Computational Particle Physics (PH5440)
Jan-May 2023

<u>Assignment: 1 (for Part 2 of course)</u>

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1. Draw histograms with suitable bin and range if the number of muons, number of taus, pT (upto 150 GeV), eta, phi of the particles.   *[10]*

2. Create the invariant mass of two leading (in pT) taus and separately muons and store the distribution as a histogram. Fit the histograms in a suitable range around the Z mass using a gaussian function and not the resolution and resolution error.   *[20]*

3. Create similar histograms and fits while applying step by step conditions on tau quality :   *[30]*
   a. The two leading taus should be of opposite charge
   b. abs(Tau_eta) < 2.3 && Tau_pt > 20 &&
   c. Tau_idDecayMode == true && Tau_idIsoTight == true
   d. Tau_idAntiEleTight == true && Tau_idAntiMuTight == true
      Note the resolution and error for the invariant mass fit and plot in a graph against the number of steps applied. The legend of the graph should contain your name in the title.

All the plots should have suitably marked axes labels and titles, be stored as PDF files and collated into one PDF file for submission.