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Ubiquitous Magnetic Excitations in the Ytterbium Pyrochlores ALANNAH HALLAS, JONATHAN GAUDET, McMaster University, NICHOLAS BUTCH, NIST Center for Neutron Research, MAKOTO TACHIBANA, National Institute for Materials Science , RAFAEL FREITAS, Universidade de Sao Paulo, CHRIS WIEBE, University of Winnipeg, GRAEME LUKE, BRUCE GAULIN, McMaster University — The ytterbium pyrochlores, $Yb_2B_2O_7$ (B = Sn, Ti, Ge) are well described in terms of S_{eff} =1/2 quantum spins with local XY anisotropy, decorating the cubic pyrochlore lattice and interacting via anisotropic exchange. While structurally only the non-magnetic B-site cation, and hence, primarily the lattice parameter, is changing across the series $Yb_2B_2O_7$ (B = Sn, Ti, Ge), a range of magnetic behavior is observed. The low temperature magnetism in $Yb_2Ti_2O_7$ and $Yb_2Sn_2O_7$ has ferromagnetic character. Conversely, $Yb_2Ge_2O_7$ displays an antiferromagnetically ordered Neel state at low temperatures. We present a comparative analysis of the spin dynamic properties of these three systems using inelastic neutron scattering. While the static properties of the ytterbium pyrochlores are distinct from one another, we find a ubiquitous character to the spin dynamics. The inelastic scattering for each of these ytterbium pyrochlores show a gapless continuum of spin excitations, that tends to resemble over-damped ferromagnetic spin waves at low Q. Furthermore, the specific heat for each of these materials follows a common form with a broad, high-temperature anomaly followed by a sharp low-temperature anomaly. We find that the dynamic properties correlate strongly with the broad specific heat anomaly but remain unchanged across the sharp, low temperature specific heat anomaly.

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