

Abstract Submitted  
for the MAR10 Meeting of  
The American Physical Society

**Non-Abelian Quantum Hall States and their Quasiparticles: from the Pattern of Zeros to Vertex Algebra** YUAN-MING LU, Boston College, XIAO-GANG WEN, Massachusetts Institute of Technology, ZHENGHAN WANG, Microsoft Station Q, ZIQIANG WANG, Boston College — In the pattern-of-zeros approach to quantum Hall states, a set of data obtained from fusing electrons is introduced to characterize a quantum Hall wavefunction, i.e. to classify different topological orders. In this work we combine (associative) vertex algebra with the pattern of zeros to classify different quantum Hall states. We find sufficient conditions on the pattern of zeros so that the data correspond to a valid wavefunction. We also show that an expanded set of data, i.e. the pattern of zeros together with the central charge of the vertex algebra, provides a more complete characterization of quantum Hall states and corresponding topological orders. This more complete characterization allows us to construct quantum Hall wavefunctions, and to obtain more topological properties of those states, such as the scaling dimensions and the statistics of quasiparticle excitations.

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Date submitted: 20 Nov 2009

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