An Inverse-Compton Based X-ray Diagnostic to Revolutionize HED and ICF Science

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The pairing of modern, high-charge rf linear accelerators with high-power lasers provides a path to extremely bright, tunable and monochromatic x-ray sources via inverse Compton scattering [1]. Utilizing microbunching of the electron beam, further gains in x-ray brightness as well as the generation of coherent x-ray pulses are possible in a single shot [2,3]. Such an x-ray source would revolutionize x-ray diagnostics of HED and ICF conditions by providing an unparalleled probe for x-ray Thompson scattering, diffraction, radiography and more [1]. These sources can be built at currently available laser research facilities for a fraction of the cost and footprint of traditional x-ray light sources, which allows for their pairing with large compression facilities such as OMEGA-60, the Sandia Z-machine, and the National Ignition Facility. This talk will outline the impact of such a light source as well as the engineering path towards building the first prototype at the Laboratory for Laser Energetics.

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