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Department of Theoretical Physics

THE QUANTUM SPACETIME SEMINAR SERIES

Matter Chern Simons Theories in a Background Magnetic Field

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Date: Mar 27, 2019
Time: 11.30 am
Venue: A-304, TIFR

In the talk we will discuss large N Chern Simons gauged fundamental fermions in the presence of a uniform background magnetic field for the U(1) global symmetry. In the absence of the magnetic field the fermionic propagators of this theory obey well known Schwinger Dynson eqtions. It will be demonstrated that magnetic field modifies these Schwinger Dyson equations only by changing products to Moyal star products. Using a basis of functions extensively studied in the literature on non-commutative solitons, we will be able to exactly solve this gap equation, and so exactly determine the spectrum of single fermion energies at zero temperature but arbitrary chemical potential. Interaction effects shift the values of unfilled Landau Level energies in a very simple manner: the main qualitative modification has a simple interpretation in terms of the effective spin of excitations. More interestingly filled Landau Levels often (i.e. in most ranges of parameters) broaden out; it takes more energy to add the final ‘fermion' to these levels than the initial ‘fermion'. We will independently study the propagators of the Chern Simons gauged large N fundamental Wilson Fisher bosons in a background magnetic field, and verify that the spectrum of single particle states so obtained exactly agrees with our fermionic results under the conjectured Bose/Fermi duality map, yielding a nontrivial test of the duality.