

Problemset 9 – Quark Gluon Plasma Physics – SS 2023

Discussion in the lecture: Friday 14

9.1 Deconfinement temperature

From measurement of the population of different charmonium states one could determine the temperature at which charmonia freeze out in their abundancies, which can be associated with a lower limit on the deconfinement temperature.

- a) If we want to determine this temperature with a 5 MeV precision in the temperature range 150 - 200 MeV, with what statistical accuracy should the 1S and 2S states be measured? We can assume here that systematic errors are negligible in comparison.
- b) For central PbPb collisions at the LHC, for $\psi(2S)$ the ratio of signal to combinatorial background in the invariant mass distribution is $5 \cdot 10^{-4}$. Estimate how many $\psi(2S)$ should be reconstructed, to obtain the statistical accuracy determined in a).