

Contribution submission to the conference Erlangen 2018

The Small Quantum Systems - SQS Instrument at the European XFEL — ●PATRIK GRYCHTOL, ALEXANDER ACHNER, THOMAS BAUMANN, REBECCA BOLL, ALBERTO DE FANIS, SASCHA DEINERT, MARKUS ILCHEN, TOMMASO MAZZA, JACOBO MONTANO, YEVHENIY OVCHARENKO, NILS RENNHACK, RENE WAGNER, PAWEL ZIOLKOWSKI, and MICHAEL MEYER — Small Quantum System Group, European XFEL GmbH, Holzkoppel 4, 22869 Schenefeld

This contribution presents the Small Quantum System (SQS) scientific instrument, which is one of six experimental end stations at the European XFEL. This experimental platform is designed for investigations of atomic and molecular systems, as well as clusters, nano-particles and small bio-molecules. It is located behind the SASE3 soft x-ray undulator, which will provide horizontally polarized FEL radiation in a photon energy range between 260 eV and 3000 eV (4.8 nm to 0.4 nm) with 0.1 to 2×10^{14} photons per pulse and up to 27000 pulses per second. Two high-quality elliptical mirrors in Kirkpatrick-Baez configuration will focus the FEL beam to a FWHM spot size of approximately 1 μm diameter. This is going to result in an intensity of more than 10^{18} W/cm^2 within the interaction region, which will allow for studying non-linear multi-photon processes. Furthermore, the short FEL pulse duration between 2 fs and 100 fs in combination with a synchronized optical femtosecond laser will enable time-resolved studies of dynamic processes, thus capturing the motion of electrons and nuclei with unprecedented resolution in space on ultrafast time scales.

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