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120-Hz Diode-Pumped Kilowatt Class Laser for Compton Scattering Sources ANDY BAYRAMIAN, GLENN BEER, ROB CAMPBELL, BARRY FREITAS, WILLIAM MOLANDER, STEVE SUTTON, STEVE TELFORD, CHRIS BARTY, Lawrence Livermore National Laboratory — A Mono-Energetic Gamma-Ray (MEGa-ray) Compton scattering light source is currently based on a 120-Hz electron accelerator. A 120-Hz laser source can increase the current gamma ray production by more than an order of magnitude and further enhancements are possible. Diode pumped solid state lasers (DPSSLs) offer the potential to operate at these higher repetition rates where flash lamp pumped laser systems are currently limited by thermal and lamp lifetime issues. Utilizing LLNL expertise in high energy DPSSLs, a 10-J, 120-Hz diode-pumped Nd:YAG laser architecture has been developed. The laser design makes use of advances in diode packaging, power conditioning, and beam conditioning to provide over 100-kW peak power array. Sapphire heatsinks and longitudinal cooling of the amplifier yields low parasitic loss and low wavefront distortion. An image relayed architecture and adaptive optics will yield a diffraction limited beam ideal for Compton scattering. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

Andy Bayramian
Lawrence Livermore National Laboratory

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