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The nucleon structure, what an Electron-Ion Collider will teach us

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The question after the individual parton (quarks and gluons) contributions to the spin of the nucleon is even after 20 years of experimental efforts not yet solved. After several precise measurements in polarized deep inelastic scattering it is clear, that the spin of the nucleon cannot be explained by the contribution of the quarks alone. This is affirmed by the newest results from COMPASS, HERMES and JLAB on the inclusive spin structure function g_1 and on the individual contributions from the different quark flavors from semi-inclusive deep inelastic scattering data. Recent measurements from the polarized proton proton collider RHIC show that also the contribution from the Gluons is smaller than originally expected. Recent clear experimental evidence of exclusive reactions, especially DVCS, allows in the formalism of generalized parton distributions the study of an other component of the nucleon spin the orbital angular momentum. The most recent results on indications of the size of the orbital angular momentum of quarks from data and lattice measurements indicate also here small contributions from quark orbital angular momenta to the spin of the proton. At the electron-ion collider (EIC) it will not only be possible to measure all these contributions to the spin of the nucleon with unseen precision, but more importantly the range of all observables can be extended to much smaller Bjoerken x (10^{-4}). This will allow removing the biggest uncertainty in all these observables the extrapolation to the currently unmeasured low-x region. The study of the spin structure is only one of the observables sensitive to the nucleon structure, which can be studied at the EIC. The possibility to run heavy nuclei will give the possibility to study the transition from the structure of a nucleon to nuclei. Several measurements giving a handle on the modifications of the partonic structure of nucleons in nuclei will be presented.