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Feasibility of transition radiation diagnostic for hot electrons generated in indirect-drive experiment YAOYUAN LIU, JIAN ZHENG, GUANGYUE HU, University of Science and Tech of China, DONG YANG, YONGGANG LIU, SANWEI LI, XIANHUA JIANG, ZHEBIN WANG, HUAN ZHANG, XIANSHI PENG, FENG WANG, SHAOEN JIANG, YONGKUN DING, Research Center of Laser Fusion, China Academy of Engineering Physics — In the experiment of indirect-drive laser fusion, parameter instabilities like stimulated Raman scattering (SRS) can generate abundant hot electrons, which can preheat fuel and degrade target gain. Hot electrons are usually investigated through their bremsstrahlung measured with filter-fluoresce (FF) X-ray spectrometer. In this presentation, we propose the feasibility of studying hot electrons by detecting the transition radiation (TR) emitted when energetic electrons pass through the outer surface of a hohlraum. With aid of Monte Carlo simulations, we find that the intensity of optical TR is equivalent to that of 0.2 eV black-body radiation (BR) in the typical experiments of the SG-III prototype facility with the energy of ˜10 kJ during 1 ns. Therefore, optical transition could be a candidate for the measurement of hot electrons without preheating. However, our simulations shows that the outer surface can be heated to 0.55 eV due to the hot electrons, leading to much brighter BR than the TR. In fact, our streaked optical pyrometer indicates that the preheating temperature reaches 0.7-1.0 eV. Hence it would be impossible to diagnose the hot electrons through optical TR. Our calculations show that it is plausibly feasible to detect the TR in the region of far infrared or THz.

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