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Operational optimizations for TES detectors at a femtosecond X-ray laser

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A large array of Transition-edge Sensors (TES) is currently in development as an X-ray spectrometer for the Linac Coherent Light Source II (LCLS-II) at SLAC National Laboratory. LCLS-II is a fast (100 KHz) pulsed X-ray laser that will be almost 1000x brighter than its predecessor, LCLS-I. The combination of high-throughput TES X-ray detectors with this high-luminosity light source will enable us to study the dynamics of chemical reactions with unprecedented resolution. As part of the development process, it has been critical to understand the optimal way to operate a TES detector under extremely high photon fluxes with short pulse times. We will describe the fundamental challenges of pairing a slow microcalorimeter such as the TES with a bright ultrafast X-ray source, and creative solutions to maximize the science reach of LCLS-II. Detailed science projections will be presented along with a comparison to existing X-ray detectors.

Less than 5 years of experience since completion of Ph.D

Y

Student (Ph.D., M.Sc. or B.Sc.)

Y

Primary authors: TITUS, Charles (Stanford); LI, Dale (SLAC); Dr CHO, Hsiao-Mei (SLAC National Accelerator Laboratory); LEE, Sang-Jun (SLAC); MORGAN, Kelsey (University of Colorado Boulder); SWETZ, Daniel (NIST); WESSELS, Abigail (University of Colorado Boulder); ULLOM, Joel (NIST/University of Colorado); IRWIN, Kent (Stanford)

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