

Picosecond Pump and Probe Experiments with CCD Detectors

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The transient structure of molecules in chemical reactions is determined by time resolved x-ray diffraction from either crystals or liquids. The experiments are done using pump and probe: ultrashort laser pulses (0.1 - 1.0 ps) excite a sub-set of molecules in the sample and delayed, 100 ps long x-ray pulses from the synchrotron, record the diffraction at a given delay. By varying the delay we can follow how molecules change shape and composition on the picosecond to the millisecond time scale. The diffracted data is recorded on a conventional CCD area detector. We will discuss how the CCD detector is used in these experiments, and try to define a future CCD detector for pump and probe. The potential gain in future high-DQE, high-speed CCD cameras will be compared to potential gains in future undulators, lasers and the low emittance lattice.