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Resonance Energy Transfer: Relay by a Third Molecule

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The effect of a third body in modifying the resonance energy transfer rate between a pair of molecules is investigated using diagrammatic time-dependent perturbation theory within the framework of non-relativistic quantum electrodynamics [1,2]. In addition to the familiar direct exchange term between donor and acceptor, the rate also contains contributions arising from indirect transfer via a polarizable third molecule, and an interference term between these two mechanisms. Previous work limited to the near-zone only [3], is extended to all separation distances between the three particles and includes the effects of retardation [4]. It is found that for a collinear arrangement of the three bodies the interference term can be negative, thereby reducing the overall migration rate. Insight is also gained into microscopic and macroscopic models of resonance energy transfer in a medium.

[1] D. P. Craig and T. Thirunamachandran, *Molecular Quantum Electrodynamics*, Academic Press, London, 1984.

[2] A. Salam, *Molecular Quantum Electrodynamics*, John Wiley & Sons, Inc., New York, 2010.

[3] D. P. Craig and T. Thirunamachandran, *Chem. Phys.* **135**, 37 (1989).

[4] A. Salam, *J. Chem. Phys.*, doi: 10.1063/1.3673779, In Press.