

Plenary Talk

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Spectroscopic signatures of quantum-coherent energy transfer — ●ELISABETTA COLLINI — Dept. of Chemical Sciences, University of Padova, via Marzolo 1, 35131 Padova (Italy)

One of the most surprising and significant advances in the study of the photosynthetic light-harvesting process is the discovery that the electronic energy transfer might involve long-lived electronic coherences, also at physiologically relevant conditions. This means that the transfer of energy among different chromophores does not follow the expected classical incoherent hopping mechanism, but that quantum-mechanical laws can steer the migration of energy. The implications of such quantum transport regime, although currently under debate, might have a tremendous impact in our way to think about natural

and artificial light-harvesting. Central to these discoveries has been the development of new ultrafast spectroscopic techniques, in particular two-dimensional electronic spectroscopy, which is now the primary tool to obtain clear and definitive experimental proof of such effects. This talk aims to provide an overview of the experimental techniques developed with the purpose of attaining a more detailed picture of the coherent and incoherent quantum dynamics relevant to energy transfer processes, not limited to the two-dimensional electronic spectroscopy. With the idea of summarizing the experimental and theoretical basic notions necessary to introduce the field, the connection between experimental observables and coherence dynamics will be analysed in detail for each technique, highlighting how electronic coherences could be manifested in different experimental signatures.