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X-Ray Free-Electron Lasers: Beam Diagnostics, Beamline Instrumentation, and Applications II

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Editors

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Introduction

The conference *X-Ray Free-Electron Lasers: Beam Diagnostics, Optics, and Applications II* took place in San Diego, California on August 18-19, 2014. The first conference with the same title was held in 2012.

The field of X-ray free-electron lasers (FEL) continues to develop at a rapid pace. Several facilities have been operating for a number of years such as the hard X-ray FELs, the Linac Coherent Light Source (LCLS) at Stanford (since 2009), and the SPring-8 Angstrom Compact FEL, SACLA in Japan (since 2011). FLASH I at DESY in Germany (since 2005), and the Fermi at Elettra in Italy (since 2011) operate in the VUV and soft X-ray range. Several other FEL facilities are under construction such as the European XFEL (planned operation in 2016), the Swiss FEL (2016), and the Korean FEL (2016). In addition, facility expansion projects are underway for FLASH II (first light in August 2014) and LCLS-II with vastly expanded capabilities.

X-ray FEL sources are known for their unique beam properties providing short pulses in the sub tens femtoseconds range with up to 10^{13} photons and transverse coherence from the UV to over 10keV photon energy, offering great potential for exploring new scientific possibilities in ultrafast science. These unparalleled beam properties also present unique challenges for beam optics, diagnostics, detectors, and timing requirements for synchronization techniques with optical lasers for pump-probe experiments.

The conference captures this rapid development in a new field and spans topics from facility updates, optical components, instrumentation, beam diagnostics to optical lasers, methods and technique development, novel detectors, applications, and simulations.

This year's contributions showed a strong emphasis on optics with a number of different designs for split and delay devices. These are very challenging instruments requiring long term projects. Significant progress has also been made in controlling the FEL beam such as implementing seeding schemes, changing the state of polarization and thus providing exciting new opportunities for experiments. Various updates on facilities and individual beamline instruments were included in the program.

We gratefully acknowledge SPIE for their support and excellent organization of the conference. We also thank the Program Committee for their ongoing support in the program organization, and the session chairs for their help in running the conference. Most importantly, we thank the many participants for their significant scientific contributions to the 2014 meeting.

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