

Coexistence of Ferromagnetism and Superconductivity

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We review the main mechanisms of the interplay between magnetism and superconductivity and discuss first for the properties of the bulk magnetic superconductors. In the case of ferromagnetism, its antagonism with superconductivity leads to spectacular effects such as a re-entrant superconductivity and the domain magnetic structure formation.

We also discuss the particularities of the proximity effect in superconductor-ferromagnet heterostructures : the damped oscillatory behaviour of the Cooper pair wave function and the conditions for the novel π -Josephson junctions formation, which open an interesting perspective for the potential applications of these structures.