

The Magnetized Quantum Breathing in Cylindrical Dusty Plasma

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Abstract : A quantum breathing mode has been theoretically studied in quantum dusty plasma. By using linear quantum hydrodynamic model, not only the quantum dispersion relation of rotation mode but also void structure has been derived in the presence of an external magnetic field. Although the phase velocity of the magnetized quantum breathing mode is greater than that of unmagnetized quantum breathing mode, attenuation of the magnetized quantum breathing mode along radial distance seems to be slower than that of unmagnetized quantum breathing mode. Clearly, drawing the quantum breathing mode in the presence and absence of a magnetic field, we found that the magnetic field alters the distribution of dust particles and changes the radial and azimuthal velocities around the axis. Because the magnetic field rotates the dust particles and collects them, it could compensate the void structure.

Keywords : the linear quantum hydrodynamic model, the magnetized quantum breathing mode, the quantum dispersion relation of rotation mode, void structure

Conference Title : ICTPMM 2017 : International Conference on Theoretical Physics and Mathematical Models

Conference Location : Paris, France

Conference Dates : July 20-21, 2017