Curriculum Vitae

Personal Information

Nicola Mayer
Date of birth: 30/07/1992
Place of Birth: Pordenone (Italy)
Nationality: Italian
Gender: Male

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Google Scholar: https://scholar.google.com/citations?user=9EZ2fK4AAAAJ

orcid.org/0000-0002-8547-0073

Education

01/2018–04/2023 **Ph.D., Physics**
Humboldt Universität, Berlin (Germany)
Thesis: *Ultrafast spectroscopy and control of quantum dynamics in tailored multicolor laser fields*
Advisor: Prof. Dr. Misha Yu. Ivanov
Final Grade: Summa cum laude (ECTS A)

09/2015–10/2017 **M. Sc., Optical Sciences**
Humboldt Universität, Berlin (Germany)
Thesis: *Interference stabilization of complex molecular Fano resonances*
Advisor: Prof. Dr. Misha Yu. Ivanov
Co-advisor: Dr. Oleg Kornilov
Final grade: 1/5 (ECTS A)

10/2011–03/2015 **B.Sc., Physics**
Università degli studi di Trieste, Trieste (Italy)
Thesis: *Study of the ultrafast vibrational dynamics of the retinal chromophore and its counterion in liquid phase* (*Studio della dinamica ultraveloce vibrazionale del cromoforo retinale e del suo contra-ione in fase liquida*)
Advisor: Prof. Dr. Fulvio Parmigiani
Co-advisor: Dr. Goran Zgrablić
Final grade: 103/110 (ECTS C)

09/2006–07/2011 **High School Diploma, Scientific Curricula**
Thesis: *Quantum mechanics and the end of determinism* (*La meccanica quantistica e la fine del determinismo*)
Liceo Leopardi-Majorana, Pordenone (Italy)
Final grade: 98/100 (ECTS A)

Research Experience

01/2025-01/2027 **MSCA Research Fellow**
Attosecond Quantum Physics Group, King's College, London (United Kingdom)
PI: Dr. Emilio Pisanty

05/2023–12/2023 **Postdoctoral researcher**
Theory Department, Max-Born-Institut, Berlin (Germany)
PI: Prof. Dr. Olga Smirnova
· Discovered and characterized the enantiosensitivity of exceptional points in chiral molecules
· Developed the concept of chiral topological light and its application for topological enantiosensitive spectroscopy

02/2023-03/2023 **Academic visitor**
Imperial College and King's College, London (United Kingdom)
Host: Dr. David Ayuso and Dr. Emilio Pisanty
Project: Structured light for enantiosensitive discrimination
· Characterized synthetic chiral light with radially- and azimuthally-polarized ω-2ω beams
· Performed high-harmonic generation simulations in fenchone, showing enantiosensitivity at all harmonic orders.

01/2018–04/2023 **Graduate researcher**
Max-Born-Institut, Berlin (Germany)
Supervisor: Prof. Dr. Misha Yu. Ivanov
Project: Generation, Characterization, and Application of Chiral Attosecond Pulses
· Discovered and characterized synthetic chiral vortex light with azimuthally varying local handedness for enantiosensitive spectroscopy,
· Discovered and characterized a method to imprint chirality on atoms using synthetic chiral light
· Discovered and characterized the role of long Rydberg trajectories in high-harmonic generation
· Developed the theory to explain a time-resolved pump-probe photoelectron experiment in helium
· Co-directed the development of a M.Sc. thesis at the Max-Born-Institut
· Co-directed the development of a B.Sc. internship at the Max-Born-Institut

09/2015-12/2017 **Student assistant**
Max-Born-Institut, Berlin (Germany)
Supervisor: Dr. Oleg Kornilov
· Co-designed, tested and implemented a piezomotor stage for liquid jet experiments
· Developed the theory of interference stabilization for multiple continua and applied it to describe a time-resolved photoelectron spectroscopy experiment in N_2.

05/2015-08/2015 **Trainee**
Freie Universität, Berlin (Germany)
Supervisor: Prof. Dr. Stephanie Reich
Project: Coating of carbon nanotube with smart surfactants
· Synthesized and characterized carbon nanotubes for virus detection in liquid solution

Grants and Scholarships

01/2025-01/2027 Postdoctoral fellowship
Awarded project: **TopROCS**, *Topologically protected chiral sensing*

	King's College, London (United Kingdom) Marie Skłodowska-Curie Actions 220908.48 €
02/2023-03/2023	AttoChem Short Term Scientific Mission Imperial College and King's College, London (United Kingdom) AttoChem Cost Action 18222 4000 €
2015	ERASMUS PR-T Traineeship Freie Universität, Berlin (Germany) ERASMUS+ (European Union) 1890 €
2012-2013	ERDISU scholarship Università degli studi di Trieste, Trieste (Italy) Regione autonoma del Friuli-Venezia Giulia 4700 €
2011-2012	Luciano Fonda scholarship Università degli studi di Trieste, Trieste (Italy) Collegio Universitario Luciano Fonda 3000 €

Awards

2022	**Outstanding Reviewer award** Journal of Physics B.: Atomic, Molecular and Optical Physics
2022	**Poster student presentation prize** International conference in Ultrafast Phenomena Montreal (Canada) Poster title: Synthetic chiral light for control of achiral and chiral media
2021	**Poster prize** Faraday Discussions on time-resolved photoinduced dynamics Online Poster title: Probing Rydberg states in non-collinear bicircular high-harmonic generation via the spin-orbit coupling
2020	**Outstanding Reviewer award** Journal of Physics B.: Atomic, Molecular and Optical Physics
2018	**Poster prize** Extreme Non-linear Optics, Attosecond Science and High-field Physics Trieste (Italy) Poster title: Interference stabilization of complex resonances

Journal Publications

1. **Nicola Mayer**, David Ayuso, Piero Decleva, Margarita Khokhlova, Emilio Pisanty, Misha Ivanov, and Olga Smirnova. Chiral topological light for detecting robust enantio-sensitive observables. *Nature Photonics*, 2024. URL https://www.nature.com/articles/s41566-024-01499-8
2. **Nicola Mayer**, Serguei Patchkovskii, Felipe Morales, Misha Ivanov, and Olga Smirnova. Imprinting Chirality on Atoms Using Synthetic Chiral Light Fields. *Physical Review Letters*, 129:243201, 2022. URL https://link.aps.org/doi/10.1103/PhysRevLett.129.243201
3. **Nicola Mayer**, Samuel Beaulieu, Álvaro Jiménez-Galán, Serguei Patchkovskii, Oleg Kornilov, Dominique Descamps, Stéphane Petit, Olga Smirnova, Yann Mairesse, and Misha Ivanov. Role of Spin-Orbit Coupling in High-Order Harmonic Generation Revealed by Supercycle Rydberg Trajectories. *Physical Review Letters*, 129:173202, 2022. URL https://link.aps.org/doi/10.1103/PhysRevLett.129.173202
4. **Nicola Mayer**, Peng Peng, David M. Villeneuve, Serguei Patchkovskii, Misha Ivanov, Oleg Kornilov, Marc J. J. Vrakking, and Hiromichi Niikura. Population transfer to high angular momentum states in infrared-assisted XUV photoionization of helium. *J. Phys. B: At. Mol. Opt. Phys.*, 53(164003), 2020. URL https://iopscience.iop.org/article/10.1088/1361-6455/ab9495
5. Johan Hummert, Geert Reitsma, **Nicola Mayer**, Evgenii Ikonnikov, Martin Eckstein, and Oleg Kornilov. Femtosecond Extreme Ultraviolet Photoelectron Spectroscopy of Organic Molecules in Aqueous Solution. *The Journal of Physical Chemistry Letters*, 9(22):6649–6655, 2018. URL ttps://doi.org/10.1021/acs.jpclett.8b02937
6. Martin Eckstein, **Nicola Mayer**, Chung-Hsin Yang, Giuseppe Sansone, Marc J. J. Vrakking, Misha Ivanov, and Oleg Kornilov. Interference stabilization of autoionizing states in molecular N2 studied by time- and angular-resolved photoelectron spectroscopy. *Faraday Discussions*, 194:509–524, 2016. URL https://pubs.rsc.org/en/content/articlelanding/2016/fd/c6fd00093b

Preprints

1. **Nicola Mayer**, Alexander Löhr, Nimrod Moiseyev, Misha Ivanov, and Olga Smirnova. Enantiosensitive exceptional points. *arXiv:2306.12293*, 2023. URL https://doi.org/10.48550/arXiv.2306.12293

Thesis

1. **Nicola Mayer**. Ultrafast spectroscopy and control of quantum dynamics in tailored multicolor laser fields. 2024. URL https://doi.org/10.18452/28371

Reviewing experience

- Reviewer for J. Phys. B: At. Mol. Opt. Phys., (5 articles)
- Reviewer for Phys. Scripta (2 articles)
- Reviewer for Phys. Rev. A (1 article)
- Reviewer for Chem. Phys. Chem. (1 article)

Presentations

Invited oral presentations

1. *Chiral vortex light for detecting robust enantiosensitive observables*, CUPUSL23, Dresden, Germany, 29/06/2023
2. *Synthetic chiral light for control of achiral and chiral media*, DPG SAMOP, Online, 15/03/2022

Oral presentations

Encircling exceptional points for enantiosensitive asymmetric population transfer, GRC Quantum Control of Light and Matter, Newport (RI), USA, 10/08/2023

Encircling exceptional points for enantiosensitive asymmetric population transfer, GRS Theoretical and Experimental Techniques for Coherent Quantum Control With Strong Fields, Newport (RI), USA, 05/08/2023

Generation of topological chiral light for robust enantiosensitive detection using structured beams, CLEO Europe EQEC, Munich, Germany, 27/06/2023

Structured synthetic chiral light with topological properties for robust and highly sensitive chiral discrimination, CLEO, San Jose, California, USA, 12/05/2023

Synthetic chiral vortices for highly-sensitive chiral discrimination, Frontiers in Optics and Laser Science, Rochester, USA, 17/10/22

HHG spectroscopy using bicircular fields in achiral and chiral media, QUTIF Final Colloquium 2022, Bad Honnef, Germany, 31/08/2022

Control of achiral and chiral media using synthetic chiral light, Quantum Frontiers in Molecular Science, Online, 06/06/2022-10/06/2022

Imprinting chirality on atoms using synthetic chiral light, Extreme Atomic Systems, Riezlern, Austria, 15/02/2022

Imprinting chirality on atoms using chiral fields, 1st AttoChem Young Scientist Symposium, Online, 15/09/2021

Probing Rydberg states in non-collinear High-Harmonic Generation via the spin-orbit coupling, QUTIF International Conference, Online, 25/02/21

Phase control of complex Fano resonances, DPG SAMOP, Rostock, Germany, 13/03/19

Phase control of complex Fano resonances, DPG SAMOP, Erlangen, Germany, 07/03/18

Interference stabilization for discrete states coupled to a number of continua, DPG SAMOP, 08/03/18

Poster presentations

Encircling exceptional points for enantiosensitive asymmetric population transfer, Quantum Control of Light and Matter GRC, Newport, Rhode Island, USA, XX, 08/2023

Encircling exceptional points for enantiosensitive asymmetric population transfer, Theoretical and Experimental Techniques for Coherent Quantum Control With Strong Fields GRS, Newport, Rhode Island, USA, 06/08/2023

Control of achiral and chiral media with synthetic chiral vortex beams, AttoChem 3rd Annual Workshop, Prague, Czech Republic, 20/09/22

Control of achiral and chiral media with synthetic chiral vortex beams, Ultrafast Phenomena, Montreal, Canada, 19/07/22

Control of achiral and chiral media with synthetic chiral vortex beams, ATTO VIII, Orlando, USA, 12/07/22

Synthetic chiral light for control of chiral and achiral media, Atto-FEL, London, United Kingdom, 29/06/22

Imprinting chirality on atoms using synthetic chiral light, AttoChem 2nd Annual Workshop, Online, 14/10/21

Probing Rydberg states in non-collinear bicircular High-Harmonic Generation via the spin-orbit coupling, AttoChem 1st Annual Workshop, Online, 18/02/21

Probing Rydberg states in non-collinear bicircular High-Harmonic Generation via the spin-orbit coupling, Faraday Discussions on Time-resolved imaging of photo-induced dynamics, Online, 01/02/21-04/02/21

Electron correlation induced hole dynamics in High Harmonic Generation by bicircular laser fields, QUTIF Research School, Freiburg, Germany, 10/10/19

Phase control of complex molecular Fano resonances, ATTO VII, Szeged, Hungary, 04/07/19

Interference stabilization of complex resonances, Extreme Non-linear Optics, Attosecond Science and High-field Physics, Trieste, Italy, 15/02/18

Interference stabilization of complex molecular Fano resonances, Erice Attosecond School, Erice, Italy, 21/03/17

Interference stabilization of autoionizing states in molecular N_2 studied by time- and angular-resolved photoelectron spectroscopy, Faraday Discussions on Ultrafast Imaging of Photochemical Dynamics, Edinburgh, Scotland, 01/09/16

Interference stabilization of autoionizing states in molecular N_2 studied by time- and angular-resolved photoelectron spectroscopy, QUTIF Annual Meeting, Dornburg, Germany, 18/05/16

Languages

Italian (native)

English (fluent)

French (intermediate)

German (basic)

August 21, 2024