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Magnetic Field Measurements in Wire-Array Z-Pinches WASIF SYED, DAVID HAMMER, MICHAL LIPSON, Cornell University — Understanding the evolution of the magnetic field topology and magnitude in the high energy density plasmas produced by wire-array Z-pinches is of critical importance for their ultimate application to stockpile stewardship and inertial confinement fusion[1]. A method to determine the magnetic field profile in megampere level wire-array Z-pinches with high spatial and temporal resolution is under development. An ideal method would be passive and non-perturbing, such as Faraday rotation of laser light. We are developing a method involving temporally-resolved Faraday rotation through a sensing waveguide placed in the vicinity of, and eventually in, a wire-array Z-pinch[2]. We present measurements of the magnetic field outside of a wire-array, and progress on measurements within the array. Our ideal device is a "thin film waveguide" coupled to an optical fiber system. While these sensing devices may not survive for long in a dense Z-pinch, they may provide useful information for a significant fraction of the current pulse. We present preliminary theoretical and experimental results. 1. M. Keith Matzen, M. A. Sweeney, R. G. Adams et al., Phys. Plasmas **12**, 055503 (2005). 2. W. Syed, D. A. Hammer, M. Lipson, R. B. van Dover, AIP Proceedings of the 6th International Conference on Dense Z-Pinches, University of Oxford, UK, July 25-28, 2005. *This research was sponsored by the National Nuclear Security Administration under the Stockpile Stewardship Academic Alliances program through DOE Cooperative Agreement DE-F03-02NA00057.

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