

Name: **Igor BONDAREV**

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## University Education/Scientific Degrees

|   |   |
|---|---|
| D.Sc. (Dr.hab.),<br>Jun 2001<br><i>(Doctor of Physical<br/>and Mathematical<br/>Sciences)</i> | Theoretical Condensed Matter Physics<br>National Academy of Sciences of the Republic of Belarus, Minsk<br><i>(This degree is higher than the Ph.D. degree. It requires 15 to 20 years<br/>of successful research and publication of at least 50 papers in refereed<br/>journals. It is awarded to less than 1% of active former Soviet Union<br/>Ph.D. scientists. A counterpart in Germany is the Habilitation degree)</i><br>Thesis title: "Theoretical aspects of the positronium spectroscopy of<br>solids" |
| Ph.D.,<br>Feb 1994  | Theoretical Condensed Matter Physics/Atomic Physics<br>Belarusian State University, Minsk (1989-93)<br>Thesis title: "Hyperfine interactions of ground-state hydrogen-like<br>atoms in external fields"   |
| M.Sc.,<br>Jun 1989  | Theoretical Physics <i>(with first class honours)</i><br>Belarusian State University, Minsk (1982-83; 1985-89)  |

## Employment/Professional Experience

|                  |   |
|------------------|---|
| 9/2005 – Present | Associate Professor in the Physics Department<br>at the North Carolina Central University, Durham, NC, USA  |
| 8/1989 – 8/2005  | Principal Research Associate (2/02–8/05), Leading Research Asso-<br>ciate (3/99–1/02), Senior Research Associate (4/95–2/99), Research<br>Associate (1/94–3/95), Junior Research Associate (1/92–12/93),<br>Engineer-Physicist (8/89–12/91) in the Institute for Nuclear Problems<br>at the Belarusian State University, Minsk, BELARUS |

## Visiting Positions

|                 |  |
|-----------------|--|
| 3/2005 – 7/2005 | North Carolina Central University, Durham, USA   |
| 11-12/2004      | Laboratoire d'Annecy-le-vieux de Physique des Particules,<br>Université de Savoie, Annecy-le-vieux, France |
| 9-10/2004       | Walter Schottky Institut, TU München, Garching, Germany  |
| 5/2003 – 4/2004 | Laboratoire de Physique du Solide, Facultés Universitaires<br>Notre-Dame de la Paix, Namur, Belgium        |
| 7-8,12/2002     | Institut für Festkörperphysik, TU Berlin, Germany  |
| 7-8/1998        | MPI für Metallforschung, Stuttgart, Germany  |
| 2-4/1996        | University of Tokyo, Japan   |
| 11-12/1994      | Institute for Nuclear Physics, Cracow, Poland  |
| 7-8/1994        | International Center for Theoretical Physics, Trieste, Italy   |
| 7-8/1993        | International Center for Theoretical Physics, Trieste, Italy   |

# Projects/Research Grants

(Listed are projects supervised in last 10 years. Total of over 25 research projects in condensed matter theory since 1994)

1. Surface electromagnetic phenomena in pristine and atomically doped carbon nanotubes: Fundamentals and applications  
Principal Investigator: I.V.Bondarev  
Funded by: US Department of Energy, Office of Basic Energy Sciences (09/2011–08/2014)
2. New concepts for the development of carbene nanotube materials for army related applications  
Principal Investigator: I.V.Bondarev  
Funded by: US Army Research office (05/2011–04/2014)
3. Nanotube composites: near-field electrodynamics and applications  
Principal Investigator: I.V.Bondarev  
Funded by: US National Science Foundation (08/2010–07/2012)
4. Electromagnetics of pristine and atomically doped carbon nanotubes. Theoretical studies of basic phenomena and physical principles for novel applications  
Principal Investigator: I.V.Bondarev  
Funded by: US Army Research office (05/2010–04/2011)
5. Atomically doped carbon nanotubes for advanced optoelectronics  
Principal Investigator: I.V.Bondarev  
Funded by: US National Science Foundation (08/2006–07/2008)
6. Mobility processes of metastable self-trapped quasiparticle excitations of polaron-acouston type in crystals  
Principal Investigator: I.V.Bondarev  
Funded by: Education & Science Ministry of the Republic of Belarus (01/2001–12/2005)
7. Positrons and positronium in nanoporous materials  
Principal Investigator: I.V.Bondarev  
Funded by: University of Savoie, France (11-12/2004)
8. Spontaneous emission dynamics of quantum dots in 2D photonic crystals  
Principal Investigators: I.V.Bondarev, J.Finley, G.Abstreiter  
Funded by: Deutsche Forschungsgemeinschaft (DFG), Germany (9-10/2004)
9. Electron-phonon and electromagnetic effects in carbon nanotubes  
Principal Investigators: I.V.Bondarev, Ph.Lambin  
Funded by: Belgian Office for Scientific, Technical and Cultural Affairs (5/2003–4/2004)
10. Electromagnetic and transport properties of solid state nanostructures with resonant electron-photon and electron-phonon states  
Principal Investigators: I.V.Bondarev, S.A.Maksimenko, V.V.Popov, G.Ya.Slepyan  
Funded by: Fundamental Research Foundations of the Republic of Belarus and Russian Federation (3/2002–02/2004)

# Teaching Experience

## Courses taught in last 10 years:

Physics Department, North Carolina Central University, Durham, NC, USA

9/2005 – Present: PHYS5300/5310 Advanced Quantum Mechanics I/II; PHYS5330 Advanced Solid State Physics; PHYS5210/5220 Statistical Mechanics I/II; PHYS4110 Thermal Physics; PHYS3410 Computational Physics; PHYS2310 General Physics for science and engineering majors; PHYS1210 Language of Science; PHYS1050 Astronomy; PHYS5800 Graduate Research (Todor Antonijevic, Justice McConnel, Joseph Estevez, Misty Green, Hicham Qasmi, Bernhard Schmid, Toros Torosyan)

Physics Department, Belarusian State University, Minsk, Belarus

9/2004 – 2/2005: 1) "Nuclear-spectroscopic methods for media investigation"; 2) "Methods of modern spectroscopy" (for graduate students)

9/2000 – 4/2003: "Mathematics for physicists" + recitation seminars with problems solving (for undergraduate students)

## Awards/Fellowships

- *The US Department of Energy, Office of Basic Energy Sciences, 2011:* award No DE-SC0007117; project title — "Surface electromagnetic phenomena in pristine and atomically doped carbon nanotubes: Fundamentals and applications"; period — 09/2011–08/2014; amount — \$300,000
- *NT2011 — 12th International Conference on the Science and Application of Nanotubes:* award certificate for outstanding contribution to the satellite symposium on Computational Tools and Challenges for Nanotubes (CCTN2011)
- *The US Army Research Office, 2011:* award No W911NF-11-1-0189; project title — "New concepts for the development of carbene nanotube materials for army related applications"; period — 05/2011–04/2014; amount — \$375,000
- *The US National Science Foundation, 2010:* award No ECS-1045661; project title — "Nanotube composites: near-field electro-dynamics and applications"; period — 08/2010–07/2012; amount — \$75,000
- *The US Army Research Office, 2010:* award No W911NF-10-1-010; project title — "Electromagnetics of pristine and atomically doped carbon nanotubes. Theoretical studies of basic phenomena and physical principles for novel applications"; period — 05/2010–04/2011; amount — \$100,000
- *North Carolina Central University, USA, 2010:* certificate of appreciation in recognition of outstanding contribution at the 2nd annual College of Science and Technology research symposium 2010
- *North Carolina Central University, USA, 2007:*
  - (i) College of Science and Technology Outstanding Faculty Research Award
  - (ii) Faculty Senate Award for Scholarly Achievement

- *The US National Science Foundation, 2006:*  
award No ECS-0631347; project title — ”Atomically doped carbon nanotubes for advanced optoelectronics”; period — 08/2006–07/2008; amount — \$75,000
- *Biography included in the 2006-08 editions of Who’s Who in Science & Engineering*
- *Biography included in the 2006-07 editions of Who’s Who in the World*
- *North Carolina Central University, USA, 2005:*  
three-month visiting professorship assignment
- *The University of Savoie, France, 2004:*  
two-month visiting professorship assignment
- *Walter Schottky Institut, TU München, Garching, Germany, 2004:*  
two-month visiting professorship assignment
- *The Belgian Office for Scientific, Technical and Cultural Affairs (OSTC), 2003:*  
one-year (May 2003 – Apr 2004) fellowship for scientific research in Belgium
- *Institut für Festkörperphysik, TU Berlin, Germany, 2002:*  
three-month visiting professorship assignment
- *The Institute for Nuclear Problems at the Belarusian State University, 2002:*  
special Diploma in recognition of scientific accomplishments
- *The President of the Republic of Belarus, 1999:*  
two-year (1999–01) Presidential Young Investigator fellowship
- *Deutscher Akademischer Austauschdienst (DAAD), 1998:*  
two-month fellowship for scientific research in Germany
- *The Japan Society for the Promotion of Science (JSPS), 1995:*  
three-month fellowship for scientific research in Japan
- *The Polish Academy of Sciences, 1994:*  
two-month fellowship for scientific research in Poland
- *The International Science Foundation (ISF), 1994:*  
Soros travel grant for participation in the 10-th International Conference on positron annihilation (May 23–29, 1994, Beijing, China)
- *The International Science Foundation (ISF), 1993:*  
Soros financial support grant for researchers from the former Soviet Union

## Other Involvements

1. 9/2010 – Present: NCCU College of Science & Technology Committee Member (Academic Policies and Procedures, Grievance)
2. 3/2006 – Present: Member of the American Physical Society
3. 5/2003 – Present: Member of the European Material Research Society
4. 1/2000 – Present: Physical Review/Physical Review Letters official referee

5. 11/2008, 5/2010: NSF QMHP panel reviewer (Quantum Modeling of High-Performance devices and systems)
6. 6/2009: Panel Chair of the NASA APRA review panel (Astronomy and Physics Research and Analysis: IR detector development)
7. 6/2008: NASA APRA panel reviewer (Astronomy and Physics Research and Analysis: IR detector development)
8. 5/2007: NSF EPDT panel reviewer (Electronics, Photonics & Device Technologies)
9. 1/1997 – 8/2005: Member of the Academic Council of the Institute for Nuclear Problems at the Belarusian State University, Minsk
10. 5/2003 – 4/2004: Member of the Belgian Physical Society
11. 01/1995 – 12/1996: Member of the New York Academy of Sciences

## Invited Seminars

1. New concepts for the development of carbon nanotube materials for advanced photonics applications  
Invited seminar at Max-Planck-Institute for Quantum Optics, Technische Universität München, Germany (August 17, 2011)
2. Carbon nanotube materials for advanced photonics applications  
Invited seminar in the theoretical chemistry research group led by Prof. Dr. W.Domcke, Department of Chemistry, Technische Universität München, Germany (April 11, 2011)
3. New concepts for the development of novel carbon nanotube materials and devices  
Invited seminar in Joint School of Nanoscience and Nanoengineering, North Carolina A&T State University and The University of North Carolina at Greensboro, NC, USA (October 8, 2010)
4. Towards the development of novel optical nanomaterials and devices  
Invited seminar in the College of Science and Technology at the North Carolina Central University, Durham, NC, USA (June 4, 2010)
5. Carbon nanotube nanophotonics  
Invited seminar in the Department of Physics at the Duke University, Durham, NC, USA (October 15, 2009).
6. Towards the development of optical nanomaterials and devices  
Invited seminar in the Physics Department at the University of South Florida, Tampa, Florida, USA (May 15, 2008).
7. Surface electromagnetic phenomena in pristine and doped carbon nanotubes  
Invited seminar in the Center for Materials Research at the Norfolk State University, Norfolk, Virginia, USA (November 2, 2007).
8. Quantum electrodynamics of surface electromagnetic excitations in carbon nanotubes  
Invited seminar in the Center for Nanoscale Systems at Cornell University, Ithaca, New York, USA (October 30, 2007).

9. Strong many-particle correlations in bulk and nanostructured materials  
Invited seminar in the Department of Engineering Science and Physics at the College of Staten Island, The City University of New York, New York, USA (May 3, 2007).
10. Cavity QED, nanophotonics and quantum communication with atomically doped carbon nanotubes  
Invited seminar in the Physics Department at the University of South Florida, Tampa, Florida, USA (September 29, 2006).
11. Optical absorption by atomically doped carbon nanotubes under strong atom-field coupling  
Invited seminar in the materials science research group led by Prof. S.Washburn at the Department of Physics and Astronomy of the University of North Carolina at Chapel Hill, USA (June 15, 2005).
12. Near-field electrodynamics of atomically doped carbon nanotubes  
Invited seminar in the Center for Optoelectronics and Optical Communications at the University of North Carolina at Charlotte, USA (May 27, 2005).
13. Positive muons as applied for hydrogen-storage capacity studies of carbon nanotubes  
Invited seminar in the muon spin rotation research group led by Prof. V.A.Gordeev at the St.-Petersburg Nuclear Physics Institute, Russia (December 22, 2004).
14. Positronium in crystalline dielectrics  
Invited seminar in the positron/positronium physics research group led by Dr. S.Gninenko at CERN, France (November 3, 2004).
15. Quantum electrodynamics of atomically doped carbon nanotubes  
Invited seminar in the quantum optics research group led by Prof. Dr. D.-G.Welsch at Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität Jena, Germany (June 22, 2004).
16. Vacuum-field effects in atomically doped carbon nanotubes  
Invited seminar in the semiconductor nanophotonics research group led by Prof. J.Finley and Prof. Dr. G.Abstreiter at Walter-Schottky-Institut, Technische Universität München, Germany (June 21, 2004).
17. Atomic spontaneous decay rate enhancement near a carbon nanotube  
Invited seminar at the Physics Department of the University of Namur, Belgium (June 23, 2003).
18. Exciton-phonon coupling and exciton pure dephasing in quasimonolayer semiconductor heterostructures  
Invited seminar in the semiconductor research group headed by Prof. Dr. I.Broser and Priv. Doz. Dr. A.Hoffmann at Institut für Festkörperphysik, Technische Universität Berlin, Germany (August 17, 2002).
19. Free and self-trapped positronium in ionic crystals: Theoretical analysis and comparison with an experiment  
Invited seminar in the positron research group headed by Prof. Dr. A.Seeger at Max-Planck Institut für Metallforschung, Stuttgart, Germany (July 17, 1998).

20. Effective quadrupole interaction of positronium in noncubic oriented crystals  
Invited seminar in the Muon Physics Laboratory of the University of Tokyo, Japan (March 12, 1996).
21. Temperature activated positronium self-trapping in ionic crystals  
Invited seminar in the solid state physics research group headed by Prof. K.Nasu at KEK, Tsukuba, Japan (February 27, 1996).
22. Crystal field effect on the angular distribution of the photons resulting from the  $3\gamma$ -decay of positronium  
Invited seminar at the Physics Department of the Tokyo Metropolitan University, Japan (February 10, 1996).
23. Influence of exchange and quadrupole interactions on the angular distribution of the photons resulting from the  $3\gamma$ -decay of positronium  
Invited seminar at the Institute for Nuclear Physics, Cracow, Poland (November 25, 1994).

## Conference Presentations

1. Nanotube plasmonics,  
**Invited** talk at the International Conference "Spins & Photonic Beams at Interface" (September 25–26, 2011, Minsk, Belarus).
2. Near-field quantum electrodynamics of pristine and atomically doped carbon nanotubes,  
**Invited** talk at the International Workshop "Low Dimensional Physics and Gauge Principles" (September 21–26, 2011, Yerevan, Armenia).
3. Plasmon generation by optically excited excitons in individual single wall nanotubes,  
Contributed talk at the 12th International Conference on the science and application of nanotubes (July 10–14, 2011, Cambridge, UK).
4. Asymptotic exchange coupling of quasi-one-dimensional excitons in carbon nanotubes,  
Contributed talk at the 7th International Symposium on computational challenges and tools for nanotubes (July 15–16, 2011, Cambridge, UK).
5. Surface plasmon amplification under controlled exciton plasmon coupling in individual carbon nanotubes,  
Contributed talk at the 11th International Conference "Physics of Light-Matter Coupling in Nanostructures" (April 4–8, 2011, Berlin, Germany).
6. Surface plasmon generation by excitons in carbon nanotubes,  
Contributed talk at the APS March Meeting (March 21-25, 2011, Dallas, TX, USA).
7. Biexcitonic non-linearities in semiconducting carbon nanotubes,  
Contributed talk at the APS March Meeting (March 21-25, 2011, Dallas, TX, USA).
8. Surface electromagnetic phenomena in pristine and atomically doped carbon nanotubes,  
**Invited** advanced seminar at the 2nd International School of nanophotonics and photovoltaics (September 15–22, 2010, Tsakhkadzor, Armenia).

9. Electrostatic field control of exciton-plasmon coupling and optical response of individual carbon nanotubes,  
*[in collaboration with L.M.Wood's group, University of South Florida]*  
 Contributed talk at the 10th International Conference on excitonic and photonic processes in condensed and nano materials (July 11–16, 2010, Brisbane, Australia).
10. Exciton-plasmon coupling and biexcitonic nonlinearities in individual carbon nanotubes,  
*[in collaboration with L.M.Wood's group, University of South Florida]*  
 Contributed talk at the 11th International Conference on the science and application of nanotubes (June 27 – July 2, 2010, Montréal, Canada).
11. Surface electromagnetic phenomena in pristine and atomically doped carbon nanotubes,  
 Contributed talk at the 6th International Symposium on computational challenges and tools for nanotubes (June 27–28, 2010, Montréal, Canada).
12. On the role of interband surface plasmons in carbon nanotubes,  
*[in collaboration with L.M.Wood's group, University of South Florida]*  
**Invited** talk at the XIIIth International Conference on quantum optics and quantum information (May 28 – June 1, 2010, Kyiv, Ukraine).
13. Electrostatic field control of exciton-surface-plasmon coupling in individual carbon nanotubes,  
*[in collaboration with L.M.Wood's group, University of South Florida]*  
 Contributed talk at the CLEO/QELS conference (May 16-21, 2010, San Jose, CA, USA).
14. Exciton-plasmon coupling and biexcitonic nonlinearities in individual carbon nanotubes,  
*[in collaboration with L.M.Wood's group, University of South Florida]*  
 Contributed talk at the 10th International Conference "Physics of Light-Matter Coupling in Nanostructures" (April 12–16, 2010, Cuernavaca, Mexico).
15. Carbon nanotubes interactions: effects of chirality,  
*[in collaboration with L.M.Wood's group, University of South Florida]*  
 Contributed talk at the APS March Meeting (March 15-19, 2010, Portland, OR, USA).
16. Exciton emission under strong exciton-plasmon coupling in carbon nanotubes,  
*[in collaboration with L.M.Wood's group, University of South Florida]*  
 Contributed talk at the APS March Meeting (March 15-19, 2010, Portland, OR, USA).
17. Two-qubit atomic entanglement in metallic carbon nanotubes,  
 Contributed talk at the APS March Meeting (March 15-19, 2010, Portland, OR, USA).
18. DFT modeling of structural, electronic and spin properties of  $\text{Eu@C}_{60}$ ,  $\text{Eu@C}_{82}$ , and  $\text{N@C}_{60}$  as candidates for qubits,  
*[in collaboration with S.Ya.Kilin's group, Belarusian Academy of Sciences]*  
 Contributed talk at the 3rd International Symposium on methods of computational chemistry (June 28 – July 2, 2009, Odesa, Ukraine).
19. Structure and physical properties of the  $\text{Eu@C}_{82}$  and  $\text{Eu@C}_{60}$  clusters by the DFT method  
*[in collaboration with S.Ya.Kilin's group, Belarusian Academy of Sciences]*  
 Contributed talk at the 17th International Symposium "Nanostructures: Physics and Technology" (June 22–26, 2009, Minsk, Belarus).

20. Quantum confined Stark effect for exciton-plasmons in carbon nanotubes,  
Contributed talk at the APS March Meeting (March 16-20, 2009, Pittsburgh, PA, USA).
21. Profiling surfaces with a carbon nanotube oscillator,  
*[in collaboration with L.M.Wood's group, University of South Florida]*  
Contributed talk at the APS March Meeting (March 16-20, 2009, Pittsburgh, PA, USA).
22. Surface exciton-plasmons and optical response of small-diameter carbon nanotubes,  
*[in collaboration with L.M.Wood's group, University of South Florida]*  
**Invited** talk at the XIIth International Conference on quantum optics and quantum information (September 20–23, 2008, Vilnius, Lithuania).
23. Modeling of the structural, electronic and spin properties of the  $\text{Eu@C}_{60}$  and  $\text{Eu@C}_{82}$  clusters by the DFT method,  
*[in collaboration with S.Ya.Kilin's group, Belarusian Academy of Sciences]*  
Contributed talk at the XIIth International Conference on quantum optics and quantum information (September 20–23, 2008, Vilnius, Lithuania).
24. Strongly coupled surface plasmon-exciton excitations in small-diameter carbon nanotubes,  
*[in collaboration with L.M.Wood's group, University of South Florida]*  
Contributed talk at the CLEO/QELS/PhAST conference (May 4-9, 2008, San Jose, CA, USA).
25. Surface exciton-plasmons in carbon nanotubes,  
*[in collaboration with L.M.Wood's group, University of South Florida]*  
Contributed talk at the APS March Meeting (March 10-14, 2008, New Orleans, LA, USA).
26. Spontaneous decay and two-qubit entanglement in ion-doped carbon nanotubes,  
*[in collaboration with M.A.Noginov's group, Norfolk State University, VA]*  
Contributed talk at the APS March Meeting (March 10-14, 2008, New Orleans, LA, USA).
27. Van Der Waals interaction between two parallel radially deformed single wall carbon nanotubes,  
*[in collaboration with L.M.Wood's group, University of South Florida]*  
Contributed talk at the APS March Meeting (March 10-14, 2008, New Orleans, LA, USA).
28. Oscillatory behavior of a double wall carbon nanotube near an infinite surface,  
*[in collaboration with L.M.Wood's group, University of South Florida]*  
Contributed talk at the APS March Meeting (March 10-14, 2008, New Orleans, LA, USA).
29. Magnetic dipole systems for probing optical magnetism,  
*[in collaboration with M.A.Noginov's group, Norfolk State University, VA]*  
Contributed talk at the APS March Meeting (March 10-14, 2008, New Orleans, LA, USA).
30. Surface electromagnetic phenomena in pristine and doped carbon nanotubes,  
Contributed talk at the 74th Annual Meeting of the Southeastern Section of the APS (November 8–10, 2007, Nashville, Tennessee, USA).
31. Exciton-photon correlations in carbon nanotubes,  
Contributed talk at the 24th European Material Research Society Conference (May 28–June 1, 2007, Strasbourg, France).

32. Qubit entanglement from a bipartite atomic system under strong atom-field coupling in a carbon nanotube,  
Contributed talk at the International Conference NANOMEETING-2007 (May 22–25, 2007, Minsk, Belarus).
33. Exciton-polariton dynamics in carbon nanotubes,  
Contributed talk at the APS March Meeting (March 5–9, 2007, Denver, Colorado, USA).
34. Cavity QED, nanophotonics and quantum communication with atomically doped carbon nanotubes  
**Invited** talk at the "Towards Functional Nanomaterials: Synthesis, Characterization, and Applications" Symposium of the 2007 TMS Annual Meeting (February 25–March 1, 2007, Orlando, Florida, USA).
35. Optical absorption by atomically doped carbon nanotubes under strong atom-field coupling  
Contributed talk at the 6th Annual Meeting in the Fitzpatrick Institute for Photonics, Symposium on "Photonics at the Frontiers of Science and Technology" (September 28–29, 2006, Duke University, Durham, North Carolina, USA).
36. Atomic entanglement in carbon nanotubes  
Contributed talk at the 6th Annual Meeting in the Fitzpatrick Institute for Photonics, Symposium on "Photonics at the Frontiers of Science and Technology" (September 28–29, 2006, Duke University, Durham, North Carolina, USA).
37. Tunnel detrapping of self-trapped positronium in SrF<sub>2</sub> single crystal  
Contributed talk at the 14th International Conference on positron annihilation (July 23–28, 2006, Hamilton, Ontario, Canada).
38. Optical absorption by atomically doped carbon nanotubes under strong atom-field coupling,  
Contributed talk at the 23rd European Material Research Society Conference (May 29–June 2, 2006, Nice, France).
39. Atomic entanglement in carbon nanotubes,  
Contributed talk at the 23rd European Material Research Society Conference (May 29–June 2, 2006, Nice, France).
40. Quantum optics phenomena in atomically doped carbon nanotubes,  
**Invited** talk at the XIth International Conference on quantum optics (May 26–31, 2006, Minsk, Belarus).
41. Qubit entanglement from a bipartite atomic system in a carbon nanotube,  
Contributed talk at the NSTI Nanotechnology Conference (May 7–11, 2006, Boston, Massachusetts, USA).
42. Atomic entanglement in carbon nanotubes,  
Contributed talk at the APS March Meeting (March 13–17, 2006, Baltimore, Maryland, USA).
43. Peculiarities of the van der Waals interactions in atomically doped carbon nanotube systems,

- Contributed talk at the International Conference NANOMEETING-2005 (May 24–27, 2005, Minsk, Belarus).
44. Near-field electrodynamic properties of atomically doped carbon nanotubes,  
Contributed talk at the NSTI Nanotechnology Conference (May 8–12, 2005, Anaheim, California, USA).
  45. Prospects for using positive muons to study physical properties of semiconductor, metallic and carbon nanostructures,  
**Invited** talk at the XXXIXth International Winter School on nuclear physics (February 14–20, 2005, St.-Petersburg Nuclear Physics Institute, Gatchina, Russia).
  46. Positronium in crystalline dielectrics,  
**Invited** talk at the XXXIXth International Winter School on nuclear physics (February 14–20, 2005, St.-Petersburg Nuclear St.-Petersburg Nuclear Physics Institute, Gatchina, Russia).
  47. Near-field electrodynamic properties of carbon nanotubes,  
Contributed talk at the 6th International Conference on nanotechnology in Carbon (October 10–13, 2004, Batz-sur-Mer, France).
  48. Sensitivity of positronium momentum distribution to phase transitions in crystalline dielectrics,  
**Invited** talk at the 35th Polish (International) Seminar on positron annihilation (September 20–24, 2004, Turawa, Poland).
  49. Near-field electrodynamic properties of atomically doped carbon nanotubes,  
**Invited** talk at the International Workshop on cooperative phenomena in optics and transport in nanostructures (May 31 – June 25, 2004, Dresden, Germany).
  50. Exciton dephasing in quasimonolayer semiconductor heterostructures,  
Contributed talk at the International Workshop on cooperative phenomena in optics and transport in nanostructures (May 31 – June 25, 2004, Dresden, Germany).
  51. The van der Waals energy of an atom near a carbon nanotube,  
Contributed talk at the Xth International Conference on quantum optics (May 30–June 3, 2004, Minsk, Belarus).
  52. Spontaneous decay dynamics in atomically doped carbon nanotubes,  
Contributed talk at the 21st European Material Research Society Conference (May 25–28, 2004, Strasbourg, France).
  53. Vacuum field effects in atomically doped carbon nanotubes,  
Contributed talk at the 21st European Material Research Society Conference (May 25–28, 2004, Strasbourg, France).
  54. Spontaneous decay dynamics in atomically doped carbon nanotubes,  
Contributed talk at the at the Belgian Workshop on carbon nanosystems (March 15, 2004, Neuiwpoort, Belgium).
  55. Delocalized positronium as a tool for investigation of second-order structural phase transitions in crystalline dielectrics,  
Contributed talk at the 13th International Conference on positron annihilation (September 7–13, 2003, Kyoto, Japan).

56. Positronium quadrupole interactions in crystalline solids,  
Contributed talk at the 13th International Conference on positron annihilation (September 7–13, 2003, Kyoto, Japan).
57. Nonradiative spontaneous decay of an excited atom near a carbon nanotube,  
Contributed talk at the International Conference on nanotubes and nanowires (August 3–8, 2003, San Diego, USA).
58. Positronium-phonon interactions in dielectric crystals,  
Contributed talk at the 12th International Workshop on low energy positron and positronium physics (July 19–21, 2003, Sandbjerg, Denmark).
59. Atomic spontaneous decay rate enhancement near a carbon nanotube,  
Contributed talk at the Belgian Workshop on carbon nanosystems (May 21, 2003, Namur, Belgium).
60. Exciton-phonon interactions and exciton pure dephasing in lens-shaped quantum dots,  
Contributed talk at the 20th European Material Research Society Conference (June 10–13, 2003, Strasbourg, France).
61. Atomic spontaneous decay rate enhancement near a carbon nanotube,  
Contributed talk at the 20th European Material Research Society Conference (June 10–13, 2003, Strasbourg, France).
62. Exciton-phonon coupling of localized quasi-2D excitons in semiconductor quantum well heterostructures,  
Contributed talk at the International Conference NANOMEETING-2003 (May 20–23, 2003, Minsk, Belarus).
63. Photon vacuum renormalization and atomic decay near a carbon nanotube,  
Contributed talk at the 26th International Conference on physics of semiconductors (July 29 – August 3, 2002, Edinburgh, Scotland).
64. Purcell effect in carbon nanotubes,  
Contributed talk at the IIInd International Symposium "Fullerenes and fullerene-like structures in condensed media" (June 4–8, 2002, Minsk, Belarus).
65. Photon vacuum renormalization and spontaneous decay of an excited atom near a carbon nanotube,  
Contributed talk at the IXth International Conference on quantum optics (May 14–17, 2002, Minsk, Belarus).
66. Delocalized and self-trapped positronium in dielectric crystals,  
**Invited** talk at the XXXVIth International Winter School on nuclear physics (February 26 – March 3, 2002, St.-Petersburg Nuclear Physics Institute, Gatchina, Russia).
67. On explanation of unusual broadening of ACAR narrow peaks in  $\text{MgF}_2$ : the nonpolar optic scattering of positronium,  
Contributed talk at the 32nd Polish (International) Seminar on positron annihilation (September 18–22, 2000, Jarnołtówek, Poland).

68. Free and self-trapped positronium in ionic crystals: Theoretical analysis and comparison with an experiment,  
**Invited** talk at the XXXIInd International Winter School on nuclear physics (February 17–22, 1998, St.-Petersburg Nuclear Physics Institute, Gatchina, Russia).
69. Anisotropic magnetic quenching of positronium formed by polarized positrons in oriented crystals,  
 Contributed talk at the 30th Polish (International) Seminar on positron annihilation (September 17–21, 1998, Jarnoltówek, Poland).
70. Tunnel self-trapping of positronium in alkali halide crystals,  
 Contributed talk at the 11th International Conference on positron annihilation (May 25–30, 1997, Kansas City, USA).
71. Positronium self-localization in alkali halide crystals,  
 Contributed talk at the 28th Polish (International) Seminar on positron annihilation (September 8–13, 1996, Jarnoltówek, Poland).
72. Temperature dependence of the positronium diffusivity in alkali halide crystals,  
 Contributed talk at the 28th Polish (International) Seminar on positron annihilation (September 8–13, 1996, Jarnoltówek, Poland).
73. Quadrupole effects for positronium atom in noncubic oriented crystals,  
 Contributed talk at the 7th International Conference on muon spin rotation/relaxation/resonance (April 15–19, 1996, Nikko, Japan).
74. On the possibility of observing the quadrupole moment of positronium in a crystal,  
 Contributed talk at the 26th Polish (International) Seminar on positron annihilation (September 11–16, 1994, Pokrzywna, Poland).
75. Hydrogen-like atom in laser field: invariant atomic parameters in the ground state,  
**Invited** talk at the International Workshop on condensed matter physics (July 17 – August 5, 1994, International Centre for Theoretical Physics, Trieste, Italy).
76. Anisotropic magnetic quenching of positronium in a crystal,  
 Contributed talk at the 10th International Conference on positron annihilation (May 23–29, 1994, Beijing, China).
77. Hyperfine interactions and anisotropy of positronium magnetic quenching in a crystal,  
 Contributed talk at the Vth International Conference on nuclear-spectroscopic methods of investigation of hyperfine interactions (September 22–24, 1993, Dubna, Russia).
78. Hyperfine structure of positronium energy levels in a crystal,  
**Invited** talk at the International Workshop on condensed matter physics (July 20 – August 10, 1993, International Centre for Theoretical Physics, Trieste, Italy).
79. Quadrupole interaction of positronium in a crystal,  
 Contributed talk at the XIIth International Symposium on nuclear quadrupole resonance (July 19–23, 1993, Zürich, Switzerland).
80. Hyperfine structure of positronium energy levels in a crystal,  
 Contributed talk at the International School of physics E. Fermi, Course CXXV "Positron spectroscopy of solids" (July 6–16, 1993, Varenna, Italy).

81. Dynamical tensor polarizability in the ground state of the hydrogen atom,  
Contributed talk at the IXth International Conference on hyperfine interactions (August 17–21, 1992, Osaka, Japan).
82. Hyperfine structure of positronium energy levels in a crystal,  
Contributed talk at the IXth International Conference on hyperfine interactions (August 17–21, 1992, Osaka, Japan).
83. Hyperfine interactions and tensor polarizability of hydrogen-like atoms,  
Contributed talk at the IXth International Conference on hyperfine interactions (August 17–21, 1992, Osaka, Japan).
84. Dynamical tensor polarizability in the ground state of the hydrogen atom,  
Contributed talk at the 4th European Conference on atomic and molecular physics (April 6–10, 1992, Riga, Latvia).
85. Influence of exchange and quadrupole interactions on the angular distribution of the photons resulting from the  $3\gamma$ -decay of positronium,  
Contributed talk at the All-Union Seminar "Positron annihilation in solids" (September 10–12, 1991, Obninsk, USSR).
86. Anisotropic hyperfine interactions of positronium in matter,  
Contributed talk at the IVth International Conference on nuclear-spectroscopic methods of investigation of hyperfine interactions (July 26–28, 1991, Uzhgorod, USSR).
87. Crystal field effect on the angular distribution of positronium  $3\gamma$ -decay quanta,  
Contributed talk at the 9th International Conference on positron annihilation (August 26–31, 1991, Szombathely, Hungary).
88. Anisotropic hyperfine interactions of positronium in matter,  
Contributed talk at the IVth International Conference on nuclear-spectroscopic methods of investigation of hyperfine interactions (July 26–28, 1991, Uzhgorod, USSR).

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# List of Publications

## (A) Articles in journals:

1. **I. V. Bondarev** ' Single wall carbon nanotubes as coherent plasmon generators ' Physical Review Letters (*submitted*).
2. **I. V. Bondarev** and T. Antonijevic ' Surface plasmon amplification under controlled exciton-plasmon coupling in individual carbon nanotubes ' Physica Status Solidi C "Current Topics in Solid State Physics" (*submitted*).
3. **I. V. Bondarev**, L. M. Woods, and A. Popescu ' On the role of interband surface plasmons in carbon nanotubes ' Optika i Spektroskopiya [English version: Opt. Spectrosc., New-York] (*at press*).
4. **I. V. Bondarev** ' Asymptotic exchange coupling of quasi-1D excitons in carbon nanotubes ' Physical Review B, Vol. 83, p. 153409, 2011 (selected for the May 2, 2011 issue of the Virtual Journal of Nanoscale Science & Technology at <http://www.vjnano.org>).
5. A. Popescu, L. M. Woods, and **I. V. Bondarev** ' Chirality dependent carbon nanotube interactions ' Physical Review B: Rapid Communications, Vol. 83, p. 081406, 2011 (selected for the February 28, 2011 issue of the Virtual Journal of Nanoscale Science & Technology at <http://www.vjnano.org>).
6. **I. V. Bondarev** ' Electrostatic field control of exciton-plasmon coupling and optical response of individual carbon nanotubes ' Physica Status Solidi B, Vol. 248, p. 468, 2011.
7. **I. V. Bondarev** ' Exciton-plasmon coupling and biexcitonic nonlinearities in individual carbon nanotubes ' Superlattices and Microstructures, Vol. 49, p. 217, 2011.
8. **I. V. Bondarev** ' Surface electromagnetic phenomena in pristine and atomically doped carbon nanotubes ' Journal of Computational and Theoretical Nanoscience, Vol. 7, p. 1673, 2010 (invited review article for the special issue on "Technology Trends and Theory of Nanoscale Devices for Quantum Applications", American Scientific Publishers, USA).
9. **I. V. Bondarev**, K. Tatur and L. M. Woods ' Surface exciton-plasmons and optical response of small-diameter carbon nanotubes ' Optika i Spektroskopiya, Vol. 108, p. 412, 2010.  
**English version:** Opt. Spectrosc. (New-York), Vol. 108, p. 376, 2010.
10. **I. V. Bondarev**, L. M. Woods and K. Tatur ' Strong exciton-plasmon coupling in semiconducting carbon nanotubes ' Physical Review B, Vol. 80, p. 085407, 2009 (selected for the August 17, 2009 issue of the Virtual Journal of Nanoscale Science & Technology at <http://www.vjnano.org>).

11. **I. V. Bondarev**, K. Tatur and L. M. Woods ' Optical response of small-diameter semi-conducting carbon nanotubes under exciton-surface-plasmon coupling ' Optics Communications, Vol. 282, p. 661, 2009.
12. A. Popescu, L. M. Woods, and **I. V. Bondarev** ' Carbon nanotube oscillator as a surface profiling device ' Nanotechnology, Vol. 19, p. 435702, 2008.
13. K. Tatur, L. M. Woods, and **I. V. Bondarev** ' Zero-point energy of a cylindrical layer of finite thickness ' Physical Review A, Vol. 78, p. 012110, 2008.
14. A. Popescu, L. M. Woods, and **I. V. Bondarev** ' Simple model of van der Waals interactions between two radially deformed single wall carbon nanotubes ' Physical Review B, Vol. 77, p. 115443, 2008 (selected for the April 7, 2008 issue of the Virtual Journal of Nanoscale Science & Technology at <http://www.vjnano.org>).
15. **I. V. Bondarev** and H. Qasmi ' Exciton-photon correlations in carbon nanotubes ' Physica E: Low dimensional systems and nanostructures, Vol. 40, p. 2365, 2008.
16. **I. V. Bondarev** ' Cavity QED, nanophotonics and quantum information processing with atomically doped carbon nanotubes ' Journal of Electronic Materials, Vol. 36, p. 1579, 2007.
17. **I. V. Bondarev**, K. Inoue, N. Suzuki, and T. Hyodo ' Tunnel detrapping of self-trapped positronium in SrF<sub>2</sub> single crystal ' Physica Status Solidi C, Vol. 4, p. 3867, 2007.
18. **I. V. Bondarev** and B. Vlahovic ' Atomic entanglement in carbon nanotubes ' Materials Science and Engineering C, Vol. 27, p. 1117, 2007.
19. K. Inoue, N. Suzuki, **I. V. Bondarev**, and T. Hyodo ' Temperature dependence of the positronium momentum distribution in CaF<sub>2</sub> ' Physical Review B, Vol. 76, p. 024304, 2007.
20. **I. V. Bondarev** ' Quantum Optics Phenomena in Atomically Doped Carbon Nanotubes ' Optika i Spektroskopiya, Vol. 103, p. 381, 2007.  
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21. **I. V. Bondarev** and B. Vlahovic ' Optical absorption by atomically doped carbon nanotubes under strong atom-field coupling' Physica E: Low dimensional systems and nanostructures, Vol. 37, p. 105, 2007.
22. **I. V. Bondarev** and B. Vlahovic ' Entanglement of a pair of atomic qubits near a carbon nanotube ' Physical Review B, Vol. 75, p. 033402, 2007 (selected for the January 22, 2007 issue of the Virtual Journal of Nanoscale Science & Technology at <http://www.vjnano.org>).
23. **I. V. Bondarev** and B. Vlahovic ' Optical absorption by atomically doped carbon nanotubes ' Physical Review B, Vol. 74, p. 073401, 2006 (selected for the August 14, 2006 issue of the Virtual Journal of Nanoscale Science & Technology at <http://www.vjnano.org>).

24. **I. V. Bondarev** and Ph. Lambin ' van der Waals coupling in atomically doped carbon nanotubes '  
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25. **I. V. Bondarev**, Y. Nagai, M. Kakimoto, and T. Hyodo ' Nonpolar optical scattering of positronium in Magnesium Fluoride '  
Physical Review B, Vol. 72, p. 012303, 2005.
26. **I. V. Bondarev** and Ph. Lambin ' The van der Waals energy of an atom near a carbon nanotube '  
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**English version:** Opt. Spectrosc. (New-York), Vol. 99, p. 475, 2005 (selected for the October 10, 2005 issue of the Virtual Journal of Nanoscale Science & Technology at <http://www.vjnano.org>).
27. **I. V. Bondarev** and Ph. Lambin ' Vacuum-field effects in atomically doped carbon nanotubes '  
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30. **I. V. Bondarev** and Ph. Lambin ' Spontaneous decay dynamics in atomically doped carbon nanotubes '  
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Physics Letters A, Vol. 328, p. 235, 2004.
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33. N. Suzuki, H. Saito, Y. Nagai, T. Hyodo, H. Murakami, M. Sano, **I. V. Bondarev**, and S. A. Kuten, ' Search for the positronium quadrupole interaction in molecular crystals '  
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- Physical Review B, Vol. 68, p. 073310, 2003 (selected for the September 15, 2003 issue of the Virtual Journal of Nanoscale Science & Technology at <http://www.vjnano.org>).
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  45. **I. V. Bondarev**, ' On the anisotropic magnetic quenching of positronium states in oriented crystals ' Fizika Tverdogo Tela, Vol. 41, p. 999, 1999 [in Russian].  
**English translation:** Physics of the Solid State (New-York), Vol. 41, p. 909, 1999.

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47. **I. V. Bondarev**, ' On the role of umklapp processes in the scattering of delocalized positronium on acoustic phonons in ionic crystals '   
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52. **I. V. Bondarev**, ' Temperature dependence of the positronium diffusivity in alkali halide crystals '   
Nukleonika, Vol. 42, p. 21, 1997.
53. **I. V. Bondarev**, ' Localized and delocalized positronium in alkali halides within the model of self-trapping '   
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### **(B) Contributions to books & conference proceedings:**

66. **I. V. Bondarev**, L. M. Woods, and A. Popescu, ' Exciton-plasmon interactions in individual carbon nanotubes '  
A book chapter in edited collection "Plasmons: Theory and Applications", ed. K. Helsey. Nova Science Publishers, USA, 2011, Ch. 16, p. 381.
67. **I. V. Bondarev**, ' Nanotube plasmonics '  
In: International Conference "Spins & Photonics Beams at Interface" (September 25–26, 2011, Minsk, Belarus). Book of abstracts, p. 19.
68. **I. V. Bondarev** and T. Antonijevic, ' Plasmon generation by optically excited excitons in individual single wall carbon nanotubes '  
In: 12th International Conference on the Science and Application of Nanotubes (NT11, July 10–14, 2011, Cambridge, UK). Book of abstracts, #121.
69. **I. V. Bondarev**, ' Asymptotic exchange coupling of quasi-one-dimensional excitons in carbon nanotubes '  
In: 7th International Symposium on Computational Challenges and Tools for Nanotubes (CCTN11 – NT11 satellite, July 15–16, 2011, Cambridge, UK). Book of abstracts, #122.

70. **I. V. Bondarev** and T. Antonijevic, ' Surface plasmon amplification under controlled exciton plasmon coupling in individual carbon nanotubes '
- In: 11th International Conference "Physics of Light-Matter Coupling in Nanostructures" (PLMCN11, April 4-8, 2011, Berlin, Germany). Book of abstracts, p. 53.
71. **I. V. Bondarev** and T. Antonijevic, ' Surface plasmon generation by excitons in carbon nanotubes '
- In: Bulletin of the American Physical Society, Vol. 56, No 1, p. Q32.00013 (APS March Meeting, March 21-25, 2011, Dallas, TX, USA).
72. T. Torosyan and **I. V. Bondarev**, ' Biexcitonic non-linearities in semiconducting carbon nanotubes '
- In: Bulletin of the American Physical Society, Vol. 56, No 1, p. X28.00004 (APS March Meeting, March 21-25, 2011, Dallas, TX, USA).
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- In: 10th International Conference on excitonic and photonic processes in condensed and nano materials (EXCON10, July 11-16, 2010, Brisbane, Australia). Book of abstracts, p. 13O01.
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75. **I. V. Bondarev**, ' Surface electromagnetic phenomena in pristine and atomically doped carbon nanotubes '
- In: 6th International Symposium on Computational Challenges and Tools for Nanotubes (CCTN10 - NT10 satellite, June 27-28, 2010, Montréal, Canada). Book of abstracts, p.8.
76. **I. V. Bondarev**, L. M. Woods, and A. Popescu, ' On the role of interband surface plasmons in carbon nanotubes '
- In: XIIIth International Conference on quantum optics and quantum information (May 28 - June 1, 2010, Kyiv, Ukraine). Book of abstracts, p. 35.
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- In: Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference 2010 Technical Digest (Optical Society of America, Washington, DC, 2010), QThH6.
78. **I. V. Bondarev**, L. M. Woods, and K. Tatur, ' Exciton-plasmon coupling and biexcitonic nonlinearities in individual carbon nanotubes '
- In: 10th International Conference "Physics of Light-Matter Coupling in Nanostructures" (April 12-16, 2010, Cuernavaca, Mexico). Book of abstracts, p. 20.
79. L. M. Woods, A. Popescu, and **I. V. Bondarev**, ' Carbon nanotubes interactions: effects of chirality '
- In: Bulletin of the American Physical Society, Vol. 55, No 2, p. B20.00005 (APS March Meeting, March 15-19, 2010, Portland, OR, USA).

80. **I. V. Bondarev**, L. M. Woods, and K. Tatur, Exciton emission under strong exciton-plasmon coupling in carbon nanotubes,  
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