Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Modeling Nuclear Fusion in High Energy Density Plasmas Using a Strongly Magnetized Non-neutral Plasma[1] D.H.E. DUBIN, UCSD — In the hot dense interiors of stars and giant planets, nuclear reactions are predicted to occur at rates that are greatly enhanced compared to those at low densities. The enhancement is caused by plasma screening of the reacting pairs, increasing the probability of close collisions. However, strongly enhanced nuclear reaction rates have never been observed in the laboratory. This poster discusses a method for observing the enhancement using an analogy between nuclear energy and cyclotron energy in a non-neutral plasma in a strong magnetic field. In such a plasma, cyclotron energy is an adiabatic invariant, and is released only through close collisions that break this invariant. It is shown that the rate of release of cyclotron energy is enhanced by precisely the same factor as that for the release of nuclear energy, because both processes rely on close collisions that are enhanced by plasma screening.[2] Simulations measuring the screening enhancement will be presented, and the possibility of exciting and studying burn fronts will be discussed.[3]

[1]Supported by NSF PHY-0354979.
[2]D. Dubin, Phys. Rev. Lett. **94**, 025002 (2005).
[3]See also adjacent poster by J. Bollinger.

D.H.E. Dubin
UCSD

Date submitted: 25 Jul 2005 Electronic form version 1.4