

Curriculum Vitae

Marek Korkusinski
Security and Disruptive Technologies
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Main areas of interest

- Theoretical condensed matter physics,
- Nanospintronics and quantum computing,
- Correlations in electronic and electron-hole systems,
- Optical and electronic properties of semiconductor nanostructures,
- Topological insulators and their realizations in semiconductor systems

Publication record of 90 papers, book chapters, and books, with over 700 citations and the index h=20 (Scopus result).

Scientific collaborations

- Dr. Pawel Hawrylak, FRSC, Quantum Theory Group, Security and Disruptive Technologies, National Research Council of Canada,
- Dr. Robin Willams and Dr. Andrew Sachrajda, Quantum Physics Group, Security and Disruptive Technologies, National Research Council of Canada,
- Dr. Marek Potemski, Director, Grenoble High Magnetic Field Laboratory, Grenoble, France,
- Dr. Gerhard Klimeck, Director, Network for Computational Nanotechnology, Purdue University, USA,
- Dr. Athos Petrou, Professor, Physics Department, State University of New York at Buffalo, USA,
- Dr. Adam Babinski, Chair of Experimental Physics, University of Warsaw, Poland,
- Prof. Manfred Bayer, Experimental Physics, Technical University of Dortmund, Germany.

Education

- 2004: Ph.D. - Physics Department, University of Ottawa, Ottawa, Canada;
Thesis title: "Correlations in Semiconductor Quantum Dots",
Thesis Supervisor: Dr. Pawel Hawrylak (Physics Department, University of Ottawa and Institute for Microstructural Sciences, National Research Council of Canada).
- 1998: M. Sc. (with Honors) - Institute of Physics, Wroclaw University of Technology, Wroclaw, Poland;
Thesis title: "Analytical Methods in the Theory of Quantum Dots",

Thesis Supervisor: Prof. Lucjan Jacak (Institute of Physics, Wroclaw University of Technology).

Positions held

- December 4, 2006 - present: Associate Research Officer, Quantum Theory Group, Security and Disruptive Technologies (former Institute for Microstructural Sciences), National Research Council of Canada, Ottawa, Canada K1A0R6
- October 5, 2005 - December 4, 2006: Assistant Research Officer, Institute for Microstructural Sciences, National Research Council of Canada, Ottawa, Canada K1A0R6
- June 15, 2005 - September 15, 2005: Postdoctoral Research Associate, Physics Department, University of Ottawa, and Visiting Scientist, Institute for Microstructural Sciences, National Research Council of Canada, Ottawa, Canada K1A0R6; supervisor: Dr. Pawel Hawrylak.
- July 20, 2004 - June 15, 2005: Postdoctoral Research Associate, School of Electrical and Computer Engineering, Purdue University, West Lafayette IN 47907, USA; supervisor: Prof. Gerhard Klimeck.
- July 2000 - July 20, 2004: Visiting Scientist/Student; Institute for Microstructural Sciences, National Research Council of Canada, Ottawa, Canada K1A0R6; supervisor: Dr. Pawel Hawrylak.

Professional Experience

- 2000 - 2003: teaching assistant at the University of Ottawa (Teaching Assistant of the Year Award in 2001),
- 2005 – present: supervision and mentoring of graduate students in the Quantum Theory Group, Security and Disruptive Technologies (former Institute of Microstructural Sciences), National Research Council of Canada,
- 2003: short visit to the Autonomous University of Madrid, Spain, working with Prof. Carlos Tejedor on a single quantum dot in a photonic cavity,
- 2001: short visit to the Department of Natural Sciences, Antwerp University (Belgium), working with Prof. F. Peeters on strain in self-assembled quantum dots,
- 1999: short visit to the Institute of Physics, Chair of Technical Physics, University of Wuerzburg, working with Dr. P. Hawrylak on Lanczos recursive methods in numerical simulations of the electronic structure of solids,
- 1998: three-month visit to the Institute of Semiconductor Technology, Technical University of Braunschweig, working with Prof. A. Schlachetzki on optical spectra and gain of quantum cascade and quantum wire lasers.

Computer skills

Operating systems:

- Windows 95, XP, 7 – experienced user and administrator,
- Apple Mac OS X – experienced user and administrator,
- UNIX/Linux – experienced user, medium-level administrator

Programming languages:

- C/C++, FORTRAN77, Python – advanced and experienced programmer,
- Java, Pascal, FORTRAN 90 – intermediate programmer
- Message Passing Interface (MPI) in parallel programming for computer clusters – advanced and experienced programmer.

Markup languages: HTML, XML

Other tools:

- Document preparation system LaTeX with RevTeX extensions,
- Microsoft Word, Powerpoint, Excel,
- Mathematical environments MATLAB, Mathematica, Maple,
- Scientific graphic packages Origin, GNUplot, Surfer
- Version control system CVS.

Lectures, invited talks

1. “Electronic Properties of a HgTe Quantum Dot” - CMOS Emerging Technologies Research Symposium, Grenoble, France, July 6-8, 2014.
2. “Atomistic Simulations of Electronic and Optical Properties of Semiconductor Nanostructures”, an invited talk at the Symposium “Nano and Giga Challenges in Electronics, Photonics, and Renewable Energy”, Tempe, Arizona, USA, March 10-14, 2014.
3. “QNANO platform for atomistic theory of semiconductor quantum dots and nanocrystals” – CMOS Emerging Technologies Research Symposium, Whistler, BC, Canada, July 17-19, 2013.
4. "QNANO - Atomistic theory of semiconductor quantum dots and nanocrystals," Extreme Photonics - Nanophotonics Summer School, Ottawa, Canada, April 30 - May 4, 2012.
5. "Optical properties of self-assembled epitaxial quantum dots and nanocrystals from atomistic theory - multi-exciton generation", International Symposium "Controlling Spin at the Nanoscale," Ottawa, Canada, October 28-29, 2010.
6. "Atomistic calculations of optical properties of nanostructures - application to III-V and II-VI systems" - seminar at the Institute of Physics, Polish Academy of Sciences, Warsaw, Poland, March 23, 2010.

7. "Multi-exciton generation in CdSe nanocrystals" - seminar at the Department of Physics, Nicolaus Copernicus University, Torun, Poland, March 26, 2010.
8. "Electrical spin manipulation and coded qubits in triple quantum dot molecules," an invited talk at the Fifth International School and Conference on Spintronics and Quantum Information Technology (SPINTECH V), Cracow, Poland, July 7-11, 2009.
9. "Atomistic theory of electronic and optical properties of semiconductor nanostructures," an invited talk at the International Conference on Theoretical Physics, Dubna-Nano 2008, Dubna, Russia, July 7-11, 2008.
10. "Atomistic tight-binding calculations of electronic and optical properties of semiconductor nanostructures," an invited talk at the CECAM Workshop "Computational approaches to semiconductor, carbon and magnetic nanostructures", Lyon, France, June 16-19, 2008.
11. "Optical detection of spin in semiconductor nanostructures", talk at the Coherent Spintronics Workshop, Institute for Quantum Computing, Waterloo, Ontario, Canada, January 9-12, 2008.
12. "Atomistic calculations of electronic and optical properties of semiconductor nanostructures", an Invited talk at the LDSN Workshop, Banff International Research Station, Banff, Alberta, Canada, November 18-22, 2007.
13. "Optical signatures of spin polarization of carriers In quantum dots", seminar at the Physics Department, University at Buffalo, Buffalo, USA, November 2007.
14. "Atomistic calculations of electronic and optical properties of semiconductor nanostructures," seminar at the National Institute of Physics of Matter, Universita di Modena e Reggio Emilia, Modena, Italy, September 10, 2007.
15. "Building semiconductor nanostructures atom by atom," invited talk at the Sixth International Conference on Low-Dimensional Structures and Devices, San Andres, Colombia, April 15-20, 2007.
16. "Atomistic calculations of the electronic structure of quantum dots," seminar at the Institute of Physics, Wroclaw University of Technology, Wroclaw, Poland, May 15, 2006.
17. "Atomistic simulations of strain and electronic structure of multimillion-atom nanostructures," Christmas Symposium, Ottawa-Carleton Institute of Physics, Ottawa, Ontario, December 19, 2005.
18. "Development of the Nanoelectronic Modeling Tool (NEMO-3D) for multimillion-atom quantum dots," Quantum Information Workshop, Avoca Beach, Australia, February 2005.
19. "Exchange and correlations in lateral quantum dots," seminar at the Department of Physics and Atmospheric Science, Dalhousie University, Halifax, Nova Scotia, August 2003.
20. "Nano-spintronics: Single and coupled spin transistor," Nanoscience Workshop of the National Research Council of Canada, St-Sauveur, Quebec, 2002.

Presentations at international conferences

1. "Theory of a strain tunable HgTe topological insulator quantum dot", 8th International Conference on Quantum Dots, Pisa, Italy, May 11-15, 2014.
2. "Fine structure of a biexciton in a quantum dot with a magnetic impurity: Magnetic sensing of a spinless system," International Conference on Electronic Properties of Two-Dimensional Systems EP2DS-MSS, Wroclaw, Poland, 1-5 July, 2013.
3. "Spin-orbit induced bonding-to-antibonding transition of the hole ground state in artificial molecules," 29th International Conference on the Physics of Semiconductors, Rio de Janeiro, Brazil, July 27 - August 2, 2008.
4. "Topological Hund's rules and electronic properties of a triple lateral quantum dot molecule in a magnetic field," Congress of the Canadian Association of Physicists, Saskatoon, Canada, June 17-20 2007.
5. "Spin-polarized multi-exciton complexes in quantum dots," International Workshop "Optical Properties of Low-Dimensional Systems," Ottawa, Canada, June 2, 2007.
6. "Optical properties of charged self-assembled quantum dots," 28th International Conference on the Physics of Semiconductors, Vienna, Austria, July 2006.
7. "Far -infrared absorption spectra of a negatively charged exciton in self-assembled quantum dots," Congress of the Canadian Association of Physicists, St. Catharines, Ontario, June 2006.
8. "Atomistic simulations in nanostructures composed of tens of millions of atoms: Importance of long-range strain effects in quantum dots," The Nanotechnology Conference and Trade Show Nanotech 2005, Anaheim, California (USA), May 2005.
9. "Atomistic simulations in nanostructures composed of tens of millions of atoms," March Meeting of the American Physical Society, Los Angeles, California (USA), March 2005.
10. "Electron and hole states in the vertically coupled self-assembled InAs/GaAs quantum dot molecule," March Meeting of the American Physical Society, Montreal, Quebec, March 2004.
11. "Exchange and correlation effects in lateral quantum dots," March Meeting of the American Physical Society, Austin, Texas, March 2003.
12. "Optical detection of Aharonov-Bohm oscillations of a single electron on a quantum ring," Congress of the Canadian Association of Physicists, Charlottetown, PEI, 2003.
13. "Exchange and correlations in a few-electron quantum dot," Congress of the Canadian Association of Physicists, Quebec City, Quebec, 2002.
14. "Coupling and entangling of electron and hole states in a quantum dot molecule," Congress of the Canadian Association of Physicists, Victoria, BC, 2001.
15. "Entangled states of electron-hole complex in a single InAs/GaAs coupled quantum dot molecule," 10th International Conference on Modulated Semiconductor Structures, Linz, Austria, 2001.

Personal

Born February 4, 1975, Wroclaw, Poland, single, no children.

Citizenship: Polish, Canadian permanent resident.

Language skills: Polish (mother tongue), English (fluent), French (intermediate), Russian (intermediate), German (basic).

References

1. Dr. Pawel Hawrylak, FRSC, Principal Research Officer, Group Leader
Quantum Theory Group, Security and Disruptive Technologies, National Research Council of Canada, Ottawa, Ontario, Canada, K1A 0R6, elm: Pawel.Hawrylak@nrc-cnrc.gc.ca
2. Dr. Andrew Sachrajda, Principal Research Officer, Group Leader
Quantum Physics Group, Security and Disruptive Technologies, National Research Council of Canada, Ottawa, Ontario, Canada, K1A 0R6, elm: Andrew.Sachrajda@nrc-cnrc.gc.ca
3. Dr. Robin Williams, Principal Research Officer, Quantum Physics Group, Security and Disruptive Technologies, National Research Council of Canada, Ottawa, Ontario, Canada, K1A 0R6, elm: Robin.Williams@nrc-cnrc.gc.ca
4. Dr. Gerhard Klimeck, Professor, School of Electrical and Computer Engineering, and Technical Director, Network for Computational Nanotechnology, Purdue University, West Lafayette, IN 47907, USA, elm: gekco@purdue.edu

List of Publications

A. Publications in refereed journals

1. Marek Korkusinski and Pawel Hawrylak, "Quantum strain sensor with a topological insulator HgTe quantum dot", Scientific Reports (Nature) **4**, 4903 (2014).
2. Udson C. Mendes, Marek Korkusinski, and Pawel Hawrylak, "Electron-electron interaction mediated indirect coupling of electron and magnetic ion or nuclear spins in self-assembled quantum dots", Phys. Rev. B **89**, 195308 (2014).
3. S. Nomura, M. Yamaguchi, H. Tamura, T. Akazaki, Y. Hirayama, M. Korkusinski, and P. Hawrylak, "Photoluminescence fine structures in the fractional quantum Hall effect regime", Phys. Rev. B **89**, 115317 (2014).
4. Isil Ozfidan, Marek Korkusinski, A. Devrim Guclu, John A. McGuire, and Pawel Hawrylak, "Microscopic theory of the optical properties of colloidal quantum dots", Phys. Rev. B **89**, 085310 (2014).
5. Udson C. Mendes, Marek Korkusinski, Anna H. Trojnar, and Pawel Hawrylak, "Optical properties of charged quantum dots doped with a single magnetic impurity", Phys. Rev. B **88**, 115306 (2013).
6. Isil Ozfidan, Anna Trojnar, Marek Korkusinski, and Pawel Hawrylak, "Geometry, Chirality, Topology and Electron-Electron Interactions in the Quadruple Quantum Dot Molecule", Solid State Communications **172**, 15 (2013).
7. Anna H. Trojnar, Marek Korkusinski, Udson C. Mendes, Mateusz Goryca, Maciej Koperski, Tomasz Smolenski, Piotr Kossacki, Piotr Wojnar, and Pawel Hawrylak, "Fine structure of a biexciton in a single quantum dot with a magnetic impurity", Phys. Rev. B **87**, 205311 (2013).
8. C. H. Li, G. Kioseoglou, A. Petrou, M. Korkusinski, P. Hawrylak, and B. T. Jonker, "Highly polarized emission from electrical spin injection into an InGaAs quantum well with free carriers", Appl. Phys. Lett. **103**, 212403 (2013).
9. M. Korkusinski and P. Hawrylak, "Atomistic theory of emission from dark excitons in self-assembled quantum dots", Phys. Rev. B **87**, 115310 (2013).
10. R.M. Abolfath, M. Korkusinski, T. Brabec, and P. Hawrylak, "Spin textures in strongly coupled electron spin and magnetic or nuclear spin systems in quantum dots", Phys. Rev. Lett. **108**, 247203 (2012).
11. A. Trojnar, M. Korkusinski, M. Potemski and P. Hawrylak, "Theory of optical properties of II-VI semiconductor quantum dots containing a single magnetic ion in a strong magnetic field", Phys. Rev. B **85**, 165415 (2012).

12. M. Korkusinski, O. Voznyy, and P. Hawrylak, "Theory of highly excited semiconductor nanostructures including Auger coupling: Exciton-biexciton mixing in CdSe nanocrystals", *Phys. Rev. B* **84**, 155327 (2011).
13. A. Trojnar, M. Korkusinski, E. Kadantsev, and P. Hawrylak, "Theory of fine structure of exciton in semiconductor quantum dots in a magnetic field", *Phys. Rev. B* **84**, 245314 (2011).
14. A. Trojnar, M. Korkusinski, E. Kadantsev, P. Hawrylak, M. Goryca, T. Kazimierczuk, P. Kossacki, P. Wojnar, and M. Potemski, "Quantum Interference in Exciton-Mn Spin Interactions in a CdTe Semiconductor Quantum Dot", *Phys. Rev. Lett.* **107**, 207403 (2011).
15. T. Smolenski, T. Kazimierczuk, M. Goryca, P. Kossacki, J.A. Gaj, P. Wojnar, K. Fronc, M. Korkusinski, and P. Hawrylak, "Influence of Configuration Mixing on Energies and Recombination Dynamics of Excitonic States in CdTe/ZnTe Quantum Dots", *Acta Phys. Pol. A* **119**, 615 (2011).
16. M. Korkusinski, O. Voznyy, and P. Hawrylak, "Fine structure and size dependence of exciton and bi-exciton optical spectra in CdSe nanocrystals", *Phys. Rev. B* **82**, 245304 (2010).
17. E.S. Kadantsev, M. Zielinski, M. Korkusinski, and P. Hawrylak, "Ab initio calculation of band edges modified by (001) biaxial strain in group IIIA-VA and group IIB-VIA semiconductors: Application to quasi-particle energy levels of strained InAs/InP quantum dot", *J. Appl. Phys* **107**, 104315 (2010).
18. D. Dalacu, M.E. Reimer, S. Frederick, D. Kim, J. Lapointe, P.J. Poole, G.C. Aers, R. Williams, W.R. McKinnon, M. Korkusinski, and P. Hawrylak, "Directed self-assembly of single quantum dots for telecommunication wavelength optical devices," *Laser Photon. Rev.* **4**, 283 (2010).
19. M. Zielinski, M. Korkusinski, and P. Hawrylak, "Atomistic tight-binding theory of multiexciton complexes in a self-assembled InAs quantum dot," *Phys. Rev. B* **81**, 085301 (2010).
20. C.-Y. Hsieh, R. Cheriton, M. Korkusinski, and P. Hawrylak, "Valence holes as Luttinger spinor based qubits in quantum dots," *Phys. Rev. B* **80**, 235320 (2009).
21. A.D. Guclu, P. Potasz, O. Voznyy, M. Korkusinski, and P. Hawrylak, "Magnetism and Correlations in Fractionally Filled Degenerate Shells of Graphene Quantum Dots," *Phys. Rev. Lett.* **103**, 246805 (2009).
22. M. Korkusinski, M.E. Reimer, R.L. Williams, and P. Hawrylak, "Engineering photon cascades from multiexciton complexes in a self-assembled quantum dot by a lateral electric field", *Phys. Rev. B* **79**, 035309 (2009).

23. M.F. Doty, J.I. Climente, M. Korkusinski, M. Scheibner, A.S. Bracker, P. Hawrylak, and D. Gammon, "Antibonding ground states In InAs quantum-dot molecules," *Phys. Rev. Lett.* **102**, 047401 (2009).
24. I. Puerto Gimenez, C.-Y. Hsieh, M. Korkusinski, and P. Hawrylak, "Charged-impurity-induced dephasing of a voltage-controlled coded qubit based on electron spin In a triple quantum dot," *Phys. Rev. B* **79**, 205311 (2009).
25. L. Gaudreau, A.S. Sachrajda, S. Studenikin, A. Kam, F. Delgado, Y.P. Shim, M. Korkusinski, and P. Hawrylak, "Coherent transport through a ring of three quantum dots," *Phys. Rev. B* **80**, 075415 (2009).
26. M. Korkusinski, M. Zielinski, and P. Hawrylak, "Multiexciton complexes in InAs self-assembled quantum dots," *J. Appl. Phys.* **105**, 122406 (2009).
27. M. Korkusinski, P. Hawrylak, and M. Potemski, "A spin-polarized bi-exciton in a semiconductor quantum dot," *J. Phys.: Condens. Matter* **20**, 454213 (2008).
28. G. Kioseoglou, M. Yasar, C.H. Li, M. Korkusinski, M. Diaz-Avila, A.T. Hanbicki, P. Hawrylak, A. Petrou, and B.T. Jonker, "Intershell exchange and sequentially electrically injected spin populations of InAs quantum-dot shell states," *Phys. Rev. Lett.* **101**, 227203 (2008).
29. J. I. Climente, M. Korkusinski, G. Goldoni, and P. Hawrylak, "Theory of valence band holes as Luttinger spinors in vertically coupled quantum dots," *Phys. Rev. B* **78**, 115323 (2008).
30. M.E. Reimer, M. Korkusinski, D. Dalacu, J. Lefebvre, J. Lapointe, P.J. Poole, G.C. Aers, W.R. McKinnon, P. Hawrylak, and R.L. Williams, "Prepositioned single quantum dot In a lateral electric field," *Phys. Rev. B* **78**, 195301 (2008).
31. S. Awirothananon, S. Raymond, S. Studenikin, M. Vachon, W. Render, A.S. Sachrajda, X. Wu, A. Babinski, M. Potemski, S. Fafard, S.-J. Cheng, M. Korkusinski, and P. Hawrylak, "Single-exciton energy shell structure in InAs/GaAs quantum dots," *Phys. Rev. B* **78**, 235313 (2008).
32. M. Korkusinski and P. Hawrylak, "Optical signatures of spin polarization of carriers in quantum dots," *Phys. Rev. Lett.* **101**, 027205 (2008).
33. F. Delgado, Y.-P. Shim, M. Korkusinski, L. Gaudreau, S. A. Studenikin, A.S. Sachrajda, and P. Hawrylak, "Spin selective Aharonov-Bohm oscillations in a lateral triple quantum dot," *Phys. Rev. Lett.* **101**, 226810 (2008).
34. B. Aslan, H.C. Liu, M. Korkusinski, P. Hawrylak, and D.J. Lockwood, "Direct observation of polarons in electron populated quantum dots by resonant Raman scattering," *Journal of Nanoscience and Nanotechnology* **8**, 789 (2008).
35. F. Delgado, Y.-P. Shim, M. Korkusinski, and P. Hawrylak, "Theory of spin, electronic, and transport properties of the lateral triple quantum dot molecule in a magnetic field," *Phys. Rev. B* **76**, 115332 (2007).

36. M. Korkusinski, L. Gaudreau, S.A. Studenikin, A.S. Sachrajda, and P. Hawrylak, "Electron Spin Based Qubits," Theme Issue of Physics in Canada: Quantum Computing and Quantum Information, *Physics in Canada* **63**, 229 (2007).
37. I. Puerto Gimenez, M. Korkusinski, and P. Hawrylak, "Linear combination of harmonic orbitals and configuration interaction method for the voltage control of exchange interaction in gated lateral quantum dot networks," *Phys. Rev. B* **76**, 075336 (2007).
38. M. Korkusinski, P. Hawrylak, A. Babinski, M. Potemski, S. Raymond, and Z. Wasilewski, "Optical readout of charge and spin in a self-assembled quantum dot in a strong magnetic field," *Europhys. Lett.* **79**, 47006 (2007).
39. T.B. Boykin, N. Kharche, G. Klimeck, and M. Korkusinski, "Approximate bandstructures of semiconductor alloys from tight-binding supercell calculations," *J. Phys.: Cond. Matter* **19**, 14 (2007).
40. M. Korkusinski, I. Puerto Gimenez, P. Hawrylak, L. Gaudreau, S. A. Studenikin, and A. S. Sachrajda, "Topological Hund's rules and the electronic properties of a triple lateral quantum dot molecule," *Phys. Rev. B.* **75**, 115301 (2007).
41. G. Klimeck, S. Ahmed, H. Bae, N. Kharche, S. Clark, B. Haley, S. Lee, M. Naumov, H. Ryu, F. Saied, M. Prada, M. Korkusinski, and T.B. Boykin, "Atomistic Simulation of Realistically Sized Nanodevices Using NEMO 3-D: Part I - Models and Benchmarks", Special Issue on Nanoelectronic Device Modeling in *IEEE Transactions on Electron Devices* **54**, 2079 (2007).
42. G. Klimeck, S. Ahmed, N. Kharche, M. Korkusinski, M. Usman, M. Prada, and T.B. Boykin, "Atomistic Simulation of Realistically Sized Nanodevices Using NEMO 3-D: Part II - Applications", accepted in Special Issue on Nanoelectronic Device Modeling in *IEEE Transactions on Electron Devices* **54**, 2090 (2007).
43. M. Korkusinski, "Theory of far-infrared absorption of a negatively charged exciton in a quantum dot," *Phys. Rev. B* **74**, 075317 (2006).
44. L. Gaudreau, S. A. Studenikin, A. S. Sachrajda, P. Zawadzki, A. Kam, J. Lapointe, M. Korkusinski, and P. Hawrylak, "Stability diagram of a few-electron triple dot," *Phys. Rev. Lett.* **97**, 036807 (2006).
45. B. Aslan, H. C. Liu, M. Korkusinski, P. Hawrylak, and D. J. Lockwood, "Polarons in electron-populated quantum dots revealed by resonant Raman scattering," *Phys. Rev. B* **73**, 233311 (2006).
46. A. Babinski, M. Potemski, S. Raymond, M. Korkusinski, W. Sheng, P. Hawrylak, and Z. Wasilewski, "Optical spectroscopy of a single InAs/GaAs quantum dot in high magnetic fields," *Physica E* **34**, 288 (2006).
47. P. Hawrylak and M. Korkusinski, "Voltage-controlled coded qubit based on electron spin," *Solid State Commun.* **136**, 508 (2005).

48. W. Sheng, M. Korkusinski, and P. Hawrylak, "Microscopic approach to many-exciton complexes in self-assembled InGaAs/GaAs quantum dots," *Physica E* **26**, 267 (2005).
49. J. I. Climente, M. Korkusinski, P. Hawrylak, and J. Planelles, "Voltage control of the magnetic properties of charged semiconductor quantum dots containing magnetic ions," *Phys. Rev. B* **71**, 125321 (2005).
50. D. Chithrani, M. Korkusinski, S.-J. Cheng, P. Hawrylak, R.L. Williams, J. Lefebvre, P. J. Poole, and G. C. Aers, "Electronic structure of the p-shell in single, site-selected InAs/InP quantum dots," *Physica E* **26**, 322 (2005).
51. M. Korkusinski, P. Hawrylak, M. Ciorga, M. Pioro-Ladrière, and A. S. Sachrajda, "Pairing of spin excitations: correlated electron states in lateral quantum dots," *Phys. Rev. Lett.* **93**, 206806 (2004).
52. A. Wensauer, M. Korkusinski, and P. Hawrylak, "Configuration interaction method for Fock-Darwin states," *Solid State Communications* **130**, 115 (2004).
53. A. S. Sachrajda, M. Korkusinski, P. Hawrylak, M. Ciorga, M. Pioro-Ladrière, and P. Zawadzki, "Spin Textures in Quantum Dots," *J. Magnetism and Magnetic Mat.* **272-276**, E1273 (2004).
54. M. Ciorga, M. Korkusinski, M. Pioro-Ladrière, P. Zawadzki, P. Hawrylak, and A. S. Sachrajda, "Simple spin textures in a quantum dot," *phys. stat. sol. (b)* **238**, 325 (2003).
55. M. Korkusinski, W. Sheng, and P. Hawrylak, "Designing quantum systems in self-assembled quantum dots," *phys. stat. sol. (b)* **238**, 246 (2003).
56. M. Pioro-Ladrière, M. Ciorga, J. Lapointe, P. Zawadzki, M. Korkusinski, P. Hawrylak, and A. S. Sachrajda, "Spin-Blockade Spectroscopy of a Two-Level Artificial Molecule," *Phys. Rev. Lett.* **91**, 026803 (2003).
57. M. Bayer, M. Korkusinski, P. Hawrylak, T. Gutbrod, M. Michel, and A. Forchel, "Optical Detection of the Aharonov-Bohm Effect on a Charged Particle in a Nanoscale Quantum Ring," *Phys. Rev. Lett.* **90**, 186801 (2003).
58. A. Wensauer, M. Korkusinski, and P. Hawrylak, "Theory of the spin-singlet filling factor $\nu=2$ quantum Hall droplet," *Phys. Rev. B* **67**, 035325 (2003).
59. A. Olaya-Castro, M. Korkusinski, P. Hawrylak, and M. Yu. Ivanov, "Effective Bloch equations for strongly driven modulation-doped quantum wells," *Phys. Rev. B* **68**, 155305 (2003).
60. H. C. Liu, B. Aslan, M. Korkusinski, S.-J. Cheng, and P. Hawrylak, "Detailed characterization of a systematic set of quantum dot infrared photodetectors," *Infrared Physics and Technology* **44**, 503 (2003).
61. B. Aslan, H. C. Liu, M. Korkusinski, S.-J. Cheng, and P. Hawrylak, "Response spectra from mid- to far-infrared, polarization behaviors, and effects of electron numbers in quantum-dot photodetectors," *Appl. Phys. Lett.* **82**, 630 (2003).

62. M. Korkusinski, P. Hawrylak, and M. Bayer, "Negatively Charged Exciton on a Quantum Ring," *phys. stat. sol. (b)* **234**, 273 (2002).
63. M. Ciorga, A. Wensauer, M. Piore-Ladrière, M. Korkusinski, J. Kyriakidis, A. S. Sachrajda, and P. Hawrylak, "Collapse of the Spin-Singlet Phase in Quantum Dots," *Phys. Rev. Lett.* **88**, 256804 (2002).
64. M. Korkusinski, P. Hawrylak, M. Bayer, G. Ortner, A. Forchel, S. Fafard, Z. Wasilewski, "Entangled states of electron-hole complex in a single InAs/GaAs coupled quantum dot molecule," *Physica E* **13**, 610 (2002).
65. P. Hawrylak and M. Korkusinski, "Excitonic artificial atoms in a semiconductor quantum dot for single photon sources," *Nonlinear Optics* **29**, 329 (2002).
66. M. Tadić, F. M. Peeters, K. L. Janssens, M. Korkusinski, and P. Hawrylak, "Strain and band edges in single and coupled cylindrical InAs/GaAs and InP/InGaP self-assembled quantum dots," *J. Appl. Phys.* **92**, 5819 (2002).
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D. Patents

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