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Probing the spin structure of $\nu = 2$ quantum Hall fluid around an antidot LEE BASSETT, CHRIS FORD, NIGEL COOPER, JONATHAN GRIFFITHS, DAVID ANDERSON, IAN FARRER, GEB JONES, DAVE RITCHIE, University of Cambridge — We experimentally investigate spin and charge excitations in a small closed edge of integer quantum Hall fluid encircling a nano-scale potential island, or antidot (AD), in a two dimensional electron system. Using quantum point contacts to inject and detect spin-polarized currents via edge states, we have measured spin-resolved transport through single ADs at filling factor two. At relatively low magnetic fields ($\approx$ 1T), tunneling between the AD states and higher Landau levels in the bulk produces pairs of Coulomb blockade peaks in conductance above the $2e^2/h$ plateau. These transmission resonances were thought to result from spin-polarized tunneling through individual single-particle AD states (of alternating spin), but our experiments show that, while spin is generally conserved during transport, the tunneling current is not spin-polarized. We interpret these results as signatures of interactions within the AD which result in a separation of the energy scales associated with spin and charge excitations.

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