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Field-induced behaviour in the spin-liquid candidate κ-$(ET)_2Cu_2(CN)_3$: The role of spin-orbit coupling KIRA RIEDL, STEPHEN M. WINTER, ROSER VALENTI, Institut fur theoretische Physik, Frankfurt — Significant evidence has recently emerged for a quantum spin liquid (QSL) state in a number of triangluar-lattice organics, such as κ-$(ET)_2Cu_2(CN)_3$. However, recent μSR studies (1) showed evidence for a very small energy gap in the ground state, and magnetic field-induced anomalies that remain essentially unexplained. In particular, a sharp crossover was observed, accompanied by a significant increase of the magnetization critical exponent β. While this crossover was initially interpreted as an exotic quantum critical point(1), we argue that the consideration of SOC suggests a more conventional interpretation (2).In the organics, SOC manifests as anisotropic exchange, which results in spin-canting through the Dzyaloshinskii-Moriya (DM) interaction and introduces zero-field magnon or spinon gaps. Contrary to the assumption that SOC in organics is negligible due to light C, S, H atoms, we show that SOC can be relevant for the explanation of low-energy properties.In particular, we argue that the low-field response of the spin liquid is dominated by the DM interaction, and this leads directly to the observed crossovers.
(1) F. Pratt et al, Nature **471**, 612 (2011).
(2) S.M. Winter, K. Riedl, R. Valenti, arXiv:1610.05468 (2016).

Kira Riedl
Institut fur theoretische Physik, Frankfurt

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