Research of relativistic nuclear interactions using the properties of Lobachevsky space

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A large number of problems in relativistic nuclear physics are focused on finding patterns in the behavior of relativistic multiparticle systems. The collision of relativistic nuclei leads to the production of many particles and a complex interaction pattern.
This work studies the interaction of a neutron with a proton target in a hydrogen bubble chamber at neutron energies ranging from 1 to 5 GeV. During the processing of tracks in a bubble chamber, the values of the momentum and scattering angles of secondary particles are determined. Using the measured values of the energies and momenta of the reaction products, the geometry of Lobachevsky is used to calculate their velocities, the defects of the triangles formed by the velocities, and the angles of the triangles in Lobachevsky space. A program code has been, developed to calculate the rates of reaction products, angles, and triangle defects in Lobachevsky space for all processed $np \longrightarrow pp\pi^-$ events.
In addition, the effective masses of the reaction products are calculated using the energies and momentum projections. By comparing the distributions of rapidities in Lobachevsky space with the effective masses, the masses of the resonances associated with neutron-proton interactions can be determined. In the $np \longrightarrow pp\pi^-$ reaction, a portion of the events involving the production of Δ^- resonances exhibits a characteristic peak at a mass of 1.232 GeV.
The greatest interest of this study is expected in the consideration of configurations in the space of relative rapidities. Events are, considered when one of the reaction product particles acquires a relatively small momentum against the background of a large momentum of the incident neutron. This area of relativistic nuclear interactions is not fully studied.