



2026 Helmholtz – OCPC – Programme for the involvement of postdocs in bilateral collaboration projects

PART A

Title of the project:

AI-Driven Multimodal Microscopy Analysis for Cellular Phenotyping

Helmholtz Centre and/or institute:

Helmholtz Munich, Institute of AI for Health

Project leader:

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Description of the project (max. 1 page):

We will develop AI methods to analyze diverse microscopy modalities, including brightfield, fluorescence, and MALDI imaging, across cell cultures and human tissue samples. Our goal is to extract rich, integrated representations of cell composition, morphology, and molecular profiles (gene and protein expression) by leveraging and advancing foundation models at the patch and single-cell level. A central focus is building multimodal embedding frameworks that unify heterogeneous imaging data for downstream clinical and biomedical tasks such as disease classification and treatment response prediction. The postdoc will work in close collaboration with experimental partners within an established lab-in-the-loop pipeline featuring robotic automation, opening avenues to explore reinforcement learning and agentic AI for adaptive experimental design. This position sits at the intersection of computer vision, multimodal AI, and biomedical discovery, offering unique opportunities to shape next-generation tools for AI-driven cell biology and pathology.



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

The project seeks collaboration with a leading Chinese research institution with demonstrated strength in biomedical AI, computational biology, and medical imaging. Specifically, the collaboration targets groups at **Fudan University** (Shanghai) and/or **Sun Yat-sen University** (Guangzhou/Shenzhen), both of which have established international reputations in cancer biology, clinical data science, and AI-driven diagnostics. Additional consideration is given to groups within the **Chinese Academy of Sciences — Shanghai Institute of Nutrition and Health (CAS-SINH)**, which hosts the CAS Key Laboratory of Computational Biology and has a strong track record of civilian biomedical research and international open-science collaboration.

Required qualification of the postdoc:

- PhD in Computer Science, Biomedical Engineering, Physics, or a related field with a strong focus on machine learning and image analysis
- Experience with deep learning for image processing, including segmentation, classification, and representation learning on microscopy or medical imaging data; hands-on experience with foundation models and self-supervised learning is highly desirable
- Additional skills in multimodal data integration, vision-language or cross-modal embedding methods, and reinforcement learning or agentic AI frameworks; familiarity with biological or clinical data (e.g. pathology, cytology, spatial omics)
- Language requirement: Proficiency in English (written and spoken) is mandatory; German is not required but advantageous for collaboration within the clinical partner network