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**An ideal experiment to determine the ‘past of a particle’ in the nested Mach-Zehnder Interferometer** FU LI, Texas AM University, HASHMI HASHMI, COMSATS Institute of Information Technology, Islamabad, Pakistan, JINXING ZHANG, The State Key Laboratory of Quantum Optics and Quantum Optics Devices, China, SHI-YAO ZHU, Beijing Computational Science Research Center, Beijing 100094, P.R. China — An ideal experiment is designed to determine the past of a particle in the nested Mach-Zehnder interferometer (MZI) by using standard quantum mechanics with quantum non-demolition measurements. We find that when the photon reaches the detector, it only follows one arm of the outer interferometer and leaves no trace in the inner MZI; while when it goes through the inner MZI, it cannot reach the detector. Our result obtained from the standard quantum mechanics is contradict to the statement based on two state vector formalism, the photon did not enter the (inner) interferometer, the photon never left the interferometer, but it was there.

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