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The electronic structure of $Bi_2Sr_2CaCu_2O_y$ in the presence of a super-current: Flux-flow, Doppler shift and quasiparticle pockets. AMIT KANIGEL, MUNTASER NAAMNEH, Physics department - Technion, J.C. CAMPUZANO, Physics department - UIC — There are several ways to turn a superconductor into a normal conductor: increase the temperature, apply a high magnetic field, or run a large current. High-Tc cuprate superconductors are unusual in the sense that experiments suggest that destroying superconductivity by heating the sample to temperatures above Tc or by applying a high magnetic field result in different 'normal' states. Spectroscopic probes show that above Tc, in the pseudogap regime, the Fermi surface is partly gapped and there are no well-defined quasiparticles. Transport measurements, on the contrary, reveal quantum oscillations in high magnetic fields and at low temperatures, suggesting a more usual Fermi liquid state. Studying the electronic structure while suppressing superconductivity by using current, will hopefully shed new light on this problem. We performed angle-resolved photoemission experiments in thin films of $Bi_2Sr_2CaCu_2O_y$ while running high-density current through the samples. Clear evidence was found for non-uniform flux flow, leaving most of the sample volume free of mobile vortices and dissipation. The super-current changes the electronic spectrum, creating quasiparticle and quasihole pockets. The size of these pockets as a function of the current is found to be doping dependent; it depends both on the superfluid stiffness and on the strength of interactions.

Amit Kanigel
Physics department - Technion

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