Physical Sciences Seminar

Towards Topological Superconductivity in Epitaxial Superconductor-Semiconductor Materials Systems

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Host: Andrew Higginbotham

A central goal in condensed matter physics is to understand and control the order parameter characterizing the collective state of electrons in quantum heterostructures. For example, new physical behaviors can emerge that are absent in the isolated constituent materials. With regards to superconductivity this has opened a whole new area of investigation in the form of topological superconductivity. This type of superconductivity is expected to host exotic quasi-particle excitations including Majorana bound states which hold promise for fault-tolerant quantum computing. In this talk, we first discuss the important role of epitaxial superconductor-semiconductor hybrid systems as an enabling materials platform. We present unprecedented values of transparency and induced gap that could allow us to reach into previously unexplored parameter regimes. In wide Josephson junctions exposed to magnetic field, we observe a minimum of critical current accompanied with a phase jump in the superconducting phase. We discuss this observation as a signature of a transition between trivial and topological superconductivity. These findings in addition to new directions in proximitizing edge modes reveal a versatile two-dimensional platform to explore mesoscopic and topological superconductivity

Tuesday, July 5, 2022 11:00am - 12:00pm

ISTA Campus Heinzel Seminar Room / Office Bldg West (I21.EG.101)

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