A Magnetic Excitation Linking Quasi-1D Chevrel-Type Selenide and Arsenide Superconductors

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The quasi-one-dimensional Chevrel phases, A2Mo6Se6 (A = Tl, In, K, Rb, Cs), are of interest due to their atypical electronic properties. The Tl and In analogues undergo a superconducting transition whereas the alkali metal analogues undergo metal-to-insulator transitions, neither of which is fully understood. This talk will report the results of inelastic neutron scattering on polycrystalline In2Mo6Se6 (Tc = 2.85 K) and Rb2Mo6Se6 (TMIT ~ 170K) which reveal a highly dispersive column of intensity present in both compounds near Q = 1.0 Å-1. The excitation is nearly indistinguishable from another excitation observed in the structurally related superconducting compound K2Cr3As3, which has been interpreted as magnetic in origin and related to Fermi surface nesting. However, the calculated Fermi surface of K2Cr3As3 differs substantially from the A2Mo6Se6 compounds, and many consider them distinct classes of materials. Nevertheless, the new observation is most consistent with a magnetic origin, linking the physics of both classes.