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Structural and magnetic properties of the $5d^2$ double perovskites Sr_2BReO_6 ($B = \text{Y, In}$) A.A. ACZEL, Z. ZHAO, Oak Ridge National Laboratory, D.T. ADROJA, Rutherford Appleton Laboratory, S. CALDER, Oak Ridge National Laboratory, P.J. BAKER, Rutherford Appleton Laboratory, J.-Q. YAN, Oak Ridge National Laboratory — We have performed magnetic susceptibility, heat capacity, neutron powder diffraction, and muon spin relaxation experiments to investigate the magnetic ground states of the $5d^2$ double perovskites Sr_2YReO_6 and $\text{Sr}_2\text{InReO}_6$. We find that Sr_2YReO_6 is a spin glass, while $\text{Sr}_2\text{InReO}_6$ hosts a non-magnetic singlet state. By making detailed comparisons with other $5d^2$ double perovskites, we argue that a delicate interplay between spin-orbit coupling, non-cubic crystal fields, and exchange interactions plays a key role in the great variation of magnetic ground states observed for this family of materials.

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