Abstract Submitted
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Fragile 3D Order in $\mathbf{V_{(1-x)}Mo_xO_2}$[1] MATTHEW KROGSTAD, Argonne National Laboratory, MATTHEW DAVENPORT, LOGAN WHITT, University of Alabama, STEPHAN ROSENKRANZ, RAYMOND OSBORN, Argonne National Laboratory, JARED ALLRED, University of Alabama — VO_2 displays a first-order metal-insulator phase transition near 340 K. Accompanying this electronic transition is a structural transition. The connection between these two transitions is unclear, with electronically-driven and structurally-driven models providing conflicting results. Electron doping via molybdenum substitution enhances metallicity and reduces the structural transition temperature; between 17Diffuse x-ray scattering measurements were performed on a single crystal of the $V_0.81Mo_0.19O_2$. In the low-temperature insulating phase, sharp rods are observed, indicating two-dimensional ordering of atomic displacements. The slight oscillation of these rods about the [110] direction in reciprocal space can be explained by weak, inherently frustrated coupling between the ordered planes. Such fragile embedded order is predicted by an Ising-like ferrodistortive model proposed by Lovorn and Sarker. 3D-PDF analysis of the diffuse scattering and structural simulations provide a clear picture of the locally ordered atomic displacements in this system.

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