INTERPLAY OF GEOMETRY AND TOPOLOGY IN FRACTIONAL QUANTUM HALL LIQUIDS

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Fractional Quantum Hall Liquids are the ultimate strongly correlated electron systems induced by high magnetic fields, and the birth place of topological phase of matter. In addition to their remarkable topological properties, recent works [1,2] have revealed the importance of an internal geometric degree of freedom (or metric) in them. We will discuss how to probe this geometric degree of freedom experimentally, in both static [3] and dynamical [4] regimes. In particular, the quantum fluctuation of internal metric results in a graviton-like excitation, which can be excited by a “gravitational wave”. We show [4] that acoustic wave in the crystal has an effect very similar to that of a gravitational wave, and can be used to excite and probe graviton excitation in fractional quantum Hall liquids.


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