TcSUH Bi-Weekly Seminar

Engineering Material Properties Through Metastability: Superconductivity, Magnetism, and Topology

Prof. Liangzi Deng

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and PI, Texas Center for Superconductivity at the University of Houston

Thursday, November 21, 2024

In Person – Room 102, Houston Science Center, 12:00 p.m. – 1:00 p.m.

Sandwiches will be provided on a first-come, first-served basis.

ABSTRACT: As the renowned material scientist Pol Duwez once noted, almost all solids important to industry are in their metastable state. For example, all record-high superconducting transition temperatures (T_cs) have been achieved only in materials under pressure, which are thus in a metastable state. The record T_c of 164 K in cuprates was set by Prof. Ching-Wu Chu's group at UH and collaborators under 31 GPa in 1994. Pressure has played a crucial role in the development of materials for science and technology due to its simplicity in varying the basic parameter of solids, the interatomic distance, without introducing complications associated with altering the chemistry of the compounds. Prof. Deng will discuss discoveries made together with Prof. Chu and colleagues in engineering the properties of different materials, including superconductors, skyrmions, and topological solids, by tuning their metastability under pressure. He will also share their recent breakthroughs in successfully retaining pressure-induced/-enhanced superconducting phases at ambient pressure in multiple systems, which has helped to pave the way for exploring uncharted physics of novel metastable states and has set a milestone toward advancing applications of superconductivity.

BIO: Prof. Liangzi Deng currently serves as an Assistant Professor in the Department of Physics and as a Principal Investigator at the Texas Center for Superconductivity, University of Houston (UH). His thesis advisor was Prof. Ching-Wu Chu, and he obtained his Ph. D. in Physics from UH in 2015. Deng's research interests lie in experimental condensed matter physics, with a focus on superconductivity, magnetism, and topology. He is particularly excited about maintaining at ambient conditions the record-high-temperature superconductivity initially achieved in certain materials under high pressure, which will enable thorough scientific studies and practical applications of these materials. His recent leading work on superconductors and topological solids has resulted in several high-profile publications, including in *Proceedings of the National Academy of Sciences* and *Nature Communications*. He has also collaborated on studies of two-dimensional materials and thermoelectric compounds that have been published in *Science*, *Nature Nanotechnology*, *etc.* Deng is a recipient of a TcSUH Welch Professorship and an MRS Outstanding Early Career Researcher Award and has been recognized as a UH 50-in-5 Scholar.