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Explorations in Quantum Dynamics and Information

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Quantum Dynamics (QD) is the study of the evolution of quantum systems, as described by dynamical relations, such as the familiar time-dependent Schrödinger equation from nonrelativistic wave mechanics. QD helps us see the structure of interactions between systems and tells us how properties of quantum systems change over time. QD has developed a rich toolbox of techniques with a wide range of applicability. Quantum Information (QI) is the study of how one can store, process, and retrieve information according to quantum rules. QI informs us about how we can access systems and what we can or cannot know about these systems. QI is a fast-growing field with remarkable realizations and exciting ramifications from technology to philosophy. In this talk I will highlight the intersection between these two important fields of quantum research. I will argue that there is much to be gained from their constructive interference. I will give examples where the combined application of QD and QI, the interplay of time and qubit, gives intriguing results and raises new questions.