

Postdoc Position in Ultrafast X-ray Science



The group for ultrafast- and high-field X-ray science at the University of Nebraska-Lincoln (UNL) has an immediate opening for a **postdoctoral researcher** in the areas of the development and applications of novel ultrafast X-ray sources, nonlinear QED, high-field X-ray science and high-power lasers. The position is initially for one year and can be renewed for up to 2.5 years.

Experiments will be conducted using the PetaWatt laser facility at UNL and X-ray free-electron laser (XFEL) at Stanford Accelerator (SLAC) National Laboratory.

Project Description

Our research focuses on the development and first applications of what might become the next-generation of X-ray sources. We use a novel approach that allows us to shrink the dimensions of the source from the kilometer-scale of a conventional facility to a table-top system. This reduction is due to a recently developed method of electron acceleration based on high-power lasers (laser-plasma accelerator), which we use as driver for our undulator source. The generated X-ray pulses have a duration of only a few femtoseconds which is more than four orders of magnitude shorter than those of current synchrotrons. Due to the inherent synchronization with the driver laser, we can apply these pulses for time-resolved four-dimensional atomic imaging experiments with a temporal resolution that cannot be reached even by state of the art X-ray free-electron lasers (XFELs). This allows us to observe the motion of atoms in both, their natural time and length scales and thus the investigation of fundamental non-equilibrium processes in molecules, chemical reactions or solids. Our developments may culminate in a table-top XFEL with revolutionary impacts on many fields of science, technology and medicine. These brilliant compact X-ray sources promise a wide-spread application in university-scale laboratories.

As driver we are using the Diocles PetaWatt laser facility at UNL, which is in the world-wide unique position to help advance this research field by performing key-experiments which have the potential to critically contribute to its success.

We also use XFELs to investigate the widely unexplored field of high-field nonlinear X-ray optics. In collaboration with the Stanford PULSE institute, we have recently performed a series of the world's first nonlinear X-ray experiments.

Both disciplines are young research fields, where novel smart and creative approaches can lead to breakthrough impacts.

Requirements

We are seeking a candidate with a strong experimental background in laser physics, ultrafast science, X-ray optics or high-field physics. Successful candidates should show self-initiative and be able to independently manage and conduct a research project. They should have performed innovative and original research and should have completed a PhD in Physics, Optics, Electrical Engineering, or related fields within the last years.

Research Setting

The research is conducted by a young, energetic group however within an already established laboratory setting at one of the few PW laser facilities worldwide.

Lincoln, Nebraska is a mid-size city (population: 300k) with the security of a small town. It is the state capital and the home of UNL, the flagship campus of the University of Nebraska. Lincoln offers a lot of cultural attractions and diversity with a college town atmosphere: liberal, young and educated, with nice architecture, lots of good bars and restaurants. It is a very affordable place to live and has been voted as the happiest US city in a [recent Gallup Poll](#).

Contact

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