Hydrostatic and chemical pressure tuning of CeFeAs$_{1-x}$P$_x$O single crystals: The intriguing interaction between 3$d$- and 4$f$-correlations

M. NICKLAS, K. MYDEEN, E. LENGYEL, A. JESCHE, 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$_x$O 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.


$^1$This work was supported by the DFG within the framework of the SPP1458.
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