The nature of magneto-elastic coupling with the isovalent substitution at the B-site in \( \text{LaCo}_{1-y}\text{B}_y\text{O}_3 \) JUAN YU, DESPINA LOUCA, Physics Department, University of Virginia — The influence of magnetic ion doping on the interplay of the lattice with magnetism in \( \text{LaCo}_{1-y}\text{B}_y\text{O}_3 \) (\( B = \text{Ni or Fe, } y = 0.1, 0.4 \)) has been investigated via neutron scattering techniques. The substitution of either \( \text{Ni}^{3+} \) (3d\(^7\)) or \( \text{Fe}^{3+} \) (3d\(^5\)) does not alter the crystal symmetry which remains rhombohedral (R-3c) at all temperatures. With doping, the degree of cooperative octahedral rotations about the (111) axis increases, but it is only with Ni that such a rotation is accompanied by a compression along the trigonal axis. The observed crystal distortion is invoked to break the degeneracy of the magnetic Co\(^{3+}\) ions, while maintaining the Co-O bonds at a constant length. The absence of two distinct types of Co-O bond lengths in the local structure with the substitution of \( \text{Fe}^{3+} \) or \( \text{Ni}^{3+} \) for Co\(^{3+}\) (3d\(^6\)) is indicative that, unlike in the hole doped cobaltites with Ba\(^{2+}\) or Sr\(^{2+}\) previously studied, the intermediate spin state of Co is either absent or suppressed. This leaves us to question the origin of the magnetic interactions, which most likely arises from a high-spin state of the Co ion.

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