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Spin Multiphoton Antiresonance at Finite Temperatures CHRISTIAN HICKE, MARK DYKMAN, Michigan State University — Weakly anisotropic $S > 1$ spin systems display multiphoton antiresonance. It occurs when an Nth overtone of the radiation frequency coincides with the distance between the ground and the Nth excited energy level (divided by $\hbar$). The coherent response of the spin displays a sharp minimum or maximum as a function of frequency, depending on which state was initially occupied. We find the spectral shape of the response dips/peaks. We also study the stationary response for zero and finite temperatures. The response changes dramatically with increasing temperature, when excited states become occupied even in the absence of radiation. The change is due primarily to the increasing role of single-photon resonances between excited states, which occur at the same frequencies as multiphoton resonances. Single-photon resonances are broad, because the single-photon Rabi frequencies largely exceed the multi-photon ones. This allows us to separate different resonances and to study their spectral shape. We also study the change of the spectrum due to relaxational broadening of the peaks, with account taken of both decay and phase modulation.

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