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Discovery of new monolayer material Nb_3SiTe_6 JIN HU, XUE LIU, CHUNLEI YUE, ZHIQIANG MAO, JIANG WEI, Department of Physics and Engineering Physics, Tulane University — The discovery of atomically-thin materials, such as graphene and monolayer transition metal dichalcogenides, has ushered in a new era of low-dimensional physics. Due to the quantum confinement effect in reduced dimensionality, the electronic structures of monolayer materials are reconstructed, leading to exotic physical properties such as Dirac fermions in graphene, large direct band gap and valley-spin coupling in MoS_2. Recently we prepared a new monolayer form of a complex material Nb_3SiTe_6. Nb_3SiTe_6 possesses a tetragonal structure with each Nb-Si lattice sheet sandwiched by two Te layers. The Te-Nb/Si-Te layers are coupled by Van der Waals gap. Similar to MoS_2, within Te-Nb/Si-Te layers each Nb forms six bonds with Te atoms, forming trigonal prismatic coordination. We successfully obtained mono-layer Nb_3SiTe_6 using micro-mechanical exfoliate technique. While bulk Nb_3SiTe_6 is metallic, the electronic properties of Nb_3SiTe_6 monolayer are expected to be distinct from those of bulk due to the quantum confinement effect. In this talk, we will report the preparation and electronic properties of Nb_3SiTe_6 monolayer. This success of preparing Nb_3SiTe_6 monolayer provides a new playground for studying low dimensional physics and nanotechnology.

Jin Hu
Department of Physics and Engineering Physics, Tulane University

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