Abstract:

In recent years, Pr-based 1-2-20 materials have attracted great attention due to the interplay of quadrupole order and superconductivity as well as the possible formation of two-channel Kondo effect, based on their quadrupolar non-Kramers ground state doublets [1,2]. In PrIr$_2$Zn$_{20}$ for instance, antiferroquadrupolar order sets in at 0.11 K [3], accompanied by signatures of two-channel Kondo effect [4].

In this talk I will focus on the thermal expansion and magnetostriction of the diluted system Y$_{1-x}$Pr$_x$Ir$_2$Zn$_{20}$, for which recent studies [5,6] revealed logarithmic temperature dependencies of specific heat over temperature [5] and quadrupole susceptibility [6] as well as an unconventional square root temperature dependence of electrical resistivity [5], indicative of a single impurity two-channel Kondo ground state. Because of the direct coupling of quadrupole moment and strain, thermal expansion and magnetostriction are powerful probes to further characterize this unconventional ground state. Our study reveals highly singular and anisotropic strain dependencies accompanied by small volume changes, which we discuss in the framework of the single impurity quadrupolar two-channel Kondo effect.


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