Seminar

Jing Xia

Department of Physics and Astronomy, UC Irvine

时间　　年 月 日（周一）下午

地点：北京大学物理楼 西

Abstract

In this talk, I will discuss our recent results on 2D magnetism and superconductivity using a scanning Sagnac MOKE microscope, which is based on a Sagnac interferometer technique first developed at Stanford [1], and has achieved unprecedented nanoradian level Kerr and Fraday sensitivity even at DC. In exfoliated $Cr_2Ge_2Te_6$(CGT) atomic layers, we report [1] the discovery of intrinsic ferromagnetism in 2D van der Walls crystals, defying the well-known Mermin-Wagner theorem. Unlike 3D magnetism, the ferromagnetic order in this 2D system is stabilized by magnetic anisotropy from the CGT structure, which is not present in graphene. As a result, changing the magnetic anisotropy with a small external magnetic field was found to strongly enhance the Curie temperature, which is a feature unique to 2D magnetism. An emerging alternative route for developing new multifunctional perovskite is by modification of the oxygen octahedral structure. We demonstrate [2] the control of structural oxygen octahedral rotation in ultrathin perovskite $SrRuO_3$ films by the deposition of a $SrTiO_3$ capping layer, which can be patterned to achieve local control. We show an increase in the Curie temperature of $SrRuO_3$ due to the suppression octahedral rotations revealed by the synchrotron x-ray diffraction. In epitaxial Bi/Ni bilayer samples, we report [3] the observation of 2D superconductivity that spontaneously breaks time-reversal symmetry (TRS). Because of strong spin-orbit interaction and lack of inversion symmetry in a Bi/Ni bilayer, superconducting pairing cannot be classified as singlet or triplet. We propose a theoretical model where magnetic fluctuations in Ni induce the superconducting pairing of the dxy ± idx2+y2 orbital symmetry between the electrons in Bi. In