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Channeling of Electrons and Positrons at SLAC

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Since 2013, several key experiments have been performed at SLAC investigating channeling of positrons and electrons in bent crystals, the latter in an energy range from 3 to 20 GeV, using the FACET and the ESTB beam facilities. Using a Ferrara-made bent Si (110) crystal these experiments have measured channeling parameters in a little-explored energy range and have investigated the quasi-channeling oscillations predicted by Sytov et al. Quantitative measurements provide data suitable to benchmark simulations and, e.g., design crystal-based beam collimation systems. Some effects, like the apparent independence of the dechanneling length on beam energy, are surprising and, while consistent with simulations, have so far been difficult to describe with a simple analytic model. More recently, the experiments have shifted towards studying the gamma-ray emission by high-energy electrons passing through crystals.

The SLAC facilities are presently undergoing changes related to LCLS-II construction. I will end my presentation with an outline of the plans for the new facilities and the ramification for the crystal program.

Primary author: Dr WIENANDS, H.-Ulrich (Uli) (Argonne National Laboratory)

Presenter: Dr WIENANDS, H.-Ulrich (Uli) (Argonne National Laboratory)

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