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"Switching" of Magnetic Anisotropy in Magnets with Strong Spin-Orbit Coupling HIROAKI ISHIZUKA, LEON BALENTS, Univ of California - Santa Barbara — Motivated by recent studies on heavy-element magnetic oxides, we theoretically study a spin model on a fcc lattice with bond-dependent anisotropic interactions. Strong spin-orbit coupling in heavy elements often gives rise to bond-dependent anisotropic interactions in magnetic compounds. Such anisotropic interactions are known to induce peculiar magnetic behavior such as quantum spin-liquid and order-by-disorder. In this study, we investigate magnetic anisotropy of a fcc lattice antiferromagnet with bond-dependent interactions. We show that, in this model, the magnetic anisotropy is induced by fluctuations in both high-temperature paramagnetic and low-temperature magnetically-ordered phases. Furthermore, they show strong temperature dependence and switching of the magnetic anisotropy as the temperature decreases; ¡111¿ direction is favored in high-temperature above magnetic transition, while ¡100¿ or ¡110¿ is favored in the ordered phase, depending on the parameter. This is in contrast to the magnetic anisotropy induced by crystal field, which is independent of temperature. Observation of this temperature dependent anisotropy may provide a way to experimentally determine the anisotropic interaction in heavy-element magnets.

Hiroaki Ishizuka
Univ of California - Santa Barbara

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