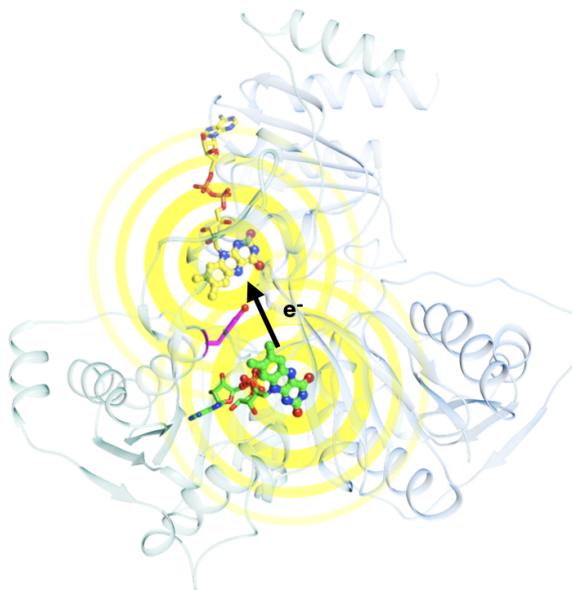


# Mini-Course on Electron Transfer

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15, 16 April 2021: 1 - 5 pm Berlin



## 1. What is electron transfer? 13:00-14:20

The importance of Electron Transfer.  
ET from the origin of life to respiration.  
**Energy expressed via  $E^\circ$ 's.**  
Redox tuning.

## 2. Breakout activities 1

## 3. How we know what we know. 15:40-17:00

Our understanding of what an electron is.  
Mechanisms of ET: tunneling,  
superexchange.

Classical analogy to transition state  
theory.

Quantum considerations: adiabatic vs. diabatic.

**Markus Equation.** Inverted Region and its Temp. dependence.  
Implementations in biochemistry. Hopping over long ranges.

## 4. Capturing energy using ET. 13:00-14:20

Biological Jablonski diagram.

### **Photosynthetic ET**

and transient spectroscopy.

Implementation of superexchange, hopping, tunneling.

Example: Pseudo symmetry in photosystems II and I.

Controlling electron transfer.

Kinetic control: Marcus

Includes thermodynamic control: redox tuning.

## 5. Breakout activities 2

## 6. Exploiting ET by coupling it to chemical work: proton transfer. 15:40-17:00

Mitchel Hypothesis.

### **Coupling ET to Proton transfer:**

fundamentals illustrated by SOD, flavins.

Mechanism: 'no-barrier' transitions.

Photosynthetic electron flow,

Examples in enzymology: ribonuclease Reductase.

Isotope effects

Bridge to permanence: electron pairing.

$K_s$  the stability constant as an indicator of  $2e^-$  vs  $1e^-$  ET: Hydride vs. ET.