Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Scanning SQUID-on-tip microscopy of vortex matter[1] YONATHAN ANAHORY, LIOR EMBON, DENIS VASYUKOV, JO CUPPENS, ELLA LACHMAN, DORRI HALBERTAL, ELAD YAAKOBI, AVIRAM URI, YURI MYASOEDOV, MICHAEL L. RAPPAPORT, Weizmann Institute of Science, MARTIN E. HUBER, University of Colorado at Denver, ELI ZELDOV, Weizmann Institute of Science, WEIZMANN INSTITUTE OF SCIENCE TEAM, UNIVERSITY OF COLORADO AT DENVER TEAM — We present a scanning nanoSQUID microscope with record spatial resolution, spin sensitivity, and operating magnetic fields for the study of vortex matter. The key element of the microscope is the SQUID-on-tip (SOT) device, which is fabricated by pulling a quartz tube into a sharp pipette, followed by three steps of thermal evaporation of a thin superconducting film onto the sides and the apex of the pipette. The devices operate at 4.2 K in applied fields of up to 1T and can be made with diameters down to 50 nm. The SQUIDs-on-tip display an extremely low flux noise of $\Phi_n = 50$ nΦ_0/Hz$^{1/2}$ and corresponding spin sensitivity of better than 1 μ_B/Hz$^{1/2}$ [1], which is about two orders of magnitude improvement over any previous SQUID. Using this new tool we have investigated static and dynamic behavior of vortices in superconducting Pb films. By driving *ac* and *dc* transport current we can study vortex displacement and the vortex potential landscape with sub-atomic precision. [1] D. Vasyukov, Y. Anahory, L. Embon, D. Halbertal, J. Cuppens, L. Neeman, A. Finkler, Y. Segev, Y. Myasoedov, M. L. Rappaport, M. E. Huber, and E. Zeldov, Nature Nanotech. **8**, 639 (2013)

[1]Azrieli and Minerva Foundation, FQRNT(Quebec), ERC (Europe)

Yonathan Anahory
Weizmann Institute of Science

Date submitted: 14 Nov 2013 Electronic form version 1.4