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Status and science program of the European XFEL

W. Gawelda* on behalf of the European XFEL GmbH

European XFEL GmbH, Albert-Einstein-Ring 19, 22761 Hamburg, Germany

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*e-mail: wojciech.gawelda@xfel.eu

The European X-Ray Free-Electron Laser (European XFEL) is currently under construction in the Hamburg metropole area, Germany. First electrons have been generated in the laser-driven injector and commissioning of the injector with beam will commence in autumn 2015. The production and the installation of the main superconducting accelerator, provided to a large extent through contributions by partners from a large number of countries, is in full swing. The 91 undulator segments to be installed for the various FEL sources have been produced, tested and are ready for installation. The challenging X-ray optics and diagnostics elements are under procurement and first components have been installed in the tunnels.

At the same time, the design of the scientific instruments is largely complete and the installation has started. This important activity will continue until the start of operation. Further important developments concern the X-ray detectors, synchronized optical lasers, sample environments and the data acquisition and storage systems.

By summer 2016 the accelerator construction and installation will be completed and commissioning with beam will be started at electron energy of 17.5 GeV. By the end of 2016 the electron beam and the undulators shall be ready for first generation of FEL radiation. In 2017 the commissioning of the electron beam, the undulator and FEL operation, and of the science instruments will continue. The three FEL sources and the six science instruments will be taken into operation in the sequence SASE1 – SASE3 – SASE2 over a period of about four to six months. In parallel, in 2017 first user experiments will be performed. Full performance of accelerator, FEL radiation and science instruments shall be reached in 2018. It is currently planned to increase the hours for accelerator operation dedicated to the user program from 1000 hrs in 2017, over 2000 hrs in 2018, to the final 4000 hrs in 2019.

In the presentation the current layout of the facility and of the scientific instruments will be discussed. Major instrumentation efforts will be presented and an outlook to the commissioning of the facility and the initial science program will be provided.