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Universal exchange-driven phonon splitting JOACHIM DEISENHOFER, Augsburg University, CHRISTIAN KANT, Technical University of Vienna, MICHAEL SCHMIDT, ZHE WANG, FRANZ MAYR, VLADIMIR TSURKAN, ALOIS LOIDL, Augsburg University — We report on a linear dependence of the phonon splitting on the non-dominant exchange coupling J_{nd} in the antiferromagnetic monoxides MnO, Fe_{0.92}O, CoO and NiO, and in the highly frustrated antiferromagnetic spinels CdCr₂O₄, MgCr₂O₄ and ZnCr₂O₄. For the monoxides our results directly confirm the theoretical prediction of a predominantly exchange induced splitting of the zone-centre optical phonon [1,2]. We find the linear relation $\hbar\Delta\omega = \beta J_{nd} S^2$ with slope $\beta = 3.7$. This relation also holds for a very different class of systems, namely the highly frustrated chromium spinels. Our finding suggests a universal dependence of the exchange-induced phonon splitting at the antiferromagnetic transition on the non-dominant exchange coupling [3].

[1] S. Massidda et al., Phys. Rev. Lett. 82, 430 (1999).

[2] W. Luo et al., Solid State Commun. 142, 504 (2007).

[3] Ch. Kant et al., arxiv:1109.4809.

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