User manual for "Masterclass" program
Author: Monika Seniut

Description

The aim of the exercise is finding strange particles, produced from pp and Pb-Pb collisions at LHC and recorded by the ALICE experiment. The information from the tracks of strange particles is used to calculate the invariant mass of the decaying particle, as a confirmation of the particle species.

The invariant mass calculation gives the distribution as shown in Figure 3. The distribution is the mass calculated for pion-pion(K0 sitribution), pion-proton(in case of lambda and anty-lambda distributions), Pb-Pb, or negative and positive pion pairs. The peak corresponds to lambda, anty-lambda or K0 and the continuum is "background" from random combinations of other particles. In K0 distribution a peak corresponds to right pion+ and pion- pairs, because other combinations of positive and negative pion pairs weaken the background.

In order to find the number of particles of a certain type, for example K0s, you need to find the number of events in the peak after background subtraction. In order to fit a curve (second degree polynomial) to the background, you first choose the fit range using the slider. To fit a Gaussian distribution to the signal you also have to select the range of the peak. When you click on "Fit signal + background", the fitted functions are superimposed on the histogram and you can check visually whether the fit is reasonable. For the background subtraction the coefficients of the second degree polynomial are used. On the histogram you get the total number of events in the peak, the number of background events and those which are signal, as well as the mean value of the Gaussian (the particle mass) and its width sigma (both in MeV/c2).

Background estimation and subtraction allows to determine the number of particles we actually have, which is used to calculate strangeness enhancement.

1 Available actions

1. Plotting histograms
2. Setting ranges for fitting functions
3. Fitting Gauss and Polynomial functions
4. Adding the best fitting results to database
5. Giving personal data

Each and every action will be described in the section below.

2 User manual

2.1 Plotting histograms

In order to plot the histogram select the type of collision that you will analyse in section "V0 histograms" by mouse click.

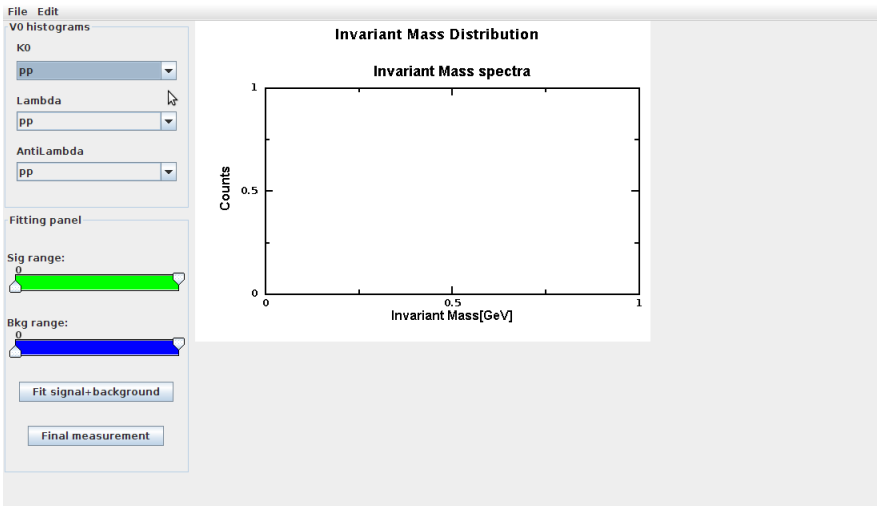

Figure 1: Step 1

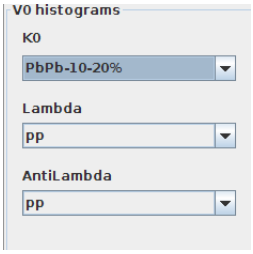

Figure 2: Step 2

After selecting the preferred type of collision, a histogram is plotted as shown in the next figure.

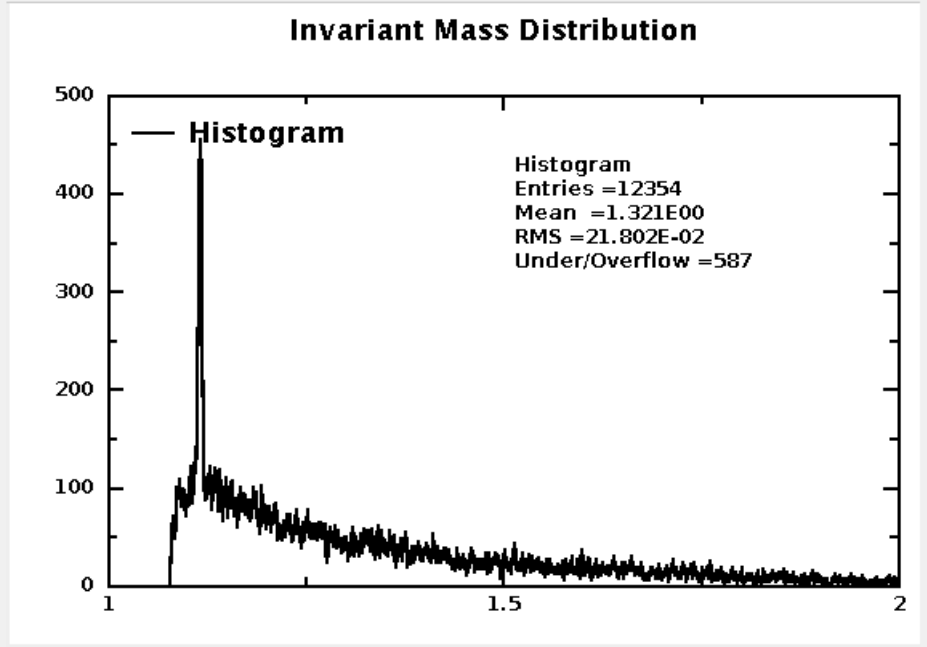

Figure 3: Histogram

2.2 Setting ranges for fitting functions

In section "Fitting panel" set the X axis interval over which functions are fitted to the data for background("Bkg range:") and polynomial("Sig range:").
Minimum range of polynomial should be lower than minimum range of Gauss.

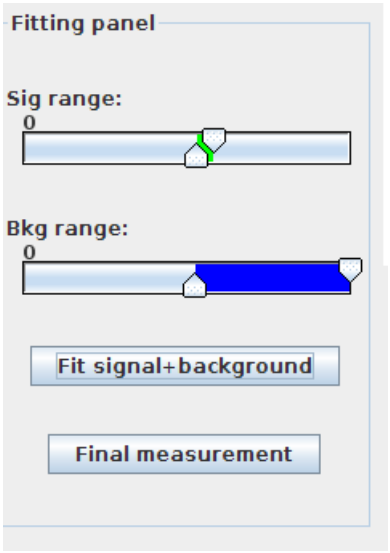

Figure 4: Fitting ranges

2.3 Fitting Gauss and Polynomial functions

After setting ranges of fitted functions, click the button "Fit signal+background". A histogram with the fitted functions will appear on the screen.

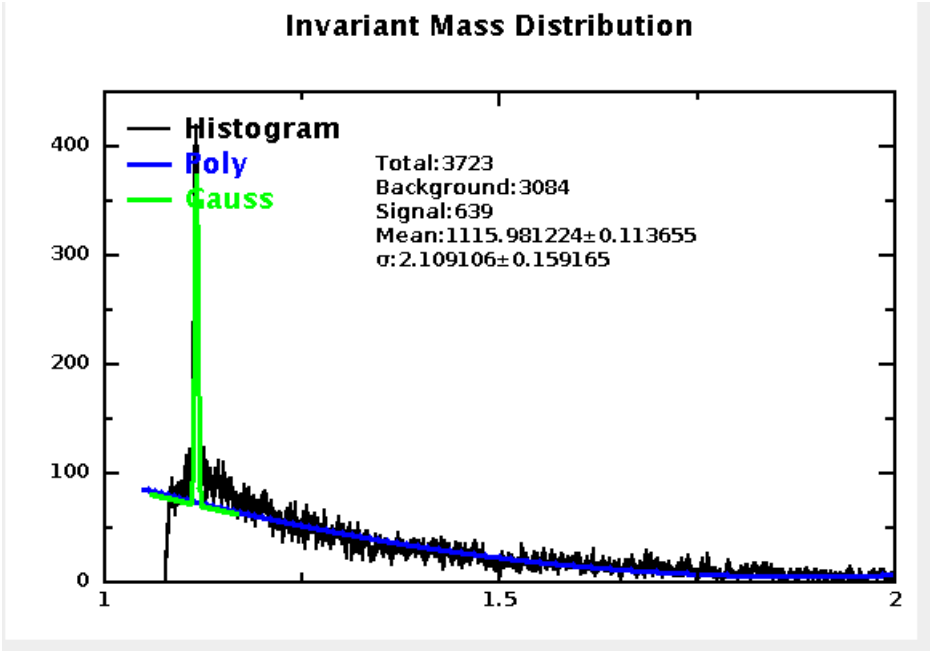

Figure 5: Histogram with fitted functions

2.4 Adding the best fitting results to database

When you decide that the function fit is good enough, please save the parameters by clicking the "Final measurement" button. After clicking the button, the window "Personal Data" appears on the screen.

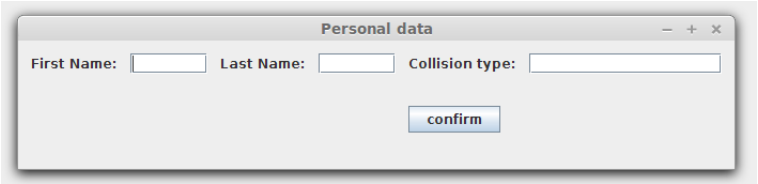

Figure 6: Personal Data window

2.5 Giving personal data

Please provide your personal data in the "Personal data" window, clicking enter after filling each text area. Confirm the personal data you entered by clicking the "confirm" button. New record will be added to database.

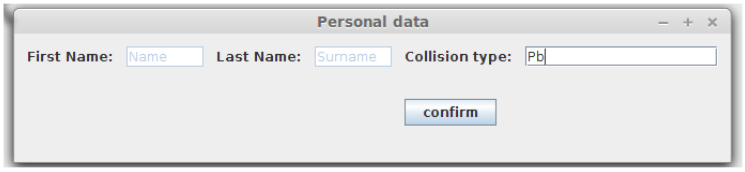

Figure 7: Giving personal data