

LaCoO<sub>3</sub> (LCO): electronic structure changes at very high magnetic fields - up to 500T.

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First reported in 1957, LCO is a non-magnetic small gap material at low temperatures; but exhibits magnetic properties at high temperatures and with doping (particularly with Sr<sup>2+</sup>). A recent experiment<sup>3</sup> to 500T indicated a magnetic state with ~1.3 Bohr magnetons per Co atom appears above 100T and persists to ~240T, when the moment again increases, up to ~3.8 Bohr magnetons at 500T, where the experiment ended after about 16 microseconds. Our DFT calculations predict a rhombohedral to cubic structural change and agree with the experimental results to 240T, but larger moments at higher fields can only be obtained with larger relative motion of the atoms.

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<sup>2</sup>S. Melding, et. al., Phys. Rev. Lett. **109**, 109, 157204 (2012).

<sup>3</sup>V.V. Platonov et. al., *Phys. of the Solid State*, v.**54**. No.2, pp-279-282 (2012).