
Vanishing bulk heat flow in the $\nu=0$ quantum Hall ferromagnet in monolayer graphene

François Parmentier*¹

¹Service de physique de l'état condensé – Commissariat à l'énergie atomique et aux énergies alternatives, Université Paris-Saclay, Centre National de la Recherche Scientifique – France

Résumé

Under high perpendicular magnetic field and at low temperatures, graphene develops an insulating state at the charge neutrality point. This state, dubbed $\nu=0$, is due to the interplay between electronic interactions and the four-fold spin and valley degeneracies in the flat band formed by the $n=0$ Landau level. Determining the ground state of $\nu=0$, including its spin and valley polarization, has been a theoretical and experimental undertaking for almost two decades. Here, we present experiments probing the bulk thermal transport properties of monolayer graphene at $\nu=0$, which directly probe its ground state and collective excitations. We observe a vanishing bulk thermal transport, in contradiction with the expected ground state, predicted to have a finite thermal conductance even at very low temperature. Our result highlight the need for further investigations on the nature of $\nu=0$.

*Intervenant