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A versatile platform for segmented blade trap[1] QUANXIN MEI, MINGLEI CAI, BOWEN LI, Center for Quantum Information, IIIS, Tsinghua University, Beijing, 100084, China, JUN WANG, School of Physics, Peking University, Beijing 100871, China, YUZI XU, Center for Quantum Information, IIIS, Tsinghua University, Beijing, 100084, China, XIANG ZHANG, Department of Physics, Renmin University of China, Beijing, 100872, China, ZICHAO ZHOU, LUMING DUAN, Center for Quantum Information, IIIS, Tsinghua University, Beijing, 100084, China
— Trapped ion system is an excellent platform for quantum simulation and quantum computation which enables us to effciently solve certain problems that are not practically feasible using classical computer system. Several setups of segmented blade trap system have been deployed in our lab, focusing on different applications including universal quantum computation and quantum simulation. In our systems, many techniques are utilized to make them more reliable and robust, including the frequency stabilization of 369nm diode laser with nonlinear spectroscopy of Ytterbium ions in a discharge lamp, an integrated control system for automatic ion loading and real-time feedback based on ions status, an efficient simulation program for accurate predictions of our trap potential, and a reliable procedure to design helical resonator accurately with high quality factor over 300. As our system is able to trap tens of ions, multiple ion detection with EMCCD has also been implemented, requiring about 1ms exposition time, and we are testing multiple ion detection with multi-channel PMT.

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