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Adiabatic Compression of Compact Tori for Current Drive and Heating SIMON WOODRUFF, ANGUS MCNAB, KENNETH MILLER, TIM ZIEMBA, Woodruff Scientific, LLC — Several critical issues stand in the development path for compact tori. An important one is the production of strong magnetic fields, (or large flux amplifications) by use of a low current source. The Pulsed Build-up Experiment is a Phase II SBIR project in which we aim to show a new means for generating strong magnetic fields from a low current source, namely, the repetitive injection of helicity-bearing plasma that also undergoes an acceleration and compression. In the Phase I SBIR, advanced computations were benchmarked against analytic theory and run to determine the best means for the acceleration and compression of a compact torus plasma. The study included detailed simulations of magnetic reconnection. In Phase II, an experiment has been designed and is being built to produce strong magnetic fields in a spheromak by the repetitive injection of magnetic helicity from a low current coaxial plasma source. The plasma will be accelerated and compressed in a similar manner to a traveling wave adiabatic compression scheme that was previously applied to a mirror plasma [1]. [1] P. M. Bellan Scalings for a Traveling Mirror Adiabatic Magnetic Compressor Rev. Sci. Instrum. 53(8) 1214 (1982) Work supported by DOE Grant No. DE-FG02-06ER84449.

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