Dicke model simulation via cavity-assisted Raman transitions[1]

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— The Dicke model is of fundamental importance in quantum mechanics for understanding the collective behaviour of atoms coupled to a single electromagnetic mode. Here, we demonstrate a Dicke-model simulation using cavity-assisted Raman transitions in a configuration using counter-propagating laser beams. The observations indicate that motional effects should be included to fully account for the results and these results are contrasted with the experiments using single-beam and co-propagating configurations. A theoretical description is given that accounts for the beam geometries used in the experiments and indicates the potential role of motional effects. In particular a model is given that highlights the influence of Doppler broadening on the observed thresholds.

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