Condensed Matter Physics Seminar Series

Exotic Superconductivity in Graphene Multilayers

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Recently, untwisted graphene multilayers have emerged as a rich platform to study quantum many-body physics. I will describe recent experiments on a stack of three layers of graphene, where superconductivity was recently discovered at the boundary between states with different broken symmetries. Experiments hint to an unconventional mechanism for superconductivity, where counterintuitively, the binding of electrons into pairs originates from the repulsive Coulomb interaction between them. Even more interestingly, one of the superconducting phases in tri-layer graphene seems to be an unusual fully spin polarized triplet state. The topology of its order parameter space, that intertwines the phase of the superconducting condensate with the spin polarization, can lead to unusual phenomena, such as anomalous supercurrent dissipation and a fractional-period ac Josephson effect.

Erez Berg is a theoretical physicist working at the Weizmann Institute of Science. After receiving his PhD from Stanford University, he received post-doctoral training from Harvard University covering topics of quantum many-body systems and topological phases of matter. In 2019, he was named Blavatnik Awards Physical Sciences & Engineering Laureate. Erez currently works as a tenured professor at Weizmann Institute of Science.