

Abstract Submitted
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Surface-enhanced quantum control of three-level systems¹ CHI-TRA RANGAN, CHRISTOPHER DILORETO, Department of Physics, University of Windsor, Ontario, Canada — Noble-metal nanoparticles can be used to enhance state decay rates in proximate quantum systems and to control local electromagnetic fields. In this paper, we show that this surface enhancement can be used to improve the preparation of desired target quantum states. We model the interaction between a three-level quantum system with an incident electromagnetic wave in proximity to a gold nanoparticle. We show that by placing a three-level quantum system near a gold nanoparticle, we can use an electromagnetic wave to control the quantum dynamics in a reduced period of time and with a lower electric field intensity when compared to an isolated system. This reduction in required time, electric field intensity and the ability to modify system purity may represent an improvement in the practical control and use of quantum information systems.

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