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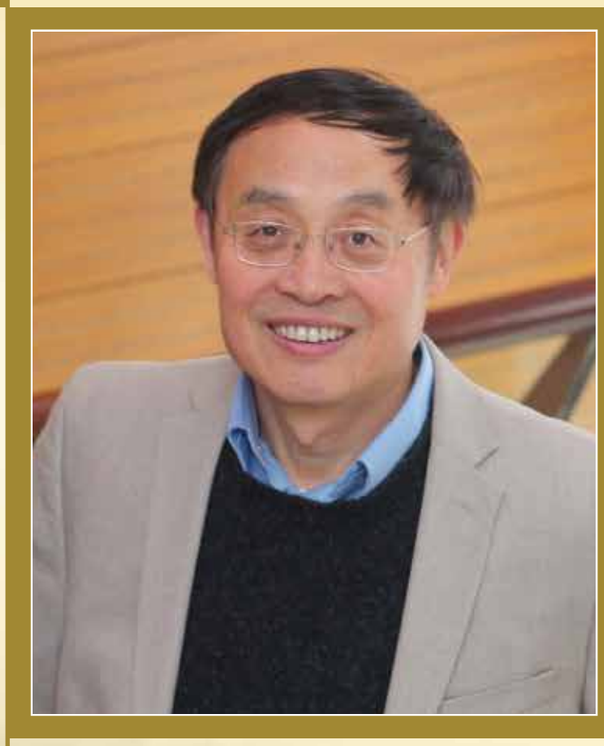

Speaker

Professor Xin-Cheng Xie

Dean of the School of Physics, Peking University

Member of Chinese Academy of Sciences

Spin Superconductor and Electric Dipole Superconductor

on

Friday, 27 October 2017 at 4:30 pm

at

Connie Fan Multi-media Conference Room
4/F Cheng Yick-chi Building
City University of Hong Kong
Tat Chee Avenue, Kowloon

Abstract

In this lecture, Professor Xie will discuss the concept of the spin superconductor (SSC), a counterpart to the charge superconductor. He will introduce the theoretical study carried out by his team to show the existence of a spin superconductor in a ferromagnetic graphene, in which the spin-polarized electron-hole excitons play the roles of the 'Cooper' pairs. The BCS-type theory and the Laudau-Ginzburg theory for the SSC will be presented. With the "London-type equations" of the super-spin-current density, Professor Xie will demonstrate the existence of an electric "Meissner effect" against a spatial varying electric field. He will also show their further study of a SSC/normal conductor/SSC junction, which predicts a spin-current Josephson effect. Recent experimental results showing spin superconductor in canted antiferromagnetic Cr2O3 via nonlocal spin transport will be reported.

By viewing the exciton in a bilayer system as an electric dipole, Professor Xie will provide a general theory for the electric dipole superconductivity, and derive the London-type and Ginzburg-Landau-type equations for the electric dipole superconductors. With these equations, he will describe the Meissner-type effect and the electric dipole current Josephson effect. These effects can provide direct evidence for the formation of the exciton superfluid state in bilayer systems and pave new ways to drive an electric dipole current.

Biography

Professor Xin-Cheng Xie obtained his B.Sc. in Physics from the University of Science and Technology of China in 1982 and Ph.D. from the University of Maryland in 1988. He became a faculty member in the Department of Physics at Oklahoma State University in USA in 1991 and was named as Regents Professor in 2004. He worked as Chief Scientist and Director of Laboratory of Condensed Matter Theory and Computation at the Institute of Physics, Chinese Academy of Sciences from 2005 to 2010. Professor Xie joined Peking University in 2010 as Chair Professor and Founding Director of International Center for Quantum Materials. In 2011 he was appointed as the Dean of the School of Physics at Peking University. Professor Xie became the Department Director of Mathematical and Physical Sciences, National Natural Science Foundation of China (NSFC) in 2016.

Professor Xie's main research interests include quantum Hall effect, quantum transport, topological matter and strongly correlated electron systems. He has authored over 200 scholarly articles, including 36 in Physical Review Letters and over 100 in other Physical Review journals. He has delivered more than 180 invited talks at universities and conferences worldwide. Professor Xie was elected as Fellow of American Physical Society in 2008 and Member of Chinese Academy of Sciences in 2015. He is an editorial board member of several international peer-reviewed journals, such as a Divisional Associate Editor for Condensed Matter Division of Physical Review Letters (PRL) and the Editor-in-Chief of Science China Physics, Mechanics & Astronomy. He also serves on the international advisory committees of many international conferences and institutes.

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