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Multiphoton antiresonance in large-spin systems CHRISTIAN HICKE, MARK DYKMAN, Michigan State University — We show that multiphoton resonance in a $S > 1$ spin system is accompanied by anticrossing of the responses in resonating states. This anticrossing accompanies the standard anticrossing of quasienergy levels. It leads to antiresonance: the ratio of the vibration amplitude to the modulation amplitude in one of the states becomes much less and in the other state much larger than in the weak-modulation limit. The response anticrossing can be observed by adiabatically sweeping the modulation frequency through multiphoton resonance. The shape and overall width of the dip/peak of the response as function of frequency strongly depend on the modulation amplitude. The effect has no analog in two-level systems and is sensitive to the parameters of the spin. It is most pronounced when the spin Hamiltonian in the absence of driving is $H_0 = \omega_0 S_z + \gamma S_z^2$. In this case several states experience multiphoton resonance at a time. The higher-order terms in S_z^2 lead to smearing of the antiresonance. We also study the response of the spin when the modulation is sharply turned on. The antiresonance leads to oscillations of the response with the multiphoton Rabi frequency. Their amplitude strongly depends on the modulation amplitude. The effect is compared with multiphoton antiresonance in a nonlinear oscillator [1]. [1] M. I. Dykman and M. V. Fistul, Phys. Rev. B **71**, 140508(R) (2005).

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