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Single electron capacitance spectroscopy of ultra clean quantum dots in high magnetic field NEAL STALEY, RAYMOND ASHOORI, Massachusetts Institute of Technology, KEN WEST, KIRK BALDWIN, LOREN PFEIFFER, Princeton University — Single quantum dots are mesoscopic semiconducting islands with a tunable occupation number. Interestingly, at low density and magnetic field, they are best described as artificial atoms with weakly interacting electrons, while at high density and field they should show the mesoscopic analog of bulk collective behavior such as the fractional quantum Hall effect. However observing collective behavior in quantum dots has been non trivial due to the extreme difficulty fabricating sufficiently high quality devices. We study the electron addition spectroscopy of ultra clean quantum dots using a capacitance technique. We measure the magnetic field dependence of the ground state energy from a completely depopulated dot, up to large electron number. We find both the expected non-interacting Fock-Darwin like behavior, as well as deviations suggestive of more novel physics.

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