QGP Homework 14.05.2021

A) Calculate the phase space boundaries for T at μ = 0 and for μ at T = 0 for a bag constant of 262 MeV/fm^3.

B) Discuss the differences between the energy density as shown on slide 14

$$\epsilon_{qg} = \frac{\pi^2}{30}(g_g + \frac{7}{8}g_q)T^4 + B$$

in comparison to (slide 6) $\epsilon = \frac{4\pi g}{(2\pi)^3}\int \frac{Ep^2 dp}{\exp(\frac{p-\mu}{T}) + 1}$ and (slide 4) $\epsilon = \frac{\pi^2}{30} g T^4$

C) Construct and draw the QGP phase diagram with nucleons and quarks only. Download the ROOT code from the webpage and follow the hints labeled with “Hint:”.

D) Replace the nucleon gas by a pion gas.