DEPARTMENT OF PHYSICS UNIVERSITY OF MARYLAND **CNAM** Condensed Matter Colloquium

2pm, **September 24th,** Room 1201

The Problem(s) of Very Low Temperature Noise in Superconducting Circuits

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We review the data on flux noise in superconducting circuits and formulate an appropriate theoretical model that involves spins coupled by RKKY interaction. We show that for the solution of this model one needs a new technique to compute the high frequency asymptotics of the spin correlators in weakly interacting disordered spin systems. We develop this technique and apply the results to the problem of flux noise. We show that the fast decay of spin correlators at high frequencies translates into the 1/f behavior of the low frequency noise generated by rare strongly coupled spins.

In the second part of the talk we consider the general question of the noise generated by strongly disordered spin systems and quantum transitions driven by the competition of the disorder and spin-spin interaction. We solve the prototypical model that describes such transitions on the Bethe lattice and show the existence not of two but three possible phases. Namely, large spin interactions lead to a complete delocalization of the spin excitations, these excitations become very slow at low temperatures in the intermediate phase and completely freeze in the strongly disordered phase.

Host: Victor Galitski