PHYSIKALISCHES KOLLOQUIUM

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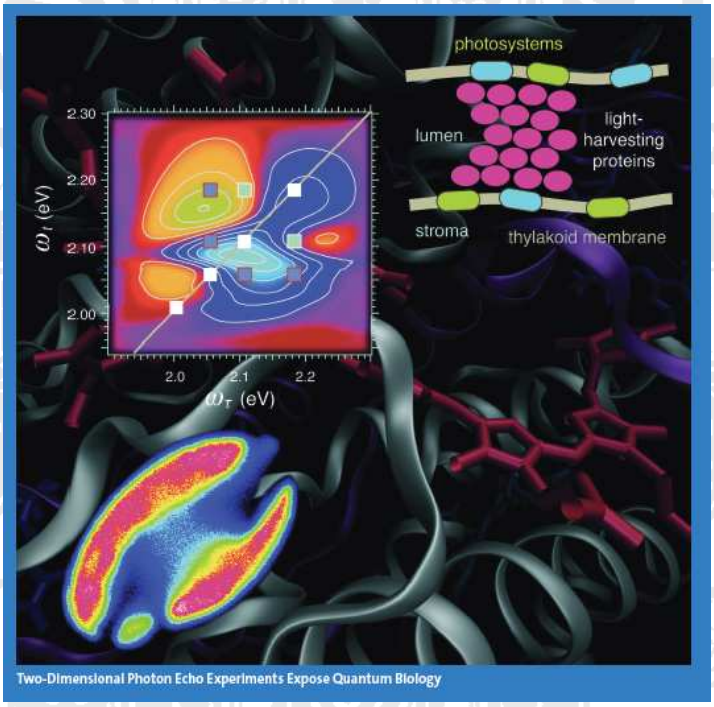
IM GROßEN HÖRSAAL



Two-Dimensional Photon Echo Experiments Expose Quantum Biology

LESSONS FROM NATURE ABOUT SOLAR LIGHT-HARVESTING

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The aim of this presentation is to summarize what has been learned from studies of photosynthetic light-harvesting and energy transfer into a few important 'lessons' that will aid the design of optimal synthetic light-harvesting systems. Some of these design principles are not easily mimicked, yet they are fascinating and still under study. An example is the role that the protein plays in optimizing light harvesting. Other phenomena challenge our understanding of chemical dynamics. Recently, for example, it has been discovered that quantum-mechanical coherence is involved in the transport of the solar energy captured by pigment molecules in the light-harvesting proteins. This has stimulated immense excitement because evidence suggests that this biological process employs intrinsically quantum-mechanical phenomena—not too dissimilar from those studied in quantum information science. It is the realization that biology, normally understood to occur in a classical, thermodynamic limit, is able to utilize quantum-mechanical superposition states and interferences that is most tantalizing. These and other concepts that could be employed by nanoscale systems for light harvesting will be described.