



2026 Helmholtz – OCPC – Programme

for the involvement of postdocs in bilateral collaboration projects

PART A

Title of the project:

Energy-filtered electron ptychography of soft matter

Helmholtz Centre and/or institute:

Forschungszentrum Jülich

Project leader:

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Department: (at the Helmholtz centre or Institute)

Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons

Programme Coordinator (Email, telephone and telefax)

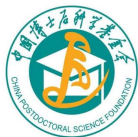
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Description of the project (max. 1 page):

Electron ptychography, utilizing 4D-STEM datasets for computational phase retrieval, is particularly advantageous for characterizing soft matter and organic-inorganic hybrid materials due to its ability to deliver high-resolution quantitative imaging while minimizing beam damage and enhancing contrast for low-atomic-number materials. Soft matter often forms thick assemblies, where multiple scattering and inelastic events dominate. In combination with multi-slice reconstruction and energy filtering, electron ptychography can model propagations through thicker specimens, enhance reconstructed image contrast and fidelity, and enable 3D volumetric reconstruction with nanometre depth resolution and atomic lateral resolution. In addition, energy filtered-electron ptychography can naturally pair with techniques such as vibrational EELS, providing insights into electronic properties or bonding in soft matter. In this project, the candidate is expected to develop relevant experimental workflow using a post-filter latest generation event-driven detector, advance reconstruction algorithms for quantitative and wider spatial frequency phase retrieval, and apply this to a few soft matter systems, such as polymers, covalent organic frameworks, and cellular structures.

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

The host German institute has frequent academic exchange with Tsinghua University, Beijing University of Technology, City University of Hong Kong, Xi'an Jiaotong University, Fudan University, and ShanghaiTech University. Applicants from all these universities, especially with strong experience on soft matter materials and/or electron ptychography, are highly welcome.



Required qualification of the postdoc:

- PhD in materials science, physics, chemistry or a related discipline
- Experience with advanced transmission electron microscopy
- Additional skills in computational imaging and ptychography
- Very good command of the English language