



Weekly Seminar

The Synthesis, μ SR and NMR Investigation of Novel Diluted Magnetic Semiconductors

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Time: 4:00pm, April 6, 2016 (Wednesday)

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4:00

Venue: Room w563, Physics Building, Peking University

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Abstract

The research of DMS has been mostly confined to MBE-grown thin films. Recently, our collaboration team fabricated many bulk form DMSs that are derivatives of Fe-based superconductors, i.e., 111 DMS system I-II-V $\text{Li}(\text{Zn,Mn})\text{As}$ with $T_C \sim 50$ K [1], 122 DMS system $(\text{Ba,K})(\text{Zn,Mn})_2\text{As}_2$ with $T_C \sim 230$ K [2,3], 1111 DMS system $(\text{La}_{1-x}\text{Ba}_x)(\text{Zn}_{1-x}\text{Mn}_x)\text{AsO}$ with $T_C \sim 40$ K [4], etc. These ferromagnets are all p-type, and have the advantage of decoupled spin and charge doping. In this talk, I will give an introduction of these novel DMSs, and talk about our μ SR and NMR results on $\text{Li}_{(1+y)}\text{Zn}_{(1-x)}\text{Mn}_x\text{P}$ that has a cubic structure identical to that of III-V $(\text{Ga,Mn})\text{As}$ and II-VI $(\text{Zn,Mn})\text{Se}$. Our experimental results [5, 6] confirmed the ferromagnetism in $\text{Li}_{(1+y)}\text{Zn}_{(1-x)}\text{Mn}_x\text{P}$ is homogeneous and intrinsic. μ SR results indicate that the mechanism responsible for ferromagnetic ordering in $\text{Li}_{(1+y)}\text{Zn}_{(1-x)}\text{Mn}_x\text{P}$ is the same as that of $(\text{Ga,Mn})\text{As}$ [6]. NMR results establish that Mn-Mn ferromagnetic interactions are not limited to the near-neighbor sites, but extend over many unit cells, mostly likely due to the p-d Zener interactions [5]. Our research on FeAs-derived compounds has attracted attentions for studies of interplay between p-d Zener ferromagnetism, antiferromagnetism, superexchange and superconductivity [7].

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- [3] K. Zhao and C.Q. Jin* et al, Chin. Sci. Bull. 59, 2524, (2014).
- [4] C. Ding and **F.L. Ning*** et al, PRB, 88, 041102(R), (2013).
- [5] C. Ding and **F.L. Ning*** et al, PRB, 88, 041108(R), (2013).
- [6] **F.L. Ning*** and H.Y. Man et al, PRB 90,085123 (2014).
- [7] T. Dietl and H. Ohno, RMP, 86, 187 (2014).

About the speaker

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