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Interplay of frustration and *f–d* exchange in a pyrochlore ferromagnet

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In quantum materials, colossal responses can emerge near phase boundaries. Molybdate pyrochlores, $R_2Mo_2O_7$, exhibit a transition from a ferromagnetic metal to a spin glass insulator as a function of the R^{3+} radius [1,2], where a spin chirality-driven anomalous Hall effect emerges due to the *R*–Mo coupling. Among this family of compounds, $Gd_2Mo_2O_7$ is a metallic ferromagnet that shows re-entrant spin glass disorder at low temperature due to the emergence of Gd–Mo interactions. We synthesized the first thin films of $Gd_2Mo_2O_7$ via molecular beam epitaxy and identified a 20K magnetic transition linked to Gd-induced Mo spin reorientation. Transport measurements of angle-dependent magnetoresistance reveal intriguing behaviour above 10T, suggesting manipulation of high-field interactions. This study will offer crucial insights into correlating evolution of spin orientation to transport anomalies and potential topological effects in molybdate pyrochlores.

References:

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