

Problem set 6 – Quark Gluon Plasma Physics – SS 2023

Discussion in the lecture: Friday June 2

6.1 Blast-wave fit

In this problem we perform a simultaneous blast-wave least-squares fit to pion, kaon, and proton p_T spectra measured by the ALICE experiment in Pb–Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV. The goal is to extract the kinetic freeze-out temperature T_{kin} and the radial flow velocity β . Please add the missing code pieces (locations marked by “*your code here*”) in `blastwave_fit_to_be_completed.ipynb` following these steps:

- a) Plot the blast-wave p_T spectrum (dN/dp_T) for protons for two different surface velocities $\beta_s = 0.2$ and $\beta_s = 0.8$ in the range $0 \leq p_T \leq 3$ GeV/ c . Use $T = 0.1$ GeV and $n = 1$.
- b) Download the ALICE pion, kaon, and proton spectra from hepdata. Read the data using the code provided in the notebook.
- c) Implement the total χ^2 as the sum of the contributions from pions, kaons, and protons