Call for 2015 DESY-ONACPR Fellowship Applicants

## **Code: DESY/2015/8**

## **Research Laboratory: DESY**

### Division/Group: FS-CFEL-3 (group leader: Prof. Dr. R. Santra)

### Supervising scientist: Prof. Dr. B. Ziaja-Motyka Email/Phone: ziaja@mail.desy.de /

### +4940 8998 6303

### Research Field: solid state and plasma physics

**Position:** Postdoctoral Researcher

**Research Area:**

Free-electron-lasers (FELs) open new horizons in studying the structure of matter. In particular, their intense radiation, emitted in pulses of ultrashort duration, may probe dynamic states of matter (phase transitions and reactions occurring within tens of femtoseconds) and generate extreme states of matter. Our group at the Center for Free-Electron Laser Science (CFEL) develops theoretical and computational tools to predict the behavior of matter exposed to intense electromagnetic radiation. In one area of our research activities, we study the time evolution of bulk solids from an initial far-from-equilibrium state, prepared by an X-ray FEL pulse, until lattice thermalization sets in.

Depending on the absorbed dose, intense X-ray radiation may induce structural transitions within the solids or, at high dose, trigger their transition to warm-dense-matter or plasma state. In order to understand the transition mechanisms on a microscopic level, we develop dedicated simulation tools, applicable for out-of-equilibrium states. Our tools are hybrid, i.e., they combine various techniques such as molecular dynamics, Monte-Carlo approach, Boltzmann kinetic approach with ab-initio tools to follow electronic and atomic structure changes. They give predictions on experimentally measured observables such as transient optical properties, diffraction patterns etc., identifying signatures of the underlying processes.

This challenging activity is interdisciplinary, at the border of atomic, solid state, and plasma physics, with implications for current and planned experiments with intense femtosecond X-ray sources. It therefore involves synergistic collaboration with various members of our group and with experimental teams.

**Specific Requirements:**

Interested candidates with excellent grades holding a Ph.D. in theoretical physics or related fields are invited to apply. Strong programming skills, experience in analytical calculations and a solid mathematical background are mandatory. Candidates are requested to provide the following documents (in English): (i) curriculum vitae, (ii) list of publications, (iii) copies of masters/diploma and Ph.D. certificates, (iv) letter(s) of reference.

**Work Place:** Hamburg

**Earliest Start:**  December 2015

**Language Requirement:** (please note that we require for all candidates proven records of English, e.g. CAE certificate)

Good knowledge of English

**Further Remarks:**