Condensed Matter Theory Center Seminar

Tuesday, July 9
11:00 am – 12:30 pm, Physics Building 2205

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"Two exact mappings and their consequences: Universal spin duals to Majorana wire networks and an exact demonstration topological aspects and pairing in Fractional Quantum Hall systems at conventional filling fractions"

We discuss the "bond algebraic" approach to dualities with a particular emphasis on Majorana nanowires and Quantum Hall systems. We show how to analyze readily solvable models (such as Kitaev's honeycomb model), within this framework. Our focus is, however, on interacting Majorana fermion systems. We illustrate how universal spin duals can be constructed for intreacting Majorana systems on general graphs in an arbitary number of dimensions. We introduce an "XXZ honeycomb compass" model which constitutes a two-component spin analog of Kitaev's honeycomb model. With the aid of these general duals, we further illustrate how to construct fermionic systems with Hubbard type interactions that exhibit non-trivial critical behavior. We then turn to Quantum Hall (QH) systems and briefly illustrate how mappings allow us to recast general Lowest Landau Level interactions as a sum of pairing terms and briefly explicitly illustrate how toplogy rears its head in QH problems. In particular, we will illustrate how the ground state subspaces for various geometries sharing the same topological genus number are related to one another by exact sunitary transformations and discuss exact results for dimensional reductions in these systems.

(All are welcome to attend)

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