

Abstract Submitted
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Density Functional Theory of the Fractional Quantum Hall Effect¹ JIANYUN ZHAO, Pennsylvania State Univ, MANISHA THAKURATHI, MANISH JAIN, DIPTIMAN SEN, Indian Institute of Science, JAINENDRA JAIN, Pennsylvania State Univ — We formulate density functional theory for the FQHE in the LLL, properly incorporating the non-perturbative physics of the repulsive interaction and the finite temperature entropy of the FQHE state. Two key ingredients of our theory are a) a microscopically derived exchange correlation interaction, and b) minimization of the free energy with respect to the composite-fermion density in various levels, as opposed to the total electron density. An application of this approach to the FQHE edge brings out its rather complex structure, showing that, in general, edge reconstruction extends much more deeply into the interior than previously suspected, and is washed out by very small temperatures. As another application, we obtain analytically the change in the density profile of composite-fermion Fermi sea exposed to the potential due to a Wigner crystal in a nearby layer, and find unexpectedly rich patterns.

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