38th INTERNATIONAL CONFERENCE
ON HIGH ENERGY PHYSICS
AUGUST 3 - 10, 2016
CHICAGO

Contribution ID: **1410** Type: **Oral Presentation**

Evolution of the jet opening angle distribution in holographic plasma (15' + 5')

Saturday, 6 August 2016 15:20 (20 minutes)

We use holography to analyze the evolution of an ensemble of jets, with an initial probability distribution for their energy and opening angle as in proton-proton (pp) collisions, as they propagate through an expanding cooling droplet of strongly coupled plasma as in heavy ion collisions. We identify two competing effects: (i) each individual jet widens as it propagates; (ii) the opening angle distribution for jets within any specified range of energies is pushed toward smaller angles, comparing final jets to initial jets with the same energies. The second effect arises because small- angle jets suffer less energy loss and because jets with a higher initial energy are less probable in the ensemble. We illustrate both effects in a simple two-parameter model, and find that their consequence in sum is that the opening angle distribution for jets in any range of energies narrows. We find that either effect can dominate in the mean opening angle for not unreasonable values of the parameters. So, the mean opening angle for jets with a given energy can easily shift toward smaller angles, as experimental data may indicate, even while every jet in the ensemble broadens.

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Session Classification: Heavy Ions

Track Classification: Heavy Ions