Optics and Spectroscopy (English translation of Optika i Spektroskopiya) 2014 vol.116 N6, pages 889-896

High temperature collective spin-photon coupling in a microwave cavity

Baibekov E.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

An ensemble of N noninteracting spins being in thermal equilibrium and coupled to the resonant mode of a lossless microwave cavity is studied as the function of the spin temperature τ. Near τ = 0 the system is known to be in a coupled spin-photon state that manifests itself by the splitting of the cavity mode (vacuum Rabi splitting). The cavity emission spectrum is simulated for arbitrary τ. A critical temperature τC = ωS √N/2, where ωS is the spin excitation energy, is related to the destruction of the strong coupling regime as a consequence of thermal excitations arising within the spin ensemble. © 2014 Pleiades Publishing, Ltd.

http://dx.doi.org/10.1134/S0030400X14060022