MECHANICAL DESIGN AND INTEGRATION OF THE SXP SCIENTIFIC INSTRUMENT AT THE EUROPEAN XFEL

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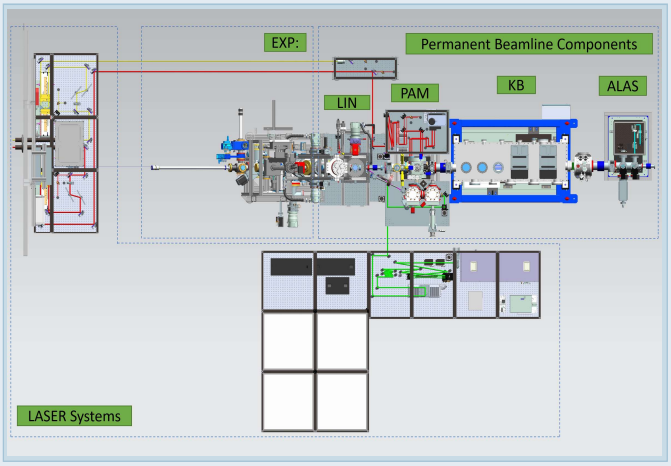
Abstract / Introduction

The European XFEL provides femtosecond X-ray pulses with a MHz repetition rate in an extended photon energy range from 0.3 to 30 keV. Soft X-rays between 0.3 and 3 keV are produced in the SASE3 undulator system, enabling both spectroscopy and coherent diffraction imaging of atoms, molecules, clusters, ions and solids. The high repetition rate opens the possibility to perform femtosecond time-resolved photoelectron spectroscopy (TR-XPES) on solids. This technique allows the simultaneous understanding of the evolution of the electronic, chemical and atomic structure of solids upon an ultrafast excitation. The realization with soft X-rays requires the use of MHz FELs. In this contribution, we present the mechanical design and experimental realization of the SXP instrument.

The main technical developments of the instrument components and the TR-XPES experimental setup are described.

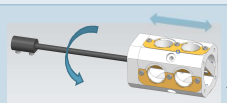
The SXP Scientific Instrument



SXP Beamline Components

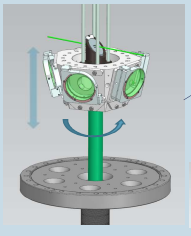
- ALAS – alignment laser system;
- KB – Kirkpatrick–Baez X-ray focusing mirror system;
- PAM – photon arrival time monitor;
- LIN – laser in-coupling unit;
- TR-XPES – time-resolved X-ray photoelectron spectroscopy;
- Laser – laser system

LIN Module

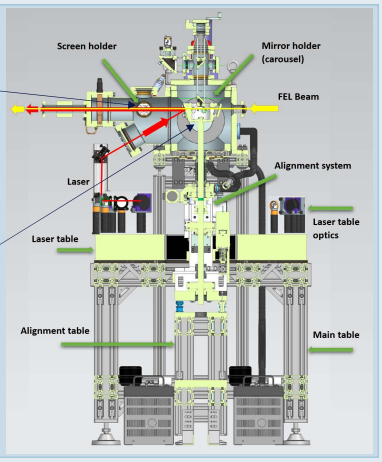


Screen holder
Linear movement - 150mm

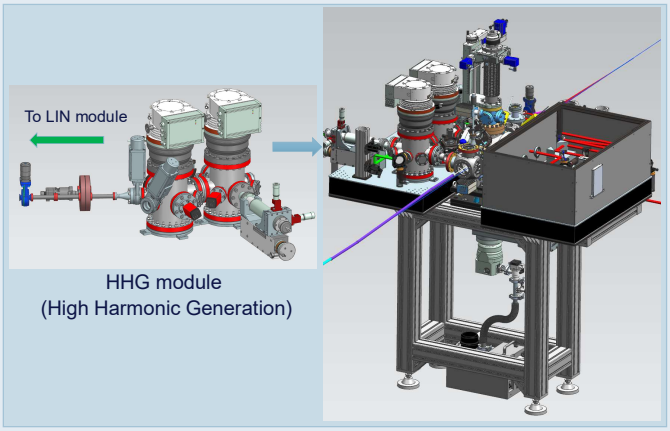
Mirroe holder - carousel



Tip-Tilt-Mirror Mount

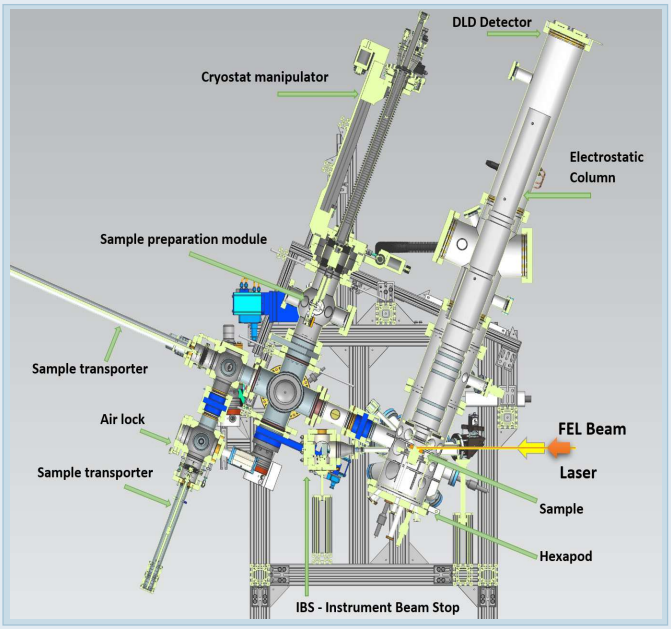


PAM Module and HHG source

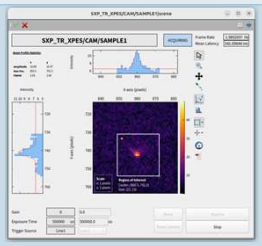


HHG module
(High Harmonic Generation)

TR-XPES station



Commissioning results



Focused FEL beam @ TR-XPES

PEEM image with the PES spectrometer