

# **Real-Time Dyson-Expansion Scheme: Efficient Inclusion of Dynamical Correlations in Nonequilibrium Spectral Properties**

**Vojtech Vlcek**

In a recent paper, we have introduced a new method, Real-Time Dyson Expansion (RT-DE), that allows for the inclusion of dynamical correlations in the spectral function while maintaining effectively the same overall scaling in the number of time steps as for mean-field approaches. This approach is based on a perturbative reconstruction of the time-off-diagonal Green's function via a real-time recasting of the perturbation theory. In this talk, I will introduce the RT-DE methodology and its performance. I will then discuss an application studying the effect of dynamical correlations on band-gap renormalization in photo-excited semiconductors.