

Collective Excitations in Spin-2 Bose-Einstein Condensates

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Abstract: The Green's functions and the correlation functions in spin-2 Bose-Einstein condensates at finite temperature are defined and the generalized Dyson-Beliaev equations are introduced. We discuss the spin conservation in z direction and decouple the Green's functions and the generalized Dyson-Beliaev equations according to different spin conservations in z direction. The anomalous vertex functions are introduced and the self-energies are separated into the proper self-energies and the improper self-energies. The generalized Dyson-Beliaev equations are decoupled according to separation of the self-energies. We calculate the Green's functions step by step in the Bogoliubov approximation and discuss the collective excitations in spin-2 Bose-Einstein condensates in the polar, ferromagnetic, and cyclic cases, respectively.

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Key words: Bose-Einstein condensates, collective excitations, Green's function

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