat. Sol. (b) 238, 262 (2003). [4] D.H. Cobden et al., Phys. Rev. Lett., 81, 681 (1998). [5] S. Moriyama et al., Appl. Phys. Lett., 87, 073103 (2005). [6] S. Moriyama et al., Phys. Rev. Lett., 94, 186806 (2005).</td></tr>
</table>

PS3.20	haug	rolf	haug@nano.uni-hannover.de
	Spin effects in quantum dots Rolf J. Haug Abteilung Nanostrukturen, Institut fór Festkφrperphysik, Universitδt Hannover, Appelstr. 2, D-30167 Hannover, Germany		
	Spins in semiconductor quantum dots are promising systems in spintronics and quantum information processing. To study spin effects single-electron tunneling is a powerful tool. With spin-resolved transport experiments it was possible to investigate the Zeeman splitting of zero-dimensional states in different systems with electron numbers varying from 1 up to more than 100. Whereas in systems with only single occupied quantum dots the anisotropy of the Zeeman splitting due to spin-orbit effects is of interest [1,2], in systems with larger number of carriers many-body effects like Kondo effect and spin blockade are used to obtain informations about the spin structure in the quantum dots[3}. [1] J. Kφnemann, R.J. Haug, D.K. Maude, V.I. Falko, B.L. Altshuler, Phys. Rev. Lett. 94, 226404 (2005) [2] K.M. Haendel, R. Winkler, U. Denker, O.G. Schmidt, R.J. Haug, Phys. Rev. Lett. 96, 086403 (2006) [3] D. Kupidura, M.C. Rogge, M. Reinwald, W. Wegscheider, R.J. Haug, Phys. Rev. Lett. 96, 046802 (2006)		
PS3.21	yokoshi	nobuhiko	yokoshi@kh.phys.waseda.ac.jp
	Voltage chacteristics of current and shot noise in Josephson junction through Tomonaga-Luttinger liquid		
	We investigate current-voltage characteristics in one-dimensional Tomonaga-Luttinger liquid (TLL) adiabatically connected with superconducting reservoirs. In one-dimensional configuration, the Coulomb interactions are well-known to play crucial roles in transport properties. We use quasiclassical Keldysh Green\'s function and functional bosonization method. In TLL region, we apply Hubbard-Stratonovich transformation to the forward scatterings, and treat the auxiliary field as local scalar potential. Therefore, the system can be regarded as usual Josephson junction under Caldeira-Leggett type \'environment\' induced by electron-electron interactions. It is found that this \'environment\' suppresses the multiple Andreev reflections, while the direct current part is not influenced by the electron-electron interactions. We also show that the Coulomb interactions suppress the shot noise when low bias voltage is applied to the system.		
PS3.22	tran cong	phong	e-mail: congphong2000@yahoo.com
	Parametric Resonance of Acoustic and Optical Phonons in a Cylindrical Quantum Wire		
	Parametric Resonance of Acoustic and Optical Phonons in a Cylindrical Quantum Wire Tran Cong Phong and Le Dinh Department of Physics, Hue University, 32 Le Loi, Hue, Viet Nam E-mail: congphong2000@yahoo.com, dinhle52@gmail.com The parametric resonance of acoustic and optical phonons in a cylindrical quantum well in the presence of an external electromagnetic field is theoretically predicted by using a set of quantum transport equations for the phonons. Dispersions of the resonant phonon frequency and the threshold amplitude of the field for parametric amplification of the acoustic phonons are obtained. If they are obtained, then they are also estimated for realistic semiconductor models.		
PS3.23	le	dinh	dinhle52@gmail.com
	Absorption of Light by Free Carriers in Rectangular Quantum Wires in the Presence of Laser Wave		
	Absorption of Light by Free Carriers in Rectangular Quantum Wires in the Presence of Laser Wave Le Dinh, Le Phuong Son and Tran Cong Phong Department of Physics, Hue University, 32 Le Loi, Hue, Vietnam E-mail: congphong2000@yahoo.com, dinhle52@gmail.com The condition w, W >> t (t is the characteristic momentum relaxation time) are used in a calculation of the coefficient a(w) representing the absorption of weak electromagnetic wave by free carriers in rectangular quantum wires in a semiconductor in the presence of strong wave (of frequency W) in the case of arbitrary values of W and w. The interaction of electrons with acoustic phonon or ionized impurities is included in the second order of the treatment. The problem is solved by an approach similar to that employed in the theory of linear Kubo reaction. The results are valid in the absence of electron heating, when a strong wave influences only the probability of carrier scattering. At the point w=sW (s = 1, 2, 3,...) the function a(w) has peaks and at these peaks the value of a(w) is given by the formula for the absorption coefficient of the strong wave alone.		
PS3.24	nguyen toan thang		ntthang@iop.vast.ac.vn
	TRANSPORT THROUGHT AN ASYMMETRICALLY COUPLED KONDO QUANTUM DOT		
	Authors: Le Duc Anh*, Hoang Anh Tuan ** and Nguyen Toan Thang **. * Hanoi University of Education. ** Institute of Physics and Electronics, HaNoi, VietNam. We calculate the conductance across a Kondo correlated quantum dot asymmetrically coupled to external leads by means of the nonequilibrium Green\'s function(NGF)technique. The system has been described by the single impurity Anderson model. Equation-of-motion method (EOM)and the Ng\'s ansatz have been used for obtaining the NGF. The experimentally observed anomalous Kondo peak in conductance is discussed.		

PS3.25	hamilton	alex	alex.hamilton@unsw.edu.au
	Ballistic transport and anisotropic Zeeman splitting in one-dimensional hole systems		
	Studying the spin degree of freedom of charge carriers in semiconductors has become an area of significant current interest not only for a fundamental understanding of spin, but also for potential applications that use spin, rather than charge, in transistors and to perform logic operations. One approach to manipulate the spin is to apply local magnetic fields or to use magnetic materials. Another approach is to exploit spin-orbit coupling to control the spin with electrical voltages. This has led to proposals for a new class of spin-field-effect transistors, where it is the spin, and not the electronic charge, that carries information. As valence-band states are predominantly p-like (unlike conduction-band states which are s-like), spin-orbit effects are particularly important in p-type semiconductors such as p-GaAs. However to date there have been only a handful of experiments on p-type GaAs nanostructures. I will present a our recent work on ballistic transport and spin-orbit coupling in one-dimensional (1D) GaAs hole systems. We have fabricated extremely high quality 1D hole quantum wires using two different approaches, which show extremely clean and stable quantized conductance plateaus at B=0 [1,2]. We observe an extreme anisotropy of the Zeeman spin splitting in the wires, which we show is a direct result of the confinement and spin-orbit coupling [3]. Using source-drain biasing spectroscopy we are able to quantitatively measure the spin splitting and show that it is linear, in contrast to two-dimensional systems. Our results show that confining holes to a 1D system fundamentally alters their spin properties, and that it is possible to tune the absolute value of the g-factor, and the anisotropy, by electrostatically changing the width of the 1D system. [1] R. Danneau, W. R. Clarke, O. Klochan, A.P. Micolich et al, Appl. Phys. Lett. 88, 012107 (2006). [2] O. Klochan, W. R. Clarke, R. Danneau, A.P. Micolich et al, unpublished (2006). [3] R. Danneau, O. Klochan, W. R. Clarke, L.H. Ho et al, to appear in Phys. Rev. Lett. (2006).		
PS3.26	sanquer	marc	marc.sanquer@cea.fr
	Individual charge traps in silicon nanowires: Measurements of location, spin and occupation number by Coulomb blockade spectroscopy authors: M. Hofheinz, X. Jehl, M. Sanquer, G. Molas, M. Vinet and S. Deleonibus CEA-DSM and CEA-LETI, CEA-Grenoble, France		
	Excellent single electron transistors can be obtained on a standard silicon microelectronics platform: a slight change of the implementation of the source-drain architecture (known as the non-overlapped geometry) can transform an excellent silicon field effect transistor into an excellent single electron transistor, with ultimate charge detection capabilities. In our silicon devices, the Coulomb island is created by doping modulation which produces a camel-back shaped conduction band offset. This offset can be adjusted by changing the doping concentration. We observe isolated dopants in doped source and drain barriers behaving as charge traps. We detect the ionization of these impurity states - which is controlled by the gate voltage - using the Coulomb island as a charge detector. The location, the spin and the time resolved occupation number of the impurities are determined. The collective statistical properties of the dopant states in the barriers influence also the main dot characteristics: an overall increase of both dielectric constant and tunneling conductance with gate voltage is observed and interpreted within the scaling theory of electronic localization. ref: 1) M. Hofheinz et al. cond-mat 0504325 2) M. Boehm et al "Size scaling of the addition spectra in silicon quantum dots" Phys. Rev. B 71, 033305, 2005. 3) G. Molas et al. \"Manipulation of periodic Coulomb Blockade Oscillations in ultra-scaled memories by single electron charging of silicon nanocrystal floating gates" IEEE Trans. on Nanotechnology, 4, 374 (2005). NB This contribution could fit PS6 as well as PS3 parallel sessions.		
PS3.27	de heer	walt	walt.deheer@physics.gatech.edu
	Electronic confinement and coherence in patterned epitaxial graphene.		
	Utrathin epitaxial graphite was grown on single-crystal silicon carbide by vacuum graphitization. The material can be patterned using standard nanolithography methods. The transport properties, which are closely related to those of carbon nanotubes, are dominated by the single epitaxial graphene layer at the silicon carbide interface, and reveal the Dirac nature of the charge carriers. Patterned structures show quantum confinement of electrons and phase coherence lengths beyond one micrometer at 4K, with mobilities exceeding 2.5 m2/Vs. These parameters suggest that all-graphene electronically coherent devices may be possible. I will also discuss recent developments on unusual low-temperature phase transitions and fractal-like magnetoresistance effects that are occasionally observed in patterned graphene structures.		
PS3.28	texier	christophe	texier@lptms.u-psud.fr
	Dephasing due to electron-electron interaction in a diffusive ring		
	We have considered the effect of electron-electron interaction on the weak localization correction of a ring pierced by a magnetic flux. Following the approach of Al\'tshuler, Aronov & Khmel\'nitzkii (AAK) for an infinite wire, Ludwig & Mirlin (LM) have recently shown that the effect of the geometry of the ring combines in a nontrivial way with the effect of electron-electron interaction: it leads to some nontrivial behaviour of the harmonics of the magnetocconductance oscillations (AAS harmonics) as a function of the perimeter and the phase coherence lentgh. We have followed a different approach and given an exact derivation of the path integral for the isolated ring. We have shown that the prefactor found by LM must be corrected. Our exact result has allowed us to re-interpret the result in a time representation and provide a better physical understanding. We have also obtained a new behaviour in the limit of large coherence length (compared to the ring perimeter).		

PS3.29	lechner	lorenz	lorenz.lechner@boojum.hut.fi
	Proximity-induced Superconductivity in a diffusive carbon MWNT		
	We have investigated superconductor induced proximity effect in diffusive multiwalled carbon nanotubes. Using current bias, we find discontinuous IV curves at temperatures < 100 mK, which suggest gate tunable supercurrents up to 1.5 nA. The superconducting state is not a true zero resistance state but our sample displays a resistance which scales approximatively as 1/sqrt(I_c). The critical current is reduced as a function of temperature above T = 100 mK as expected for a diffusive SNS system;. For the critical magnetic field we find about 12 mT, which reflects the destruction of the energy gap \\delta \\sim 1 K in the Ti/Al contacts of thickness 10nm/70 nm. Using voltage bias, we find strong peaks in the differential conductance that we assign to disorder enhancement of multiple Andreev reflections.		
PS3.30	ono	keiji	k-ono@riken.jp
	Electrical manipulation of electron and nuclear spins in quantum dots		
	Electron spins and nuclear spins in semiconductor nanostructures are subject to intensive studies from the viewpoints of quantum information processing. Double quantum dots in the spin blockade (SB) regime, where the electron conduction is mostly blocked by Pauli effect unless the electron spin state is changed, are one of the platforms to explore the spin effects in quantum dots [1]. We have proposed the spin-blocked double dots can act as a nuclear spin polarizer [2,3]. Transition from the spin-blocked triplet state to unblocked singlet state can be induced by the hyperfine flip-flop scatterings with the nuclei in the quantum dots. However at zero magnetic field, a finite tunnel coupling and exchange interaction between dots lifts the degeneracy of the singlet and the triplet states, and this energy separation greatly surpluses the most efficient elastic hyperfine scatterings. At a certain magnetic field B0 Zeeman splitting of the triplet states induces degeneracy of the SZ = +1 triplet and the singlet states. The elastic hyperfine scattering from SZ = +1 triplet to the singlet states is substantially favored over those from SZ = 0 or -1. Nuclear spin will be thus “pumped” from — to -, and eventually leads to dynamic polarization of the nuclei. This novel nuclear polarization mechanism can be also tuned on/off electrically by means of the source-drain voltage VS, since the triplet-singlet energy separation depends sensitively on VS. When VS is tuned from a certain value at SB region to zero, at B0, the triplet-singlet energy separation increase and the triplet-singlet degeneracy is lifted. Thus the pumping of the nuclear spins is stopped and the nuclear spin system is nearly decoupled from the electronic systems. This polarized and electrically decoupled nuclear spin system can be manipulated following the continuous wave (CW) and pulsed NMR techniques. The manipulated nuclear spin state is measured electrically by means of a recovery time, a time needed to reestablish the polarized initial state after VS is tuned back to the value at SB region. In this paper we present results of these CW and pulsed NMR applied to InGaAs and GaAs quantum dots. In the GaAs dots a well-resolved quadrupole splitting is observed in the CW NMR spectrum of 71Ga nuclei. Asymmetric peak heights shows the nuclear spin is indeed polarized, i.e., IZ = 3/2 is mostly populated compared to IZ = 1/2, -1/2, or -3/2. We also demonstrate a logic gate operation of the four-level system using this initial state and transition selective rf pulses. [1] K. Ono et al., Science, 297, 1313 (2002). [2] T. Inoshita et al., J. Phys. Soc. Jpn. 72, Suppl. A 183 (2003), T. Inoshita et al., ICPS2004. [3] K. Ono et al., Phys. Rev. Lett 92, 256803 (2004). cond-mat/0309062.		
PS3.32	nguyen	hong quang	nhquang@iop.vast.ac.vn
	On the effective mass of electron in nanocrystals and nanowires		
	We study the electronic structures of semiconductor nanocrystals and nanowires by tight-binding method using the sp3d5s* model. By fitting the electron band structure calculated using the effective mass approximation to that obtained by tight-binding method, we suggested the semi-analytical formulas for the electron effective mass in nanocrystals and nanowires. These formulas seem to be very useful for practical purpose.		
PS3.33	ecoffey	serge	serge.ecoffey@epfl.ch
	Hybrid Nanowire-MOS circuit architectures: from basic physics to digital and analog applications		
	Among credible candidates for post-CMOS nanoelectronics, Silicon Nanowires (SiNW) have attracted high interest due to their potential to realize new building blocks for nanoelectronics and their ability to explore the fundaments of electrical conduction at the nanoscale. Moreover, silicon NWs could serve as technology platform to build SET and/or Coulomb blockade (CB) devices for both digital and analog applications. This talk aims to show that SiNWs and co-integrated MOSFETs-SiNWs have a great potential for the beyond CMOS technology generations. First, a short description of Single Electron Transistor (SET) working principles and performances are given. Some of the unique characteristics and functionality of SETs, are shown and complementarity with CMOS is demonstrated through the so-called SETMOS hybrid circuit architecture. SiNWs processing for both MOSFET and SET applications are also discussed. A particular attention is granted to the modeling, fabrication and characteristics of gate-all-around (GAA) silicon nanoscale MOS devices showing SET like behavior at low temperature. Ultra-thin (10nm) gated polysilicon nanowires (polySiNW) are then presented. PolySiNWs with V-shape I-V characteristics and charge trapping hysteresis at room temperature together with stochastic Coulomb Oscilations (CO) at low temperature. PolySiNW devices have a broad variety of applications such as random number generator, pico-ampere current detection, very low power logic and memory. Finally, hybrid CMOS-polySiNW integrated circuits are validated and a hybrid Negative Differential Resistance (NDR) circuit cell with excellent performances is demonstrated.		

PS3.34	shopfer	fΓ©licien	felicien.schopfer@lne.fr
	Ensemble averaging of magnetoconductance oscillations in quantum networks : dimensional crossover from mesoscopic to macroscopic		
	Magnetoconductance oscillations in metallic networks of mesoscopic loops – loops whose typical size is of the order of the electron phase coherence length Lphi - are one of the most spectacular manifestation of the quantum nature of electron transport at the mesoscopic scale: they result from the modulation of quantum interferences between electronic waves by a magnetic flux via the Aharonov-Bohm effect. An important question is to understand how such quantum effects average, and even disappear like in the case of the Aharonov-Bohm (AB) h/e flux periodic oscillations, when going from a mesoscopic to a macroscopic network formed with an increasing number of loops. A preliminary answer has been provided in considering the simple case of series arrays of mesoscopic loops whose total lengths were much longer than Lphi: these experiment [1] showed that, in these samples, the ensemble averaging of the magnetoconductance oscillations consist in a trivial incoherent summation of uncorrelated contributions from phase coherent regions. But a crucial and more interesting question is to know what happens to the ensemble averaging when the network size decreases and becomes smaller than Lphi. By measuring the size dependence of the amplitude of both Altshuler-Aronov-Spivak (AAS) h/(2e) flux periodic oscillations and AB oscillations in silver networks of various size ranging from N=10 to N=10^6 plaquettes and constant anisotropic aspect ratio, we have been able to probe the never explored regime of ensemble averaging of quantum effects in fully quantum coherent conductors. The dependences measured exhibit a dimensional crossover: when the smallest dimension of the network becomes smaller than Lphi, so that we can consider the sample as a fully electron phase coherent (mesoscopic) object in one direction whereas macroscopic in the other, the scaling law of the AB and AAS dimensionless conductance amplitudes change from N^(-1/2) to N^(-3/4) and from N^(0) to N^(-1/2) respectively [2]. These results demonstrate, on one hand, that the ensemble averaging process of quantum effects depends on the dimensionality of the conductor defined towards Lphi and, on the other hand, that when the sample becomes fully coherent the averaging may be very subtle characterized by original and non-trivial scaling laws. Besides using the recently predicted relation between conductance fluctuations and weak localization [3] in order to give a theoretical explanation to the size dependences of the AB and AAS oscillations amplitudes observed, our results provide the first experimental confirmation of this fundamental relation. [1] C. P. Umbach, C. van Haesendonck, R. B. Laibowitz, S. Washburn, and R. A. Webb, Phys. Rev. Lett. 56, 386 (1986) [2] F. Schopfer, F. Mallet, D. Mailly, Ch. Texier, G. Montambaux, L. Saminadayar, and Ch. Bðuerle, submitted to Phys. Rev. Lett. [3] I. L. Aleiner and Ya. M. Blanter, Phys. Rev. B 65, 115317 (2002)		
PS3.35	nguyen	van hieu	nvhieu@iop.vast.ac.vn
	Two-photon Rabi Oscillations of Biexciton in Semiconductor Quantum Dot. (Nguyen Van Hieu and Nguyen Bich Ha, Institute of Materials Science, VAST)		
	Theory of Rabi oscillations in a three-level system “ground state-exciton-biexciton” in a two-level semiconductor quantum dot is presented. In particular the two-photon Rabi oscillaions of the biexciton is studied in details. The Rabi flopping of the populations of different states as well as the Rabi splitting of the spontaneous emission spectral lines are investigated.		
PS3.36	meir	yigal	ymeir@bgu.ac.il
	Noise and dephasing in quantum point contacts		
	Experimental investigations of current shot noise in quantum point contacts show a reduction of the noise near the 0.7 anomaly. It is demonstrated that such a reduction naturally arises in a model proposed recently to explain the characteristics of the 0.7 anomaly in quantum point contacts in terms of a quasi-bound state, due to the emergence of two conducting channels. We calculate the shot noise as a function of temperature, applied voltage and magnetic field, and demonstrate an excellent agreement with experiments. It is predicted that with decreasing temperature, voltage and magnetic field, the dip in the shot noise is suppressed due to the Kondo effect. The relation with the induced dephasing on nearby quantum dots is discussed.		
PS3.38	kravtsov	vladimir	kravtsov@ictp.trieste.it
	Energy absorption in quantum dots driven by a time-dependent perturbation.		
	We consider quantum dots and mesoscopic rings subject to time-dependent perturbation. We focus on energy absorption rate and energy distribution of electrons in such systems. As a first step we consider a quantum dot with non-interacting electrons described by the time-dependent random matrix theory, which is isolated from the environment and only coupled to the time-dependent perturbation. We obtain analytically the weak dynamic localization i.e. the corrections to the energy absorption rate which are growing with time since the onset of perturbation. We also derive the quantum kinetic equation for the electron energy distribution function and obtain the probability of multiple-photon processes of absorption and emission. Next we consider the effect of electron-electron interaction on the energy absorption rate and show that it destroys the dynamic localization in system isolated from environment and thus lacking the cooling mechanism. Finally we consider a quantum dot weakly connected with the massive leads in the Coulomb blockade regime. In this case cooling at low temparatures is provided by the escape of hot electrons into leads and the thermal equilibrium may be reached. We study the signature of the dynamic localization in the shape of the Coulomb blockade peak in the dc conductance under ac pumping.		

PS3.39	kettemann	stefan	kettemann@physnet.uni-hamburg.de
	Free Magnetic Moments and Dephasing in Disordered Quantum Wires		
	The screening of magnetic moments in metals, the Kondo effect, is found to be quenched with a finite probability in the presence of nonmagnetic disorder. Numerical results, based on the solution of the selfconsistent 1-loop equation, as well as on numerical renormalisation group calculations for a disordered electron system show that the distribution of Kondo temperatures exhibits a pronounced second peak for small Kondo temperatures. It is shown that the probability that magnetic moments remain unscreened at low temperatures increases with disorder, and with decreasing dimension of the conductor. Analytical calculations, taking into account correlations between eigenfunction intensities yield a finite width for the distribution in the thermodynamic limit. The resulting low temperature dephasing rate due to magnetic moments in disordered mesoscopic metals is evaluated.		
PS3.40	itoh	tadashi	itih@mp.es.osaka-u.ac.jp
	Lasing and ultrafast decay of confined biexcitonic luminescence in semiconductor CuCl quantum dots		
	Two-photon resonant excitation of biexcitons confined in semiconductor quantum dots (QDs) produces completely inverted population between the biexciton and exciton states. This population inversion causes various kinds of peculiar phenomena related to the biexciton photoluminescence (PL), e.g. highly efficient lasing [1,2] or Dicke\'s superradiance originating from the coherent collective motion of photo-excited dipoles among many QDs [3]. In order to investigate such optical phenomena, we have measured time-resolved PL of the biexcitons in CuCl QDs embedded in NaCl matrices under the one-photon resonant excitation of excitons or the two-photon resonant excitation of biexcitons. The temporal profiles of the biexciton PL at 4 K were measured by a streak camera with time resolution of ~20 ps. Under the one-photon excitation, the profile shows a single exponential decay with decay time of ~170 ps. On the other hand, under the two-photon resonant excitation, there appear two decay components. With increasing the excitation intensity, the fast decay component becomes more dominant and the decay time becomes shorter. We have succeeded in explaining these behaviors by assuming the occurrence of the superradiance, the profile of which has a pulsed shape of the squared hyperbolic secant with the pulse width inversely proportional to the number of the excited dots. Furthermore, the measurement of the time-resolved PL spectra by means of optical Kerr gate method with time resolution of ~1 ps shows clearly the ultrafast PL response under the two-photon excitation. In this paper, we will discuss the possibility of the Dicke�fs superradiance of biexcitons inher! ent in the QDs. [1] G. Oohata et al., Physica E 26, 347 (2005). [2] Y. Kagotani et al., J. Luminescence 112, 113 (2005). [3] R. H. Dicke, Phys. Rev. 95, 99 (1954).		
PS3.41	glazman	leonid	glazman@umn.edu
	DYNAMIC RESPONSE OF ONE-DIMENSIONAL INTERACTING FERMIONS		
	Evaluation of the dynamic structure factor of interacting one-dimensional fermions with a nonlinear dispersion relation was posing an interesting problem, which could not be addressed within the Luttinger liquid theory. The recent solution of the problem for spinless fermions uncovered new universal features of the structure factor, originating from the combined effects of the nonlinear dispersion and interactions. The sharp peak, characteristic for the Tomonaga-Luttinger model, broadens up; for a fixed wave vector q, the structure factor becomes finite at arbitrarily large frequency. The main spectral weight, however, is confined to a narrow frequency interval with the width of order q^2/2m; here mass m is determined by the curvature of the dispersion relation. At the boundaries of this interval the structure factor exhibits power-law singularities with exponents depending on the interaction strength and on the wave vector.		
PS3.42	oda	shunri	soda@pe.titech.ac.jp
	Preparation, characterization and application of nanocrystalline silicon quantum dot devices		
	Recent progress in the fabrication technology of silicon nanostructures has enabled to observe novel electrical and optical characteristics of silicon quantum dots, such as singleelectron tunneling, ballistic electron transport, visible photoluminescence and high-efficiency electron emission. In this talk, I will present possible applications of silicon nanocrystals, which may cause breakthrough in silicon microelectronics technology, particularly on non-volatile memory devices, nano-electromechanical-system devices, and silicon based photonic devices.		
PS3.43	de franceschi	silvano	silvano@tasc.infm.it
	Supercurrent transport in semiconductor quantum dots		
	A zero-resistance supercurrent can flow between two weakly coupled superconductors due to the Josephson effect. The microscopic origin of this supercurrent depends on the nature of the weak link. I shall discuss the experimental realization of Josephson junctions formed by an individual semiconductor nanowire bridging two aluminum-based superconducting electrodes. Two distinct situations will be discussed: 1) The supercurrent is carried by the diffusive, but coherent, transport of correlated pairs of electrons across the nanowire. In this case the critical current can be tuned by a gate voltage acting on the carrier density in the nanowire. 2) An interacting quantum is defined in the nanowire by means of local gate electrodes. Due to Coulomb blockade, the transfer of a Cooper pair occurs by subsequent and correlated co-tunneling of the constituent electrons through the discrete energy levels of the quantum dot. For certain charge states of the dot, this transport mechanism r! esults in a π-shift in the Josephson current-phase relation, i.e. a “negative” supercurrent.		

PS3.44	le quang	anh quoc	lequanganhquoc@yahoo.com
	Lasing properties of PbSe quantum dots doped PMMA polymer for infrared optical amplification		
	Colloidal II-VI semiconductor quantum dots (QDs) have attracted much attention due to their potential for a wide range of applications. In this communication, the stimulated emission and the optical gain at 1310 nm in the PMMA thin film containing PbSe quantum dots are measured by amplified spontaneous emission technique. We demonstrate also the lasing effect in microcavities based on PbSe-PMMA.		
PS3.45	saminadayar	laurent	quspin@grenoble.cnrs.fr
	Dephasing in Kondo systems in the zero temperature limit		
	Low temperature dephasing has been at the heart of a very controversial debate since the experimental observation of a saturation of the phase coherence time ?? in mesoscopic wires. Recently, the importance of dephasing by magnetic (Kondo) impurities has also been widely recognized. However, theoretical predictions were available only for two particular situations: at zero temperature, a perfect screening of the magnetic impurities should lead to a standard Fermi liquid behaviour (the strong coupling limit). At temperatures much higher than the Kondo temperature TK, the so-called Nagaoka-Suhl formula give a correct description of the dephasing; in between, only recent numerical [1,2] results give the temperature dependance of the phase coherence time. So far, no experimental results managed to show both the high and the low temperature behaviour of the dephasing time in Kondo systems. Using Ag/Fe system, whose Kondo temperature is about 3K, we have been able to compare the dephasing time in Kondo systems with these exact results over a large temperature range. We show that the dephasing rate can be scaled to a universal curve of ?? per ppm as a function of T/TK; moreover, we show that this universal curve follow perfectly the numerical results down to 0.1 TK. Below this temperature, deviations from the Fermi liquid model appear ad the dephasing rate seems to saturate to a finite value. [1] G. Zarαnd, L. Borda, J. Von Delft and N. Andrei, Phys. Rev. Lett. 93, 107204 (2004). [2] C. Bδuerle, F. Mallet, F. Schopfer, D. Mailly, G. Eska and L. Saminadayar, Phys. Rev. Lett. 95, 266805 (2005).		
PS3.46	das	mukunda	mukunda.das@anu.edu.au
	Quantum Transport in Mesoscopic Systems		
	The quantisation of conductance in quantum wires and quantum point contacts into ‘Landauer steps’ appears to be adequately explained in terms of coherent transmission of electron waves through a loss-free barrier. However, the picture of quantum coherent scattering at this phenomenological level cannot address the central theoretical issue of metallic conduction: what causes dissipation in a ballistic quasi-one dimensional wire? Such a question is far more than academic. In the near future, reliable and effective nano-electronic design will demand not merely fashionable models, but ones that are credible both for physics and engineering. It is beyond the gift of coherence-based phenomenologies to cover the advances that are needed. In this talk we present the answer to this question. It is given uniquely by many-body quantum kinetics, totally free of unwanted phenomenology. Our microscopic application of well-tested many-body methods leads not only to conductance quantisation [1], by a full and precise accounting for inelastic energy loss, but we also resolve a long standing experimental enigma in the noise spectrum of a quantum point contact [2-4]. Finally we shall critically assess and analyse a recent report on the negative resistance of a nanotube [5]. [1] M. P. Das and F. Green, Landauer formula without Landauer’s assumptions, J. Phys: Cond Mat. 15 (2003) L687. [2] M. P. Das and F. Green, What is novel in quantum transport for mesoscopics? Pramana: J. Physics (2006) to appear, cond-mat/0511448. [3] M. P. Das and F. Green, Ballistic transport is dissipative: the why and how, J. Phys: Cond Mat. 17 (2005) V13. [4] F. Green, J.S. Thakur and M. P. Das, Where is the shot noise of a quantum point contact? Phys. Rev. Lett. 92 (2004) 156804. [5] M. P. Das, F. Green, and J.S. Thakur, cond-mat/0601595.		

Rencontres du Vietnam 2006
Nanophysics: from fundamentals to applications
List of Abstracts

PS4: Spintronics and Hybrid Structures

<table>
<tr><td>PS4.1</td><td>nguyen</td><td>quang tuong</td><td>quang-tuong.nguyen@polytechnique.o</td></tr>
<tr><td></td><td colspan="3">Evanescent states in semiconductors with inversion asymmetry and spin-orbit interaction</td></tr>
<tr><td></td><td colspan="3">Evanescent states in semiconductors with inversion asymmetry and spin-orbit interaction Tuong Nguyen-Quang* and Paul Voisin* *Laboratoire de Photonique et de Nanostructures, CNRS, route de Nozay, F-91460, Marcoussis, France. E-mail: quang-tuong.nguyen@polytechnique.org Keywords: evanescent states, spin-orbit interaction, k.p theory. The study of spin-orbit interaction in semiconductors has been the object of many experimental and theoretical investigations in the last few years. It links the carrier spin and the electric charge dynamics, hence opening a broad prospective of developing a new generation spin electronic devices. Among the possible devices, spin-dependent tunnel diodes have shown some promises [1]. However, to the best of our knowledge, spin-related phenomena in the complex band structure have not yet been thoroughly considered from a theoretical point of view. Spin degeneracy in the conduction band of semiconductors without inversion symmetry is lifted by the bulk inversion asymmetry (BIA) [2]. The latter is proportional to the cube of the wave vector and can provide a considerable spin polarization of electrons tunnelling through barriers [3]. In a recent paper, N. Rougemaille et al. [3] have examined the complex band structure of zinc-blende semiconductors within the framework of the 14-band k.p theory. They claimed the strict disappearance of evanescent states for an electron impinging on a potential barrier in the [110] direction. Many paradoxical conclusions can be extrapolated from their results. For instance, a GaAs/AlGaAs superlattice grown along the [110] direction should be dispersion-less whatever the superlattice period is. Furthermore, when turning on the inversion asymmetry parameters, the evanescent states in this direction would disappear abruptly for an infinitesimal asymmetry. Here, we re-examine the spin-orbit coupling effect on the complex band structure of zinc-blende semiconductors without inversion symmetry. This issue is addressed using a 14*14 k.p Hamiltonian and a 40-band tight binding model. To obtain all of the solutions corresponding to the complex band, we use the following trick: setting k=|k|exp(iφ), one gets a non-hermitian k.p Hamiltonian that admits, in general, complex eigenvalues Re[E]+i*Im[E]. By rotating φ, one changes both the real and imaginary parts of an eigensolution E. For a wave vector complex k, there are 4 possible solutions which are distinct but the non-physical imaginary part of the eigenenergy can vanish for some values of φ, differing in general from π/2 or 3π/2. Therefore, we show that the evanescent states exist for any direction in the Brillouin zone [4]. Due to bulk inversion asymmetry, the evanescent states are spin-split, and their spin splitting can become large in the midgap region where the looped dispersion is nearly vertical. This spin splitting suggests that with appropriate band structure engineering, one could design spin-dependent tunnel diodes actins as spin filters. 1. A. T. Hanbicki et al. Appl. Phys. Lett. 82, 4092 (2003). 2. G. Dresselhaus, Phys. Rev. 100, 580 (1955). 3. V. I. Perel et al. Phys. Rev B 67, 201304 R (2003). 4. N. Rougemaille et al. Phys. Rev. Lett. 95, 186406 (2005). 5. T. Nguyen-Quang, J.-M. Jancu, P. Voisin, submitted to Phys. Rev. Lett (2006). Parallel Session: #4</td></tr>
<tr><td>PS4.2</td><td>kettemann</td><td>stefan</td><td>ketteman@physnet.uni-hamburg.de</td></tr>
<tr><td></td><td colspan="3">Dimensional Control of Antilocalisation and Spin Relaxation in Quantum Wires Alternative Title: Free magnetic moments in disordered metals</td></tr>
<tr><td></td><td colspan="3">The dimensional crossover of the weak localisation correction to the conductance is calculated for Rashba and Dresselhaus spin orbit coupling. The spin relaxation rate due to Rashba and the linear Dresselhaus term is found to be diminished as the wire width becomes smaller than the spin orbit length in a nonmonotonic, oscillatory way, while there remains a small relaxations rate due to the cubic Dresselhaus term in the triplet Cooperon channels. As a result, while the antilocalisation first increases as the wire width becomes smaller, the sign of the magnetoconductance can switch to weak localisation, when the wire width is smaller than the spin orbit length, and the dephasing length is smaller than a spin relaxation length scale $1/Q_{\\gamma}$, due to the spin relaxation caused by the cubic Dresselhaus coupling $\\gamma$. In between, a regime of very weak magnetoconductance is found.</td></tr>
</table>

PS4.3	holleitner	alexander	holleitner@lmu.de
	Spin Relaxation in n-InGaAs Wires: Transition from two Dimensions to one Dimension		
	For an efficient information processing scheme based upon the electron spin, it is important to explore carrier spin relaxation mechanisms in nanostructures as a function of dimensionality. In two and three dimensions, elementary rotations do not commute, with significant impact on the spin dynamics if the spin precession is induced by spin-orbit coupling. Spin-orbit coupling creates a randomizing momentum-dependent effective magnetic field; the corresponding relaxation process is known as the D'yakonov-Perel' mechanism. In an ideal one-dimensional system, however, all spin rotations are limited to a single axis, and the spin rotation operators commute. In the regime approaching the one-dimensional limit, a progressive slowing and finally a suppression of the D'yakonov-Perel' spin relaxation have been predicted. We report on spin dynamics of electrons in narrow two-dimensional n-InGaAs channels as a function of the wire width [1]. We find that electron-spin relaxation times ! increase with decreasing channel width, in accordance with recent theoretical predictions. Surprisingly, the suppression of the spin relaxation rate can be detected for widths that are an order of magnitude larger than the electron mean free path. We find the spin diffusion length and the wire width to be the relevant length scales for explaining the observed effects. We acknowledge financial support by AFOSR and ONR. [1] A.W. Holleitner, V. Sih, R.C. Myers, A.C. Gossard, and D.D. Awschalom, cond-mat/0602155.		
PS4.4	aprili	marco	aprili@lps.u-psud.fr
	Ferromagnetic Josephson Junctions as classical spins		
	Ferromagnetic/Superconducting hybrid nanostructures can originate new ground states. For instance, a ferromagnetic p -junction spontaneously generates a dissipationless current when introduced in a superconducting loop or in a large Josephson junction as measured by Hall [1] and Josephson magnetometry [2]. The ground-state of this device is degenerated since the supercurrent can circulate equally clockwise or anticlockwise and it reproduces a two-level system. If the potential barrier between the two states is large (classical limit), one of the two states is chosen at the critical temperature and the current corresponds to a half a quantum flux in the loop that is confirmed by a statistical analysis of our results. The loop or the large Josephson junction simulates a ferromagnetic cluster with an uniaxial anisotropy (classical spin). Finally, the transition to this time reversal breaking state and the possibility to attend the quantum limit will be discussed. [1] A. Bauer, J. Bentner, J. M. Aprili, ML Della-Rocca, M. Reinwald, W. Wegschneider and C. Strunk, Physical Review Letters 92, 217001 (2004). [2] ML. Della-Rocca, M. Aprili, T.Kontos, A. Gomez and P. Spathis, Physical Review Letters 94, 197003 (2005)		
PS4.5	sanchez	david	david.sanchez@uib.es
	Fano-Rashba effect in quantum wires		
	We consider a quasi-one-dimensional (quasi-1D) semiconductor wire with spin-orbit (Rashba) coupling localized in a region of the wire. Such setup has been proposed, e.g., for an all-electrical spin transistor by attaching the wire to ferromagnetic leads [1] or as a tool for entanglement detection via shot noise [2]. We demonstrate that in the strict 1D limit, the Rashba interaction plays the role of an attractive impurity, leading to the formation of bound states. In a quasi-1D system, these bound states couple to the background conduction channels through the Rashba intersubband mixing. As a consequence, the conductance plateaus show pronounced dips as a function of the Fermi energy [3]. We discuss the set of parameters for the observation of this effect and show that it can be understood as generalized Fano antiresonances with complex asymmetry parameters that depend in a nontrivial way on the transmission phase. Therefore, the Fano-Rashba effect arises from the combined e! ffect of the Rashba interaction to generate bound states without further confinement and to induce wave interference due to the intersubband coupling term of the Rashba coupling only. We give exact numerical results and propose an approximate model which captures the main ingredients of the effect. [1] S. Datta and B. Das, Appl. Phys. Lett. 56, 665 (1990). [2] J.C. Egues, G. Burkard, and D. Loss, Phys. Rev. Lett. 89, 176401 (2003). [3] J. Faist, P. Gueret, and H. Rothuizen, Phys. Rev. B 42, 3217 (1990); S.A. Gurvitz and Y.B. Levinson, ibid. 47, 10578 (1993); J.U. Nockel and A.D. Stone, ibid. 50, 17415 (1994).		
PS4.6	lin	juhn-jong	jjlin@mail.nctu.edu.tw
	Logarithmic Zero-Bias Conductance Peaks in Sc/AlOx/Al Tunnel Junctions J. J. Lin(a,b) and S. S. Yeh(a) (a)Institute of Physics, National Chiao Tung University, Hsinchu 30010, Taiwan (b)Department of Electrophysics, National Chiao Tung University, Hsinchu 30010, Taiwan		
	We have fabricated a series of Al(25 nm)/AlOx/Sc(60 nm) tunnel junctions and measured the differential conductance (dI/dV) between 250 mK and 32 K in magnetic fields up to 4 T. We found that, in zero field, the tunnel junctions exhibited zero-bias conductance peaks which are logarithmic both in temperature and in bias voltage. Such a logarithmic behavior may be understood in terms of an enhanced tunneling due to the electrons being undergone spin-flip scattering in the barrier. In the presence of a magnetic field, the logarithmic conductance peaks were weakly suppressed. On the other hand, we found that in Al(25 nm)/AlOx/Sc(5 nm)/Al(60 nm) tunnel junctions, the differential conductance peaks disappeared. Instead, zero-bias conductance dips were observed. The underlying physics will be discussed.		

PS4.7	han	jung hoon	hanjh@skku.edu
	Magnetism-induced electric polarization in a linear chain		
	Electric polarization is the basis of ferroelectric devices. Recently, polarization which is induced by the magnetic ordering has come into focus both experimentally and theoretically. Current theoretical frameworks predict that the polarization is induced in the direction orthogonal to the propagation direction of the spin orientation. A more recent finding by the author shows, however, that electric polarization can be induced in the direction of the cluster\'s axis. This finding prompts the possibility to use such a magneto-electric system for charge pumps. We discuss possible implications for such application and review the current experimental status.		
PS4.8	truong	viet giang	truong@inha.ac.kr
	Er3+, Yb3+ and Ce3+ - doped Y2O3 nanoparticles in PMMA polymeric host V.G. Truong 1*, A.Q. Le Quang 2, B.S. Ham 1 and I. Ledoux 2 (1) Graduate School of Information and Communications, Inha University, Incheon 402-751, Republic of Korea (2) Laboratoire de Photonique Quantique et Molıculaire, UMR CNRS 8537, Institut d'Alembert, Ecole Normale Supırieure de Cachan, 61 av. du Prısident Wilson, 94 235 Cachan, France.		
	Erbium-doped waveguide amplifiers (EDWAs), operating in the third window of the optical telecommunication, is attracting many attentions because their potential applications in integrated optics to compensate the optical losses and pre-amplify the signal for active devices. A new class of hybrid materials based lanthanide-doped yttrium oxide (Y2O3) nanoparticle guests embedded in a polymer host have been designed for the efficient laser emission and amplification applications. To synthesize the nanoparticles, the combustion method has been used. The morphology and size of this oxide nanoparticle are investigated using the XRD and SEM techniques. The average size of these nanoparticles is finely tuned by adjusting the combustion fuel- metal nitrate ration. In order to increase Er3+ luminescence efficiency at 1.5µm, two other ions ytterbium and cerium have been used as sensitizers for erbium ion. Ytterbium allow to increase the excitation cross-section of Er3+ at the 980 nm pumping, then the Cerium is co-doped to enhance the 4I13/2 population of the Er3+ via energy transfer process to Ce3+. Y2O3 nanoparticles with an optimized erbium-ytterbium composition have been incorporated in a PMMA polymer matrix and display the strong gain coefficient values (up to 30 cm-1). These results open the new perspectives in the domain of hybrid material-based telecommunication amplifiers.		
PS4.9	lee	youngpak	yplee@hanyang.ac.kr
	Spin-photonics and spin photonic crystals as emerging issues		
	A representative item, in the field of photonics aiming at ultrafast devices, is photonic crystals (PC) which are a new-concept material or structure to control the propagation of light in various ways. Furthermore, even spin-PC or magnetic PC (MPC) and left-handed materials (LHM) appear recently, where magnetic components are also included in the basic periodic arrangement of nonmagnetic ones to be controlled magnetically as well. The interest in photon-spin interaction is grown, but the basis is not solid yet. It is a crucial time to promote this kind of research, and this chance hopefully provides an opportunity for it. Presently, the development of next-generation devices for information process has been and is being performed worldwide at a lot of relevant research institutes, companies and universities. In Korea, while the recent encouragement for the precise elucidation on photon-spin interactions is noticed and the comprehensive system is being established, for example, through Quantum Photonic Science Research Center, it is still insufficient for the foundation of basic research on highly time-, space- and energy-resolved studies, especially, for nonlinear magneto-optics, spin dynamics and magnetic band structures. In other words, the development of devices based on magnetic quantum structures, aiming at information process, is in the early stage even internationally as well as domestically. The level of relevant basic researches is progressively upgraded, but the application technology is far from the practical devices and systems. Even for the basic matters, the quantum-mech! anical understanding and the control mechanism of spin coherence, which is one of the essential constituents in realizing next-generation spin-photonic devices, are established only conceptually. Recent advances in the fabrication of magneto-optical (MO) materials and their integration onto various platforms continue to open up new avenues for the development of integrated spin-photonic devices and magnetic recording media. In photonics, on-chip MO mode converters on ¥²-¥´ semiconductor platforms, spatial light modulators, and current sensors have been demonstrated. Materials under study for these applications include magnetic semiconductors and magnetic garnet films that are integrated onto semiconductors. Device structures being developed are traditional waveguide structures, interferometers, and MPC. Current challenges in this area include obtaining integrated MO materials with high Faraday rotations, yet low losses; developing permanent magnets for biasing the MO element; and designing structures that will enable high isolation, yet compact size. Spin-photonic devices are expected to be developed as photonic devices, capable to control photon-spin interaction and coherence, with the following performance; an operation speed of 10-15 s, an information density of 1012 bit/in2, an ultrahigh efficiency and a highly-low power consumption. This stream of researches accommodates the needs for new-concept photonic devices based on quantum structures, spin-photonic memory devices, spin-photonic pumping/detecting devices and nano-chips, which overcome the scaling limit of Si-based VLSI and the superparamagnetic limit of magnetic nano-systems. The developments are to realize new-function and -concept devices such as optical-switching ones with a density of Tbit, light-receiving and -emitting devices operated at room temperature, spin-photonic ones for information process, and spin-photonic coherence devices.		

PS4.10	könig	jörgen	koenig@tp3.ruhr-uni-bochum.de
	Interplay of Ferromagnetism and Coulomb Interaction in Quantum-Dot Spin Valves		
	Spintronics devices rely on spin-dependent transport behavior evoked by the presence of spin-polarized electrons, e.g., in ferromagnets. Transport through nanostructures such as quantum dots, on the other hand, is dominated by strong Coulomb interaction, that gives rise to Coulomb blockade, non-trivial many-body correlations and other interesting behavior detectable in transport. In this talk I shall consider a system in which both concepts are combined, namely a single-level quantum dot attached to ferromagnetic leads with, in general, non-collinear magnetization directions. An applied bias voltage leads to a finite spin polarization of the quantum dot level. The dynamics of the accumlated quantum-dot spin can be manipulated by gate and transport voltages. It is, furthermore, influenced by external magnetic fields as well as by a newly predicted effective exchange field that arises due to the interplay of spin polarization in the leads and strong Coulomb interaction in the ! quantum dot. I will discuss possibilities to detect this spin dynamics in various transport regimes.		
PS4.11	do	bang	bangdb@ims.vast.ac.vn
	The magnetoresistance effect of Heusler alloys Cu2MnAl and Co2MnSi		
	The magnetoresistance effect of Heusler alloys Cu2MnAl and Co2MnSi Do Bang(a), Nguyen Huy Dan(a), Nguyen Anh Tuan(a), Nguyen Hai Nam(b), Do Thanh Huu(b), Nguyen Van Dai(a), Do Hung Manh(a), Nguyen Chi Thuan(a), Le Van Hong(a) and Nguyen Xuan Phuc(a) a) Institute of Materials Science, 18 Hoang Quoc Viet, Hanoi, Vietnam b) Pedagogical University, 136 Xuan Thuy, Hanoi, Vietnam The samples were prepared in forms of rod, ribbon and thin film by suction-casting, melt-spinning and pulse laser deposition methods, respectively. The magnetoresistance of the both Cu2MnAl and Co2MnSi alloys depends on thickness of the samples. Although, sign of the magnetoresistance ratios of two alloys are contrary, negative for Cu2MnAl and positive for Co2MnSi, their magnitudes are strongly increased by decreasing sample thickness. The magnetoresistance also depends on annealing process of the samples. The Curie temperature of alloys nearly unchanges with variation of sample thickness and attains ~ 600K for Cu2MnAl and ~ 980K for Co2MnSi. Mechanism of the magnetoresistance effect in these Heusler alloys is discussed.		
PS4.12	takahashi	saburo	takahasi@imr.tohoku.ac.jp
	Josephson current through a half-metallic ferromagnet		
	There is growing interest in the Josephson effect of superconductor/ferromagnet/superconductor junctions. Recently, the Josephson supercurrent through a half-metallic ferromagnet CrO2 has been observed [1] and a spin-triplet supercurrent through CrO2 is deduced. Since the supercurrent is carried by spin-singlet Cooper pairs in conventional superconductors, the superconducting order parameter decays quickly in strong ferromagnets like transition-metal ferromagnets or oxide ferromagnets, so that the existence of singlet pairs is completely prohibited in strong ferromagnets. It has been predicted that the quick decay of the order parameter does not occur if spin-triplet superconductivity is induced in ferromagnets [2,3]. The underlying physics for the occurrence of spin-triplet superconductivity is a conversion from spin-singlet to spin-triplet pairs at the interface. However, these theories do not take into account the dynamic aspect of magnetization, such as spin wave emis! sion and absorption, in the conversion process. In this presentation, we theoretically investigate the Josephson coupling between two singlet superconductors through a half-metallic ferromagnet by taking account of spin-wave assisted tunneling of electrons between the half-metal and the superconductors, and show that a Josephson coupling appears between the superconductors by inducing triplet correlations in the half-metal. We will discuss the length scale of the order parameter decay, the zero-pi transition in the critical current, and the Josephson current controlled by magnetization dynamics in a superconductor/half-metal/superconductor junction. This work is done with collaboration with S. Hikino, M. Mori, J. Martinek, and S. Maekawa. [1] R. S. Keizer et al., Nature (London) 439, 825 (2006). [2] F. S. Bergeret et al., Phys. Rev. Lett. 86, 4096 (2001). [3] M. Eschrig et al., Phys. Rev. Lett. 90, 137003 (2003).		
PS4.13	tanaka	yukio	ytanaka@nuap.nagoya-u.ac.jp
	General theory of proximity effect in unconventional superconductor jucntions		
	We present a general theory of the proximity effect in junctions between diffusive normal metals (DN) and unconventional superconductors in the framework of the quasiclassical Green\'s function formalism. Various possible symmetry classes in a superconductor are considered which are consistent with the Pauli principle: even-frequency spin-singlet even-parity (ESE) state, even-frequency spin-triplet odd-parity (ETO) state, odd-frequency spin-triplet even-parity (OTE) state and odd-frequency spin-singlet odd-parity (OSO) state. For each of the above four cases symmetry and spectral properties of the induced pair amplitude in the DN are determined. It is shown that the pair amplitude in a DN belongs respectively to an ESE, OTE, OTE and ESE pairing state.		

PS4.14	jonckheere	thibaut	jonckhee@cpt.univ-mrs.fr
	Controllable pi junction in a Josephson quantum-dot device with molecular spin		
	We consider a model for a single molecule with a large frozen spin sandwiched in between two BCS superconductors at equilibrium, and show that this system has a $\\pi$ junction behavior at low temperature. The $\\pi$ shift can be reversed by varying the other parameters of the system, e.g., temperature or the position of the quantum dot level, implying a controllable $\\pi$ junction with novel application as a Josephson current switch. In contrast to previous works the importance of the contribution from the continuum of states above the superconducting gap is brought out. The free energy for certain configuration of parameters shows a bistable nature, which is a necessary pre-condition for achievement of a qubit.		
PS4.15	tatara	gen	tatara@phys.metro-u.ac.jp
	Theory of Threshold Current of Domain Wall Motion		
	Threshold current of domain wall motion[1] under spin-polarized electric current in ferromagnets is theoretically studied. The wall is described by use of equations of motion in terms of two collective coordinates, wall position and spin polarization out-of easy-plane[1,2]. Effects of non-adiabaticity[1,2] and spin relaxation, both represented by so-called a beta-term[3] in Landau-Lifshits equation, are taken account in addition to extrinsic pinning. It is demonstrated[4] that there are four different regime where threshold current jc is characterized by different dependence on extrinsic pinning, shape-anistoropy and beta. Identification of the origin of threshold is thus necessary to lower the threshold current in experiments. 1) L. Berger, J. Appl. Phys. 49 (1978) 2156; L. Berger, J. Appl. Phys. 55 (1984) 1954. 2) G. Tatara and H. Kohno, Phys. Rev. Lett. 92 (2004) 086601. 3) S. Zhang and Z. Li:Phys. Rev. Lett. 93 (2004) 127204; A. Thiaville, Y. Nakatani, J. Miltat and Y. Suzuki:Europhys. Lett. 69 (2005) 990;S. E. Barnes and S. Maekawa:Phys. Rev. Lett. 95 (2005) 107204. 4) G.Tatara et al, J. Phys. Soc. Jpn., 75, 64708 (2006).		
PS4.16	nitta	junsaku	nitta@material.tohoku.ac.jp
	Spin interference in InGaAs 2DEG rings		
	The spin-orbit interaction in InGaAs-based 2DEGs can be controlled by the gate voltage. Based on this property, we have proposed a spin interference device. An array of interference rings made of InGaAs 2DEG can suppress the sample specific features such as universal conductance fluctuations and AB type interference. We can measure the gate voltage dependence of time reversal symmetric AAS interferences. The gate voltage dependence of AAS oscillations reveals that the spin precession angle can be controlled by the gate voltage.		
PS4.17	nguyen anh	tuan	tuanna@itims.edu.vn
	TECHNOLOGIES, STRUCTURES, PHYSICAL PROPERTIES AND APPLICATIONS OF NANOSTRUCTURED MAGNETIC MATERIALS		
	This paper reviews the recent status of research and applications in magnetic nanoparticles and nanostructured materials at ITIMS. We focus on the spinel ferrite nanoparticles Fe_3O_4, hard magnetic hexagonal ferrite submicron-granules $BaFe_{12}O_{19}$, hard magnetic alloy thin films $L1_0$ Fe-Pt and rare earth-transition metal NdFeB, and some other special functional magnetic thin films based on the MTJ structures of the $Co/Al_2O_3/Co$ trilayers and the ferromagnetic/antiferromagnetic structures of the Co/MnPd bilayers. Topics presented include technology, structural characteristics, electronic and magnetic properties and some applications or probabilities for using these magnetic nanomaterials in Vietnam. The remarkable results in our studies include the following: (1) Successfully prepare by chemical methods the spinel ferrite nanoparticles with average diameter down to 10 nm and the hexagonal ferrite submicron-granules with average diameter of about 100 nm. The ferrofluids made from th! e spinel ferrite nanoparticles with both types of solvents based on oil and water have been prepared and used to observe magnetic bits or domains and to damp and improve the dynamic characteristic of electrodynamic loudspeakers. The barium ferrite submicron-granules have been received with good hard magnetic properties and high magnetic anisotropy. This material showed that it is suitable for applications in elastic magnets, adhesive magnets or absorbing films for electromagnetic waves. (2) For the hard magnetic materials, the Fe-Pt and NdFeB thin films have been produced with good hard magnetic properties. The most dominant points in FePt thin films are that the films have been sputtered successfully onto polymer substrates. The technological regime for significantly decreasing the temperature of fcc-fct structure phase transition, about 100oC, has been established and shown the role for hard magnetic property of the polymer substrate and addition of Ag in FePt alloys. Dom! inant points of the NdFeB thin films deposited on silicon subs! trates a re that they were sputtered successfully in form of multilayer structures and this to lead to enhancement significantly hard magnetic properties. (3) For the special functional magnetic thin films, the MTJ structures and ferromagnetic/ antiferromagnetic bilayers with the thicknesses of the layers in nanoscale have been prepared successfully by sputtering technique. The most dominant points for MTJ structures are obtained of the tunnel magnetoresistance (TMR) effect caused by spin-dependent tunneling and observation of Coulomb blockade phenomena opened out capacity for applications in single spin electron tunnel (SSET) devices of spintronics. There appear of some interesting phenomena on physics related to the unidirection anisotropic exchange (UDAE, or exchange biased coupling, EBC) in the ferromagnetic/antiferromagnetic bilayer structures. (4) In the application area of nanomaterials, ITIMS seems to be a one of domestic sciences institutes starting bring forth some nanoprod! uces used first time in Vietnam, such as magnetic fluids, low magnetic field sensors/switchers using spin valves. Many other applications of nanomaterials will be still proposed and speeded up at ITIMS.		

PS4.18	egues	carlos	egues@if.sc.usp.br
	Spin orbit interaction in symmetric quantum wells: zitterbewegung and spin Hall effect		
	I this talk I will first briefly review the basics of the spin orbit interaction in two-dimensional electron gases and its application in novel spin FETs [1,2] and as a useful means of coherently manipulating and modulating the flow of entangled spins in solids [3,4]. Then I will introduce (from the Kane model) a novel spin-orbit coupling arising in symmetric wells with two subbands [5]. This inter-subband-induced spin orbit coupling gives rise to usual an zitterbewegung with cycloidal-type orbits without magnetic fields. I will conclude my talk with a brief discussion of the spin-Hall effect in these novel systems [6]. This work was supported by the Swiss NSF, the NCCR Nanoscience, EU NoE MAGMANet, DARPA, ARO, ONR, JST ICORP, CNPq, and FAPESP. [1] J. Schliemann, J. C. Egues and D. Loss Phys. Rev. Lett. 90, 146801 (2003); [2]J. C. Egues, G. Burkard, and D. Loss, Appl. Phys. Lett. 82, 2658 (2003); [3] J. C. Egues, G. Burkard, and D. Loss, Phys. Rev. Lett. 89, 176401 (2002); [4] J. C. Egues, G. Burkard, D. Saraga, J. Schliemann, and D. Loss, Phys. Rev. B 72, 235326 (2005). [5] E. S. Bernardes, J. Schliemann, J. C. Egues, and D. Loss, cond-mat/0607218 [6] M. Lee, J. C. Egues, and D. Loss, in preparation.		
PS4.19	Faini	Giancarlo	giancarlo.faini@lpn.cnrs.fr
	Large phase coherence effects in GaMnAs diluted ferromagnetic based nanostructures: towards a quantum spintronics. L. Vila, R. Giraud, L. Thevenard, A. Lemaître, F. Pierre, J. Dufouleur, D. Mailly and G. Faini, Laboratoire de Photonique et de Nanostructures, LPN-CNRS, Route de Nozay, F-91460 Marcoussis – France		
	The ability to manipulate phase-coherent spin-polarized currents in a ferromagnet would be a significant milestone for the development of coherent nanospintronics. Yet, phase coherence is usually hampered in a ferromagnet by efficient inelastic scattering processes, and a significant phase breaking even occurs down to the lowest temperatures due to low-energy electron-magnon collisions. After a short overview, I will discuss our most recent achievements on how to preserve phase coherence in an epitaxial hole-induced ferromagnet, GaMnAs. Large effective phase coherence lengths were extracted mainly from universal conductance fluctuations, even if these values are extracted in the framework of semi-classical approximations which may not be relevant for the very specific universality class of these systems, and the physics is further complicated by the valence band structure, with strongly mixed heavy-light spin-polarized holes. Nevertheless, the observation of these quantum interference effects gives confidence in doing man-made controlled coherent spin transport in an epitaxial ferromagnet, which lay the basis for a possible development of the field of coherent nanospintronics.		

PS5: Molecular Electronics

PS5.1	romeike	christian	romeike@physik.rwth-aachen.de
	Kondo-transport spectroscopy of magnetic anisotropy of single molecule magnets		
	We demonstrate that a single molecule magnet, coupled strongly to leads (i.e. Kondo temperature T_K much larger than the magnetic splittings), exhibits a Kondo effect which is induced by quantum tunneling of the magnetic moment and involves the magnetic excitations in an essential way. We find a strong modulation of the Kondo effect as function of a longitudinal magnetic field or the transverse anisotropy parameters for all spin values $S>1/2$. The effect can be used for an accurate transport spectroscopy of the magnetic spectrum in a low magnetic field regime. We set up a relationship between the Kondo effects for successive integer and half-integer spins.		
PS5.2	nitzan	abraham	nitzan@post.tau.ac.il
	Inelastic effects in molecular conduction: inelastic spectra, resonant tunnelling and noise		
	In this talk will first review our recent theoretical work on inelastic electron tunneling and inelastic tunneling spectra in off-resonance situations,[1-3] then consider situations characterized by strong electron-phonon coupling.[4-6] Timescale and coupling strength issues are discussed with regards to non-linear response (bistability, hysteresis and switching).[4] A new numerical approach to the calculation of inelastic tunneling currents in the strong coupling limit will be described and applied to evaluate resonant tunneling spectra.[5] We also analyze the effect of electron-phonon coupling on the current noise spectra of molecular junction, in both the weak and the strong coupling limits, with emphasis on the information on junction properties that can be extracted from the noise spectrum.[6] 1. M. Galperin, M. Ratner and A. Nitzan, J. Chem. Phys. 121, 11965-11979 (2004) 2. M. Galperin, M. Ratner and A. Nitzan, Nano Letters, 4, 1605-1611 (2004) 3. M. Galperin, A. Nitzan, M. A. Ratner and D. R. Stewart, J. Phys. Chem. B, 109, 8519-8522 (2005) 4. M. Galperin, M. A. Ratner and A. Nitzan, Nano Letters, 5, 125-130 (2005) 5. M. Galperin, A. Nitzan, and M. A. Ratner, Phys. Rev. B 73, 045314 (2006) 6. M. Galperin, A. Nitzan, and M. A. Ratner, cond-mat/0604029		
PS5.3	ilani	shahal	shahal.ilani@cornell.edu
	Measuring the Quantum Capacitance of Individual Carbon Nanotubes		
	The electronic capacitance of a one-dimensional system, such as a carbon nanotube, is a thermodynamic quantity that contains fundamental information about the one-dimensional ground state. It is composed of an electrostatic component, describing the interactions between electrons and their correlations, and a kinetic term given by the electronic density of states. These two terms determine, for example, the propagation velocity of charge waves in the nanotube. Here we report on the first direct capacitance measurement of individual carbon nanotubes. We use a metallic top-gate separated from a single wall carbon nanotube by a thin oxide layer to form a two-plate capacitor. Capacitance is measured at low temperatures as a function of the carrier density in the nanotube, which is tuned using the top-gate over a wide range of both electrons and holes. Our measurements detect the electrostatic part of the capacitance as well as the quantum corrections arising from the electronic ! density of states. We identify the van-Hove singularities that correspond to the one-dimensional electron and hole subbands. We further show that the measured capacitance exhibit clear electron-hole symmetry. Finally, the strength of electronic correlations is determined from the deviations of the measured electrostatic component from the simple Hartree approximation.		
PS5.4	van ruitenbeek	jan	ruitenbeek@physics.leidenuniv.nl
	Quantum properties of atomic-sized conductors: Single atoms, chains of atoms, and molecules		
	Using remarkably simple experimental techniques it is possible to gently break a metallic contact and thus form a conducting nanowire. Although the atomic structure of contacts can be quite complicated, as soon as the weakest point is reduced to just a single atom the complexity is removed. This has allowed for quantitative comparison of theory and experiment for many properties, and atomic contacts have proven to form a rich test-bed for concepts from mesoscopic physics [1]. More recently, similar techniques are being used to contact and study individual organic molecules. Junctions of single molecules such as H_2 and CO bonded between Pt electrodes can be characterized in great detail by vibration spectroscopy and the dependence of the vibration modes on the stretching of the junction [2]. [1] N. Agraot, A. Levy Yeyati and J.M. van Ruitenbeek, Phys. Rep. 377 (2003) 81-380. [2] R.H.M. Smit, et al., Nature 419 (2002) 906; D. Djukic, K.S. Thygesen C. Untiedt, R.H.M. Smit, K.W. Jacobsen, and J.M. van Ruitenbeek, Phys. Rev. B. 71 161402(R) (2005).		

PS5.5	cuevas	juan-carlos	juancarlos.cuevas@uam.es
	Ab initio description of the electronic transport in single-molecule junctions		
	Present trends in the miniaturization of electronic devices suggest that ultimately single molecules may be used as electronically active elements in a variety of applications. Recent advances in the manipulation of single molecules now permit to contact an individual molecule between two electrodes and measure its electronic transport properties. In contrast to single-electron transistors based on metallic islands, molecular devices have a more complicated, but in principle tunable, electronic structure. In addition to generic principles of nanoscale physics, e.g. Coulomb blockade, the chemistry and geometry of the molecular junction emerge as the fundamental tunable characteristics of molecular junctions. In my talk, I will present our recent efforts to describe the electronic transport through single molecules, which are based on the combination of ab initio quantum chemistry calculations and Green functions techniques. Such an approach allows us to elucidate the relation between the electronic structure of individual molecules and the electrical conduction of the circuits in which they are embedded. This fact will be illustrated in my talk with the discussion of the following important topics motivated by recent experiments: (i) length dependence of the conductance of rod-like molecules, (ii) effect of the breaking of the conjugation in the transport through oligo-phenylenes, (iii) conductance of aluminium breakjunctions in the presence of oxygen molecules and, if there is time, (iv) conductance of atomic-sized contacts under laser irradiation.		
PS5.6	heersche	hubert	hubert@qt.tn.tudelft.nl
	Supercurrents in graphene		
	The cone-shaped bandstructure of graphene makes the conduction electrons behave like massless Dirac particles. This gives rise to surprising transport properties, e.g. an anomalous quantum hall effect [1]. In order to study the physics of the “relativistic Josephson-effect”, we have contacted graphene flakes with superconducting electrodes. At sufficiently low temperatures we observe proximity induced supercurrents in graphene (Ic~10-1000nA). A back-gate electrode allows us to change the carrier concentration. Depending on the sign of the gate voltage, the charge carriers are electrons or holes, respectively. The critical current depends on the carrier concentration and is therefore tunable with the gate. The superconductor-graphene-superconductor (SNS) system effectively acts as a bipolar Josephson-Field-Effect-Transistor. Supercurrents are observed even at the point of zero carrier concentration (Dirac point). In contrast to standard theory for short SNS junctions the I! cRn product is not independent of the carrier concentration, but reduced near the Dirac point. [1] Novosolov, K.S. et al., Nature 438, 197 (2005); Zhang, Y. et al., ibid. 438, 201 (2005).		
PS5.8	imura	ken-ichiro	imura@riken.jp
	Full counting statistics for molecular spintronics --- an analytically solvable model in the incoherent tunneling regime		
	Full counting statistics (FCS) for molecular spintronics is studied. In the language of conventional mesoscopic physics, transport through a quantum dot in the strong Coulomb blockade regime, coupled to a magnetic impurity with an arbitrary spin s is considered. In order to apply the master equation approach to FCS, we focus on the incoherent tunneling regime, and discovered that the FCS can be obtained analytically for an arbitrary spin s for a setup, with two spin sectors $j=s\\pm 1/2$, as well as for the one with only one spin sector, in the bias window (mu_L>epsilon>mu_R, with epsilon being an energy level of the dot). Base on the obtained current and dwell time distribution functions, we performed a contour plot of joint distribution.		
PS5.9	von oppen	felix	vonoppen@physik,.fu-berlin.de
	Pair tunneling through single molecules		
	By a polaronic energy shift, the effective charging energy of molecules can become negative, favoring ground states with even numbers of electrons. In the first part of the talk, I show that charge transport through such molecules near ground-state degeneracies is dominated by tunneling of electron pairs which coexists with (featureless) single-electron cotunneling. Due to the restricted phase space for pair tunneling, the current-voltage characteristics exhibits striking differences from the conventional Coulomb blockade. In asymmetric junctions, pair tunneling can be used for gate-controlled current rectification and switching. In the second part, I discuss the charge Kondo physics in this system at low temperatures.		

PS5.10	keane	zachary	zkkeane@rice.edu
	Three-terminal Devices To Examine Molecular Conductance Switching		
	We report electronic transport measurements of single-molecule transistor devices incorporating bipyridyl-dinitro oligophenylene-ethynylene dithiol (BPDN-DT), a molecule known to exhibit conductance switching in other measurement configurations. We observe hysteretic conductance switching in 8% of devices with measurable currents and find that dependence of the switching properties on gate voltage is rare when compared to other single-molecule transistor devices. This suggests that polaron formation is unlikely to be responsible for switching in these devices. We discuss this and alternative switching mechanisms.		
PS5.11	dam	hieu chi	dam@jaist.ac.jp
	Structural and electronic properties of Pt nano clusters adsorbed on single wall carbon nanotube		
	A systematic study of single Pt atom and Ptn (n= 3, 5, 7) clusters adsorbed on graphite and metallic (5, 5) single wall carbon nanotube were performed by theoretical calculations within Density Functional Theory. Calculations focus on the geometric and electronic structure and interaction between Pt clusters and single wall carbon nanotube were carried out. We found that the bridge sites on the outer wall of carbon nanotube are the most favourable for Pt atom adsorption, however Pt atoms prefer to form a cluster than to disperse. The average C-Pt and Pt-Pt bond length, binding energy, and the charge transfers from Pt cluster to the carbon nanotube increase with the size of cluster. First principles simulation of gas adsorption suggests a higher performance for catalytic activities of Pt clusters adsorbed carbon nanotube, in compare with free Pt clusters.		
PS5.12	schofield	steven	steven.schofield@newcastle.edu.au
	Acetone on Si(001): A study for silicon-based molecular electronics		
	The ability to covalently attach organic molecules to semiconductor surfaces in a controllable and selective manner is currently receiving much attention due to the potential for creating hybrid silicon-organic molecular-electronic devices. Scanning tunnelling microscopy (STM) is ideally suited for such studies as it can provide information on the geometric and electronic structure of individual adsorbates on surfaces, and can also serve as an electrical contact to the molecule for conductance measurements. However, it has been reported several times that surface adsorbed organic molecules containing C=C double bonds are unstable when under the influence of the applied biases and currents of an STM tip. Here we use STM and density functional theory calculations to study the adsorption of acetone [(CH3) 2CO] to the silicon (001) surface, and the stability of the resulting adsorbate structures with respect to applied STM biases currents as well as substrate temperature. We show both bias and time-dependent STM images and their agreement with total energy DFT calculations and simulated STM images. We demonstrate the ability to convert from kinetically-favoured to thermodynamically-favoured adsorbate structures, which can be performed for the entire surface using a thermal anneal, or for individual molecules using an STM tip-mediated process. This has important implications for the creation of robust single-molecule devices on silicon.		

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PS6: NEMS and Nanodevices

PS6.1	blanter	yaroslav m.	blanter@tnntw14.tn.tudelft.nl
	Single-electron tunneling with strong mechanical feedback		
	We demonstrate the feasibility of a strong feedback regime for a single-electron tunneling device weakly coupled to an underdamped single-mode oscillator. In this regime, mechanical oscillations are generated and the current is strongly modified whereas the current noise is parametrically big with respect to the Poisson value. This regime requires energy dependence of the tunnel amplitudes. For sufficiently fast tunnel rates the mechanical contribution to current noise can exceed the Poisson value even beyond the strong feedback regime. O.Usmani, Ya. M. Blanter, Yu. V. Nazarov, cond-mat/0603017		
PS6.2	shekhter	robert	shekhter@fy.chalmers.se
	Mechanically Assisted Single-Electronics		
	The properties of nanocomposite materials are afected by coupling between mechanical deformations of the materials and electronic charge transport. In the simplest system, which is a single electron transistor (SET) with deformable tunnel-barriers (Nano-Electro-Mechanical SET, NEM-SET), mechanically assisted charge transfer becomes possible. This can be viewed as \"shuttling of single electrons\" between metallic leads by a movable small-sized cluster. In this talk we review diferent theoretical and experimental achievements on mechanicaly assisted transport of single electrons in NEM-SET tinneling devices.		
PS6.3	wan	yue-min	ymwan@isu.edu.tw
	Development of silicon-based single-electron transistor for room temperature operation		
	In this work, we will describe the development of uUltrathin oxide gated (thickness ~ 6 nm) single-electron transistor for room temperature operation. Both point-contact and nanopillar SETs will be discussed in detailed.		
PS6.4	do	van-nam	van-nam.do@ief.u-psud.fr
	Influence of a magnetic field on the electronic transport in resonant tunneling diodes		
	The non-equilibrium Green function technique is applied to analyze the electronic transport in resonant tunneling diodes (RTDs) with the presence of a barrier-surface-orthogonal magnetic field. The magneto-tunneling is investigated using the model of fully coherent transport. The obtained results show that the typical triangular form of the current is modified into the staircase-like shape. Consequently the multi-peaks of the differential conductance are observed. Particularly, the partition noise is also studied. We realize that the Fano factor can be suppressed below the one-half critical value depending on the magnetic intensity. Our simulation results suppose for the recent discussion that the strong suppression of noise is the evidence of the dominance of the coherent tunneling in RTDs.		
PS6.5	nguyen	van hieu	nvhieu@iop.vast.ac.vn
	Charge Distribution in Quantum Dot Based Nanodevices.		
	To be submitted		

PS6.6	ahn	kang-hun	ahnkh@cnu.ac.kr
	Nanomechanical Double Charge Shuttles; Symmetry-breaking electric current		
	We investigate the transport and the dynamical properties of tunnel-coupled double charge shuttles. The tunnel coupling gives rise to non-linear mechanical interactions between the shuttles. The oscillation frequencies of two shuttles are mode-locked to the applied oscillating voltages. We find that the symmetric double charge shuttle undergoes a bifurcation leading to two symmetry breaking states of non-zero direct electric currents in opposite signs. This rectification is due to the appearance of the asymmetric charging of the double charge shuttles caused by a novel dynamical instability.		
PS6.7	vu	ngoc tuoc	tuocvungoc@mail.hut.edu.vn
	POSSIBLE SUPPRESSION THE DIRECT TUNNELING CURRENT IN NITRIDE HETEROSTRUCTURE DEVICE By Vu Ngoc Tuoc (a), Nguyen Manh Thuong (b) (a)Institute of Engineering Physics (IEP), Hanoi University of Technology (HUT) (b)Center for Training of Talented training, Hanoi University of Technology (HUT)		
	GaN has emerged as a promising material for the high-speed, high-power device suitable for high-power microwave applications. However, GaN metal semiconductor field-effect transistor (MESFET) and AlGaN/GaN high electron mobility transistor (HEMT) devices suffer from high gate leakage current which reduces the reliability and efficiency of the devices prevents them reaching potential high-power levels. In such structures, the tunneling current is found to be the dominant contribution to the current at the heterointerface. In this work we developed a simulation tool for obtaining self-consistent solutions of the coupled system of Schrφdinger-Poisson equations and used Wentzel–Kramer–Brillouin (WKB) approximation to obtain the tunneling probability of the barrier from the metal to the channel region in a metal–polar semiconductor's heterostructure junction. By studying the possible introduction of alternating ultra thin capping from the GaN semiconductor alloy we shows that it ! can reduce the tunneling current density without affecting the sheet charge density or changing the circuit characteristics of the device significantly. This is of use in designing low gate leakage structures in the gate region of nitride heterostructure devices. Keyword: Nanoelectronics device, direct tunneling, Schφdinger-Poisson solver.		
PS6.8	meschke	matthias	meschke@boojum.hut.fi
	Observation of heat transport through a superconducting line		
	Electron gas in a normal metal conductor relaxes efficiently with lattice phonons, but this relaxation mechanism weakens drastically when the temperature is reduced [1]. This issue is particularly relevant for mesoscopic structures investigated at very low temperatures, i.e. around 50mK. Our present experiment [2] investigates the crossover between dominant electron-phonon coupling to a region at low temperatures, were heat is predominantly propagating by photon radiation, in our case along a superconducting line. In this region, thermal conductance is expected to be limited by the quantum of thermal conductance, $G_Q = \pi k_B^2 T/6\hbar$ [3]. Our experiment has implications on, e.g., performance and design of ultra-sensitive bolometers and electronic micro-refrigerators [4], whose operation is largely dependent on weak thermal coupling between the device and its environment. [1] M.L. Roukes, M.R. Freeman, R.S. Germain, R.C. Richardson, and M.B. Ketchen, Phys. Rev. Lett. 55, 422 (1985). [2] M. Meschke, W. Guichard, and J.P. Pekola, cond-mat/0605678. [3] D.R. Schmidt, R.J. Schoelkopf, and A.N. Cleland, Phys. Rev. Lett. 93, 045901 (2004). [4] F. Giazotto, T.T. Heikkilõ, A. Luukanen, A.M. Savin, and J.P. Pekola, Rev. Mod. Phys. 78, 217 (2006).		
PS6.9	pistolesi	fabio	fabio.pistolesi@grenoble.cnrs.fr
	Current fluctuations for AC forced charge shuttle		
	It has been shown that a single electron transistor where the central island can oscillate between two leads can act as a shuttle for the electrons. The stochastic fluctuation of the occupation induces an oscillating force that, in turn, forces the island to oscillate. The forcing force is thus generated by the oscillation itself. I will discuss the effect of an oscillating bias voltage on the dynamics and on the current fluctuations. We found that the system acts as a rectifier with a DC current strongly depending on the ratio of the forcing frequency to the resonance frequency of the mechanical part. This is in good qualitative agreement with the observations of D.V. Scheible and R. H. Blick, [Appl. Phys. Lett. 84, 4632 (2004)]. The development of the instability in presence of an AC and DC component will be also analyzed. I will then discuss current fluctuations for shuttle transport. In particular in the adiabatic limit for the AC field it is possible to obtain analytica! l expression. References: F. Pistolesi, Phy. Rev. B, 69 245409 (2004). F. Pistolesi and R. Fazio, Phys. Rev. Lett. 94, 036806 (2005). F. Pistolesi and R. Fazio, New Journal of Physics, invited paper to appear in the special issue on nanomechanics (2006).		

PS6.10	johansson	andreas	andreas.johansson@phys.jyu.fi
	Molecular Scale Memory Elements		
	The ongoing race to implement nano-scale materials such as single walled carbon nanotubes into logic devices is steadily making progress. One of the interesting applications of nanotubes would be to utilize their exceptional properties to create closely stacked non-volatile memory elements. We are studying the possibilities to create such a memory element by placing charge traps in the vicinity of a nanotube device. The aim is to place the charge traps at well calibrated distances from the nanotubes so that they can be addressed in a controlled way with high device reproducibility. I will present some general ideas of how to build, characterize, and implement a molecular scale memory element, and show our findings to date in this study.		
PS6.11	bui	tinh	buicongtinhk5@yahoo.com
	MAGNETOELASTIC NANOSTRUCTURED FeCoSiB RIBBON FOR NOVEL GENERATION OF SENSITIVE STRAIN SENSORS B.C. Tinh, N.H. Duc and D.T. Huong Giang Laboratory for Nano Magnetic Materials and Devices, Faculty of Physics Engineering and Nanotechnology, College of Technology, Vietnam National University, Hanoi Buiding E3, 144 Xuan Thuy Road, Cau Giay, Hanoi		
	Among basic principles for strain sensor’s community, the stress dependence of the magnetic permeability has been receiving an increasing interest. For this case, amorphous and/or nanostructured soft magnetic ribbons are good material candidates. This report deals with (Fe80Co20)78Si12B10 ribbon . The samples with thickness of 30 micrometers are prepared by using single-roll melt spinning equipment with a copper roll in an Argon environment. Microstructure, magnetic and magnetoelastic properties of ribbon are studied. The FESEM images show that the sample after annealed at low temperature (Ta < 623K) is nanostructure with a uniform grain size as small as 15 nanometers. At higher annealing temperature (Ta > 673K), the crystalline grains grow up to 30 nanometers. Ribbons in the nanostructured state are used as core materials in the self-induction or multual-induction coils. Then, the strain can be indirectly determined by measuring the inductance (L) or the multual in! ductance (M). For strain sensor application, it is found that the ribbons of small nanocrystallites will favor for linear stress dependence of output signal (L and M) with higher sensitivity rather than that of bigger grain size. This is globally considered in the relation between magnetic, magnetoelastic and microstructure properties of the ribbons. This material is very promising for a novel generation of strain sensing applications.		
PS6.13	poiroux	thierry	thierry.poiroux@cea.fr
	MOS transistors for 32nm technology node and beyond: requirements, potential solutions and challenges		
	The International Technology Roadmap for Semiconductors forsees sub 20-nm gate length devices by 2010. In order to maintain the performance improvement trend that made the success of MOS technologies, these ultra short transistors will require on one hand enhanced transport properties and, one the other hand, an improved electrostatics control of the channel. Thus, as the scaling of classical CMOS is approaching its limits, several major changes are needed at material and also device architecture levels. We will thus discuss in a first part the requirements for future MOSFET technologies. Then, we will discuss the solutions that are envisaged at device level, focusing in particular of the challenges associated to the fabrication of multiple gate transistors.		

PS6.17	nguyen	hai	nhhai@vnu.edu.vn
	Magnetic fluids: preparation, properties, and applications B– researches at Vietnam National University, Hanoi		
	Revival in research of magnetic fluids (MFs) is due to their promising applications in physical, biological, and environmental sciences when the nanoworld can be manipulated. This paper reports researches of Vietnam National University, Hanoi on magnetic fluids. Magnetic Fe3O4 (magnetite) nanoparticles have been prepared by coprecipitation and microemulsion method. The particle size of 10 – 30 nm could be controlled by the content of the reactant ions and portion of water/surfactant in the coprecipitation and microemulsion technique, respectively. Magnetite nanoparticles (MNPs) produced under N2 showed much higher saturation magnetization compared to that of particles produced under ambient conditions. The nanoparticles were coated by a single layer (core/oleic acid or core/polyisobutylene-polysuccinimide) or double layers of surfactants (core/oleic acid (OA)/sodium dodecyl sulfate (SDS)). They were dispersed in a nonpolarized (hexane) or an aqueous solution (water) to have ! MFs. Mechanism of oxidation resistance of nanoparticles was studied systematically. Three protection methods which have been proposed were high viscosity of the carrier liquid, relevant surfactant coating particles, and doping effect of Fe2+ by Co2+ or Ni2+. The superparamagnetic behavior of MNPs have been examined with theoretical results taking into account of polydisperse of particle size and anisotropic nature of magnetite. Magnetite nanoparticles were used for biological application in which hydrophobic antibiotic chloramphenicol was used as a drug to study loading and release ability of the double layer coated nanoparticles. Escherichia coli (E.coli) were used as host bacteria to investigate the effect of the drug release process. Principle for loading is that the hydrophobic affinity helps the drug molecules stay in between of the two layers of surfactants. Drug release is diffusion due to the gradient of concentration of the drug in between two layers of surfactants! and the surrounding environment. The killing effects of chlor! amphenic ol-coated magnetite nanoparticles changing with time was evaluated by measuring the diameter of circle in which E.coli colonies could not grow on agar plate due to the diffusion of the antibiotic. It is shown that the diameter of the non-colony circle gained maximal value at the first day and gradually decreased, which was detectable even after 45 hours while no circle could be detected after 45 hours in case of the control water-soluble chloramphenicol. The conclusion is that magnetic nanoparticles was biocompatible and they maintain the effect of the drug longer than that in the case without magnetic nanoparticles. For environmental application, magnetic nanoparticles were used to assist purifying wastewater. Combining magnetite nanoparticles with Al2(SO4)3 emulsion to precipitate dirt from wastewater taken from Sıt river (a highly contaminated river in Hanoi). We found that magnetic nanoparticles help the precipitation process of dirt occur 100 times faster than that usin! g gravitational separation and 10 times faster than that using Al2(SO4)3 emulsion without nanoparticles.		
PS6.18	phan	ngoc minh	minhpn@ims.vast.ac.vn
	Utilization of Individual Carbon Nanotube for Electron Field Emitters and Near-field Scanning Probes		
	Currently, there are two approaches in carbon nanotube (CNTs) research and development: (i) utilization of large quantity CNTs for application in field emission display, advanced nanocomposite materials, electrical and thermal conductors for energy storage, nano-biotechnology, etc; (ii) utilization of individual CNT for application in such as advanced scanning probe microscopy, advanced electron field emitter, electronic devices. The application of the individual CNT is very interesting and promising. However, technological problems in making such devices still remain. In this presentation, we present our approach on utilization of individual CNT on Si and metallic tips for near-field scanning probes and electron field emitters. Individual CNTs were successfully grown on the Si tips by using an ˝§electric field enhanced hot-filament CVD˝¨ process. Such CNT/Si tips have been successfully utilized for advanced atomic force microscopy probes. Electron field emission of the CNT/Si tip was also measured with a threshold field of 4 V/ƒέm that is very much lower than that of the Si tip itself. The growth mechanism of the CNT on the Si tip was clarified where the surface bonding on the tip was taken into consideration. The CNTs were also grown on W nanotips using a ˝§self-heating CVD˝¨ process. Electron field emission and thermal-field emission were measured. Such devices are potentially applicable for advanced Schottky emitters and advanced scanning tunneling microscopy probes as well.		
PS6.19	buks	eyal	eyal@ee.technion.ac.il
	MASS DETECTION WITH NONLINEAR NANOMECHANICAL RESONATORS		
	Nanomechanical resonators having small mass, high resonance frequency and low damping rate are widely employed as mass detectors. We study the performances of such a detector when the resonator is driven into a region of nonlinear oscillations [1]. We predict theoretically that in this region the system acts as a phase-sensitive mechanical amplifier. This behavior is exploited to experimentally demonstrate strong intermodulation amplification [2] and noise squeezing [3] in the output signal of such a detector. We show that mass sensitivity of the device in this region may exceed the upper bound imposed by thermo-mechanical noise upon the sensitivity when operating in the linear region. On the other hand, we find that the high mass sensitivity is accompanied by a slow response of the system to a change in the mass. References: [1] Eyal Buks and Bernard Yurke, 'Mass Detection with Nonlinear Nanomechanical Resonator ', arXiv: quant-ph/0606081. [2] R. Almog, S. Zaitsev, O. Shtempluck, E. Buks, 'High intermodulation gain in a micromechanical Duffing resonator ', Appl. Phys. Lett. 88, 213509 (2006). [3] R. Almog, S. Zaitsev, O. Shtempluck, E. Buks, 'Noise Squeezing in a Nanomechanical Duffing Resonator ', arXiv: cond-mat/0607055.		

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PS7: Quantum Hall effect and Graphene

PS7.1	novoselov	kostya	kostya@manchester.ac.uk	
	QED in a Pencil Trace			
	Quantum electrodynamics (resulting from the merger of quantum mechanics and relativity theory) has provided a clear understanding of phenomena ranging from particle physics to cosmology and from astrophysics to quantum chemistry. The ideas underlying quantum electrodynamics also influence the theory of condensed matter, but quantum relativistic effects are usually minute in the known experimental systems that can be described accurately by the non-relativistic Schr\\\"{o}dinger equation. Here we report an experimental study of a condensed-matter system (graphene, a single atomic layer of carbon) in which electron transport is essentially governed by Dirac's (relativistic) equation. The charge carriers in graphene mimic relativistic particles with zero rest mass and have an effective 'speed of light' $c_*\\approx10^6$ m/s. Our study reveals a variety of unusual phenomena that are characteristic of two-dimensional Dirac fermions. In particular we have observed the following: first, graphene's conductivity never falls below a minimum value corresponding to the quantum unit of conductance, even when concentrations of charge carriers tend to zero; second, the integer quantum Hall effect in graphene is anomalous in that it occurs at half-integer filling factors; and third, the cyclotron mass mc of massless carriers in graphene is described by $E=m_c c_*^2$. This two-dimensional system is not only interesting in itself but also allows access to the subtle and rich physics of quantum electrodynamics in a bench-top experiment.			
PS7.2	braggio	alessandro	braggio@fisica.unige.it	
	Current moments of fractional Hall quasiparticles through an antidot			
	The statistics of tunneling current is studied in a fractional quantum Hall antidot geometry. A comparison between Fano factor and skewness is proposed to distinguish the charge of the carriers irrespectively of non-universal exponents in single-quasiparticle propagators. Various regimes are considered in order to address different statistics for the transport process. Non-Fermi liquid properties generate positive correlations in the shot noise limit of the Fano factor. Possible experimental consequences are discussed.			

PS7.3	schopfer	félicien	felicien.schopfer@lne.fr	
	Recent developments in the metrological application of the quantum Hall effect			
	A metrological application of the quantum Hall effect (QHE) came in the mind of the Physicists as soon as it has been discovered in 1980. After they demonstrated its reproducibility and that it does not depend on the material or geometry device with a relative uncertainty as low as some parts in 10^10, metrologists decided to use QHE to realize the primary standard of electrical resistance. Today, due to a dedicated and high resolution instrumentation, based notably on cryogenic current comparators, it is possible to determine currently the resistance of a material standard with a relative uncertainty of some parts in 10^9 by comparison with a Hall resistance quantized on the i=2 plateau at the value RK/2 (where RK is the von Klitzing constant, equal to 25812.807 (1 +/- 10^(-7)) ohms). In the best metrological QHE devices, the only plateaus where the Hall resistance is quantized precisely enough to allow a metrological application are the i=2 and i=4 ones. Hence the quantum ! resistance standards realized in a single Hall bar present only the values RK/2 or RK/4. The most recent breakthrough in the QHE metrology, comes from the application of the multiple connexion technique. This latter, whose principle is based on fundamental properties of the QHE, consist in making redundant links between multiterminal QHE devices connected in series or parallel array. It allows to reduce to a negligible level the contacts and links resistances and consequently allows to consider the array equivalent to a quantum resistor from which it is possible to define and measure a very well quantized four-terminal resistance. Using this technique it is possible to design quantum resistance standards presenting various and adjusted values. Actually, we have succeeded in fabricating arrays whose values extend from RK/200 (100 Hall bars in parallel) to 50RK (100 Hall bars in series) and that we have been measured perfectly quantized with a relative uncertainty which can be as low as one part in 10^9. This new generation of quantum resistance standards, shorte! ning the calibration chain from QHR to resistors with usual values, allows to improve the accuracy of these calibrations. Another elegant application of the multiple connection technique is the comparison of four QHR in a Wheatstone bridge structure. By measuring the balancing current of a lithographically defined QHE Wheatstone bridge we have demonstrated the possibility to test the agreement between four QHR with a relative uncertainty of some parts in 10^11. These results pioneer a new generation of experimental tests of the QHE universality with an accuracy never achieved so far. The success of the universality tests undertaken is of capital importance in the context of the definition of a new international system of units (SI) based on the fundamental constants of Physics (h the Planck constant, e the charge of the electron, c the celerity, kB the Boltzmann constant). In fact it will reinforce the confidence in the theoretical equality $RK=h/e^2$ and will hence allow to link the electrical resistance unit, expressed in terms of RK using QHE, to the constants h and e. The idea of the definition of a new SI based on the fundamental constants arises from a recent evolution of the metrology: the dematerialization of the classical standards which represent the base units by the use of quantum physics effects, which link measurable quantities with these constants. In the context of the establishment of the new SI, the QHE universality tests undertaken are completed with other experiments in our lab: a determination of RK using a Thompson-Lampard type calcul! able capacity standard, the metrological triangle and the watt balance. The metrological triangle experiment which consists in applying the ohm law with the quantum realization of the three quantities involved (voltage realized from the Josephson effect (JE), resistance from QHE and current from an electron pump based on single electron tunnelling (SET)), is a test of the coherence of the constants involved in the three effects JE, QHE and SET. One of the aims of the watt balance experiment is to dematerialize the kilogram standard, last material representation of all the base units, in linking it to electrical units and consequently to the fundamental constants.			
PS7.4	von klitzing	klaus	klitzing@fkf.mpg.de	
	Nanoelectronics: from basic research to new applications			
	K. von Klitzing*, Max Planck Institut fór Festkφrperforschung, D-70569 Stuttgart, Germany The transition from micro- to nanoelectronics is not only an extrapolation to smaller dimensions on the basis of scaling laws but a quantum leap with new phenomena and unexpected device properties. The confinement of electrons in two- one – and zero-dimensional systems together with an additional localization due to a strong magnetic field leads to drastic variations in the electronic and optical properties of these systems with the potential of new applications. The quantum Hall effect was one of these unexpected discoveries which opened a new research field and the talk summarizes the most important applications connected to this phenomenon. In addition some of the more recent discoveries in the field of low dimensional electron systems which may lead to a new type of dc voltage transformer, a frequency selective THz detector or a three terminal quantum dot device will be discussed. * in cooperation with J.Smet, I.Kukushkin, C.Jiang, W.Dietsche, R.Wiersma, J.Weis, and A.Welker			
PS7.5	orgad	dror	orgad@phys.huji.ac.il	
	The Tomonaga-Luttinger Model and the Chern-Simons Theory for the Edges of Multi-layer Fractional Quantum Hall Systems			
	Wen\'s chiral Tomonaga-Luttinger model for the edge of an m-layer quantum Hall system of total filling fractor nu=m/(pm +- 1) with even p, is derived as a random-phase approximation of the Chern-Simons theory for this state. The theory allows for a description of edges both in and out of equilibrium, including their collective excitation spectrum and the tunneling exponent into the edge. While the tunneling exponent is insensitive to the details of a nu=m/(pm + 1) edge, it tends to decrease when a nu=m/(pm - 1) edge is taken out of equilibrium. The applicability of the theory to fractional quantum Hall states in a single layer is discussed.			