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Magnetic excitations in the quadrupolar ordered CeB_6

Tuesday, 18 September 2018 10:00 (30 minutes)

Cerium hexaboride is a textbook example of an f-electron system hosting an exotic antiferroquadrupolar order. Even after decades of intense studies, it still lacks a complete theoretical description, and experiments continue to present puzzles in the form of unexpected observations. In recent years, we have scrutinized the magnetic excitation spectrum of CeB_6 and its doped derivatives such as $Ce_{1-x}La_xB_6$ and $Ce_{1-x}Nd_xB_6$. In this keynote lecture, I would like to present our most recent results with a focus on magnetic-field and doping dependence of spin correlations and collective magnon excitations in these systems. We find clear signatures of long-range RKKY interactions between the f-electron multipoles in the diffuse quasielastic response in zero magnetic field that sensitively depends on charge doping. Further, field-induced collective magnon modes have been mapped out in fields up to 14.5 T applied along different crystallographic directions, revealing new high-field magnetic excitations that were not previously detected in electron spin resonance (ESR) or any other probes. These modes exhibit a significant anisotropy with respect to the field direction, offering a new stepping stone for the theoretical understanding of multipolar excitations in the antiferroquadrupolar phase of CeB_6.

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