STUDY OF A NON INTERCEPTING ION BEAM DIAGNOSTIC FOR BEAM DENSITY PROFILE*

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Measurement of the charge distribution and phase space of an ion beam using conventional intercepting diagnostics such as a Faraday cup, slit cup, pepperpot, or scintillator is highly perturbative, and often completely disrupts the ion beam itself. This is presently unavoidable for phase space measurements, though total beam charge can be measured non-perturbatively using a Rogowski coil or other similar inductive probes located around the beam. Such devices cannot quantify the cross sectional charge distribution in the beam. An electron beam diagnostic system for measuring the charge distribution of an ion beam without changing its properties is presently under development. In this new diagnostic a low energy, low current electron beam is moved transversely across the ion beam; the measured electron beam deflection is used to calculate the line-integrated charge density of the ion beam. The conceptual basis of the diagnostic, the design and setup of the system, characterization of the mechanical construction, electron beam transport and its trajectory is presented. Extraction of electric field from electron beam deflection is also presented to represent effectiveness of the diagnostic.

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