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Watching the Real-time Evolution of a Laser Modified Atom Using Attosecond Pulses NIRANJAN SHIVARAM, HENRY TIMMERS, XIAO-MIN TONG, University of Tsukuba, Japan, ARVINDER SANDHU, University of Arizona — In the presence of even moderately strong laser fields, atomic states are heavily modified and develop rich structure. Such a laser dressed atom can be described using the Floquet theory in which the laser dressed states called Floquet states are composed of different Fourier components. In this work we use XUV attosecond pulses to excite a He atom from its ground state to near-infrared (NIR) laser dressed Floquet states, which are ionized by the dressing laser field. Quantum interferences between Fourier components of these Floquet states lead to oscillations in He ion yield as a function of time-delay between the XUV and NIR pulses. From the ion yield signal we measure the quantum phase difference between transition matrix elements to two different Fourier components as a function of both time-delay (instantaneous NIR intensity) and NIR pulse peak intensity. These measurements along with information from time-dependent Schrodinger equation simulations enable us to observe the real-time evolution of the laser modified atom as the dominant Floquet state mediating the ionization changes from the 5p Floquet state to the 2p Floquet state with increasing NIR intensity.

Niranjan Shivaram
University of Arizona

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