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Theory of the thermoelectricity of intermetallic compounds with Ce, Eu or Yb ions

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The thermoelectric properties of intermetallic compounds with Ce or Yb ions are explained by the single-impurity Anderson model which takes into account the internal structure of the 4f states. The calculated thermopower exhibits all the characteristic features observed in Ce, Eu, and Yb intermetallics[1]. Assuming that pressure changes the effective coupling, we calculate various characteristic energy scales of the model and obtain the (T, p) phase diagram which agrees with the experimental data on CeRu₂Si₂, CeCu₂Si₂, CePd₂Si₂, and similar compounds. The chemical pressure effects in EuCu₂(Ge_{1-x}Si_x)₂ are discussed as well. The evolution of the thermopower as a function of temperature, pressure or doping is related to the crossovers between various fixed points of the model. The seemingly complicated shape of $S(T)$ is explained in terms of the redistribution of the single-particle spectral weight within the Fermi window.

[1] V. Zlatić and R. Monnier, Phys. Rev. B **71**, 165109 (2005)

Keywords :