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Quantum Hall Transitions and Quantum Number Fractionalization in Trapped Cold Atom Systems

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Recently there have been experimental attempts to realize quantum Hall physics in trapped cold atom systems, either through rotation or synthetic gauge fields. This can potentially open up a completely new direction in the study of quantum Hall effects. In this talk I will discuss possible quantum phase transitions between integer and fractional quantum Hall states, driven by attractive interactions between fermionic atoms. Such transitions have no counterparts in electronic quantum Hall liquids, but are related to fractionalization transitions studied in other strongly correlated systems. In one of these examples charge fractionalization is associated with the confinement-deconfinement transition of the (2+1D) Z_2 gauge theory, which is in the Ising universality class.