9.7 cm

Two-channel Kondo problem in $ZrAs_{1.58}Se_{0.39}$

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Low-temperature electrical resistivity $\rho(T)$ of the closely related phases $ZrAs_{1.58}Se_{0.39}$ (3% of vacancies within the monoatomic As layers) and $ZrP_{1.54}S_{0.46}$ (the $2a$ site fully occupied with P atoms) has been investigated along the c axis down to $T \gtrsim 0.08\,K$ and in $B \leq 14\,T$. Whereas for both systems a $-AT^{1/2}$ term in $\rho(T)$ was observed at $T \lesssim 15\,K$, an influence of the magnetic field on their electrical transport was found to be *qualitatively* different: for the As-based compound, a coefficient A ($= 0.167\,\mu\Omega cmK^{-1/2}$) remains virtually unchanged even in the highest available magnetic fields. For the P-based compound, however, an application of B significantly reduces the A-coefficient value from $0.038\,\mu\Omega cmK^{-1/2}$ ($B = 1\,T$) to $0.008\,\mu\Omega cmK^{-1/2}$ ($B = 14\,T$), *i.e.*, by factor nearly 5. These distinctly different observations indicate *qualitatively* different phenomena occurring in the material with ($ZrAs_{1.58}Se_{0.39}$) and without ($ZrP_{1.54}S_{0.46}$) broken pnictogen-pnictogen chemical bonds: a $\rho(T, B)$ behavior of the latter system is characteristic for the 3D electron-electron interaction in disordered systems, while the magnetic-field-independent $-AT^{1/2}$ term points at a two-channel Kondo problem derived from two-level states triggered by vacancies in the monoatomic As layers.

13.4 cm

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