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Thin cylinder limit of Halperin bilayer quantum Hall states
ALEXANDER SEIDEL, Washington University in St Louis, KUN YANG, National High Magnetic Field Laboratory, Florida State University — The traditional framework to study fractional quantum Hall states is based on Laughlin type wavefunctions and Chern-Simons field theories. Recently, a new framework has been proposed that puts stronger emphasis on the one-dimensional (1d) Hilbert space structure of Landau levels. One way to obtain this framework is by observing that states describing fractional quantum Hall liquids may be adiabatically evolved into simple one-dimensional charge-density-wave (CDW) patterns when the system is deformed, e.g., into a thin torus or cylinder. Many general properties of fractional quantum Hall systems are rooted in these CDW states, such as degeneracies and fractional quantum numbers. In this talk, the thin cylinder limit of Halperin (m, m', n) bilayer quantum Hall states will be discussed. The corresponding CDW patterns are quite complicated for general (m, m', n), and can be worked out from a discrete version of the plasma analogy in a "squeezed space". The simpler cases map onto well-known spin-1/2 physics. This has some implications for a possible phase transition of the (331) state into the Moore-Read state.

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