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Feedback control of evaporative cooling through continuous nondestructive measurement JULIAN WOLF, JONATHAN KOHLER, JOHANNES ZEIHER, DAN STAMPER-KURN, University of California at Berkeley — Dispersive coupling of an ultracold atomic ensemble to a high-finesse optical cavity enables continuous readout of the number of atoms present in the ensemble. Real-time feedback based on this measurement allows for experimental parameters to be varied depending on the instantaneous atom number. I will present recent experiments in which we have implemented such a feedback loop during evaporative cooling of a cloud of ultracold ^{87}Rb, informing the cutoff time of the evaporation. This procedure has the potential to reduce fluctuations in final atom number to below the shot-noise limit. Further, by tuning closer to the strong-coupling regime, the dispersive atom number readout could be made sensitive to single-atom evaporation events, offering a microscopic probe of the evaporation process. In addition to providing a novel technique for improved preparation of atomic ensembles in a broad range of experiments, this work paves the way toward the observation and characterization of the microscopic processes involved in the evaporation of atomic ensembles.

Julian Wolf
University of California at Berkeley

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