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Surface ferri-magnetism in some antiferromagnetic materials

YONGBIN LEE, Ames Laboratory; Dept. of Physics and Astronomy, Iowa State University, Ames, BRUCE HARMON, Ames Laboratory; Dept. of Physics and Astronomy, Iowa State University, Ames — In an antiferromagnetic material with inversion symmetry the electronic energy bands are spin degenerate because of time reversal symmetry. However, at the surface the inversion symmetry is broken, which opens the possibility of breaking the spin degeneracy and inducing a significant net moment on the surface. As an example of this spin degeneracy breaking, we discuss the electronic structure of antiferromagnetically ordered BaMn_2As_2 . Unlike the bulk bands, its surface bands can individually possess a net spin polarization. Also the bulk bands in this material have a gap, however the calculated spin polarized surface states cross the Fermi level. Our calculations show that an applied field perpendicular to the surface and along the spin axis induces a significant net surface magnetization, which does not extend significantly into the bulk. - Work at the Ames Laboratory was supported by the US DOE, Basic Energy Science, under contract No. DE-AC02-07CH11358.

Yongbin Lee
Ames Laboratory; Dept. of Physics and Astronomy,
Iowa State University, Ames

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