



2025 Helmholtz – OCPC – Programme for the involvement of postdocs in bilateral collaboration projects

PART A

Title of the project:

THz generation at PETRA IV: Feasibility study of adiabatic bunch compression with wakefields of Cherenkov waveguides

DESY Division & Group:

M-MPY

Project leader/supervisor:

Sergey Antipov; sergey.antipov@desy.de; +49 40 8998 5328

Web-address:

www.desy.de, sr.desy.de

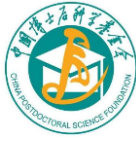
Programme Coordinator:

Martin Sandhop; martin.sandhop@desy.de; +49 40 8998 4172

Description of the project (max. 1 page):

DESY also working on design of a fourth generation 6 GeV light source PETRA IV, which will become the laboratory's flagship facility, serving a wide range of scientific applications from biology to chemistry to material science. At the same time, generation of intense THz generation is gaining popularity for pump-probe experiments. It has been predicted that one can use a corrugated structure to drastically enhance the THz content in the bunch form factor of a beam stored in a light source (*JINST* **18** P07024, *PRAB* **27** 112803). A detailed impedance model of such a device would be crucial to assess its real-world performance in the ring in the presence of other impedance sources, synchrotron radiation, and errors.

The successful applicant will work closely with the PETRA IV design team to design a concept of a passive wakefield bunch compressor for coherent THz generation. The tasks will include designing the structure and necessary matching optics, modelling its performance and optimizing its parameters based on the input from potential users, and proposing and prototype experiment to confirm the performance at a THz beamline at European XFEL or in a storage ring in collaboration with external partners, such as KIT or BESSY.



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

<insert text here>

Required qualification of the postdoc:

- PhD in Physics
- Demonstrated proficiency in numerical modeling and simulation
- Experience with standard accelerator design and simulation tools:
MAD-X, Elegant, Ocelot, or similar
- Ability to collaborate across multiple teams
- Familiarity with FELs and beam impedance simulations is a plus
- Language requirement: good knowledge of English, both written and oral