HEAVY-FERMION BEHAVIOUR OF LiV_2O_4

R.J. Radwański[a,b], Z. Ropka[b] and R. Michalski[a,b]
[a]Inst. of Physics, Pedagogical University, 30-084 Kraków,
[b]Center for Solid State Physics, św. Filip 5, 31-150 Kraków
Poland.

9.7 cm

LiV_2O_4 has been announced as the first heavy-fermion 3d-ion oxide (*Phys.Rev.Lett.* **78** (1997) 3729). Its Sommerfeld coefficient γ of 0.42 J/K^{2}mol is surely not very large ($CeAl_3$: 1600 mJ/K^{2}mol but UPt_3: 430 mJ/K^{2}mol) but it is exceptionally large for a 3d-ion system. It shows no magnetic order down to 0.02 K. Though χ exhibits the Curie-Weiss law above 100 K with S$\simeq$1/2, it stabilizes at low temperatures.

We have studied properties of the V^{3+} and V^{4+} ions in LiV_2O_4. We have completed evidence that these heavy-fermion (h-f) like properties can result from particularities of the fine electronic structure of the d^1 system and the breaking of the time reversal symmetry in the atomic scale. Finally we would like to point out that the occurence of the h-f behaviour for a 3d-ion system, with an odd number of d electrons, has been predicted by the crystal-field model. This model has been originally developed for the f-electron systems and the finding of the h-f state in LiV_2O_4 we are taking as the nice confirmation of the model.

Finally, we would like to mention that according to our results the excitations involved in the h-f state in LiV_2O_4 are of the spin nature in contrary to often discussed charge-fluctuation excitations.

13.4 cm

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Corresponding author :
R.J. Radwanski

Address for correspondence :
Center for Solid State Physics, św. Filip 5, 31-150 Kraków

Email address :
sfradwan@cyf-kr.edu.pl