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Absence of quantum oscillations in electronic excitation transfer in the Fenna-Matthews-Olson complex[1] ALEXANDER EISFELD, Harvard University, GERHARD RITSCHEL, JAN RODEN, Max-Planck-Institute for the Physics of Complex Systems, WALTER STRUNZ, TU Dresden, ALAN ASPURU-GUZIK, Harvard University — Energy transfer in the photosynthetic Fenna-Matthews-Olson (FMO) complex of the Green Sulfur Bacteria is studied theoretically taking all three subunits (monomers) of the FMO trimer and the recently found eighth bacteriochlorophyll (BChl) molecule into account. For the calculations we use the efficient Non-Markovian Quantum State diffusion approach. Since it is believed that the eighth BChl is located near the main light harvesting antenna we look at the differences in transfer between the situation when BChl 8 is initially excited and the usually considered case when BChl 1 or 6 is initially excited. We find strong differences in the transfer dynamics, both qualitatively and quantitatively. When the excited state dynamics is initialized at site eight of the FMO complex, we see a slow exponential-like decay of the excitation. This is in contrast to the oscillations and a relatively fast transfer that occurs when only seven sites or initialization at sites 1 and 6 is considered. Additionally we show that differences in the values of the electronic transition energies found in the literature lead to a large difference in the transfer dynamics.

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