

Abstract Submitted  
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**Analytically solvable driven time-dependent two-level quantum systems**<sup>1</sup> EDWIN BARNES, SANKAR DAS SARMA, Condensed Matter Theory Center, University of Maryland — Analytical solutions to the time-dependent Schrodinger equation describing a driven two-level system are invaluable to many areas of physics, but they are also extremely rare. Here, we present a simple algorithm based on a type of partial reverse-engineering that generates an unlimited number of exact analytical solutions for a general time-dependent Hamiltonian. We demonstrate this method by presenting several new exact solutions that are particularly relevant to qubit control in quantum computing applications. We further show that our formalism easily generates analytical control protocols for performing sweeps across energy level anti-crossings that execute perfect Landau-Zener interferometry and rapid adiabatic passage near the quantum speed limit. [1] Phys. Rev. Lett. 109, 060401 (2012)

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Edwin Barnes  
Condensed Matter Theory Center, University of Maryland

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