

A Very High Resolution Optical Transition Radiation Beam Profile Monitor

Marc Ross, SLAC

J. Frisch, S. Anderson, K. Jobe, D. McCormick, Be. McKee, J. Nelson, T. Smith, SLAC

H. Hayano, T. Naito, N. Terunuma, KEK

Abstract

We have constructed and tested a $2\ \mu\text{m}$ resolution beam profile monitor based on optical transition radiation (OTR). Theoretical studies of OTR [M. Castellano, V.A. Vezilov, Phys., Rev. ST Accel. Beams 1,062801 (1998)] show that extremely high resolution, to about the wavelength of the light emitted, is possible. Such high resolution single pulse profile monitors will be very useful for future free electron laser and linear collider projects. Using the very low emittance 1.3 GeV electron beam at the KEK ATF [R. Okugi et al., Phys. Rev. ST Accel. Beams 2,022801 (1999)], we have imaged transition radiation from $5\ \mu\text{m}$ σ beam spots. Our test device consisted of a finely polished copper target, a thin fused silica window, a 35 mm working distance microscope objective (5x and 10x) and a triggered CCD camera. A wire scanner located near the target is used to verify the profile monitor performance. In this paper we report results of beam tests.