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Chiral spin currents and spectroscopically addressable single merons in quantum dots CATHERINE STEVENSON, JORDAN KYRIAKIDIS, Dalhousie University — We provide unambiguous theoretical evidence for the formation of correlation-induced isolated merons in rotationally-symmetric quantum dots beyond the lowest-Landau-level approximation. For experimentally accessible system parameters, unbound merons condense in the ground state at magnetic fields as low as $B^* = 0.3$ T and for as few as $N = 3$ confined fermions. The four-fold degenerate ground-state at B^* corresponds to four orthogonal merons characterised by their winding number ± 1 and topological charge ± 1. This degeneracy is completely lifted by the Rashba and Dresselhaus spin-orbit interactions, yielding spectroscopic accessability to individual merons. We further derive a closed-form expression for the topological chirality in the form of a chiral spin current and use it to both characterise our states and predict the existence of other topological textures in other regions of phase space.

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