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Superradiance in spin-J atoms: Effects of multiple atomic levels

GUIN-DAR LIN, SUSANNE YELIN, University of Connecticut, ITAMP Harvard-Smithsonian Center for Astrophysics — We study the superradiance dynamics in a dense system of atoms each of which can be generally a spin-J particle with J an arbitrary half-integer. Using a novel formalism we derive an effective two-body master equation to study the relevant cooperative and collective effects, taking into account the coherence of transitions between different atomic levels. One direct application of such calculation is to study the superradiance, in the context of polar molecules, due to transitions between multiple excitation levels, e.g. vibrational modes.

Guin-Dar Lin
University of Connecticut,
ITAMP Harvard-Smithsonian Center for Astrophysics

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