Abstract Submitted
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Theory of xchange splittings of bands in diluted magnetic semiconductors[1] TOMASZ DIETL, CEZARY SLIWA, Institute of Physics, PAS, Warsaw — A series of recent photoemission and magnetooptical experiments, particularly on magnetically doped nitrides and oxides, but also on (Ga,Mn)As, points to the limiting understanding of the physics governing the sp-d exchange interaction in these systems. We have developed theory of band splittings in diluted magnetic semiconductors taking into consideration a possibility that the magnetic ion can trap a hole. We have found that the exchange coupling between the bound and delocalized carriers has actually a similar magnitude to that characterizing the sp-d exchange interaction [1]. Furthermore, our results demonstrate that the presence of the corresponding bound state itself renormalizes extended states in a spin-dependent fashion [2]. We show that these two effects can explain the unexpected sign and magnitude of the apparent s- d and p-d exchange integrals determined by magnetooptical studies carried out for (Ga,Mn)As [3] as well as for (Zn,Co)O, (Ga,Mn)N, and (Ga,Fe)N [4].
[1] C. Sliwa, T. Dietl, cond-mat/arXiv:0707.3542. [2] T. Dietl, cond-mat/0703278. [3] J. Szczytko et al., Solid State Commun. 99, 927 (1996); M. Poggio et al., Phys. Rev. B 72, 235313 (2005). [4] W. Pacuski et al., ibid. 73, 035214 (2006); ibid. 76, 165304 (2007); arXiv:0708.3296.

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