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**Spin-wave analysis of a broad magnetization plateau in volborthite** EDWARD PARKER, LEON BALENTS, Univ of California - Santa Barbara — Volborthite ($Cu_3V_2O_7(OH)_2 \cdot 2H_2O$) is a system comprised of spin-1/2 ions forming quasi-2D layers of Kagomé lattices. It displays two striking experimental features: strong geometric frustration (with a magnetic ordering temperature more than two orders of magnitude below its Curie temperature), and an extremely broad $m = \frac{1}{3}m_{sat}$ magnetization plateau extending over a range of more than 100 T. Density functional theory calculations suggest that it has a complicated anisotropic spin coupling structure with both ferromagnetic and antiferromagnetic first- and second-nearest-neighbor bonds. We present results for the classical phase diagram for this system, focusing on how the upper and lower critical fields of the magnetization plateau depend on the exchange couplings. We also present a semiclassical large-$S$ expansion, and show how including the leading quantum corrections in $1/S$ gives a magnon self-energy that shifts the classical values for the plateau's critical fields.

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