Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"Quantum Hall States, Binary Invariants and Regular Graphs"

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Abstract: A study of FQH ground states is crucial for understanding FQH phases. These states are rather extraordinary and special. In due course of the talk I will review their known properties: symmetric polynomials + incompressible fluid + meaningful thermodynamic limit + clustering properties + dominance by a root configuration. The soul of my research is to answer the question: why do FQH ground states possess these properties? Or rather, how should one think of FQH states mathematically that demystifies all of these, seemingly independent, properties? The work shows that there is a triple correspondence between FQH states, binary invariants and regular graphs. What the first correspondence means is that any FQH state is a binary invariant and vice versa. The second correspondence lets us, furthermore, draw FQH states; i.e. each FQH state is representable by a regular graph. The mathematics involved is simple and will be discussed in the talk. I also systematically resolve the question of thermodynamic limit using graph theory. In the course of answering these questions, an enormous family of model FQH states is built, include Laughlin, Read-Rezayi, Gaffnian, Haffnian, etc., as very special cases. This new perspective will hopefully shed some light on how to fully classify FQH phases.

12:00pm
Tuesday, April 11, 2017
Duboc Room (4-331)

Host: Michael Pretko