Spin dynamics in heavy-fermion pyrochlore compound $YMn_2Zn_{20-x}In_x$

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Heavy-fermion (HF) behavior in transition metal compounds such as LiV_2O_4 and $Y(Sc)Mn_2$ is one of fascinating phenomena in condensed-matter physics, as it might be a manifestation of geometrical frustration in itinerant electron systems. To clarify the origin of such a behaveor, we have been focusing on correlation between the heavy quasiparticle (QP) state and spin fluctuation, and demonstrated by μSR that the spin fluctuation rate (ν) exhibits a linear dependence on temperature ($\nu \propto T$) in $Y_{1-x}Sc_xMn_2$ ($x > 0.05$) and LiV_2O_4 which is in conjunction with development of the HF behavior at low T region [1, 2]. Such a T-linear dependence is att -ributed to spin of "quasi-1D Hubbard chains" [3], suggesting that the quasi-1D character of the t_{2g} band associated with the pyrochlore lattice plays important role in the formation of heavy QP's. This is also in line with the scenario of heavy QP formation due to1D-to-3D crossover[4].

Recent revelation of heavy-fermion behavior in a newly synthesized compound $YMn_2Zn_{20-x}In_x$ is drawing much interest as the third example of *d*-electron heavy-fermion system [5]. To examine the above mentioned correlation, we preformed μSR measurements on this compound with x=2.36 down to 300 mK. Preliminary result shows that ν exhibits a similar T-linear behavior over the temperature range where the HF behavior is observed [fig.1]. We are going to present more details on the data analysis, and discuss the origin of the HF behavior.

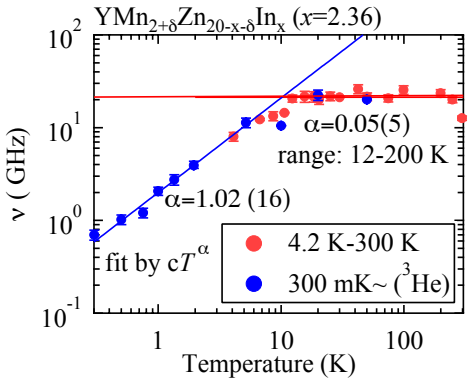

Fig.1 Temperature dependence of spin fluctuation rate ν on $YMn_2Zn_xIn_x$ (x=2.36).

References

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