QGP Homework 30.04.2021

A) Use ROOT to numerically integrate the following expression from the lecture: $\epsilon = \frac{4\pi g}{(2\pi)^3} \int \frac{Ep^2 dp}{\exp(\frac{p-\mu}{T}) + 1}$

Use g = 12, T = 150 MeV and μ= 0.0, 50.0 MeV. Return the two results in units of GeV/fm^3.

A-2) Use m = 0.1 and 1 GeV in E for the numerical integration.

B) Plot the Fermi energy density for μ= 0.0 MeV (g = 12) as a function of T using ROOT: $\epsilon_q = \epsilon_{\bar{q}} = \frac{3g}{\pi^2} T^4 d(4) = \frac{7\pi^2}{240} g T^4$

Plot in the same pad the Boson energy density with g = 16.
(Use one of the following for plotting: TH1D, TGraph, TF1)

$$\epsilon = \frac{\pi^2}{30} g T^4$$

Examples for most basic functions of ROOT can be found in your ROOT installation directory under /tutorials. In case of questions please send me an email:
schmah@physi.uni-heidelberg.de