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Hydrostatic and chemical pressure tuning of $CeFeAs_{1-x}P_xO$ single crystals: The intriguing interaction between $3d$- and $4f$-correlations[1]

M. NICKLAS, K. MYDEEN, E. LENGYEL, A. JESCHE[2], C. GEIBEL, Max Planck Institute for Chemical Physics of Solids, Dresden, Germany — We present a combined P-substitution and hydrostatic pressure study on $CeFeAs_{1-x}P_xO$ single crystals in order to investigate the peculiar relationship of the local moment magnetism of Ce, the ordering of itinerant Fe moments, and their connection with the occurrence of superconductivity [1,2]. Our results evidence a close relationship between the weakening of Fe magnetism and the change from antiferromagnetic to ferromagnetic ordering of Ce moments at $p^* = 1.95$ GPa in $CeFeAs_{0.78}P_{0.22}O$. The absence of superconductivity in $CeFeAs_{0.78}P_{0.22}O$ and the presence of a narrow and strongly pressure sensitive superconducting phase in $CeFeAs_{0.70}P_{0.30}O$ and $CeFeAs_{0.65}P_{0.35}O$ indicate the detrimental effect of the Ce magnetism on superconductivity in P-substituted CeFeAsO.

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[2] K. Mydeen, E. Lengyel, A. Jesche, C. Geibel, and M. Nicklas, Phys. Rev. B 86, 134523 (2012).

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