MAR17-2016-020142

Abstract for an Invited Paper
for the MAR17 Meeting of
the American Physical Society

On the solution of the Kondo Problem[1]

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The Kondo model, first written down in the early 1950s, describes the antiferromagnetic interaction of a local spin-1/2 impurity, typically a magnetic moment, with a Fermi sea, typically the conduction band in a metal. It is a prototype example of a many body system where non-perturbative effects give rise to new phenomena – the screening of the impurity spin and the growth of scattering strength at low energy scales, closely akin to quark confinement. The Kondo model and the physics of local magnetic moments in metals were extensively studied in the 60's and 70's by experimentalists and theorists. After Kondo showed the failure of perturbation theory, the unsolved "Kondo Problem" gained great interest in condensed matter theory. Later, Anderson and Yuval introduced the idea of Scaling, Wilson carried out the first NRG (Numerical Renormalization Group) analysis showing a crossover from weak to strong coupling regime as the temperature is lowered and Nozières gave a simple characterization of the strong coupling physics. In this talk I shall describe some of the history, the motivation and thought processes that led to the construction of an exact solution of the model by means of a Bethe Ansatz and show how the previous work fits beautifully into this exact framework. I'll also talk briefly how today, the Kondo model is providing a new perspective on non-equilibrium many body physics.

[1]The recent work described here was supported by NSF grant DMR 1410583