

FAKULTÄT für PHYSIK
LUDWIG-MAXIMILIANS-UNIVERSITÄT
MÜNCHEN/GARCHING

PHYSIK-DEPARTMENT
TECHNISCHE UNIVERSITÄT MÜNCHEN
MÜNCHEN/GARCHING

Garching Maier-Leibnitz-Kolloquium

Donnerstag, 20.10.2022, 16¹⁵ Uhr

Hörsaal der LMU in Garching, Am Coulombwall 1
Treffen zum gemeinsamen Kaffee 16 Uhr

Dr. Stuart Morris

(University of Warwick)

Simulating highly charged ion beams from laser-solid interactions in the modern PIC code: EPOCH

In a laser beam of 1 micron wavelength, the typical photon energy is around 1 eV, while atomic binding energies can range from 10 eV to many keV. As a result, when these lasers strike metal foil targets, no individual laser photon is capable of ionising a target atom. However, modern laser facilities can reach focused intensities in excess of $1e20$ W/cm², which create photon densities so high that ionisation can proceed through collective effects, which turns the target into a plasma. The complex trajectories of electrons and ions in the laser and charge fields can eventually yield dense, energetic beams of highly charged, heavy ions. However, the source of these ions is difficult to diagnose experimentally, as the interaction occurs on a femto-second time-scale. Computational modelling is also difficult, due to the huge number of particles within the plasma. Fortunately, particle-in-cell (PIC) methods provide a powerful framework for modelling these problems, and the EPOCH code is up to the challenge. This seminar will talk through how PIC codes like EPOCH work, some of the extra physics packages added to the code, and where the heavy ion beams come from in laser-solid interactions.

Hybrid online access via ZOOM:

<https://lmu-munich.zoom.us/j/98457332925?pwd=TWc3V1JkSHpyOTBPQVlMelhuNnZ1dz09>

Meeting ID: 984 5733 2925

Passcode: 979953

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