

Abstract Submitted
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Understanding strong-field coherent control using the Parametric State Expansion¹ JENS SVENSMARK, B. D. ESRY, J. R. Macdonald Laboratory, Kansas State University — The carrier-envelope phase (CEP) of an ultrashort laser pulse is 2π -periodic. We have shown^{2,3} that from this simple, almost trivial, observation the analytic dependence of any observable on the CEP can be found by expanding the wave function in a Fourier series. The Fourier index turns out to be interpretable as the photon number. From this insight, it is possible to predict when CEP effects will be most pronounced, and thus help choose parameters to maximize control via the CEP. But why stop with CEP? The same basic formulation can be applied to any parameter that influences a given problem. For instance, an elliptically polarized laser pulse can be parametrized with a 2π -periodic ellipticity parameter. The angle between non-collinear pump and probe pulses is similarly a periodic parameter in the Hamiltonian. The analytic dependence of observables such as the strong-field photoelectron momentum distribution on these parameters can thus be derived. We will present these derivations and explore their interpretations, focusing on the physical insights they provide.

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