AMO/XSD seminar
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Tuesday, Feb 19 at noon in 432/C010.

Abstract:

Probing and reconstructing transient one-dimensional crystalline strains using time-resolved x-ray diffraction

Since the late 1990s, ultrafast x-ray pulses have been used to probe impulsive strains propagating in the bulk of optically opaque materials. Time-resolved x-ray diffraction has been proven to be a very powerful tool for visualizing transient one-dimensional crystalline strains, ranging from crystal growth to shockwave production.

In this presentation, I will describe a series of time-resolved x-ray diffraction experiments that visualize transient strain formation from nanometer-scaled laser-excited metallic films. Utilizing a table top picosecond x-ray source in conjunction with a high-power optical laser system, the resulting optical pump/x-ray probe spectra reveal that the spatiotemporal structure of the transient acoustic pulse is bipolar with acoustic wave-vectors up to inverse of the film thickness. In addition, I will also discuss the real-world constraints that place limits on the validity of the reconstructed transient acoustic pulse.