Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Anisotropic magnetoresistance of a one-dimensional superconducting niobium strip\textsuperscript{1} JIONG HUA*, ZHILI XIAO*, ALEXANDRA IMRE, SUHONG YU*, UMESH PATEL*, LEO OCOLA, RALU DIVAN, ALEXEI KOSHELEV, JOHN PEARSON, ULRICH WELP, WAI-KWONG KWOK, Argonne National Laboratory, *Northern Illinois University — We investigated confinement effects on the resistive anisotropy of a superconducting niobium strip with a rectangular cross-section. When the strip’s transverse dimensions are comparable to the superconducting coherence length, we find the angle dependent magnetoresistances at a fixed temperature can be scaled as $R(\theta, H) = R(H / H_{c\theta})$ where $H_{c\theta} = H_{c0} (\cos^2 \theta + \gamma^{-2} \sin^2 \theta)^{-1/2}$ is the angular dependent critical field, $\gamma = w/d$ is the width to thickness ratio of the strip, and $H_{c0}$ is the out-plane critical field at $\theta = 0^\circ$. Our results can be understood in terms of the anisotropic diamagnetic energy of a one-dimensional superconductor in a magnetic field.

\textsuperscript{1}This work is supported by NSF Grant No. DMR-0605748 and by DOE, under contract DE-AC02-06CH11357, Award DE-FG02-06ER46334.

Jiong Hua
Argonne National Laboratory

Date submitted: 20 Nov 2008
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