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Coherent quantum state of magnons (from superfluid 3He to YIG)

Yury Bunkov[1, 2]
[1]Institut NEEL, France
[2]Kazan Federal University, Russia

We have discovered in 1984 the spin superfluidity and magnon BEC in superfluid antiferromagnetic 3He-B (2008 Fritz London Memorial Prize). Later the many coherent quantum phenomena: Spin current Josephson effect; coherent transport on a long distance; critical spin super-current; phase slippage; Goldstone modes; spin quantum vortex, etc. have been observed. The magnon BEC have been observed in different types of antiferromagnetic superfluid 3He. All this experiments was made at the temperature below 1 mK. Indeed, in 2014 we have discovered high Tc spin super-fluidity in solid antiferromagnetic MnCO3 and CsMnF3 at the temperature of 1 K. Recently we have discovered the magnon BEC in Yttrium Iron Garnet at room temperature. In the last experiments we have used the YIG film at the magnetic field, perpendicular the film. In this conditions we have observed the classical magnon BEC at k=0. The magnon coherent transport-the super-magnonics are under investigations in YIG. We can demonstrate the first pioneering results for this phenomenon.

yuriy.bunkov@neel.cnrs.fr

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