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Superconducting properties and the interplay between magnetism and superconductivity in 1111 Fe arsenides as revealed by torque magnetometry 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 in $LaFeAsO_{0.9}F_{0.1}$ single crystals. We developed a method to separate the magnetic and the superconducting components inherent to the FeAs layers and which are superimposed onto the reversible torque signal $\tau_{\rm rev}(\theta, H, T)$. We show that by exploring the amplitude of the superconducting component in $\tau_{\rm rev}(\theta)$ as a function of H, it is possible to extract the thermodynamic value of the superconducting upper critical field H_{c2}. This so obtained value can be used to extract the field and the temperature dependencies of respectively, the superconducting anisotropy and the superfluid density through the Kogan formalism. We observe a strong temperature and field dependence of the superconducting anisotropy as expectable within a multi-band superconducting scenario. The resulting T-dependence of the superfluid-density resembles the behavior previously reported for LaFePO and which was ascribed to nodal superconductivity.

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