Curriculum Vitae

Personal Information

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

Email: nicola.1.mayer@kcl.ac.uk/mayer.phys.acc@gmail.com

Google Scholar Profile

ORCID Profile

Research Experience

01/2025-12/2026 **UKRI HE Guarantee Marie Skłodowska-Curie Research Fellow**
Attosecond Quantum Physics Group, King's College, London (United Kingdom)
Host: 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.

05/2015-07/2015 **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

Education

01/2018–04/2023 **PhD, 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 **MSc, 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 **BSc, 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)

Grants and Scholarships

01/2025-12/2026 **Postdoctoral fellowship**
Awarded project: TopROCS, *Topologically protected chiral sensing*
King's College, London (United Kingdom)
UKRI HE Guarantee Marie Skłodowska-Curie Actions
220908.48€ (192297£)

02/2023-03/2023 **AttoChem Short Term Scientific Mission**
Imperial College and King's College, London (United Kingdom)
AttoChem Cost Action 18222
4000€

05/2015-07/2015 **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**, Alexander Löhr, Nimrod Moiseyev, Misha Ivanov, and Olga Smirnova. Enantiosensitive exceptional points in open chiral systems. *accepted in Phys. Rev. A*, 2026. doi: 10.1103/7rtp-3xts. URL https://doi.org/10.1103/7rtp-3xts
2. Lauren B. Drescher, **Nicola Mayer**, Kylie Gannan, Jonah R. Adelman, and Stephen R. Leone. Attosecond optical orientation. *Physical Review Letters*, 135:163201, Oct 2025. doi: 10.1103/kfjh-zc96. URL https://link.aps.org/doi/10.1103/kfjh-zc96
3. **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*, 18:1155–1160, 2024. URL https://www.nature.com/articles/s41566-024-01499-8
4. **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
5. **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
6. **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
7. 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
8. 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. Emilio Pisanty, **Nicola Mayer**, Andrés Ordóņez, Alexander Löhr, and Margarita Khokhlova. Chiral moments make chiral measures. *arXiv:2603.26793*, 2026. doi: 10.48550/arXiv.2603.26793. URL 10.48550/arXiv.2603.26793

Conference proceedings

1. **Mayer Nicola**, David Ayuso, Piero Decleva, Margarita Khokhlova, Emilio Pisanty, Misha Ivanov, and Olga Smirnova. Chiral topological light for robust enantiosensitive detection of molecular chirality. 13578: 120–128, 2025. URL http://dx.doi.org/10.1117/12.3064067
2. Kyle Acheson et al. Strong-field physics: general discussion. *Faraday Discussions*, 228:470–487, 2021. URL https://doi.org/10.1039/D1FD90025K

Thesis

- **Nicola Mayer**. Ultrafast spectroscopy and control of quantum dynamics in tailored multicolor laser fields. *Humboldt-Universität zu Berlin*, 2024. URL https://doi.org/10.18452/28371

Teaching and supervision experience

- Main supervisor of Kajol Mistry, 4th year 2025/2026 MSci Physics student in King's College London, London, UK
- Tutorials in Quantum Mechanics (2nd year UG), Spring Term 2025, King's College London, London, UK
- Tutorials in Electromagnetism (2nd year UG), Spring Term 2025, King's College London, London, UK
- Tutorials in Thermal Physics and Properties of Matter (2nd year UG), Autumn Term 2025, King's College London, London, UK
- Tutorials in Mathematical Methods for Physics (2nd year UG), Autumn Term 2025, King's College London, London, UK

Reviewing experience

- Reviewer for J. Phys. B: At. Mol. Opt. Phys., Phys. Rev. A, Phys. Scripta, Chem. Phys. Chem., ACS Photonics, Phys. Rev. Lett.

Presentations and outreach

Invited presentations

- *Structuring light in time and space for efficient chiral sensing*, Invited seminar at Dipartimento di Scienze Chimiche and Farmaceutiche, Università degli studi di Trieste, Trieste, Italy, 18/05/2026
- *Enantiosensitive exceptional points in open chiral systems*, 22nd International Workshop on Pseudo-Hermitian Hamiltonians in Quantum Physics (PHHQP-XXII), Heraklion, Greece, 16/10/2025
- *Chiral topological light for robust enantiosensitive detection of molecular chirality*, SPIE Active Photonic Platforms (APP) 2025, San Diego, California, USA, 03-07/08/2025
- *Chiral vortex light for detecting robust enantiosensitive observables*, Control of Ultrafast Attosecond and Strong Field Processes Using Structured Light (CUPUSL23), Dresden, Germany, 29/06/2023
- *Synthetic chiral light for control of achiral and chiral media*, DPG Spring Meeting of the Section Atoms, Molecules, Quantum Optics and Photonics (DPG SAMOP), Online, 15/03/2022

Oral presentations

- *Structured light for enhanced attosecond chiral sensing*, DPG SAMOP 2026, Mainz, Germany, 02/03/2026
- *Enantiosensitive exceptional points for exceptional detection of molecular chirality*, META 2025, Torremolinos, Spain, 23/07/2025
- *Enantiosensitive exceptional points in open chiral systems*, WE-Heraeus-Seminar: Non-Hermitian and Topological Photonics, Bad Honnef, Germany, 19/06/2025
- *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

- *Vector-vortex structured chiral light for enhanced sensing of chiral molecules*, ICOAM, Graz, Austria, 18/06/2026
- *Enantiosensitive exceptional points of open chiral systems*, ATTO X, Lund, Sweden, 09/07/2025
- *Chiral topological light for detection of robust enantiosensitive observables*, ATTO X, Lund, Sweden, 09/07/2025
- *Encircling exceptional points for enantiosensitive asymmetric population transfer*, Quantum Control of Light and Matter GRC, Newport, Rhode Island, USA, 10/08/2023
- *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 pho-*

toelectron 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

Scientific communication

- *Using a chiral vortex to detect molecular chirality could help identify drug candidates*, Interview in Electro Optics

Languages

Italian (native)

English (fluent)

French (intermediate)

German (basic)

July 10, 2026