

DIAGNOSTICS FOR INTENSE HEAVY ION BEAMS *

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Modern diagnostic techniques provide detailed information on beam conditions in injector, transport, and final focus experiments in the HIF-VNL. Parameters of interest include beam current, beam energy, transverse and longitudinal distributions, emittance, and space charge neutralization. Imaging techniques, based on kapton films and optical scintillators, complement and in some cases, may replace conventional techniques based on slit scans. Time-resolved optical diagnostics that provide 4-D transverse information on the experimental beams are in operation on the existing facilities. Current work includes a folded, compact optical diagnostic suitable for insertion in transport lines, improved algorithms for data analysis and interpretation, and a high-resolution electrostatic energy analyzer. A longitudinal diagnostic kicker has been implemented for generating longitudinal space-charge waves that travel on the beam. Time of flight of the space charge wave and an electrostatic energy analyzer provide an absolute measure of the beam energy. Special diagnostics to detect secondary electrons and gases desorbed from the wall have been developed.

The diagnostics currently in use are suitable for low kinetic energy, but high intensity and integrated experiments will require increasing emphasis on non-intercepting diagnostics, such as beam current transformer and capacitive pickup. One new non-intercepting diagnostic under development is the electron beam potential probe. We will discuss the techniques, results, and plans for implementation of these and other new diagnostics.

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