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Multipole cluster superfluorescence: The generalized Dicke model

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Abstract

The peculiarities of superfluorescence in systems consisting of a few neighbor particles (clusters), when exchange or/and electrostatic multipole interactions between particles become significant, are investigated theoretically. It is shown that interaction between particles in the cluster leads to superpoissonian statistics of emitted photons and the intensity I of quadrupole superfluorescence on the double frequency depends on the number N of active centers as $I \sim N^{-\alpha}$, where $\alpha > 2$. In particular, $\alpha = 3$, when $N \gg 1$. Possible schemes of cluster construction in nuclei systems are considered and prospects of observation of multipole gamma superfluorescence are discussed.

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Keywords

Cluster, Multipole, Superfluorescence, Superradiance