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Local thermometry and compressibility measurements as new probes of strongly correlated states

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Electrons in two dimensions and strong magnetic fields can form an insulating two-dimensional system with conducting one-dimensional channels along the edge. Electron interactions in these systems can have fractionalized charge excitations and chiral edges with independent transport of charge and heat, even in opposite directions. Here, we use a quantum dot as a local thermometer to explore such heat transport along the edge at filling factor one and 2/3 in a GaAs 2DEG. Moreover, using a scanning quantum dot as a local charge sensor allows us to extract the charge of elementary excitations at filling factor 5/2 as well as to observe a delicate sequence of fractional quantum Hall states in suspended graphene.