

TWO-STREAM STABILITY ASSESSMENT OF INTENSE HEAVY ION BEAMS PROPAGATING IN PREFORMED PLASMAS*

D.V. Rose, T.C. Genoni, D.R. Welch, Mission Research Corp.,
5001 Indian School Road, NE, Albuquerque, NM, 87111

A recent analysis [1] of the stability of intense ion beams propagating in unmagnetized, preformed plasmas is being applied to heavy ion fusion (HIF) reactor chamber parameters. An earlier analysis carried out for heavy ion beams propagating in an evacuated chamber [2] predicted stability over a range of beam parameters. That analysis invoked a temporally evolving, maximum unstable wavenumber to detune two-stream unstable growth for a focusing beam. This conclusion is presently being re-examined using particle-in-cell simulations.

The modular accelerator concept for HIF is presently being evaluated. The concept uses solenoid transport with high line-charge densities [3,4]. Propagating ion beams are time-of-flight compressed in a magnetized plasma, which fills the transport sections upstream of the reactor chamber. The analysis presented in [1] has been extended to include the impact of applied axial magnetic fields on the growth and saturation of the two-stream instability.

*This work is support by the US DOE through Lawrence Berkeley National Laboratory and the Princeton Plasma Physics Laboratory.

- 1 D.V. Rose, T. C. Genoni, and D. R. Welch, and C. L. Olson, "Two-stream studies for heavy ion beam propagation in a reactor chamber," proceedings of the 2003 Particle Accelerator Conf., p. 3165.
- 2 P. Stroud, *Lasers and Particle Beams* **4**, 261 (1986).
- 3 B. G. Logan, private communication (2003).
- 4 E. P. Lee and R. Briggs, "The solenoidal transport option: IFE drivers, near-term research facilities, and beam dynamics," Lawrence Berkeley National Laboratory Report LBNL-40774, HIFAN 914, Sept. 1997.