

Abstract Submitted  
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**Compass Impurity Model of Tb Substitution in  $\text{Sr}_2\text{IrO}_4$** <sup>1</sup> LONG ZHANG, FA WANG, Peking University, DUNG-HAI LEE, University of California, Berkeley — We show that upon Tb substitution the interaction between the magnetic moments on the impurity  $\text{Tb}^{4+}$  ion and its surrounding  $\text{Ir}^{4+}$  ions is described by a “compass” model, i.e., Ising-like interaction favoring the magnetic moments across each bond to align along the bond direction. Such interaction nucleates quenched magnetic vortices near the impurities and drives a reentrant transition out of the antiferromagnetic ordered phase at low temperatures hence quickly suppresses the Néel temperature consistent with the experiment [Phys. Rev. B **92**, 214411 (2015)]. As a by-product, we propose that the compass model can be realized in ordered double perovskites composed of the spin-orbital-coupled  $d^5$  ions and the half-closed-shell  $f^7$  ions.

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