

Abstract Submitted
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Carrier Mediated Ferromagnetism in Fe-doped SrTiO₃¹ CHUN-LAN MA, School of Mathematics and Physics, Suzhou University of Science and Technology, Suzhou 215009, China, ROCIO CONTRERAS-GUERRERO, RAVI DROOPAD, Ingram School of Engineering, Texas State University, San Marcos, TX 78666, USA, BYOUNGHAK LEE, Department of Physics, Texas State University, San Marcos, TX, 78666, USA — The discovery of III-V dilute magnetic semiconductors (DMSs) and the subsequent unsuccessful search for room temperature ferromagnetism in DMSs have motivated researches on alternate dilute magnetic systems. Recent progresses in thin film growth techniques of perovskite oxides suggest that dilute magnetic oxides (DMOs) can be viable candidates to improve the magnetic properties of DMSs. In this talk we present an ab initio study of Fe-doped SrTiO₃. We find that a ferromagnetic ordering among localized Fe t_{2g} spins is mediated by itinerant Fe e_g electrons. The exchange interaction between t_{2g} and e_g electrons depends on crystal field splitting, on-site electron-electron interaction, and the relative energy of Fe d-orbitals to oxygen p-orbitals. The exchange coupling and the majority-minority spin splitting decrease with decreasing carrier concentration, confirming that itinerant carriers mediate the ferromagnetism.

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