Chez Pierre

Presents ...

Monday, October 25, 2021

12:00pm Noon

Chez Pierre Seminar

Nurit Avraham – The Weizmann Institute of Science

"Visualization of Topological Boundary Modes Manifesting Topological Nodal-Point Superconductivity."

Abhay Kumar Nayak, Aviram Steinbook, Yotam Roet, Jahyun Koo, Gilad Margalit, Irena Feldman, Avior Almoalem, Amit Kanigel ,Gregory A. Fiete , Binghai Yan, Yuval Oreg ,Haim Beidenkopf

Topological superconductors are an essential component for topologically protected quantum computation and information processing. Although signatures of topological superconductivity have been reported in heterostructures, material realizations of intrinsic topological superconductors are rather rare. In my talk I will present scanning tunnelling spectroscopy measurements of the transition metal dichalcogenide 4Hb-TaS_2, that interleaves superconducting 1H-TaS_2 layers with strongly correlated 1T-TaS_2 layers, showing spectroscopic evidence for the existence of topological surface superconductivity. These include edge modes running both along 1H layer terminations and under 1T layer terminations, where they separate between superconducting regions of distinct topological nature. We also observe signatures of zero-bias states in vortex cores. All boundary modes exhibit crystallographic anisotropy, which together with a finite in-gap density of states throughout the 1H layers allude to the presence of a topological nodal-point superconducting state. Our theoretical model attributes this phenomenology to an inter-orbital pairing channel that necessitates the combination of surface mirror symmetry breaking and strong interactions. I will describe the model and show its correspondence with the experimental data.