Designed quantum transport on periodically driven networks

Quantum transport on networks with many degrees of freedom is important for different topics in physical biology. It has been shown that efficient transport can be guaranteed by single design principles which are compatible with the statistical character of those systems. A new challenge is to make the models more realistic in the sense that the interaction of the network with the environment – for example the influence of vibrational modes in biological complexes – should be considered in the systems' hamiltonian as an explicit time dependence. This semi-classical treatment allows a compact mathematical description without loosing the deciding property of the quantised energy exchange between the vibrating field and the network.

I will show that the resonant driving between the initial and the final state leads to a transport mechanism very similar to the case of a direct static coupling. With this mechanism the design principle of the "dominant doublet" can be generalised for periodically driven networks in a natural way by using floquet theory as an important mathematical tool. I will also give a short outlook on the concept of a resonant middle state between initial and final state which seems very promising for further research.