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Observation of Incompressibility of a New Type of Fractional Quantum Hall State in the Lowest Landau Level[1] NODAR SAMKHARADZE, IAN ARNOLD, Purdue University, LOREN PFEIFFER, KEN WEST, Princeton University, GABOR CSATHY, Purdue University — We report on an ultra-low temperature study of a quantum Hall system in the $1/3<\nu<2/5$ region. Due to the residual interaction of composite fermions, this region is proposed to support a new type of fractional quantum Hall states at filling factors ν =4/11 and 3/8. These states are expected to belong to a different universality class from those described by the weakly interacting composite fermion model. Despite the previous observations of magnetoresistance features at ν =4/11,5/13 and 3/8 [Pan et al, Phys. Rev. Lett. 90, 016801], the hallmark property of activated behavior of the fractional quantum Hall states has not yet been observed for any of these states. In our study we have achieved an electronic temperature lower by a factor 5 in comparison to the previous work, revealing for the first time, an activation gap at ν =4/11 and an incipient incompressibility at ν =5/13. However, despite the considerable progress in identifying the later two fractional quantum Hall ground states, at ν =3/8 in our sample we observe compressible state.

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