

Operation of Photo Electron Spectrometers for Photon Diagnostics at the European X-ray Free Electron Laser

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Angle resolved photo-electron spectrometers with micro-channel plate detectors and combined with fast digitizer electronics are versatile and powerful devices for providing both soft and hard X-ray non-invasive single shot photon diagnostics at MHz repetition rate X-ray free-electron lasers.

Hard X-ray beamlines imposes specific design challenges due to poor photo-ionization cross-section and very high photo-electron velocities.

Furthermore, recent advancements in machine learning enables resolution enhancement by training the photo-electron spectrometer together with an invasive high resolution spectrometer which generates a response function model.

Primary author: LAKSMAN, Joakim (European XFEL)

Presenter: LAKSMAN, Joakim (European XFEL)

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