TcSUH Special Seminar

Superconductivity in Compressed Iron Arsenide and Selenide

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University of Houston Science Center
Room 102
12:00 noon – 1:00 p.m.

ABSTRACT:

Iron-based superconductors are classified as the second family exhibiting high-temperature superconductivity after copper oxides. Here I will talk about our recent studies on the superconducting and normal-state properties of electron- and hole-doped iron arsenide and iron selenide through resistivity, specific heat, magnetization, and x-ray diffraction measurements at different pressures up to 60 GPa, temperatures down to 60 mK, and magnetic fields up to 60 T. New evidence is provided for quantum criticality in the compressed parent iron arsenide as well as electron-doped iron arsenide. Two physical parameters are identified to control the superconducting transition temperature in both electron- and hole-doped iron arsenide. An unexpected insulating state is observed in some heavily compressed compounds. The heavy compression can also drive the system to re-enter novel superconductivity with much higher transition temperature than the ambient value. These results indicate that rich physics is still hidden in iron-based superconductors.

BIO:

Xiao-Jia Chen is currently a staff scientist of the newly established Center for High-Pressure Science and Technology Advanced Research in Shanghai. He was awarded as a Global Expert of the 1000 Talent Plan from the Central Government of China in 2014. He also holds a joint scientist position with U.S. Carnegie Institution of Washington's Geophysical Laboratory where he has been working since 2003. He earned his bachelor degree from Xianyang Normal University in 1990, Master degree from Henan Normal University in 1993, and Ph. D. from Zhejiang University in 1997. He has expertise in the experimental and theoretical study of superconductivity, magnetism, and hydrogen-bearing materials at high pressures. He served as a leader of superconductivity program of U.S. Department of Energy's Energy Frontier Research in Extreme Environments Center during 2009-2014 before moving to China, where his research led to the discovery of the enhanced superconductivity at higher pressure in cuprates and the re-emergence of superconductivity at higher pressure with much higher T_c than the ambient value in iron-based superconductors. His current research focuses on the discovery of new superconductors and the improvement of the performance of known superconductors by understanding the fundamental physics of superconductivity. He has published over 100 papers in peer-reviewed scientific journals including *Nature and its research journals* and *Physical Review Letters* and *Physical Review B*.

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