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Particles' and antiparticles' flow difference studies

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Studying the properties of strongly interacting hot and dense medium created in heavy ion collisions has been accomplished in part by studying the azimuthal anisotropy of particle emission in the transverse plane, known as anisotropic flow. Flow measurements are key observable because it reflects the viscous hydrodynamic response to the initial spatial anisotropy, produced in the early stages of the collision. In previous studies [1] performed by the STAR collaboration at the Relativistic Heavy Ion Collider (RHIC) the increase of the elliptic flow (v2) difference between particles and antiparticles with the decrease of the collision energy has been observed.
For some time, much theoretical interest has been invested in explaining the relationship between collision energy and elliptic flow. One of them is the *mean field* approach, where the increase of elliptic flow is the result of a repulsive potential of quarks, while the reduction of antiparticles' elliptic flow is the result of an attractive potential of antiquarks. Another possibility is the presence of transported protons in the examined medium. These are particles made of constituent quarks originating from the collided nuclei. Their correlations with the participant plane is stronger (increase the v_2) and they survive the entire evolution of the medium, while quarks and antiquarks produced in quark-gluon plasma participate only in part of this evolution scenario. This presentation will demonstrate experimental measurements aimed at better understanding the physical mechanisms driving the difference in observed elliptic flow between particles and antiparticles.

[1] STAR Collaboration: Phys. Rev. C 88 (2013) 14902

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