

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Fluctuating pancake vortices revealed by dissipation of Josephson vortex lattice¹ ITSUHIRO KAKEYA, Kyoto University, Japan, ALEXEI KOSHELEV, Materials Science Division, Argonne National Laboratory, IL, ALEXANDER BUZDIN, Institut Universite de France and Universite de Bordeaux, France, TAKASHI YAMAMOTO, KAZUO KADOWAKI, University of Tsukuba, Japan — In strongly anisotropic layered superconductors in tilted magnetic fields the Josephson vortex lattice coexists with the lattice of pancake vortices. Due to the interaction between them, the dissipation of the Josephson-vortex lattice occurs to be very sensitive to the presence of the pancake vortices. If the c-axis magnetic field is smaller than the corresponding lower critical field the pancake stacks are not formed but the individual pancakes may exist in the fluctuational regime either near surface in large-size samples or in the central region for small-size mesas. We calculate the contribution of such fluctuating pancake vortices to the c-axis conductivity of the Josephson vortex lattice and compare the theoretical result with measurements on small mesas fabricated out of $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ crystals. A fingerprint of fluctuating pancakes is characteristic exponential dependence of the c-axis conductivity observed experimentally. Our results provide strong evidence of the existence of the fluctuating pancakes and their influence on the Josephson-vortex-lattice dissipation.

¹I.K. was supported by Sumitomo Foundation and Kakenhi (Grant-in-Aid) No. 23681030. A.E.K. was supported by UChicago Argonne, LLC, operator of Argonne National Laboratory, a U.S. DOE laboratory, operated under contract No. DE-AC02-06CH11357.

Itsuhiro Kakeya
Kyoto University, Japan

Date submitted: 11 Nov 2011

Electronic form version 1.4