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Bose-Einstein condensation of magnons at room temperature

We show experimentally that Bose-Einstein condensation of magnons can be observed at room temperature. A gas of thermalized quasi-equilibrium magnons with a non-zero chemical potential is created in a magnetic film using parametric pumping. The process of magnon thermalization is studied and the value of the chemical potential of the gas after the thermalization is determined directly from the measured distribution of magnons over the spectrum. At high enough pumping powers the chemical potential reaches the energy corresponding to the lowest magnon frequency. Under these conditions a narrow peak of magnon population close to the bottom of the magnon spectrum appears. The widths of the peak both in the frequency and the k-vector-space are determined. The measured width of the peak is six orders of magnitude smaller than that expected for the thermal distribution. We associate this effect with Bose-Einstein condensation of magnons. Experimental evidence for spontaneous coherence of the condensate is found.

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