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Avalanche Mechanism for the Enhanced Loss of Ultracold Atoms[1]

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— In several experiments with ultracold trapped atoms, a narrow loss feature has been observed near an *atom-dimer resonance*, at which there is an Efimov trimer at the atom-dimer threshold. The conventional interpretation of these loss features is that they are produced by the *avalanche mechanism*, in which the energetic atom and dimer from 3-body recombination undergo secondary elastic collisions that produce additional atoms with sufficient energy to escape from the trapping potential. We use Monte Carlo methods to calculate the average number of atoms lost and the average heat generated by recombination events in a Bose-Einstein condensate and in a thermal gas. We improve on previous models by taking into account the energy-dependence of the cross sections, the spacial structure of the atom cloud, and the elastic scattering of the atoms. We show that the avalanche mechanism cannot produce a narrow loss feature near the atom-dimer resonance. The number of atoms lost from a recombination event can be more than twice as large as the 3 that would be obtained in the absence of secondary collisions. However the resulting loss feature is broad and its peak is at a scattering length that is larger than the atom-dimer resonance and depends on the trap depth.

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