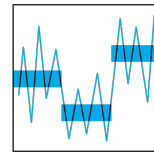
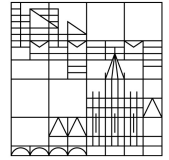


Physikalisches Kolloquium

SFB 1432



Universität
Konstanz



Di 25.10.22
15:15 Uhr
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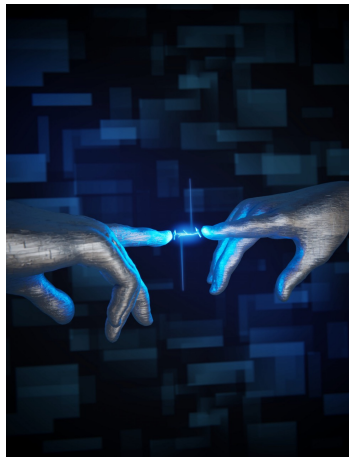
Im Anschluss Kaffee/Tee



Prof. Dr. Juan Carlos Cuevas
Autonomous University of Madrid
SFB 1432 Mercator Fellow

Interplay between superconductivity and magnetism at the atomic scale: Yu-Shiba-Rusinov bound states

The competition between magnetism and superconductivity is one of the most fundamental problems in condensed matter physics. The ability of the scanning tunneling microscope (STM) to manipulate individual magnetic atoms and molecules has enabled to study this competition at the atomic scale. One of the most interesting manifestations of the interplay between these two antagonistic phases of matter is the appearance of the so-called Yu-Shiba-Rusinov (YSR) bound states in the spectrum of a single magnetic impurity coupled to a superconductor. Numerous STM-based experiments on single magnetic impurities on surfaces of conventional superconductors have reported the observation of these superconducting bound states. Those experiments have elucidated many basic aspects of the YSR states, but there are still many open questions. In this talk, I will present our recent advances in the understanding of YSR states resulting from a close collaboration between experiment and theory. In particular, I will report on two different topics: (i) tunnelling between individual YSR states [1-3] and (ii) the Josephson current as a tool to probe a YSR quantum phase transition [4].



- [1] H. Huang, C. Padurariu, J. Senkpiel, R. Drost, A. Levy Yeyati, J.C. Cuevas, B. Kubala, J. Ankerhold, K. Kern, C.R. Ast, *Nature Physics* 16, 1227 (2020).
- [2] A. Villas, R.L. Klees, G. Morrás, H. Huang, C.R. Ast, G. Rastelli, W. Belzig, J.C. Cuevas, *Phys. Rev. B* 103, 155407 (2021).
- [3] H. Huang, J. Senkpiel, C. Padurariu, R. Drost, A. Villas, R.L. Klees, A. Levy Yeyati, J.C. Cuevas, B. Kubala, J. Ankerhold, K. Kern, C.R. Ast, *Phys. Rev. Research* 3, L032008 (2021).
- [4] S. Karan, H. Huang, C. Padurariu, B. Kubala, G. Morrás, A. Levy Yeyati, J.C. Cuevas, J. Ankerhold, K. Kern, C.R. Ast, *Nature Physics* 18, 893 (2022).