

MAR13-2012-020018

Abstract for an Invited Paper
for the MAR13 Meeting of
the American Physical Society

Hot Spot and THz Wave Generation in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$ Intrinsic Josephson Junction Stacks

REINHOLD KLEINER, University of Tuebingen

Stacks of intrinsic Josephson junctions made of the high temperature superconductor $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$ have been shown to emit coherent radiation at THz frequencies [1]. Emission is observed both in a low bias regime and a high bias regime. While at low bias the temperature of the stack is close to the bath temperature, at high bias a hot spot and a standing wave, formed in the “cold” part of the stack, coexist [2-5]. THz radiation is very stable in this regime, exhibiting a linewidth which is much smaller than expected from a purely cavity-induced synchronization mechanism [6]. We investigate the interaction of hot spots and THz waves using a combination of transport measurement, direct electromagnetic wave detection and low temperature scanning laser microscopy (LTSLM). In this talk recent developments will be presented, with a focus on the mechanism of hot spot formation.

In collaboration with B. Gross, S. Guénon, M. Y. Li, J. Yuan, N. Kinev, J. Li, A. Ishii, K. Hirata, T. Hatano, R. G. Mints, D. Koelle, V. P. Koshelets, H. B. Wang and P. H. Wu.

- [1] L. Ozyuzer, et al., *Science* **318**, 1291 (2007).
- [2] H. B. Wang, et al., *Phys. Rev. Lett.* **102**, 017006 (2009).
- [3] H. B. Wang, et al., *Phys. Rev. Lett.* **105**, 057002 (2010).
- [4] S. Guenon, et al, *Phys. Rev B* **82**, 214506 (2010).
- [5] B. Gross, et al., *Phys. Rev. B* **86**, 094524 (2012).
- [6] M. Y. Li, et al., *Phys. Rev. B* **86**, 060505 (R) (2012).