

Theory of energy and charge transfer in photosynthetic pigment-protein complexes

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I will provide an overview over our method development concerning the parameterization of the Frenkel exciton / charge transfer (CT) Hamiltonian of photosynthetic pigment-protein complexes and the development of dynamic theory of optical spectra and energy and charge transfer. Applications are presented on light-harvesting and photoprotection in the core of green-sulfur bacteria [1], (ii) the effects of CT couplings on optical spectra of reaction centers (RC) of photosystem II [2], and the identification of a chlorophyll *f* pigment in the RC of far red light-adapted cyanobacteria [3].

[1] Klinger et al. *Phys. Chem. Chem. Phys.* 2023, 25, 18698.

[2] Gemeinhardt et al. *J. Phys. Chem. Lett.* 2023, 14, 11758.

[3] Consoli et al. *Science* 2025, 390, eado6830.