Transverse and Longitudinal Beam Diagnostics using Transition Radiation*, S. DÖBERT, R. EICHHORN, H. GENZ, H.-D. GRÄF, R. HAHN, T. HAMPEL, S. KOSTIAL, H. LOOS, M. REICHENBACH, A. RICHTER, V. SCHLOTT, E. SPAMER, A. STASCHECK, M. THOMAS, O. TITZE, T. WESP, Institut für Kernphysik, TH-DARMSTADT, Schlossgartenstr.9, D-64289 Darmstadt - Transition radiation emitted from a thin foil in the beamline has become a preferable method for cost efficient and comfortable beam diagnostics in the regime of intercepting monitors. The optical part of the produced radiation spectrum allows the use of commercial standard CCD cameras for beamspot imaging and transverse diagnostics. A full two dimensional intensity distribution can be easily provided by use of fast graphical data processing which also allows to determine the transverse beam parameters. OTR diagnostics is routinely used at the S-DALINAC to measure the complete set of transverse beam parameters. The method is being used for electron energies ranging from 250 keV to 120 MeV and minimum beam currents of 0.5 μA and 20 nA respectively. The energy spread of the extracted electron beam is measured in a dispersive section of the beamline by projecting the energy distribution on a transverse axis. When the accelerator is used to drive the Free Electron Laser (FEL) the peak current is an important parameter and therefore knowledge of the bunch length is essential. It has been determined using the millimetre wavelength range of the transition radiation spectrum and an autocorrelation technique. For a charge of 5 pC per bunch at a 10 MHz repetition rate a bunch length of (4 ± 0.25)ps was measured and confirmed by a streak camera measurement.

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