Francesco Scazza

Curriculum Vitae

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OFFICE

Dipartimento di Fisica
Università degli Studi di Trieste
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LAB

CNR-INO
Edificio Q2 - Area Science Park
Strada Statale 14 Km 163,5
34149 Basovizza-Trieste (TS), Italy

Born: June 20, 1985 — Gallarate (VA), Italy
Nationality: Italian

Current position

Associate professor in Physics of Matter (FIS/03), Dipartimento di Fisica, Università degli Studi di Trieste (Italy)
Associate research fellow of Istituto Nazionale di Ottica, CNR-INO (Italy)

Scientific qualification

Italian scientific qualification – ***"Abilitazione Scientifica Nazionale (ASN)"*** as Associate Professor (Professore Universitario di Seconda Fascia) - Sector 02/B1 Experimental Physics of Matter

Research interests

I am an associate professor at the Physics Department of the University of Trieste and an associate fellow of CNR-INO. I lead a newly established experimental group (7 team members) in Trieste investigating **many-body physics with artificial quantum systems**, with a focus on out-of-equilibrium dynamics and transport in correlated multi-orbital fermionic systems. I have assessed expertise in **quantum simulation with ultracold atoms**, as recognized by numerous invited talks, international collaborations, and publications in high-impact international journals.

My current research interests include:

Quantum many-body physics with ultracold quantum gases – strongly correlated quantum many-body systems, experiments with strongly interacting Fermi gases, quantum impurities, quantum transport and out-of-equilibrium many-body dynamics, superfluidity and magnetism in ultracold Fermi gases, Hubbard physics in optical lattices, SU(N)-symmetric fermionic models.

Experimental atomic physics and optical techniques – laser cooling and trapping, Feshbach resonances, radio-frequency precision spectroscopy, optical clock spectroscopy, optical lattices, arbitrary optical potentials, quantum gas microscopes.

Quantum information and quantum optics – optical tweezer arrays, neutral atom quantum information processing, collective effects in light-atom interactions, continuous variable quantum optics, optical quantum communications and QKD.

Previous positions

11/2019 ↓ 05/2021

Permanent researcher – ***"Ricercatore di III Livello"*** at CNR-INO. Research activity on strongly correlated Fermi gases in highly resolved optical potentials, mesoscopic quantum transport, and fermionic many-body systems. *Main role*: Senior research scientist in the ultracold lithium laboratory of the Quantum Gases group at LENS.

Istituto Nazionale di Ottica del Consiglio Nazionale delle Ricerche (CNR-INO)
c/o Laboratorio Europeo di Spettroscopie Nonlineari (LENS)
Sesto Fiorentino, Italy

10/2019 ↓ 11/2019

Visiting scientist at the Department of Electrical Engineering, Princeton University, USA. Research activity on quantum information with ytterbium atoms in optical tweezer arrays in the group of Prof. Jeff Thompson.

Department of Electrical Engineering, Princeton University
Princeton NJ, USA

08/2016 ↓ 11/2019

Fixed-term researcher – ***"Primo Ricercatore a tempo determinato"*** at CNR-INO on the **Marie Skłodowska-Curie** project SCOUTFermi2D – "Strongly correlated ultracold fermions in two-dimensional tailored optical potentials: pairing, superfluidity and disorder" (H2020-MSCA-IF-2015, individual intra-European fellowship, Grant Agreement n. 705269) and project QuSiM2D – "Simulazione quantistica di nuovi stati della materia in due dimensioni" funded by Ente Cassa di Risparmio di Firenze. Research scientist in the ultracold lithium laboratory of the Quantum Gases group at LENS.

Istituto Nazionale di Ottica del Consiglio Nazionale delle Ricerche (CNR-INO)
c/o Laboratorio Europeo di Spettroscopie Nonlineari (LENS)
Sesto Fiorentino, Italy

08/2015 ↓ 08/2016

Postdoctoral fellow – ***"Assegnista di ricerca"*** at CNR-INO. Postdoc in the ultracold lithium laboratory led by Dr. Giacomo Roati and Dr. Matteo Zaccanti in the Quantum Gases group at LENS.

Istituto Nazionale di Ottica del Consiglio Nazionale delle Ricerche (CNR-INO)
c/o Laboratorio Europeo di Spettroscopie Nonlineari (LENS)
Sesto Fiorentino, Italy

04/2015 ↓ 07/2015

Research assistant at LMU München under the "Nanosystems Initiative Munich" (NIM2) cluster of excellence. Research activity in the ultracold ytterbium laboratory led by Dr. Simon Fölling in the group of Prof. Immanuel Bloch.

Ludwig-Maximilians-Universität München (LMU), Munich, Germany

03/2010 ↓ 03/2015

PhD fellow at LMU München (MPQ fellow *"Stipendium"* from 15/03/2010 to 14/12/2011 and LMU München employee *"Wissenschäftliche Mitarbeiter"* from 15/12/2011 to 31/03/2015). Research activity in the ultracold ytterbium laboratory led by Dr. Simon Fölling in the group of Prof. Immanuel Bloch.

Max Planck Institute for Quantum Optics (MPQ), Garching, Germany
Ludwig-Maximilians-Universität München (LMU), Munich, Germany

02/2009 ↓ 08/2009

Research internship at Laboratoire Kastler-Brossel on the project "Generation of multimode non-classical quantum states of light in the spatial domain" under the supervision of Nicolas Treps. Research activity in the quantum optics laboratory led by Prof. Claude Fabre at LKB.

Université Pierre et Marie Curie Paris 6 (UPMC) and Laboratoire Kastler-Brossel (LKB)
Paris, France

Education

03/2010 ↓ 02/2015

Ph.D. in Physics (Doktor der Naturwissenschaften)
Final grade: Summa cum laude. Date of defense: 23/02/2015

Thesis title: *Probing orbital SU(N)-symmetric interactions with ytterbium Fermi gases in optical lattices.* Advisor: Prof. Immanuel Bloch. Referees: Prof. Wilhelm Zwerger, Prof. Harald Weinfurter, Prof. Wolfgang Zinth.

Ludwig-Maximilians-Universität München, Munich, Germany

10/2007 ↓ 11/2009

M.Sc. degree in Physics – curriculum in Condensed Matter Physics
Final grade: 110/110 cum laude. Date of defense: 24/11/2009

Thesis title: *Generation of multi-mode non-classical quantum states of light in the spatial domain.* External advisor: Prof. Nicolas Treps. Internal advisor: Prof. Matteo Paris.

Università degli Studi di Milano, Italy

09/2004 ↓ 10/2007

B.Sc. degree in Physics
Final grade: 110/110 cum laude. Date of defense: 24/10/2007

Thesis title: *Approximate joint measurements of non-commuting observables in qubit systems.* Advisor: Prof. Matteo Paris.

Università degli Studi di Milano, Italy

Scientific output

I co-authored **29 scientific publications** (25 published on international journals, 4 published on conference proceedings), including 1 Nature, 1 Science, 3 Nature Physics, 1 Nature Communications, 2 Physical Review X, 7 Physical Review Letters and 3 Advanced Quantum Technologies.

h-index: 18 (Scopus), 20 (Google Scholar).

Total citation count: 1472 (Scopus), 2205 (Google Scholar). Google Scholar profile: https://scholar.google.com/citations?user=OVzx0UcAAAAJ.

ArXiv author query: https://arxiv.org/search/?searchtype=authorquery=Scazza%2C+F.

My **major scientific achievements** include:

- First observation of the Kelvin-Helmholtz instability of a superfluid shear layer [Nature Physics 2024];
- First observation of the sound emitted by annihilating quantum vortices in a superfluid [Nature 2021];
- First observation of the current-phase and current-voltage relations in a tunnel junction between strongly correlated Fermi superfluids [Science 2020, PRL 2021];
- First observation of the ferromagnetic instability in an ultracold atomic Fermi gas [Nature Phys. 2017, PRL 2018, PRA 2020], in collaboration with Prof. Wolfgang Ketterle, Nobel Laureate in Physics 2001;
- First observation of repulsive polaron quasiparticles in a homonuclear Fermi mixture [PRL 2017, PRL 2020];
- First direct observation of a SU(N) Mott insulating phase of ultracold fermions in an optical lattice [PRX 2016];
- First observation of an orbital Feshbach resonance [PRL 2015];
- Full construction of a new ultracold ytterbium apparatus, allowing the first clock-state manipulation in 3D optical lattices with alkaline-earth-like atoms [Nature Phys. 2014].

Other Scientific Activities

2015 → Present **Referee** for Nature Physics, Physical Review Letters, Physical Review X, Physical Review Research, Physical Review A, Europhysics Letters, Optics Letters and Physics Letters A.

2015 → Present Ongoing **scientific collaborations**:
Dr. Giacomo Roati and Dr. Matteo Zaccanti, CNR-INO Firenze, Italy: *Strongly interacting Fermi gases.*
Prof. Meera Parish and Dr. Jesper Levinsen, Monash University, Australia: *Strongly interacting Fermi gases.*
Prof. Pietro Massignan, ICFO and UPC, Barcelona, Spain: *Quantum impurities and correlated transport with ultracold atoms.*
Prof. Massimo Capone and Dr. Adriano Amaricci, SISSA Trieste, Italy: *Two-orbital quantum many body systems.*
Prof. Guido Pagano, Rice University, USA: *Quantum information with neutral atom arrays.*
Dr. Marcello Dalmonte, ICTP Trieste, Italy: *Quantum simulation with alkaline-earth atoms.*
Dr. Giacomo Cappellini and Dr. Jacopo Catani, CNR-INO Firenze, Italy: *Two-electron Rydberg atom arrays.*
Prof. Leonardo Fallani, University of Florence, Italy: *Two-electron Rydberg atom arrays.*
Dr. Alessio Recati, CNR-INO, Trento, Italy: *Dynamics of repulsive Fermi gases.*
Prof. Andrea Trombettoni, University of Trieste, Italy: *Quantum transport with cold atoms.*
Prof. Angelo Bassi, University of Trieste, Italy: *Quantum communication and QKD.*
Dr. Alessandro Zavatta, CNR-INO Firenze, Italy: *Quantum communication and QKD.*

2023 → Present **Co-investigator** of the EU Quantum Flagship project PASQuanS2.

2023 **Scientific chair** of the 15th Italian Quantum Information Science conference (IQIS 2023), 18-22 September 2023, Trieste, Italy.

2023 **Co-Organizer** of the QACTUS 2023 workshop: *"Quantum coherent dynamics: turbulence, non-equilibrium and interactions*, 6-8 September 2023, Barcelona, Spain.

2023 → Present **Principal Investigator** of the MUR PRIN2022 project CoQuS.

2023 → Present **Co-Investigator** in the CNR-INO unit of the PASQuanS^2 project EU FET Flagship on Quantum Technologies.

2022 → Present **Principal Investigator** of the FARE 2020 project FastOrbit.

2021 → Present **Principal Investigator** of the ERC Starting Grant (ERC-StG-2020) project OrbiDynaMIQs.

2019 → 2023 **Co-investigator** of the PRIN2017 project CEnTraL in the CNR-INO unit.

2018 → 2021 Member of the QOMBS European Quantum Flaghsip consortium in the Quantum Gases team at CNR-INO.

2012 → 2015 Member of the UQUAM ERC Synergy project as part of the Quantum Many Body Systems division led by Immanuel Bloch at Max Planck Institute for Quantum Optics.

2015 → 2018 Member of the Italian Physical Society (SIF) and the American Physical Society (APS).

Research grants, fellowships and awards

2023 **PRIN 2022** (Progetti di Ricerca di Interesse Nazionale), project CoQuS: *"Buildup of complexity in quantum simulators from the bottom up."*, Project n. 2022ATM8FY, Total funding $\sim 231\,$k€ over 24 months (138 k€ for the Trieste unit).

2022 **FARE 2020** (Framework per l'attrazione e il rafforzamento delle eccellenze per la ricerca in Italia), project FastOrbit: *"Exploring quantum coherence with fast nuclear qubits and orbital manipulation in ytterbium atom arrays*", Project n. R20WNHFNKF, Total funding $\sim 272\,$k€ over 60 months.

2020 **ERC Starting Grant** (ERC-2020-STG), project OrbiDynaMIQs: *"Two-orbital quantum many-body systems: from Kondo dynamics to mediated interactions"*, Grant Agreement n. 949438, Total funding ~ 1.42 M€ over 60 months.

2020 Awarded a permanent researcher position at Istituto Nazionale di Ricerca Metrologica (INRiM), Turin, Italy (declined).

2019 Awarded a permanent researcher position at Consiglio Nazionale delle Ricerche (CNR), Italy (accepted).

2016 **Marie Skłodowska-Curie** postdoc fellowship (Individual Intra-European fellowship H2020-MSCA-IF-2015) at CNR-INO, Italy – Project SCOUTFermi2D: *"Strongly correlated ultracold fermions in two-dimensional tailored optical potentials: pairing, superfluidity and disorder"*, Grant Agreement n. 705269, Total funding ~ 168 k€ over 24 months.

2015 Postdoctoral fellowship ("Assegno di Ricerca") under the PoLiChrom ERC project, Grant Agreement n. 637738, at CNR-INO, Italy.

2015 Research fellowship within the excellence cluster "Nanosystems Initiative Munich" (NIM2) of the LMU München, Germany.

2010 PhD fellowship of the Max Planck Institute for Quantum Optics, Germany.

2009 Erasmus grant for research internship at Laboratoire Kastler-Brossel (LKB), Paris, France.

Teaching activity

04/2023 – 08/2024 **Lecturer** (appointed) for the course "*Fisica Generale 1*" in the "Corso di Laurea in Ingegneria Industriale e Navale" of the University of Trieste, Italy – Academic Year 2023/24 (40 hours)

09/2023 – Present **Lecturer** (appointed) for the course "*Atomi, Molecole e Fotoni*" in the "Corso di Laurea Magistrale in Fisica" of the University of Trieste, Italy – Academic Year 2023/24 (48 hours)

09/2023 – Present **Lecturer** (appointed) for the course "*Laboratorio di Fisica della Materia Condensata*" in the "Corso di Laurea Magistrale in Fisica" of the University of Trieste, Italy – Academic Year 2023/24 (24 hours)

03/2023 – 09/2023 **Lecturer** (appointed) for the course "*Fisica Generale 1*" in the "Corso di Laurea in Ingegneria Industriale e Navale" of the University of Trieste, Italy – Academic Year 2022/23 (50 hours)

06/2023 **Lecturer** (appointed) for the course "*Quantum Hardware*" in the "Master Degree in Physics of Data" of the University of Padua, Italy – Academic Year 2022/23 (8 hours)

05/2023 **Lecturer** (invited) at Quantum-NEST School, ICTP Trieste, Italy: *Fundamentals of ultracold atomic gases* (3 hours)

09/2022 – 02/2023 **Lecturer** (appointed) for the course "*Atomi, Molecole e Fotoni*" in the "Corso di Laurea Magistrale in Fisica" of the University of Trieste, Italy – Academic Year 2022/23 (48 hours)

11/2022 **Lecturer** (invited) at 1st CAPS School on Ultracold Atoms at Universitat Politècnica de Catalunya, Barcelona, Spain: *Ultracold atomic Fermi gases in the strongly correlated regime* (3 hours)

03/2022 – 09/2022 **Lecturer** (appointed) for the course "*Fisica Generale 1*" in the "Corso di Laurea in Ingegneria Industriale e Navale" of the University of Trieste, Italy – Academic Year 2021/22 (40 hours)

10/2021 – 01/2022 **Lecturer** (appointed) for the course "*Fisica Applicata*" in the "Corso di Laurea Interateneo Trieste-Udine in Tecniche della prevenzione nell'ambiente e nei luoghi di lavoro", University of Trieste, Italy – Academic Year 2021/22 (20 hours)

06/2021 **Assistant lecturer** for the Master course "*Statistical Physics*" held by Prof. Davide Galli at the Department of Physics, Università degli Studi di Milano, Italy: *Many-body transport in ultracold Fermi gases* (1.5 hours)

06/2020 **Lecturer and tutor** for the PhD course "*Science Communication*" at LENS, University of Florence, Italy ($\sim$ 12 hours)

05/2020 **Assistant lecturer** for the Master course "*Statistical Physics*" held by Prof. Davide Galli at the Department of Physics, Università degli Studi di Milano, Italy: *Quantum transport*

with ultracold Fermi gases (1.5 hours)

09/2019 **Lecturer** at 2019 Summer School of the PhD program in Quantum Technologies of the University of Napoli, CNR and University of Camerino, Ischia, Italy: *Ultracold atomic Fermi gases in the strongly correlated regime* ($\sim$ 4 hours)

06/2018 PhD level **lecture** at ICTP, Trieste, Italy: *Ultracold atoms with SU(N) symmetry* (1 hour)

06/2016 **Assistant lecturer** for the PhD course "*LENS Lectures*" at LENS, University of Florence, Italy: *Introduction to the Hubbard model with fermions in optical lattices* (2 hours)

06/2016 **Assistant lecturer** for the Master course "*Statistical Physics*" held by Prof. Davide Galli at the Department of Physics, Università degli Studi di Milano, Italy: *Introduction to the Hubbard model with fermions in optical lattices* (2 hours)

09/2013 – 12/2013 **Teaching assistant** for the Master course "*Seminar on modern Experiments in Quantum Optics*" held by Dr. Ulrich Schneider and Dr. Simon Fölling at the Faculty of Physics, Ludwig-Maximilians-Universität, München, Germany ($\sim$ 20 hours)

04/2013 – 07/2013 **Teaching assistant** for the Master course "*Quantum optics*" held by Prof. Immanuel Bloch at the Faculty of Physics, Ludwig-Maximilians-Universität, München, Germany ($\sim$ 40 hours)

Supervision of students

11/2021 – Present **Supervisor** of three PhD students and four undergraduate students at Department of Physics, University of Trieste, and CNR-INO, Trieste, Italy.

04/2023 – 10/2023 **Co-advisor ("correlatore")** of the Bachelor thesis of Carlo Tortora and Fabrizio Barbuio, Universitá degli Studi di Trieste, Italy.

02/2023 – 10/2023 **Co-advisor ("correlatore")** of the Master thesis of Elena Fanella, Universitá degli Studi di Trieste, Italy: *Analyzing the feasibility of underwater quantum key distribution with time-bin encoding in the visible spectrum.* Final grade: 110/110 cum laude.

05/2022 – 2/2023 **Advisor ("relatore")** of the Master thesis of Stefano Vigneri, Universitá degli Studi di Trieste, Italy: *Realization of an accordion optical lattice for trapping ytterbium atoms.* Final grade: 110/110 cum laude.

04/2021 – 10/2021 **Advisor ("relatore")** of the Master thesis of Omar Abdel Karim, Universitá degli Studi di Firenze, Italy: *Laser cooling of single ytterbium atoms in optical tweezer micro-traps.* Final grade: 110/110 cum laude.

10/2020 – 09/2021 **Co-advisor ("correlatore")** of the Master thesis of Alessandro Muzi Falconi, Universitá degli Studi di Milano and LENS, Sesto Fiorentino, Italy: *Spin-dependent optical potentials for ultracold lithium Fermi gases.* Final grade: 110/110 cum laude.

05/2018 – 2/2019 **Co-advisor ("correlatore")** of the Master thesis of Riccardo Panza, Universitá degli Studi di Milano and LENS, Sesto Fiorentino, Italy: *Production and characterization of quasi-two-dimensional ultracold lithium gases.* Final grade: 110/110 cum laude.

11/2017 – 02/2018 **Co-supervisor** of Erasmus+ traineeship project of Marcel Duda, LENS, Italy: *Testing and characterization of a bi-chromatic microscope objective for experiments with ultracold lithium.*

04/2017 – 12/2017 **Advisor ("relatore")** of the Master thesis of Eleonora Lippi, Universitá degli Studi di Firenze, Italy: *Realization of a large-spacing optical lattice for trapping fermionic lithium gases in two dimensions.* Final grade: 110/110.

05/2016 – 07/2016 **Co-supervisor** of Erasmus+ traineeship project of Mathieu Bertrand, LENS, Italy: *Production of a quasi-two-dimensional harmonic optical trap for an ultracold Fermi gas.*

2012 – 2015 **Co-supervisor** of 2 PhD students and 4 undergraduate students with projects ≥ 3 months at Ludwig-Maximilians-Universität, München, Germany: Philip Ketterer (MSc thesis), Christian Schweizer (MSc thesis), Martin Spiessl (BSc thesis), Maxim Tabachnyk (BSc thesis), Emily Davis (traineeship) and QinQin Yu (traineeship).

Institutional activities

2022 → Present **Faculty member of the board of the PhD in Physics**, Department of Physics, University of Trieste, Italy.

2023 **Committee member** for the selection of permanent staff members and fixed-term researchers at CNR-INO, Italy.

09/2022 **President of the PhD final examination committee** for the PhD in Physics - Condensed Matter Physics section at University of Trieste.

2022 **Reviewer and defense committee external member** for PhD theses at: Politecnico di Torino, Scuola Internazionale Superiore di Studi Avanzati (SISSA), University of Florence and LMU Munich.

2021 → 2022 **Committee member** for the selection of fixed-term researchers (rtd-A) and postdoc fellows (assegno di ricerca) in the sector FIS/03 – Physics of Matter, University of Trieste, Italy.

Invited scientific talks

I have been invited to deliver talks at **22 international conferences and workshops**. In addition, I delivered more than 20 contributed talks at international conferences and workshops. Furthermore, I presented **20 seminars** in universities and research institutes worldwide: IQOQI Innsbruck, Institut d'Optique Palaiseau, Heidelberg University, Columbia University, NYU, Joint Quantum Institute, JILA University of Colorado, Rice University, University of Cambridge, ETH Zurich, MPQ Munich, LMU Munich, University of Hamburg, University of Tuebingen, ICFO, ICTP, University of Trento, Elettra Sincrotrone Trieste, University of Salerno, Universidade Federal do Rio Grande do Norte. A selection of invited talks in conferences and workshops is given in the following:

05/2024 *Nonequilibrium phenomena in strongly-correlated ultracold matter*, Errore Majorana Foundation, Erice, Italy.

08/2023 Conference on *Impurity Physics with Cold Atoms and Ions*, AIAS Aarhus, Denmark.

06/2023 *CMT@Brixen* conference, Brixen, Italy.

09/2022 *Italian Quantum Information Science (IQIS 2022)* conference, University of Palermo, Italy.

05/2022 *Atomtronics 2022*, Centro de Ciencias de Benasque, Spain.

02/2022 *2nd Adriatic Conference on Strongly Correlated Systems*, ICTP Trieste, Italy.

08/2021 Workshop on *Quantum simulation in AMO physics and condensed matter*, Cargèse, France.

11/2020 *Young Researchers Workshop on Quantum Fluctuations in Ultracold Gases* (online event).

05/2019 *Atomtronics 2019*, Centro de Ciencias de Benasque, Spain.

09/2018 *Superfluctuations 2018* conference, S. Benedetto del Tronto, Italy.

04/2018 *Quantum Gases and Quantum Coherence 2018*, 669. WE-Heraeus Seminar, Physikzentrum Bad Honnef, Germany.

11/2017 Conference on *Frontiers in Two-Dimensional Quantum Systems*, ICTP Trieste, Italy.

09/2017 Workshop on *Quantum Material Trends*, Università Cattolica di Brescia, Italy.

07/2017 Conference on *Frontiers of Quantum and Mesoscopic Thermodynamics*, Prague, Czech Republic.

06/2014 *2nd Kavli-MPQ Workshop*, Max Planck Institute for Quantum Optics, Garching, Germany.

Outreach activities

05/2024 Speaker at the Italian Quantum Weeks 2024 – Talk to the general public *"Atomi freddi e viaggi al polo Nord"* at Knulp, Trieste.

04/2023 Speaker at the Italian Quantum Weeks 2023 – Talk to the general public *"Dall'entanglement ai dispositivi quantistici"* at Knulp, Trieste.

02/2023 Introductory lecture for high-school students *"Strane (ma semplici) regole nel Paese dei*

Quanti" at the University of Trieste.

10/2022 Public lecture on the occasion of the 2022 Nobel Prize in Physics *"La meccanica quantistica alla prova del banco ottico"* at the University of Trieste.

10/2022 Interviewed by La Repubblica within the article *"Nobel ai fisici dei quanti che hanno portato nel futuro computer e crittografia"* by Elena Dusi (05/10/2022).

05/2022 Co-organizer and speaker of the Italian Quantum Weeks 2022 – Talk to the general public *"Un aperitivo quantistico: Atomi freddissimi e tecnologie quantistiche a Trieste"* at Caffé San Marco, Trieste.

08/2021 Contributor to a three-parties inter-European (Italy, Slovenia and Croatia) public demonstration of quantum key distribution (QKD) during the G20 Digital Ministers' Meeting (5 August 2021), Trieste, Italy.

04/2021 Article for the general public *"Simulatori quantistici: prototipi per i materiali di domani"* on the newspaper Trieste All News – https://www.triesteallnews.it

02/2021 Public outreach event at University of Trieste: *"Esperienze di ERC@UniTS"*.

09/2020 Member of the CNR team that presented the first public demonstration of quantum key distribution (QKD) in Italy during the closing ceremony of ESOF2020 (6 September 2020), Trieste, Italy: *QKD encrypted videocall between the Italian Prime Minister, Prof. Giuseppe Conte, and the Rector of the University of Trieste, Prof. Roberto Di Lenarda.*

06/2018 Presenter at ScienzEstate 2018, Sesto Fiorentino, Italy: *Presentation of scientific experiments to a broad general audience.*

11/2017 Outreach article on the magazine De Physicus (Volume 28, Number 3, 2017), edited by Technical University of Delft, The Netherlands: *Orbital spin-exchanging interactions: when two is definitely more than one.*

10/2017 Interviewed by Gizmodo within the article *"Scientists Just Built the Most Precise Clock Ever to Help Understand Our Crazy Universe"* by Ryan Mandelbaum (05/10/2017).

Language skills

Italian: native speaker
English: fluent
French: advanced
German: intermediate

Publications in peer-reviewed journals

1. L. Pezzè, K. Xhani, C. Daix, N. Grani, B. Donelli, F. Scazza, D. Hernandez-Rajkov, W. J. Kwon, G. Del Pace, G. Roati. *Stabilizing persistent currents in an atomtronic Josephson junction necklace.* Nature Comm. **15**, 4831 (2024).

2. D. Hernandez-Rajkov, N. Grani, F. Scazza, G. Del Pace, W. J. Kwon, M. Inguscio, K. Xhani, C. Fort, M. Modugno, F. Marino, G. Roati. *Connecting shear-flow and vortex array instabilities in annular atomic superfluids.* Nature Phys. **20**, 939 (2024).

3. F. M. Surace, P. Fromholz, F. Scazza, M. Dalmonte. *Scalable, ab initio protocol for quantum simulating SU(N) × U(1) lattice gauge theories.* Quantum **8**, 1359 (2024).

4. K. Xhani, G. Del Pace, F. Scazza, G. Roati. *Decay of persistent currents in annular atomic superfluids.* Atoms **11**, 109 (2023).

5. D. Ribezzo, M. Zahidy, I. Vagniluca, N. Biagi, *et al.*, (including F. Scazza). *Deploying an inter-European quantum network.* Adv. Quantum Technol. **6**, 2200061 (2023).

6. G. Del Pace, K. Xhani, A. Muzi Falconi, M. Fedrizzi, N. Grani, D. Hernandez Rajkov, M. Inguscio, F. Scazza, W. J. Kwon, and G. Roati. *Imprinting persistent currents in tunable fermionic rings.* Phys. Rev. X **12**, 041037 (2022).

7. F. Scazza, M. Zaccanti, P. Massignan, M. M Parish, and J. Levinsen. *Repulsive Fermi and Bose polarons in quantum gases.* Atoms **10**, 55 (2022).

8. W. J. Kwon, G. Del Pace, K. Xhani, L. Galantucci, A. Muzi Falconi, M. Inguscio, F. Scazza, and G. Roati. *Sound emission and annihilations in a programmable quantum vortex collider.* Nature **600**, 64 (2021).

9. L. Amico, M. Boshier, G. Birkl, A. Minguzzi, C.Miniatura, L. C. Kwek, *et al.*, (including F. Scazza). *Roadmap on Atomtronics: State of the art and perspective.* AVS Quantum Science **3**, 039201 (2021).

10. A. Trombettoni, F. Scazza, F. Minardi, G. Roati, F. Cappelli, L. Consolino, A. Smerzi, and P. De Natale. *Quantum simulating the electron transport in quantum cascade laser structures.* Adv. Quantum Technol. **4**, 2100044 (2021).

11. G. Del Pace, W. J. Kwon, M. Zaccanti, G. Roati, F. Scazza. *Tunneling transport of unitary fermions across the superfluid transition.* Phys. Rev. Lett. **126**, 055301 (2021).

12. H. S. Adlong, W. E. Liu, F. Scazza, M. Zaccanti, N. D. Oppong, S. Fölling, M. M. Parish, and J. Levinsen. *Quasiparticle lifetime of the repulsive Fermi polaron.* Phys. Rev. Lett. **125**, 133401 (2020).

13. W. J. Kwon, G. Del Pace, R. Panza, M. Inguscio, W. Zwerger, M. Zaccanti, F. Scazza, and G. Roati. *Strongly correlated superfluid order parameters from dc Josephson supercurrents.* Science **369**, 84 (2020).

14. K. Xhani, E. Neri, L. Galantucci, F. Scazza, A. Burchianti, K.-L. Lee, C. F. Barenghi, A. Trombettoni, M. Inguscio, M. Zaccanti, G. Roati, and N. P. Proukakis. *Critical transport and vortex dynamics in a thin atomic Josephson junction.* Phys. Rev. Lett. **124**, 045301 (2020).

15. F. Scazza, G. Valtolina, A. Amico, P. E. S. Tavares, M. Inguscio, W. Ketterle, G. Roati, and M. Zaccanti. *Exploring emergent heterogeneous phases in strongly repulsive Fermi gases.* Phys. Rev. A **101**, 013603 (2020). (Selected as Editors' Suggestion).

16. G. Pagano, F. Scazza, and M. Foss-Feig. *Fast and scalable quantum information processing with two-electron atoms in optical tweezer arrays.* Adv. Quantum Tech. **2**, 1800067 (2019). (Selected for the cover of Adv. Quantum Tech. Vol. 2, Issue 3-4).

17. A. Amico*, F. Scazza*, G. Valtolina, P. E. S. Tavares, W. Ketterle, M. Inguscio, G. Roati, and M. Zaccanti. *Time-resolved observation of competing attractive and repulsive short-range correlations in strongly interacting Fermi gases.* Phys. Rev. Lett. **121**, 253602 (2018). (Selected as Editors' Suggestion and for a Viewpoint in Physics). *These authors contributed equally to this work.

18. E. Neri, F. Scazza, and G. Roati. *Coherent and dissipative transport in a Josephson junction between fermionic superfluids of Li-6 atoms.* AIP Conf. Proc. **1950,** 020003 (2018).

19. A. Burchianti, F. Scazza, A. Amico, G. Valtolina, J.A. Seman, C. Fort, M. Zaccanti, M. Inguscio, and G. Roati. *Connecting dissipation and phase slips in a Josephson junction between fermionic superfluids.* Phys. Rev. Lett. **120,** 025302 (2018).

20. F. Scazza, G. Valtolina, P. Massignan, A. Recati, A. Amico, A. Burchianti, C. Fort, M. Inguscio, M. Zaccanti, and G. Roati. *Repulsive Fermi polarons in a resonant mixture of ultracold Li-6 atoms.* Phys. Rev. Lett. **118,** 083602 (2017). (Selected as Editors' Suggestion)

21. G. Valtolina, F. Scazza, A. Amico, A. Burchianti, A. Recati, T. Enss, M. Inguscio, M. Zaccanti, and G. Roati. *Exploring the ferromagnetic behaviour of a repulsive Fermi gas of ultracold atoms.* Nature Phys. **13,** 704709 (2017).

22. C. Hofrichter, L. Riegger, F. Scazza, M. Höfer, D. R. Fernandes, I. Bloch, and S. Fölling. *Direct Probing of the Mott Crossover in the SU(N) Fermi-Hubbard Model.* Phys. Rev. X **6,** 021030 (2016).

23. M. Höfer, L. Riegger, F. Scazza, C. Hofrichter, D. R. Fernandes, M. M. Parish, J. Levinsen, I. Bloch, and S. Fölling. *Observation of an orbital interaction-induced Feshbach resonance in ^{173}Yb.* Phys. Rev. Lett. **115,** 265302 (2015). (Selected as Editors' Suggestion and for a Viewpoint in Physics)

24. F. Scazza, C. Hofrichter, M. Höfer, P. De Groot, I. Bloch, and S. Fölling. *Observation of two-orbital spin-exchange interactions with ultracold SU(N)-symmetric fermions.* Nature Phys. **10,** 779–784 (2014). (Selected for News and Views in Nature Physics)

25. B. Chalopin, F. Scazza, C. Fabre and N. Treps. *Direct generation of a multi-transverse mode non-classical state of light.* Opt. Express **19,** 4405–4410 (2011).

26. B. Chalopin, F. Scazza, C. Fabre and N. Treps. *Multimode non-classical light generation through the optical-parametric-oscillator threshold.* Phys. Rev. A **81,** 061804(R) (2010).

Other publications

1. I. Paparelle, F. Mousavi, F. Scazza, A. Bassi, M. G. A. Paris, A. Zavatta. *A continuous-variable quantum secure direct communication protocol with squeezed states.* Conference on Lasers and Electro-Optics/Europe and European Quantum Electronics Conference 2023, paper EB_5_4 (2023).

2. I. Paparelle, F. Mousavi, F. Scazza, A. Bassi, M. G. A. Paris, A. Zavatta. *Practical quantum secure direct communication with squeezed states.* arXiv:2306.14322 (2023).

3. F. Scazza, G. Del Pace, L. Pieri, R. Concas, W. J. Kwon, and G. Roati. *An efficient high-current circuit for fast radio-frequency spectroscopy in cold atomic gases.* arXiv:2104.12730 (2021).

4. A. Amico, F. Scazza, G. Valtolina, P.E.S. Tavares, A. Burchianti, C. Fort, M. Inguscio, M. Zaccanti, and G. Roati. *Spin response and metastability of a strongly repulsive Fermi gas of ultracold atoms.* European Conference on Lasers and Electro-Optics and European Quantum Electronics Conference 2017, paper EC_2_5 (Optical Society of America, 2017).

5. B. Chalopin, F. Scazza, C. Fabre, and N. Treps. *Multimode squeezing of transverse modes with a self-imaging optical parametric oscillator.* CLEO/Europe and European Quantum Electronics Conference 2011, paper EA1_1 (Optical Society of America, 2011).

Autorizzo il trattamento dei dati personali contenuti nel mio curriculum vitae in base all'art. 13 del D. Lgs. 196/2003 e all'art. 13 del Regolamento UE 2016/679 relativo alla protezione delle persone fisiche con riguardo al trattamento dei dati personali.

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