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Structure of Ground state Wave Functions for the Fractional Quantum Hall Effect: A Variational Approach[1] SUTIRTHA MUKHERJEE, SUDHANSU MANDAL, Indian Association for the Cultivation of Science — The internal structure and topology of the ground states for fractional quantum Hall effect (FQHE) are determined by the relative angular momenta between all the possible pairs of electrons. Laughlin wave function is the only known microscopic wave function for which these relative angular momenta are homogeneous (same) for any pair of electrons and depend solely on the filling factor. Without invoking any microscopic theory, considering only the relationship between number of flux quanta and particles in spherical geometry, and allowing the possibility of inhomogeneous (different) relative angular momenta between any two electrons, we develop a general method for determining a closed-form ground state wave function for any incompressible FQHE state. Our procedure provides variationally obtained very accurate wave functions, yet having simpler structure compared to any other known complex microscopic wave functions for the FQHE states. This method, thus, has potential in predicting a very accurate ground state wave function for the puzzling states such as the state at filling fraction 5/2.

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SUTIRTHA MUKHERJEE
Indian Assoc/Cultivation of Sc

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