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Novel Manifestations of Defects in Cobalt-doped TiO_2 ALEXANDRE LUSSIER, E. NEGUSSE, J. HOLROYD, J. DVORAK, Y.U. IDZERDA, Dept. of Physics, Montana State University, Bozeman, MT 59717, USA, E. ARENHOLZ, The Advanced Light Source, Berkeley, CA 94720, USA, S.R. SHINDE, S.B. OGALE, T. VENKATESAN, Center for Superconductivity Research, Dept. of Physics, University of Maryland, College Park, MD 20742-4111, USA — Room temperature ferromagnetism in magnetic-impurity-doped metal oxides offers the hope of integrating magnetism in conventional semiconductor technology, resulting in a new and more powerful generation of electronics. New models have been proposed to explain the still unresolved ferromagnetic mechanisms and experimental data is required to confirm or disprove them. Our experimental measurements by X-ray Absorption Spectroscopy (XAS) revealed a surprising new spectral feature at the L_2 and L_3 edges of cobalt in cobalt-doped rutile TiO_2, anatase TiO_2, and $La_{0.5}Sr_{0.5}TiO_3$. Our observations, and supporting Monte Carlo simulations, show that the feature is associated with isolated defects consisting of cobalt atoms and accompanying oxygen vacancies. We will reveal the striking similarities between our model and a recently proposed theoretical model for ferromagnetism.

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