

A Short Bunch High Voltage Extractor for Photocathode Testing and Beam Dynamics Studies, D. GIOVE, P. MICHELATO, C. PAGANI, P. PIERINI, L. SERAFINI, D SERTORE, G. TRAVISH, LASA-INFN, Milan - We describe a system designed for photocathode testing and beam dynamics studies which is based on a high voltage extractor and a sub picosecond drive laser. The system's distinctive characteristics are the ability to run in the short bunch regime δ^- where the dynamics are not governed by the Child-Langmuir law -- and the availability of both transverse and longitudinal beam diagnostics to determine the full beam distribution. The system consists of a pseudo parallel plate 100 KV DC gun with a removable cathode and a cathode-anode gap of 8 mm, yielding a cathode field of up to 10 MV/m. The drive laser is a Nd:Glass system capable of producing over 200 μ J at 264 nm with a pulse length adjustable from approximately 250 fs to over 1 ps. The goals of the system, described in this paper, are to support ongoing photocathode studies, including measuring high current density extraction from prepared cathodes and investigating the effect of surface variation of the quantum efficiency on the transverse emittance, and exploring beam dynamics such as the short bunch blow out regime which has recently been proposed as a way to produce uniform ellipsoidal charge density distributions [1].

[1] L. Serafini, et al., NIM A387 305 (1997).