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## Topical Research Conference Research Trends in Laser Matter Interaction 2010

May 7- 8, 2010  
La Jolla, California 92037

### ADVANCED COMPTON SCATTERING LIGHT SOURCE R&D AT LLNL\*

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Recent progress in accelerator physics and laser technology have enabled the development of a new class of tunable gamma-ray light sources based on Compton scattering between a high-brightness, relativistic electron beam and a high intensity laser pulse produced via chirped-pulse amplification (CPA). A precision, tunable gamma-ray source driven by a compact, high-gradient X-band linac is currently under development and construction at LLNL.

High-brightness, relativistic electron bunches produced by an X-band linac designed in collaboration with SLAC will interact with a Joule-class, 10 ps, diode-pumped CPA laser pulse to generate tunable-rays in the 0.5-2.5 MeV photon energy range via Compton scattering.

The source will be used to excite nuclear resonance fluorescence lines in various isotopes; applications include homeland security, stockpile science and surveillance, nuclear fuel assay, and waste imaging and assay. The source design, key parameters, and current status are presented, along with some new physics in the narrow-band, weakly nonlinear regime.

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