String Hadronization

These two analysis examples are taken from **examples/expl1.optns** (string hadronisation). Please refer to the "Complete examples" section to get a complete description of the simulation configuration.

Transverse momentum distribution

```
!---------------------------------
! Define analysis (pt distribution)
!---------------------------------

beginanalysis
  histogram
    pt     ! x = transverse momentum
    numptl ! y = number of particles
    11 ! normalisation code (per event, per bin width)
    0  ! x-min
    5  ! x-max
    10 ! number of bins
  trigger rap -1 1 ! rapidity range
  set hisfac 0.5   ! divide by rapidity range
  idcode 120  idcode -120  ! charged pions
  idcode 130  idcode -130  ! charged kaons
  idcode 1120 idcode -1120 ! protons and antiprotons
endanalysis

!-------------------------------------------------
! Write out final results to output file
!-------------------------------------------------

write "pt distribution"
histoweight
writearray 3 ! creates 3-column table in z-expl1.histo: x, y, y-error
```

Define analysis

We first define *xvariable* as ***pt*** (transverse momentum) and *yvariable* as ***numptl*** (number of particles). The following four numbers define: the normalisation code (***11*** means that we perform a normalisation, dividing by the number of events and by the bin width), the transverse momentum range (from ***0*** to ***5***) and the number of bins (***10***).

A trigger is set to get only particles with rapidity in range [-1, 1].

A normalisation factor of ***0.5*** is used.

The ***idcode*** commands define the particles of interest. Please refer to **src/KWt/idt.dt** to get EPOS identifier values. In this example, we only focus on charged pions (π^+, π^-), charged kaons (K^+, K^-), protons and antiprotons ($p, \overline{p}$).

Output

This example will create a p_T distribution (d^2N/dp_Tdy), for charged pions (π^+, π^-), charged kaons (K^+, K^-), protons and antiprotons ($p, \overline{p}$), within$-1 < y < 1$ (y being the rapidity), distributed in 10 bins between p_T= 0 and p_T = 5 GeV.

The command **write** defines the histogram title (here: **pt distribution**).

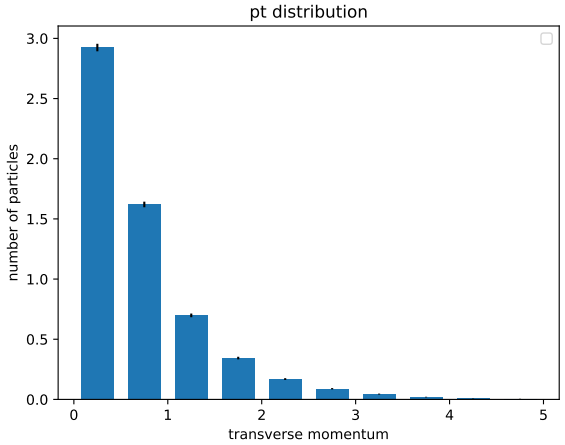
The command **histoweight** prints the histoweight value.

Finally, the command **writearray *3*** creates a 3-column table with x, y and y-error values.
The analysis results are written in the file **${HTO}z-expl1.histo**.

```
pt distribution
histoweight 0.30000000000000E+04
array 3
0.2500E+00 0.2924E+01 0.3122E-01
0.7500E+00 0.1620E+01 0.2324E-01
0.1250E+01 0.6983E+00 0.1526E-01
0.1750E+01 0.3437E+00 0.1070E-01
0.2250E+01 0.1690E+00 0.7506E-02
0.2750E+01 0.8867E-01 0.5437E-02
0.3250E+01 0.4433E-01 0.3844E-02
0.3750E+01 0.1933E-01 0.2539E-02
0.4250E+01 0.7333E-02 0.1563E-02
0.4750E+01 0.4000E-02 0.1155E-02
endarray
```

We get 10 bins with transverse momentum values in the range [0, 5] with a total of 3000 events.

One can then build and display the plot with one's own plotting tool. Here are the plot created with a simple python script using the matplotlib package.



Rapidity distribution

The file **examples/expl1.optns** contains another histogram definition corresponding to a rapidity distribution.

```
!--------------------------------------------------
! Define analysis (rapidity distribution)
!--------------------------------------------------
beginanalysis
  histogram
    rap    !x = rapidity
    numptl !y = number of particles
    11     !normalisation
    -5     !x-min
    5      !x-max
    20     !number of bins
  idcode 120  idcode  -120 !charged pions
  idcode 130  idcode  -130 !charged kaons
  idcode 1120 idcode -1120 !protons and antiprotons
endanalysis

!--------------------------------------------------
! Write out final results to output file
!--------------------------------------------------

write "rapidity distribution"
histoweight
writearray 3
```

Define analysis

We first define the *xvariable* as **rap** (rapidity) and *yvariable* as **numptl** (number of particles). The next four numbers define: the normalisation code (***11*** means that we perform a normalisation, dividing by the number of events and by the bin width), the rapidity range (from ***-5*** to ***5***) and the number of bins (***20***).

The ***idcode*** commands define the particles of interest. Please refer to **src/KWt/idt.dt** to get EPOS identifier values. In this example, we only focus on charged pions (π^+, π^-), charged kaons (K^+, K^-), protons and antiprotons ($p, \overline{p}$).

Output

This example will create a rapidity distribution (dN/dy), for charged pions (π^+, π^-), charged kaons (K^+, K^-), protons and antiprotons ($p, \overline{p}$), distributed in 20 bins between y = -5 and y = 5 .

The following commands allow to write out the results in an histogram filename named **${HTO}z-expl1.histo**. The command ***write*** defines the histogram title (here: ***rapidity distribution***). The command ***histoweight*** prints the histoweight value.

Finally, the command ***writearray 3*** creates a 3-column table with x, y and y-error values.
The analysis results are written in the file **${HTO}z-expl1.histo**

```
rapidity distribution
histoweight 0.30000000000000E+04
array 3
-0.4750E+01 0.5120E+00 0.1848E-01
-0.4250E+01 0.9127E+00 0.2467E-01
-0.3750E+01 0.1291E+01 0.2933E-01
-0.3250E+01 0.1499E+01 0.3162E-01
-0.2750E+01 0.1567E+01 0.3232E-01
-0.2250E+01 0.1445E+01 0.3103E-01
-0.1750E+01 0.1397E+01 0.3052E-01
-0.1250E+01 0.1512E+01 0.3175E-01
-0.7500E+00 0.2056E+01 0.3702E-01
-0.2500E+00 0.3845E+01 0.5063E-01
 0.2500E+00 0.3912E+01 0.5107E-01
 0.7500E+00 0.2033E+01 0.3681E-01
 0.1250E+01 0.1497E+01 0.3159E-01
 0.1750E+01 0.1391E+01 0.3045E-01
 0.2250E+01 0.1433E+01 0.3090E-01
 0.2750E+01 0.1526E+01 0.3190E-01
 0.3250E+01 0.1516E+01 0.3179E-01
 0.3750E+01 0.1311E+01 0.2957E-01
 0.4250E+01 0.9440E+00 0.2509E-01
 0.4750E+01 0.5040E+00 0.1833E-01
endarray
```

We get 20 bins with rapidity values in the range]-5, 5[with a total of 3000 events.
One can then build and display the plot.