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Plasma instability control toward high fluence, high energy x-ray continuum source PATRICK POOLE, ROBERT KIRKWOOD, SCOTT WILKS, BRENT BLUE, Lawrence Livermore National Laboratory — X-ray source development at Omega and NIF seeks to produce powerful radiation with high conversion efficiency for material effects studies in extreme fluence environments. While current K-shell emission sources can achieve tens of kJ on NIF up to 22 keV, the conversion efficiency drops rapidly for higher Z K-alpha energies. Pulsed power devices are efficient generators of MeV bremsstrahlung x-rays but are unable to produce lower energy photons in isolation, and so a capability gap exists for high fluence x-rays in the 30 – 100 keV range. A continuum source under development utilizes instabilities like Stimulated Raman Scattering (SRS) to generate plasma waves that accelerate electrons into high-Z converter walls. Optimizing instabilities using existing knowledge on their elimination will allow sufficiently hot and high yield electron distributions to create a superior bremsstrahlung x-ray source. An Omega experiment has been performed to investigate the optimization of SRS and high energy x-rays using Au hohlraums with parylene inner lining and foam fills, producing ˜10x greater x-ray yield at 50 keV than conventional direct drive experiments on the facility. Experiment and simulation details on this campaign will be presented. This work was performed under the auspices of the US DoE by LLNL under Contract No. DE-AC52-07NA27344.

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