



Contribution ID: 805

Type: Poster

Examination of the universal behavior of the η -to- π^0 ratio in heavy-ion collisions

Wednesday 6 April 2022 19:06 (4 minutes)

We demonstrate that the p_T dependence of the η/π^0 ratio at mid rapidity is universal within a few percent for high energy $p+p$, $p+A$ and $d+A$ collisions, over a broad range of collision energies. The η/π^0 ratio increases with p_T up to 4 to 5 GeV/c where it saturates at a nearly constant value of 0.487 ± 0.024 . Above $p_T = 5$ GeV/c the same constant value is also observed in A+A collisions independent of collision system, energy, and centrality. At lower p_T , where accurate η/π^0 data is absent for A+A collisions, we estimate possible deviations from the universal behavior, which could arise due to the rapid radial hydrodynamic expansion of the A+A collision system. For A+A collisions at RHIC we find that possible deviations are limited to the p_T range from 0.4 to 3 GeV/c, and remain less than 20% for the most central collisions.

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Session Classification: Poster Session 2 T05 / T13

Track Classification: Electroweak probes