清华大学高等研究院

Institute for Advanced Study, Tsinghua University

学术报告

Title: **Enhanced Rashba spin-orbit interaction in transition metal oxide heterostructure**

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Time: **10:30am, Thursday, Jan 7, 2016**

Venue: **Conference Hall 322, Science Building, Tsinghua University**

Abstract

An intriguing feature of the two-dimensional electron gas (2DEG) emerging at the transition metal oxide surface is the Rashba spin-orbit interaction, the momentum-dependent spin splitting due to the broken inversion symmetry and atomic spin-orbit coupling. Although a large Rashba splitting is generally desirable for both scientific studies and practical applications, it has not been understood how we can maximally enhance this splitting. Here, we present a promising route to realize significant Rashba-type band splitting using a thin film heterostructure. Based on first-principles methods and analytic model analyses, a tantalate monolayer on BaHfO$_3$ is shown to host two-dimensional bands %with %considerable band splittings, originating from Ta t_{2g} states with strong Rashba spin splittings at both the band minima and saddle points. An important factor in this enhanced splitting is the significant t_{2g}-e_g interband coupling, which can generically arise when the inversion symmetry is maximally broken in the 2DEG on a transition metal oxide surface. Our results could be useful in realizing topological superconductivity at oxide surfaces.