Contribution ID: **69** Type: **not specified**

# Non-equilibrium heating of a plasma to million-Kelvin temperature

Intense x-ray pulses from x-ray free-electron lasers (XFELs) can produce matter at extreme conditions. This can be used to gain insight on stellar and planetary interiors or on high-energy density plasmas in inertial confinement fusion. Because of the ultrashort pulse duration, XFEL-produced plasmas are initially out of equilibrium, and the ensuing thermalization dynamics are not well understood. Recently, an experiment conducted at the European XFEL demonstrated that a neon plasma was formed by an XFEL pulse with an electron temperature approaching 1 keV, corresponding to about 1 million Kelvin. The DESY summer student working on this project will have the opportunity to learn the basics of x-ray-matter interactions and plasma physics. The student will become familiar with the XATOM and XMDYN codes developed at DESY. These codes allow the student to perform non-equilibrium simulations of neon plasma formation, in order to explore how to reach such extreme temperatures and to determine the time scale on which thermalization between electrons and ions unfolds.

## Group

FS-CFEL-3

## Project Category

A6. Theory and computing

## Special Qualifications

## DESY Site

Hamburg

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