

The Friedrich Schiller University Jena is a scientifically recognized university with over 17,500 students. Jena is a young and vibrant university town with dynamic business activities, successful scientific innovation centers and a vibrant cultural scene around a traditional university. The Institute for Physical Chemistry of the Friedrich Schiller University Jena has at the earliest possible date one position as

Doctoral Researcher Position (m/f)

Topic: Modelling and Simulation of the Strong-field Physics of HeH⁺

Since its first experimental observation in 1925, the HeH⁺ molecular ion, the simplest hetero-nuclear molecule, has served as a fundamental benchmark system for understanding principles of molecular formation and electron correlation. HeH⁺ continues to intrigue researchers as the first molecular species to arise in the universe, yet it has mysteriously remained absent in astronomical spectra.

So far, H₂⁺, the simplest molecule, has typically been used as the prototype to understand the dynamics of molecules in strong laser fields. This understanding is then extended to interpret and predict the behavior of more and more complex molecules. However, the dynamics of the simple molecule lacks several fundamental features as these molecules are symmetric, homo-nuclear, and do not have a permanent dipole moment. In stark contrast, HeH⁺ is a two-electron system with a large mass asymmetry, a strong electronic asymmetry, and a permanent dipole moment. Most molecules lie somewhere between the perfect symmetry of H₂⁺ and the extreme asymmetry of HeH⁺. Therefore, knowledge of both is required for the general understanding of laser-induced molecular dynamics necessary to form a foundation from which the behavior of more complex molecules can be predicted.

In frame of this project funded by the German Research Foundation (DFG), we aim at investigating the strong-field driven dynamics of the smallest hetero-atomic molecule HeH⁺. The focus will be to describe and mimic the ionization and fragmentation dynamics of HeH⁺ and its isotopologues (H⁴He⁺, D³He⁺, D⁴He⁺, T³He⁺,...) in different wavelength regimes and pulse forms using semi-classical methods.

This project will be in close collaboration the group of Prof. Dr. Gerhard Paulus (IOQ Jena), where the corresponding experiments will be conducted, and the group of Prof. Dr. Manfred Lein (University Hannover).

Qualification requirements:

- Completed studies of physics, chemistry, mathematics or related disciplines
- Highly motivated and creative personality
- Knowledge of a programming language like Fortran (or C, C++)
- Good understanding of physics is required
- Ability to work in highly inter-disciplinary teams

Main tasks:

- Theoretical modeling and simulation of strong-field atomic and molecular processes
- Utilizing, extending and modifying existing codes on semi-classical dynamics
- Scientific investigations, literature research

- The candidate is expected to participate in a scientific qualification project, e.g. a doctorate works.

We offer:

- An exciting field of activity with creative leeway
- The opportunity to conduct research in an innovative research consortium
- A comprehensive mentoring program under the supervision of several experienced researchers
- Participation in a vivid scientific network, including participation in national and international conferences
- Attractive fringe benefits, e.g. Capital Assets, Job Ticket (benefits for public transport), occupational pensions (VBL)
- the pay scale follows the wage agreements for public employees of federal German states (TV-L E13, 75%)
- university health promotion and a family-friendly working environment with flexible working hours

The position is initially limited to 3 years; an extension is possible. Severely handicapped people are given preference for equal qualifications, aptitude and professional qualifications. Applications with complete application documents must be sent by 31st of December 2018 to:

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If the return of the application documents is desired, a sufficiently stamped return envelope must be enclosed. Please consider our application information: http://www.uni-jena.de/stellenmarkt_hinweis.html. Please also note the information on the collection of personal data on: www.uni-jena.de/Universität/Stellenmarkt/Datenschutzhinweis