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Recent developments in diagnostics for Heavy Ion Fusion experiments *

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We discuss progress in diagnostic development for the Heavy Ion Fusion program in the HIF-VNL at LBNL and LLNL. Typical HIF beams are high current (up to 1 A), and the energy range is 60 keV to 2.0 MeV, increasing up to 10 MeV in the near future. Beam parameters of interest include current, density distribution, energy, energy distribution, emittance, and space potential, in injector, transport, and final focus sections.

Optical diagnostics based on a scintillator screen and a gated intensified CCD camera have been implemented and provide full 4-D transverse information on the experimental beams. Current work includes development of a compact optical diagnostic and improved algorithms for data analysis and interpretation. A longitudinal diagnostic kicker has been implemented for generating longitudinal space-charge waves. Comparison of the waves with a simple 1-D fluid model of the beam will be presented. Time of flight of the space charge wave and an electrostatic energy analyzer provide an absolute measure of the beam energy. These and other new diagnostics will be described.

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