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Superconductivity and Magnetism in iron-pnictides: co-existence or not?

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In this talk I will review the weak-coupling approach to describe the interplay of two electronic orders: superconductivity (SC) in the form of Cooper pairs, and magnetism in the form of the spin-density waves (SDW). The two orders, traditionally thought as incompatible, are close neighbors in magnetically-active Fe-based superconductors with surprisingly high T_c . Complex multi-band structure, multiple interactions and many families of these materials create a range of possible states of mingling between superconductivity and magnetism. I will present a list of different parameters, including (a) the Fermi surface shape, (b) the order parameter structure, (c) the relative strength of SC and SDW interactions, (d) the external magnetic field, and describe which properties, or their combinations, lead to co-existence or avoidance of SC and SDW orders, and how transition between the two orders occurs upon doping.