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## Two new magnetic cubic compounds: $\text{Pr}_3\text{Pt}_2\text{Si}_{11}$ and $\text{Nd}_3\text{Pt}_2\text{Si}_{11}$

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## TWO NEW MAGNETIC CUBIC COMPOUNDS:

### $\text{Pr}_3\text{Pt}_{23}\text{Si}_{11}$ AND $\text{Nd}_3\text{Pt}_{23}\text{Si}_{11}$

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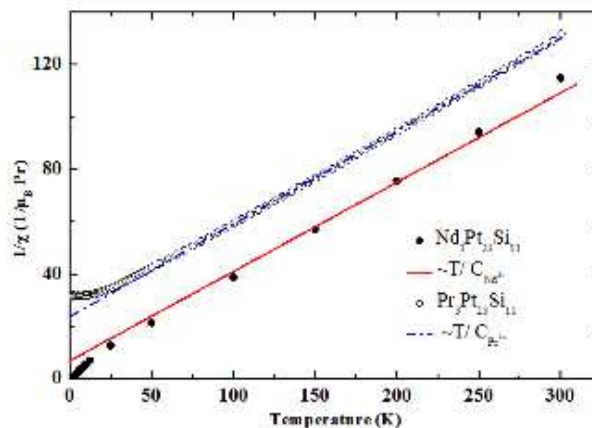
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The ternary system R-Pt-Si (R = rare earth element) has triggered a lot of interest, due to peculiar physical behaviors of some compounds: unconventional superconductivity, heavy-fermion properties, coexistence of superconductivity and magnetic ordering...

Recently, we synthesized for the first time two new compounds of the  $\text{R}_3\text{Pt}_{23}\text{Si}_{11}$  series with Pr and Nd. They both crystallize in the same Fm-3m cubic space group as  $\text{Ce}_3\text{Pt}_{23}\text{Si}_{11}$  [1-3]. The lattice parameter value is  $a_{\text{Pr}} = 16.8634(3)$  Å and  $a_{\text{Nd}} = 16.8493(4)$  Å for  $\text{Pr}_3\text{Pt}_{23}\text{Si}_{11}$  and  $\text{Nd}_3\text{Pt}_{23}\text{Si}_{11}$  respectively. Compared to those of the La and Ce compounds, these values are consistent with the lanthanide contraction.

From magnetic and heat capacity measurements, it is found that  $\text{Nd}_3\text{Pt}_{23}\text{Si}_{11}$  presents a ferromagnetic order at 1.56 K, while  $\text{Pr}_3\text{Pt}_{23}\text{Si}_{11}$  remains paramagnetic down to lowest reachable temperature. At higher temperatures, from 50K to 300K, the inverse of the magnetic susceptibility follows a Curie-Weiss law in both compounds. The effective moments, deduced from the experimental slope, are  $3.55\mu_{\text{B}}/\text{Pr}$  and  $3.46\mu_{\text{B}}/\text{Nd}$  respectively, in agreement with the theoretical values expected for trivalent ions (see figure 1). The deviations from the Curie-Weiss law below 50 K are ascribed to crystal electric field effects.



**Figure 1:** Thermal variation of the inverse of the susceptibility for  $\text{Pr}_3\text{Pt}_{23}\text{Si}_{11}$  and  $\text{Nd}_3\text{Pt}_{23}\text{Si}_{11}$  (Pr curve has been offset by 20 T/ $\mu_{\text{B}}$ ). Lines correspond to the Curie-Weiss law taking into account the theoretical values of the Curie constants of  $\text{Pr}^{3+}$  and  $\text{Nd}^{3+}$  ions.

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