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Electron Beam Optimization for a High-Brightness Gamma-Ray Source[1] DAVID J. GIBSON, SCOTT G. ANDERSON, SHAWN M. BETTS, FREDERIC V. HARTEMANN, IGOR JOVANOVIC, DENNIS P. MCNABB, MICHAEL J. MESSERLY, MIROSLAV Y. SHVERDIN, CRAIG W. SIDERS, AARON M. TREMAINE, CHRISTOPHER P. J. BARTY, Lawrence Livermore National Laboratory — Compton-Scattering based systems offer a path to high-brightness high-energy (> 1 MeV) x-ray & gamma-ray sources due to their favorable scaling with electron energy. LLNL is currently engaged in an effort to build such a device, dubbed the "Thomson-Radiated Extreme X-Ray" (T-REX) source. Presented here is an overview of the system design, which includes both a UV-laser-driven electron photoinjector and an intense scattering laser. Also shown are the results of detailed electron beam and gamma-ray generation modeling designed to optimize the brightness and flux of the gamma-ray beam, including UV drive laser profile effects, charge v. emittance tradeoffs, thermal emittance effects, and contributions of focusing geometry.

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