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Abstract for an Invited Paper
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Giant anisotropic interactions in frustrated quantum magnet BiCu2PO6

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I will discuss a series of comprehensive inelastic neutron scattering measurements which uncover the full magnetic excitation spectrum in the valence bond ordered compound $BiCu_2PO_6$. Owing to its frustrated geometry and potential to realize unique quantum phase transitions in high magnetic fields, $BiCu_2PO_6$ has received significant attention in recent literature. However, the true nature of the magnetic Hamiltonian responsible for the high field phenomena has not been known until now. I will present measurements of the spin excitation spectrum in $BiCu_2PO_6$ from which the magnetic Hamiltonian is elucidated. The spectrum is unique to the frustrated two-leg ladder geometry in $BiCu_2PO_6$ and we have been able to correctly describe the lowest energy excitations within the framework of a bond-operator theory, incorporating anisotropic magnetic exchange interactions which are comparable to the Heisenberg exchange terms. The anisotropic exchange interactions originate from spin orbit coupling and are of an unexpectedly large magnitude for a Cu based magnetic compound, potentially indicating the relevance of Bismuth in the superexchange pathway. $BiCu_2PO_6$ is a complex and unique quantum magnet combining frustration and anisotropic exchange; the discovery of such large anisotropic interactions in $BiCu_2PO_6$ hints at new routes for incorporating spin anisotropies in 3d transition metal based magnets.