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The nature of magneto-elastic coupling with the isovalent substitution at the B-site in $LaCo_{1-y}B_yO_3$ JUAN YU, DESPINA LOUCA, Physics Department, University of Virginia — The influence of magnetic ion doping on the interplay of the lattice with magnetism in $LaCo_{1-y}B_yO_3$ (B = Ni or Fe, y= 0.1, 0.4) has been investigated via neutron scattering techniques. The substitution of either Ni^{3+} ($3d^7$) or 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 Fe^{3+} or 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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