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Weyl Magnon FEI-YE LI, Institute of Theoretical Physics, Chinese Academy of Sciences, YAO-DONG LI, Department of Computer Sciences, Fudan Univ, YUE YU, Physics Department, Fudan Univ, YONG BAEK KIM, Physics Department, Univ of Toronto, Ontario; School of Physics, Korea Institute for Advanced Study, Seoul, LEON BALENTS, Kavli Institute for Theoretical Physics, UCSB, California, GANG CHEN[1], Physics Department, State Key Laboratory of Surface Physics, Fudan Univ; Perimeter Institute for Theoretical Physics — Conventional magnetic orders in Mott insulators are often believed to be trivial as they are simple product states. In this talk, we argue that this belief is not always right. We study a realistic spin model on the breathing pyrochlore lattice. We find that, although the system has a magnetic ordered ground state, the magnetic excitation is rather nontrivial and supports linear band touchings in its spectrum. This linear band touching is a topological property of the magnon band structure and is thus robust against small perturbation. We thus name this magnon band touching as Weyl magnon. Just like the Weyl fermion, the existence of Weyl magnon suggests the presence of chiral magnon surface states. Unlike the surface Fermi arcs for the Weyl fermions, the chiral surface state for Weyl magnon appears at a finite energy due to the bosonic nature of the magnons. Moreover, the external magnetic field only couples to the spins with a Zeeman term and thus can readily shift the Weyl node position. This provides a way to control the Weyl magnon. Our work will inspire a re-examination of the excitation spectrum of many magnetic ordered systems.

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