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Critical Theory of the Multi-Channel Anderson Impurity Model

HENRIK JOHANNESSON, Chalmers University of Technology and Göteborg University, Sweden, CARLOS J. BOLECH, Université de Genève, Switzerland, NATAN ANDREI, Rutgers University, USA — We have carried out a nonperturbative analysis of the multi-channel Anderson impurity model, using a combination of Bethe Ansatz and boundary conformal field theory techniques. We present exact, analytical expressions for the zero-temperature entropy, the low-temperature impurity thermodynamics - including the Wilson ratio - and the critical exponents of the Fermi edge singularities characterizing the time-dependent hybridization of conduction electrons and impurity. For the case of two channels we also present exact results for the single-electron Green's function, the impurity self-energy, and the low-temperature resistivity of the model. We compare our results to those obtained from more conventional, approximate methods. Implications for the study of the non-Fermi liquid physics of Uranium-based heavy fermion materials are discussed.

Henrik Johannesson
Chalmers and Göteborg University

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