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$_x$CoO$_4$ (0.39 < x < 0.73) and La$_{2-x}$Sr$_x$CoO$_4$ (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, $Q_c = (\epsilon_c,0,l)$, scales roughly linearly with doping and is proportional to the concentration of Co$^{2+}$ ions, $\epsilon_c \sim (1-x)$. 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.