

Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Plasma Liner Compression of Compact Toroids to Fusion Conditions JOHN SLOUGH, CHRIS PIHL, GEORGE VOTROUBEK, MSNW LLC — To make fusion practical at small scale, an efficient method for repetitively compressing the FRC to fusion gain conditions is required. A promising approach, and the one is being explored at the MSNW facility employs a plasma shell to radially compress and heat the FRC plasmoid to fusion conditions. The energy that is required for the implosion compression and heating of the FRC plasmoid is derived from both the radial kinetic energy of the plasma liner used to compress it, and the axial kinetic energy of the FRC's motion prior to compression. The timescale for forming and accelerating both the FRC and liner can be much longer than the time it takes for the energy to be thermalized in the implosion. This greatly reduces the demand on the power delivery systems as the energy can be accumulated over a time interval of several microseconds far from the interaction region. The design and testing of the key components for the formation of the plasma liner have been successfully completed, as well as the numerical and analytical work to optimize the liner compression. The results from this work will be presented as well as plans for a proof of concept experiment.

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Date submitted: 18 Jul 2008

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