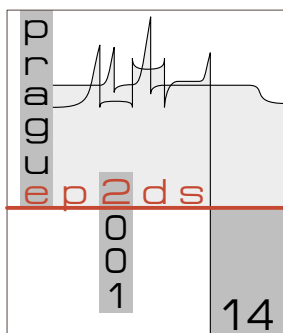


Proceedings of the Fourteenth International Conference on the Electronic Properties of Two-Dimensional Systems

EP2DS-14

held in Praha, Czech Republic
30 July – 3 August, 2001



Guest Editors:

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Preface

This volume contains 233 papers presented at the Fourteenth International Conference on the Electronic Properties of Two-Dimensional Systems (EP2DS-14), which was held in Praha, Czech Republic, at the hotel Pyramida and the nearby hostel Kajetánka, a facility of Charles University, from 30 July to 3 August 2001. It was attended by 376 participants from 33 countries. There were 13 invited talks, and another 293 contributions were selected by the Programme Committee from 492 submitted abstracts. As the selection process was far from perfect, we believe that the presented contributions make a representative cross section of recent works in the main topics of the Conference.

The EP2DS-14 conference was the fourteenth in the biennial series which was launched in Providence, Rhode Island, in 1975 and has continued to rotate between North America, Europe and Japan. The EP2DS community has remained to be, we believe, one of the most important ones in the semiconductor physics. It has meanwhile grown in size, and significant changes have also taken place in subjects of scientific interest. The focus of EP2DS conferences is now the fundamental physics related not only to two-dimensional electron systems, but also to one- and zero-dimensional systems. We were pleased to host the Conference on behalf of the European scientific community in the first year of the third millennium. It was wide in scope. The main attention was paid, in particular, to quantum Hall systems — especially ferromagnets, magnetic semiconductors, effects related to spin-orbit interactions, nuclear spin involved effects, localization and metal-insulator transitions, transport in laterally modulated systems, Kondo effect and spin blockade in quantum dots, real space and k -space mapping and various hybrid structures.

We have much pleasure in thanking several organizations and companies, in particular to

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for their support, and to

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for their sponsorship. Without this help, the Conference could not have been organized the way it was. We also wish to thank all members of the International Programme Committee for a really difficult work of selecting the papers, as well as all members of the International Advisory Committee for invaluable advice given to us, at various stages, on various aspects of the Conference. These colleagues have definitely ensured a well-conceived scope of the conference and the high quality of the presented contributions. We also thank the referees for reviewing the papers, which has, after all, enabled the publication of the present volume. Last but certainly not least, we would like to thank all conference participants who contributed significantly to a friendly scientific atmosphere during the Conference.

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- EP-0453 **J. Ebbecke**, K. Pierz, F.J. Ahlers: *Influence of the shape of a quasi-one-dimensional channel on the quantized acousto-electric current*
- EP-0384 **M.E. Portnoi** and V.M. Apalkov: *Electron-phonon interaction in a two-subband quasi-2D system in quantizing magnetic field*
- EP-0566 **F. Schulze-Wischeler**, U. Zeitler, F. Hohls, R.J. Haug, D. Reuter and A.D. Wieck: *Phonon excitation of a two-dimensional electron system around $\nu = 1$*
- EP-0028 **R. Fletcher**, M. Tsaousidou, P.T. Coleridge, Y. Feng and Z.R. Wasilewski: *Electron-phonon coupling and phonon drag thermopower of a very low mobility 2DEG*
- EP-0633 **E.M. Höhberger**, R.H. Blick, F.W. Beil, W. Wegscheider, M. Bichler and J.P. Kotthaus: *Magnetotransport in freely suspended two-dimensional electron systems for integrated nanomechanical resonators*
- EP-0651 D. Romanov, **V. Mitin** and M. Stroscio: *Polar surface vibration strips on GaN/AlN quantum dots and their interaction with confined electrons*

9 Optical properties of two-dimensional systems

- EP-0195 **P. Hawrylak**, F.J. Teran, M. Potemski, G. Karczewski: *Band-gap renormalization and photoluminescence from an interacting two-dimensional electron gas in a magnetic field*
- EP-0656 **H.A. Nickel**, T. Yeo, C.J. Meining, A.B. Dzyubenko, M. Furis, D.R. Yakovlev, B.D. McCombe and A. Petrou: *Interaction of an electron gas with photoexcited electron-hole pairs in modulation-doped GaAs and CdTe quantum wells*
- EP-0614 **S. Maćkowski**, G. Karczewski, and J. Kossut: *Optical properties of CdTe/ZnTe quantum dot superlattices*
- EP-0595 **C.M. Townsley**, Y.H. Kim, R.J. Nicholas, K.A. Prior and B.C. Cavenett: *Anomalous g-factors and diamagnetic shifts of biexcitons in ZnS quantum wells*
- EP-0407 **W. Ossau**, D.R. Yakovlev, G.V. Astakhov, A. Waag, C.J. Meining, H.A. Nickel, B.D. McCombe and S.A. Crooker: *High magnetic field optical studies of 2DEG in modulation doped ZnSe quantum wells*
- EP-0224 **M. Hayne**, T. Vanhoucke, M. Henini and V.V. Moshchalkov: *Magnetophotoluminescence of positively-charged excitons in GaAs quantum wells*
- EP-0523 **C. Bardot**, M. Potemski, G. Martinez, A. Riedel, R. Hey and K.J. Friedland: *Intrinsic magnetophotoluminescence of a two dimensional electron gas with high concentration and mobility in a symmetric quantum well*
- EP-0466 **B.M. Ashkinadze**, V. Voznyy, E. Cohen, Arza Ron and V. Umansky: *Magnetic field induced evolution from bulk exciton to 2DEG – free hole luminescence in modulation doped heterojunctions*
- EP-0019 A. Qarry, R. Rapaport, G. Ramon, **E. Cohen**, Arza Ron, A. Maan and L.N. Pfeiffer: *Magnetic field effect on the free electron - exciton scattering in GaAs/AlGaAs bare quantum wells and in microcavities*
- EP-0591 **T. Takamasu**, S. Takagi, Y. Imanaka and G. Kido: *Photoluminescence spectra measured in the quantum Hall system with different well width samples*
- EP-0005 **H.P. van der Meulen**, J.M. Calleja, J. Sanchez, R. Hey, K.J. Friedland and K. Ploog: *Anomalous magneto-optical properties of a two-dimensional electron gas around integer filling factors*
- EP-0574 **A.S. Plaut**, A. Pinczuk, B.S. Dennis, C.F. Hirjibehedin, L.N. Pfeiffer and K.W. West: *Optical investigation of high-mobility dilute two-dimensional hole gases in GaAs (311)A quantum structures*
- EP-0135 **C. Riva**, F.M. Peeters, K. Varga: *Theory of Trions in quantum wells*
- EP-0121 L.C.O. Dacal and **J.A. Brum**: *Effects of an electron gas on the negative trion in semiconductor quantum wells*
- EP-0438 **M.R. Singh** and J. Desforges: *Excitons formation from spatially separated electrons and holes in semiconductor nanostructures with disorder*
- EP-0427 N.A. Fromer, **C. Schüller**, D.S. Chemla, T.V. Shahbazyan, I.E. Perakis, D. Driscoll and A.C. Gossard: *Femtosecond dynamics of inter-Landau level excitations of a two dimensional electron gas in the quantum Hall regime*
- EP-0378 **S.-J. Cheng** and R.R. Gerhardts: *New collective modes in wide quantum wells with in-plane magnetic fields*

- EP-0355 D. Porras, J. Fernández-Rossier and **C. Tejedor**: *Coherent control and four wave-mixing of Fermi edge singularities in doped quantum wells*
- EP-0258 **D. Schneider**, F. Hitzel, A. Schlachetzki, P. Boensch: *Dependence of electron effective mass on the subband occupation in $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}/\text{InP}$ quantum wells*
- EP-0243 K. Shibata, **N. Kotera**, H. Arimoto, N. Miura, Yongjie Wang, E.D. Jones, J.L. Reno, M. Washima, T. Mishima: *Study of band nonparabolicity using electron cyclotron resonance of $\text{InGaAs}/\text{InAlAs}$ quantum wells below 100 Tesla*
- EP-0674 **M. Vitzethum**, R. Schmidt, P. Kiesel, P. Schafmeister, J. Koch, D. Reuter, A.D. Wieck and G.H. Döhler: *A novel photoconductive detector for single photon detection*
- EP-0432 **L.V. Kulik**, I.V. Kukushkin, V.E. Kirpichev, J.H. Smet, K. von Klitzing, V. Umansky, W. Wegscheider: *Cyclotron spin-flip excitations in the 2D-electron system*
- EP-0390 H. Aikawa, **S. Takaoka**, K. Oto, K. Murase, T. Saku, Y. Hirayama, S. Shimomura and S. Hiyamizu: *In-plane magnetic field dependence of cyclotron resonance in two-dimensional electron systems*
- EP-0568 **C. Faugeras**, J. Zeman, D.K. Maude, M. Potemski, G. Martinez, A. Riedel, R. Hey, K.J. Friedland: *Magneto infrared absorption and polaron coupling in high electron density GaAs quantum well*

10 Localization and metal-insulator transitions

- EP-0463 **M.E. Gershenson**, V.M. Pudalov, H. Kojima, N. Butch, E.M. Dizhur, G. Brunthaler, A. Prinz and G. Bauer: *Crossed magnetic fields technique for studying spin and orbital properties of 2d electrons in the dilute regime*
- EP-0088 **T. Heinzl**, R. Jäggi, M. von Waldkirch, E. Ribeiro, K. Ensslin, S.E. Ulloa, G. Medeiros-Ribeiro and P.M. Petroff: *Transport signatures for correlated disorder in self-assembled InAs quantum dots on GaAs*
- EP-0638 **A.K. Savchenko**, Y.Y. Proskuryakov, S.S. Safonov, S.H. Roshko, M. Pepper, M.Y. Simmons, D.A. Ritchie, A.G. Pogosov, Z.D. Kvon: *Fermi-liquid behaviour near the crossover from ‘metal’ to ‘insulator’ of 2D electron and hole systems*
- EP-0317 **C. Possanzini**, L. Ponomarenko, D. de Lang, A. de Visser, S.M. Olsthoorn, R. Fletcher, Y. Feng, P.T. Coleridge, R.L. Williams and J.C. Maan: *Scaling behavior of metal-insulator transitions in a Si/SiGe two-dimensional hole gas*
- EP-0479 S. Bogdanovich and **D. Popović**: *Glass transition in a two-dimensional electron system in silicon*
- EP-0481 **V. Dobrosavljević** and A.A. Pastor: *Glassy behavior of electrons as a precursor to the localization transition*
- EP-0280 **J. Jaroszyński**, D. Popović and T.M. Klapwijk: *Low-frequency resistance noise studies across the metal-insulator transition in silicon MOSFETs*
- EP-0431 **A. Lewalle**, M. Pepper, C.J.B. Ford, D.J. Paul, N. Griffin, B.P. Coonan, G. Redmond and G.M. Crean: *Investigation of the zero-field 2D “metallic” state with r_s and k_{F} controlled independently*
- EP-0014 T. Yeo, **B.D. McCombe**, B.M. Ashkinadze and L.N. Pfeiffer: *Metal-insulator transition of spatially separated electrons and holes in mixed type I-type II GaAs/AlAs quantum wells*
- EP-0459 **A.A. Shashkin**, S.V. Kravchenko, V.T. Dolgoplov and T.M. Klapwijk: *Possible ferromagnetic instability in a dilute 2D electron system*
- EP-0073 **V. Kagalovsky**, B. Horovitz and Y. Avishai: *Random matrix theory and metal-insulator transition in disordered superconductors*
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- EP-0288 I.V. Gornyi, **A.D. Mirlin** and P. Wölfle: *Current correlations and quantum localization in a random or homogeneous magnetic field*
- EP-0549 **H. Kobori**, N. Hatta, M. Kawaguchi and T. Ohyama: *Magnetic-field-induced two- to three-dimensional transition in weak localization and weak anti-localization regimes for $\text{In}_2\text{O}_{3-x}$ thin films*
- EP-0643 C.E. Yasin, **M.Y. Simmons**, A.R. Hamilton, N.E. Lumpkin, R.G. Clark, L.N. Pfeiffer and K.W. West: *The fate of quantum Hall extended states as $B \rightarrow 0$ and the possibility of a 2D metal*
- EP-0316 A.L.C. Pereira and **P.A. Schulz**: *Extended state floating up in a lattice model: Bona fide levitation fingerprints, irrespective of the correlation length*

- EP-0341 T. Koschny and **L. Schweitzer**: *Influence of correlated disorder potentials on the levitation of current carrying states in the quantum Hall effect*
- EP-0370 **Gil-Ho Kim**, J.T. Nicholls, C.-T. Liang, D.A. Ritchie, and S.I. Khondaker: *Insulator-quantum Hall liquid transitions in a two-dimensional electron gas using self-assembled InAs dots*
- EP-0349 **K. Buth**, M. Widmann, U. Merkt, E. Batke and K. Eberl: *Percolation of quantum Hall droplets in intentionally disordered GaAs/GaAlAs heterojunctions*
- EP-0510 **D.T.N. de Lang**, L. Ponomarenko, A. de Visser, C. Possanzini, S.M. Olsthoorn and A.M.M. Pruisken: *Evidence for a quantum Hall insulator in an InGaAs/InP heterostructure*
- EP-0565 **F. Hohls**, U. Zeitler and R.J. Haug: *Variable-range hopping in the quantum Hall regime*
- EP-0284 U. Zülicke, **E. Shimshoni**: *Localization of the Hall resistivity at high magnetic fields: Absence of the quantized Hall insulator*

11 Quantum wires and contacts

- EP-0504 **M.A. Topinka**, B.J. LeRoy, R.M. Westervelt, K.D. Maranowski and A.C. Gossard: *Imaging coherent electron wave flow in a two-dimensional electron gas*
- EP-0599 **K. Ueno**, M. Eto and K. Kawamura: *Interband scattering at metallic nano-junctions*
- EP-0659 **L. Worschech**, S. Reitzenstein, M. Kesselring, A. Schliemann and A. Forchel: *Coherent and ballistic switching effects in GaAs/AlGaAs nanojunctions*
- EP-0362 **T. Ihn**, J. Rychen, T. Cilento, R. Held, K. Ensslin, W. Wegscheider and M. Bichler: *Scanning gate measurements on a quantum wire*
- EP-0363 **R. Crook**, C.G. Smith, M.Y. Simmons and D.A. Ritchie: *Imaging electrostatic microconstrictions in long 1D wires*
- EP-0608 **I.A. Larkin**, J.H. Jefferson and A.V. Vagov: *Ballistic transport of electrons in a long single-mode 1-D channel*
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- EP-0046 **K.J. Thomas**, J.T. Nicholls, D.R. Mace, M.Y. Simmons, D.A. Ritchie and M. Pepper: *Effect of temperature and magnetic field on the 0.7 structure in a ballistic one-dimensional wire*
- EP-0109 **Y. Tokura** and A. Khaetskii: *Towards a microscopic theory of the 0.7 anomaly*
- EP-0047 **H. Buhmann** and L.W. Molenkamp: *1D diffusion: A novel transport regime in narrow 2DEG channels*
- EP-0309 **H.-S. Sim**, G. Ihm, N. Kim, S.J. Lee and K.J. Chang: *Edge-channel transport through quantum wires with a magnetic quantum dot*
- EP-0458 J. Rubio, C. Pascual, A. Pinczuk, B.S. Dennis, L.N. Pfeiffer, K.W. West and **J.M. Calleja**: *Optical study of the one-dimensional electron gas in cleaved-edge-overgrown semiconductor quantum wires*
- EP-0554 **M. Yamamoto**, M. Stopa, Y. Tokura, Y. Hirayama and S. Tarucha: *Coulomb drag between quantum wires: Magnetic fields and negative anomaly*
- EP-0015 D. Boese, M. Governale, A. Rosch, **U. Zülicke**: *Magnetotunneling between parallel quantum wires: From coherent oscillations to spin-charge separation*
- EP-0361 **J. Haruyama**, I. Takesue and T. Hasegawa: *Anti-localization caused by slight doping of heavy-mass impurities in carbon nanotubes and a novel spintronics device*
- EP-0181 **O.V. Kibis**: *Electronic phenomena in chiral carbon nanotubes in presence of a magnetic field*
- EP-0100 **I. Milošević**, T. Vuković, S. Dmitrović and M. Damnjanović: *Electro-optical properties of single-walled Carbon nanotubes*
- EP-0672 **G. Cuniberti**, R. Gutierrez, G. Fagas, F. Grossmann, K. Richter and R. Schmidt: *Fullerene based devices for molecular electronics*

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- EP-0367 **J. Nitta**, T. Koga, and H. Takayanagi: *Interference of Aharonov-Bohm ring structures affected by spin-orbit interaction*
- EP-0555 **Jeng-Bang Yau**, E.P. De Poortere and M. Shayegan: *Aharonov-Bohm oscillations measured in two-dimensional GaAs holes*
- EP-0308 **N.T. Bagraev**, A.D. Bouravleuv, W. Gehlhoff, V.K. Ivanov, L.E. Klyachkin, A.M. Malyarenko, S.A. Rykov, I.A. Shelykh: *Spin-dependent single-hole tunneling in self-assembled silicon quantum rings*
- EP-0648 Z. Xie and **S.A. Lyon**: *4-terminal reflection and transmission in an Aharonov-Bohm ring*
- EP-0298 **A.E. Hansen**, A. Kristensen, S. Pedersen, C.B. Sørensen, and P.E. Lindelof: *Decoherence in Aharonov-Bohm rings*
- EP-0477 **A.W. Holleitner**, H. Qin, R.H. Blick, K. Eberl and J.P. Kotthaus: *Aharonov-Bohm oscillations for charge transport through two parallel quantum dots*
- EP-0534 A.A. Bykov, **O. Estibals**, I.V. Marchishin, L.V. Litvin, A.K. Bakarov, A.I. Toropov, D.K. Maude and J.C. Portal: *Small ring interferometer on the basis of a GaAs quantum well with a high density 2D electron gas*
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- EP-0209 A. Emperador, M. Pi, **M. Barranco** and E. Lipparini: *Spin features in the Raman spectrum of nanoscopic rings*
- EP-0038 **S.E. Ulloa**, A.O. Govorov, A.V. Kalameitsev, R. Warburton and K. Karrai: *Magnetoexcitons in quantum-ring structures: a novel magnetic interference effect*

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- EP-0273 **P.C. Main**, A. Patanè, R.J.A. Hill, A. Levin, L. Eaves, M. Henini, D.G. Austing, S. Tarucha, Yu.V. Dubrovskii and E.E. Vdovin: *Mapping the wave functions in quantum dots*
- EP-0630 **I. Hapke-Wurst**, U. Zeitler, R.J. Haug and K. Pierz: *Mapping the g-factor anisotropy of InAs self-assembled quantum dots*
- EP-0637 **S. Sasaki**, Y. Kitamura, W. Izumida, K. Ono, S. Tarucha: *The Kondo effect in a one- and two-electron quantum dot*
- EP-0313 R. López, R. Aguado, **G. Platero** and C. Tejedor: *Transport in quantum dots in the Kondo regime under the influence of an AC potential*
- EP-0578 **Z.D. Kvon**, O. Estibals, A.Y. Plotnikov, J.C. Portal, A.I. Toropov and J.L. Gauffier: *Single-electron conductance oscillations of small open quantum dot*
- EP-0541 **A.L. Chudnovskiy** and S.E. Ulloa: *Kondo effect in a two-level quantum dot coupled to an external fermionic reservoir*
- EP-0529 **S.I. Erlingsson**, Yu.V. Nazarov and V.I. Fal'ko: *Hyperfine-mediated spin-flip transitions in GaAs quantum dots*
- EP-0626 **S.J. Geer**, A.G. Davies, C.G. Smith, L.D. Macks, W.R. Tribe, E.H. Linfield, C.A.G. Jones and D.A. Ritchie: *Investigation of an open quantum dot with a Coulomb blockade quantum dot detector*
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- EP-0506 **B. Hackens**, C. Gustin, V. Bayot and M. Shayegan: *Evidence for spin-orbit effects in an open ballistic quantum dot*
- EP-0503 **G. Kießlich**, A. Wacker and E. Schöll: *Sequential tunneling through an array of electrostatically coupled quantum dots*
- EP-0154 **V. Ryzhii**: *Negative differential infrared photoconductivity in quantum-dot structure*
- EP-0502 **Yu.N. Khanin**, E.E. Vdovin, L. Ponomarenko and K.S. Novoselov: *Resonant tunnelling via states of the X-related donors located at different atomic layer in AlAs barrier*
- EP-0374 **J. Königmann**, P. König, E. McCann, V.I. Fal'ko, R.J. Haug: *Correlations in the local density of states probed by single electron tunneling*
- EP-0475 **O.M. Bulashenko**, J.M. Rubí: *Shot noise as a tool to probe an electron energy distribution*
- EP-0596 S.H. Roshko, S.S. Safonov, **A.K. Savchenko**, W.R. Tribe and E.H. Linfield: *Suppressed shot noise in 1D and 2D electron transport via localized states*
- EP-0375 **A. Nauen**, J. Königmann, U. Zeitler, F. Hohls, R.J. Haug: *Shot noise in tunneling through single localized states*
- EP-0314 M.K.K. Nakaema, M.J.S.P. Brasil, **F. Iikawa**, E. Ribeiro, T. Heinzl, K. Ensslin, G. Medeiros-Ribeiro, P.M. Petroff and J.A. Brum: *Micro-photoluminescence of self-assembled quantum dots in the presence of an electron gas*
- EP-0467 **A. Wismolek**, M. Potemski, V. Thierry-Mieg, R. Planel: *Single-dot-like emission induced by high magnetic fields*

- EP-0590 **M. Tadić** and F.M. Peeters: *Electronic structure of the valence band in cylindrical strained InP/InGaP quantum dots in an external magnetic field*
- EP-0623 **S.A. Mikhailov**: *Few-electron quantum dots and disks in zero magnetic field: Possible indications on a liquid-solid transition*
- EP-0241 **J. Kainz**, S.A. Mikhailov, A. Wensauer and U. Rössler: *Ground state energies of quantum dots in high magnetic fields: A new approach*
- EP-0342 **R. Krahne**, V. Gudmundsson, Ch. Heyn and D. Heitmann: *Inter-dot interaction in an array of elliptical quantum dots*
- EP-0346 **D.G. Austing**, S. Sasaki, K. Muraki, K. Ono, S. Tarucha, M. Barranco, A. Emperador, M. Pi and F. Garcias: *Influence of mismatch on the addition energy spectra of vertical diatomic artificial molecules*
- EP-0526 **M. Bayer**, G. Ortner, A. Larionov, V. Timofeev, A. Forchel, P. Hawrylak, K. Hinzer, M. Korkusinski, S. Fafard and Z. Wasilewski: *Entangled exciton states in quantum dot molecules*
- EP-0634 **D. Sánchez**, L. Brey and G. Platero: *Canted phase in artificial molecules*
- EP-0042 **K. Král**, Z. Khás, P. Zdeněk, M. Čerňanský and C.Y. Lin: *Relaxation of electron energy in polar semiconductor double quantum dot*

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- EP-0267 **A. Richter**, P. Baars, U. Merkt: *Supercurrents in two-dimensional electron systems*
- EP-0530 **J. Eroms**, M. Tolkieln, D. Weiss, U. Rössler, J. de Boeck and S. Borghs: *Chaotic motion and suppression of commensurability effects in an Andreev antidot billiard*
- EP-0319 **H. Takayanagi**, T. Akazaki, M. Kawamura, Y. Harada, J. Nitta: *Superconducting junctions using AlGaAs/GaAs heterostructures with high H_{c2} NbN electrodes*
- EP-0322 **J.S. Correa**, T.A. Eckhause, E.G. Gwinn and M. Thomas: *Temperature dependence of critical currents in Nb/InAs/Nb Josephson junction arrays*
- EP-0296 **S.G. Chung**: *Superconductor-insulator transition in a single Josephson junction*
- EP-0676 **D. Quirion**, F. Lefloch and M. Sanquer: *Transport and heating effect in proximity superconducting structures*
- EP-0242 **E. McCann**, G. Tkachov, and V.I. Fal'ko: *Magnon-assisted Andreev transport across ferromagnet-superconductor junctions*
- EP-0508 **M. Taki**, Y. Nakae, Y. Yamamoto, I. Ferdsteyn, K. Kindo, M. Hagiwara, H. Hori: *Spin polarization of a 2D-electron gas and the magnetization problem of nano-particles*
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- EP-0414 Yu.P. Monarkha, **S.S. Sokolov**, G.-Q. Hai and N. Studart: *Channel magnetotransport of surface electrons on superfluid helium*