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Optimal Excitation energy transfer dynamics in light-harvesting systems[1] JIANLAN WU[2], JIANSHU CAO, ROBERT SILBEY, Chemistry Department, MIT — With the facilitation of surrounding protein environments, excitation energy transfer (EET) in photosynthetic systems can be highly efficient and robust. This talk compares different descriptions of dissipative exciton dynamics, discusses the generic mechanism of optimal energy transfer, and explores its implications for light-harvesting systems. (i) The generalized Bloch-Redfield equation provides a reliable description of exciton dynamics over a broad range of parameter space. (ii) The generic mechanism of optimal efficiency allows us to examine the interplay of quantum coherence, dynamics noise, and static disorder in a unified conceptual framework. (iii) The topological symmetry and network structures in photosynthetic systems reveal useful insights for the optimal design of artificial energy transfer systems.

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