Pinning mode of 2D electron system with short-range alloy disorder

B.H. MOON, B.A. MAGILL, L.W. ENGEL, NHMFL/FSU, D.C. TSUI, L.N. PFEIFFER, K.W. WEST, Princeton University — At the low Landau filling ($\nu$) termination of the fractional quantum Hall effect (FQHE) series, a two-dimensional electron system (2DES) becomes an insulator, which is identified in sufficiently low-disorder samples as a form of pinned Wigner solid. The microwave conductivity spectrum of such a solid shows a striking resonance, which is understood as a pinning mode, in which pieces of solid oscillate within the disorder potential. We report on the observation of the pinning mode of a 2DES that resides within Al$_x$Ga$_{1-x}$As with $x=0.85\%$. For a carrier density of $n=8.7 \times 10^{10}$/cm$^2$, a resonance with a peak frequency ($f_{pk}$) of about 5 GHz appears as $\nu$ goes below the 2/3 FQHE. A local minimum in resonance amplitude vs. $\nu$ occurs around $\nu=1/2$. We will discuss the contribution of the alloy disorder to $f_{pk}$.

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