Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Observation of the correspondence between Landau-Zener transition and Kibble-Zurek mechanism with a superconducting qubit system[1]

MING GONG, DONG LAN, YUHAO LIU, XINSHENG TAN, HAIFENG YU, YANG YU, SHILIANG ZHU, School of Physics, Nanjing University, China, GUOZHU SUN, YU ZHOU, YUNYI FAN, PEIHENG WU, School of Electronic Science and Engineering, Nanjing University, China, XUEDA WEN, Department of Physics, University of Illinois at Urbana-Champaign, Urbana, IL 61801, USA, DANWEI ZHANG, Guangdong Provincial Key Laboratory of Quantum Engineering and Quantum Materials, SPTE, South China Normal University, Guangzhou 510006, China, SIYUAN HAN, Department of Physics and Astronomy, University of Kansas, Lawrence, KS 66045, USA — We present a direct experimental observation of the correspondence between Landau-Zener transition and Kibble-Zurek mechanism with a superconducting qubit system. We develop a time resolved approach to study quantum dynamics of the Landau-Zener transition. By using this method, we observe the key features of the correspondence between Landau-Zener transition and Kibble-Zurek mechanism, e.g., the boundary between the adiabatic and impulse regions, the freeze out phenomenon in the impulse region. Remarkably, the scaling behavior of the population in the excited state, an analogical phenomenon originally predicted in Kibble-Zurek mechanism, is also observed in the Landau-Zener transition.

[1]This work was partly supported by the SKPBR of China (2011CB922104), NSFC (91321310, 11125417, 11474153, 11474154, 61521001), and the PCSIRT (Grant No. IRT1243)

Yang Yu
School of Physics, Nanjing University

Date submitted: 05 Nov 2015 Electronic form version 1.4