Abstract Submitted
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Compact Laser Technology for Compton Scattering Sources[1] M. SHVERDIN, F. ALBERT, S.G. ANDERSON, A. BAYRAMIAN, S.M. BETTS, C. EBBERS, D. GIBSON, M. MESSERLY, F.V. HARTEMANN, C.W. SIDERS, D.P. MCNABB, C.P.J. BARTY — We describe compact laser technology for Mono-Energetic Gamma-Ray (MEGa-Ray) Compton scattering light source at LLNL. The high energy, 120W interaction laser utilizes chirped pulse amplification (CPA) in Nd:YAG to amplify a sub-nanometer bandwidth 20 μJ pulses from a fiber system to 1J. A novel pulse stretcher provides a dispersion of over 7000ps/nm to expand a several picosecond wide seed pulse to 6ns. After amplification, the pulse is re-compressed to 10ps with a hyper-dispersive pulse compressor. We also describe a technique for over an order of magnitude increase in the generated gamma-ray flux by recirculation of the interaction laser pulse. This technique, termed Recirculation Injection by Nonlinear Gating (RING), consists of frequency doubling the incident laser pulse inside a dichroic mirror cavity. The resonator mirrors transmit at 1ω and reflect at 2ω. The 2^{nd} harmonic of the incident pulse then becomes trapped inside the cavity. To date, we demonstrated 14 times cavity enhancement of 180mJ, 10ps, 532nm laser pulses.

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