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Precise charge measurement for laser plasma accelerators[1] KEI NAKAMURA, LBNL, ANTHONY GONSALVES, CHEN LIN, THOMAS SOKOLLIK, SATOMI SHIRAISHI, JEROEN VAN TILBORG, ALAN SMITH, DAVE RODGERS, RICK DONAHUE, WARREN BYRNE, WIM LEEMANS — A comprehensive study of charge diagnostics was conducted to verify their validity for measuring electron beams produced by laser plasma accelerators (LPAs). The electron energy dependence of a scintillating screen (Lanex Fast) was studied with subnanosecond electron beams ranging from 106 MeV to 1522 MeV at the Lawrence Berkeley National Laboratory Advanced Light Source (ALS) synchrotron booster accelerator. Using an integrating current transformer as a calibration reference, the sensitivity of the Lanex Fast was found to decrease by 1% per 100 MeV increase of the energy. By using electron beams from LPA, cross calibrations of the charge were carried out with an integrating current transformer, scintillating screen (Lanex from Kodak), and activation based measurement. The diagnostics agreed within ∼8%, showing that they all can provide accurate charge measurements for LPAs provided necessary cares.

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