

Oxana Mishina

Senior Research Fellow

👤 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 (Saarbrücken, 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

🏢 Employment History

External collaborator at CNR-INO, Trieste

September 2022 — Present

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

Hobbies

Dancing Tango Argentino,
Singing in a choir, Horseback riding

Trieste, 29.09.2022

Networking activities at the European level for the growth of an ecosystem of education and research on the topics of photonic quantum technologies.

Links

[LinkedIn](#)

[Google scholar](#)

[Research Gate](#)

Senior Research Fellow at CNR-INO, Trieste

September 2021 — August 2022

Team coordinator: Chiara Machiavello

Projects:

- [QTEdu CSA](#) - Coordination and Support Action for Quantum Technology Education

Functions:

- Creating and managing an online community portal <https://qtedu.eu/>
- Organizing Italian [Quantum Weeks @Trieste](#)
- Co-organizing of [EQTC2021: Education section](#)
- 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 and administration of a Web portal and new repositories for QTEdu community qtedu.eu
- Dissemination of QTEdu CSA results on the web
- Dissemination of QTEdu Open Pilot Projects results
- QTEdu internal project management and coordination

Senior Research Fellow at CNR-IOM, Trieste

October 2020 — August 2021

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 projects
- 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.

Funktionen:

- 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. Eugene 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.

✳ **Courses**

1-day Course on Exploring Diversity, Equity and Inclusion, SISSA

September 2022

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

November 2014

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

★ **Scientific production and dissemination**

Organising a public winner selection of a creativity contest "Quantum Suggestions", Trieste

September 2022

Presenting the Italian Quantum Weeks initiative and the 12 creativity projects for a public jury vote at Studio Tomaso

[More info](https://www.triestecontemporanea.it/) (<https://www.triestecontemporanea.it/>)

Organising a panel at Treiste Next - Sceince Festival

September 2022

Quantum Technology: is it a revolution?

[More information](https://triestenext.it) (triestenext.it) [Video recording](#) (YouTube)

Invited speaker at World of Quantum at the Laser World of Photonics, Munich

April 2022

Overview of the activities of QTedu CSA during the session "Education and Career" chaired by Tatjana Wilk and Fabio Scafirimuto.

Organising Italian Quantum Weeks, Trieste

March 2022 — May 2022

Two weeks to dive into the quantum world: lab tours, quantum game cafe, seminars in city cafe,s and more.

Website: <https://www.quantumweeks.it/trieste/>

Organising and Charing 2nd QTedu Working Group meetings, online

March 2022 — March 2022

5 days of [QTedu Topical Education Working Groups](#) meetings with up to 50 participants per day.

Invited speaker at "Responsible Quantum Technologies (ResQT)", online

December 2021

- [Presentation about the progress of QTedu CSA](#)
- [Participation in a panel discussion](#) on Responsible Outreach for QT

Organising and Co-charing EQTC2021, Online Europe

November 2021

Charing "QTEdu community workshops on school education and outreach" and organizing the [Education section of EQTC2021](#).

Presenting QTEdu CSA at 107 National Congress of Italian Physical Society, online

September 2021

"Coordination and support action for Quantum Technology Education in Europe - QTEdu CSA" - abstract on p. 364 of [congress proceedings](#).

Co-organizing EQW2020: Education session, online

November 2020

- [EQW2020: Education section](#) was the 1st Pan-European 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, 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.

Organising and Charing 1st 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

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

22 articles

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

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

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

h-index = 10, Google scholar

10 of my articles have been cited minimum 10 times

22 citations per article, 465 total, 46 in 2015, Google scholar

2005 — Present

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

Tutor 14 interns at QIntern 2022 , online

July 2022 — August 2022

Unraveling the gender diversity in Quantum Science and Tech

Interns: [Amol Aggarwal](#), [Eyad Elsenany](#), George Johny, Isago Mangwane, [Vaishnavi Markunde](#), [Bruna Shinohara De Mendonça](#), [Srijita Nandi](#), [Nikhil Kumar Parida](#), [Kritika Rag](#), [Monica Ramchandani](#), [Juweria Sayed](#), [Amina Sellami](#), [Ananya Shrivastava](#), Sammith Singamsetty

Project Description: Researching and collaboration on well know and on-air figures in Quantum Science and Tech to shed a light on the impact of a broader community on the development in this domain. Such research was done for computer science and brought up a lot of surprises on gender diversity in the area, that was previously unspoken. This project aims to collect more diverse gender participation in the progress of Quantum Science and technology.

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

📖 References

★ Dissemination activities

Experiment and games with the public at Treiste Next - Sceicne Festival

September 2022

Activities at CNR bust within Area Science Park presentation space:

ENJOY SCIENCE: EXPLORE, EXPERIMENT AND LEARN!

- *Running an action game "Acting like a photon" (16 players over 6 game secession)*
- *Running a "Decide Game: Quantum" (8 players over 4 sessions)*
- *Running "Quantum Race" game (25 players over 3 sessions)*

quantum@school: Racconti Quantistici, Italy / online

April 2022 — April 2022

Moderating national conference for Italian school pupils:

- [1-hour panel discussion with 5 researchers](#) presenting to school students Photonic Quantum Technologies.
- Presenting an [8 min introduction about a single photon](#).

Posso fare una portauovo con laser? ...boh, Trieste

April 2022 — April 2022

[5 min public presentation](#) about hardware for Quantum Computers and specifically a cold atom platform.

Science ambassador at SISSA for School (S4S) 2021-22, Trieste / online

March 2022 — April 2022

45 min learning with game-playing:

- 20 min free play Quantum Race game created by Fabio Chiarello (CNR-IFN) - discover quantum concepts like quantum state, quantum tunneling, quantum teleportation, and wave function collapse.
- 15 min interactive presentation "Quantum superpowers" about their use in Quantum technologies.

Science ambassador 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 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 nell'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"

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

March 2018

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

Science communicator at school, Trieste, Italy

May 2018

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

Lyceum 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 refugees" 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.

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

Review of the EU projects, Luxemburg

2018 — May 2018

Reviewer and evaluator for the call H2020-FETFLAG-03-2018 "[FET
Flagship on Quantum Technologies](#)".

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

2014

Editorial board, Atoms

2014 — 2015

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)

Reviewer, Science and Education (SCED)