

2017 Helmholtz – OCPC – Programme for the involvement of postdocs in bilateral collaboration projects

PART A

Title of the project: Development of gas-/cluster targets for laser-induced HHG production

Helmholtz Centre and institute:

Forschungszentrum Jülich, Peter Grünberg Institut - Electronic Properties (PGI-6)

Project leader: Prof. Claus M. Schneider, Prof. Markus Büscher

Web-address: www.fz-juelich.de/pgi/pgi-6/DE/Home/home_node.html

Description of the project:

The Jülich Short-pulse Particle Acceleration and Radiation Center (*JuSPARC*) that is currently being set-up at the Forschungszentrum Jülich will enable world-class research with short-pulsed (femtosecond) photon and particle beams. It will provide novel means to investigate and understand ultrafast and non-linear phenomena in condensed matter, material, information science and energy research. A large versatility in spectroscopy, microscopy and scattering experiments is obtained by generating and exploiting photon pulses in a wide range of photon energies from the visible to the hard X-rays.

At the heart of *JuSPARC* several fs-pulse lasers with highest possible repetition rates will drive targets in which photons with energies of a few 100 eV can be produced. They serve as core units for optimized up-conversion techniques generating the light for the respective experiments. In order to achieve highest possible X-ray fluxes, innovative target concepts, like gas capillaries, gas jets in vacuum, as well as gases enriched with nm-sized clusters are to be used.

At a later stage the extension of *JuSPARC* to higher pulse energies at maximum achievable repetition rate is foreseen. Then Photons with energies in the keV range can be produced and delivered to users.

The proposed project aims at the optimization, design and construction of a target system – to be used at *JuSPARC* or at a comparable facility in China – which maximizes the X-ray flux and allows for reliable and stable operation in the framework of a user facility.

Description of existing or sought Chinese collaboration partner institute:

Collaboration already exists with the CAS Shanghai Institute of Optics and Fine Mechanics (SIOM) which is specialized in high-power laser technology, strong field physics, high-intensity optics, information optics, quantum optics, laser and optoelectronic devices, and optical materials, etc. SIOM's State Key Laboratory of High Field Laser Physics is engaged mainly in laser physics, particularly high field laser physics and related pioneer researches on new frontiers, including the new generations of ultra-intense, short pulse laser sources.

The expertise of SIOM with high power lasers complements that of the Forschungszentrum where, within the *JuSPARC* facility, systems operating at maximum repetition rate will be used. This existing collaboration is an example of best practice in joining forces between German and Chinese research institutes.

We welcome collaboration with any Chinese institution that deals with the same subjects and shares our scientific interests.

Required qualification of the post-doc:

- PhD in laser or plasma physics
- Experience with femtosecond Lasers and their use for x-ray production
- Additional skills in targetry

PART B**Documents to be provided by the post-doc:**

- Detailed description of the interest in joining the project (motivation letter)
- Curriculum vitae, copies of degrees
- List of publications
- 2 letters of recommendation

PART C**Additional requirements to be fulfilled by the post-doc:**

- Max. age of 35 years
- PhD degree not older than 5 years
- Very good command of the English language
- Strong ability to work independently and in a team