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Observation of fractional quantum Hall effect at even-denominator 1/2 and 1/4 fillings in wide quantum wells JAVAD SHABANI, TAYFUN GOKMEN, YENTING CHIU, MANSOUR SHAYEGAN — Magneto-transport measurements on electrons confined to a wide GaAs quantum well reveal that the correlated electron states at low Landau level fillings (ν) display a remarkable dependence on the symmetry of the electron charge distribution. At a density of 1.93×10^{11} cm^{-2} and well width of 57nm, developing fractional quantum Hall states are observed at the even-denominator fillings 1/2 and 1/4 when the distribution is symmetric, but they quickly vanish when the distribution is made asymmetric. At lower densities, as we make the charge distribution asymmetric, we observe a rapid strengthening of the insulating phases that surround the $\nu = 1/5$ fractional quantum Hall state. In narrower wells with width 55nm and 47nm, we observe developing quantum Hall states at $\nu = 1/2$ and 1/4 when the charge distribution is significantly asymmetric. The very large electric subband separation and the highly asymmetric charge distribution at which we observe these quantum Hall states, together with the fact that they disappear when the charge distribution is made symmetric, suggest that these are one-component states, possibly described by the Moore-Read Pfaffian wavefunction.

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