

Yevhen Miroshnychenko

Curriculum Vitae

Education and research

- from 08 / 2009 **Marie Curie Fellow, QUANTOP - Danish National Research Foundation's Center for Quantum Optics Department of Physics and Astronomy University of Aarhus, Denmark**
- 09 / 2008 – 07 / 2009 **Post. Doc. Researcher, QUANTOP - Danish National Research Foundation's Center for Quantum Optics Department of Physics and Astronomy University of Aarhus, Denmark**
- 09 / 2006 – 08 / 2008 **Post. Doc. Researcher, Institut d'Optique, Palaiseau, France**
- 09 / 2002 – 08 / 2006 **Dr. rer. nat. (Grade: Magna cum laude), Institute of Applied Physics, University of Bonn, Germany.**
Title: "An atom sorting machine". Supervisor: Prof. Dieter Meschede
- 10 / 1999 – 08 / 2002 **German Diplom-Physiker (Grade: Excellent), University of Bonn, Germany.**
Major subject: Physics. Minor subject: Computer science.
Diploma thesis title: "Design and test of an optical high finesse resonation for single atom experiments".
- 09 / 1995 – 07 / 1999 **Bachelor of physics (With distinction), Department of Theoretical Nuclear Physics, Kiev National University, Ukraine.**
Bachelor project title: "Analytic solutions of some quantum mechanical problems with double-well potentials".

Awards

- 2009 **EU Marie Curie Fellowship.**
Awarded by EU in order to finance advanced individual training and career development.
- 2007 **Finalist of the AMOP PhD-Award 2007.**
This prize is given by the German Physical Society for the recognition of outstanding research in the frame of a PhD-thesis and its excellent oral and written presentation.
- 1999 – 2002 **DAAD and Wilhelm Und Else Heraeus-Stiftung Scholarship.**
Awarded by DAAD (German Academic Exchange Service) and Wilhelm Und Else Heraeus-Stiftung (Germany) to outstanding international scholars for the participation in the Master-plus-Programme (Bonn International Physics Programme) at the University of Bonn (Germany).

Teaching

- 04 / 2011 – 06 / 2011 **Graduate teaching, University of Aarhus, Denmark**

Course “Experimental laser physics”. Duties include lecturing a part of the course, tutoring theoretical exercises and laboratory experiments, examining students.

10 / 2008 – 10 / 2011	Supervision of Master and Bachelor projects, University of Aarhus, Denmark
08 / 2010 – 10 / 2010	Undergraduate teaching, University of Aarhus, Denmark Tutoring of the Course “Statistical physics”
11 / 2009 – 01 / 2010	Graduate teaching, University of Aarhus, Denmark Lecture Course “Modern quantum physics with atoms, ions and light”. Duties include selection of the topics of a part of the course, lecturing, preparation and tutoring exercise sessions, preparation and evaluation of exams.
09 / 2009	Undergraduate teaching, University of Aarhus, Denmark Lecturing to undergraduate students as a part of the Course “Special relativity”
05 / 2009	Undergraduate teaching, University of Aarhus, Denmark Preparation and mentoring a lab experiment for undergraduate students as a part of the Course “Optics and waves”
2005, 2008	Teaching secondary school students, University of Aarhus, Denmark, University of Bonn, Germany Lecturing and laboratory demonstrations about atom trapping and laser cooling to secondary school students
09 / 2002 – 02 / 2006	Undergraduate teaching, University of Bonn, Germany. Part time teaching during my PhD candidature. Duties included tutoring undergraduate physics students, laboratory demonstrations and making assessments.

Other professional activities

11 / 2008	Organization of a workshop for the EU project MICROTRAP (FP6-517675)
09 / 2001 – 09 / 2002	Programming for the Website of Springer-Verlag, Heidelberg, Germany. The aim of this part time job was to create, as the supplementary online material to the book, visualizations of physical effects explained in the 21 st edition of the book “Herthsen-Physik”, published by Springer-Verlag.
02 / 2000 – 04 / 2000	Internship in the Institute of Applied Physics, University of Bonn, Germany.

Personal details

Date of birth	19th February, 1978, Kiev, Ukraine
Citizenship	Ukrainian
Marital status	Married
Children	1
Address	QUANTOP - Danish National Research Foundation's Center for Quantum Optics, Department of Physics and Astronomy

	University of Aarhus, Bygning 1520, Ny Munkegade, DK-8000, Aarhus C, Denmark
E-mail	miroshny@phys.au.dk
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Fax	+45 8612 0740

Refereed publications

- [1] Coherent excitation of a single atom to a Rydberg state,
Y. Miroshnychenko, A. Gaëtan, C. Evellin, P. Grangier, D. Comparat, P. Pillet, T. Wilk, and A. Browaeys,
Phys. Rev. A **82**, 013405 (2010)
- [2] Entanglement of two individual neutral atoms using Rydberg blockade,
T. Wilk, A. Gaëtan, C. Evellin, J. Wolters, Y. Miroshnychenko, P. Grangier, and A. Browaeys,
Phys. Rev. Lett. **104**, 010502 (2010)
- [3] Observation of collective excitation of two individual atoms in the Rydberg blockade regime,
A. Gaëtan, Y. Miroshnychenko, T. Wilk, A. Chotia, M. Viteau, D. Comparat, P. Pillet, A. Browaeys, P.
Grangier,
Nature Physics **5**, 115 (2009)
- [4] Two-dimensional transport and transfer of a single atomic qubit in optical tweezers,
J. Beugnon, C. Tuchendler, H. Marion, A. Gaetan, Y. Miroshnychenko, Y.R.P. Sortais, A.M. Lance,
M.P.A. Jones, G. Messin, A. Browaeys, P. Grangier,
Nature Physics **3**, 696 (2007)
- [5] Inserting two atoms into a single optical micropotential
Y. Miroshnychenko, W. Alt, I. Dotsenko, L. Förster, M. Khudaverdyan, D. Meschede,
S. Reick, and A. Rauschenbeutel
Phys. Rev. Lett. **97**, 243003 (2006)
- [6] Number-triggered loading and collisional redistribution of neutral atoms in a standing wave dipole trap
L. Förster, W. Alt, I. Dotsenko, M. Khudaverdyan, D. Meschede, Y. Miroshnychenko,
S. Reick, and A. Rauschenbeutel
New J. Phys., **8**, 259 (2006)
- [7] Precision preparation of strings of trapped neutral atoms
Y. Miroshnychenko, W. Alt, I. Dotsenko, L. Förster, M. Khudaverdyan, A. Rauschenbeutel, and D.
Meschede
New J. Phys., **8**, 191 (2006) (Focus on Cold Atoms in Optical Lattices)
- [8] An atom-sorting machine
Y. Miroshnychenko, W. Alt, I. Dotsenko, L. Förster, M. Khudaverdyan, D. Meschede,
D. Schrader, and A. Rauschenbeutel
Nature (London), **442**, 151 (2006)
- [9] Submicrometer position control of single trapped neutral atoms
I. Dotsenko, W. Alt, M. Khudaverdyan, S. Kuhr, D. Meschede, Y. Miroshnychenko,
D. Schrader, and A. Rauschenbeutel
Phys. Rev. Lett. **95**, 033002 (2005)
- [10] Adiabatic Quantum State Manipulation of Single Trapped Atoms
M. Khudaverdyan, W. Alt, I. Dotsenko, L. Förster, S. Kuhr, D. Meschede,
Y. Miroshnychenko, D. Schrader, and A. Rauschenbeutel
Phys. Rev. A **71**, 031404 (2005)

- [11] Experimental Analysis of dephasing Mechanisms in a Standing Wave Dipole Trap
S. Kuhr, W. Alt, D. Schrader, I. Dotsenko, Y. Miroshnychenko, A. Rauschenbeutel, and D. Meschede
Phys. Rev. A **72**, 023406 (2005)
- [12] Neutral Atom Quantum Register
D. Schrader, I. Dotsenko, M. Khudaverdyan, Y. Miroshnychenko, A. Rauschenbeutel, and D. Meschede
Phys. Rev. Lett. **93**, 150501 (2004)
- [13] Application of electro-optically generated light fields for Raman spectroscopy of trapped Cesium atoms
I. Dotsenko, W. Alt, S. Kuhr, D. Schrader, M. Müller, Y. Miroshnychenko, V. Gomer, A. Rauschenbeutel, and D. Meschede
Appl. Phys. B **78**, 711-717 (2004)
- [14] Coherence properties and quantum state transportation in an optical conveyor belt
S. Kuhr, W. Alt, D. Schrader, I. Dotsenko, Y. Miroshnychenko, W. Rosenfeld, M. Khudaverdyan, V. Gomer, A. Rauschenbeutel, and D. Meschede
Phys. Rev. Lett. **91**, 213002 (2003)
- [15] Continued imaging of the transport of a single neutral atom
Y. Miroshnychenko, D. Schrader, S. Kuhr, W. Alt, I. Dotsenko, M. Khudaverdyan, A. Rauschenbeutel, and D. Meschede
Optics Express **11**(25), 3498-3502 (2003)

Manuscripts in preparation

- [16] Analysis of a spatially sensitive scheme for single ion coherent manipulation,
Y. Miroshnychenko, A. Gorshkov, M. Drewsen, manuscript in preparation.
- [17] Profiling of micrometer sized laser beams in restricted volumes
Y. Miroshnychenko, O. Nielsen, A. Thorsen and M. Drewsen, submitted to Appl. Phys. Lett.
- [18] Ultra low heating rates in a linear Paul trap
G. Poulsen, Y. Miroshnychenko and M. Drewsen, manuscript in preparation.

Conference proceedings

- [19] Entanglement of two ground state neutral atoms using Rydberg blockade
Y. Miroshnychenko, A. Browaeys, C. Evellin, A. Gaëtan, T. Wilk, J. Wolter, P. Grangier, A. Chotia, D. Comparat, P. Pillet, and M. Viteau
Proceedings of the XIII International Conference on Quantum Optics and Quantum Information, Kyiv, Ukraine, May 2010 (Optics and Spectroscopy, **111**, 575 (2011))
- [20] Controllable interactions between Rydberg atoms and ultracold plasmas
P. Pillet, T. Vogt, M. Viteau, A. Chotia, J. Zhao, D. Comparat, T. F. Gallagher, D. Tate, A. Gaëtan, Y. Miroshnychenko, T. Wilk, A. Browaeys, and P. Grangier
Proceedings of the XXVI International Conference on Photonic, Electronic and Atomic Collisions (2009)
- [21] Entanglement of two individual atoms using the Rydberg blockade
A. Browaeys, A. Gaëtan, T. Wilk, C. Evellin, J. Wolters, Y. Miroshnychenko, P. Grangier, P. Pillet, D. Comparat, A. Chotia, M. Viteau
Proceedings of the 19th International Conference on Laser Spectroscopy (2009)

- [22] Recent progress on the manipulation of single atoms in optical tweezers for quantum computing
A. Browaeys, J. Beugnon, C. Tuchendler, H. Marion, A. Gaetan, Y. Miroshnychenko,
Y.R.P. Sortais, A.M. Lance, M.P.A. Jones, G. Messin, P. Grangier
Proceedings of the 18th International Conference on Laser Spectroscopy (2007)
- [23] Controlling strings of single trapped atoms
A. Rauschenbeutel, W. Alt, I. Dotsenko, L. Förster, M. Khudaverdyan, Y. Miroshnychenko, D. Schrader,
and D. Meschede
Proceedings of the 17th International Conference on Laser Spectroscopy (World Scientific, Singapore,
2005)
- [24] Controlled transport of single neutral atom qubits
D. Schrader, S. Kuhr, W. Alt, Y. Miroshnychenko, I. Dotsenko, W. Rosenfeld,
M. Khudaverdyan, V. Gomer, A. Rauschenbeutel, and D. Meschede
Proceedings of the 16th International Conference on Laser Spectroscopy (World Scientific, New York,
2003)

Theses under my co-supervision

- [25] O. H. A. Nielsen, Assembly of the Aarhus Microtrap Experiment, Master thesis (2009)
- [26] J. L. Hansen, Lensed optical fibers in a Micro Ion Trap, Bachelor Thesis (2010)
- [27] J. K. Pedersen, Frembringelse af Laserstråle med en Holografisk Ændret Rumlig Profil, Bachelor
Thesis (2010) (in Danish)
- [28] A. Thorsen, Fiber based beam profiler, Bachelor Thesis (in preparation)
- [29] G. Poulsen, Ground State Cooling of Atomic and Molecular Ions, Ph. D. Thesis (partial co-
supervision, in preparation)

Conference presentations and seminar talks

Analysis of a spatially sensitive scheme for single ion coherent manipulation,
The Second Nordic Physics Meeting, Helsinki, Finland, March 2011

Entanglement of two individual neutral atoms using the Rydberg blockade, XIII International Conference
on Quantum Optics and Quantum Information, Kyiv, Ukraine, May 2010

Aarhus MICROTRAP project status, Workshop of the EU project MICROTRAP (FP6-517675), Aarhus,
Denmark, November 2008

Engineering quantum systems atom by atom, Scientific seminar, Department of Physics, University of
Freiburg, Germany, June 2008

Quantum Engineering: An Atom Sorting Machine, PAQ07 conference, London, UK, September 2007

An atom sorting machine, Spring annual meeting of German Physical Society, Düsseldorf, Germany,
March 2007 (invited)

Position and state control of neutral atoms using optical tweezers, Spring annual meeting of German
Physical Society, Berlin, Germany, March 2005

Realization of a Quantum Register with Individual Neutral Atoms and Beyond, Scientific seminar, NEC Laboratories, Tsukuba, Japan, March 2005

Robust and Efficient Addressing of Single Atoms Using Adiabatic Passages, Spring annual meeting of German Physical Society, Munich, Germany, March 2004

Addressing Individual Atoms, Joint meeting of the Institute of Applied Physics (Bonn) and Imperial College (London), London, May 2003