Abstracts

Multiple Quantum Frequency Conversion in Extended Interaction Structures

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In 1959, E.T. Jaynes suggested that resonant, multiquantum processes could provide an efficient method of frequency conversion at high frequency and high powers. This conversion is mediated by a gas or solid composed of molecules having a strong electric-dipole absorption at a frequency Omega. Such a system can resonantly absorb energy from an electromagnetic field at all odd subharmonic of Omega. The omega/spl ap/ Omega/(2n + 1) subharmonic absorption is said to correspond to a 2n + 1 quantum process. The excited (driven) molecular system has electric dipole moments at all odd harmonics of the drive omega. The resonant dipole moment at a frequency (2n + 1)omega /spl ap/ Omega generates an electromagnetic field resulting in the frequency conversion process proposed by Jaynes. Here we report theoretical calculations and experimental observation of this multiquantum frequency conversion in a traveling-wave structure.

❑ Return to main document.