A method of determining narrow energy spread electron beams from a laser plasma wakefield accelerator using undulator radiation

In this paper a new method of determining the energy spread of a relativistic electron beam from a laser-driven plasma wakefield accelerator by measuring radiation from an undulator is presented. This could be used to determine the beam characteristics of multi-GeV accelerators where conventional spectrometers are very large and cumbersome. Simultaneous measurement of the energy spectra of electrons from the wakefield accelerator in the 55–70 MeV range and the radiationspectra in the wavelength range of 700–900 nm of synchrotron radiation emitted from a 50 period undulator confirm a narrow energy spread for electrons accelerated over the dephasing distance where beam loading leads to energy compression. Measured energy spreads of less than 1