Charmed hadrons in statistical hadronization model

Charmonium and open charm production in nuclear collisions at SPS/FAIR energies and the possible influence of a hot hadronic medium

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what can be gained from measurements at lower energies,
sensitivity to in-medium modifications of charmed hadrons

charm conservation equation

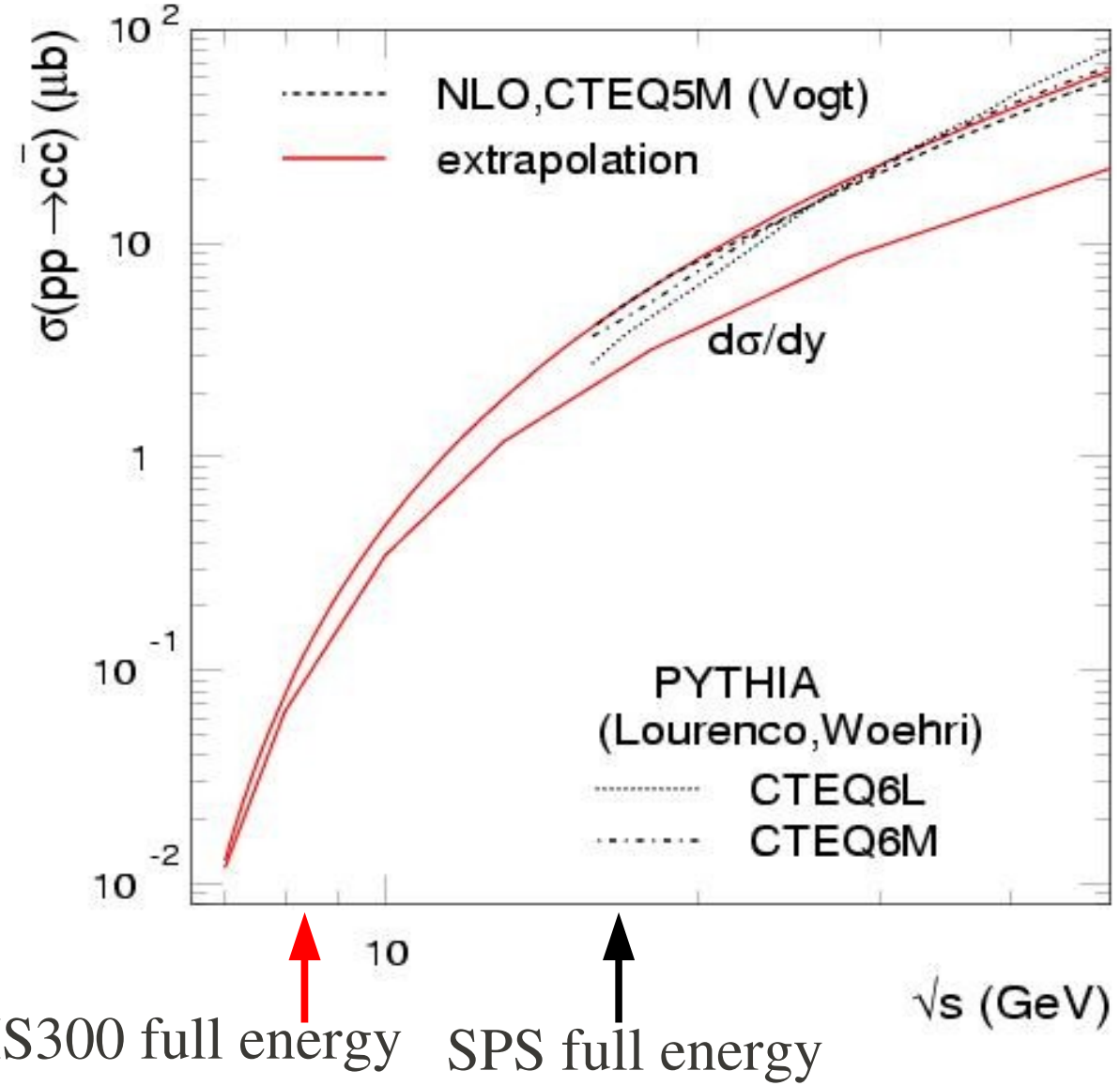
no medium effect

$$\sigma_{c\bar{c}} = 1/2 \left[\sigma_{D^+} + \sigma_{D^-} + \sigma_{D^0} + \sigma_{\bar{D}^0} + \sigma_{\Lambda_c} + \sigma_{\bar{\Lambda}_c} \ldots\right]$$

medium effects on charmed hadrons affect redistribution of charm, but not overall cross section

it is not consistent with the charm conservation equation to reduce all charmed hadron masses in the medium for an enhanced cross section

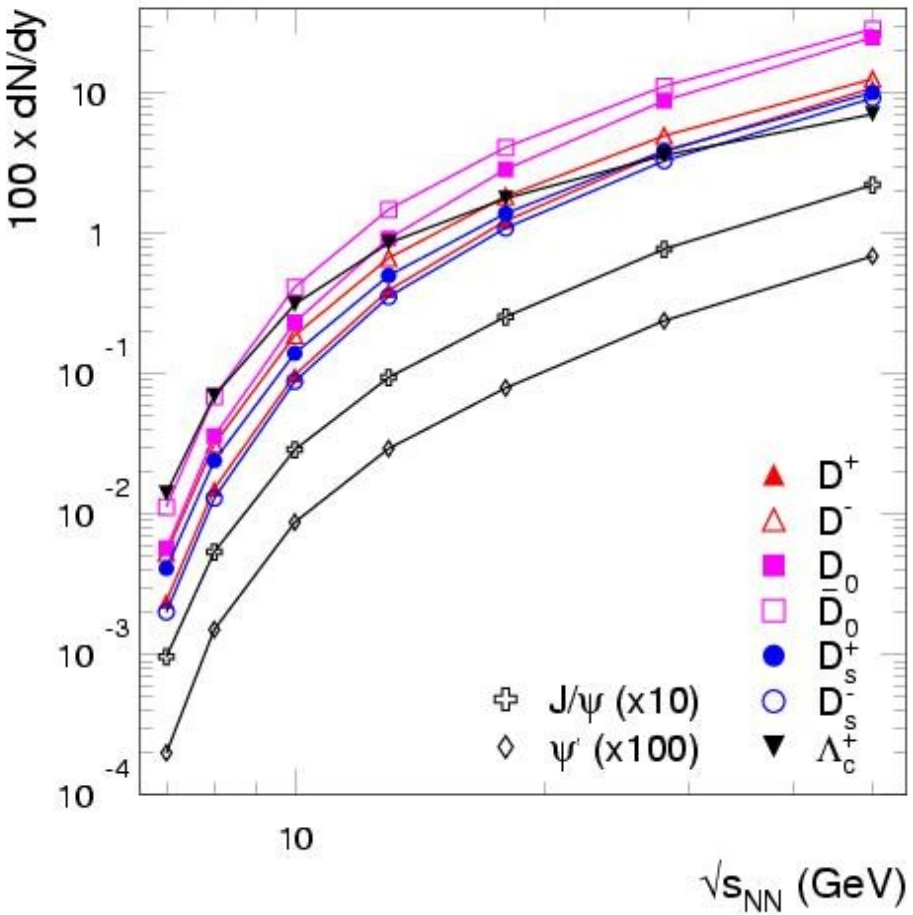
Extrapolation of pQCD cross section to low energies

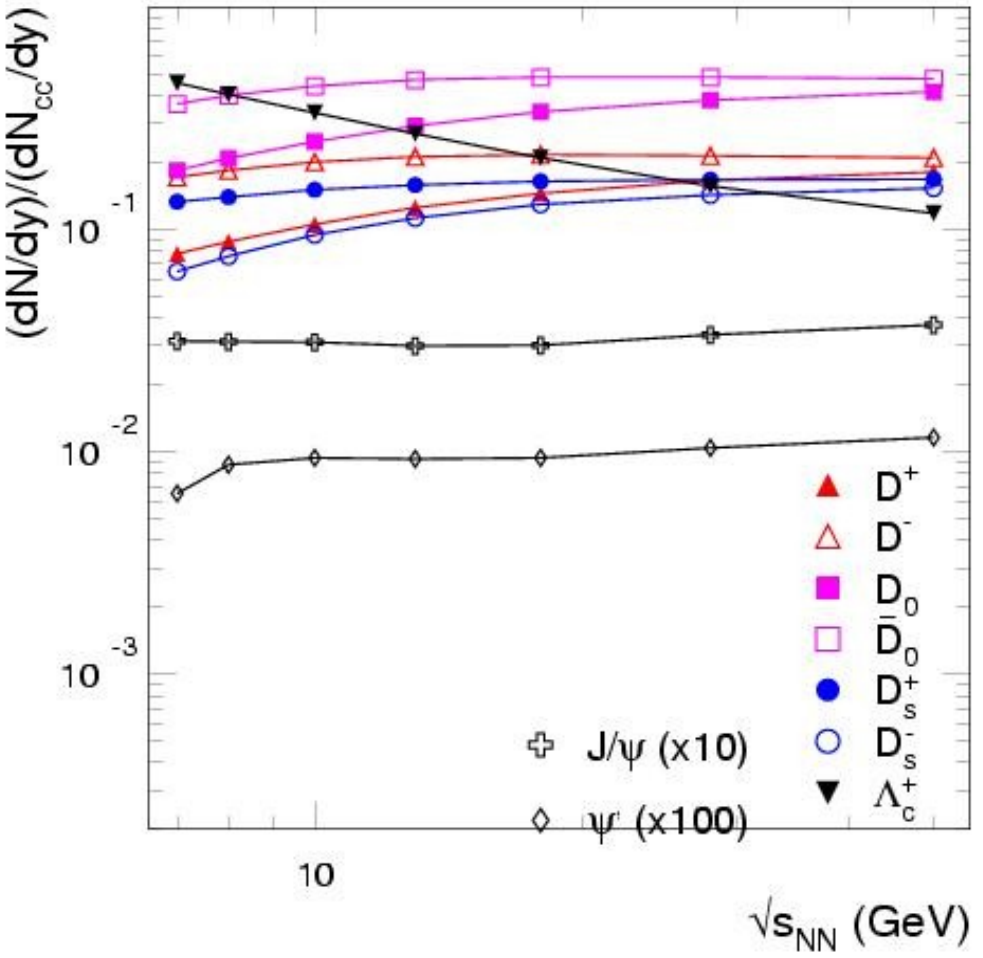


charm threshold in NN: 5.1 GeV

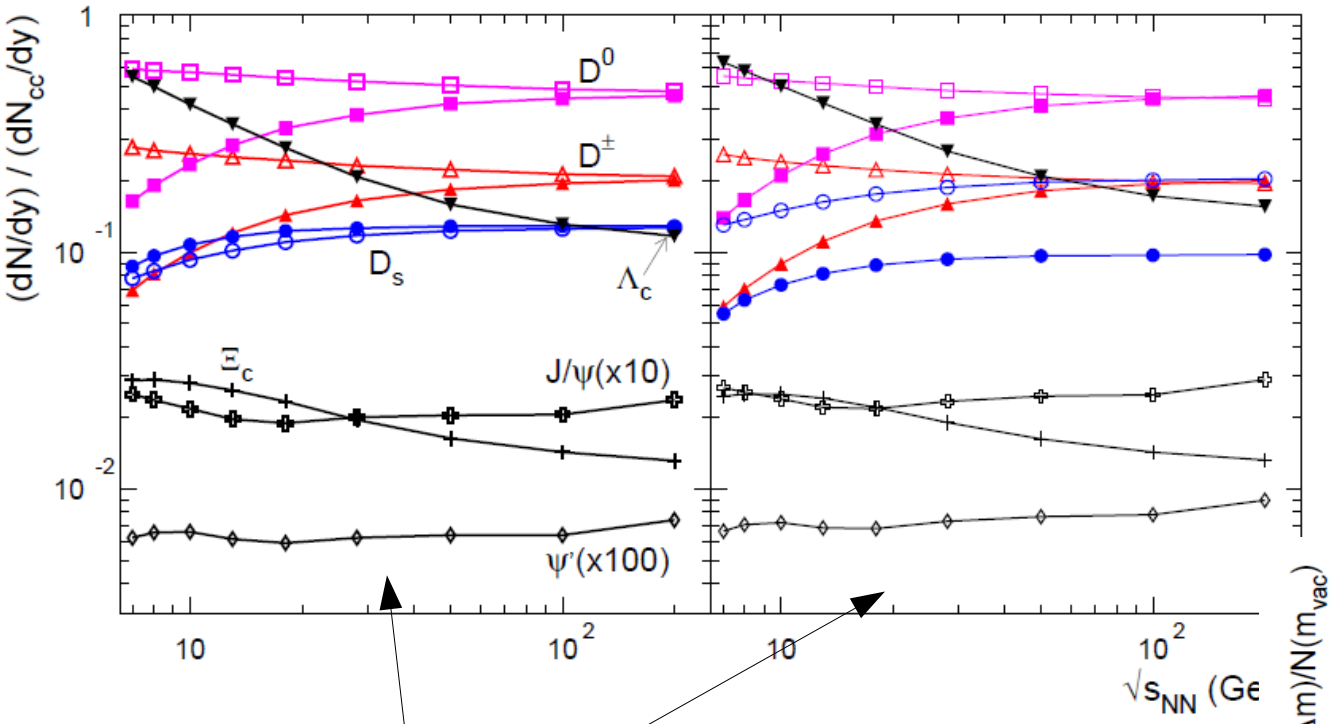
absolute threshold in Pb-Pb collisions: T_{lab}/A = 31 MeV

Statistical hadronization predictions for open and hidden charm at low energies

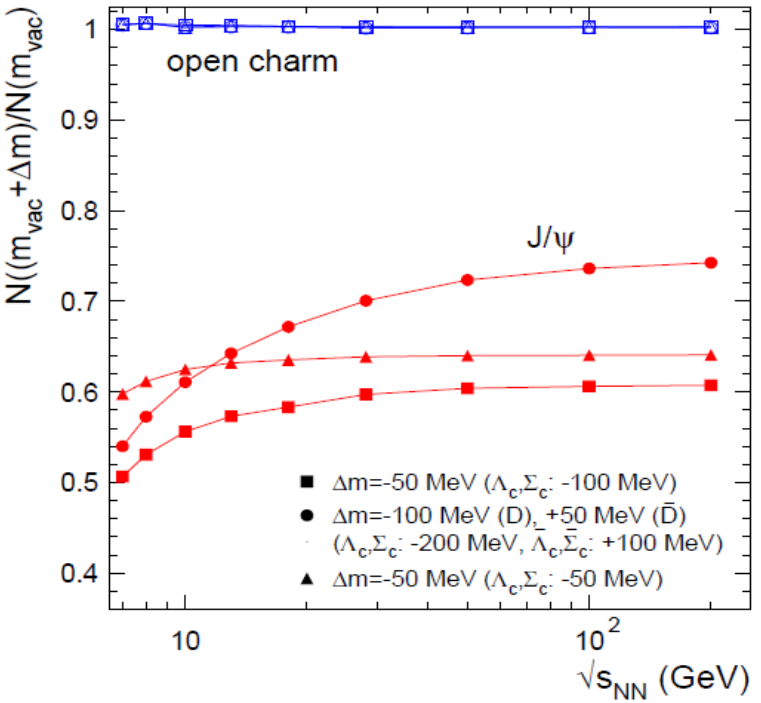




Effect of in-medium modification of masses



due to charm conservation laws there are no visible effects in open charm some sensitivity (20% level) only in charmonia



We consider two scenarios[3] for a possible mass change Δm of open charm hadrons containing light, u or d, quarks: i) a common decrease of 50 MeV for all charmed mesons and their antiparticles and a decrease of 100 MeV for the Λ_c and Σ_c baryons (50 MeV decrease for Ξ_c); ii) a decrease of 100 MeV for all charmed mesons and a 50 MeV increase for their antiparticles, with the same (scaled with the number of light quarks) scenario as in i) for the baryons. Scenario i) is more suited for an isospin-symmetric fireball produced