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# The role of chains for superconductivity inoptimally doped YBCO thin films: ARPES view

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YBCO is a famous and intensively studied compound belonging to the high-temperature cuprate superconductors. It might sound boring to study such an old system. However, there are many important and unsolved problems to be clarified. For example,the electronic interaction bewteen chains and planes is not yet understood as well as the role of chains for superconductivity. One reason, why the scientific progress for Y123 stagnated in this compound, was the experimental feasibility. In contrast to the Y124 phase [1-3], which has a stable surface after the cleavage of single crystals, the Y123 phase has no natural cleavage plane [4]. As a result, electronic reconstruction occurs and drives the system out of the polar catastrophe scenario [5], leaving behind an overdoped surface. Thus, the optimally doped compound is not accessible in this way.Significant progress was done by Y. Sassa et al., who were able to overcome the polar catastrophe problem and could grew Y123 films for the first time by using a suitable substrate underneath [6,7]. We were now able to optimize the Y123 film growth and could stabilize the nearly optimally doped Ortho-I phase of Y123. In contrast to previous experiments [8-10], the absence of band foldings enables the precise angle-dependent measurement of the chains and planes separately. We find a clear d-wave superconducting gap on the planes, whereas the chains are isotropically gapped. Beeing able to track signals coming from the chains and planes separately, this paths the way for future experiments which could give the additional piece of information to understand superconductivity and/or the role of chains for superconductivity in HTSC cuprates.

[1] T. Kondo et al., Phys. Rev. Lett. 98 , 157002 (2007).
[2] T. Kondo et al., Phys. Rev. B. 80 , 100505 (2009).
[3] T. Kondo et al., Phys. Rev. Lett. 105 , 267003 (2010).
[4] V. B. Zabolotny et al., Phys. Rev. B. 76 , 064519 (2007).
[5] G. Koster et al., Phys. Condens. Matter 20, 264007 (2008).
[6] Y. Sassa et al., Phys. Rev. B. 83 , 140511(R) (2011).
[7] Y. Sassa, PhD thesis EPFL (2011).
[8] H. L. Edwards et al., Phys. Rev. Lett. 69 , 2967 (1992).
[9] D. J. Derro et al., Phys. Rev. Lett. 88 , 097002 (2002).
[10] K. Nakayama et al., Phys. Rev. B. 75 , 014513 (2007).

## Position

Postdoc

**Primary author:** JANDKE, Jasmin Maria (PSI - Paul Scherrer Institut)

**Co-authors:** Dr NAAMNEH, Muntaser (PSI); CAPUTO, Marco (Paul Scherrer Insitut); BONINI GUEDES, Eduardo (Paul Scherrer Institute); SASSA, Yasmine (ETH Zurich); Dr MAUREL VELÀZQUEZ, Laura; PLUMB, Nicholas (Paul Scherrer Institut); SHI, Ming (Paul Scherrer Institut); RADOVIC, Milan (Paul Scherrer Institut)

**Presenter:** JANDKE, Jasmin Maria (PSI - Paul Scherrer Institut)

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