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Influence of disorder on the thermopower of heavy-fermion materials

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The influence of substitutional disorder on the transport properties of heavy-fermion systems is investigated. The dynamical mean-field theory treatment of the periodic Anderson model PAM has been combined with the coherent potential approximation for disordered systems to obtain a suitable treatment for the disordered PAM. Considering two distinct local environments of a binary alloy A_cB_{1-c} with arbitrary concentration c, we explore two types of disorder: on the f site and on the ligand sites. The temperature and concentration dependence of the thermoelectric power is calculated. The characteristic concentration dependence as well as the order of magnitude of the thermopower are reproduced for metallic heavy-fermion systems and for Kondo insulators. In particular, sign changes of the Seebeck coefficient as function of temperature and concentration are observed.