



Contribution ID: 153

Type: **not specified**

Beam Diagnostics II

Wednesday 24 September 2025 12:10 (1 hour)

In the second lecture, the working principle of frequently used beam instruments for electron and proton beams concerning the transverse and longitudinal profile measurement is discussed. A broad range of instruments is available for transverse profile measurement, typically based on the interaction of beam particles with matter and the subsequent detection of secondary particles or photons. These include Secondary Emission Monitors (SEM grids), wire scanners, scintillation screens, Optical Transition Radiation (OTR) screens, and Ionization Profile Monitors (IPMs). Transverse profile data can be used to determine beam emittance in transfer lines through various reconstruction methods. Longitudinal bunch profiles are measured using several techniques—either by broadband detection of the bunch's electric field, electro-optical sampling, or via synchrotron radiation emission. The application of Beam Loss Monitors (BLMs) is also briefly addressed, emphasizing their role in machine protection and diagnostics.

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