



Physical Sciences Seminar

Superconducting Quantum Interference at the Atomic Scale

Christian Ast

Max Planck Institute for Solid State Research | Germany

Host: Georgios Katsaros

Magnetic impurities on superconductors give rise to discrete bound states inside the superconducting gap known as Yu-Shiba-Rusinov (YSR) states. Varying the impurity-superconductor coupling induces a quantum phase transition (QPT) as the YSR state energy passes through zero. The concomitant sign change in the Josephson current – a long sought for hallmark of this QPT – has remained elusive so far. Using scanning tunneling microscopy (STM), we demonstrate such a 0 to π transition of a Josephson junction through a YSR state as we continuously change the impurity-superconductor coupling [1]. We detect the sign change in the Josephson current by exploiting a second transport channel as a reference in analogy to a superconducting quantum interference device (SQUID), which provides a rudimentary phase sensitivity for the STM. The change in the Josephson current through the QPT is significant and demonstrates the role of the impurity spin as well as the parity change across the QPT.[1] Karan, et al., Nature Physics 18, 893 (2022)

Tuesday, March 12, 2024 11:00am - 12:00pm

Heinzel Seminar Room / Ground Floor / Office Building West



This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station. Please find a schedule of the ISTA Shuttle on our webpage: <https://ista.ac.at/en/campus/how-to-get-here/> The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.