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Quark Structure of the Nucleon and Angular Asymmetry of Proton-Neutron Hard Elastic Scattering[1] MISAK SARGSIAN, CARLOS GRANADOS, Florida International University — We investigate the asymmetry in angular distribution of hard elastic proton-neutron scattering with respect to 90° center of mass scattering angle. This asymmetry on quark level is generated due to the mixture of quark scatterings with and without flavor interchange in the isoscalar pn state. We demonstrate that the magnitude of the angular asymmetry is related to the helicity-isospin symmetry of the quark wave function. Our estimate of the asymmetry within the quark-interchange model of hard scattering demonstrates that the quark wave function of a nucleon based on the exact SU(6) symmetry predicts an angular asymmetry opposite to that of experimental observations. On the other hand the quark wave function within diquark picture of the nucleon produces an asymmetry consistent with the data. Comparison with the data allowed us to extract the relative sign and the magnitude of the vector and scalar diquark components of the quark wave function of nucleon. Overall, our conclusion is that the angular asymmetry of hard elastic scattering of baryons provides a new venue in probing quark-gluon structure of baryons and should be considered as an important observable in constraining the theoretical models.

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