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Collapse Dynamics of an Attractive Box-Trapped Bose-Einstein Condensate CHRISTOPH EIGEN, ALEXANDER GAUNT, NIR NAVON, ZORAN HADZIBABIC, ROBERT SMITH, Univ of Cambridge — We study the collapse dynamics of an attractive Bose-Einstein condensate confined in an optical box potential. After initiating the collapse (by suddenly changing the interaction to sufficiently negative) the wave-function shrinks in an accelerating manner. At some point (the collapse time), there is a sudden loss of atoms due to three-body recombination and an almost simultaneous emission of a shell of atoms with excess kinetic energy leaving the remnant condensate. We find that the collapse time, which we observe to vary over two orders of magnitude, can be expressed as a universal function of atom number, interaction strength and box size. Furthermore, we measure how the energy of the emitted shell and the remnant condensate atom number vary across this parameter space. In certain finely tuned conditions we observe a striking and unexplained bifurcation of possible outcomes.

Christoph Eigen
Univ of Cambridge

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