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In Search of an Organizing Principle for Quantum Hall Systems

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I will describe connections between ground states of quantum Hall Hamiltonians with multiple-Landau-level orbitals, whose excitations display either Abelian or non-Abelian braiding statistics, and (non-holomorphic) symmetric polynomials. In the case of two-body interactions, these represent parton states. The emergent Entangled Pauli Principle (EPP), which defines the “DNA” of the quantum Hall fluid state, is behind the exact determination of the topological characteristics of those vacua, including charge and braiding statistics of excitations, and effective edge theory descriptions. This DNA admits a tensor network structure of finite bond dimension that emerges via root level entanglement and encodes all universal properties of the fluid. I will also present recent work connecting these findings to the so-called “strange metal”, a compressible critical state of matter with a hyperdegenerate ground state subspace and no Landau quasiparticles.

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