Contribution ID: **67** Type: **not specified**

From the RAA to azimuthal correlations: what can we learn from heavy-quark observables?

Friday, 16 November 2012 17:45 (25 minutes)

The observation of strong jet quenching and the suppression of high-p_t hadrons in relativistic heavy-ion collisions are striking experimental signatures for the formation of a deconfined QCD plasma in which partons suffer from medium-induced energy loss. In particular, heavy quarks are considered as suitable probes for revealing the properties of the produced matter as they are created at very early stages in hard scattering processes and assumed not to thermalize completely within the medium. Typical observables for the interaction of heavy quarks with the medium constituents are the nuclear modification factor R_{AA} and the elliptic flow v_2, which we present within a combined Monte-Carlo approach and realistic fluid dynamic description of the expanding plasma for both RHIC and LHC energies. In the main part of this talk we will investigate the potential of correlations between heavy quarks and anti-quarks to reveal basic principles of energy loss scenarios at LHC. At low p_t any correlation of the initially heavy quark-antiquark pair is lost due to thermalization, at larger p_t, however, these correlations in p_t and azimuthal angle ϕ survive and show distinctive features for purely elastic and elastic plus radiative energy loss mechanisms. We discuss these results in view of the core-corona effect and the centrality dependence.

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Session Classification: HF particle correlations