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Anisotropic magnetoresistance of a one-dimensional superconducting niobium strip[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 magentoresistances at a fixed temperature can be scaled as R(θ, 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, γ = 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.

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