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The Detector Development Program for the European X-ray Free Electron Laser

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The European X-ray Free Electron Laser (XFEL) will provide as-yet-unrivaled peak brilliance and ultra-short pulses of spatially coherent X-rays with a pulse length of less than 100 fs in the energy range between 0.25 and 25 keV. The high radiation intensity and ultra-short pulse duration will open a window for novel scientific techniques and will allow to explore new phenomena in biology, chemistry, material science, of matter at high energy density, in atomic, ion and molecular physics. The European XFEL will provide six different user accessible experiment stations which will be optimized for different scientific applications.

The variety of scientific applications and especially the unique XFEL time structure will required adequate instrumentation to be developed to exploit the full potential of the light source. In 2007 the European XFEL GmbH started three independent multi-national detector development programs, with the primary goal to overcome the technological challenges for imaging detectors given by the XFEL burst mode frame rate and the required high dynamic range. I will present a summary of requirements for detectors at the European XFEL and the status of the European XFEL detector development projects, which includes large area ultra-fast 2D imaging detectors and 1D and 2D detectors for, e.g., spectroscopy applications. I will provide an overview and outlook over the forthcoming 4 years long implementation phase of the project with respect to detector R&D, detector performance optimization, integration, and commissioning.

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