

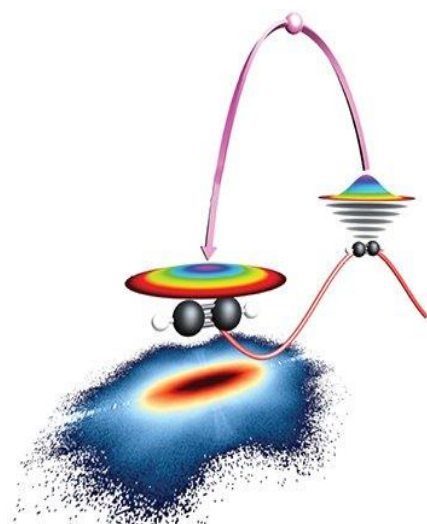
The Max-Born Institute for Nonlinear Optics and Short Pulse Spectroscopy (MBI) conducts basic research in the field of nonlinear optics and ultrafast dynamics arising from the interaction of light with matter and pursues applications that emerge from this research. It develops and uses ultrafast and ultra-intense lasers and laser-driven short-pulse light sources in a broad spectral range in combination with methods of nonlinear spectroscopy.

With its research, MBI fulfills a national mission and is an integral part of the international scientific community. The Max-Born-Institute invites applications for the position

PhD student (m/f/d)

Job profile:

In division A of the Max-Born-Institute (MBI) in Berlin we investigate electronic and nuclear dynamics in atoms, molecules, and clusters in the ultrafast regime of attoseconds (10^{-18} s) to few femtoseconds (10^{-15} s). Processes on these unprecedented timescales represent one of the major new frontiers in contemporary physics.



We are offering a fully funded **PhD project in physics** dedicated to the **experimental investigation of laser-driven electron rescattering in molecules**. In this process, a single electron is extracted from a molecule by laser-induced tunnel ionization, accelerated in the strong infrared field of the laser and driven back to its origin within a fraction of the optical cycle (see image), where it can elastically scatter. Due to the well-defined source of the electron and the locking of the process to the optical laser cycle a high current is achieved at the location of the molecule, comparable to a conventional electron beam. Hence, from analysis of the diffracted, energetic electrons structural information on the molecule can be obtained, such as in conventional electron diffraction, but now with inherent time resolution. Laser-Induced Electron Diffraction (LIED), often described by self-imaging of a molecule by one of its own electrons, is one of the most promising emerging techniques to make the molecular movie. LIED is capable of recording structural changes in molecules, for instance during a chemical reaction, in real time. At MBI we are one of the pioneers of this technique [1,2].

We are looking for a PhD student (m/f/d), to join our team and lead the following scientific projects:

- Determine the structure of a molecule with LIED, using two independent ionization channels, by means of a coincidence experiment recording photoions and -electrons.
- Investigate the role and dynamics of inelastic recattering of the electron with its molecule.
- Follow time-resolved dynamics using electron rescattering in a pump-probe experiment.

The position is embedded in the QUTIF priority program of the Deutsche Forschungsgemeinschaft (DFG). Attendance of its regular workshops is expected. In our laboratory, we use a state-of-the-art Reaction Microscope to detect the full 3D momentum of photoions and -electrons in coincidence, as created in the interaction of a molecular target with a high-repetition rate, cutting-edge OPCPA laser system.

You will work within a team of both young and experienced scientists at MBI, an institute for fundamental science within the Leibniz association and linked to the three Berlin universities. Our institute is located in the buzzing and trendy capital of Germany. Berlin has established itself as a center for arts and creative institutions in Europe and has international reputation for its diverse culture.



**Requirements:**

We are looking for a highly motivated PhD student (m/f/d) holding a Master degree in physics or a related field. Previous experience with molecular physics, ultrafast laser technology, and ion/electron spectroscopy is a plus.

Offer:

The researcher position is available immediately and initially limited to 3 years. The payment is according to the German TVöD salary scheme for scientists in public research institutions (75%).

MBI is an equal opportunity employer and places particular emphasis on fostering career opportunities for women. Qualified women are therefore strongly encouraged to apply. If equally qualified, severely handicapped persons are given preference.

MBI supports the reconcilability of family and working life and is certified as family-friendly by the "family audit".

Please use the button "Apply online" and upload your application with a CV and a description of the research experience, electronically via the MBI online recruiting platform at www.mbi-berlin.de/career. The deadline for applications is **15th March 2020**.

For further information and inquiries please contact Dr. Jochen Mikosch, (jochen.mikosch@mbi-berlin.de).

[1] Schell *et al.*, *Science Advances* **4**, eaap8148 (2018); [2] Karamatskos *et al.*, *J.Chem.Phys.* **150**, 244301 (2019)