Seminar

Static structure factor and the dispersion of the Girvin-MacDonald-Platzman density mode for fractional quantum Hall fluids on the Haldane sphere

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We study the neutral excitations in the bulk of fractional quantum Hall (FQH) fluids generated by acting the Girvin-MacDonald-Platzman (GMP) density operator on the uniform ground state. Creating these density modulations atop the ground state costs energy since any density fluctuation in the FQH system has a gap stemming from the underlying inter-particle interactions. We calculate the GMP density mode dispersion for many bosonic and fermionic FQH states on the Haldane sphere using the ground state static structure factor computed on the same geometry. Previously, this computation was carried out on the plane. Analogous to the GMP algebra of the lowest Landau level (LLL) projected density operators in the plane, we derive the algebra for the LLL-projected density operators on the sphere, which facilitates the computation of the density mode dispersion. Contrary to previous results on the plane, we find that in the long-wavelength limit, the GMP mode provides an accurate description of the dynamics of the primary Jain states.

Thursday, Mar 6th 2025

16:00 Hrs (Tea / Coffee 15:45 Hrs)

Seminar Hall, TIFRH