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Symmetry breaking between two dynamic attractors in the parametrically-driven magneto-optical trap KIHWAN KIM, MYOUNG-SUN HEO, KIHWAN LEE, KIYOUB JANG, WONHO JHE, School of Physics and Center for Near-field Atom-photon Technology, Seoul National University, Seoul, 151-747,Korea, HEUNG-RYOUL NOH, Department of Physics, Chonnam National University, Gwangju, 500-757, Korea — Nowadays there have been lots of studies about fluctuation-induced transitions in equilibrium and far from equilibrium states. The double well structure of those systems is very similar to that of the box separated into two compartments of the same section. When there are diffusions which come from thermal noise or spontaneous emissions the populations of both states are nearly same except some fluctuations. Surprisingly, in our parametrically driven magneto-optical trap we have observed the symmetry of the number of atoms in both states was broken at certain experimental conditions. Because the atoms in each state are nearly non-interacting ideal gas, which is much different from the granular particles, symmetry breaking (SB) of populations in our system is very strange and need to understand the underlying mechanism. We have found the most important factor of SB was the total number of atoms in both states. The critical numbers have been measured experimentally. We also developed the theoretical model that explains the phenomena very well, and quantitative simulation results compared to the experiments.

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