

# CURRICULUM VITAE

## Professor Mikhail Portnoi

### University of Exeter, College of Engineering, Mathematics and Physical Sciences

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### PERSONAL DETAILS

Date of Birth: 15<sup>th</sup> May, 1965

Place of Birth: Leningrad, USSR

Nationality: British and Russian (dual)

Family Status: Married with two children

### EDUCATION/QUALIFICATIONS

**PhD in Physics**, 1996, University of Utah, Salt Lake City, USA. Dissertation title: “Few-particle excitons”, supervisors: E.I. Rashba and D.C. Mattis.

**Candidate of Physico-Mathematical Sciences** (Russian equivalent of PhD), 1994, A.F. Ioffe Physical-Technical Institute, St. Petersburg, Russia. Dissertation title: “Polarization properties of photo-luminescence of hot electrons in quantum wells”, supervisor: V.I. Perel.

**Diploma with Distinction** (Russian equivalent of MSc), 1988, Leningrad Electrical Engineering Institute (currently known as St. Petersburg State Electrotechnical University), Joint Department of Optoelectronics of Leningrad Electrical Engineering Institute and Ioffe Physical-Technical Institute. Thesis: “Scattering of electrons in two-dimensional systems”, supervisor: V.I. Perel.

**Secondary School Certificate**, 1982, Physics & Mathematics School No 239, Leningrad, USSR

### EMPLOYMENT HISTORY

October 2013 – present: **Associate Professor**, College of Engineering, Mathematics and Physical Sciences (Physics & Astronomy), University of Exeter, UK

November 2006 – October 2013: **Senior Lecturer**, College of Engineering, Mathematics and Physical Sciences (Physics & Astronomy), University of Exeter, UK

January 1999 – November 2006, **Lecturer** (Lecturer B from 01/10/2001), School of Physics, University of Exeter

April 1996 – December 1998: **Research Associate**, Physics Department, Heriot-Watt University, Edinburgh, UK

September 1992 – March 1996: **Graduate Teaching Assistant** and **Research Assistant**, Department of Physics, University of Utah, Salt Lake City, USA

April 1988 – December 2002: **Member of the Research Staff**, A.F. Ioffe Physical-Technical Institute of the Russian Academy of Sciences (on leave since September 1992), also (1991-1992) part-time Assistant Professor at St. Petersburg Technical University, Department of Solid-State Physics

### VISITING POSITIONS

April 2018 – present, **Research Professor**, ITMO University, St. Petersburg, Russia

January-March 2019, **Visiting Professor**, Westlake University, Hangzhou, China

July-August 2019, August-September 2016, August-September 2014, July-August 2013, August-September 2012, July-August 2011 and July-August 2010: **Visiting Professor**, International Institute of Physics, Federal University of Rio Grande do Norte, Natal, Brazil

July-August 2009, July 2008, July-August 2007: **Visiting Professor**, International Center for Condensed Matter Physics (ICOMP), University of Brasília, Brazil

October 2005 – September 2006: Full **Professor** and Head of the Quantum Wires and Two-Dimensional Electron Gas Group, International Center for Condensed Matter Physics (ICOMP), University of Brasília, Brazil

May – June 2004: **Visiting Scientist**, Max Planck Institute for the Physics of Complex System, Dresden, Germany

## RESEARCH

Research interests cover several areas of theoretical and mathematical physics as well as nanoscale device modelling and include exactly-solvable problems, scattering theory, quantum and statistical mechanics of low-dimensional systems, theory of excitons and electron-hole plasma in semiconductor nanostructures, optics and electron-phonon interaction in the quantum Hall regime and, most recently, electronic properties and terahertz applications of carbon nanotubes and graphene.

Research highlights include developing a theory of optical orientation and hot photoluminescence in quantum wells [3-8]; formulation and development of the anyon exciton model as a basis for optical detection of charge fractionalisation in the fractional quantum Hall regime [9-14,33,34,37,ch1]; extension of Levinson's theorem, which relates scattering phase shifts of slow particles to the number of bound states, to two-dimensional (2D) systems [15-17] and the application of this theorem to statistical mechanics of a quasi-2D electron-hole plasma [18,19,22,36,57]; a thorough analysis of the 2D-exciton problem in momentum space yielding important results in mathematical physics [28,30,31,ch1]; development of a theory of electron-phonon interaction in the quantum Hall regime, which included theoretical treatment of phonon-assisted transport [50], luminescence of inter- and intra-band magnetoexcitons [26,32], two-phonon dissociation of magnetorotons [27] and the manifestation of many-body effects in phonon spectroscopy [24,29]; explaining the puzzling results of torque magnetometry in the quantum Hall regime [35,40-42,44]; prediction of superlattice behaviour of chiral carbon nanotubes and nanohelices in a transverse electric field [43,45,52,55,82,94]; several proposals on carbon nanotube terahertz applications [48,53,54,56,61-64,76] and a study of excitons in narrow-gap nanotubes [66,86] representing a one-dimensional analogue of the long-standing problem of atomic collapse in relativistic quantum mechanics. The work on non-simply-connected nanostructures encompasses not only carbon nanotubes but also excitonic effects and electric dipole oscillations in Aharonov-Bohm quantum rings [60,68,69,72,91,94]. Most recent studies have been focused on zero-energy states and confinement in graphene [65,67,70,73,77,83,86,87,89,90] and graphene's optical properties including valley separation using linearly polarized light [b1]. (References correspond to the publication list within this CV)

## GRANTS

EU H2020 RISE Project "Terahertz Antennas with Self-Amplified Spontaneous Emission" (TERASSE) H2020-MSCA-RISE-823828, 2019-2023 [Exeter PI] (€193,200 for Exeter)

EU H2020 RISE Project "Collective Excitations in Advanced Nanostructures" (CoExAN) H2020-MSCA-RISE-644076, 2015-2019 [Exeter PI] (€225,000 for Exeter)

EU FP7 IRSES Project "Carbon-nanotube-based terahertz-to-optics rectenna" (CANTOR) FP7-PEOPLE-IRSES-612285, 2014-2017 [Coordinator, Exeter PI] (€91,200)

EU FP7 IRSES Project "Interaction phenomena in novel materials" (InterNoM) FP7-PEOPLE-IRSES-612624, 2013-2017 [Exeter PI] (€38,000 for Exeter)

EU FP7 Marie Curie Initial Training Network "Novel Type of Terahertz Devices" (NOTEDEV) FP7-PEOPLE-ITN-607521, 2013-2017 [Exeter PI, Package Leader] (€570,000 for Exeter)

EU FP7 IRSES Project "Quantum optics of carbon-based nanostructures" (QOCaN) FP7-PEOPLE-IRSES-316432, 2013-2016 [Coordinator, Exeter PI] (€96,000)

EU FP7 IRSES Project "Spin-related phenomena in mesoscopic transport" (SPINMET) FP7-PEOPLE-IRSES-246784, 2010-2014 [Exeter PI] (€28,800 for Exeter)

International Travel Grant - Travel for Collaboration, Incoming Visit of Prof. O.V. Kibis, Royal Society, 2010 (£4,000)

EU FP7 Marie Curie Initial Training Network "Spin effects for quantum optoelectronics" (Spin-Optronics) FP7-PEOPLE-ITN-237252, 2009-2013 [Exeter PI, Theory Package Leader] (€224,738 for Exeter)

EU FP7 IRSES Project "Route to Bose-Einstein condensation at room temperature" (ROBOCON) FP7-PEOPLE-IRSES-230832, 2009-2012 [Exeter PI] (€93,600 for Exeter)

EU FP7 IRSES Project "Terahertz applications of carbon-based nanostructures" (TerACaN), FP7-PEOPLE-IRSES-230778, 2009-2012 [Coordinator, Exeter PI] (€86,400)

EPSRC grant "On the theory of electron-phonon interaction in the quantum Hall regime", 2001 – 2003, PI (£63,500)

Joint Project grant with Russia "Carbon nanotubes as a basis for optoelectronic devices in the terahertz range", The Royal Society, 2007 – 2009 (£12,000)

INTAS Project grant "Electromagnetics of nanostructures", 2006-2008 [Partner, Exeter PI] (€7,500 for Exeter)

Visiting Professorship awarded by the Scientific Committee of the International Centre for Condensed Matter Physics (ICCMP), University of Brasilia, Brazil; three postdoctoral fellowships at ICCMP funded by MCT and FINEP (Brazil) in conjunction with this professorship, 2005-2006 (total value approximately £250,000)

Joint Project grant with Russia "A study of the anomalous electronic and optical properties of chiral carbon nanotubes", The Royal Society, 2003 – 2005 (£10,000)

Funding to run a four-week seminar and one-week workshop at the Max Planck Institute for Physics of Complex Systems in Dresden, May-June 2004 (approximately £120,000)

Alliance: Franco-British Partnership Programme 2003-2004, Project "Excitons and trions in nitride-based quantum wells", British Council [UK Coordinator] (£3,625)

Two ORSAS/University of Exeter Project PhD Studentships, 1999-2002 (£60,000 in total)

Conference travel grants from the Royal Society (7 grants), EU (Europrofessor) and NATO

## TEACHING

### Current teaching (University of Exeter)

#### Lecture courses:

**Methods of Theoretical Physics (PHY3062)** from 09/2012, 15 credits (expanded from the 10-credit PHY3140 module delivered in 2001-2012), an elective taken by over 50 students. I am a module leader fully responsible for all aspects of this module. I proposed, designed the syllabus and developed this module, which has become one of the most popular Physics electives praised by students, peer assessors and external examiners.

**Nanostructures and Graphene (PHY3064)** from 09/2019, 15 credits, an elective taken by over 20 students.

**Tutorials:** Year 2 Tutorial Groups, 3 weekly tutorials in groups of up to 5 students, 77 contact hours per year, weekly marked homework assignments, PDR and pastoral care.

**MPhys Project supervision:** Supervision of two-year MPhys projects. My MPhys projects have consistently attracted best Physics students: Newman Prizes: Downing (2011), Robinson (2010), Atherton (2003); Black Prizes: Churchill (2013), Stone (2011), Robinson (2010). The European Science Engineering and Technology (SET) Best Student of the Year Awards 2010 – The NPL Best Physics Student Award for Neil Robinson. Several MPhys projects led to publications and conference presentations [65,67,70,77,82, ch4, c84].

### Previous teaching

**University of Exeter:** Lecture courses: Quantum Many-Body Theory (PHYM013), 2017-2018; Thermal Physics (PHY2023), 2012-2015; Statistical Physics (PHY2201), 2006-2011; Classical Theory of Fields (PHY2214), 2006-2007; Methods of Theoretical Physics (PHY3140), 2001-2012, Mathematics for Physicists (PHY1116), 1999-2005, and Quantum Physics III (PHY4422), 2000-2005. In addition: 1<sup>st</sup> Year Problems Classes, 2<sup>nd</sup> Year Problems Classes, 1<sup>st</sup>, 2<sup>nd</sup> and 4<sup>th</sup> Year Tutorial Groups, 3<sup>rd</sup> Year BSc Laboratory, MPhys and BSc Project supervision, General Problems Paper setting and marking.

**I was nominated for Guild Teaching Awards at Exeter in several categories (Best Lecturer, Innovative Teaching, Best Feedback Provider and Supportive Member of Staff) in 2010-16.**

**1996 – 1998: Heriot-Watt University:** Foundation Physics (tutorials), 4<sup>th</sup> Year Projects.

**1992 – 1996: University of Utah**, Graduate Teaching Assistant: College Physics for Scientists and Engineers (discussions), University Physics for Scientists and Engineers (discussions), Modern Physics for Scientists and Engineers (discussions), Elementary Physics Laboratory. Also physics and mathematics tutor with the University of Utah Tutoring Centre.

**1991 – 1992: St Petersburg State Technical University**, Lectures: Introduction to Solid State Theory.

## **EXTERNAL PhD EXAMINING**

L. Chalmers, PhD, Loughborough University, 2010  
 A. V. Paraskevov, PhD, Loughborough University, 2010  
 I. Iorsh, PhD, Durham University, 2013  
 R. Puddy, PhD, University of Cambridge, 2013  
 E. Cherotchenko, PhD, University of Southampton, 2017

## **POST-GRADUATE PERSONNEL**

### **PhD supervision as an only or first supervisor**

T.P. Collier, 2015 – 2019, Thesis: “Double-gated quantum rings and nanohelices: from theory to novel applications”

V.A. Saroka, 2014 – 2017, Thesis: “Theory of optical and THz transitions in carbon nanotubes, graphene nanoribbons and flat nanoclusters”

C.A. Downing, 2011 – 2015, Thesis: “Quantum confinement in low-dimensional Dirac materials”

A.M. Alexeev, 2010 – 2013, Thesis: “Quantum rings in electromagnetic fields”

R.R. Hartmann, 2007 – 2010, Thesis: “Optoelectronic properties of carbon-based nanostructures: Steering electrons in graphene by electromagnetic fields”

D.G.W. Parfitt, 2001 – 2003, Thesis: “Exactly-solvable problems for two-dimensional excitons”

V.V. Nikolaev, 1999 – 2002, Thesis: “Many-particle correlations in quasi-two-dimensional electron-hole systems”

**Current:** Andrew Wild (from 01/10/2019)

### **Second supervisor/mentor or internal PhD examiner**

T. Atherton, M. Eames, D. Vasyukov, M. Dvornik, R. De Rosa, S. Hubbard, L. Coombs, M. Gentile, R. Valkass, F. Sainsbury-Martinez, C. Davies, C. Beckerleg, R. Stanchev, P. Karlsen, C. Durrant

### **Research assistants & long-term visiting professors**

Dr V.M. Apalkov (PDRA), 2001 (Exeter)  
 Dr K.V. Kavokin (PDRA), 2002 – 2003 (Exeter)  
 Prof. O.V. Kibis (Visiting Professor), 2003 – 05, 2007–10 (Exeter), 2006 (ICCMP-UnB)  
 Dr V.L. Campo Jr. (PDRA), 2005 – 2006 (ICCMP-UnB)  
 Dr J.R. Madureiro (PDRA), 2005 – 2006 (ICCMP-UnB)  
 Dr M. Rosenau da Costa (PDRA), 2005 – 2006 (ICCMP-UnB)  
 A.M. Alexeev (Marie Curie Fellow/Early Stage Researcher), 2010 – 2013 (Exeter)  
 V.A. Saroka (Marie Curie Fellow/Early Stage Researcher), 2014 – 2017 (Exeter)  
 P. Karlsen (Marie Curie Fellow/Early Stage Researcher), 2014 – 2017 (Exeter)

## **ADMINISTRATION**

October 2000 – September 2005: Postgraduate Admissions Tutor, Research Committee member  
 September 1999 – September 2002: Tutorial groups' organiser  
 Pre-University Physics Course organiser (2000, 2001)

April 1999 – July 2001: School of Physics Colloquium coordinator

October 1999 – July 2011: Student-Staff Liaison Committee member

October 1999 – present: undergraduate admissions interviews and parents tours

## EXTERNAL RECOGNITION

Over **60 invited talks** and plenary or keynote lectures at international conferences (see a list below)

Over 30 invited seminars and colloquia at leading universities and research centres

**Associate Editor**, Journal of Nanophotonics (SPIE): July 2009 - present.

**Co-director** of the two-months Research Workshop '[Weyl Fermions in Condensed Matter Physics](#)', International Institute of Physics, Natal, Brazil, 2019

**Program Committee Chairman** of the [International School on Nanophotonics, Photovoltaics and Metamaterials \(ISNP 2019\)](#), Varadero, Cuba, 2019

**Program Committee Chairman** of the [International Workshop on Quantum Light in Nanostructures \(QLIN-2018\)](#), Acquafredda di Maratea, Italy, 2018

Member of the International Program Committee of the [34th International Conference on the Physics of Semiconductors \(ICPS 2018\)](#), Montpellier, France, 2018

Member of the Program Committee of [PLMCN-19 Conference](#), Chengdu, China, 2018

Member of the Programme Committee of [PLMCN-18 Conference](#), Wurzburg, Germany, 2017

**Program Committee Chairman** of the [6th International School on Nanophotonics and Photovoltaics](#), Cefalu, Sicily, 2015

Member of the Programme Committee of IMMEA-2015 Conference, Marrakesh, Morocco, 2015

Member of the Programme Committee of ICISO2013 Conference, Toulouse, France, 2013

Member of the Programme Committee of the International School on Spin-Optics, St Petersburg, Russia, 2012

**Co-chairman** of the Research Workshop 'Advances in Physics and Applications of Low-Dimensional Systems', International Centre for Condensed Matter Physics, Brasilia, Brazil, 2007

Member of the Programme Committee of PLMCN-7 Conference, Havana, Cuba, 2007

Member of the Programme Committee of the Nanomodeling II Conference at the 2006 SPIE Optics and Photonics Annual Meeting, San Diego, USA, 2006

**Co-chairman** of the Seminar and Workshop 'Cooperative Phenomena in Optics and Transport in Nanostructures' at the Max Planck Institute for Physics of Complex Systems in Dresden, 2004

Founding member of the Mediterranean Institute of Fundamental Physics (since 2010)

Member of the EPSRC Peer Review College (2003-2005, 2006-2008, 2009-present)

INTAS evaluator (2003-2006); EU Referee of the Russian Mega-grants (2010-2011)

Member of the American Physical Society (since 1992)

Referee for the Physical Review (PRB, Letters and PRA), AIP, ACS, EPS, IOP, Nature Group, and numerous Elsevier and Springer journals.

## PUBLICATIONS

**h-index** (as of 07/12/2019): **25** (Web of Science); **29** (Google Scholar)

## BOOKS

[b1] R.R.Hartmann and [M.E.Portnoi](#), *Optoelectronic Properties of Carbon-based Nanostructures: Steering electrons in graphene by electromagnetic fields* (LAP LAMBERT Academic Publishing, Saarbrücken, 2011), **ISBN-10:** 3844328580; **ISBN-13:** 978-3844328585.

## BOOK CHAPTERS

[ch8] T.P.Collier, V.A.Saroka, C.A.Downing, A.M.Alexeev, R.R.Hartmann, and [M.E.Portnoi](#) "Terahertz Applications of Non-Simply-Connected and Helical Nanostructures", in *Fundamental*

and *Applied Nano-Electromagnetics II (THz Circuits, Materials, Devices)*, edited by A.Maffucci and S.A.Maksimenko, NATO Science for Peace and Security Series B: Physics and Biophysics (Springer, Dordrecht, 2019), Chapter 11, pp. 201-214. DOI: [https://doi.org/10.1007/978-94-024-1687-9\\_11](https://doi.org/10.1007/978-94-024-1687-9_11)

[ch7] V.A.Saroka, R.R.Hartmann, M.E.Portnoi “Interband transitions in narrow-gap carbon nanotubes and graphene nanoribbons”, in *Carbon-Based Nanoelectromagnetics*, edited by A.Maffucci, S.Maksimenko, and Yu.Svirko (Elsevier, Amsterdam, 2019), Chapter 4, pp. 99-119.

[ch6] A.M.Alexeev and M.E.Portnoi “Quantum rings in electromagnetic fields”, in *Physics of Quantum Rings. Second Edition*. NanoScience and Technology, edited by V.M.Fomin (Springer, Cham, 2018), Chapter 13, pp. 347-409.

[ch5] A.Maffucci, S.Maksimenko, and M.E.Portnoi “Carbon nanotubes and graphene nanoribbons for terahertz applications”, in *Fundamental and Applied Nano-Electromagnetics*, edited by A.Maffucci and S.A.Maksimenko, NATO Science for Peace and Security Series B: Physics and Biophysics (Springer, Dordrecht, 2016), Chapter 6, pp. 103-123.

[ch4] C.A.Downing, M.G.Robinson, and M.E.Portnoi “Electromagnetic properties of nanohelices”, in *Fundamental and Applied Nano-Electromagnetics*, edited by A.Maffucci and S.A.Maksimenko, NATO Science for Peace and Security Series B - Physics and Biophysics (Springer, Dordrecht 2016), Chapter 2, pp. 27-44.

[ch3] A.M.Nemilentsau, G.Ya.Slepyan, S.A.Maksimenko, O.V.Kibis, and M.E.Portnoi “Terahertz radiation from carbon nanotubes” in *The Handbook of Nanophysics, Vol. 4: Nanotubes and Nanowires*, edited by K.D.Sattler (CRC Press, New York, 2010), Chapter 5, pp. 5.1-5.16.

[ch2] M.E.Portnoi, O.V.Kibis and M.Rosenau da Costa “Prospective terahertz applications of carbon nanotubes” in *Smart Materials for Energy, Communications and Security*, edited by I.A.Luk'yanchuk and D.Messane, NATO Science for Peace and Security Series B - Physics and Biophysics (Springer, Dordrecht, 2008), pp. 81-93.

[ch1] D.G.W.Parfitt and M.E.Portnoi “Exactly-solvable problems for two-dimensional excitons” in *Mathematical Physics Frontiers*, edited by C.V.Benton (Nova Science Publishers, NY, 2004), pp. 1-66. (See also <http://xxx.lanl.gov/abs/cond-mat/0410095>)

## PAPERS IN PEER-REVIEWED JOURNALS

[100] R.G.Polozkov, N.Y.Senkevich, S.Morina, P.Kuzhir, M.E.Portnoi, and I.A.Shelykh “Carbon nanotube array as a van der Waals two-dimensional hyperbolic material”, *Phys. Rev. B* **100** (23), 235401 (2019).

[99] T.P.Collier and M.E.Portnoi “Double-gated nanohelix as a novel tunable binary superlattice”, *Nanoscale Research Letters* **14**, 257 (2019).

[98] C.A.Downing and M.E.Portnoi “Trapping charge carriers in low-dimensional Dirac Materials”, *International Journal of Nanoscience* **18** (3 & 4), 1940001 (2019).

[97] V.A.Shahnazaryan, V.A.Saroka, I.A.Shelykh, W.L.Barnes, and M.E.Portnoi “Strong Light-Matter Coupling in Carbon Nanotubes as a Route to Exciton Brightening”, *ACS Photonics* **6** (4), pp. 904–914 (2019)

[96] C.A.Downing and M.E.Portnoi “Zero-Energy Vortices in Dirac Materials”, *Phys. Status Solidi B* **256**, 1800584 (2019) (**Feature Article**)

[95] R.R.Hartmann, V.A.Saroka, and M.E.Portnoi “Interband transitions in narrow-gap carbon nanotubes and graphene nanoribbons”, *J. Appl. Phys.* **125** (15), 124303 (2019). (**Editor's Pick**)

[94] T.P.Collier, A.M.Alexeev, C.A.Downing, O.V.Kibis, M.E.Portnoi “Terahertz Optoelectronics of Quantum Rings and Nanohelices”, *Semiconductors* **52** (14), 1813 (2018).

[93] H.Abdelsalam, V.A.Saroka, I. Lukyanchuk, and M.E.Portnoi “Multilayer phosphorene quantum dots in an electric field: energy levels and optical absorption”, *J. Appl. Phys.* **124** (12), 124303 (2018).

[92] V.A.Saroka, A.L.Pushkarchuk, S.A.Kuten, and M.E.Portnoi “Hidden correlation between absorption peaks in achiral carbon nanotubes and nanoribbons”, *J. Saudi Chem. Soc.* **22** (8), 985 (2018).

- [91] T.P.Collier, V.A.Saroka, and M.E.Portnoi "Tuning terahertz transitions in a double-gated quantum ring" *Phys. Rev. B* **96** (23), 235430 (2017)
- [90] C.A.Downing and M.E.Portnoi "Bielectron vortices in two-dimensional Dirac semimetals" *Nature Communications* **8**, 897 (2017).
- [89] R.R.Hartmann, M.E.Portnoi "Two-dimensional Dirac particles in a Pöschl-Teller waveguide" *Scientific Reports* **7**, 11599 (2017).
- [88] V.A.Saroka, I.Lukyanchuk, M.E.Portnoi, and H.Abdelsalam "Electro-optical properties of phosphorene quantum dots" *Phys. Rev. B* **96** (8), 085436 (2017).
- [87] C.A.Downing and M.E.Portnoi "Localization of massless Dirac particles via spatial modulations of the Fermi velocity" *Journal of Physics: Condensed Matter* **29**, 315301 (2017).
- [86] R.R.Hartmann and M.E.Portnoi "Pair states in one-dimensional Dirac systems" *Physical Review A* **95** (6), 062110 (2017).
- [85] V.A.Saroka, M.V.Shuba, and M.E.Portnoi "Optical selection rules of zigzag graphene nanoribbons", *Phys. Rev. B* **95** (15), 155438 (2017).
- [84] G.Slepyan, A.Boag, V.Mordachev, E.Sinkevich, S.Maksimenko, P.Kuzhir, G.Miano, M.E.Portnoi, and A.Maffucci "Anomalous electromagnetic coupling via entanglement at the nanoscale", *New J. Phys.* **19**, 023014 (2017).
- [83] C.A.Downing and M.E.Portnoi "Massless Dirac fermions in two dimensions: Confinement in nonuniform magnetic fields" *Phys. Rev. B* **94** (16), 165407 (2016).
- [82] C.A.Downing, M.G.Robinson, and M.E.Portnoi "Nanohelices as superlattices: Bloch oscillations and electric dipole transitions", *Phys. Rev. B* **94**(15), 155306 (2016).
- [81] C.A.Downing and M.E.Portnoi "Magnetic quantum dots and rings in two dimensions", *Phys. Rev. B* **94**(4), 045430 (2016).
- [80] H.Abdelsalam, M.H.Talaat, I.Lukyanchuk, M.E.Portnoi, and V.A.Saroka "Electro-absorption of silicene and bilayer graphene quantum dots", *J. Appl. Phys.* **120**(1), 014304 (2016).
- [79] G.Ya.Slepyan, A.Boag, V.Mordachev, E.Sinkevich, S.Maksimenko, P.Kuzhir, G.Miano, M.E.Portnoi, and A.Maffucci "Nanoscale electromagnetic compatibility: Quantum coupling and matching in nanocircuits", *IEEE Transactions on Electromagnetic Compatibility*, **57**(6), pp.1645-1654 (2015)
- [78] A.M.Alexeev, R.R.Hartmann, and M.E.Portnoi "Two-phonon scattering in graphene in the quantum Hall regime", *Phys. Rev. B* **92**(19), 195431 (2015)
- [77] C.A.Downing, A.R.Pearce, R.J.Churchill, and M.E.Portnoi "Optimal traps in graphene", *Phys. Rev. B* **92** (16), 165401 (2015)
- [76] R.R.Hartmann and M.E.Portnoi "Terahertz transitions in quasi-metallic carbon nanotubes", *IOP Conf. Ser.: Mater. Sci. Eng.* **79** (1), 012014 (2015).
- [75] C.A.Downing and M.E.Portnoi "One-dimensional Coulomb problem in Dirac materials", *Phys. Rev. A* **90** (5), 052116, pp. 1-5 (2014).
- [74] R.R.Hartmann, J. Kono, and M.E.Portnoi "Terahertz science and technology of carbon nanomaterials", *Nanotechnology* **25**, 322001 (2014).
- [73] R.R.Hartmann and M.E.Portnoi "Quasi-exact solution to the Dirac equation for the hyperbolic-secant potential", *Phys. Rev. A* **89** (1), 012101 (2014).
- [72] A.M.Alexeev, I.A.Shelykh, and M.E.Portnoi "Aharonov-Bohm quantum rings in high-Q microcavities", *Phys. Rev. B* **88** (8), 085429 (2013).
- [71] K.B.Arnardottir, O.Kyriienko, M.E.Portnoi, and I.A.Shelykh "One-dimensional Van Hove polaritons", *Phys. Rev. B* **87** (12), 125408 (2013).
- [70] D.A.Stone, C.A.Downing, and M.E.Portnoi "Searching for confined modes in graphene channels: the variable phase method", *Phys. Rev B* **86** (7), 075464, pp. 1-8 (2012).
- [69] A.M.Alexeev and M.E.Portnoi "Electric dipole moment oscillations in Aharonov-Bohm quantum rings", *Phys. Rev. B* **85** (24), 245419, pp. 1-9 (2012).

- [68] A.M.Alexeev and M.E.Portnoi “Terahertz transitions in Aharonov-Bohm quantum rings in an external electric field”, *Phys. Status Solidi C* **9** (5), pp. 1309–1314 (2012).
- [67] C.A.Downing, D.A.Stone, and M.E.Portnoi “Zero-energy states in graphene quantum dots and rings”, *Phys. Rev. B* **84** (15), 155437, pp. 1-6 (2011).
- [66] R.R.Hartmann, I.A.Shelykh, and M.E.Portnoi “Excitons in narrow-gap carbon nanotubes”, *Phys. Rev. B* **84** (3), 035437, pp. 1-8 (2011).
- [65] R.R.Hartmann, N.J.Robinson, and M.E.Portnoi “Smooth electron waveguides in graphene”, *Phys. Rev. B* **81** (24) 245431, pp. 1-5 (2010).
- [64] K.G.Batrakov, O.V.Kibis, P.P.Kuzhir, S.A.Maksimenko, M.Rosenau da Costa, and M.E.Portnoi “Mechanisms of terahertz emission from carbon nanotubes”, *Physica B* **405** (14), pp. 3054-3056 (2010).
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- [c19] M.E.Portnoi and I.Galbraith “Screened Coulomb potential in two dimensions: Unexpected Beauty”, Bulletin of the American Physical Society, Ser. II, **44**(1), p.1912, 1999.
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- [c13] M.E.Portnoi and I.Galbraith “Screened excitons in wide-gap semiconductors and quantum wells.” Programme and Abstracts of the 8<sup>th</sup> International Conference of II-VI Compounds, p. 224, Grenoble, France, 1997.

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[c11] M.E.Portnoi and I.Galbraith “Screened excitons in quantum wells.” Nanostructures: Physics and Technology 97, International Symposium, Proceedings, pp.83-86, St. Petersburg, Russia, 1997.

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[c7] E.I.Rashba, V.M.Apalkov, and M.E.Portnoi “Spectroscopy of the Fractional Quantum Hall Effect: Manifestation of Fractional Charges.” The 1993 International Conference on Luminescence, Storrs, CT, USA, ICL’93 Technical Digest, Th3B-4.

[c6] M.E.Portnoi “Influence of the valence band warping on the polarization of hot photoluminescence in quantum wells.” The 1993 International Conference on Luminescence, Storrs, CT, USA, ICL’93 Technical Digest, Tu4-87.

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## PRESENTATIONS

15th International Conference on Optics of Excitons in Confined Systems, OECS-2019, St. Petersburg, Russia, September 16-20, 2019

41st Photonics & Electromagnetics Research Symposium, PIERS 2019, Rome, Italy, June 17-20, 2019 (**invited**)

4th International Conference on Terahertz Emission, Metamaterials and Nanophotonics, TERAMETANANO-IV, Lecce, Italy, May 27-31, 2019

International Conference on Physics Chemistry and Applications of Nanostructures, Nanomeeting-2019, Minsk, Belarus, May 21-24, 2019 (**invited**)

International School on Nanophotonics, Photovoltaics and Metamaterials (ISNP2019), Varadero, Cuba, April 2019 (**program committee chairman**)

3rd International Workshop on Electromagnetic Properties of Novel Materials (EMPNM III), Moscow, Russia, December, 18-20, 2018 (**invited**)

International Conference on Smart Nanomaterials: Advances, Innovation and Application (SNAIA), Paris, France, December 10-13, 2018 (**invited**)

International Conference on Metamaterials and Nanophotonics (METANANO2018), Sochi, Russia, September, 2018 (**keynote, invited**)

International Workshop on Nanocarbon Photonics and Optoelectronics (NPO2018), Savonlinna, Finland, 2018 (**invited**)

34th International Conference on the Physics of Semiconductors (ICPS2018), Montpellier, France, 2018

International Workshop on Quantum Light in Nano-structures (QLIN2018), Acquafredda di Maratea, Italy, 2018 (**program committee chairman**)

26th International Symposium: Nanostructures: Physics and Technology, Minsk, Belarus, 2018

NATO Advanced Research Workshop on "Fundamental and Applied NanoElectroMagnetics II (FANEM)", Minsk, Belarus, 2018 (**invited**)

3rd International Conference on Physics of 2D Crystals (ICP2C3), Valletta, Malta, 2018 (**invited**)

2017 Annual Meeting of the APS Mid-Atlantic Section, Newark, New Jersey, 2017 (**invited**)

19th International Conference on Electromagnetics in Advanced Applications (ICEAA'17), Verona, Italy, 2017

International School on Polaritonics and Photovoltaics (ISPP-2018), Campofelice di Roccella, Sicily, Italy, 2017 (**invited**)

18th International Conference on Physics of Light-Matter Coupling in Nanostructures, PLMCN-18, Wurzburg, Germany, 2017

25th International Symposium: Nanostructures: Physics and Technology, St. Petersburg, Russia, 2017

2nd International Conference on Terahertz Emission, Metamaterials and Nanophotonics (TERAMETANANO-2), Venice, Italy, 2017 (**invited**)

International Workshop on Physics of Exciton-Polaritons in Artificial Lattices, Daejeon, South Korea, 2017 (**invited**)

2nd International Conference on Physics of 2D Crystals (ICP2C2), Ha Long, Vietnam, 2017 (**invited**)

7th MIFP March Meeting, Marino (Roma), Italy, 2017

International Workshop on Polaritonics, Ventnor, Isle of Wight, United Kingdom, 2016 (**invited**)

International Workshop on New Trends in Integrable Systems, Natal, Brazil, 2016 (**invited**)

Encontro de Física 2016, Natal, Brazil, 2016

International School of Solid State Physics. 72nd Course/School: EPIOPTICS-14, Erice, Sicily, 2016 (**invited**)

International Summer School and Workshop: Nanostructures for Photonics (NSP 2016), St. Petersburg, Russia, 2016 (**invited**)

International Workshop on Physics of 2D Crystals (IW2DC 2017), Campofelice di Roccella, Sicily, Italy, 2016 (**invited**)

International Conference on Terahertz Emission, Metamaterials and Nanophotonics (TERAMETANANO), Cartagena, Columbia, 2016

17th International Conference on Physics of Light-Matter Coupling in Nanostructures, PLMCN-17, Nara, Japan, 2016 (**invited**)

The 2016 APS March Meeting, Baltimore, Maryland, 2016

International Forum on Physics in XXI Century, Havana, Cuba, 2016 (**invited**)

- 2015 Energy Materials Nanotechnology (EMN) Meeting, Hong Kong, 2015 (**invited**)
- International School of Nanophotonics and Photovoltaics, Cefalu, Sicily, Italy, 2015 (**chairman**)
- IEEE Computer Society Annual Symposium on VLSI (ISVLSI 2015), Montpellier, France, 2015
- 23<sup>rd</sup> International Symposium: Nanostructures: Physics and Technology, St. Petersburg, Russia, 2015
- School on Anomalous Transport, Superconductivity and Magnetism in Nanosystems, Kiev, Ukraine, 2015 (**invited**)
- International Workshop on Quantum Transport in 2D Systems, Luchon, France, 2015 (**invited**)
- Day in honour of Michel Dyakonov, Montpellier, France, 2015 (**invited**)
- International Conference on Metamaterials and Nanophysics (METANANO 2015), Varadero, Cuba, 2015 (**invited**)
- 5<sup>th</sup> International Symposium on Terahertz Nanoscience (TeraNano V), Martinique, 2014 (**invited**)
- International Workshop on Polaritonics, Aldourie Castle, Scotland, 2014 (**invited**)
- International Workshop on Nanoelectromagnetics of Advanced Materials for Microwave-to-THz Applications (WS8 of the 44<sup>th</sup> European Microwave Conference), Rome, Italy, 2014 (**invited**)
- 21<sup>st</sup> International Conference on High Magnetic Fields in Semiconductor Physics, Panama City Beach, Florida, 2014 (**invited**)
- 22<sup>nd</sup> International Symposium: Nanostructures: Physics and Technology, Zelenogorsk, Russia, 2014
- International Conference on Problems of Strongly Correlated and Interacting Systems, St. Petersburg, Russia, 2014 (**invited**)
- International Conference on Metamaterials and Nanophysics (METANANO 2014), Varadero, Cuba, 2014 (**invited**)
- 4<sup>th</sup> MIFP March Meeting, Marino (Roma), Italy, 2014
- India-UK Scientific Seminar: From Graphene Analogues to Topological Insulators (GATI-2014), Kolkata, India, 2014 (**invited**)
- 13<sup>th</sup> International Conference on Electromagnetics in Advanced Applications (ICEAA'13), Turin, 2013
- International School of Nanophotonics and Photovoltaics, Maratea, Italy, 2013 (**invited**)
- 21<sup>st</sup> International Symposium: Nanostructures: Physics and Technology, St. Petersburg, Russia, 2013
- International Conference on Spin-Optronics (ICSO 2013), Toulouse, France, 2013 (**invited**)
- 14<sup>th</sup> International Conf. on Physics of Light-Matter Coupling in Nanostructures, PLMCN-14, Crete, 2013
- International Workshop on Physics of Excitons (IWPE 2013), Varadero, Cuba, 2013 (**invited**)
- 3<sup>rd</sup> International Symposium on Terahertz Nanoscience (TeraNano III), Honolulu, USA, 2012 (**invited**)
- International School on New Materials and Renewable Energy, Tbilisi, Georgia 2012 (**invited**)
- International Workshop "Advances in Quantum Technology", Natal, Brazil, 2012 (**invited**)
- Graphene Week 2012, Delft, the Netherlands, 2012
- International Conference on Fundamental and Applied NanoElectroMagnetics (FANEM'12), Minsk, Belarus, 2012 (**invited**)
- International School of Nanophotonics and Photovoltaics, Phuket, Thailand, 2012 (**invited**)
- 2<sup>nd</sup> MIFP March Meeting, Marino (Roma), Italy, 2012

- International School of Nanophotonics and Photovoltaics, Maratea, Italy, 2011 (**invited**)
- International Meeting on Materials for Electronic Applications: IMMEA-2011, Agadir, Morocco, 2011 (**plenary**)
- 19<sup>th</sup> International Symposium: Nanostructures: Physics and Technology, Yekaterinburg, Russia, 2011 (**invited**)
- IOP Topical Research Meetings in Physics: Graphene and Related Two-Dimensional Materials, London, 2011
- NANOMEETING-2011, Minsk, Belarus, 2011
- 11<sup>th</sup> International Conference on Physics of Light-Matter Coupling in Nanostructures, PLMCN-11, Berlin, 2011
- 1<sup>st</sup> MIFP March Meeting, Marino (Roma), Italy, 2011
- Graphene Brazil 2010, Belo Horizonte, Brazil, 2010
- International School of Nanophotonics and Photovoltaics, Tsakhkadzor, Armenia, 2010 (**invited**)
- International Workshop "Spin-related Phenomena in Mesoscopic Transport", Natal, Brazil, 2010 (**invited**)
- 1<sup>st</sup> International School on Spin-Optics, Les Houches, France, 2010 (**invited**)
- International Workshop on Physics of Computer Technologies, Natal, Brazil, 2010 (**invited**)
- 4<sup>th</sup> Italian-Russian meeting on Solid State Physics of the XXI century, Castel Gandolfo, Italy, 2010 (**invited**)
- International Workshop on Terahertz Radiation and Metamaterials, Benasque, Spain, 2009 (**invited**)
- International School of Nanophotonics and Photovoltaics, Maratea, Italy, 2009 (**invited**)
- V.I. Perel' Memorial Symposium "Theoretical problems of semiconductor physics", St. Petersburg, Russia, 2009 (**invited**)
- 2<sup>nd</sup> Loughborough Symposium: Mini-symposium on THz Radiation, Loughborough, UK, 2009 (**invited**)
- 9<sup>th</sup> International Conference on Physics of Light-Matter Coupling in Nanostructures, PLMCN-9, Lecce, Italy, 2009
- 3<sup>rd</sup> 'PolaRoma' Meeting on Modern Solid State Theory, Castel Gandolfo, Italy, 2009 (**invited**)
- 18<sup>th</sup> International Conference on High Magnetic Fields in Semiconductor Physics, São Pedro, Brazil, 2008
- 29<sup>th</sup> International Conference on the Physics of Semiconductors, Rio de Janeiro, Brazil, 2008
- 2<sup>nd</sup> Italian-Russian 'PolaRoma' Meeting on Modern Solid State Theory, Rome, 2008 (**invited**)
- NATO ARW "Smart Materials for Energy, Communications and Security", Marrakesh, Morocco, 2007
- International Conference on Semiconductor Materials and Optics, Warsaw, Poland, 2007 (**invited**)
- International Workshop "Advances in Physics and Applications of Low-Dimensional Systems", Brasília, 2007
- 15<sup>th</sup> International Symposium: Nanostructures: Physics and Technology, Novosibirsk, Russia 2007
- The Royal Society Discussion Meeting on Carbon-Based Electronics, London 2007
- 7<sup>th</sup> International Conference on Physics of Light-Matter Coupling in Nanostructures, PLMCN-7, Havana, 2007 (**invited**)



- 1<sup>st</sup> Italian-Russian 'PolaRoma' Workshop on Modern Solid-State Theory, Rome, 2007 (**invited**)
- SPIE 51<sup>st</sup> Annual Meeting: Nanomodeling II Conference, San Diego, California, 2006 (**Keynote Lecture**)
- XXIX Encontro Nacional de Física da Matéria Condensada (ENFMC), São Lourenço, MG, Brazil, 2006
- 5<sup>th</sup> French-Russian Meeting "Avancées en physique du solide", Clermont-Ferrand, France, 2006 (**invited**)
- International Workshop on Magnetic Nanostructures, ICCMP-UnB, Brasília, Brazil, 2005
- International School on Nanophotonics, Maratea, Italy, 2005 (**invited**)
- 2<sup>nd</sup> International Conference on Spontaneous Coherence in Excitonic Systems, Southampton, UK, 2005
- International Summer School "Arrays of Quantum Dots and Josephson Junctions", Kiten, Bulgaria, 2005 (**invited**)
- 4<sup>th</sup> French-Russian Meeting "Avancées en physique du solide", Clermont-Ferrand, France, 2005 (**invited**)
- SPIE 49<sup>th</sup> Annual Meeting: Nanomodeling Conference, Denver, Colorado, 2004 (**Keynote Lecture**)
- 27<sup>th</sup> International Conference on the Physics of Semiconductors, Flagstaff, Arizona, USA, 2004
- International Symposium "Topical Problems of Modern Physics", St Petersburg, Russia, 2004 (**invited**)
- 3<sup>rd</sup> French-Russian Meeting "Avancées en physique du solide", Clermont-Ferrand, France, 2004 (**invited**)
- 3<sup>rd</sup> International Conference on Physics of Light-Matter Coupling in Nanostructures, PLMCN-3, Sicily, 2003 (**invited**)
- 11<sup>th</sup> International Symposium: Nanostructures: Physics and Technology, St. Petersburg, Russia, 2003
- 2<sup>nd</sup> French-Russian Meeting "Avancées en physique du solide", Clermont-Ferrand, France, 2003 (**invited**)
- 15<sup>th</sup> International Conference on High Magnetic Fields in Semiconductor Physics, Oxford, 2002
- 26<sup>th</sup> International Conference on the Physics of Semiconductors, Edinburgh, UK, 2002
- International Conference on Superlattices, Nano-structures and Nano-devices, Toulouse, France, 2002
- NATO ARW on Optical Properties of 2D Systems with Interacting Electrons, St Petersburg, 2002 (**invited**)
- 2<sup>nd</sup> International Conference on Physics of Light-Matter Coupling in Nanostructures, PLMCN-2, Crete, 2002 (**invited**)
- 1<sup>st</sup> International Conference on Physics of Light-Matter Coupling in Nanostructures, PLMCN-1, Rome, 2001 (**invited**)
- 7<sup>th</sup> International Conference on Optics of Excitons in Confined Systems, Montpellier, 2001
- 14<sup>th</sup> International Conference on the Electronic Properties of Two-Dimensional Systems, Prague, 2001
- International Workshop on Correlation Effects in Low-Dimensional Electron Systems, Lancaster, UK, 2001
- The 2001 APS March Meeting, Seattle, Washington, 2001

International Workshop on the Physics of Light-Matter Coupling in Nitrides, Saint-Nectair, France, 2000

Newton Institute Workshop: Strongly Correlated Electron Systems - Novel Physics and New Materials, Cambridge, UK, 2000

24<sup>th</sup> International Conference on the Physics of Semiconductors, Jerusalem, Israel, 1998

The 1998 APS March Meeting, Los Angeles, California, 1998

Condensed Matter and Materials Physics Conference (CMMP'97), Exeter, United Kingdom, 1997

8<sup>th</sup> International Conference on II-VI Compounds, Grenoble, France, 1997

3<sup>rd</sup> International Workshop on Fullerenes and Atomic Clusters, St. Petersburg, Russia, 1997

5<sup>th</sup> International Symposium: Nanostructures: Physics and Technology, St. Petersburg, Russia, 1997

Condensed Matter and Materials Physics Conference (CMMP'96), York, United Kingdom, 1996

The 4<sup>th</sup> International Conference on Optics of Excitons in Confined Systems, Cortona, Italy, 1995

The 1995 APS March Meeting, San Jose, California, 1995

The 1993 International Conference on Luminescence, Storrs, Connecticut, 1993

The 1993 APS March Meeting, Seattle, Washington, 1993

38<sup>th</sup> Scottish Summer School in Physics "Physics of Nanostructures," St. Andrews, UK, 1991

5<sup>th</sup> International Conference on Superlattices and Microstructures, Berlin, Germany, 1990

1989-91: All-Union Conferences on Physics of Semiconductors, Theory of Semiconductors, and Physics of Heterostructures

#### **Invited talks at seminars and colloquia**

Fudan University, Shanghai, China, 2019

Westlake University, Hangzhou, China, 2019

University of Science and Technology of China (USTC), Hefei, 2017

Columbia University, New York, USA, 2017

Sheffield Hallam University, 2017

Research Institute for Nuclear Problems of Belarusian State University, Minsk, Belarus, 2016

St Petersburg State Polytechnic University, St Petersburg, Russia, 2015

A.F. Ioffe Physical-Technical Institute, St Petersburg, Russia, 2015

National High Magnetic Field Laboratory, Florida State University, Tallahassee, 2014

Institut Néel / CNRS & Nanosciences Foundation, Grenoble, France, 2013

University of Regensburg, Germany, 2012

Cambridge University (CAPE-CIKC Advanced Technology Lecture), 2011

University College London (Mathematics), 2010

Strathclyde University, Glasgow, UK, 2008

University of Bath, UK, 2007

University of Montpellier, France, 2007

Southampton University, UK, 2007

Sheffield Hallam University, UK, 2007

University of Campinas (UNICAMP), Brazil, 2006

University of California, San Diego (UCSD), USA, 2006

University of Cardiff, UK, 2005

University of Utah, Salt Lake City, USA, 2004

Birmingham University, UK, 2003

University of Warwick, UK, 2002

Cavendish Laboratory, Cambridge University, UK, 2001

Loughborough University, UK, 2000

EMCORE Corporation, Somerset, NJ, USA, 1999

Advanced Studies Institute, Princeton, USA, 1999

Clarendon Laboratory, Oxford University, UK, 1997

King's College, London, UK, 1996

University of Sheffield, UK, 1996

AT&T Bell Labs, Murray Hill, USA 1992

TU Munich, Germany, 1992

University of Kassel, Germany, 1992

University of Wurzburg, Germany, 1992

Several seminar and colloquium talks at the Ioffe Institute; University of Utah; Heriot-Watt University; University of Exeter; ICCMP-University of Brasilia; International Institute of Physics (IIP-UFRN) – Natal, Brazil during my employment in or extended visits to these institutions