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Study of Fe(Se, Te) micron-sized rings by magnetic force microscopy GREGORY POLSHYN, CAN ZHANG, TYLER NAIBERT, JAMES ECKSTEIN, RAFFI BUDAKIAN, University of Illinois at Urbana-Champaign — The study of fluxoid states and fluxoid dynamics in mesoscopic iron-based superconducting rings is valuable for characterizing the basic properties of the superconductor, and may also provide important insight into the superconducting paring symmetry. We report the fabrications of micron-sized rings and disks from thin films of Fe(Se, Te) grown by molecular beam epitaxy. In order to study fluxoid states in rings we developed a custom-tailored version of magnetic force microscopy (MFM). This technique has a number of qualitative advantages for working with mesoscopic superconducting samples in comparison to the conventional MFM and other imaging techniques. We observed metastable fluxoid states in rings of different sizes. Thermally activated fluxoid dynamics of these states was studied and modeled. In addition, we found different regimes of interaction between Fe(Se, Te) ring and MFM tip which are explained. Possibilities of the existence of exotic vortex states and proposals for experiments to test the symmetry of the superconducting order parameter in iron based superconductors are analyzed.

Gregory Polshyn
University of Illinois at Urbana-Champaign

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