

Abstract Submitted
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Low Temperature STM Study of Vortex Motion on Fe doped NbSe₂ HUI WANG, JONGHEE LEE, MICHAEL DREYER, Department of Physics, University of Maryland, College Park, MD 20742, BARRY BARKER, Laboratory for Physical Sciences, National Security Agency, 8050 Greenmead Drive, College Park, MD 20740 — We investigated the vortex motion around magnetic Fe impurities on type II superconductor NbSe₂ by a home built low temperature STM. Using Scanning Tunneling Spectroscopy Maps we recorded the movie of the motion at 4 K with a very slow decaying rate of the magnetic field (~ 5 nT/s). The map images were taken with a 400 nm by 400 nm field of view and in a 0.75 T magnetic field to start with. Each frame of the movie has ~ 109 vortices and takes ~ 8 min to acquire. Scanning tunneling spectroscopy data show that the superconductivity is destroyed at the impurity sites, which indicates that they serve as attractive pinning centers for the vortex lattice. The behavior of the overall motion of the vortex lattice can be explained by the Larkin-Ovchinnikov collective pinning theory. The average speed of the motion is ~ 5 $\mu\text{m/s}$. Our STS movie data display the pinning and depinning events of a single vortex around the pinning center. A flux creep model will be exploited to understand the effect of the pinning centers on the vortex motion.

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