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Magneto-Optical Investigation of $\text{La}_{1-x}\text{Sr}_x\text{CoO}_3$ ($x = 0.15, 0.2$)

RALF RAUER, MICHAEL RÜBHAUSEN, Institut für Angewandte Physik, Universität Hamburg, D-20355 Hamburg, JOHN F. MITCHELL, Materials Science Division, Argonne National Laboratory, Argonne, IL, 60439 — A complete magneto-optical characterisation of the perovskite cobaltites $\text{La}_{0.8}\text{Sr}_{0.2}\text{CoO}_3$ and $\text{La}_{0.85}\text{Sr}_{0.15}\text{CoO}_3$ was performed using temperature dependent spectral generalised magneto-optical ellipsometry (SGME). The measurements cover the energy range from 1.5 to 5.5 eV and temperatures between 175 and 25 K. The complex diagonal and off-diagonal elements ε_{xx} and ε_{xy} of the dielectric tensor are determined simultaneously yielding enhanced sensitivity to the interplay between electronic and magnetic properties and thus to the electronic structure of the ferromagnetic phase. The investigated compositions are close to the phase boundary between unconventional ferromagnetism and a mixed phase displaying spin-glass as well as ferromagnetic behaviour at $x = 0.18$. While, for the 15% doped sample, the amplitude of the magneto-optical response is found to be proportional to the net magnetisation, for the $x = 0.2$ sample this holds true only for temperatures $T \geq T' \approx 100$ K. Additionally, an energy shift of the order of 100 meV of spectral features of ε_{xy} is observed below T' .

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