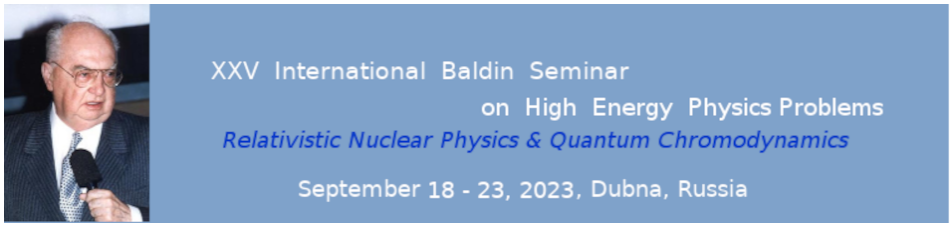

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Double spin correlations in elastic proton-proton and proton-neuteron scattering at large angles in the reaction dd⟶ pnpn

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An unexpectedly large double-spin correlation A_{NN} was found at large angles in elastic pp scattering ($_{c.m.} = 90^\circ$) at $\sqrt{s_{NN}} = 3$ GeV and 5 GeV in Ref. [1]. These energies correspond to the thresholds for strangeness and charm production in pp collisions, respectively. The observed strong correlations (cross-section ratio of 4 : 1 for parallel and antiparallel spins of colliding protons) are compatible with the assumption of the formation of uudss̄uud anduudcc̄uud octoquark resonances in the s channel that have the quantum numbers of J = L = S = 1, where L is the orbital angular momentum, S is the spin momentum, and J is the total angular momentum of the respective resonance [2]. On the basis of this assumption, the authors of [2] also explained qualitatively an unusual behavior of the color transparency in reactions of the A(p, 2p)B type and oscillations in the differential cross section dσ/dt for elastic pp scattering in the region of manifestation of quark counting rules. However, the last two effects have a different explanation within the nuclear-filtering model [3]. Hard dynamics in elastic pp and pn-scattering may be markedly different. Furthermore, pn channel includes the isoscalar channel in addition to the isovector one. In view of this, it is of importance to study the doubly polarized channel of elastic pn scattering in the same energy range of $\sqrt{s_{NN}} = 3 - 5$ GeV. This may be done at the SPD in the dd collisions [4]. We studied double spin correlation of the reaction $dd \to pnpn$ with the impulse (double pole) approximation and found that at zero relative momenta of nucleons in both deuterons, when the deuteron S-wave dominates, the transversal and longitudinal dd- correlation coincides with the similar double-spin correlation in pp or pn- elastic large angle scattering. Effects of rescatterings and the D-wave contribution are under consideration.
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