PHYSICS & ASTRONOMY SEMINAR

"Quantum Technologies with Atoms and Solids"

Presented by:

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Abstract: From knotted cords to contemporary computers, the revolution of information technologies has been a major driving force for human civilization. Since its birth in early 1900's, quantum mechanics has played a fundamental role in the innovation of many crucial technologies (e.g., lasers, transistors), which are considered as major achievements of the "first quantum revolution". In the past two decades, the technological quest has focused on the "second quantum revolution", with the goal of developing novel quantum technologies that utilize the creation, manipulation, and measurement of quantum superposition and entanglement in quantum materials. In this talk, I will review this field and showcase the great power of quantum technologies with two examples: the design of a novel quantum matter - superfluid quasicrystals with ultracold atoms, and the realization of exotic Majorana fermions in the solid state heterostructure of 2D material/s-wave superconductor for fault-tolerant topological quantum computation. Despite of the technological challenges, quantum technologies could potentially advance our society by revolutionizing computing, communication, security, materials, and sensors in the near future.

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