

# Ferromagnetic order in epitaxially strained LaCoO<sub>3</sub> thin films

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LaCoO<sub>3</sub> films grown epitaxially on <001> oriented (LaAlO<sub>3</sub>)<sub>0.3</sub>(Sr<sub>2</sub>AlTaO<sub>6</sub>)<sub>0.7</sub> substrates by pulsed laser deposition exhibit ferromagnetic ordering below a critical temperature,  $T_c$ , of 85 K. In a control experiment, polycrystalline films of LaCoO<sub>3</sub> were prepared in the same way, but with a buffer layer to inhibit epitaxial growth. They did not show ferromagnetic order down to  $T \approx 5$  K, and their temperature dependent susceptibility was identical to that of bulk LaCoO<sub>3</sub>. The ferromagnetism in epitaxial films is not simply a property of the surface region, rather it extends over the complete film thickness, as shown by the linear increase of the saturation magnetization with increasing film thickness. We discuss this surprising result in terms of ferromagnetic order induced by epitaxial tensile strain via the properly chosen substrate.

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