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Study on transverse Momentum Resolution of SPD Straw Tracker in high multiplicity ion-ion collisions

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The performance of the Straw Tracker (ST) is one of the key factors determining the momentum resolution of the Spin Physics Detector (SPD) at the NICA collider. The quality of charged-particle track reconstruction depends not only on the detector geometry and event multiplicity but also on the parameters of the track-finding and track-fitting algorithms.

This work focuses on track reconstruction in the SPD ST and its impact on the relative transverse momentum resolution for different charged-track multiplicities. Monte Carlo simulations are used to reconstruct charged-particle trajectories in various light-to-moderate ion-ion collisions. Reconstructed tracks are matched to Monte Carlo "true tracks" via the fraction of common detector hits, which allows one to correctly account for mixed and incorrectly reconstructed track candidates. The transverse momentum resolution is studied using the relative residual, evaluated in different transverse-momentum intervals for different colliding ion species. Wrong hit associations with tracks at high multiplicities result in notable tails in the relative resolution. The choice of an appropriate fit function is also discussed.

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