Electron-phonon interaction and electronic correlations in transport through electrostatically and tunnel coupled quantum dots

D. Krychowski[1] and S. Lipiński[1]

[1] *Institute of Molecular Physics, Polish Academy of Sciences, M. Smoluchowskiego 17, 60-179 Poznań*

We investigate two equivalent capacitively and tunnel coupled quantum dots, each coupled to its own pair of leads. Local Holstein type electron-phonon coupling at the dots is assumed. We eliminate the linear e-ph coupling terms employing Lang-Firsov transformation. To study many-body effects we use the finite-U mean-field slave boson approach. For vanishing interdot interaction, weak e-ph coupling and finite tunneling, molecular orbital spin Kondo effects occur for single electron or single hole occupations. Strong e-ph interaction suppresses tunneling between the dots and degenerate states of single dot Kondo resonances emerge in this range at low temperatures. Similarly, for double occupancy and strong e-ph coupling two impurity Kondo (2K) becomes the ground state, while for weaker coupling local spin singlet (LSS) is formed and for still smaller coupling orbital spin singlet (OSS) appears. When dots are additionally capacitively coupled spin-orbital SU(4) Kondo state can occur for strong e-ph interaction. For the attractive effective intradot interaction charge Kondo effects appear in which charge fluctuations occur between even-occupied states.