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Competing Interactions in the S=3/2 Kagome Staircase $Co_3V_2O_8$: Evolution of the Commensurate and Incommensurate Phases in a Magnetic Field JOEL HELTON, YING CHEN, JEFFREY LYNN, National Institute of Standards and Technology, GEORGII BYCHKOV, SERGEI BARILO, Belarus Academy of Sciences, NYRISSA ROGADO, ROBERT CAVA, Princeton University — Single crystal neutron diffraction studies have been performed on the $S = 3/2$ kagome staircase compound $Co_3V_2O_8$ with a magnetic field applied along the magnetization easy-axis ($\vec{H} \parallel \vec{a}$). Previous zero-field measurements reported incommensurate, transversely polarized spin density wave (SDW) phases [with a temperature dependent propagation vector of $\vec{k} = (0\ \delta\ 0)$] interspersed with multiple commensurate lock-in transitions at temperatures above the ferromagnetic ground state. For small applied fields along $\vec{a}$, $\mu_0 H \approx 0.05$ T, the commensurate lock-in phases are destabilized in favor of the incommensurate SDW, while slightly larger applied fields restore the commensurate lock-in phase with $\delta = 1/2$ and yield a new commensurate phase with $\delta = 2/5$. For measurements in an applied field, higher-order scattering is observed that corresponds to the second-harmonic.

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