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The Quasi-Electron Shell Structure of the Fractional Quantum Hall Effect[1] WICK HAXTON, Physics Dept., UC Berkeley and Nuclear Science Division, LBNL, DANIEL HAXTON, Chemical Sciences Division, LBNL — The fractional quantum Hall effect (FQHE) formulated on a sphere resembles the nuclear shell model, with the desired translationally invariant states having total angular momentum zero. This property was exploited by Ginocchio and Haxton (GH) to derive a new set of scalar operators and a first-Landau-level representation of the full set of hierarchy states (fillings 1/3, 2/5, 3/7, etc.), with overlaps identical to those of Jain, who used unphysical higher Landau levels excitations followed by numerical projection. We demonstrate that the GH operators produce an appealing description of the FQHE as shells filled by non-interacting quasi-electrons, or composite fermions. These are explicitly constructed, and their planar forms are also found. The evolution of the shells and their quasi-electrons is quite unusual. The connections with electron correlations and Laughlin's variational arguments are described. We discuss how "new states" found experimentally at fillings such as 4/11 and 5/13 fit into this scheme.

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