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SPIN OBSERVABLES OF pd ELASTIC SCATTERING AT 20 –50 GeV/c WITHIN THE GLAUBER MODEL AND pN AMPLITUDES

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Spin amplitudes of pp- and pn elastic scattering contain important information on the dynamics of the NN interaction. Systematic information on these amplitudes is accumulated in the SAID data base [1] and available up to kinetic energy 3 GeV for pp and 1.2 GeV for pn scattering. At higher energies there are only non-complete data on pp scattering, whereas information about the pn amplitudes is very poor. In the literature there are some parametrizations for pN amplitudes obtained in the eikonal model [2] and within the Regge phenomenology for 3 - 50 GeV/c [3]. A possible way to check the existing parametrizations is to study spin effects in proton-deuteron (pd) and neutron-deuteron (nd) elastic and quasi-elastic scattering. At high energies and small four-momentum transfer t pd scattering can be described by the Glauber diffraction theory of multistep scattering, which involves as input on-shell pN elastic scattering amplitudes. Application of this theory with spin-dependent effects included [4] demonstrates a good agreement with the pd scattering data at energies about 1 GeV if the SAID data on pN scattering amplitudes are involved into calculations [4,5].

Here we apply the spin-dependent Glauber theory [4] to calculate spin observables of pd elastic scattering at 20 - 50 GeV/c using available pp elastic scattering amplitudes f_{pp} parametrized in Ref. [3] within the Regge formalism. As a first approximation, for pn elastic scattering we use pp amplitudes from [3]. We should note that the Regge formalism allows one to construct pn- (and antiproton N) amplitudes together with the pp amplitudes. However, in view of scare experimental information about the spin dependent pn amplitudes, and taking into account that the spin-independent parts of the pp- and pn amplitude at high energies are approximately the same, we put here $f_{pn} = f_{pp}$. The calculated vector (A_y^p, A_y^d) and tensor (A_{xx}, A_{yy}, A_{xz}) analysing powers and the spin-correlation coefficients like $C_{y,y}, C_{y,yy}, C_{x,x}$ can be measured at SPD NICA [6] that will provide a serious test of the used pN amplitudes.

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