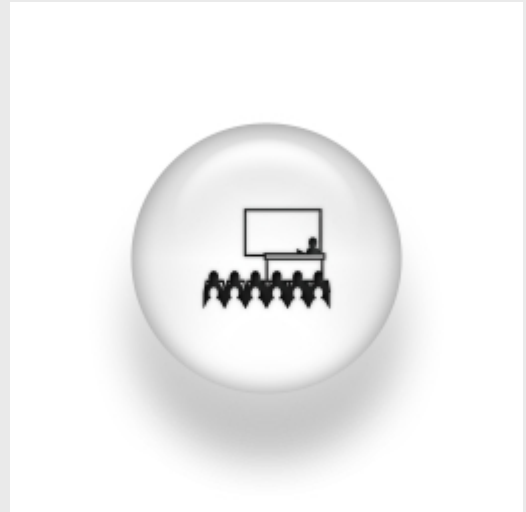


Superconducting molecular quantum dots

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ABSTRACT:

The Josephson current through nanoscale quantum dots will be discussed in this talk, mainly from a theory point of view. The effects of electron-electron interactions, in particular the interplay of Kondo physics and superconductivity in spin-degenerate quantum dots and in carbon nanotube dots (where a larger $SU(4)$ symmetry can be realized) are addressed. In systems with an internal degree of freedom, it is possible to modify this mode in a dissipationless manner through changes in the superconducting phase difference. This is shown for the case of a two-level system as model of a conformational degree of freedom. I will also discuss effects of spin-orbit coupling, which can induce a spontaneous breaking of time reversal symmetry, leading to an anomalous Josephson current.