Weekly Seminar

Dynamic fingerprint of fractionalized excitations in single-crystalline $Cu_3Zn(OH)_6FBr$

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摘要

Beyond the absence of long-range magnetic orders, the most prominent feature of the elusive quantum spin liquid (QSL) state is the existence of fractionalized spin excitations, *i.e.*, spinons. When the system orders, the spin-wave excitation appears as the bound state of the spinon-antispinon pair. Although scarcely reported, a direct comparison between similar compounds illustrates the evolution from spinon to magnon. Here, we perform the Raman scattering on single crystals of two quantum kagome antiferromagnets, of which one is the kagome QSL candidate $Cu_3Zn(OH)_6FBr$, and another is an antiferromagnetically ordered compound $EuCu_3(OH)_6Cl_3$. In $Cu_3Zn(OH)_6FBr$, we identify a unique one spinon-antispinon pair component in the E_{2g} magnetic Raman continuum, providing strong evidence for deconfined spinon excitations. In contrast, a sharp magnon peak emerges from the one-pair spinon continuum in the E_g magnetic Raman response once $EuCu_3(OH)_6Cl_3$ undergoes the antiferromagnetic order transition. From the comparative Raman studies, we can regard the magnon mode as the spinon-antispinon bound state, and the spinon confinement drives the magnetic ordering.

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报告人简介

梅佳伟博士，南方科技大学物理系助理教授，主要从事量子磁性和超导方面的研究。梅佳伟博士在清华大学取得学士和博士学位后，曾在瑞士、加拿大和美国从事博士后工作，2017年7月至今于南方科技大学工作。