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Magnetic field effect on the spin-wave gaps in the real antiferromagnets SASHA CHERNYSHEV, UC Irvine — An unusual dependence of the excitation spectrum of a 2D antiferromagnet with a weak Dzyaloshinskii-Moriya interaction D on the external magnetic field H is studied. While the $\mathbf{k} = 0$ gap follows closely the "uniform precession" behavior, $\Delta_0 \sim H$, the gap at the antiferromagnetic ordering vector $\Delta_{\mathbf{Q}_{AF}}$ evolves from $\sim D$ at $H = 0$ to $\propto \sqrt{D}$ at $H \sim H_s/2$ and then to $\propto D^{2/3}$ at $H = H_s$, where H_s is the saturation field. In small fields this gap shows a non-analytic behavior $\Delta_{\mathbf{Q}_{AF}} \sim \sqrt{H}$. These results are directly applicable to the 2D AF $K_2V_3O_8$. The mutual effect of the magnetic field and DM interaction on the quantum fluctuations is also studied.

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