Abstract Submitted
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3D Resistive MHD Simulations of Formation, Compression, and Acceleration of Compact Tori[1] SIMON WOODRUFF, THOMAS MEYER, JAMES STUBER, Woodruff Scientific Inc, CARLOS ROMERO-TALAMAS, University of Maryland Baltimore County, MICHAEL BROWN, Swarthmore, MANJIT KAUR, Swartmore, DAVID SCHAFFNER, Bryn Mawr — We present results from extended resistive 3D MHD simulations (NIMROD [1]) pertaining to a new formation method for toroidal plasmas using a reconnection region that forms in a radial implosion, and results from the acceleration of CTs along a drift tube that are accelerated by a coil and are allowed to go tilt unstable and form a helical minimum energy state. The new formation method results from a reconnection region that is generated between two magnetic compression coils that are ramped to 320kV in 2μs. When the compressing field is aligned anti-parallel to a pre-existing CT, a current sheet and reconnection region forms that accelerates plasma radially inwards up to 500km/s which stagnates and directed energy converts to thermal, raising temperatures to 500eV. When field is aligned parallel to the pre-existing CT, the configuration can be accelerated along a drift tube. For certain ratios of magnetic field to density, the CT goes tilt-unstable forming a twisted flux rope, which can also be accelerated and stagnated on an end wall, where temperature and field increases as the plasma compresses. We compare simulation results with adiabatic scaling relations. [1] C. Sovinec et al Journal of Computational Physics, 195, 355 (2004).

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