

Spin and Orbital Angular Momentum Correlations in the Proton and in Nuclei

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The quark orbital angular momentum component of proton spin, L_q , can be defined in QCD both as the integral of a Wigner phase space distribution weighting the cross product of the quark's transverse position and momentum and in terms of a twist-three Generalized Parton Distribution (GPD). I will present results on the link between the two definitions, which reflects their dependence on partonic intrinsic transverse momentum. Connecting the definitions provides the key for correlating direct experimental determinations of L_q , and Lattice QCD calculations. The direct observation of both quark orbital angular momentum and spin-orbit correlations does not require transverse spin polarization, but can occur using longitudinally polarized targets. This mechanism can also be tested in nuclei which provide targets of different spin.