



# AGATA Data format and data reprocessing

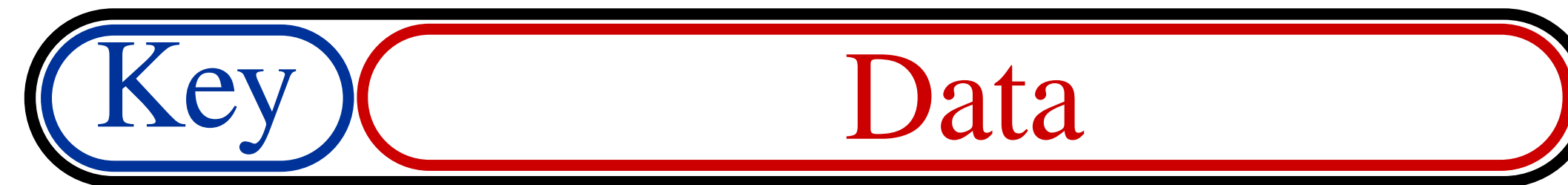
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on behalf of the AGATA Analysis Working Group

AGATA Analysis School: 12/09/2023, Legnaro

# The AGATA Data Format (ADF)

## ADF Frame:



The key contains:

- Data length
- Data type
- Timestamp
- Event number

The Data contains either:

- data (energies, hits...)
- adf frames

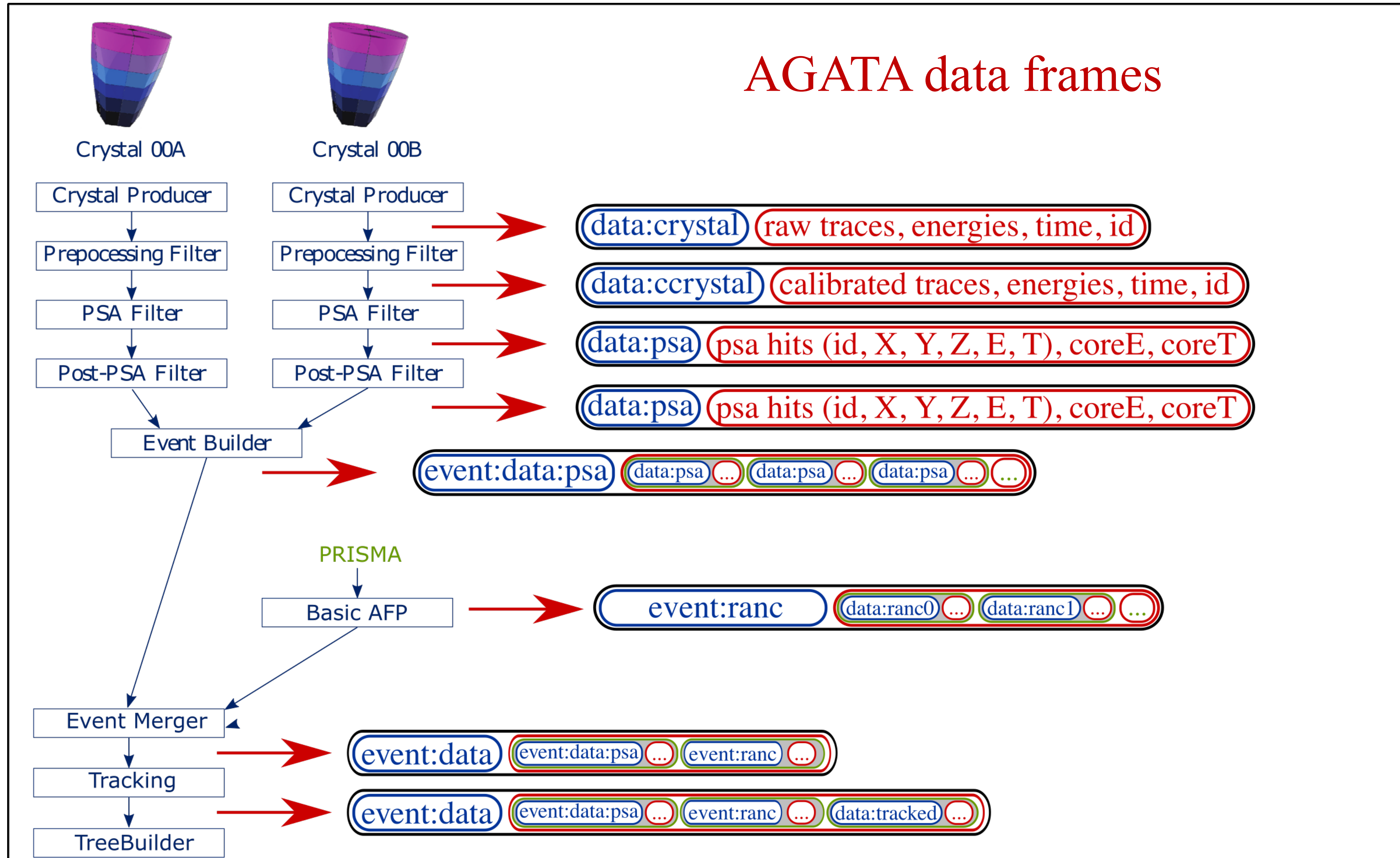
## The AGATA Data Format (ADF)

ADF Composite frame:



As any frame, the composite frame contains:

- its key (data length, frame type, timestamp...)
- its data, composed of 3 standard adf subframes



## AGATA data reprocessing

Typical replay folder:

- **Conf:** folder containing all the actors configuration files
- **Data:** folder containing the input data (generally symbolic link)
- **Out:** folder where the data are written
- **Topology.conf:** file used to define the actors topology to be done
- **gen\_conf.py:** python script to generate the conf files (paths update)

```
dudouet@:/Volumes/JDev_Ana/AGATA/prisma_test/run_test$ ll
total 144
drwxr-xr-x   8 dudouet  staff   256 15  août 17:00 ./
drwxr-xr-x   4 dudouet  staff   128 13  août 2021 ../
-rw-r--r--@  1 dudouet  staff  6148 13  août 2021 .DS_Store
drwxr-xr-x  43 dudouet  staff  1376 16  août 2021 Conf/
drwxr-xr-x  45 dudouet  staff  1440 28  avr  2022 Data/
drwxr-xr-x  43 dudouet  staff  1376 11  août 2021 Out/
-rw-r--r--@  1 dudouet  staff   501 15  août 17:00 Topology.conf
-rwxr-xr-x@  1 dudouet  staff 58008 17  août 2021 gen_conf.py*
```

# Topology file

```

Topology.conf — run_test
1 LOOP CRY5 00A 00B 00C 01A 01B 01C
2 Chain 3      CRY5
3 Producer    BasicAFP
4 Filter      PostPSAFilter
5 Dispatcher  EventBuilder
6 ENDL00P
7
8 Chain 2      Builder/
9 Builder     EventBuilder
10 Dispatcher EventMerger
11
12 Chain 2     prisma/
13 Producer   BasicAFP
14 Dispatcher EventMerger
15
16 Chain 3     Merger/
17 Builder    EventMerger
18 Filter     TrackingFilterOFT
19 Consumer   TreeBuilder
20
Line: 1:34 | Apac... | Tab Size: 4 |

```

- **LOOP:** List of crystals to be analyzed for LLP.
- **Chain N:** N need to correspond to the number of actors in the chain

A chain needs:

- To start by a producer or a Builder.
- To end by a consumer or a Dispatcher

# The gen\_conf.py script

- Use to make the full configuration of a replay ( paths & actors configuration)

```

31 #####
32 ##### 0 Type of analysis and replacement symbols #####
33 #####
34
35 PROGTYPE='femul'      # NARVAL or femul  (to choose between os.getcwd() and '' for CWD)
36 CONFTYPE='offline'    # ONLINE or OFFLINE (used just to exclude the ReadDataDir line in the Producers)
37
38 MACROS={              # various replacements for symbols defined in 2).
39 '$CONFDIR'           : 'Conf',                # this will be prefixed by CWD/
40 '$READDIR'           : 'Data',                # this will be prefixed by CWD/; if ONLINE this will not be written
41 '$SAVEDIR'           : 'Out',                 # this will be prefixed by CWD/; if ONLINE this will be replaced by $READDIR
42 '$ANALYSIS'          : 'Analysis',           # this will be prefixed by CWD/; if ONLINE this will be replaced by $READDIR
43 '$BUILDER'           : 'Builder',            # this will be prefixed by CWD/
44 '$MERGER'            : 'Merger',             # this will be prefixed by CWD/
45 '$PSABASE'           : '../ADL',             # standard place at AGATA
46 '$CRYSTAL_ID'        : "",                  # the actual value is defined in GeDataBase
47 '$SIGNAL_BASIS'      : "",                  # the actual value is defined in GeDataBase
48 '$CRYSTAL'           : "",                  # the actual value taken from Topology['CRYSTAL']
49 }
50
51 #####
52 ##### 1 Structure of analysis #####
53 #####
54
55 Topology={           # The directories to be generated in Conf, Data and Out
56 'CRYSTAL'           : "00A 00B 00C 02A 02B 02C 03A 03B 03C 04A 04B 04C 10A 10B 10C 11A 11B 11C 12A 12B 12C 13A 13B 13C",
57 'BUILDER'           : "Builder",
58 'MERGER'            : "Merger",
59 'ANALYSIS'          : "Analysis",
60 }

```

**Offline mode** →

**ADL path** →

**Topology** →

## The gen\_conf.py script

- Use to make the full configuration of a replay ( paths & actors configuration)

```

62 # The name of the used actors must correspond to one of the tuples defined in the following section.
63 # This requirement creates a problem for BasicAFP and BasicAFC when they are used in chains of different type
64 # (e.g. after PSA and after Tracking) and one wants to define chain-specific names for their input/output files.
65 # The solution is to suffix the name of the chain-type (e.g. _CRYSTAL or _GLOBAL or any other), to the defining tuple.
66 # This suffix will be silently removed from the actual name of the generated configuration files.
67
68 ▼ Actors={      # These are the xxxx.conf files to be generated
69   'CRYSTAL'   : "PreprocessingFilter PSAFilter PostPSAFilter",
70   'BUILDER'   : "EventBuilder",
71   'MERGER'    : "EventMerger TrackingFilter TreeBuilder",
72 ▲ }
73
74 ▼ ExtraFiles={ # If not already present, these files can be copied from a directory specified in the command line. CrystalPos LUT is placed at 3
75   .           places in order to have eventually tracking at different places offline
76   'CRYSTAL'   : "PreprocessingFilterPSA.conf xinv_1325-1340.cal xdir_1325-1340.cal Trapping.cal RecalEnergy2.cal",
77 ▲ 'MERGER'    : "CrystalPositionLookUpTable",
  
```

- List of configuration files that will be generated by the script
- List of configuration files that will be kept as it is (calibration files)



# The gen\_conf.py script

- Actors configuration...

```

131 PostPSAFilter=(
132 #ActualClass      basic",          # name of the used daughter class, uncomment for offline
133 "SaveDataDir     $SAVEDIR/$CRYSTAL", # normally Out
134 "EnergyGain      4",              # channels/keV of the calibrated energy spectra
135 #SmearPos         4",              # to randomize points on a 2mm3 volume
136 #ForceSegmentsToCore",           # sum of segments forced to energy of the core. Use it EITHER in the PSA OR in the Tracking
137 #CoreEnergyGate   500 520 ",      # possibility to restrict the energy range
138 #RecalCC          1",              # recalibration of CC Energy
139 #RecalSG          1",              # recalibration fired Segments
140 #TimeShiftCC      f32",           # time shift of core (ns)
141 #Verbose",        # more verbose terminal-output
142 "TrappingFile    Trapping.cal",   # file with the trapping-correction coefficients
143 #NoMultiHist",   # exclude local spectra and matrices
144 ##### command lines to be produced only for the specified crystals
145 {
146 '00A': ("RecalCC -0.099 1.000111", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC -0.352"),
147 '00B': ("RecalCC 0.115 1.000070", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 3.818"),
148 '00C': ("RecalCC 0.179 0.999901", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 3.726"),
149 '02A': ("RecalCC 0.086 0.999977", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 0.800"),
150 '02B': ("RecalCC -0.093 1.000140", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 0.588"),
151 '02C': ("RecalCC -0.340 1.000548", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 3.592"),
152 '03A': ("RecalCC 0.124 0.999947", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 0.689"),
153 '03B': ("RecalCC -0.054 1.000089", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC -10.543"),
154 '03C': ("RecalCC 0.117 1.000052", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 0.135"),
155 '04A': ("RecalCC -0.051 1.000239", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 3.529"),
156 '04B': ("RecalCC 0.255 0.999856", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC -7.781"),
157 '04C': ("RecalCC 0.367 0.999665", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 0.402"),
158 '10A': ("RecalCC 0.210 0.999794", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 1.688"),
159 '10B': ("RecalCC 0.030 1.000027", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 1.649"),
160 '10C': ("RecalCC -0.410 1.000475", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC -0.249"),
161 '11A': ("RecalCC 0.441 0.999582", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 3.080"),
162 '11B': ("RecalCC 0.210 0.999872", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC -0.324"),
163 '11C': ("RecalCC -0.215 1.000465", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC -6.115"),
164 '12A': ("RecalCC 0.290 0.999738", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC -0.996"),
165 '12B': ("RecalCC 0.018 1.000115", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 2.988"),
166 '12C': ("RecalCC 0.223 0.999770", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 1.311"),
167 '13A': ("RecalCC 0.075 1.000085", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC -2.725"),
168 '13B': ("RecalCC 0.140 0.999922", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 0.738"),
169 '13C': ("RecalCC 0.016 1.000070", "RecalEnergy2 RecalEnergy2.cal", "TimeShiftCC 0.352"),
170 }
171 )

```

# The gen\_conf.py script

- Actors configuration...

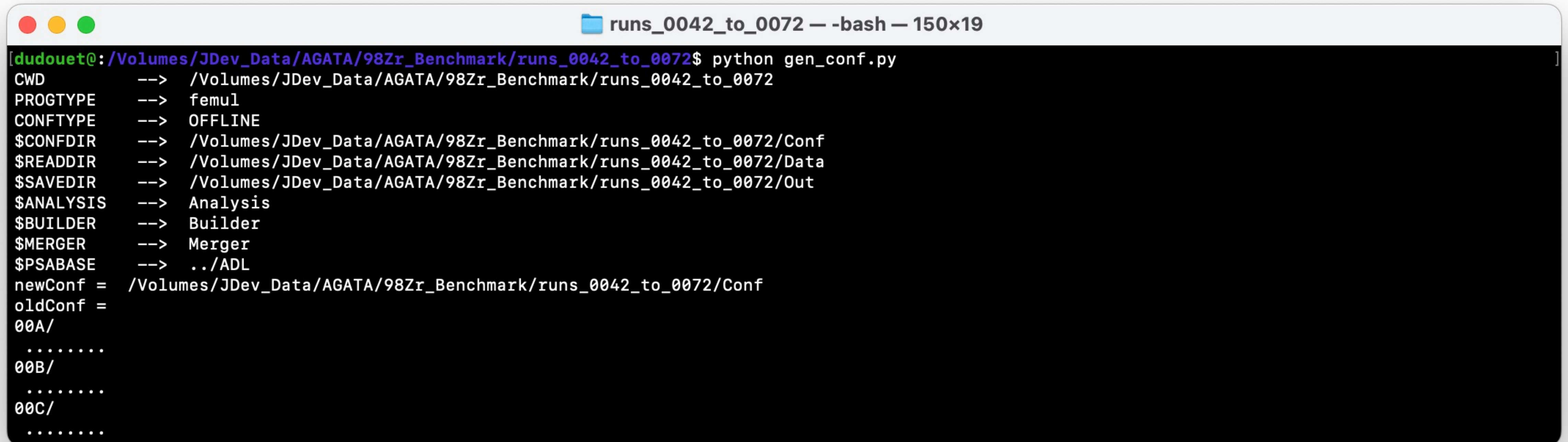
```

447
448
449 TreeBuilder=(
450 "ActualClass    TreeBuilder",           # name of the used daughter class
451 "SaveDataDir    $SAVEDIR/$ANALYSIS Tree_ TreeMaster ", # name of the final root file "AgNedDiamTree_0000.root"
452 "AddDetector    AGATA_BUILDER    event:data:psa    0", # Add a detector in the Tree (DetName, ADF key, Mode [-1: Must NOT be present, 0: Can be present, 1: Must be present])
453 "AddDetector    AGATA_TRACKING    data:tracked    0", # Add a detector in the Tree (DetName, ADF key, Mode [-1: Must NOT be present, 0: Can be present, 1: Must be present])
454 "AddDetector    PRISMA            event:ranc      0", # Add a detector in the Tree (DetName, ADF key, Mode [-1: Must NOT be present, 0: Can be present, 1: Must be present])
455 #"AddDetector    SPIDER            event:ranc      0", # Add a detector in the Tree (DetName, ADF key, Mode [-1: Must NOT be present, 0: Can be present, 1: Must be present])
456 #"AddDetector    EUCLIDES          event:ranc      0", # Add a detector in the Tree (DetName, ADF key, Mode [-1: Must NOT be present, 0: Can be present, 1: Must be present])
457 #"AddDetector    LABR              event:ranc      0", # Add a detector in the Tree (DetName, ADF key, Mode [-1: Must NOT be present, 0: Can be present, 1: Must be present])
458 "AddDetector    DANTE            event:ranc      0", # Add a detector in the Tree (DetName, ADF key, Mode [-1: Must NOT be present, 0: Can be present, 1: Must be present])
459 "MaxRootFileSize 600",
460 "MergerMode",
461 )
462
463
464 TB_PRISMA=(
465 "ConfPath        $CONFDIR/prisma",      #Path to Prisma configuration files
466 "LUTFile         lutPRISMA.txt",        #LUT file name (default is : lutPRISMA.txt)
467 "ManagerFile     manager.conf",        #Manager file name (default is : manager.conf)
468 "WriteRawTree", #Store the raw data in the output Tree (default 1)
469 "WriteAnaTree", #Store the analyzed data in the output Tree (default 1)
470 "DoPrismaAnalysis", #Ignore the input analyzed data (if present) and process the prisma lib on the raw data (default 0)
471 #"Verbose", # Print warnings in the processing
472 )
473
474 TB_SPIDER=(
475 "ConfPath        $CONFDIR/spider",      #Path to Prisma configuration files
476 "WriteRawTree", #Store the raw data in the output Tree (default 1)
477 "WriteAnaTree", #Store the analyzed data in the output Tree (default 1)
478 #"Verbose", # Print warnings in the processing
479 )
480
481 TB_EUCLIDES=(

```

## The gen\_conf.py script

- **Once all is configured: script execution: “python gen\_conf.py”**



```
runs_0042_to_0072 -- -bash -- 150x19
[dudouet@:/Volumes/JDev_Data/AGATA/98Zr_Benchmark/runs_0042_to_0072$ python gen_conf.py
CWD --> /Volumes/JDev_Data/AGATA/98Zr_Benchmark/runs_0042_to_0072
PROGTYPE --> femul
CONFTYPE --> OFFLINE
$CONFDIR --> /Volumes/JDev_Data/AGATA/98Zr_Benchmark/runs_0042_to_0072/Conf
$READDIR --> /Volumes/JDev_Data/AGATA/98Zr_Benchmark/runs_0042_to_0072/Data
$SAVEDIR --> /Volumes/JDev_Data/AGATA/98Zr_Benchmark/runs_0042_to_0072/Out
$ANALYSIS --> Analysis
$BUILDER --> Builder
$MARGER --> Merger
$PSABASE --> ../ADL
newConf = /Volumes/JDev_Data/AGATA/98Zr_Benchmark/runs_0042_to_0072/Conf
oldConf =
00A/
.....
00B/
.....
00C/
.....
```

## The gen\_conf.py script

- Once all is configured: femul execution: “*femul Topology.conf*”

```

dudouet@:/Volumes/JDev_Data/AGATA/98Zr_Benchmark/runs_0042_to_0072$ femul Topology_PreproToTracking.conf
#####
# Using Narval actors without Narval #
#####

OS is Apple
Using std threads
Using root 6.28/04
Library ADF is /Users/dudouet/Softs/gammasoftware/lib/ADF.conf

# Wed Aug 16 09:17:34 2023
# femul Topology_PreproToTracking.conf

Topology file      Topology_PreproToTracking.conf
Configuration directory Conf/

The ADF configuration file is /Users/dudouet/Softs/gammasoftware/agapro/femul/ADF.conf

Reading topology from --> Topology_PreproToTracking.conf
LOOP CRY5 00A 00B 00C 02A 02B 02C 03A 03B 03C 04A 04B 04C 10A 10B 10C 11A 11B 11C 12A 12B 12C 13A 13B 13C
Chain 5      CRY5
Producer    BasicAFP
Filter      PreprocessingFilter
Filter      PSAFilter
Filter      PostPSAFilter
Dispatcher  EventBuilder
ENDLOOP
Chain 5      CRY5 ==> 00A
Producer    BasicAFP
Filter      PreprocessingFilter
Filter      PSAFilter
Filter      PostPSAFilter
Dispatcher  EventBuilder

```

- Femul options: “*femul Topology.conf -options*”
  - **-nothr**: run the non-threaded event loop
  - **-turns nn**: limit analysis to nn turns
- To print all options: “*femul -h*”