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Valence instability of Eu in $EuPd_3B_x$ ($0 < x < 0.53$) ANDREAS LEITHE-JASPER, ROMAN GUMENIUK, MIRIAM SCHMITT, WILDER CARILLO-CABRERA, WALTER SCHNELLE, CHRISTOPH GEIBEL, HELGE ROSNER, MPI CPfS Dresden — In a joint theoretical and experimental study large series of intermetallic compounds $EuPd_3B_x$ and $GdPd_3B_x$ are characterized by X-ray diffraction, metallography, EPMA and chemical anlysis assessing the range of formation up to $x < 0.53$ and $x < 0.42$, respectively. Density functional based electronic structure calculations predict a valence change in $EuPd_3B_x$ above $x = 0.19(0.02)$ from a non-magnetic Eu^{3+} state into a magnetic Eu^{2+} state which is reflected in a discontinuity of the lattice parameter. Consistent with the calculations X-ray diffraction data show a kink in the lattice parameter at $x = 0.22(0.02)$. X-ray absorption spectroscopy measurements assign this kink to a transition into a heterogeneous mixed valence state of Eu. The influence of external pressure on the valence instability will be discussed.

Andreas Leithe-Jasper
MPI CPfS Dresden

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