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Bose-Einstein condensation of confined magnons in nanostructures: the first 30 years and some recent experiments LAWRENCE BENNETT, EDWARD DELLA TORRE, CHIDUBEM NWOKOYE, ABID SIDDIQUE, MOHAMMADREZA GHAHREMANI, Institute for Magnetic Research, Department of Electrical and Computer Engineering, The George Washington University, Washington, DC 20052, USA — The Bose-Einstein condensation (BEC) theory was proposed in 1924 by Bose and Einstein. They showed that a non-interacting gas of bosons condenses into a coherent BEC in which a macroscopic number of bosons occupy the lowest-energy single particle state below a critical temperature [1]. An extension of this phenomenon to magnons, spin-wave quanta that behave as bosonic quasiparticles, in magnetic nanoparticles has been observed [2,3]. The BEC of magnons has unique characteristics differentiating it from atomic BEC, creating the potential for a whole new variety of interesting behaviors and applications that include high temperature Bose-Einstein condensation and novel nanomagnetic devices. We report the review of the theoretical and experimental work done in the first 30 years and present recent experimental research related to the topic. [1] Bose, S. N. (1924) Zeitschrift f ur Physik, 26, 178; Einstein, A. and Sitzungsber, K. (1925) Preuss. Akad. Wiss., Phys. Math. Kl. 3. [2] Swartzendruber, L. J., Rugkwamsook, P., Bennett, L. H., and Della Torre, E. (2000) J. Appl. Phys., 87, 5684. [3] Bennett L. H., and Della Torre E. (2014) J. Mod. Phys., 5, 693.

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