Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Diagnosing the High Energy Deuterium Spectra in IEC Devices Using Doppler Shifted Fusion Products DAVID BORIS, Fusion Technology Institute - University of Wisconsin-Madison — The UW-Inertial Electrostatic Confinement (IEC) device is comprised of concentric spherical metallic grids within a cylindrical vacuum vessel. The central grid, which can be held at high negative potentials ($\sim$ -100 to -200kV), is the device cathode, while the outer grid, held at ground potential, is the device anode. This configuration accelerates ions, created near the anode, toward the center of the device. A weakly ionized cold plasma, created by a filament assisted DC discharge outside the anode, is the ion source for the device. The fill gas for this device is typically deuterium, thus leading to D-D fusion rates on the order of 10^8 fusions/s. The high energy protons and tritons resultant from D-D fusion reactions have been observed using charged particle detectors. These detectors are capable of discerning the Doppler shift on D-D fusion products imparted by the center of mass energy of the deuterium reactants. From the fusion product spectra compiled by a multi-channel analyzer the energy spectra of the deuterium reactants can be calculated. Using this diagnostic the effect, on the deuterium spectra, of varying the parameters of fill gas pressure, cathode voltage, cathode current and grid geometry have been examined.

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Date submitted: 26 Aug 2008 Electronic form version 1.4