

CURRICULUM VITAE OF ALEXEI ORLOV

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EDUCATION

1990 Ph.D. in Physics of Semiconductors and Dielectrics “Mesoscopic effects in hopping conductivity of GaAs MESFETs,” Institute of Radio Engineering and Electronics (IREE), Russian Academy of Sciences, Moscow, Russia.

1983 M.Sc. in Physics
“Experimental studies of Hall effect in HgMnTe at low and ultra-low temperatures,” Moscow State University, Physics Dept., Low-temperature Division, Moscow, Russia.

PROFESSIONAL EXPERIENCE and RESEARCH ACTIVITY

2000 – present. Research Associate Professor, Department of Electrical Engineering, University of Notre Dame, Notre Dame, IN 46556

1997 – 1999. Research Assistant Professor, Department of Electrical Engineering, University of Notre Dame, Notre Dame, IN 46556

1994 – 1997. Postdoctoral Research Associate, Department of Electrical Engineering, University of Notre Dame, Notre Dame, IN 46556

1993 – 1994. Visiting Research Fellow, Semiconductor Physics Group, Physics Department, University of Exeter, England, UK.

1992 – 1993. Senior Research Scientist, Institute of Radio Engineering and Electronics (IREE), Russian Academy of Sciences, Moscow, Russia.

1990-1992. Research Scientist, IREE, Moscow

1983-1990. Junior Research Scientist, IREE, Moscow

MAIN INTERESTS IN

Experimental studies of electron properties and possible applications of nanodevices, nanostructures and mesoscopic systems:

Single electron devices (transistors, memories, logic),

Quantum-Dot Cellular Automata, Mesoscopic systems, Molecular Electronics

RESEARCH OVERVIEW

1994 - present.

Studies of quantum devices, nanoelectronics and nanomagnetism: Single-Electron Transistors (SET), Electric and Magnetic Quantum-Dot Cellular Automata, Single-Electron Memories with destructive and non-destructive readouts, coupled single electron

devices (Au/Cr, Al/Al₂O₃, AFM-assembled Au, and semiconductor GaAs/AlGaAs quantum dots).

Studies of electronic properties of novel semiconductors and semiconductor devices (GaN, InAs/GaSb, InP, InGaAs, GaAs, SiGe structures).

Design, fabrication and tests of InAs/GaSb HEMTs, HEMTs and 1D channels on GaAs/AlGaAs.

1992-1994

Experimental studies of quantum ballistic transport in GaAs/AlGaAs heterostructures with the short continuous gate.

Study of the giant negative magnetoresistance in 2D systems close to metal-insulator transition. Experimental study of Hall effect in hopping conductivity.

1984-1992

Studies of mesoscopic effects in linear and –nonlinear transport characteristics of the two-dimensional hopping system based on GaAs MESFETs

1983-1984

Fabrication and experimental study of galvano-magnetic properties of thin Bi films at low temperatures

1982 –1983

Experimental study of Hall-effect and magnetic susceptibility of HgMnTe at low temperatures using RF-SQUID.

EXPERIMENTAL EXPERIENCE

Experimental technique:

Design and implementation of experimental setups:

- for transport measurements of nanostructures (with support electronics);

- galvano-magnetic measurements of semiconductors;

- low-noise, small signal transport measurements of FETs and SETs nanostructures at low temperatures (He⁴, He³ systems, dilution refrigerators);

- C-V measurements ;

- automated DLTS measurements.

Design and implementation of instrument control, data acquisition and analysis software

Data Analysis Programs (Basic, Pascal) – extensive data manipulation, including integration, interpolation, differentiation, filtering, statistical analysis of data, etc.

Data Acquisition Programs (LabWindows/CVI, Pascal ,) – variety of applications, IEEE and RS-232 instruments control, PC-card support, graphical presentation of acquired data etc. (More than 10 applications, including QCA

control system, non-invasive SET-detector, DLTS- spectrometer, C-V-T meters, superconducting magnet control systems, multi-gate control systems, automated Hall effect meters , etc.).

Design and implementation of hardware and electronics:

control system for SET-electrometers (local oscillator, lock-in and PID controller)

optically isolated control systems for operations of gated nanostructures;
optically isolated data acquisition and control system for a small signal measurements;

scan generators, precise current and voltage sources;

power supplies and temperature controllers for dilution refrigerators;

high impedance ($>10\text{G}\Omega$ @ 20 Hz) low-noise differential amplifiers;

low-noise, low offset, low drift current amplifiers;

AC bridges; He level meters; Hall sensor electronics;

1.5K He inserts for long-term transport measurements;

low inductance superconducting magnets (1-2T);

high stability, low-noise magnet power supplies (up to 150 Amp output);

low temperature thermometry including support electronics;

EMI and RF filters for low-noise setups and screened room.

Experience with low-noise small signal measurements:

AC measurements: Lock-in based measurements (SRS 830, EG&G 5210, 5110, Unipan 232, Unipan 233, Unipan 237, others);

SRS Boxcar averager SR250;

AC bridges: LR-400, AVS-47, SHE, others.

DC measurements: Variety of DVMs (Keithley 2000, 196, 236, others), and electrometers

Measurements of magnetic susceptibility using AC SQUID, design and fabrication of RF SQUID and SQUID electronics.

Experience with ultra low temperature and high/low magnetic fields applications:

dilution refrigerators (DF) (SHE, Oxford Instruments and Leiden Cryogenics DF (with silver and plastic mixing chambers)) including various problem fixes;

He3 refrigerators (home-made, Oxford top-loading, Oxford HeliOx);

variety of superconducting magnets (0.1-15 T systems) and electromagnets.

High-Speed measurements :

High frequency (up to 35 GHz) testing and modeling of semiconductor FETs using HP network analysers and HP4145 SPA

Experience with various software packages for data analysis:

Microcal Origin 3-6, Grapher, Surfer, Scientific Interactive Graphics (SIG, USSR), Kaleidagraph, Matlab, LabWindows, Cryomeas (Cambridge UK), DAAS, HP ICCap.

Manufacturing and Management experience:

Manager/Engineer in small private business (manufacturer of speakerphones with caller ID phones, based on Z80 processor). Supervised 5 electronic technicians (1992-1993) .

Instrument knowledge:

Various Lock-in (analog and DSP) and narrow band amplifiers (EG&G, Stanford, Unipan, etc.), boxcar averagers (SR250), voltage and current preamplifiers.
Semiconductor parameter analyzers (HP 4145, others).
Analog and DSO oscilloscopes (2225 and others), spectrum analyzers.
Various digital voltmeters, ammeters and electrometers (Keithley 236, 617, 191, 600series, 2000, others).
C-V analyzers (Keithley 500 series), C-V meters.
Programmable power supplies (HP 3245A, Tektronix TM5003, others).
Data acquisition and control instruments: PC labcards: PCL 711,714, ACCESS, Computerboards, others); GPIB boards: NI brands (488.2M others), PCL-848, Keithley, etc.
Superconducting magnet power supplies (Oxford instruments, Cryomagnetics, Cryogenics, Lakeshore, others),
Resistance and Impedance bridges (SHE, AVS-47, others),
Various low frequency and RF oscillators and synthesizers (HP3245A, others)
Network Analysers (HP 7422)
Temperature controllers (ITC4- Oxford instruments, others);
High vacuum equipment (Fc1800 e-beam evaporator, VEECO and Edwards thermal evaporators, various pumps (diffusion, mechanical, turbo molecular, cryo), leak detectors (Edwards Spectron 300E)
Field emission SEMs: Hitachi S4500, Amray 1400 SEM and various optical microscopes.

PROCESSING SKILLS:

Photolithography (mask making, use of aligners, resist processing)
Electron beam lithography and imaging (Amray 1400, Hitachi)
Thermal and E-beam metal deposition (Al, Au, Ti, Ni, Ge, Cr, Pd)
Multiple wet, plasma, and Reactive Ion etching
Metal annealing (furnace, Rapid Thermal Processor)
Si and Al thermal and plasma oxidation
Wafer scribing (Si, GaAs, GaSb/InAs)
Device packaging and bonding (wedge and ball bonders).
Experience with GaSb/InAs processing and fabrication of HFETs, using optical and E-beam lithography.
Experience with GaAs processing and fabrication of GaAs/AlGaAs HFET (split and continuous gate devices, using optical and E-beam lithography)
Extensive experience with Al-AlOx based SET technology (photo- and E-beam lithography, shadow evaporation, oxidation, packaging, testing)
Thin films fabrication (Bi, Al, Cr)

PROFESSIONAL SOCIETIES

American Physical Society, since 1996

AWARDS RECEIVED

Best Paper, International Microprocess and Nanotechnology Conference, 1999
with G.L. Snider, I. Amlani, C. S. Lent, and G. H. Bernstein

DARPA Ultra-Electronics award for sustained excellence, 1998
with G.L. Snider, I. Amlani, C. S. Lent, G. H. Bernstein, J. Merz and W.Porod

Young Scientist Competition, 2nd prize, IREE, Moscow, 1988

Diploma Science Competition, 1st prize, Moscow State University, Physics Dept., 1982

INVITED BOOK CHAPTER

"Experimental Studies of the Quantum-Dot Cellular Automata Devices" in "Recent research developments in vacuum science and technology" to be published in 2004

GRANTS RECEIVED

"Nirt: Architectures and Devices for Quantum-dot Cellular Automata," P.M. Kogge, P.J. Fay, C.S. Lent, A.O. Orlov, and G.L. Snider, National Science Foundation, \$1,000,000, 8/1/02-7/31/06. Co-PI directing experimental low-temperature measurements.

270,000 from NSF "A Novel High-Speed Electrometer for Nanoscale Electronic Device Research," co-PI with P. J. Fay and G.L. Snider, GN ECS-0100075, 6/1/2001-5/31/2004.

\$343,000 from the Office of Naval Research (DURIP), "Fabrication and Measurement of High-Speed, High Temperature Quantum –Dot Cellular Automata," co-PI (with G. L. Snider, G.H. Bernstein, A. Seabaugh, and P. Fay) GN N00014-00-0516, 3/31/00-3/30/01.

\$70,000 from SRC "Realization of a non-destructive Single Electron Memory," co-PI with G.L Snider, G.H. Bernstein, A.N.Korotkov, and K.K. Likharev

TEACHING EXPERIENCE

EE598I : "Advanced instrumentation and Measurements", Fall 2001, 2002, 2003
EE598H, Lab course: "Instrumentation for Nanoelectronics", Spring 2002, 2003,2004

EE222 : "Introduction to Electrical Science":Summer 1999, 1998, Fall 1997.

Graduate colloquium (summer 1996): "Low and Ultra-Low Temperature Technique and Transport Measurements".

DEPARTMENTAL SERVICE

Graduate Admissions Committee (2003- present)

WORK WITH THE STUDENTS:

Graduate:

Karthik Swaminathan, 2002 – present.

Xiangning Luo, “Novel Metal Single-Electron Devices,”

advisors: A. O. Orlov and G. L. Snider

Kameshwar Yadavalli “Realization of non-destructive Single electron Memory,”

advisors: A. O. Orlov and G. L. Snider

Ravi Kummamuru “Studies of Clocked QCA devices,” advisor: G.L.Snider, Notre Dame
Master’s Degree Thesis completed in 2000

Islamshah Amlani ”Fabrication and Measurements of Al/AlO_x QCA Devices ”

PhD thesis completed in 2000, advisor: G.H.Bernstein, Notre Dame

Greg Bazan “ Fabrication and Measurements of GaAs/AlGaAs coupled dots for
Quantum Cellular Automata”, PhD thesis completed in 1998, advisor: G.H.Bernstein,

Notre Dame

Xiaoshan Zuo “Fabrication and measurements of SiGe quantum devices,” advisor: G. L.
Snider, Notre Dame;

Nikolai Sinev “ Observation of 1D - conductance quantization in the

GaAs/GaAlAs HEMT with a short continuous gate” IREE, Russian Academy of

Sciences, Moscow, Master’s Degree Thesis completed in 1993, advisor : A. O. Orlov

Undergraduate

Nicholas Anderson, Research Experience for Undergraduates, 2002.

RESIDENCY STATUS

US permanent resident.

REFERENCES

Dr. Gregory L. Snider, Department of Electrical Engineering, University of Notre Dame
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Dr. Alexander K. Savchenko, Physics Department, University of Exeter, Exeter, UK
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Dr. Gary H. Bernstein, Department of Electrical Engineering, University of Notre Dame
Gary.H.Bernstein.1@nd.edu, phone (219) 631 6269

Dr. Craig S. Lent, Department of Electrical Engineering, University of Notre Dame
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Dr. James L. Merz, Department of Electrical Engineering, University of Notre Dame
merz.2@nd.edu, phone (219) 631 6291

Dr. Mikhael E. Raikh, Physics Department, University of Utah, Salt Lake City, UT
raikh@mail.physics.utah.edu

Dr. Gregory Bazan, BTV Manufacturing Engineering, CMOS7SF/EDRM7SF Program
Management, Dept. RYKV, IBM Burlington
1000 River St., Bldg. 975 - 2, col. K4
Essex Junction, VT 05452-4299
gbazan@us.ibm.com

Refereed Journal Publications:

1. Hua Qi, Sharad Sharma, Zhaohui Li, Gregory L. Snider, Alexei O. Orlov, Craig S. Lent, and Thomas P. Fehlner, "Molecular Quantum Cellular Automata Cells. Electric Field Driven Switching of a Silicon Surface Bound Array of Vertically Oriented Two-Dot Molecular Quantum Cellular Automata," *J. of the American Chemical Society*, Vol. 125, pp. 15250-15259, 2003.
2. Ravi K. Kumamuru, Alexei O. Orlov, Rajagopal Ramasubramaniam, Craig S. Lent, Gary H. Bernstein, and Gregory L. Snider, "Operation of a Quantum-Dot Cellular Automata (QCA) Shift Register and Analysis of Errors," *IEEE Transactions on Electron Devices*, Vol. 50, pp. 1906-1913, 2003.
3. K.K. Yadavalli, A.O. Orlov, G.L. Snider and A.N. Korotkov, "Single electron memory devices: Toward background charge insensitive operation," *J. Vacuum Science and Technology B*, Vol. 21, pp. 2860-2864, 2003..
4. Alexei O. Orlov, Ravi Kumamuru, Craig S. Lent, Gary H. Bernstein, and Gregory L. Snider, "Clocked quantum-dot cellular automata shift register," *Surface Science*, Vol. 532-535, pp. 1193-1198, 2003
5. A. O. Orlov, R. K. Kumamuru, R. Ramasubramaniam, C. S. Lent, G. H. Bernstein, and G. L. Snider, Two Stage Shift Register for Clocked Quantum-dot Cellular Automata, *Journal of Nanoscience and Nanotechnology*, Vol 2., 351 (2002).
6. R. K. Kumamuru, J. Timler, G. Toth, C. S. Lent, R. Ramasubramaniam, A. O. Orlov, G. H. Bernstein, and G. L. Snider, Power gain in a quantum-dot cellular automata latch, *Applied Physics Letters*, Volume 81, Issue 7, pp. 1332-1334 (2002)
7. T. Junno, S. -B. Carlsson, H. Q. Xu, and L. Samuelson, A. O. Orlov and G. L. Snider, Single-electron tunneling effects in a metallic double dot device, *Appl. Phys. Lett.*, Vol. 80 (4), pp. 667-669 (2002).
8. A. O. Orlov, R. K. Kumamuru, R. Ramasubramaniam, G. Toth, C. S. Lent, G. H. Bernstein, and G. L. Snider, Experimental Demonstration of a latch in Quantum-dot Cellular Automata, *Appl. Phys. Lett.*, 77(2), pp. 295-297 (2001).
9. I. Amlani, A.O. Orlov, R.K. Kumamuru, G. H. Bernstein, C. S. Lent, and G. L. Snider, Experimental demonstration of a leadless quantum-dot cellular automata cell, *Applied Physics Letters*, Vol. 77, no. 5, pp. 738-740 (2000)
10. A. O. Orlov, I.Amlani, R. K. Kumamuru, R. Ramasubramaniam, G. Toth, C. S. Lent, Gary H. Bernstein, and Gregory L. Snider, Experimental demonstration of clocked single-electron switching in quantum-dot cellular automata, *Applied Physics Letters*, Vol. 77, no.2, pp. 295-297 (2000).
11. G. L. Snider, A. O. Orlov, I. Amlani, X. Zuo, G. H. Bernstein, C. S. Lent, J. L. Merz, and W. Porod, "Quantum-Dot Cellular Automata: Review and Recent Experiments," *J. Vac.Sci. Technol.*, **17** (4), 1394-1398 (1999).
12. G. L. Snider, A. O. Orlov, I. Amlani, X. Zuo, G. H. Bernstein, C. S. Lent, J. L. Merz, and W. Porod, "Quantum-Dot Cellular Automata: Review and Recent Experiments," *J. Appl. Phys*, **85** (8), 4283-4285 (1999).

13. G. L. Snider, A. O. Orlov, I. Amlani, G. H. Bernstein, C. S. Lent, J. L. Merz, and W. Porod, "Quantum-Dot Cellular Automata: Line and Majority Logic Gate", *Jpn. J. Appl. Phys*, Vol. 38, 7227-7229 (1999)
14. G. Toth, A. O. Orlov, I. Amlani, C. S. Lent, G. H. Bernstein, and G. L. Snider, "Conductance Suppression due to Correlated Electron Transport in Coupled Double-dots," *Phys. Rev. B* **60**, 16906 (1999)
15. I. Amlani, A.O. Orlov, G. L. Snider, C. S. Lent, and G. H. Bernstein "Experimental Observation of Electron Switching in a Quantum-dot Cellular Automata Cell", *Superlattices and Microstructures*, 25(5), pp.273-278 (1999).
16. G. L. Snider, A. O. Orlov, I. Amlani, G. H. Bernstein, C. S. Lent, J. L. Merz, and W. Porod, "Quantum-dot Cellular Automata," *Microelectronic Engineering*, vol. 47, 261-263 (1999).
17. A. O. Orlov, I. Amlani, G. Toth, C. S. Lent, G. H. Bernstein and G. L. Snider, "Experimental Demonstration of a Binary Wire for Quantum-Dot Cellular Automata," *Applied Physics Letters*, 74(19), pp. 2875-2877 (1999).
18. I. Amlani, A.O. Orlov, G.Toth, C. S. Lent, G. H. Bernstein, and G. L. Snider "Digital Logic Gate Using Quantum-Dot Cellular Automata", *Science* (284), 289 (1999).
19. R. Gaska, M. S. Shur , A. D. Bykhovski, A. O. Orlov and G. L. Snider "Electron mobility in modulation-doped AlGa_N-Ga_N heterostructures", *Applied Physics Letters*, 74 (2), pp. 287-289 (1999).
20. G. H. Bernstein, I. Amlani, A. O. Orlov, C. S. Lent, and G. L. Snider "Observation of Switching in a Quantum-Dot Cellular Automata," *Nanotechnology*, **10**, pp. 166-173 (1999).
21. I. Amlani, A.O. Orlov, G. L. Snider, C. S. Lent, and G. H. Bernstein. "Demonstration of a Functional Quantum-dot Cellular Automata Cell", *J.Vac.Sci.Technol. B*16(6) , pp. 3795-3799 (1998).
22. I.Amlani, A.O. Orlov, G. L. Snider, C. S. Lent, W.Porod, and G. H. Bernstein "Experimental Observation of Electron Switching in a Quantum-dot Cellular Automata Cell" *Superlat. And Microstruc.*, **25**(5), pp. 273-278 (1999).
23. A. O. Orlov, I. Amlani, G. Toth, C. S. Lent, G. H. Bernstein and G. L. Snider, "Correlated Electron Transport in Coupled metal Double-dots" *Appl. Phys. Lett.*, 73 (19), pp.2787-2789 (1998).
24. G. L. Snider, A. O. Orlov, I. Amlani, G. H. Bernstein, C. S. Lent, J. L. Merz, and W. Porod, "Experimental Demonstration of Quantum-dot Cellular Automata," *Semiconductor Science and Technology*, 13, A130-A134 (1998).
25. I. Amlani, A. O. Orlov, G. L. Snider, C. S. Lent, and G. H. Bernstein, "Demonstration of Six-dot Quantum Cellular Automata System," *Appl. Phys. Lett.*, 72(17), pp.2179-2181 (1998).
26. G.L. Snider, A. O. Orlov, I. Amlani, G. H. Bernstein, C. S. Lent, J. L. Merz, and W.Porod, "A Functional Cell for Quantum-dot Cellular Automata," *Solid State Electronics*, Volume 42, No.7-8, pp.1355-1359 (1998).
27. W. Porod, C. S. Lent, G. H. Bernstein, A. O. Orlov, I. Amlani, G. L. Snider, and J. L. Merz, "Quantum-Dot Cellular Automata: Computing with Coupled Quantum Dots," *Int. J. of Electr.* , **86**(5), pp. 549-590 (1999).

28. R. Gaska, J. W. Yang, A. Osinsky, A. O. Orlov, G. L. Snider, M. S. Shur, "Electron Transport in AlGa_N-Ga_N Heterostructures Grown on 6H-SiC Substrates", *Appl. Phys. Lett.*, Volume 72, Issue 6, pp. 707-709 (1998).
29. I. Amlani, A. O. Orlov, G. L. Snider, C. S. Lent and G. H. Bernstein, "External Charge State Detection of a Double-dot System," *Appl. Phys. Lett.*, 71(12), pp. 1730-1732 (1997).
30. A.O.Orlov, I.Amlani, G.H.Bernstein, C.S.Lent, and G.L.Snider, "Realization of a Functional Cell for Quantum-Dot Cellular Automata", *Science*, Vol. 277, pp.928-930 (1997).
31. I.Amlani, A.O.Orlov, G.L.Snider, and G.H.Bernstein "Differential Charge Detection for Quantum-Dot Cellular Automata", *J.Vac.Sci.Technol. B*15(6) , pp. 2832-2835 (1997).
32. N. E. Sluchanko, V. V. Glushkov, S. V. Demishev, M. V. Kondrin, N. A. Samarin, A. K. Savchenko, A. O. Orlov, G. L. Snider, V. V. Brazhkin, V. V. Moshchalkov "Thermoelectric power anomalies and electron-phonon interaction in nonequilibrium solid solutions Al Si", *Phys. Rev. B* -- Volume 56, Issue 17, pp. 10816-10819 (1997).
33. G.Bazan, A.O.Orlov, G.L.Snider, and G.H.Bernstein, "Charge Detector Realization for AlGaAs/GaAs Quantum-dot Cellular Automata", *J.Vac.Sci.Technol.*, B14(6), pp.4046-4050 (1996).
34. G. H. Bernstein, G.Bazan, M.Chen, C.S.Lent, J.L.Merz, A.O.Orlov, W.Porod, G.L.Snider, P.D.Tougaw, "Practical Issues in the Realization of Quantum-Dot Cellular Automata", *Superlattices and Microstructures*, Vol. 20, No. 4, 1996.
35. A.S.Rylik, A.O.Orlov, E.I.Laiko "Quantum Quasi One-Dimensional Transport and Experimental Studies of the Fluctuation Potential in GaAs/GaAlAs heterostructures", *Microelectronics*, Vol. 24, No.2, 140 (1995).
36. A.O.Orlov, A.K.Savchenko, A.S.Rylik, B.A.Mala'khov and N.A.Sinev, Ballistic Transport Through The Fluctuation Potential: Strong One-Dimensional Quantisation In Two-Dimensional GaAs/AlGaAs Structures. *Journal of Physics: Condensed Matter* Vol.6 (1994) L349-L354.
37. A.S.Rylik, A.O.Orlov, E.I.Laiko, Quantum quasi one-dimensional transport and experimental study of potential fluctuations in heterostructures GaAs/GaAlAs, *Physics of Low-Dimensional Structures*, Vol.1 (1994)
38. A.K.Savchenko, A.O.Orlov, E.I.Laiko, and V.V.Kuznetsov. Mesoscopic effects in hopping conduction of n-GaAs samples with small dimensions, *Superlattices and Microstructures*, Vol.9, No.3, 297 (1991)
39. A.O.Orlov, A.K.Savchenko, and A.K.Koslov. Mesoscopic fluctuations of hopping conductance of a short channel GaAs field effect transistor - experimental testing of ergodicity, *Sol.St.Comm.*, Vol.72, No.8, 743 (1989)
40. A.O.Orlov, M.E.Raikh, I.M.Ruzin, and A.K.Savchenko. Statistical properties of mesoscopic conductivity fluctuations in a short-channel GaAs field-effect transistor, *Sov.Phys.JETP*, Vol.69, No.6, 1229 (1989)
41. A.O.Orlov, M.E.Raikh, I.M.Ruzin, and A.K.Savchenko. Distribution function of hopping conductance fluctuations of a short GaAs field effect transistor channel, *Sol.St.Comm.*, Vol.72, No.7, 169 (1989)

42. A.O.Orlov, A.K.Savchenko, and B.I.Shklovskii. Evolution of a fluctuation potential in the case of depletion in a channel of a field-effect GaAs transistor, *Sov.Phys.Semicond.*, Vol.23, No.8, 830 (1989)
43. A.O.Orlov and A.K.Savchenko. Mesoscopic fluctuations in the current-voltage characteristics of a short sample with a hopping conductivity, *JETP Lett.*, Vol.47, No.8, 470 (1988)
44. E.I.Laiko, A.O.Orlov, A.K.Savchenko et al. Negative magnetoresistance and oscillations of the hopping conductance of a short n-type channel in GaAs field-effect transistor., *Sov Phys JETP* **66**, 1258 (1987).
45. A.O.Orlov, A.K.Savchenko Oscillations of nonlinear characteristics of samples with small dimensions , *JETP Lett* **44**, 41 (1986).
46. A.O. Orlov, A.K.Savchenko, E.V.Chenskii et al. Oscillations of the electron mobility in the channel of a GaAs field effect transistor, *JETP Lett* **43**, 540 (1986).

List of selected other publications

1. Kameshwar Yadavalli, Alexei Orlov, and Gregory Snider, "Background charge insensitive Single-electron memory devices," 3rd IEEE Conference on Nanotechnology, San Francisco, CA, August, 2003.
2. Kameshwar Yadavalli, Alexei Orlov, and Gregory Snider, "Background charge insensitive Single-electron memory devices," SRC TECHCON Conference, Dallas, TX, August 2003.
3. R.Kumnamuru, A. Orlov, C. Lent, G. Bernstein, G. Snider, "Clocked Quantum-dot Cellular Automata Shift Register," International Workshop on Quantum Devices and Quantum Computing, Notre Dame, IN, August 2003.
4. R. Kumnamuru, G Toth, J. Timler, C. Lent, A. Orlov, G. Snider, "Power Gain in Clocked Quantum-Dot Cellular Automata Devices," International Workshop on Quantum Devices and Quantum Computing, Notre Dame, IN, August 2003.
5. K.K. Yadavalli, A.O. Orlov, G.L. Snider and A.N. Korotkov, "Single electron memory devices: Toward background charge insensitive operation," International Symposium on Electron, Ion, and Photon Beam Technology and Nanofabrication, Tampa, FL, May 2003
6. Alexei O. Orlov, Ravi Kumnamuru, Gary H. Bernstein, Craig S. Lent, and Gregory L. Snider, "Quantum-dot Cellular Automata Shift Register," NanoTech 2003, San Francisco, CA, February 2003.
7. Gary H. Bernstein, Ravi K. Kumnamuru, Alexei O. Orlov, Rajagopal Ramasubramaniam, Craig S. Lent, and Gregory L. Snider, "Experimental Progress in Quantum-dot Cellular Automata," Fourth International Symposium on Nanostructures and Mesoscopics Systems, Tempe, AZ, February 2003.
8. Ravi K. Kumnamuru, Alexei O. Orlov, Rajagopal Ramasubramaniam, Craig S. Lent, Gary H. Bernstein, and Gregory L. Snider, "Experimental demonstration of a QCA shift register and analysis of errors," International Electron Devices Meeting, San Francisco, CA, December 2002.
9. Alexei O. Orlov, Ravi Kumnamuru, Rajagopal Ramasubramaniam, Craig S. Lent, Gary H. Bernstein, and Gregory L. Snider, "Clocked Quantum-dot Cellular Automata Shift Register," 7th International Conference on Nanometer-scale Science and Technology, Malmö, Sweden, June, 2002.
10. Alexei O. Orlov, Ravi Kumnamuru, Rajagopal Ramasubramaniam, Craig S. Lent, Gary H. Bernstein, and Gregory L. Snider, "Clocked quantum-dot cellular automata devices," 10th International Symposium: Nanostructures: Physics and Technology, St. Petersburg, Russia, June, 2002.
11. Kameshwar Yadavalli, Alexei Orlov, Gregory Snider, "Compensation of Background-Charge in Single-Electron Memory Devices," American Physical Society March Meeting, Indianapolis, IN March 2002.
12. A. Orlov, I. Amlani, R. Kumnamuru, G. Toth, G. Bernstein, C. Lent, G. Snider "Experimental Studies of Quasi-Adiabatic Quantum-dot Cellular Automata", APS March meeting, Minneapolis, 2000
13. I. Amlani, A.Orlov, R. Kumnamuru, G. Toth, G. Bernstein, C. Lent, G. Snider "Charging Diagram of a Leadless Double-dot "APS March meeting, Minneapolis, 2000

14. R. Kummamuru, I. Amlani, A.Orlov, G. Toth, G. Bernstein, C. Lent, G. Snider
“Functional Characterization of a Leadless QCA Cell” APS March meeting,
Minneapolis, 2000.
15. R. Gaska, J.W.Yang, M.S.Shur, A.O.Orlov, G.L.Snider, “Electron Transport In
Doped Channel AlGa_N-Ga_N Heterostructures: Evidence of Transition Between 2D
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