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Inverse Compton Scattering as a diagnostic of electron beams

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The interaction of an intense laser pulse with a relativistic electron beam results in a burst of highly energetic photons, via the Inverse Compton Scattering (ICS) process. For a GeV electron beam, photons are generated with energies in excess of 10 MeV, far exceeding the energies possible from magnetic undulators. Characterizing such a photon source presents a real challenge for diagnostic development, but also is of great interest to several potential applications typically serviced by bremsstrahlung sources or electron-positron annihilation. Here, we report on the development of an ICS diagnostic, planned for use with the FLASHForward electron driven plasma wakefield acceleration experiment at DESY. The primary goal of this diagnostic is to reveal properties of the driver and witness beams from the plasma experiments that are otherwise not possible to measure. We will report on the simulated source properties and diagnostic performance, as well as preparatory work with a 25 TW laser wakefield accelerator.

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