

Abstract Submitted  
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**Adiabatic passage with ultrashort laser pulses** SERGEY ZHDANOVICH, EVGENY SHAPIRO, CIAN MENZEL-JONES, MOSHE SHAPIRO, JOHN HEPBURN, VALERY MILNER — We develop a method of executing complete population transfer between quantum states using a series of femtosecond laser pulses. The method can be applied to a large class of problems as it benefits from the high peak power and large spectral bandwidth afforded by ultrashort pulses. The new type of “piecewise adiabaticity” is reflected by the robustness of the degree of population transfer to a wide variation in the intensities, durations, and time delays between the pulses. The method is studied in detail for two- and three-level systems, and demonstrated experimentally in atomic rubidium where piecewise adiabatic population transfer between two electronic states is observed. Piecewise adiabatic passage offers a new set of tools for manipulating the population of atomic and molecular states on ultrashort time scale.

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