Filling of a supercondonducting gap by photoinduced fluctuations

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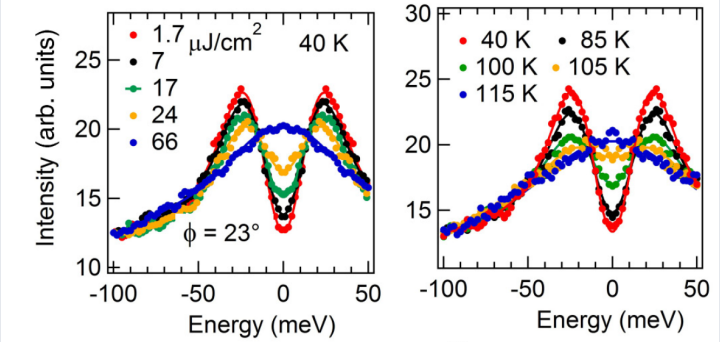
Conversely to conventional superconductors, the cuprates display a layered structure and a pairing interaction extending over a fewlattice sites. As a consequence the d-wave gap does not follow a mean-field behaviour. As shown by the figure, the thermal excitation (rigth panel) or photoexcitation (left panel) gradually fill the gapped spectral region. By employing tim and angle resolved photoelectron spectroscopy we observed that thermal fluctuations are effective only for temperatures near the critical value whereas photoinduced fluctuations scale linearly at low pumping fluence. The peculiar behavior of the photoexcited state indicates that Cooper pairs scatter with a nonthermal distribution of low-energy excitations. We show that an intermediate coupling model accounting for the finite pair breaking explains the gap filling both in the near-nodal as well as in the off-nodal direction.



Z. Zhang, C. Piovera, E. Papalazarou, M. Marsi, M. d'Astuto, C. J. van der Beek, A. Taleb-Ibrahimi and L. Perfetti, *Photoinduced filling of near-nodal gap in $Bi_2Sr_2CaCu_2O_{8+\delta}$*, Physical Review B 96, 064510 (2017)

Résultats obtenus dans le cadre du projet FEMTOARC financé par le thème 1 du LabEx PALM et porté par Luca Perfetti (LSIà et Amina Taleb (SOLEIL).