SFB/TRR 21 - Colloquium

11. December 2015, Stuttgart

Tilman Zibold
(College de France, Paris)

Spin nematic order in antiferromagnetic spinor condensates

We investigate experimentally spin ordering in a spin-1 Bose-Einstein condensate of sodium atoms. Antiferromagnetic spin-exchange interactions favor spin-nematic ordering, where the magnetic order is characterized by a second rank tensor with the symmetry of an ellipsoid. In a mean field description this order is enforced by locking a particular relative phase 0 between the spin components. We reveal this mechanism by two methods, a study of the magnetization noise after spin rotation and a maximum-likelihood analysis to infer the probability distribution function of 0. Our methods can in principle also be applied to atoms with higher spin in order to reveal complex magnetic phases.

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Universität Stuttgart, NWZII, Raum 2.136
Pfaffenwaldring 57, 70569 Stuttgart

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