

Rigorous bounds on entanglement entropy for free Fermions

Let ρ be the ground state of a d -dimensional infinitely extended free Fermi gas at absolute zero temperature and $\Omega \subset \mathbb{R}^d$ of finite volume $|\Omega|$. Then let us call $S(\Omega)$ the von Neumann entropy (or entanglement entropy) of the reduced state ρ_Ω obtained by taking a suitable partial trace of ρ . Introducing a scaling parameter L , the function $S(L\Omega)$ displays the fascinating $L^{d-1} \ln L$ asymptotic behavior to leading order in L as L tends to infinity. We provide rigorous bounds for this scaling.

This is joint work with R. Helling and H. Leschke.