Check File Structure

General discussion

This check file contains all kinds of information depending on the print command used in the optns file. The general syntax is

```
print name number
```

which writes output from the module "*name*" using print level "*number*". The higher the number the more detailed is the output. This is essentially a tool for developers. However, the command

```
print * 2
```

may be useful for the "normal user". Here one produces several lists of partices (including their parent-children relations), at different stages of the simulation. The structure of the file is as follows

```
############ start event number 1 ############
.....
############ list before fragmentation ##########
...
############ list after fragmentation ##########
...
############ final decay ##################
...
############ list after bjinta ###############
...
############ start event number 2 ############
.....
```

where "..." refers to the particle list at that stage. A particle list contains the particles with one line per particle, with several columns, the most important ones being (these are actually the first 12 columns):

```
ior     - index of first parent of particle i
jor     - index of last parent of particle i
i       - index of particle
ifr1    - index of first child
ifr2    - index of last child
id      - particle id (EPOS code)
ist     - particle status
ity     - particle type of origin
pt      - particle transverse momentum
m       - particle mass
E       - particle energy
y       - particle rapidity
```

Concerning the particle id, we have

```
1 to 6          - quarks
-6 to -1        - antiquarks
    9           - gluons
3 digits        - mesons
4 digits        - baryons
```

The file **src/KWt/idt.dt** contains the EPOS particle id codes.

Concerning the particle status ist, we have

```
  20,21         - parton
   29           - string
    0           - last generation hadron
    1           - other hadron
```

A complete list of particle status values can be found in the file **src/KWt/istat.dt**.

Example

In the following we show an example for electron-positron annihilation.
For simplicity we only show the frst 9 columns.

The first table (before fragmentation) showns the intial particles (electron, id=12 and positron, id=-12), the photon (id=10) produced from $e^+ + e^- \to \gamma$, and then the produced chain of partons from $\gamma \to s + \bar{s} \to s + g + g + \bar{s}$ with a strange quark (id=3) and a strange antiquark (id=-3) as well as two gluons (id=9).

```
########################################################################
############  list before fragmentation  ###############################
########################################################################
ior jor i ifr1 ifr2 id ist ity   pt
------------------------------------------------------------------------
 0   0  1  0    0   12  1   0  0.000E+00
 0   0  2  0    0  -12  1   0  0.000E+00
 1   2  3  4    7   10  1   0  0.000E+00
 3   3  4  0    0    3 20  30  0.109E+01
 3   3  5  0    0    9 20  30  0.778E+00
 3   3  6  0    0    9 20  30  0.446E+00
 3  -3  7  0    0   -3 20  30  0.000E+00
```

Next we look at the list after fragmentation. In our example, the chain of 4 partons $s - g - g - \bar{s}$ represents a kinky string, which decays into hadrons. In the list, one first maps the chain of partons to a string, with i=8, and with status ist=29 (=string). The string entry is only for bookkeeping, the properties of the string are known via the parent indices ior and jor, which allow to trace back to the partons which constitute the string.

```
################################################################
##############  list after fragmentation  ######################
################################################################
ior jor  i ifr1 ifr2     id     ist ity     pt
----------------------------------------------------------------
 4   7   8  9    22  800100010   29  30  0.225E-03
 8   0   9  0     0    -130       0  30  0.213E+00
 8   0  10  0     0     110       0  30  0.116E+00
 8   0  11  0     0     110       0  30  0.874E+00
 8   0  12  0     0     111       0  30  0.730E+00
 8   0  13  0     0     121       0  30  0.687E+00
 8   0  14  0     0     111       0  30  0.519E+00
 8   0  15  0     0     231       0  30  0.370E+00
 8   0  16  0     0    -231       0  30  0.210E-01
 8   0  17  0     0    2130       0  30  0.780E+00
 8   0  18  0     0   -1231       0  30  0.635E+00
 8   0  19  0     0    -120       0  30  0.162E+00
 8   0  20  0     0     120       0  30  0.215E+00
 8   0  21  0     0     230       0  30  0.672E+00
 8   0  22  0     0     330       0  30  0.389E+00
```

Directly following the string stry i=8, we see the string decay products, with i from9 to 22. All these particles have mother index 8 (the string) and status 0, because they are (at this moment) last generation. The resonances did not decay yet.

In the list, we see several resonances, which will finally decay:

```
i=12, id=111,  name=rho0
i=13, id=121,  name=rho+
i=14, id=111,  name=rho0
i=15, id=231,  name=K*0
i=16, id=-231, name=K*0b
i=17, id=2130, name=Lambda
i=18, id=-1231,name=Sigma*0
i=21, id=230,  name=K0
i=22, id=330,  name=eta'
```

The decay products will be seen in the following list, where the father index ior (the leftmost number) allows to identify the decaying particle.

```
#################################################################
############## final decay ######################################
#################################################################
 12  0  23  0  0   -120    0   30  0.880E+00
 12  0  24  0  0    120    0   30  0.337E+00
 13  0  25  0  0    120    0   30  0.328E+00
 13  0  26  0  0    110    0   30  0.447E+00
 14  0  27  0  0   -120    0   30  0.359E+00
 14  0  28  0  0    120    0   30  0.334E+00
 15  0  29  0  0   -120    0   30  0.193E+00
 15  0  30  0  0    130    0   30  0.508E+00
 16  0  31  0  0    120    0   30  0.268E+00
 16  0  32  0  0   -130    0   30  0.284E+00
 17  0  33  0  0   -120    0   30  0.231E+00
 17  0  34  0  0   1120    0   30  0.552E+00
 18  0  35  0  0  -2130    0   30  0.391E+00
 18  0  36  0  0    110    0   30  0.264E+00
 21  0  37  0  0    -20    0   30  0.672E+00
 22  0  38  0  0   -120    0   30  0.108E+00
 22  0  39  0  0    120    0   30  0.118E+00
 22  0  40  0  0    220    0   30  0.205E+00
 35  0  41  0  0    120    0   30  0.562E-01
 35  0  42  0  0  -1120    0   30  0.399E+00
```

We also see a decay of a decay product: particles 41 and 42 are decay products of 35, which is already decay product of 18. In principle we are done, particle production is finished, but it is nevertheless useful to consider one more list, namely the full list at the end with the complete parent-children relations for all particles. This is provided in the following list.

```
#################################################################
############  list after bjinta  ################################
#################################################################
 ior jor   i ifr1 ifr2  id    ist  ity    pt
 ---------------------------------------------------------------
  0   0    1    0    0    12      1    0   0.000E+00
  0   0    2    0    0   -12      1    0   0.000E+00
  1   2    3    4    7    10      1    0   0.000E+00
  3   3    4    8    0     3     21   30   0.109E+01
  3   3    5    8    0     9     21   30   0.779E+00
  3   3    6    8    0     9     21   30   0.446E+00
  3  -3    7    8    0    -3     21   30   0.247E-04
  4   7    8    9   22 800100010 29   30   0.225E-03
  8   0    9    0    0  -130      0   30   0.213E+00
  8   0   10    0    0   110      0   30   0.116E+00
  8   0   11    0    0   110      0   30   0.874E+00
  8   0   12   23   24   111      1   30   0.730E+00
  8   0   13   25   26   121      1   30   0.687E+00
  8   0   14   27   28   111      1   30   0.519E+00
  8   0   15   29   30   231      1   30   0.370E+00
  8   0   16   31   32  -231      1   30   0.210E-01
  8   0   17   33   34  2130      1   30   0.780E+00
  8   0   18   35   36 -1231      1   30   0.635E+00
  8   0   19    0    0  -120      0   30   0.162E+00
  8   0   20    0    0   120      0   30   0.215E+00
  8   0   21   37   37   230      1   30   0.672E+00
  8   0   22   38   40   330      1   30   0.389E+00
 12   0   23    0    0  -120      0   30   0.880E+00
 12   0   24    0    0   120      0   30   0.337E+00
 13   0   25    0    0   120      0   30   0.328E+00
 13   0   26    0    0   110      0   30   0.447E+00
 14   0   27    0    0  -120      0   30   0.359E+00
 14   0   28    0    0   120      0   30   0.334E+00
 15   0   29    0    0  -120      0   30   0.193E+00
 15   0   30    0    0   130      0   30   0.508E+00
 16   0   31    0    0   120      0   30   0.268E+00
 16   0   32    0    0  -130      0   30   0.284E+00
 17   0   33    0    0  -120      0   30   0.231E+00
 17   0   34    0    0  1120      0   30   0.552E+00
```

```
 18  0  35  41   42 -2130      1  30   0.391E+00
 18  0  36   0    0   110      0  30   0.264E+00
 21  0  37   0    0   -20      0  30   0.672E+00
 22  0  38   0    0  -120      0  30   0.108E+00
 22  0  39   0    0   120      0  30   0.118E+00
 22  0  40   0    0   220      0  30   0.205E+00
 35  0  41   0    0   120      0  30   0.562E-01
 35  0  42   0    0 -1120      0  30   0.399E+00
```