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Geometrical Description of fractional quantum Hall quasiparticles[1] YEJE PARK, BO YANG, F.D.M. HALDANE, Princeton University — We examine a description of fractional quantum Hall quasiparticles and quasiholes suggested by a recent geometrical approach (F. D. M. Haldane, Phys. Rev. Lett. 108, 116801 (2011)) to FQH systems, where the local excess electric charge density in the incompressible state is given by a topologically-quantized "guiding-center spin" times the Gaussian curvature of a "guiding-center metric tensor" that characterizes the local shape of the correlation hole around electrons in the fluid. We use a phenomenological energy function with two ingredients: the shear distortion energy of area-preserving distortions of the fluid, and a local (short-range) approximation to the Coulomb energy of the fluctuation of charge density associated with the Gaussian curvature. Quasiparticles and quasiholes of the 1/3 Laughlin state are modeled as "punctures" in the incompressible fluid which then relax by geometric distortion which generates Gaussian curvature, giving rise to the charge-density profile around the topological excitation.

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