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Chiral pair density wave phase of confined 3He-A film HAO WU, Dept. Physics, Northwestern University, JAMES A SAULS, Dept. Physics Astronomy, Northwestern University — The edge states of a 3He-A film are Weyl Fermions propagating in a direction determined by the chirality of the bulk phase, which leads to a non-vanishing spontaneous mass current on the edge. We report calculations of the reduction in the edge mass currents due to hybridization as a function of lateral confinement, D. Strong lateral confinement leads to a sequence of quantum phase transitions. The A phase undergoes a transition to a pair density wave (PDW) phase with broken translational symmetry at $D_{c2} \sim 13\xi_0$, and a transition to a polar state at $D_{c1} \sim 9\xi_0$. The order parameter for $D_{c1} < D$ is calculated self-consistently. The resulting phase is a periodic array of chiral domains with opposite chirality separated by domain walls. The mass currents on the domain walls contradict the direction of current on the edges, which leads to separation into multiple regions of circulating current in each domain. The periodicity of PDW phase increases as confinement length D increases and eventually only one domain is left in the lateral confined film when D approaches D_{c2}. We calculated and compared the free energy of the confined single domain wall and the homogeneous A phase, and determined the phase boundary $D_{c2} - T$.

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