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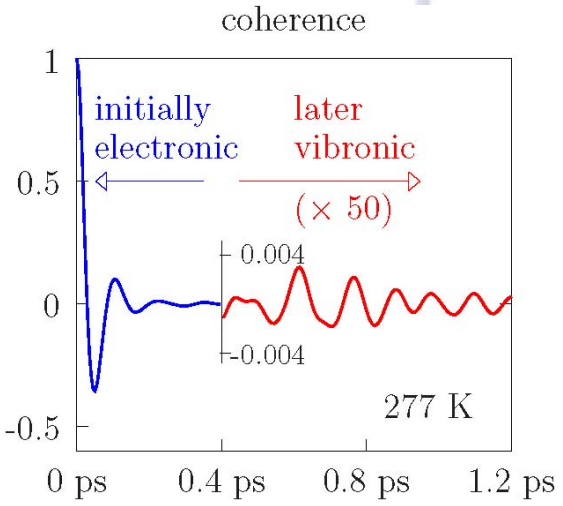
Good or bad vibrations from photosynthetic complexes? Mechanisms for long-lived electronic coherence in dissipative environments

The measurement of oscillatory signals in pump-probe spectroscopy of light-harvesting complexes has led to a debate on the role of coherent electronic transport through molecular networks. Molecular vibrations induce strong dissipation and require to reconcile two seemingly contradictory observations of transport in light-harvesting complexes:
(i) long-lasting electronic oscillations and (ii) fast thermalization.

The calculation and interpretation of the experimentally recorded 2d spectra presents a tremendous computational challenge, which we obliterate by utilizing high-performance graphics-processing units (GPU) to propagate systems of density matrices.

I discuss how the vibronic mode structure of the Fenna-Matthews-Olson complex influences the electronic coherence life-time and which mechanisms support long-lasting coherences.

C. Kreisbeck, T. Kramer, Journal of Physical Chemistry Letters **3**, 2828 (2012)



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