# Data and Metadata Processing Workflow for Multi Dimensional Photoemission Spectroscopy

Rapidly increasing development of accelerator-based light sources like synchrotron radiation or free-electronlaser (FEL) facilities and detectors have brought photoemission spectroscopy to a new regime in data acquisition. Data streams resolving each individual photoelectron event enable correlation of each detected electron to the full state of the experimental apparatus, allowing drift and jitter corrections. This increases the quality and control over acquired data at the cost of complexity in data post-processing and data size.

We developed a distributed workflow pipeline which takes advantage of single event resolution to correct and calibrate Multi-Dimensional Photoemission Spectroscopy (MPES) data and generate an open-source data structure ready for analysis and storage with complete metadata description. The post-processed data is stored in the NeXus format, following metadata definitions which are built as a community effort. A universal set of descriptors for MPES is inherited by the application definitions for the single experiment specific datastructures (trARPES, spin-ARPES, nanoARPES, etc.).

The flexible structure of the single-event data-frames, recorded together with the experiment-agnostic workflow and unified metadata descriptors, allow this pipeline to be applied to different experimental setups, from table-top to large scale facilities, enabling not only sharing of advanced analysis and data visualization methods within

a large community, but also following the F.A.I.R. principles of scientific data management.

During the training period, the candidate will take part in two beamtimes at the free-electron laser FLASH, as well as be involved in laboratory-based experiments. The proportion of typical daily work will be distributed as follows: "physics" –20 %, "computing" –70% and "engineering" –10%.

Since this multi-dimensional data are produced during real experiments, candidates with a focus on the area "A1: Solid-state physics and nanoscience (application oriented)" or "A2: Molecular science (application oriented)" are also very welcome to apply.

#### Field

B2: Data processing (software-oriented)

## **DESY Place**

Hamburg

## **DESY Division**

FS

## **DESY Group**

FS-FLASH-O

## **Special Qualifications:**

Experience in programming, good team skills, good English language skills.

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