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Magnetically inhomogeneous ground-state below the first order valence transition in $(\mathbf{Pr}_{1-y}\mathbf{Y}_y)_{0.7}\mathbf{Ca}_{0.3}\mathbf{CoO}_{3-\delta}$ DANIEL PHELAN, KANWAL PREET BHATTI, MATTHEW TAYLOR, SHUN WANG, CHRISTOPHER LEIGHTON, Dept. of Chem. Eng. and Mat. Sci., University of Minnesota — Certain Pr-based cobaltites undergo an intriguing first-order metal-insulator transition on cooling, thought to be a manifestation of an abrupt valence transition (VT) where electron occupancy shifts from Pr to Co ions and thus depletes the hole concentration and inhibits ferromagnetic (FM) ordering. We discuss the inhomogenous nature of the magnetic ground-state (g.s.) of one such series of compounds, $(Pr_{1-y}Y_y)_{0.7}Ca_{0.3}CoO_{3-\delta}$. Although y=0 has a metallic, FM g.s., magnetization and transport studies indicate that the VT is stabilized upon Y substitution. Small angle neutron scattering measurements evidence short-range FM clusters of mean size $\sim$ 45 $\mathring{A}$, co-existing with low-density regions of long-range FM order in the g.s of y=0.075, which undergoes the VT at $\sim$ 80 K. These clusters are observed in magnetotransport, where a negative magnetoresistance and strong field-cooling effects occur as a result of inter-cluster tunneling. The results can be interpreted in the context of the system being driven into a phase-separated regime by the VT; however, the g.s. is significantly more inhomogeneous than in simpler cobaltites (e.g. $La_{1-x}Sr_xCoO_3$), likely due to inhomogeneities in the distributions of A-site ions and O vacancies.

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