



Quantum Efficiency Seminar und Colloquium

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Efficient upconversion by triplet-triplet-annihilation

A very promising approach to obtain efficient upconversion of light is the use of triplet-triplet annihilation of excitations in molecular systems. In real materials, besides upconversion, many other physical processes take place - fluorescence, non-radiative decay, annihilation, diffusion - and compete with upconversion. In my talk I will give a short introduction to noncoherent upconversion, and present a proof of principle model that can be used to shed light on the relevance of the interaction between the different physical processes that take part in these kinds of systems. Ultimately, we want to establish general principles that may guide experimentalists toward the design of materials with maximum efficiency. Here we show, in a 1D model system, that even in the presence of these processes upconversion can be optimized by varying the ratio between the two molecular species present in this kind of materials. We derive scaling laws for this ratio and for the maximum efficiency of upconversion, as a function of the diffusion rate J , as well as of the creation and of the decay rate of the excitations.

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