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Proto-CIRCUS tilted-coil tokamak-torsatron hybrid: design and construction M. DOUMET, B.Y. ISRAELI, K.C. HAMMOND, R.M. SWEENEY, F.A. VOLPE, Columbia U., D.A. SPONG, ORNL, A.W. CLARK, USMA, Y. KORNBLUTH, Yeshiva U. — An innovative magnetic confinement concept is based on a toroidal configuration in which the toroidal field coils are tilted and interlinked with each other. Field line tracing and equilibrium calculations suggest that this configuration can generate rotational transform with lower plasma current and exhibit less effective magnetic ripple than tokamaks of comparable size. These properties may have interesting implications for disruptions and steady-state operation. Proto-CIRCUS is a tabletop device recently constructed at Columbia University to test this concept. It features six interlocked coils with independently adjustable radial positions and tilt angles. Plasmas will have major and minor radii of approximately 16 cm and 5 cm, respectively. Start-up, heating and current drive will initially rely on 2.45 GHz electron cyclotron waves. Here we describe the design and construction of the device and present the results of numerical optimizations aimed at minimizing the required plasma current. Flux surface measurements will confirm whether this relatively simple concept can generate the expected rotational transform.

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