

Rydberg dressing of a one-dimensional Bose-Einstein condensate

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We study the influence of Rydberg-dressed interactions in a one-dimensional (1D) Bose-Einstein condensate (BEC). We show that a 1D geometry offers several advantages over a three-dimensional geometry for observing BEC Rydberg dressing. The effects of dressing are studied by investigating collective BEC dynamics after a rapid switch-off of the Rydberg dressing interaction. The results can be interpreted as an effective modification of the s -wave scattering length. We include this modification in an analytical model for the 1D BEC and compare it to numerical calculations of Rydberg dressing under realistic experimental conditions.

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