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Improved Inertial Electrostatic Confinement Device for ^{3}He-^{3}He Fusion[1] GABRIEL BECERRA, JOHN SANTARIUS, GERALD KULCINSKI, University of Wisconsin — Ions in inertial electrostatic confinement (IEC) systems are accelerated radially by an electrostatic field between two spherical grids, a configuration in which ^{3}He-^{3}He fusion has previously been demonstrated as part of the advanced fuels program at the University of Wisconsin [1]. A campaign is underway to enhance the experimental setup, in order to sustain cathode voltages beyond 200 kV. Additionally, the helicon plasma source and its ion extraction system are being upgraded to deliver ion currents of ∼60 mA. These improvements will help achieve the goal of significantly raising the ^{3}He-^{3}He fusion rates, to allow for a detailed diagnostic study of IEC physics with helium-3 fuel, as well as a direct comparison with a theoretical model [2]. Initial results will be presented.

[1] G.R. Piefer, "Performance of a Low-Pressure, Helicon Driven IEC 3He Fusion Device," Ph.D. thesis, University of Wisconsin-Madison (2006).
[2] G.A. Emmert and J.F. Santarius, "Atomic and molecular effects on spherically convergent ion flow. I. Single atomic species," *Physics of Plasmas* **17**, 013502 (2010).

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John Santarius
University of Wisconsin

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