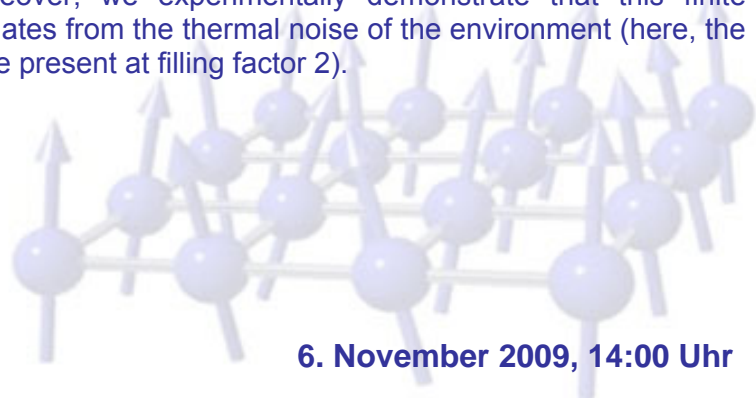


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### Quantum coherence in the Integer quantum Hall regime

The edge states of the Integer Quantum Hall regime (IQHE) are ballistic chiral wires which allow realizations of the electronic counter parts of experiments usually done in Quantum Optics. One of the most promising is the possibility to violate Bell's inequalities, using two coupled Mach-Zehnder interferometers and cross correlated noise measurements. However, one of the major limitation for such kind of experiments is the so-called coherence length  $l_\phi$  which represents the typical length on which a quasiparticle exchanges information with the surrounding environment. Here we present the first experimental determination of the coherence length and its temperature dependence, in the IQHE regime at filling factor two. Moreover, we experimentally demonstrate that this finite coherence length originates from the thermal noise of the environment (here, the neighbouring edge state present at filling factor 2).



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