

A discrete energy space induced fermion parity breaking fixed point of the Kondo model

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One of the most striking features of quantum mechanics is the non-locality of entanglement. Taking this concept to its ultimate limit every particle should be able to explore the complete universe, even currently unknown parts of the universe possibly containing new physics. At least we can not rule out such an entanglement. In return we should treat every particle as a particle in a box, namely the universe, which leads us to the conclusion, that there is a discrete space–time at very low energies. Such an hypothesis opens the possibility for rather unconventional, speculative scenarios.

Here we combine the well established Kondo problem with the more speculative field of a discrete space time. We show that a discrete energy space induces a flow towards a new fix point by breaking the conservation of charge and spin and lifting the fermion parity. This parity lifting fixed point appears on a scale set by the discretization of energy space. In contrast to the Planck scale the associated energy scale is at very low energy scales, possibly given by the inverse size of the universe. We note that we one can not provide a term in a the Hamiltonian of a typical lattice model that breaks the fermion parity as it would consist of products of odd numbers of annihilation and creation operators.