Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Vortex lock-in transition coinciding with the 3D to 2D crossover in $YBa_2Cu_3O_7$ SASKIA BOSMA, STEPHEN WEYENETH, Physics Institute - University of Zurich, ROMAN PUZNIAK, Institute of Physics - Polish Academy of Sciences, ANDREAS ERB, Walther Meissner Institute - Bavarian Academy of Sciences, HUGO KELLER, Physics Institute - University of Zurich — Dimensionality is essential to understand the behavior of vortices in layered cuprate superconductors. A 3D (three-dimensional) to 2D (two-dimensional) crossover takes place when the out-of-plane coherence length becomes smaller than the interplane distance. We directly detected a vortex lock-in transition by torque magnetometry in an overdoped $YBa_2Cu_3O_{7-\delta}$ single crystal of low anisotropy. The locked-in state was observed below the 3D to 2D crossover temperature, independently of extrinsic pinning effects thanks to a high quality clean crystal and the use of a vortex shaking technique. The lock-in is enhanced by decreasing temperature and increasing magnetic field. The shape of the torque signal is in very good agreement with the model developped by Feinberg and Ettouhami [Int. J. Mod. Phys. B **7**, 2085 (1993)] for quasi-2D superconductors, despite the low anisotropy of the material. Additionally, we present a new torque magnetometer design featuring vortex shaking, and compatible with the *Quantum Design* PPMS system.

Hugo Keller
Physics Institute - University of Zurich

Date submitted: 01 Nov 2012 Electronic form version 1.4