Director Department for Microstructured Quantum Matter Max Planck Institute for the Structure and Dynamics of Matter, Hamburg, Germany

Tenure-Track Assistant Professor, Laboratory for Quantum Materials, Institute of Materials, EPFL, Lausanne, Switzerland

CONTACT

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EDUCATION

2008 - 2013
PhD
Thesis: 'The Role of Anisotropy in Iron-Pnictides addressed by Focused Ion Beam sample fabrication'. Advisor: B. Batlogg
Dept. of Condensed Matter Physics, ETH Zurich, Switzerland

2003 - 2008
Diploma in Physics
ETH Zurich, Switzerland

Philip J. W. Moll

RESEARCH

My work is focused on prototyping advanced functionalities that novel materials promise tomorrow with the actual materials available today. We are interested in materials in which electrons fundamentally behave differently than in Copper or Silicon. My group develops fabrication schemes to turn even microscopic crystallites of complex compound materials into micro- and nano-structures of highest quality and study their electronic and magnetic properties. The workhorse tool of our technique is the Focused Ion Beam, which allows us to carve crystalline circuits out of these particles with nanometric precision. With this approach, we go beyond the possibilities of static crystals and tune the quantum states of these materials in extreme and non-linear ways. Most prominently, we apply controlled strain and strain gradients to quantum materials which are impossible to achieve on the macro scale. This allows us to tune correlation landscapes, channel density waves, or create artificial gauge fields in solids. Ultrafast quenching and extreme non-linear currents modify the electronic spectrum and induce novel, meta-stable quantum states.

SCIENTIFIC CAREER

From 2022	**Director, Department for Microstructured Quantum Matter** Max Planck Institute for the Structure and Dynamics of Matter (MPSD), Hamburg, Germany
2018 – 2022	**Tenure-Track Assistant Professor** Laboratory for Quantum Materials, Institute of Materials, EPFL, Lausanne, Switzerland
2015 – 2019	**Independent Max-Planck-Research-Group Leader** Max-Planck-Institute for Chemical Physics of Solids, Dresden, Germany
2014 – 2015	**Postdoctoral researcher** Group Prof. J. Analytis University of California Berkeley, USA
2013 – 2014	**Postdoctoral researcher** Group Prof. B. Batlogg ETH Zurich, Switzerland
2008 – 2013	**Scientific assistant** (during PhD studies) ETH Zurich, Switzerland

FELLOWSHIPS AND AWARDS

2020	**World Economic Forum Young Scientist,** Class of 2020
2018	**Nicholas Kurti Science Prize** "for leading the development of novel micro-structuring techniques, allowing the fabrication of bespoke devices and experiments from complex quantum materials"
2018	**IUMRS – MRS Singapore Young Researcher Award Finalist**
2017 – 2023	**ERC Starting Grant MiTopMat** European Research Council
2014	**ABB Award of the Swiss Physical Society** For outstanding scientific work in all areas of Physics
2014	**Global Young Scientist Summit (GYSS),** Singapore, 2014

2014	**Advanced Postdoc Fellowship** "Uniaxial strain in microstructured quantum matter" Swiss National Science Foundation
2013	**ETH Medal for PhD Thesis** ETH Zurich, Switzerland
2013	**FEI Award** for "outstanding work in the field of electron- and ion-beam applications" Swiss Society for Optics and Microscopy (SSOM)
2013	**Application Note Award** for "an elegant engineering solution for a challenging experiment" Attocube systems AG, Germany

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

From 2018	5 postdocs, 6 PhD students, 5 Master projects Institute of Materials, EPFL, Lausanne, Switzerland
2015 – 2019	3 postdocs, 1 PhD student, 1 Master project Max-Planck-Institute for Chemical Physics of Solids, Dresden, Germany

TEACHING ACTIVITIES

2021 – 2022	**"MSE-438: Materials for superconducting technology"** (Master 1+2) EPFL, Lausanne, Switzerland
2019 – 2022	**"MSE-213: Statistics and Probability Theory for Materials Science"** (Bachelor 3) EPFL, Lausanne, Switzerland
Spring 2020	**Doctoral course: "Materials for superconducting technology"** (cancelled due to COVID-19) EPFL, Lausanne, Switzerland
2008 – 2012	**Scientific assistant during PhD studies** Microteaching lectures for up to 60 students ETH Zurich, Switzerland

FURTHER CONTRIBUTIONS TO THE COMMUNITY

- Lead organizer of the 2020 Aspen Winter Conference "Future Directions in Topological States of Matter: Beyond the single particle picture". My concept expressing the need of the maturing field of topology to devise a roadmap towards new topological phases in strongly interacting systems was selected for funding in this highly competitive conference series. More than 120 participants from all over the world joined.
- Building networks beyond the usual communities is a main activity of mine. I serve in the steering and organizing committees of the "Young Research Leaders in Topology" and the "European FIB Network". The goal of the YRLT is to bring pre-tenured researchers from diverse fields loosely concerned with physical manifestations of topology and to find commonalities across communities. The EU-F-N is a highly interdisciplinary forum joining physics, chemistry, biology, and engineering, both from academia and industry.
- Teaching and openness in science: My team and I have established a completely open atmosphere of transferring all knowhow and skills. This has been very well received in the pre-pandemic time, with guests from MIT, Stanford, Berkeley, LANL, Harvard, UESTC, ETHZ and more.

INSTITUTIONAL RESPONSABILITIES

From 2019
Steering Committee of "European FIB Network" Eu-F-N

2018 –2022
Faculty member
Institute of Materials, EPFL, Switzerland

2018 –2022
Bachelor Student Advisor
Institute of Materials, EPFL, Switzerland

2021 –2022
Organizer of the Materials Institute Seminar Series
EPFL, Switzerland

2015 –2021
National High Magnetic Fields Laboratory User Advisory Committee
From 2020: Vice Chair; 2021: Chair

PUBLICATION STATISTICS (Source Google Scholar)

Total number of peer reviewed publications: 56

h index: 24

total citations: 2.561

Average citation per paper: 46

Highly cited papers (>100 citations): 6

High-impact-journal publications: Nature (2); Science (3); Nature Physics (3); Nature Materials (2); Nature Communications (6); PNAS (1)

ORGANISATION OF SCIENTIFIC MEETINGS

2022
Organizer "European FIB network annual meeting", Hamburg, Germany

2022
Co-organizer MaNEP Meeting 2020
Saas Fe, Switzerland
(COVID: postponed to 2022)

2021
Co-organizer "European FIB network annual meeting", TU Vienna, Austria

2020
Organizer "Future Directions in Topological States of Matter: Beyond the single particle picture", Aspen Winter Conference, USA

2018
Co-organizer of the Conference "Young Research Leaders in Topology"
Weizmann Institute, Israel