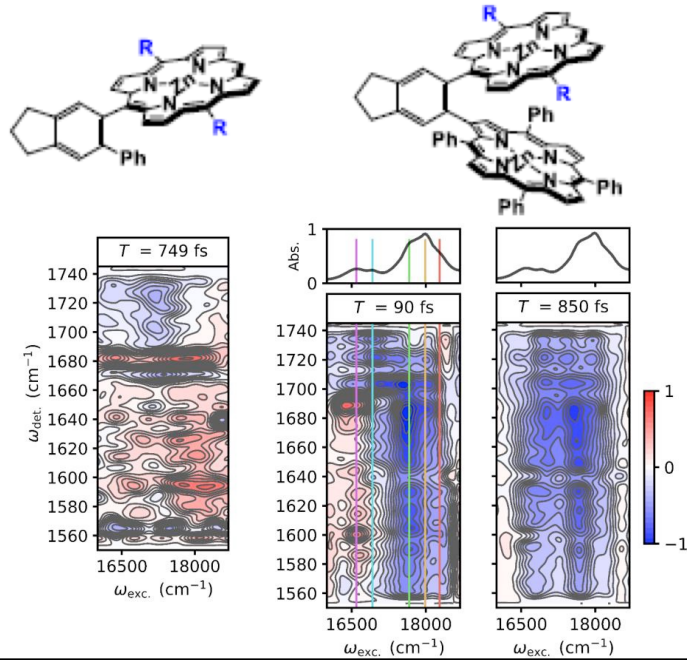


# Engineering and Sustaining Excited-State and Spin/Charge Coherences in Molecular and Nanoscale Systems

## Building Coherence with Strong Electronic Coupling



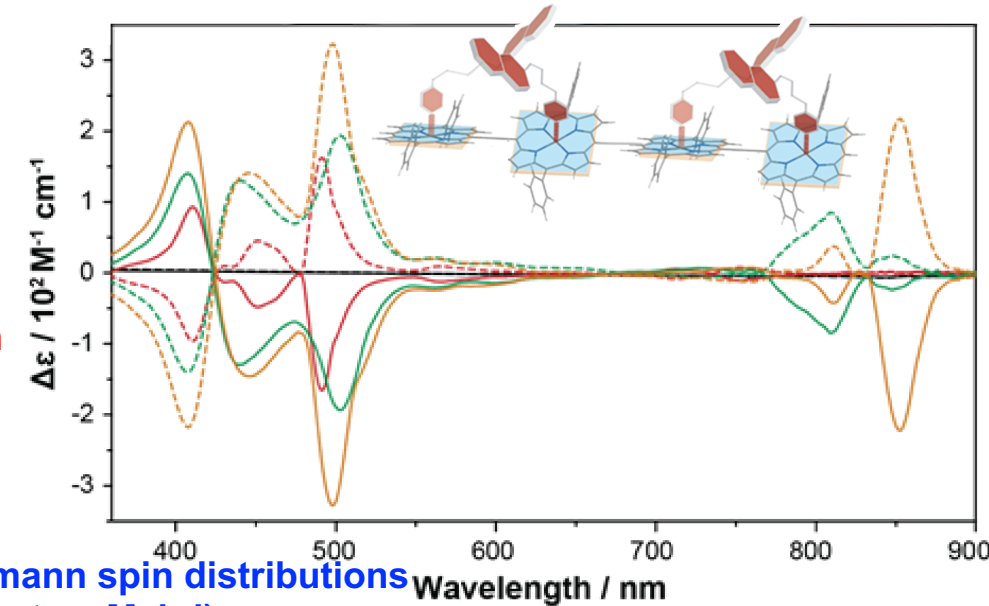
How does symmetry breaking impact the nature and persistence of vibronic coherence?

Ultrafast 2DEV illuminates how the nature of excitonic interactions sustains coherence and directs the flow of energy (Fleming, Therien, Beratan, Makri).

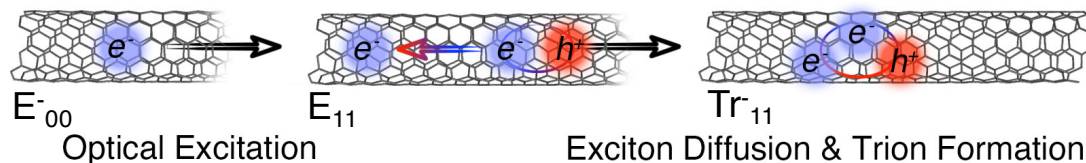
Can the combination of CPL excitation and chromophore chirality control excited-state spin polarizations and the nature of spin coherences following ultrafast charge separation?

Such approaches modulate non-Boltzmann spin distributions of  $T_1$  states. (Wasielewski, Therien, Beratan, Makri).

## Interchanging Spatial & Spin Coherence

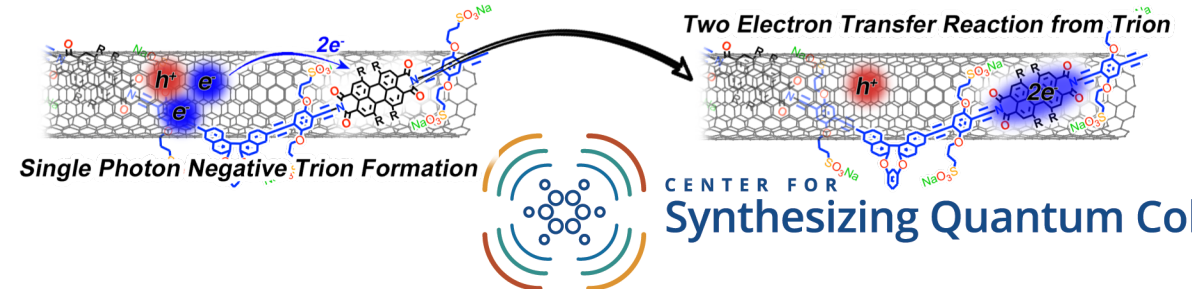


## Directing Particles & Quasiparticles Coherently



Looking Ahead: Can the CSQC disrupt the energy conversion paradigm in which photon absorption transfers at best a single charge?

Designing and characterizing novel compositions of matter in which a single photon coherently drives the migration of two charges. (Therien, Fleming, Wasielewski, Beratan, Makri).



Engaging coherence - Producing Leaders



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Synthesizing Quantum Coherence