

2017 HGF – GSI – OCPC – Programme

for the involvement of postdocs in bilateral collaboration projects

Part A:

Title of the project:

XUV and X-ray microscopy with laser based radiation sources

Helmholtz Centre and institute:

Helmholtz Institute Jena and
Institute of Optics and Quantum Electronics, University of Jena, Germany

Project leader:

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Web-address:

http://www.physik2.uni-jena.de/qe/Forschung/Projekte_QE_eng.html
(new webpage under construction will be online soon)

Department: (at the Helmholtz centre or Institute)

Institute of Optics and Quantum Electronics

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Description of the project (max. 1 page):

Optical microscopy is the enabling technology for exploring micrometer sized structures. Smaller objects cannot be resolved, because the resolution is limited by wavelength of the illuminating light source. With the availability of synchrotrons and more recently x-ray free-electron lasers delivering coherent short wavelength radiation, imaging with nanometer resolution has become now feasible. Despite many scientific breakthroughs, a wide-spread use was prohibited by the availability of the large scale facilities. So laboratory sources based on nonlinear frequency conversion of visible/near-IR laser pulses into the XUV regime gained a lot of attention. Here especially high harmonic generation has been extensively studied allowing the generation of coherent short wavelength radiation in the XUV. Spatially coherent hard x-ray radiation can be e.g. generated with a laser based betatron radiation emitting a continuum. These sources are not only compact, but offer also the possibility for time-resolved microscopy, with a temporal resolution in the femtosecond range. In the

frame of the research stay this technology should be transferred from fundamental science to applied science and thus transform it into a versatile widely usable tool also for non-optical experts in other scientific fields. Another possibility for the work will be to conduct basic research requiring atomic spatial and temporal resolution. Among the applications are identifying cancer cells with high resolution microscopy or study the energy transfer in nanostructured materials with time resolved imaging.

Description of existing or sought Chinese collaboration partner institute (max. half page):

The partner should have experience in at least one of the following topics: Experience in ultrafast optics, i.e. development, operation and application of high (average and peak) power femtosecond laser systems; especially using such lasers for the generation of coherent short wavelength radiation in the XUV and x-ray range; spectroscopy and imaging with the laser based sources with high temporal and spatial resolution; lensless microscopy using short wavelength radiation (using lab sources or large scale facilities like synchrotrons,) and here we are interested in realizing experimental setups or developing advanced reconstruction codes

Required qualification of the post-doc:

- PhD in Physics, Optics
- Experience with Imaging, X-ray optics, laser driven short wavelength sources, microscopy, ultrafast lasers
- Additional skills in interdisciplinary research, English, scientific writing

Part B:

Documents to be provided by the post-doc:

- Detailed description of the interest in joining the project (motivation letter)
- Curriculum vitae (CV)
- copies of degrees as a proof of education qualification
- List of publications (if any)
- 2 letters of recommendation

Part C:

Additional requirements to be fulfilled by the post-doc:

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