Temperature dependence of the collective excitation for a dipolar Bose gas in presence of the three body contact interactions

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We present the frequencies of collective modes l = 0, l = 1 and l = 2 of dipolar gas at finite temperature deducted from a calculation of excitations energies by Hartree-Fock Bogoliubov-Popov approximation (HFB-P). We investigate how the three body contact interactions affect the different densities as well as condensate and non-condensate in this system of ultracold Bose gas trapped harmonically *via* the presence of the dipole-dipole interaction (DDI) which etablish a long range character. In this work, we start by solving numerically the Gross Piteavskii and a coupled Bogoliubov-de-Gennes equations at finite temperature in presence of the three body contact interactions which present a no-explored subject.