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**A Synthetic Model of a Laser Inverse Compton Scattering Diagnostic for Runaway Electrons in DIII-D**[1] G. A. WURDEN, Los Alamos, T. E. EVANS, General Atomics, E. M. HOLLMANN, UCSD — We have developed a code to simulate the signals from a new laser scattering diagnostic for DIII-D, which will measure the relativistic electron population expected in the DIII-D tokamak after disruptions triggered by argon pellet injection. Experimentally, the post disruption runaway current can be as large as 1 MA, and existing measurements suggest there exists a significant fraction of runaways, or even a bump on the tail distribution, at 6-10 MeV. The inverse scattering Compton cross section is highly peaked in the forward direction of the runaway electron beam. Relativistically upshifted scattered light is integrated over position and angles, and binned in energies, as it is collected at the detector position. We have done calculations for a variety of assumed electron distribution functions, with pitch angle distribution becoming smaller at higher energies. Argon pellets will be used to trigger disruptions, so we calculate the accompanying bremsstrahlung noise background from the runaways interacting with high-Z residual argon ions in the plasma. For a 10 joule laser, with 80 picosecond pulse width, using a 100 $cm^2$ detector, a runaway electron population density of $10^{10}$ $cm^{-3}$ at 6-10 MeV, and an argon density of $10^{13}$ $cm^{-3}$, the expected signal-to-noise ratio in the 100 eV to 20 keV range will be >200:1.

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