Oxana Mishina

Professional Summary

My scientific journey started in Saint-Petersburg (RU), with graduating in Nuclear Physics for medical applications and then getting a Ph.D. in Physics and mathematics. Working as a theoretical physicist I modeled quantum technologies (QT) based on atoms in experimental labs at NIB (Copenhagen, DK), and LKB (Paris, FR), and in the theoretical quantum physics group at USAAR (Saarbreucken, DE). Changing the gear to the education research I developed a methodology for teaching quantum theory for teacher students at TUBS (Braunschweig, DE) and collaborated in the PLS program conducting in-service teacher training at UniTS (Trieste, It). Having the feet in both physics education and QT research I am currently involved in the coordination and support action for Quantum Technology Education in Europe (QTEdu CSA) and for the Quantum Flagship (QFlag).

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!

Education

Ph.D., St.-Petersburg state polytechnic university, St.-Petersburg
November 2005 — January 2009

Title: *Multi-mode quantum swapping between light and atomic system via Raman scattering*

Master of Science (M.S.), St.-Petersburg state polytechnic university, St.-Petersburg
2003 — 2005

Specialty: Radiation physics, Technical 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

Specialty: Radiation physics, Technical physics

Courses

2-days Science popularization training, Formation continue et V.A.E., Univertite Paris-Sud
November 2014

Details

Skills

- Quantum physics
- Physics Education
- Science communication
- Public speaking
- Problem solving
- Networking
- International team work
- Event management
- Project writing / Reporting
- Presentation
- Consensus meeting
- Webpage content management
- Database Management

Languages

- Russian
- English
- Italian
- German
- French

20.06.2021

5-day Advanced Workshop on Technology for Sustainable Development - Hands-on science , ICTP, Trieste, Italy
September 2018

2-day Workshop on Learning Analytics and Online Learning Tools, Trieste University, Italy
February 2019

Links
LinkedIn
Google scolar
Research Gate

Employment History

Senior Research Fellow at CNR-IOM, Trieste
October 2020 — Present

Team coordinator: Chiara Machiavello

Projects:

- QFlag CSA - Coordination and Support Action for Quantum Flagship (WP3)
- QTEdu CSA - Coordination and Support Action for Quantum Technology Education

Functions:

- Co-organizing of EQW2020: Education section
- Creation and maintenance of online repositories of European: Education programs and Outreach materials in Quantum Technology
- Alignment between Quantum Industry Consortium (QuIC), Internation Cooperation CSA (InCoQFlag), QFlag CSA, and QTEdu CSA on Education in QT related efforts
- Co-coordination of QTEdu WGs (School, Higher Education, Industry&Workforce, Education research, Equity&Inclusion)
- Creation of a Web portal and new repositories for QTEdu community
- Assistance in the Dephy study about desirable competencies and skills of the future quantum workforce and in the delivery of Comperance Framework for Quantum Technologies
- Coordinating the formation of pan-European pilot consortia for QT Education and Review the submitted progects
- QTEdu internal project management and coordination

Postdoctoral researcher in physics education at Braunschweig Technical University, Braunschweig
June 2016 — August 2020

Group leader: Prof. Rainer Muller - head of the Physics Education Depart

Projects:

- TU4Teachers: Teacher training at TU Braunschweig - granted by the German Ministry for Education and Research (BMBF) for the quality-controlled teacher training http://tu4teachers.de/pro-mint.php
- milq - teaching quantum physics at secondary schools https://www.milq.info/en/
- Education WG of the Quantum Flagship

Functions:

- Developing and assisting the teaching of new interactive and engaging courses of theoretical physics (Mechanics, Electrodynamics, Quantum Mechanics) for teacher-students
- Computer algebra (Mathematica) student project on quantum physics with photons including Quantum eraser
- Setting up a Jupiter Lab with an interactive script of the Quantum Physics course
- Teaching - Experimental seminars on teaching physics as school.
- Bringing educational resource milq to the international level: translation, dissemination, collaboration with international partners
- Advocating for the appearance of the Education WG within the Quantum Flagship, co-organizing the Education and Training workshop within the first European Quantum Technology Conference https://eqtc19.sciencesconf.org/, coordinating the contribution of the Education community to the Strategic Research Agenda: Education and Training https://qt.eu/engage/resources/.
- Helping to bring the Quantum Future Academy to all European countries https://www.quantentechnologien.de/event/quantum-future-academy-2020.html
- Preparing the project for Coordination and Support Action for Quantum Technology Education https://cordis.europa.eu/project/id/951787

Tutor for school teachers at Trieste University, Trieste
2017 — 2019

Projects: Occasional collaboration projects with Prof. Maria Peressi and Prof. Giorgio Pastore on training and formations in physics for secondary school teachers in the framework of the Piano Lauree Scientifiche (PLS).

Functions:

- Preparing and delivering workshops on teaching quantum physics to the secondary school for the teachers of the region "INSEGNARE LA FISICA MODERNA NELLA SCUOLA SECONDARIA SUPERIORE"
- Assisting the hands-on laboratories for secondary school students at the university campus "ONDE, DIFFRAZIONE E RETICOLI".

Science ambassador in schools at Saarland University, Saarbrücken
March 2015 — May 2016

Project: Occasional collaboration projects for establishing and maintaining the connection between regional schools and research group of Proff. Giovanna Morigi

Functions: Interactive seminars for pupils about quantum science and experimental workshop with Lab in the box in Werden Gymnasium.

Marie Curie Fellow at Saarland University
March 2013 — March 2015

Group leader: Prof. Giovanna Morigi - head of Theoretical Quantum Optics group

Project: Light-phonon quantum interface with atomic arrays in a cavity (AAPLQIC) - individual Marie Curie IEF project (grant number 330004), funding from the European Union Programme FP7/2007-2013.

Funktion: Building the theory of driving atoms into the novel quantum states motion with laser light.

Postdoctoral researcher in theoretical physics at Saarland University, Saarbrücken
September 2011 — February 2013

Group leader: Prof. Giovanna Morigi - head of Theoretical Quantum Optics group

Project: Atomic QUantum TEchnologies (AQUTE) - Integrating Project (grant number 247687), funding from the European Union Programme FP7/2007-2013, under the FP7-ICT.

Funktions:

- Building the theory of cooling atoms with laser light inside an optical resonator.
- Teaching - Assisting the teaching of advanced quantum optics courses.

Postdoctoral researcher in theoretical physics at University of Pier and Marie Curie, Paris
February 2009 — August 2011

Projects:

- Quantum memory for light based on ensemble of multi-level atoms - theoretical project funded with the personal fellowship from L'Institut Francilien de Recherche sur les Atomes Froids (IFRAF).

Functions:

- Building the theory of the quantum memory for light for the experiments carried on in the lab with room temperature and ultra-cold Cs atoms.

PhD student in theoretical physics at St.-Petersburg State Polytechnic University, St.-Petersburg
November 2005 — January 2009

Group leader: Prof. Dmitry V. Kupriyanov - head of Laboratory of Quantum Optics and Quantum Information

Projects:

- Advanced Quantum Imaging and Quantum Information with Continuous Variables - funded by the International Association for the promotion of cooperation with scientists from the independent states of the former Soviet Union (INTAS).
- Quantum coherent effects in multi-scattering of light by atomic ensembles - funded by Russian Foundation for the Basic Research (RFBR)

Functions:

- Building the theory of the quantum information exchange between atoms and light.
- Teaching - assisting theoretical physics courses.

PhD fellow at Niels Bohr Institute, Copenhagen
September 2007 — September 2008

Group leaders: Prof. Eugine Polzik **(experiment)**, Prof. Anders Sørensen **(theory)**

Project:

- High-efficiency quantum memory for light based on an atomic ensemble inside a cavity - a theoretical project funded by the personal fellowship from the Russian government.

Function:

- Building the theory of the quantum memory for light for the experiment based on room temperature Cs atoms.

Visiting researcher at ICFO, Barcelona
April 2007 — May 2007

Collaboration with Dr. Morgan Mitchel on quantum memory for light.

Scientific production and dissemination

Co-Charing 1sr meetings QTEdu Working Groups, Online
March 2020

Meetings of 5 QTEdu Topical Education Working Groups with over 190 participants in total.

Chairing the 1st Quantum Physics Education Workshop within EQTC 2019, Grenoble, France
February 2019

Bringing together physicist and physics education researches to share education projects and develop a pan-European strategic agenda for education in Quantum Science and Technologies.

16 scientific visits and seminars, Worldwide

21 articles

14 articles in peer review journals, 6 in conference proceedings, 1 community paper. The list of publications is attached to the CV.

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

Highly active scientist (2% of physicists who have done more then 10 dissimination activities)

h-index = 10, Google scolar

10 of my articles have been cited minimum 10 times

23 citations per article, 432 total, 44 in 2015, Google scolar

Highlights 2014: Best Video abstract , New Journal of Physics

782 views in ~5 years (~3,3 views/week)

Reviewer in 11 Journals / 2 editorial board member / EC reviewer/co-organizing 4 events
2010 — Present

Invited researcher at Niels Bohr Institute, Copenhagen, Denmark
July 2006 — August 2006

Invited researcher at ICFO, Barcelona, Spain
April 2007 — May 2007

Visiting researcher at Trieste University, Trieste, Italy
October 2017 — September 2018

Establishing collaboration on physics and mathematics education research.

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

- Quantum Physics formation for teachers, 5 workshops of 3-hour, (Trieste University)
- Hands-on experiments for school students: Waves and Interference, 3 workshops of 3-hours (Trieste University)
- Theoretical quantum physics for teacher-students, seminars, 2 hours/week, 2 semesters (TU Braunschweig)
- Theoretical mechanics for teacher-students, seminars, 2 hours/week, 1 semester (TU Braunschweig)
- Theoretical electrodynamics for teacher-students, seminars, 2 hours/week, 1 semester (TU Braunschweig)
- 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)
- Electrodynamics, seminars, 3 hours/week, 3 semesters (SpbSTU, Russia)
- Classical mechanics seminars, 3 hours/week, 2 semesters (SpbSTU, Russia)
- Private classes in Physics and Mathematics for the high school student, 1 year, 2 pupils, (SPb, Russia)

Fellowships and 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

Dissemination activities

Sceince ambasador at SISSA for School (S4S) 2020-21, Trieste/Online
April 2021 — May 2021

- Games where pupils have to match scientists with their scientific field based on two hints.
- Q&A session with the scientists.
- Short seminar from one of the scientists.

Quantum Game Cafe, Cafe Rossetti, Trieste, Italy
April 2019

16-19 April - four gaming evenings with 10 games available for public and all of them inspired by laws of quantum physics. 15-20 gamer every evening and 2-3 invited quests quantum physics expert playing and talking about quantum.

Science communicator at school, Goriza, Italy
February 2019

Interactive seminar on "Quantum technologies" at the Science week in Liceo Scientifico Statale Duca degli Abruzzi.

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 this 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 Europen Open Science Forum - ESOF2018, Toulouse, France
June 2018

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

Guest researcher for physics olympiad winners , Friuly-Vevezia-Giulia, Italy
March 2018

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

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.

Science communicator at school, Gorizia, Italy
February 2018

Interactive seminar on "Quantum technologies" at the Science week in Liceo Scientifico Statale Duca degli Abruzzi.

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 for the group of 6 artists.

Reviewer(1)/editorial board member(2)/EC reviewer(1)/organizing board(4)

Co-organizing 1st metings of the QTEdu Working groups, Online
June 2021 — June 2021

Meetings of 5 QTEdu Topical Education Working Groups with over 190 participants in total.

Co-organizing EQW2020: Esucation session, Online
November 2020

- EQW2020: Education section was the 1st Pan-Europen outreach event in Quantum Technologies targeting schools.
- 23 participation countries, 42 interactive 1-hour webinars with Quantum Technology experts in national languages, pupils from 390 different schools participated.
- All talks are available on YouTube channel of the Quantum Flagship.

Co-organizing QFA2020, Berlin/Online
November 2020

- Quantum Future Academy 2020 was the 1st Pan--European initiative targeting university students.
- 29 participating countries sent 2 students after a national selection process.
- 1-week stimulating event with workshops, company visits, and meeting with key stakeholders of QT.

Education Workshop at the EQTC 2019, Grenoble
February 2019

Chair and co-organizer of the 2 day Education Workshop
at the first European Quantum Technology Conference
https://eqtc19.sciencesconf.org/

Review of the EU projects, Luxemburg
2018 — May 2018

Reviewer and evaluator for the cal H2020-FETFLAG-03-2018 "FET Flagship on Quantum Technologies".

Editorial board, American Association for Science and Technology (AASCIT), Atoms
2014

Editorial board, Atoms
2014

Reviewer, Scientific reports

Reviewer, Optics Express

Reviewer, Optics Commmunication

Reviewer, New Journal of Physics

Reviewer, European Physics Lellers

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)

Reviewer, Science and Education (SCED)