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Edge Effects on Vortex Nucleation in Superconducting Granular Aluminum Films W. F. MAUGHAN, A. D. DEMANN, S. B. FIELD, Colorado State University — Type-II superconductors experience an intermediate state in which quantized magnetic flux lines, or vortices, penetrate the sample in the presence of a magnetic field. An applied current nucleates these vortices on one edge of the film, and then drives them to the other edge where they exit the sample. Because this nucleation process occurs at the sample edge, the details of the edge geometry are critical. In order to probe the effects of a tapered edge on vortex nucleation, a granular aluminum-oxide sample with five segments was fabricated. Each of the segments has a tapered edge on one side and shares the same vertical reference edge on the opposing side. In our experiments, the currents required to nucleate vortices at each edge were measured as a function of the applied magnetic field. These critical currents indicate the magnitude of the barrier to nucleation created by the edges. A clear trend between the size of the barrier and the taper length is observed.

Weston Maughan
Colorado State University

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