The Meaning of the Schrodinger Equation, the Limitations of the Adiabatic Hypothesis, and the Origins of Electron and Energy Transfer

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In this lecture, I will discuss the breakdown of the Born-Oppenheimer approximation, and why separation of nuclear motion and electronic transitions cannot always be true. Several simple and familiar examples will be made to convince the audience on this point. After agreeing that the world is more complicated that the simple Born-Oppenheimer picture predicts, we will then discuss several interesting non-equilibrium consequences, including electron and energy transfer and electronic relaxation. Finally, time permitting, I will discuss how can one make progress in modeling these phenomena computationally, using both *ab initio* quantum chemistry and quantum dynamics programs.