

Chez Pierre

Presents ...



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MIT Room 4-331

“Ferroelectricity in an Ising Chain Magnet”

by

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Abstract: The concept of magnetism-driven ferroelectricity has recently drawn a significant attention in condensed matter physics and materials science community. Among the simplest model systems showing this effect are magnetic spiral compounds, and frustrated collinear chain magnets with alternating charge order. While many experimental realizations of the former systems exist, no examples of the latter have been reported so far. Herein, we report discovery of an experimental realization of this model in the Ising chain compound $\text{Ca}_3\text{Co}_2\text{-xMn-xO}_6$ ($x \approx 1$). Unlike in the spiral magnetoelectrics where antisymmetric exchange coupling is active, the symmetry breaking in $\text{Ca}_3\text{Co}_2\text{-xMn-xO}_6$ occurs through exchange striction associated with symmetric superexchange coupling. Since the latter can be large, this observation may help identify candidate systems with large magnetoelectric coupling and significant magnetoelectric effects. This compound also exhibits unusual magnetoelectric freezing transitions and unconventional effects of disorder.