Magnetic resonance spectroscopy for spinor Bose condensates

Akiyuki Tokuno*[1] and Shun Uchino[1]

[1]DPMC-MaNEP, University of Geneva – Suisse

Résumé

Ultracold Bose atoms with spin degrees of freedom in the presence of magnetic fields are known to exhibit a quantum fluid with nontrivial spin orders, caused by peculiar effect to atoms such as spin dependent interactions and quadratic Zeeman splitting.
For such systems, one of the important challenges is to develop measurement techniques to capture complicated spin orders.

As an attempt for this issue we theoretically study resonance phenomena induced by magnetic fields. Assuming a dynamically modulated magnetic field, the energy absorption rate, which is measured in experiment, is formulated within linear response theory, and the spectrum is found to be described by a new type of spin correlation function: the autocorrelation of quadratic Zeeman term.

In addition, for a demonstration of this spectral feature, we consider spin-1 Bose condensate, and calculate the spectrum with Bogoliubov theory. As a result the spectrum is found to exhibit individual characteristic behavior depending on the spin orders.

*Intervenant