

# Curriculum Vitae of Francesca FERLAINO

Personal Information	
Place and Date of Birth	Napoli (Italy); 23.12.1977
Contact Informations	<b>University of Innsbruck</b> , Institut für Experimentalphysik, Technikerstraße 25/2, Innsbruck, Austria <b>Institute for Quantum Optics and Quantum Information</b> (IQOQI-Innsbruck) Austrian Academy of Sciences  <b>Phone:</b> +43 512507 -52440 <b>ORCID:</b> <a href="https://orcid.org/0000-0002-3020-6291">orcid.org/0000-0002-3020-6291</a> <b>Email:</b> <a href="mailto:Francesca.ferlaino@uibk.ac.at">Francesca.ferlaino@uibk.ac.at</a> <b>Researcher ID:</b> <a href="https://orcid.org/0000-0002-3020-6291">E-6726-2012</a>  <a href="http://www.erbium.at">http://www.erbium.at</a> <a href="http://www.iqoqi.at">http://www.iqoqi.at</a>

## RESEARCH FOCUS

Dipolar quantum gases and mixtures • Spectroscopy, laser cooling and trapping of complex multi-electron atomic species • Precision quantum simulation with long-range interacting particles • Strongly correlated many-body quantum phase with lattice-confined quantum gases • Clock-transition and internal state manipulation • Ultracold scattering and few-body Physics • Complex atomic species for quantum science

## CURRENT ACADEMIC POSITIONS

- Since 2014 Scientific Director of the Institute for Quantum Optics and Quantum Information (IQOQI-Innsbruck) of the Austrian Academy of Science
- Since 2014 Professor of Physics (Full Professor - P98), University of Innsbruck, Austria

## PROFESSIONAL EXPERIENCE

- 2024-2026 Deputy Director of the Institute for Quantum Optics and Quantum Information (IQOQI) of the Austrian Academy of Science
- Since 2024 Associate Member of the Donostia International Physics Center (DIPC), San Sebastian, Spain
- Since 2020 Director of the platform Atom\*Innen for women in quantum physics
- 2019-2022 Managing Director of the Institute for Quantum Optics and Quantum Information (IQOQI) of the Austrian Academy of Science
- 2013-2017 Director of the Innsbruck Physics Research Center, Univ. Innsbruck
- 2009-2014 Tenure-Track Professorship (P99) for Atomic Physics (2012-2014); Research and Teaching Associate (2009-2011), University of Innsbruck
- 05-07/2016 DIPC Visiting Fellowship, San Sebastian, Spain
- 04-05/2016 JILA Visiting Fellowship, University of Colorado, Boulder, US
- 03-04/2016 Bershadsky Distinguished Visiting Fellowship at Harvard University, Cambridge, US
- 03-06/2014 Guest Lecturer at the University of Wien, Austria
- 2007 - 2009 Lise-Meitner Postdoctoral Fellow of the Austrian Science Fund (FWF)

- 2006 - 2007 Postdoctoral research associate, University of Innsbruck, (Advisor Prof R. Grimm)
- 2004 - 2006 Postdoctoral research associate, European Laboratory for Non-Linear Spectroscopy (LENS), Florence, Italy (Advisor Prof M. Inguscio)

## EDUCATION

- 2001 - 2004 Ph.D. in Physics, LENS and University of Florence, Italy  
Dissertation: *Atomic Fermi gases in optical lattices* (Supervisor Prof. M. Inguscio)
- 1995 - 2000 Diploma in Physics, *magna cum laude*, University Federico II, Naples, Italy (Advisors Prof. A. Barone and Prof. A. Smerzi)
- 1999 - 2000 Undergraduate Research Fellowship, International School for Advanced Studies (SISSA), Trieste, Italy
- 1995 - 2000 Studies in Physics, University Federico II of Naples, Italy

## HONORS & AWARDS

- 2024 Austrian of the year 2024 – Category Research, Die Presse
- 2024 Commendatore dell'ordine della Stella d'Italia, for contributing to the strengthening of bilateral relations between Italy and Austria
- 2024 Südtiroler Sparkasse Foundation's Science Prize for exceptional research achievements
- 2023 Grete Rehor State Prize – Austrian Women-prize 2023
- 2022 ERC Advanced Grant from the European Research Council
- 2021 Kardinal Innitzer Prize for Natural Sciences 2021; Citation "*for outstanding achievements in the field of ultracold quantum gases*"
- 2019 Elected Fellow of the American Physical Society (APS); Citation "*for ground-breaking experiments on dipolar quantum gases of erbium atoms, including the attainment of quantum degeneracy of bosons and fermions, studies on quantum-chaotical scattering, the formation of quantum droplets, and investigations on the roton spectrum*"
- 2019 Grand Prix de Physique "Cécile DeWitt-Morette/École de Physique des Houches" from the French Academy of Science (inaugural prize)
- 2019 Junior BEC Award; Citation "*for pioneering work on Bose-Einstein condensation of dipolar Erbium atoms and more generally degenerate quantum gases with long-range interactions and for realizing novel quantum phases of matter with such systems*"
- 2019 Italian Prize for Women "Tutte Unite"
- 2017 Antonio Feltrinelli Giovani for Physics of the Accademia dei Lincei, Italy
- 2017 Erwin Schrödinger Prize of the Austrian Academy of Sciences (ÖAW)
- 2015 Ignaz L. Lieben Prize of the Austrian Academy of Sciences (ÖAW)
- 2015 ERC Consolidator Grant from the European Research Council
- 2014 Alexander von Humboldt Professorship (nominating university: Ulm, declined)
- 2014 Sebetia-Ter International Prize "Premio Georges Charpak – Antonio Barone"
- 2011 Preis der Landeshauptstadt Innsbruck (together with S. Knoop & M. Berninger)

2010	ERC starting Grant from the European Research Council
2010	AIDDA prize for women in science, Italy
2010	Kohlrausch Prize of the Austrian Physical Society (ÖPG)
2009	START Prize of the Austrian Science Fund (FWF)

### ELECTED MEMBERSHIPS

2025-2029	Austrian Academy of Sciences, voting corresponding member in Austria in the field of mathematics and natural sciences
2023	Centro Interdisciplinare Linceo Giovani (Global Young Academy), Founding Member
2021	Austrian Academy of Sciences, Corresponding Member of the Mathematical and Natural Sciences Class
2019	American Physical Society (APS), Elected Fellow
2011-2019	"Junge Kurie" (Young Academy), Austrian Academy of Sciences, Elected Member

### INSTITUTIONAL RESPONSIBILITIES (selection)

Since 2023	Member of the Board of Directors of the Cluster of Excellence "Quantum Science Austria" (FWF)
2019 – 2022	Managing Director, IQOQI Innsbruck, Austrian Academy of Sciences
Since 2019	Elected member of the Senate of the University of Innsbruck
2016 – (2025)	Co-Speaker of the DK-ALM (FWF)
Since 2009	Member of several habilitations and hiring committees

### COMMISSIONS OF TRUST (selection)

2024-2027	Member of the Scientific-Technical Committee. Eniquantic
Since 2023	Member of the International Advisory Committee (IAC) of the International Conference on Atomic Physics (ICAP) series
Since 2023	QCN Quantum Community Network of the Quantum Flagship (Austrian deputy representative)
2018 – (2023)	Member of Strategic Research Agenda Working Group (SRA-WG) for the Quantum Flagship
2018 – (2026)	Member of Scientific Advisory Board (SAB), Max-Planck-Institut für Quantenoptik (MPQ), Garching b. München, Germany
2016 – 2019	Member of Scientific Advisory Committee, GSI Helmholtzzentrum für Schwerionenforschung, Germany
2016 – 2019	Member of the Strategic Advisory Board for QUANTERA-NET in Quantum Technologies
<b>Referee activities:</b>	Member of the ERC Advanced/Consolidator Grant Panel 2016, 2018 (co-Chair), 2020, 2022; Referee for national and international grants, including ERC, DFG-SFB, and ANR grants; Referee for Science; Nature; Nature Physics; Phys. Rev. Lett. and others

## TEACHING AND MENTORING ACTIVITIES

<b>Teaching</b>	Since 2007: various basic and advanced courses in bachelor, master, and PhD programs at the Univ. of Innsbruck, including <i>atomic and molecular physics</i> and <i>solid-state physics</i> (mandatory Bachelor courses), <i>laser cooling and trapping</i> , <i>quantum gases</i> , and laboratories courses; Guest lecturer at the Univ. of Vienna (Semester 2014) and various international and national summer schools.
<b>Support of Young Researchers</b>	Since the establishment of my research group in 2009, I have supervised <b>22</b> PhD students (including 4 co-supervised), <b>12</b> master students, and directed <b>11</b> post-doctoral fellows. Among them, 1 Master students, 11 PhD students and 7 post-docs are currently working in the team. I consider mentoring of young researchers a very important aspect of my professional duties. Among the graduated PhD students, Frisch and Baier have been awarded the IQOQI Dissertation Prize, Baier also received the prestigious Schrödinger Post-Doctoral Fellowship, Patscheider has been awarded the Hypo Tirol Bank Dissertationspreis 2023. A PhD Student has been awarded the Frankreich-Preise 2023 (Lafforgue), three PhD students have been awarded the prestigious Poster Prize at YAO-2018 (Sohmen), at ICAP-2018 (Politi, 1st ranked) and at the EMMI Long-Range-Interaction in the Ultracold (Natale, 1 <sup>st</sup> ranked). One Master student received the Excellence Scholarship from U. Innsbruck. Among the 11 post-docs, K. Aikawa is now Ass. Prof. at the U. of Tokyo (JP), L. Chomaz is Junior Prof. at U. Heidelberg (DE), B. Yang is Ass. Prof. at the Southern University of Science and Technology (CHN), and M. Mark has a permanent research position at U. Innsbruck. I have supported several PostDocs in successful applications for independent fellowships (incl. Litvinov, Druptive innovation – Early Career Seed Money (2024); Chomaz, Elise-Richter fellowship 2020 and Marie-Curie Fellowship; Norcia, PostDoc Fellowship from the Erwin Schrödinger Center for Quantum Science and Technology (ESQ) 2020; Aikawa and Trautmann, Lise-Meitner fellowship 2019). Since 2020, I also cover the official roles of Mentor for Early Career Stage Scientists (ÖAW) and Undergraduate Student Advisor (UIBK).
<b>Support of women</b>	Founder and director of the platform Atom*innen which aims to develop gender equality and supports women working in the field of quantum physics

## OTHER ACTIVITIES (selections)

<b>Organization and co-organization of Conferences (selection)</b>	The physics of strongly interacting matter: neutron stars, cold atomic gases and related systems Trento, IT (2024) • ITAMP Workshop (2023) • EMMI Workshop on Supersolidity, Trento, IT (2021) • Six editions of Workshop: Long-range interactions in the ultracold (2016-Ercolano, IT; 2017 Bad Honnef, DE; 2018 Hannover, DE; 2019 Gif-sur-Yvette, FR; 2022 Innsbruck, AT; 2023 San Sebastian, ES) • ITN Workshop on universality in few body systems, US (2014) • Introductory Course on Ultracold Quantum Gases, Innsbruck, AT • International Workshop "Coherence and Decoherence at Ultracold Temperatures", DE (2011)
<b>Public outreach/dissemination of science (selection)</b>	As Head of the Innsbruck Physics Center first, and then IQOQI director I am involved in many activities for the dissemination of science to the general public. These include the Day of Physics, the Long Night of Research, Schönheit vor Weisheit: Die Wissenschaft der Kunst, die Kunst der Wissenschaft (event for the general public), the Innsbruck Physics Lecture.

## SCIENTIFIC INTEREST

<b>Main areas of research</b>	Quantum science with many-body quantum gases of complex atoms
-------------------------------	---

### Recent main accomplishments

- First observation of vortices in dipolar supersolid (2024) • Spin manipulation of Er (2024)
- Glitches in dipolar supersolid (2023) • First observation of dipolar vortices (2022) and two-dimensional supersolidity with Dysprosium atoms (2021) • Clock-type transition in erbium atoms • Rydberg spectroscopy in multi-electrons lanthanides atoms • Observation (simultaneously with other two groups) of a one-dimensional supersolid state in Dysprosium and first observation in Erbium (2019) • First observation of roton quasiparticles (2018) • Observation of quantum-stabilized macro droplets (2018) • First realization of strongly-correlated dipolar matter in an extended Bose-Hubbard setting (2016) • Discover of chaotic scattering in multi-electron atoms (2014) • Ground state RbCs molecules (2015) • Bose-Einstein condensation of Er atoms (2012), degenerate Fermi gas (2014), and a dipolar quantum mixture of Er and Dy atoms (2018)

### INVITED AND PLENARY TALK AT GLANCE (selection)

Invited Speaker/Hot Topic/Keynote: More than 100 contributions, including the last six editions of ICAP (2022-Toronto; 2018-Barcellona; 2016-Seoul; 2014-Washington; 2012-Paris; 2010-Cairns); seven BEC conference-Sant Feliu de Guixols (2023; 2021; 2019; 2017; 2015; 2013; 2007); WE-Heraeus-Seminar, Bad Honnef (2020; 2017; 2016, 2014); Plenary talk (2017) and Invited talk at Jahrestagung der DPG (2013); KITP Conference, Santa Barbara (2023; 2013); ITAMP (2012, 2009); SIF Congresso Nazionale, Naples (2012); DAMOP (2022; 2019; 2011; 2016); APS March Meeting (2021; 2017); EGAS (2024; 2021; 2015; 2011).

### MAJOR COLLABORATIONS THAT LED TO JOINT PUBLICATIONS (selection)

R. Bisset (U. Innsbruck), J. Bohn (JILA), B. Blakie (U. Otago), O. Dulieu (LAC), T. Giamarchi (U. Geneva), C. Greene (U. Purdue, US), R. Grimm (U. Innsbruck) D. Jin (JILA), M. Lepers (U. Bourgogne), S. Kotochigova (Temple, US), T. Pfau (U. Stuttgart), A. Rey (JILA), A. Recati (U. Trento), F. Robicheaux (U. Purdue), L. Santos (U. Hannover), P. Zoller (U. Innsbruck).

## Francesca Ferlino – 10 Most Important Publications

---

1. E. Casotti, E. Poli, I. Klaus, A. Litvinov, C. Ulm, C. Politi, M.J. Mark, T. Bland, **F. Ferlino**, *Observation of vortices in a dipolar supersolid*, Nature, 635, 327-331 (2024). [DOI](#)
2. L. Klaus, T. Bland, E. Poli, C. Politi, G. Lamporesi, E. Casotti, R.N. Bisset, M.J. Mark, **F. Ferlino**, *Observation of vortices and vortex stripes in a dipolar condensate*, Nature Physics, 18, 1453-1458 (2022). [DOI](#)
3. M. Norcia, C. Politi, L. Klaus, E. Poli, M. Sohmen, M. J. Mark, R. N. Bisset, L. Santos, **F. Ferlino**, *Two-dimensional supersolidity in a dipolar quantum gas*, Nature 596, 357-361 (2021). [DOI](#) Featured in [Physicsworld research update](#), [Pro-Physik](#), [Pressraum](#), [Media Inaf](#), [Der Standard](#), [Die Presse](#). WoS highly cited.
4. L. Chomaz, D. Petter, P. Ilzhöfer, G. Natale, A. Trautmann, C. Politi, G. Durastante, R. M. W. van Bijnen, A. Patscheider, M. Sohmen, M. J. Mark, **F. Ferlino**, *Long-lived and transient supersolid behaviors in dipolar quantum gases*, Phys. Rev. X, 9, 021012 (2019). [DOI](#). Featured in [APS Physics Viewpoint](#), [Physicsworld research update](#), [Phys.org](#), [Techtimes](#), [WoS highly cited](#).
5. A. Trautmann, P. Ilzhöfer, G. Durastante, C. Politi, M. Sohmen, M. J. Mark, **F. Ferlino**, *Dipolar Quantum Mixtures of Erbium and Dysprosium Atoms*, Phys. Rev. Lett., 121, 213601 (2018). [DOI](#). Featured in [APS Physics Synopsis](#), [Physicsworld](#), [Der Standard](#).
6. L. Chomaz, R. M. W. van Bijnen, D. Petter, G. Faraoni, S. Baier, J. H. Becher, M. J. Mark, F. Wächtler, L. Santos, **F. Ferlino**, *Observation of roton mode population in a dipolar quantum gas*, Nature Phys. 14, 442 (2018). [DOI](#). Features in [Physicsworld](#), [15 years of nature Physics](#), [WoS highly cited](#).
7. S. Baier, M. J. Mark, D. Petter, K. Aikawa, L. Chomaz, Z. Cai, M. Baranov, P. Zoller, **F. Ferlino**, *Extended Bose-Hubbard Models with Ultracold Magnetic Atoms*, Science 352, 201 (2016). [DOI](#). Featured in [Der Standard](#). [WoS highly cited](#).
8. K. Aikawa, S. Baier, A. Frisch, M. Mark, C. Ravensbergen, **F. Ferlino**, *Observation of Fermi surface deformation in a dipolar quantum gas*, Science 345, 1484 (2014). [DOI](#).
9. A. Frisch, M. Mark, K. Aikawa, **F. Ferlino**, J. L. Bohn, C. Makrides, A. Petrov, S. Kotochigova, *Quantum Chaos in Ultracold Collisions of Erbium*, S., Nature 507, 475 (2014). [DOI](#).
10. K. Aikawa, A. Frisch, M. Mark, S. Baier, A. Rietzler, R. Grimm, **F. Ferlino**, *Bose-Einstein Condensation of Erbium*, Phys. Rev. Lett. 108, 210401 (2012). [DOI](#).