

# Electronic Tunneling through Dissipative Molecular Bridges

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## Outline

### Motivation:

- Controlled electron transport in molecular devices and in biological systems.

### Background:

- ET in Donor-Acceptor complexes: The Golden Rule, the Condon approximation and the spin-boson Hamiltonian.
- ET in Donor-Bridge-Acceptor complexes: McConnell's formula for the tunneling matrix elements.

### The problem:

- Electronic-nuclear coupling at the molecular bridge and the breakdown of the Condon approximation.

### The model system:

- Generalized spin-boson Hamiltonians for dissipative through-bridge tunneling.

### Results:

- The weak coupling limit: Langevin-Schroedinger formulation, simulations and interpretation of ET through a dissipative bridge
- Beyond the weak coupling limit: An analytic formula for the tunneling matrix element in the deep tunneling regime.

### Conclusions:

- Promotion of tunneling through molecular barriers by electronic-nuclear coupling.
- The effect of molecular rigidity.