Abstract Submitted
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In-situ tunable vortex pinning with an array of ferromagnetic anti-dots[1] YONG-LEI WANG, MSD, Argonne National Lab, IL, USA, ZHILI XIAO, MSD, Argonne National Lab and Department of Physics, Northern Illinois University, USA, LEO OCOLA, RALU DIVAN, CNM, Argonne National Lab, IL, USA, GEORGE W. CRABTREE, MSD, Argonne National Lab, IL, USA and Departments of Physics, University of Illinois at Chicago, USA, WAI-KWONG KWOK, MSD, Argonne National Lab, IL, USA, SUPERCONDUCTIVITY AND MAGNETISM GROUP, MSD, ARGONNE NATIONAL LAB TEAM — We investigated vortex pinning effects of a ferromagnetic antidot array in a superconducting film. A square antidot array of 30 nm thick permalloy (Py) was patterned onto a MoGe superconducting film with thickness of 100 nm. Although we found no evidence of vortex pinning enhancement by the pristine magnetic antidot array in perpendicular magnetic fields, we found that by applying an independently controlled in-plane magnetic field the magnetic antidot array can provide excellent vortex pinning, resulting in a tunable superconducting critical current enhancement. Through micromagnetic simulation and magnetic force microscopy imaging, we demonstrate that the tunable vortex pinning originates from spatially periodic stray field generated by the magnetic antidot array in the presence of an in-plane magnetic field.

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