



Oxana Mishina

External member, Laboratory of Quantum Optics and Quantum Information

📍 TRIESTE, ITALY

👤 Profile

My goal of today is to rise up the awareness about the intriguing and yet one of the most prosperous theory the human intelligence has developed so far – the Quantum Theory. Currently, I am a researcher at the department of physics education, a tutor for teachers, and the luckiest guest in schools talking to the beautiful minds about the quantum mysteries.

During my research career (1999 - ...) I have discovered several features visible only through the prism of the quantum perspective.

The first was the fascinating nature of atomic SPIN, deeply hidden beneath the intriguing layers of quantum theory. It turned out that, despite the mystery of its nature, spin can interact and communicate its properties to something we can clearly see every day, to light. I devoted my Ph.D. work to understand how this quantum information exchange between the spin of atoms and light works. It turned out that one can build a quantum memory for light based on this completely new idea!

The second thing I found on my quantum path was even more intriguing. It appeared to be possible to control the atomic motion by the very same thing we see every day, by light. The technology available today enables us to exchange the quantum state back and forth between the light and the atomic motion, which mathematically look much more similar than in life in fact.

Quantum technologies have revolutionized our society with computers, GPS, digital cameras, screens, lasers and radiological medicine! Now we are living the second quantum revolution: the birth of quantum computers, quantum communication devices, quantum sensors and quantum simulators. They will be faster, more secure, more precise and will address questions we cannot answer yet! I am honored to be part of this revolution!

📄 Scientific production and dissemination

19 articles in open access

13 articles in peer review journals, 6 in conference proceedings.

h-index = 10, Google scholar

10 of my articles have been cited minimum 10 times

18.8 citations per article, 340 total, 43 in 2015, Google scholar

Highlights 2014: Best Video abstract, New Journal of Physics

228 views in 19 months (~3 views/week)

Details

Trieste, Italy

PLACE OF BIRTH

Murmansk, USSR

🌐 Social Profiles

[Research Gate](#)

[Google scholar](#)

[LinkedIn](#)

📊 Skills

Quantum physics

Science communication

Public speaking

Problem solving

Networking

International team work

Event management

Project writing / Reporting

Presentation

Consensus meeting

🌐 Languages

Russian

English

Italian

German

French

❤️ Hobbies

Dancing Tango

Argentino

Singing in a choir

Horseback riding

16 scientific visits and seminars, Worldwide

35 outreach talks, EU (30), Russia (1)

Highly active scientist (2% of physicists who have done more than 10 dissemination activities)

Reviewer in 10 Journals / 2 editorial board member / EC reviewer
[2010](#) – [Present](#)

Invited researcher at Niels Bohr Institute, Copenhagen, Denmark
[July 2006](#) – [August 2006](#)

Invited researcher at ICFO, Barcelona, Spain
[April 2007](#) – [May 2007](#)

Employment History

Tutor for school teachers at Trieste University, Trieste
[October 2017](#)

Teaching quantum physics to the high school teachers of the region.

Researcher in physics education at Braunschweig Technical University, Braunschweig
[June 2016](#) – [Present](#)

Developing new courses of theoretical physics for teacher-students.

Science ambassador in schools at Saarland University, Saarbrücken
[March 2015](#) – [May 2016](#)

Interactive seminars for pupils about quantum science.

Researcher in theoretical physics at Saarland University, Saarbrücken
[September 2011](#) – [February 2015](#)

Building the theory of cooling atoms with laser light and novel quantum states of motion.

Researcher in theoretical physics at University of Pier and Marie Curie, Paris
[February 2009](#) – [August 2011](#)

Building the theory of the quantum memory for light.

PhD fellow at Niels Bohr Institute, Copenhagen
[September 2007](#) – [September 2008](#)

Building the theory of the quantum memory for light.

PhD student in theoretical physics at St.-Petersburg State Polytechnic University, St.-Petersburg
[November 2005](#) – [January 2009](#)

Building the theory of the quantum information exchange between atoms and light.

Visiting researcher at ICFO, Barcelona

[April 2007](#) – [May 2007](#)

Collaboration with Dr. Morgan Mitchel

<http://mitchellgroup.icfo.es/mg/pmwiki.php?n=Main.HomePage>

Education

Ph.D., St.-Petersburg state polytechnic university, St.-Petersburg

[November 2005](#) – [January 2009](#)

Building the theory of quantum interface between light and atomic ensembles.

Master of Science (M.S.), St.-Petersburg state polytechnic university,
St.-Petersburg

[2003](#) – [2005](#)

Theoretical and Mathematical Physics. Honored 4.8/5.

Thesis title: "Quantum correlations in a quasi-resonance interaction of radiation with polarized atomic medium".

Bachelor of Science (BS), St.-Petersburg State Politechnical University,
St.-Peterburg

[1999](#) – [2003](#)

Engineering Physics/Applied Physics

Dissemination activities

Maker @ Trieste Mini Maker Fair, ICTP, Trieste, Italy

[September 2018](#)

Laboratory: "Act like a quantum: What can I do that a single photon can't?"

Spirit: Imagine you are a photon! Try to pass an interferometer where the paths first split and reunite. Let's see if there is indeed a difference between how you pass it and how a photon does. Wanna know what are these photons? Come over!"

In details: Human size model of a Mach-Zehnder- Interferometer where people imitate single photons.

4 seminars in two days, 28 participants over all.

Lecturer at a National Summer School for Teachers, Udine, Italy

[July 2018](#)

Presentation: "Singoli fotoni nel L'interferometro di Mach-Zehnder".

45 min, 70 participants.

Presenter at European Open Science Forum - ESOF2018, Toulouse,
France

[June 2018](#)

Poster: " Teaching Quantum Physics: visual, interactive, engaging"

Science communicator at school, Trieste, Italy

[May 2018](#)

Interactive seminar: "Single photons in the Mach-Zehnder-Interferometer".

Lyceo Scientifico Galileo Galilei, 60 min, 20 pupils.

Guest researcher for physics olympiad winners, Friuly-Venezia-Giulia, Italy

March 2018

Presentation of my carrier path: "The best choices of my life"

Science communicator at school, Gorizia, Italy

February 2018

Interactive seminar: "Quantum technologies"

Science Educator at Trieste Mini-Maker Fair, Trieste, Italy

May 2016

Interactive seminar „Exploring the surprising ways quantum objects move“ Interactive seminar „Meeting the two souls of a laser: light-particle and light-wave“ (2000 visitors in 2 days)

Coordinator of "Physics for refugee" project, Saarland, Germany

December 2015 – May 2016

"Physics for refugees" initiative by the German Physical Society (DPG) brings physics experiments to refugee camps in Germany and welcome children and their parents to learn physics. Link: <http://www.dpg-physik.de/pff/index.html>

Responsibilities:

- Building up a team of 25 volunteers to bring the experiments to three refugee camps.
- Coordinating the action as a contact point between the DPG, refugee camps and the team.
- Visiting the camps and doing experiments with children and their parents.

Guide at the Quantum Physics Department, Saarbrücken, Germany

December 2015

Organizing a "Lunch in the lab" event for Ph.D. students (18 visitors).

Science communicator at American University of Paris, France

2015 – 2016

Guest seminars for the literature students at the Creative Writing Course run by Sian Melangell Dafydd:

2015 - „Moving in the quantum world.“ (15 students).

2016 - „Meeting the two souls of a laser: light-particle and light-wave.“ (15 students).

Educator for physicist, Zelenogorsk, Russia

July 2015

Online seminar: "Who to communicate quantum science." (18 participants)

Science communicator at the 3rd Open Academia, Saarbrücken, Germany

April 2015

Interactive seminar „Moving in the quantum world.“ (8 participants).

Educator at the Highlights of Physics: "Quantum Worlds", Saarbrücken, Germany

[September 2014](#)

Presenting the theoretical concepts of Quantum Cryptography to the general public.
1 week, 33 000 visitors.

Role model for women in science, Saarbrücken, Germany

[February 2014](#)

Seminar: "Marie Curie Intra-European Fellowship - a field report" *within the event* „Horizon 2020 für Naturwissenschaftlerinnen“ event at the Institute of New Materials, Campus Saarbrücken.

Science ambassador for the artists from Parsons Paris School of Art and Design, Paris, France

[July 2010](#)

Presentation "Quantum memory: from dreams to reality" followed by the discussion and a guided tour in the Kastler-Brossel Laboratory of the University of Paris 6 for the group of 6 artists.

Awards

Marie Curie Fellowship, Saarland University

[March 2013](#)

Awarded for research on "Light-phonon quantum interface with atomic arrays in a cavity" (2 years).

IFRAF fellowship, Paris

[February 2011](#)

Awarded for research on "Quantum memory for light based on an ensemble of multi-level atoms" (2 years).

Presidential scholarship for scientific training abroad, Copenhagen

[September 2007](#)

Awarded for research on "High-efficiency quantum memory for light with atomic ensembles inside a cavity" (1 year).

Support for Young Scientists without an Academic Degree, St.-Petersburg

[September 2006](#)

Awarded for research on "Multi-mode quantum swapping between light and atomic system" (1 year).

Medal "For the Devotion to Science", St.-Petersburg

[June 2005](#)

Awarded by Saint-Petersburg Assembly of Young Scientists and Specialists

Reviewer (10) / editorial board member (2) / EC reviewer

Review of the EU projects

[2018 – May 2018](#)

Editorial board, American Association for Science and Technology (AASCIT), Atoms

[2014](#)

Editorial board, Atoms

[2014](#)

Reviewer, Scientific reports

Reviewer, Optics Express

Reviewer, Optics Communication

Reviewer, New Journal of Physics

Reviewer, European Physics Letters

Reviewer, Journal of the Optical Society of America B (JOSA B)

Reviewer, Special issues of Quantum Information Processing (QIP)

Reviewer, European Physics Journal D (EPJD)

Reviewer, Journal of Physics: B (Jphys:B)

Reviewer, Journal of Physics: A (Jphys:A)

■ Courses

Science popularization training, Certification authority: Formation continue et V.A.E., Université Paris-Sud

[November 2014](#)

■ Teaching qualifications and experience

Qualified as teacher-researcher (enseignant-chercheur) in section 30-Diluted media and optics (Milieux dilués et optique), French Ministry of Education

[February 2015](#)

Co-Tutoring PhD students

Michael Scherman (2011, France), Alexandra Scheremet (2012, France/Russia), Hannes Gothe (2014-2016, Germany)

Teaching

[2005 – Present](#)

- Electrodynamics, seminars, 3 hours/week, 3 semesters (SpbSTU, Russia)
- Classical mechanics seminars, 3 hours/week, 2 semesters (SpbSTU, Russia)

- Advanced quantum physics seminars, 3 hours/week, 1 month (Saarland University, Germany)
- Quantum optics with cold gases, 2 hours/ 2 weeks, 1 semester (Saarland University, Germany)
- Private classes in Physics and Mathematics for the high school student (1 year, 2 pupils)
- Theoretical quantum physics for teacher-students, seminars, 2 hours/week, 1 semester (TU Braunschweig)
- Theoretical mechanics for teacher-students, seminars, 2 hours/week, 1 semester (TU Braunschweig)
- Quantum Physics formation for teachers, workshops, 3hours/months, 1 semester (Trieste University)