Robust d-wave pairing symmetry in hole-doped cuprate superconductors†
CHANG TSUEI, IBM T.J. Watson Research Center, Yorktown Heights, NY 10598

After a debate over many years, it is widely agreed that an order parameter with \( d_{x^2-y^2} \) symmetry has been established in optimally doped cuprate superconductors\(^1\). The controversy has now shifted to the possibility of changes in pairing symmetry as a result of doping. In this talk, we will first report new results of a precise measurement on the location of nodes in the d-wave gap function at the Fermi surface of a high-\( T_c \) superconductor \( \text{YBa}_2\text{Cu}_3\text{O}_7 \). We will then present a series of phase-sensitive tricrystal experiments to demonstrate, using the half-flux quantum effect, that the d-wave pair state in several cuprate systems is robust against a wide range of doping variations from under-doped, through optimal doping, to over-doped regimes. Implications of the findings of this work for understanding high-temperature superconductivity will be discussed at the end of the talk.

† work done with J.R. Kirtley, A. Ariando, Hans Hilgenkemp, G. Hammerl, J. Mannhart, H. Raffy, and Z.Z. Li.