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Evidence for intrinsic vortex pinning in 1111 Fe arsenides single-crystals GANG LI, GAEL GRISONNANCHE, BENJAMIN CONNER, National High Magnetic Field Lab, NIKOLAI ZHIGADLO, SERGIY KATRYCH, ZBIGNIEW BUKOWSKI, JANUSZ KARPINSKI, Laboratory for Solid State Physics, ETH Zürich, CH-8093 Zürich, Switzerland, LUIS BALICAS, National High Magnetic Field Lab — We performed a study of the angular dependence of the magnetic torque $\tau(\theta)$ in $LaFeAsO_{0.9}F_{0.1}$ and in $SmFeAsO_{0.9}F_{0.1}$ single crystals. Here, θ is the angle between the magnetic field and inter-plane c-axis. As the temperature is lowered, one observes the emergence of sharp features in the magnetic torque for fields nearly aligned along the conducting planes. In particular, one observes two sharp peaks at a critical angle θ_c placed respectively slightly above and below $\theta = 90^\circ$, in the reversible component of the torque. Their position in angle, relative to $\theta = 90^\circ$, decreases as the field increases, and increases as the temperature is lowered. We conclude that θ_c corresponds to a critical pinning angle whose behavior is consistent with theoretical predictions for the intrinsic pinning of vortices by a layered crystallographic structure. However, in sharp contrast with the cuprates, in the region of temperatures where this behavior is observed the superconducting anisotropy of 1111 Fe arsenides is rather small, as measured by torque magnetometry.

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