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Landau-Zener-Stückelberg Interference of Microwave Dressed States in a Superconducting Phase Qubit GUOZHU SUN, RISE, Nanjing University, China, XUEDA WEN, School of Physics, Nanjing University, China, BO MAO, University of Kansas, YANG YU, School of Physics, Nanjing University, China, JIAN CHEN, WEIWEI XU, LIN KANG, PEIHENG WU, RISE, Nanjing University, China, SIYUAN HAN, University of Kansas — Landau-Zener-Stückelberg (LZS) interference is a well-known quantum phenomenon in a variety of physical systems, including atoms and solid-state systems. However, all the previous works were performed in simple systems having avoided level crossings in their energy diagrams. From both theoretical curiosity and practical significance it is important to know whether LZS interference can be observed in the dressed states, usually generated from the interaction between photons and atoms. We present the observation of LZS interference of the dressed states arising from a macroscopic quantum object, a superconducting phase qubit, interacting with a microwave field. The dependence of LZS interference fringes on the microwave power, microwave frequency, and the initial state of the qubit agrees quantitatively very well with the theoretical prediction. Such LZS interferometry involving the dressed states enables us to control the quantum states of multipartite systems with ease. In fact, this method is applicable to ANY quantum systems, which have avoided level crossings resulting from interaction between the individual constituents and photons.

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