Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Investigating the possibility of entropy transfer between particles and laser fields during cooling processes[1] JOHN BARTOLOTTA, JARROD REILLY, MURRAY HOLLAND, JILA, University of Colorado, Boulder — We develop and theoretically analyze a gedanken experiment that explores the subtle topic of entropy transfer from particles to laser fields during the process of laser cooling. An ensemble of non-interacting, motionless particles is placed in a lossless optical cavity and is prepared in a mixed state with weights in two ground states, one of which is resonant with the cavity. The particles interact with a coherent state, which is also prepared in the cavity, according to the Jaynes-Cummings Hamiltonian. The particles can decay from an excited state into the non-resonant ground state by spontaneous emission into free space. We track any entropy flow between the ensemble of particles and cavity field throughout this process by calculating the mutual information between the cavity field and an ensemble of auxiliary particles that purify the initial particle state.

[1]This work was supported by NSF PFC Grant No. PHY 1734006

John Bartolotta
JILA, University of Colorado, Boulder

Date submitted: 30 Jan 2020 Electronic form version 1.4