Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Vortex Measurements in Niobium on a Alumina Substrates with 100nm Triangular Nanopore Lattice TANNER SCHULZ, LIWEN TAN, DAN DAHLBERG, BETHANIE STADLER, University of Minnesota — Anodized aluminum films self-assemble into uniformly sized and spaced nanopores dependent upon the current and voltage used during the anodization procedure. This process has been optimized to provide a regular triangular nanopore lattice with a spacing of 100nm. The insulating alumina serves as a rigid substrate/template to investigate the effects of the periodic array on a superconducting thin film of niobium subject to a perpendicular applied field. We observe vortex matching effects in magnetization, current, and resistance measurements due to an overlap of the nanopore and vortex spacing at field multiples of 2.3 kOe. Further, we have investigated flux noise in our samples and find significant voltage noise due to the interaction of our superconducting film with the periodic geometry of our alumina substrate. We show that at fixed DC current values the power spectrum exhibit frequency structure dependent upon the applied field. These flux noise measurements help provide a better understanding of the flux flow in superconductors with non-magnetic periodic pinning.

Tanner Schulz
University of Minnesota

Date submitted: 20 Nov 2009 Electronic form version 1.4