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Equality of certain bulk wave functions and edge correlations in $d = 2$ and $d = 3$[1] RAMAMURTI SHANKAR, Yale University, ASHVIN VISHWANATH, University of Californian Berkeley — Ground state wavefunctions and gapless edge physics provide two complementary approaches to the study of quantum Hall liquids. Seminal work of Read and Moore establishes a connection between wavefunctions and 1+1 D Conformal Field Theories, which also describe edge states. Here we provide a transparent derivation of the edge correlation-wavefunction *equality* for certain topological superconductors - theories with edge states, where charge is not conserved. By studying the 2+1 D $p + ip$ superconductor in some detail, we show that the only necessary ingredient is an approximate Lorentz invariance. We are therefore able to extend the derivation to other dimensions, for example an analogous equality of bulk wavefunctions and edge correlations is derived for superfluid $^3He - B$ in $d = 3$. A key realization is that ground state wavefunctions can be extracted by considering Euclidean partition functions with a time dependent chemical potential. We also demonstrate that the method works for interacting phases, by studying a "fractional" topological superconductor using the parton construction. This connection may help identify novel topological phases in various dimensions.

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