Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Investigation of vortex dynamics in type-II superconductors using a scanning SQUID-on-tip microscope LIOR EMBON, YONATHAN ANAHORY, DENIS VASYUKOV, JO CUPPENS, ELLA LACHMAN, DORRI HALBERTAL, NAREN HOOVINAKATTE, ELAD YAAKOBI, AVIRAM URI, YURI MYASOEDOV, MICHAEL RAPPAPORT, Weizmann Institute of Science, MARTIN HUBER, University of Colorado, ELI ZELDOV, Weizmann Institute of Science — A novel scanning microscope based on a nanoSQUID which is fabricated on the apex of a sharp tip has been developed. This SQUID-on-tip (SOT) based system possesses record spin sensitivity, spatial resolution, and operable magnetic fields, combined with a geometry which allows nanoscale sample-probe distance using tuning fork based AFM feedback. Our SQUIDs can operate at liquid 4He temperatures in applied magnetic fields of up to 1T, be made as small as 50 nm and display an extremely low flux noise of 50 $n\Phi_0/\sqrt{Hz}$ which corresponds to a spin sensitivity better than $1\mu_B/\sqrt{Hz}$ [1]. Using these newly acquired capabilities we can now directly image vortices in Pb films over a wide range of fields while running currents through the sample to exert force on the vortices and to controllably drive them from a static state to "flux creep" and to a "flux flow" regime.

[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)

Lior Embon
Weizmann Institute of Science

Date submitted: 15 Nov 2013 Electronic form version 1.4