



## 2023 Helmholtz – OCPC – Programme for the involvement of postdocs in bilateral collaboration projects

### PART A

**Title of the project:**

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Laser-plasma injector for PETRA IV synchrotron light source

**Helmholtz Centre, division:**

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DESY-M

**Project leader:**

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Sergey Antipov

**Contact Information of Project Supervisor: (Email, telephone)**

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**DESY Group:**

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MPY

**DESY-OCPC Programme Coordinator (Email, telephone and telefax)**

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**Description of the project (max. 1 page):**

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DESY is preparing an upgrade of its synchrotron light source PETRA to a 4th generation light source PETRA IV. Providing ultra-low-emittance electron beams at 6 GeV, PETRA IV will be a substantial upgrade in terms of beam quality (two orders of magnitude smaller beam emittance) with respect to the present machine. The exquisite beam quality and performance of PETRA IV will enable a new X-ray source with unprecedented spatio-temporal resolution.

As a part of the PETRA IV project, DESY is pursuing an R&D towards laser-plasma-based injectors, which hold a promise of compact and efficient electron sources in the energy range of up to several GeV. Based on the positive operational experience of the LUX laser-plasma facility a conceptual set-up has been proposed to provide high-quality beams for injection into storage rings.



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The successful applicant will work closely with the PETRA IV design team as well as with the laser and plasma physics groups on advancing the design of the PETRA IV plasma injector and its integration into the PETRA IV injector chain. The tasks will include designing transport beamlines and injection system for the plasma beams, optimising the plasma accelerator, and performing comprehensive start-to-end simulations of its performance.

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

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**Required qualification of the postdoc:**

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- 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
  - Additional experience in plasma simulation is a plus
  - Language requirement: good knowledge of English, both written and oral
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