

Diagnostics of laser wakefield electron acceleration inside capillary tubes

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Intense ultrashort laser pulse interacting with plasma expels electrons from the regions of high intensity and leaves in its wake a plasma wave. The ultrahigh longitudinal electric field associated to this plasma wave, of the order of 100 GV/m, is capable of accelerating electrons to GeV-class over only a centimeter-scale distance. Meanwhile, the accelerated electrons are transversely wiggled by the radial electric field of the plasma wave during the process of acceleration, generating a synchrotron-like X-ray radiation. The measured X-ray beams are therefore can be used to diagnose the process of electron acceleration in the plasma.

An experiment was recently conducted at the Lund Laser Centre (LLC) in Sweden in order to characterize capillary-guided laser wakefield accelerators. We will present the results of diagnostics about electron trajectory, the number of electron oscillation, and the acceleration extension in the plasma using the observed X-ray beams.

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