THE UNIVERSITY OF UTAH

NOVEL SUPERCONDUCTORS IN TWO-DIMENSIONAL MATERIALS AND HETEROSTRUCTURES

presented by

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AT 4PM
JFB 334

REFRESHMENTS WILL BE SERVED IN
JFB 334
AT 3:45PM

PHYSICS & ASTRONOMY DEPARTMENT
CONDENSED MATTER SEMINAR

ABSTRACT

The physics of superconductors in reduced dimensions — two in particular — is related to such varied phenomena as high-temperature superconductivity, topological superconductivity, and the paradigmatic quantum phase transition, the superconductor-insulator transition. The discovery of graphene has led to the ability to produce new, highly crystalline 2D superconductors from other van der Waals bonded materials, which has given us access to superconductivity in single atomic layers as well as new ways of tuning and understanding superconductivity in these systems. In this talk, I will present an overview of superconductivity in two dimensions and I will discuss our recent experiments on single- and few-atomic-layer devices constructed from the transition metal dichalcogenides TaS_2 and $NbSe_2$, which possess remarkable properties due to their crystal symmetry and strong spin-orbit coupling (known as "Ising superconductivity"). I will discuss their connection to exotic phenomena such as spin-triplet Cooper pairing and topological superconductivity. Additionally, I will discuss our measurement of the superconducting proximity effect in the helical metallic edge states of the two-dimensional topological insulator 1T'-WTe_2. These experiments have implications for the realization of topological superconductivity in 1D and the creation of Majorana modes in a van der Waals material platform.