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Experimental observation of discrete helical modes in imploding cylindrical liners[1] D. A. YAGER-ELORRIAGA, P. ZHANG, A. M. STEINER, N. M. JORDAN, P. C. CAMPBELL, Y. Y. LAU, R. M. GILGENBACH, Univ of Michigan - Ann Arbor — The 1-MA Linear Transformer Driver at the University of Michigan was used to implode ultrathin (400 nm thick) cylindrical aluminum liners[1] that were pre-embedded with externally applied, axial magnetic fields of B_z = 0.2-2.0 T. Using 12-frame laser shadowgraphy and visible self-emission, helical striations were found that *increased* in pitch angle during the implosion and *decreased* in angle during the later time explosion, despite the relatively large, peak azimuthal magnetic field exceeding 40 T. The results are interpreted as a discrete, non-axisymmetric eigenmode of a helical instability that persists from implosion to explosion. The helical pitch angle φ was found to obey the simple relation $\varphi = m/kR$, where m, k, and R are the azimuthal mode number, axial wavenumber, and radius of the helical instability. Analytic growth rates[2] for experimental parameters are presented, and show that early in the current pulse, axisymmetric modes ($m = 0$) are completely stabilized while non-axisymmetric modes ($m \geq 1$) are found to be unstable. [1] D. A. Yager-Elorriaga, et al., *Rev. Sci. Instrum.* **86**, 113506 (2015). [2] M. R. Weis, P. Zhang, et al., *Phys. Plasmas* **22**, 032706 (2015).

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