Anisotropic Rescaling of a Splayed Pinning Landscape in Hg-cuprates: Strong Vortex Pinning and Recovery of Variable Range Hopping

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Abstract

Strong vortex pinning by fission-induced uniformly splayed columnar tracks in anisotropic mercury cuprates is demonstrated to result from (re)scaling of the pinning landscape by a large superconducting anisotropy. The effective 'narrowing' of the splay distribution restores variable range vortex hopping (VRH) motion expected for nearly parallel pins. VRH emerges as a distinctive peak in the vortex creep rate ($\sim 12\%$ at low fields at $T/T_c \sim 0.5$) of the most anisotropic $HgBa_2Ca_2Cu_3O_{8+\delta}$ – a peak well described by a glassy dynamics with the characteristic exponent $\mu \sim 1/3$.