SACRAMENTO STATE

Department of Physics and Astronomy

SPRING 2021 Colloquium Series - Virtual

"Room Temperature Superconductivity in a Carbonaceous Sulfur Hydride"

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One of the long-standing challenges in experimental physics is the observation of room-temperature superconductivity. Recently, high-temperature conventional superconductivity in hydrogen-rich materials has been reported in several systems under high pressure. An important discovery leading to room-temperature superconductivity is the pressure-driven disproportionation of hydrogen sulfide (H2S) to H3S, with a confirmed transition temperature of 203 kelvin at a very extreme pressure of 155 gigapascals. By introducing methane at low pressures into the H2S + H2 precursor mixture for H3S, molecular exchange is allowed within a large assemblage of van der Waals solids that are hydrogen-rich with H2 inclusions; these guest–host structures become the building blocks of superconducting compounds at extreme conditions. I will present our recent observation of superconductivity in a photochemically transformed carbonaceous sulfur hydride system, starting from elemental precursors, with a maximum superconducting transition temperature of 287.7 ± 1.2 kelvin achieved at 267 ± 10 gigapascals. I will also highlight pathways for reducing the pressure to create these remarkable quantum materials, along with a projection of future technology.

Thursday, March 18, 2021
4:00 – 5:20PM

Talk will be via Zoom – contact physics@csus.edu for links

Open & Free to all students, faculty and public