Nonreciprocal interactions via reservoir engineering

An interaction process between two quantum systems is in general reciprocal. This means that forward and backward process are inherently present and both systems are influenced by the interaction. One may ask the question if it is possible to break this symmetry, i.e., if one can realize a unidirectional interaction between two quantum systems? This is indeed possible, as we found that any factorisable (coherent) Hamiltonian interaction can be rendered directional if balanced with the corresponding dissipative interaction. This powerful concept can be exploited to engineer nonreciprocal devices for quantum information processing, computation and communication protocols, e.g., to achieve control over the direction of propagation of photonic signals, enabling to construct circulators, optical isolators or directional amplifiers. In this talk I will introduce the basic concept and discuss possible implementations for nonreciprocal devices in superconducting circuit and optomechanical architectures.

Ort: ITP, Raum 211

Interessenten sind herzlich eingeladen!

gez. Prof. Rosenow