Poster-1-5

Interplay of charge density wave order and superconductivity

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In many superconductors, the superconducting state emerges on top of a charge density wave (CDW). An intriguing example is the AV_3Sb_5 (A=K,Rb,Cs) family of superconductors, where a 2×2 in-plane CDW ordered phase, potentially breaking time-reversal symmetry, appears at $T \approx 100$ K. To determine the microscopic origin and structure of the ordered phases, one often studies the CDW and superconductivity on the kagome lattice independently. However, it remains an outstanding question to understand the mutual influence of the different orders. In our work, we present a phenomenological theory of CDW and superconducting orders based solely on symmetry arguments for the kagome lattice. For this purpose, we derive a Ginzburg-Landau free energy of possible 2×2 CDW order and superconductivity and explore the impact of the dominant coupling terms. In particular, we study the consequences of additional spatial or time-reversal-symmetry breaking of the CDW order, coupling to a pair density wave, and we discuss possible experimental consequences. Our study uncovers a rich phenomenology with interesting differences to the results of earlier studies in tetragonal systems.