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Incommensurate charge and spin ordering in doped layered Co perovskite oxides: small-polaron charge glass I. ZALIZNYAK, CMPMSD, Brookhaven National Laboratory, N. SAKIYAMA, ISSP, University of Tokyo, S.-H. LEE, University of Virginia, Y. MITSUI, H. YOSHIZAWA, ISSP, University of Tokyo — Using neutron diffraction, we have investigated two families of cobalt-based layered perovskite oxides, $Pr_{2-x}Ca_xCoO_4$ ($0.39 < x < 0.73$) and $La_{2-x}Sr_xCoO_4$ (x=0.5, 0.61), which are relatives of high-Tc cuprate superconductors. In the range of heavy doping, $0.5 < x < 0.75$, we have discovered the doping-dependent incommensurate short-range ordering of charges and magnetic moments, whose scattering signatures look somewhat similar to those previously found in cuprates and nickelates. The average incommensurability of charge order (CO) propagation vector, $\mathbf{Q}c = (\varepsilon_c,0,l)$, scales roughly linearly with doping and is proportional to the concentration of Co^{2+} ions, $\varepsilon_c \sim (1-x)$. CO exists already at room temperature and shows no change on cooling. In cobaltites, this CO can be understood as a glassy state formed by nano-scale patches of commensurate small-polaron superlattices, whose average period is determined by the doping, x, but the long-range coherence is frustrated by the charge neutrality requirement. Static magnetic spin order in cobaltites only develops at low $T < 40$ K. Its period is roughly twice that of CO, indicating dominant antiferromagnetic correlation between the nearest Co^{2+} spins.

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