Pre-Meeting Calculation Requests : DAB-MOD

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**1) Provide Heavy-Flavor Transport Coefficients (mu\_B=0)**

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*(a) Current best estimtate of Ds(2\piT) as function of T over available T-range (both charm and bottom, if available).*

Because we use Moore and Teaney model the Ds(2\piT) does not depend on T :

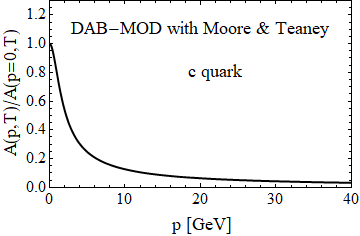
* Ds(2\piT)/ћc=2.23 for charm.
* Ds(2\piT)/ћc =2.47 for bottom.

These are the optimized values used in arXiv:1907.03308.

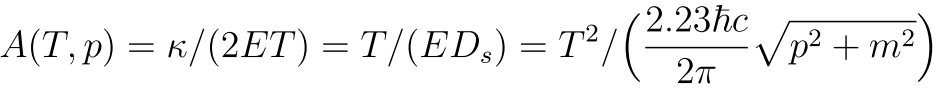
*(b) Normalized momentum dependence of friction coefficient, A(p;T)/A(p=0;T), for current best estimate.*

The relativistic fluctuation-dissipation relation gives:  
 

As D\_s is independent of p in Moore and Teaney model, we get:  
  
where m = 1.27 GeV for charms.



*(c) Table of current best estimates of charm friction and momentum-diffusion coefficients for p=0-40GeV (in steps of dp=0.2GeV) and T=0.16-0.6GeV (steps dT=0.02GeV) for mu\_B=0. The idea is to run them through a Langevin simulation in a common hydrodynamic medium evolution.*

As writen above, the friction coefficient [in fm-1] is :  
, with ћc=0.1973 [GeV.fm].

You can estimate the values of the table with this relation.

The momentum-diffusion coefficient [in GeV2/fm] is :



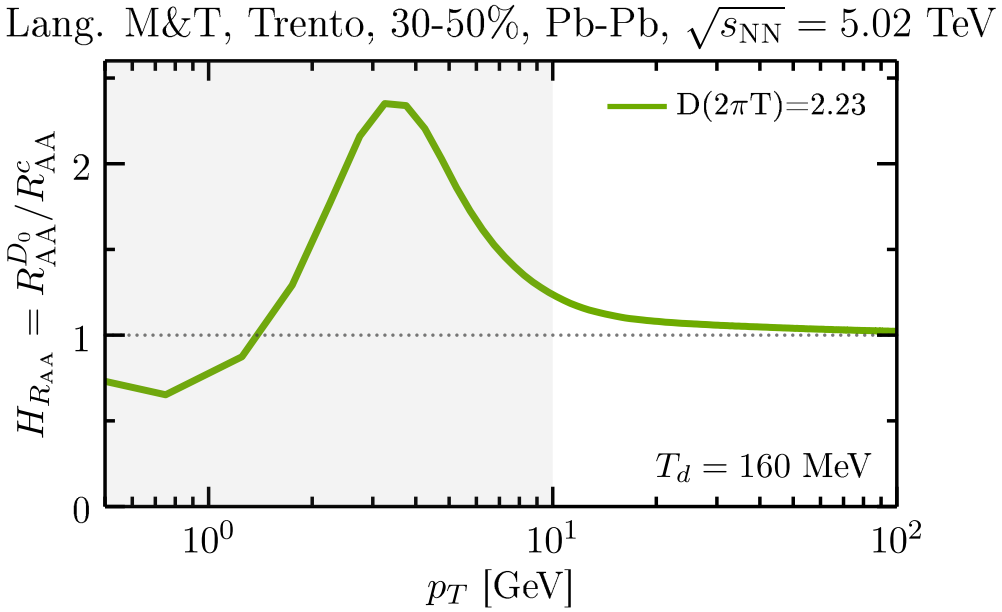
You can estimate the values of the table with this relation.

**2) Assess Hadronization and Hadronic Phase (test case: 30-50% 5TeV PbPb collisions)**

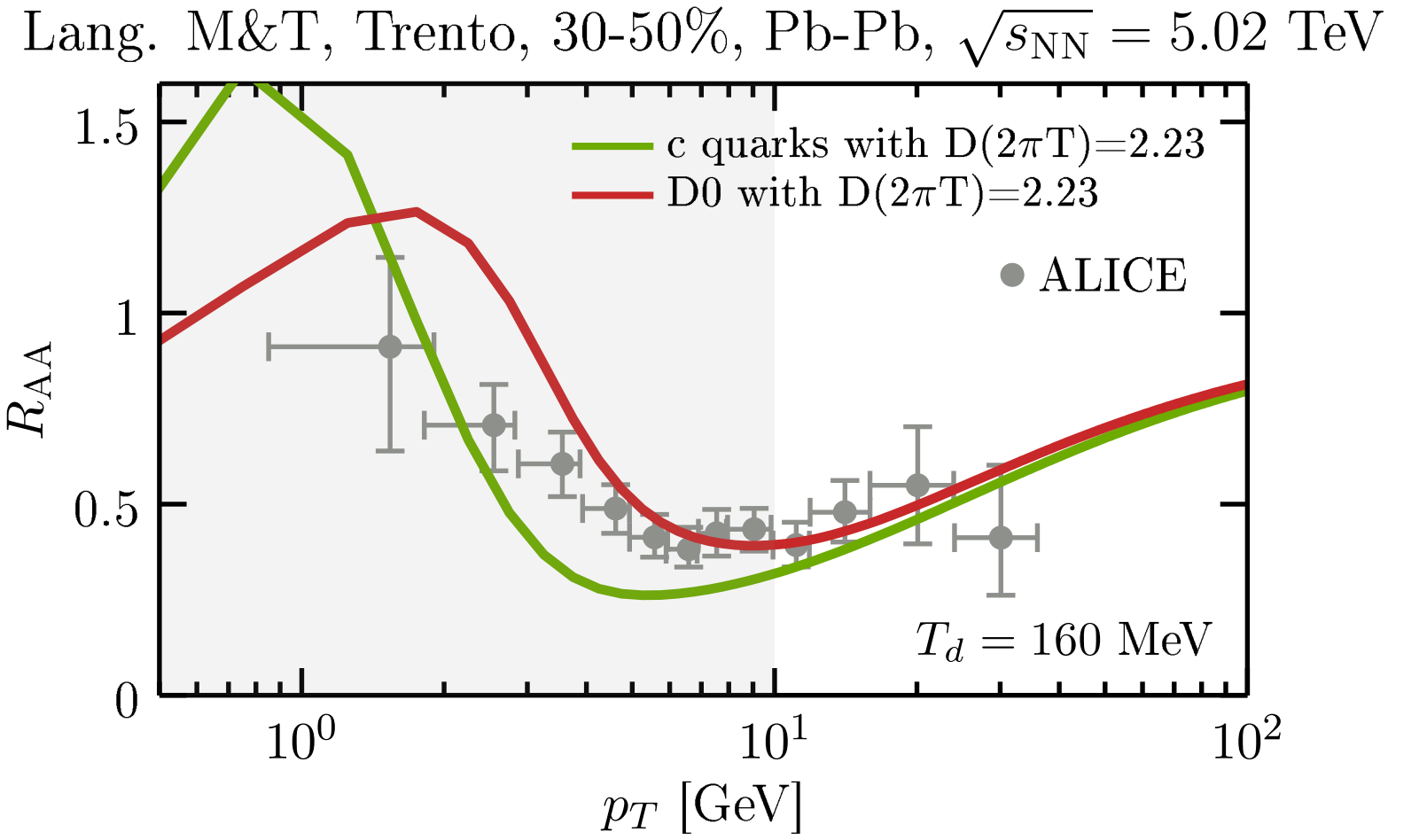
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*(a) Compute H\_AA(pT;T\_H) = R\_AA^H\_Q (pT;T\_H) / R\_AA^Q(pT;T\_H) , the ratio of the R\_AA of the heavy meson (H\_Q) just after hadronization to the R\_AA of the heavy quark (Q) just before hadronization, for H\_Q=D,Lambda\_c (as available) and Q=c.*

Only for direct D0 (data in : « H\_RAA\_D0overCharm\_Centrality\_30\_50.dat ») :

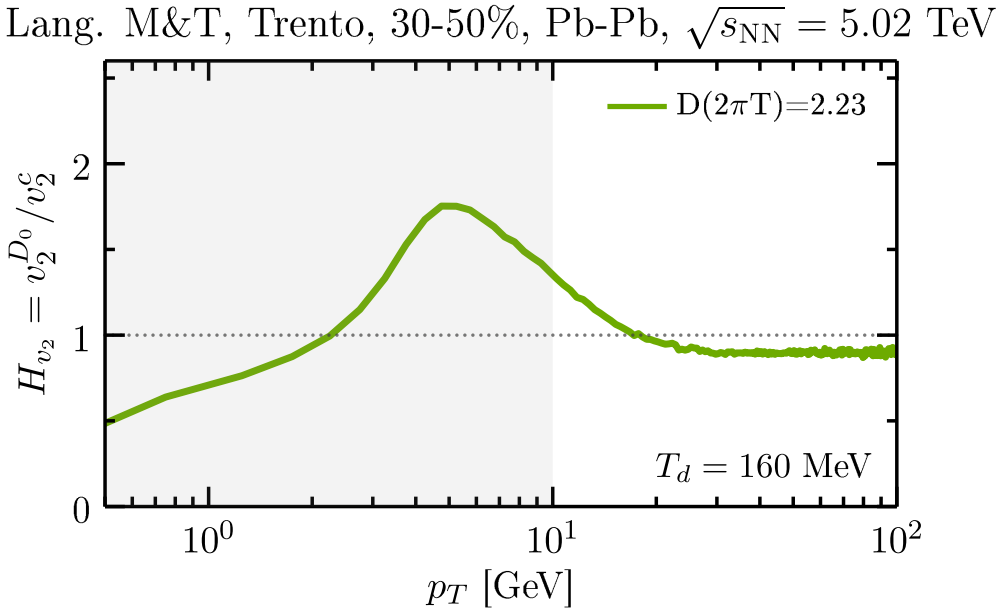


The corresponding RAA to better understand :

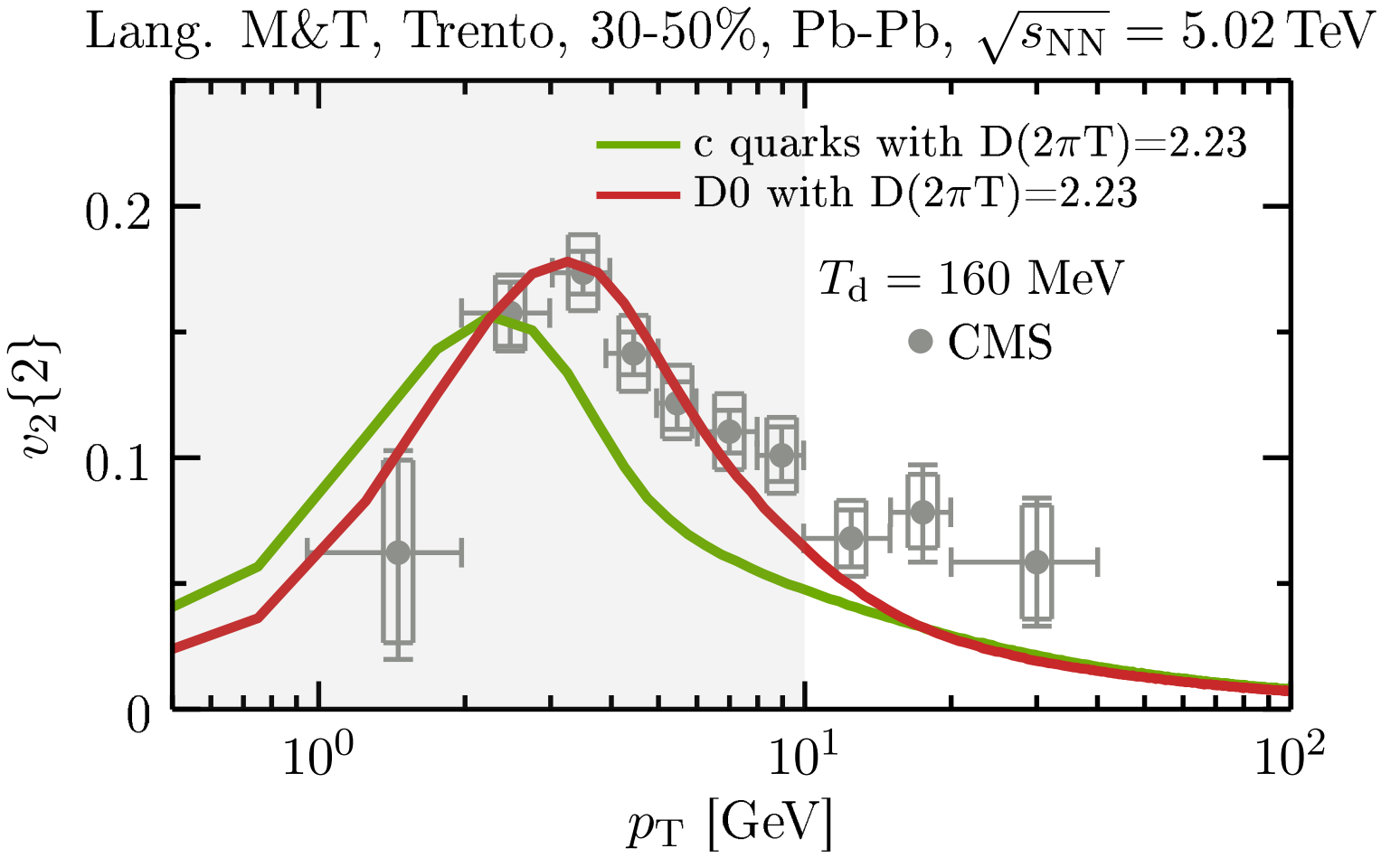


*(b) The same as (a) but for the elliptic flow, v2: H\_v2(pT;T\_H) = v2^H\_Q (pT;T\_H) / v2^Q(pT;T\_H).*

Only for direct D0 (data in : « H\_v2\_D0overCharm\_Centrality\_30\_50.dat ») :



The corresponding v2 to better understand :



See arXiv:1906.10768 [nucl-th] (section V.) for more details about the fragmentation+coalescence model used in DAB-MOD.

*(c) Compute H\_AA and H\_v2 ratios for D-meson spectra at kinetic freezeout over those right after hadronization (if applicable).*

No hadronic rescattering in DAB-MOD.

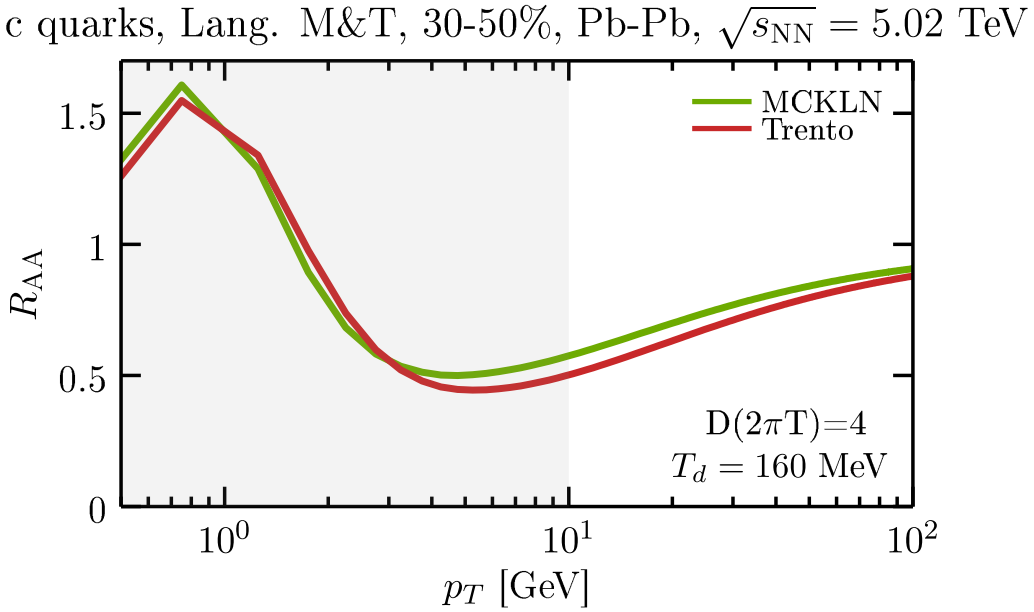
**3) Transport Simulations with Imposed Coefficients**

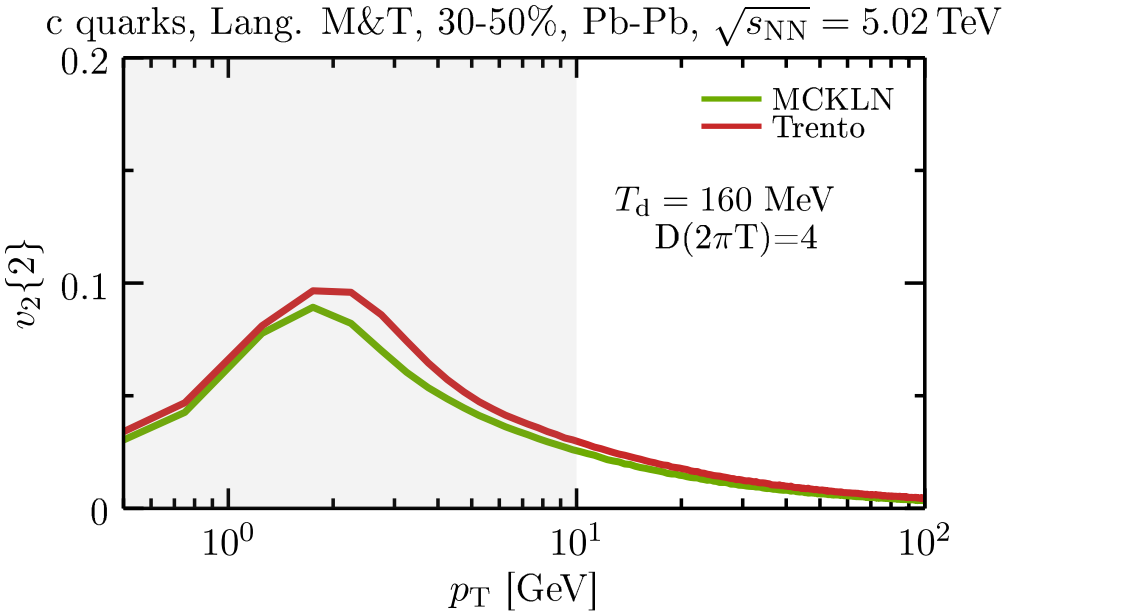
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*(a) Renormalize the charm-quark transport coefficients with a temperature-dependent but momentum-independent K factor, K(T), as to obtain a temperature-independent value of D\_s (2piT) == 4 (for Langevin approaches, D\_s = T / [m\_Q A(p=0)]); then compute R\_AA and v2 of charm quarks right before hadronization for 30-50% 5TeV PbPb collisions within your model.*

Shown here for two different QGP backgrounds (initial conditions and equation of states) :  
- MCKLN (an implementation of a Color Glass Condensate kT-factorization model) + « S95n-v1 » outdated equation of state  
- Trento (tuned to IP-Glasma) + « EOS2+1 » (from lQCD) equation of state

(See arXiv:1906.10768 [nucl-th] for more details.)





The related data files (« RAA\_Charm\_Trento\_D2piT\_4\_Centrality\_30\_50.dat » and « v2\_Charm\_Trento\_D2piT\_4\_Centrality\_30\_50.dat ») are given for Trento initial conditions.

*(b) As an optional assignment (time permitting), to compare transport coefficients from different models: Renormalize current charm-quark transport coefficient, A(p;T), qhat/T^3 for a common R\_AA in a fixed brick problem (as in Fig. 7 in Phys. Rev. C99 (2019) 054907); then compute R\_AA and v2 of charm quarks right before hadronization for 30-50% 5TeV PbPb collisions within your model.*

I didn’t have enough time to perform this analysis.