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Wakefield Excitation In Solid Density Plasma

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ABSTRACT.

The wakefield excitation in the high-power laser irradiated nano-wire target exhibits high laser energy absorption compared to flat-target. In Extreme Light Infrastructure Nuclear Physics (ELI-NP), Romania, high-power lasers are entering a new realm of 10~PW peak power, capable of obtaining a focused intensity of $1023 Wcm{-}2$. Through particle-in-cell simulations, it has been observed that the irradiation of solid-density materials with such intense laser pulses leads to the generation of substantial wakefield excitations driven by particles, resulting in electron acceleration and the emission of photons. The investigation of wakefield excitation phenomena within solid plasma density is carried out. Furthermore, the potential implications of these findings for laser-driven nuclear physics applications will be explored