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Birth of a resonant attosecond wavepacket L. ARGENTI[1], UAM, Spain, V. GRUSON, L. BARREAU, CEA-Saclay, IRAMIS, LIDL, France, A. JIMENEZ-GALAN, UAM, Spain, F. RISOUD, J. CAILLAT, A. MAQUET, Sorbonne Univ., UPMC Univ. Paris 6, France, B. CARRE, F. LEPETIT, J.-F. HERGOTT, T. RUCHON, CEA-Saclay, IRAMIS, LIDL, France, R. TAIEB, Sorbonne Univ., UPMC Univ. Paris 6, France, F. MARTIN, UAM, Spain, P. SALIERES, CEA-Saclay, IRAMIS, LIDL, France — Both amplitude and phase are needed to characterize the dynamics of a wavepacket. However, such characterization is difficult when both attosecond and femtosecond timescales are involved, as it is the case for broadband photoionization to a continuum encompassing autoionizing states. Here we demonstrate that Rainbow RABBIT, a new attosecond interferometry, allows the measurement of amplitude and phase of a photoelectron wavepacket created through a Fano resonance with unprecedented precision. In the experiment, a tunable attosecond pulse train is combined with the fundamental laser pulse to induce two-photon transitions in helium via an intermediate autoionizing state. From the energy and time-delay resolved signal, we fully reconstruct the resonant electron wavepacket as it builds up in the continuum. Measurements accurately match the predictions of a new time-resolved multi-photon resonant model, known to reproduce ab initio calculations. This agreement confirms the potential of Rainbow RABBIT to investigate photoemission delays in ultrafast processes governed by electron correlation, as well as to control structured electron wavepackets.

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