

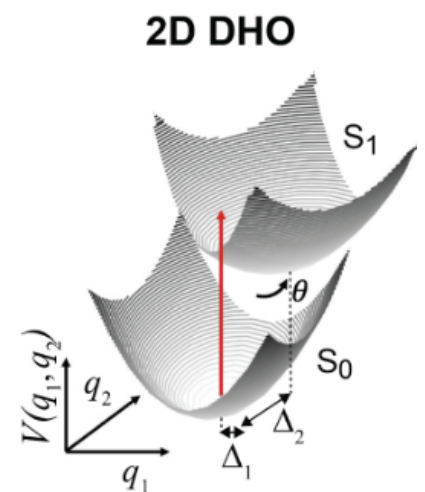
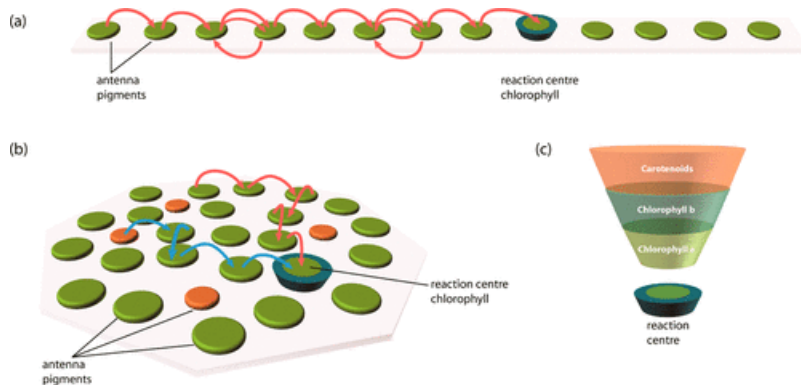
# Physics Department Seminar

11 am April 12, 2024 Science Building Room 126

## Femtosecond Coherence Spectroscopy for Multiple Vibrational Modes.

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When molecules within a material are hit by ultrashort laser pulses, their excited state transitions appear as oscillations when plotted on a time-dependent spectral graph. In a spectral measurement, several normal mode vibrations can be plotted as a function of the probe frequency, alongside their amplitudes and phases. A Femtosecond Coherence Spectroscopy (FCS) profile can simulate these spectral patterns and correlate them with the ones found in the lab. The first FCS model constructed only accounted for the excited state molecular vibrations in

one dimension. As a result, it was incapable of simulating the asymmetry present within the lab data when given realistic parameters. A 2D model acts as an improvement by adding an extra degree of freedom to the molecular vibrations as well as accounting for the mixing of the excited state vibrations through Duschinsky rotation. Consequently, the 2D model served as a better simulation of the lab data than the 1D model. In the future, we need to discover the root cause for the asymmetry present.