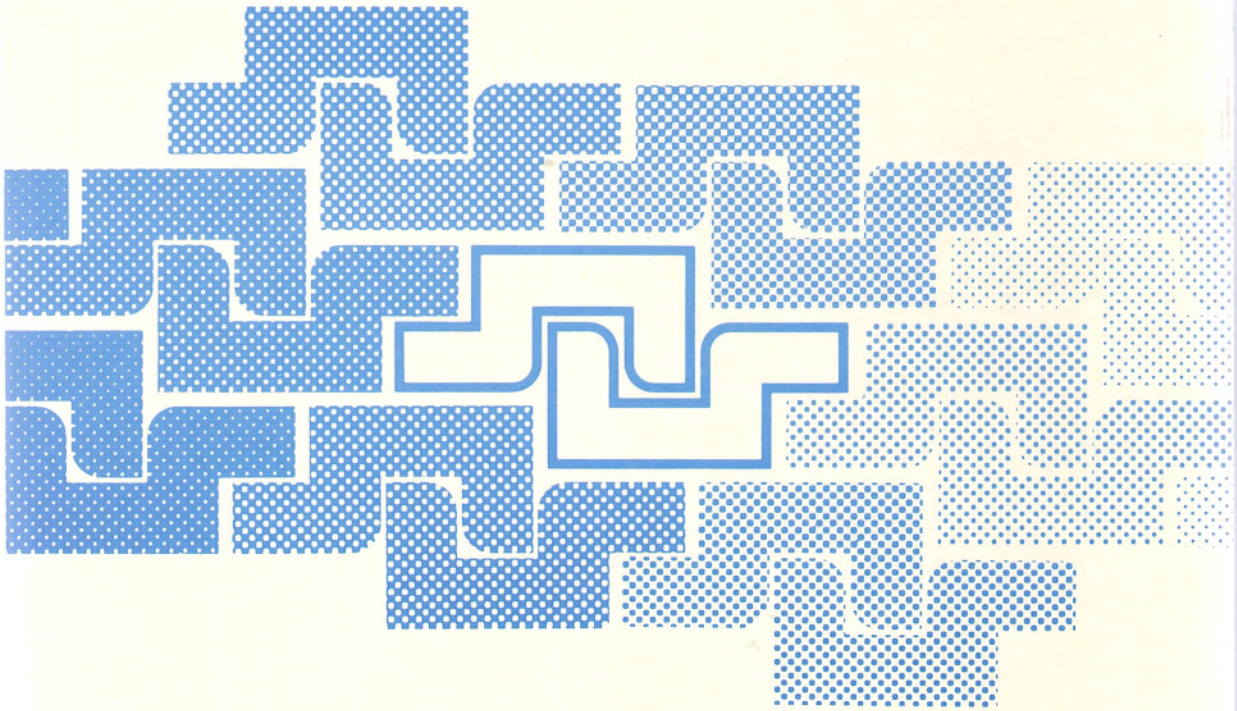

Applications of Statistical and Field Theory Methods to Condensed Matter

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COMPARISON OF EFFECTIVE MODELS FOR CuO_2 LAYERS IN OXIDE SUPERCONDUCTORS

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Several effective models, as derived from a general two-band Hubbard model for CuO2 layers in oxide superconductors are studied. In particular we compare the Hubbard model with the hole-spin models (unsymmetrized and symmetrized) and a generalized effectice single-band (t-J) model.[1] Our exact diagonalization results for a finite CuO2 chain of 4 cells show that spectral properties of a single mobile quasiparticle in a general Hubbard model can be well reproduced by reduced effective models. This remains valid even in the mixed valence regime, where the straightforward derivation of the hole-spin model is not possible due to the breakdown of the perturbation expression using hopping parameter in the Hubbard model as a small parameter.

In figure are presented the lowest lying branches for a system with a single additional hole on a chain of 4 cells for different models: a)Two band Hubbard model; b)Hole-spin model; c)Symmetrized hole-spin model; d)Kondo-lattice model; e)Generalized t-J model.

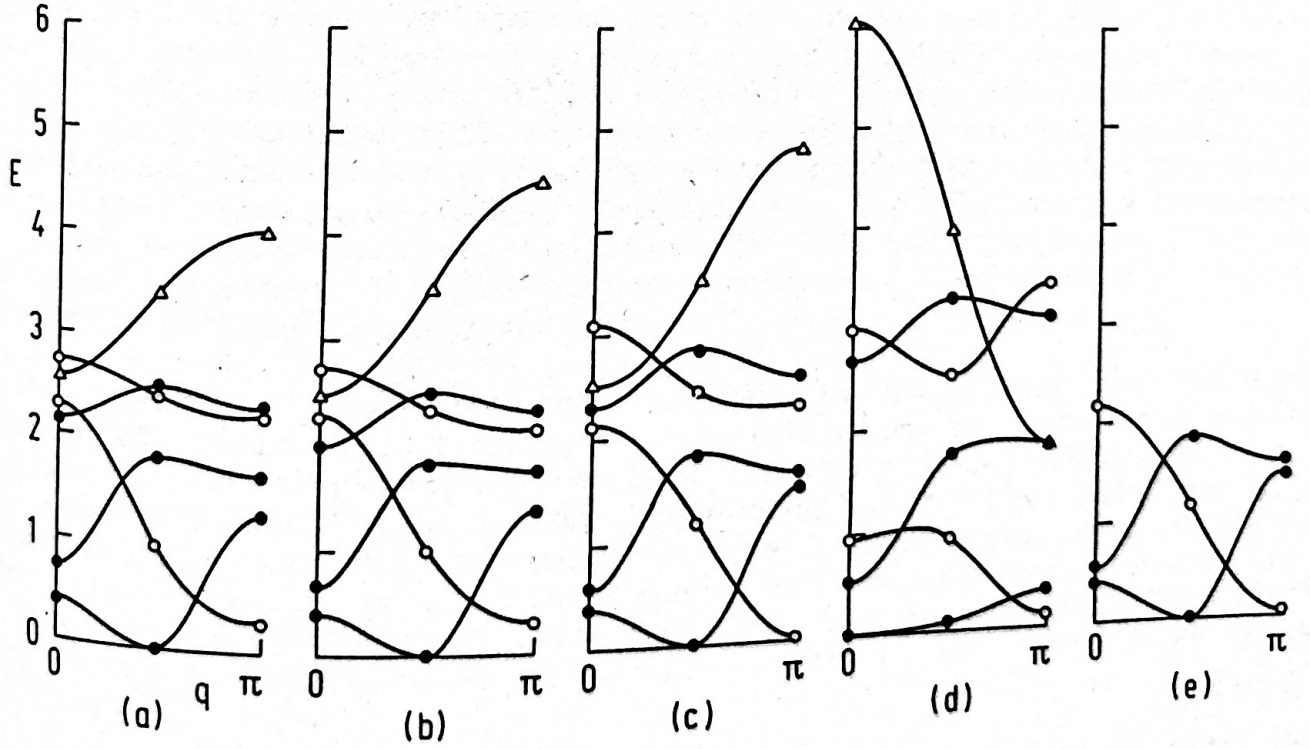

Figure 1

REFERENCE

[1] A. Ramšak and P. Prelovšek, Phys. Rev. B **40**, 2239 (1989).