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Surface-Enhanced Quantum Control

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Quantum control of molecular states is important in that it can be used to manipulate the behaviour of quantum systems. In particular, noble-metal nanoparticles can be used to enhance state decay rates in proximate quantum systems and modify local electromagnetic fields. This enhancement allows us to achieve a high level of control over the quantum dynamics of an atomic system. We use the Lindblad Master equation to model the interaction between a quantum system, an incident electromagnetic wave and proximate nanoparticles in order to predict how the system will respond to being driven by the incident electromagnetic wave. This allows us to predict how particular state densities can be prepared and how various system configurations can affect processes such as fluorescence.

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