



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

PART A

Title of the project:

Impact of TPC Readout on Jet Flavour Tagging at Future Higgs Factories

DESY Division & Group:

FH-FTX

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Description of the project (max. 1 page):

Highly efficient and pure identification of the jet flavour and charge, not only for b- and c-, but also for s- and u-/d- and gluon jets, is a crucial ingredient to many physics targets of a future electron-positron collider for precision studies of the Higgs boson, the top-quark and Z- and W-bosons. The ability of the planned experiments to measure the specific energy loss in a gaseous tracking device like a Time Projection Chamber (TPC), in order to separate e.g. kaons and protons from pions, is known to be an important ingredient. The high rates expected at the lower energy runs of future circular colliders like CEPC or FCC-ee are challenging for TPCs with classical pad readout and instead require pixelated readout. This, in turn, could also improve the determination of the specific energy loss, for instance via cluster counting. Goal of the project is to develop a realistic reconstruction algorithm for a pixel TPC and to integrate it into the full, key4hep-based simulation and reconstruction chain of typical Higgs factory detectors, e.g. ILD. Then, the improvement with respect to identifying the jet flavour and charge and the impact on a challenging physics target, for instance the measurement of the branching fraction of $H \rightarrow s\bar{s}$ will be evaluated.



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

IHEP is the flagship institute of Particle Physics Research at China. It could be the host institute of the Circular Electron Positron Collider, and it also support the promotion of other electron positron Higgs factories.

IHEP has strong expertise on the advanced reconstruction and detector technologies w.r.t. the proposed topic. IHEP has been an active member of the TPC, and the partner research, Manqi RUAN, is not only expertise in Particle Flow reconstruction, but also realized the concept of Jet Origin Identification that could in principle identify jets generated from 11 different coloured SM particles: all kinds of quarks except top and anti-top, plus gluons. Jet Origin Identification could significantly enhance the discovery power of electron positron Higgs factories, especially with future development and optimization of relevant detector technology and advancement of physics studies and algorithm development.

Required qualification of the postdoc:

- PhD in Experimental Particle Physics
- Experience with detector design and/or reconstruction algorithms for collider experiments
- Excellent communication and team work skills
- Fluent in English

