relatively independent of pressure, and hence of ϵ_j, the spin quantum number S in eq. (3) is assumed constant. Furthermore, since $|S| = 0$ at $T \geq T_c$, it follows that for any temperature $T \geq T_c$

$$\frac{\Delta\theta}{\theta_o} = -P_1^{-1}P - \frac{1}{2}P_2^{-2}P^2 \qquad (6)$$

where $\Delta\theta = (\theta - \theta_o)$ and θ_o is the value of θ at $P = 0$. If the influence of thermal expansion is neglected, the parameters are $P_1^{-1} \equiv \sum_j A_j$ and $P_2^{-2} = \sum_j \lambda_j^2 A_j^2$, which contain $\lambda_j \equiv \gamma_{uv}^j/\beta_{uv}^j$, $A_j \equiv \sum_i \beta_{uv}^j K_{ji}$, $B_j \equiv \sum_i \beta_{uv}^j K_{ji} \sum_k \alpha_k c_{ki}$. The remarkable susceptibility above T_c in Fe_2P indicates that

$$\theta = T_c\,(1 + a + p^{-1}P + \cdots) \quad \text{or} \quad \Delta\theta \approx (1 + a)\,\Delta T_c + T_c p^{-1}P \qquad (7)$$

So long as $\lambda_j^2\Delta\theta/\theta_o \ll 1$ remains valid, substitution of eq. (7) into eq. (6) gives

$$P = -Q_1\Delta T_c - Q_1^2 Q_2\,(\Delta T_c)^2 \qquad (8)$$

where $Q_1 \equiv (1 + a)\,[(\theta_o/P_1) + (T_c/p)]^{-1}$ and $Q_2 \equiv (\theta_o/2P_2^2)\,[(\theta_o/P_1) + (T_c/p)]^{-1}$. Comparison of eq. (8) with eqs. (1) and (2) shows that eq. (4) has the correct form and that $Q_1Q_2 \sim 3 \times 10^{-3}\,[K]^{-1} \sim \theta_o^{-1}$. Therefore $(P_1/P_2) \sim 1$, or $\lambda_j \sim 1$. If all the constants but θ_o and T_c in Q_1Q_2 are the same for Fe_2P and $Fe_2P_{0.9}As_{0.1}$, the ratio of the respective θ_o are $252 \times 1.7/710 \times 1.2 \approx 1/2$. The measured Curie temperatures at 1 atm are T_c = 221K and 341K, respectively, which demonstrates the essential self-consistency of the analysis. In fact, the small discrepancy can be qualitatively accounted for by the observation that the pressure sensitivity of T_c, and hence p, is larger in Fe_2P.

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7. Unlike $CoS_{2-x}Se_x$, crystal-field effects influence the magnetic interactions in Fe_2P and may introduce some antiferromagnetic near-neighbor interactions.