Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Proton Beam Fast Ignition Fusion: Nonlinear Generation of B_θ-Fields by Knock-on Electrons V. ALEXANDER STEFAN, Institute for Advanced Physics Studies, Stefan University, La Jolla, CA — The knock-on electrons, generated by the fast proton beam[1] in interaction with the free and bound electrons in a precompressed DT fusion pellet, outrun the proton beam, generating the B_θ-fields ahead of the beam, which may lead to the defocusing of the beam, if $B_\theta < 0$. The B_θ-fields are generated due to the magnetic instability, $\partial \mathbf{B}_\theta/\partial t \sim (c/\sigma)\nabla \times \mathbf{j}_{ne}$, where j_{ne} is the knock-on electron current density,σ is the background plasma conductivity, and c the speed of light. [2] The instability growth rate compensates for relatively low knock-on generation efficiency by a proton beam. The saturation level,(electron trapping mechanism), of the B-field ahead of the beam, is of the order of 10 MG and is reached on the time scale of 10ps.

[1]M. Roth et al, Phys. Rev. Lett. 86, 436 (2001); M. Tabak et al, Phys. Plasmas 1 (5), 1626 (1994); H. L. Buchanan, F. W. Chambers, E. P. Lee, S. S. Yu, R. J. Briggs, and M. N. Rosenbluth, LLNL , UCRL Report 82586, 1979.
[2]V. Alexander Stefan, *Laser Thermonuclear Fusion*: Res. Review, (1984-2008), on Generation of Suprathermal Particles, Laser Radiation Harmonics, and Quasistationary B-Fields. (Stefan University Graduate Courses: ISSN:1543-558X), (S-U-Press, 2008).

V. Alexander Stefan
Institute for Advanced Physics Studies, Stefan University, La Jolla, CA

Date submitted: 05 Jul 2011 Electronic form version 1.4