The Mott transition in an extremely correlated electron system

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The study of strongly correlated electronic systems is the fundamental challenge of modern condensed matter theory. We consider here a theory of the Mott transition in a most basic model of extremely correlated electrons – a model that can be traced to the very large U limit of the Hubbard model. The relevant quasi-particles in the theory are projected fermions (described by Hubbard-type operators) for the considered two species of fermions and doublons. Using a Green's function decoupling scheme, we obtain self-consistent equations for the average occupancy of projected fermions and doublons, which reveal a Mott transition at zero temperature. We identify a new exact contribution to the insulating transition from an "excluded volume"-like term. This term makes the treatment distinct from the slave-boson or Gutzwiller approaches commonly used for strongly correlated systems. We emphasize that the presented simple theory is intrinsically thermal, *i.e.* it can directly be applied to non-zero temperatures. We discuss preliminary results on the behaviour of some thermodynamic quantities.

9.7 cm

13.4 cm

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