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Generation of high frequency coherent light by means of superradiant parametric resonance ANATOLY SVIDZINSKY, LUQI YUAN, Texas A&M University — Extended atomic ensembles excited collectively act as a cavity for photons resonant with the atomic frequency ω. In such a system the energy of electromagnetic field goes back and forth between the field and the atoms on a superradiant time scale determined by the collective frequency $\Omega << \omega$. We show that if atomic ensemble is driven by a laser with frequency Ω this can yield exponential grows of the high frequency atomic field in the direction opposite to the propagation direction of the driving field. We demonstrate that using the effect of collective parametric resonance one can, e.g., make a device which converts IR laser beam into XUV coherent light with the gain about 100 per cm. Our findings can lead to development of a new type of table-size coherent sources of XUV and X-ray radiation.

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