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Shape of the proton in a uniform magnetic field

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The effect of a uniform background magnetic field on the wave function of the d-quark in the ground state of the proton is calculated in Lattice QCD. We focus on the wave functions in the Landau and Coulomb gauges. When the quarks are annihilated at different lattice sites, we observe the formation of a scalar u-d diquark pair within the proton in the Landau gauge, which is not present in the Coulomb gauge. The overall distortion of the wave function under a very large magnetic field, as demanded by the quantisation conditions on the field, is quite small.

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