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**Fundamental Principles in Noise-Assisted Transport:  
From Quantum Networks to Light-Harvesting Complexes**

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Abstract:

We discuss different aspects of the quantum dynamics of excitation transport across complex networks in the presence of, possibly strong, system-environment interactions. We make a case for the systematic study of fundamental elements underlying the quantum dynamics of these systems, identify such elements and explore the resulting interplay of quantum dynamics and environmental decoherence. We apply our results to discuss the highly efficient excitation energy transport observed in certain biological, photosynthetic complexes which have been recently shown to display quantum coherence.