EXCITONIC FERROMAGNETISM IN THE HEXABORRIDES

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Recently Young et al. [1] reported the surprising discovery of ferromagnetism in $Ca_{1-x}La_xB_6$ - a material without d- or f-electrons. The ferromagnetism has special features: it occurs only in the narrow range $0 < x < 0.01$, it has a very small moment(< 0.1 μ_B/La), but it has a high T_C ($\sim 600K$). The small overlap of valence and conduction bands provides favorable conditions for the formation of a triplet exciton condensate. When doped it is energetically favorable to distribute the carriers asymetrically between quasiparticle spin directions [2] leading to a ferromagnetic state with a small moment oriented perpendicular to the direction of the triplet condensate [3]. This form of excitonic ferromagnetism provides a natural explanation for the unusual properties of ferromagnetism in the hexaborides.

1. D.P. Young et al., Nature **397**, 412 (1999)
2. B.A. Volkov,Yu. Kopaev and A.I. Rusinov, Sov.Phys. JETP **41**, 952 (1975)
3. M.E. Zhitomirsky, T.M. Rice and V.I. Anisimov, cond-mat/9904330

9.7 cm

13.4 cm

Subject category :

1. Correlated Electrons and High Temperature Superconductors

Presentation mode :
PLENARY LECTURE

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