

## PCP1-9

### Observation of Flux States and Vortex Penetration in Perforated Square Loops of Superconducting Amorphous MoGe Films

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We report the magnetic visualizations of flux states in perforated square loops of superconducting amorphous MoGe films cooled in magnetic fields. Scanning superconducting quantum interference device microscopy measurements clearly revealed how the magnetic field is distributed in the loops at different magnetic fields. We found various flux states with different configurations, including vortices trapped in between holes and/or sample edges. Counting the number of trapped vortices for each image, we found that the vortices are completely excluded from the loop when the applied field is below a threshold field. We also found that the threshold field depends not only on the sample size, but also the arrangements of holes. These findings are useful for trapping or eliminating vortices in square loops, which can be crucial elements for designing various devices for quantum information processing, memory, and metrology.

Keywords: Mesoscopic superconductors, Flux States, Scanning SQUID microscope