AGATA Data format and data reprocessing

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The AGATA Data Format (ADF)

ADF Frame:

The key contains:

- Data lenght
- Data type
- Timestamp
- Event number

The Data contains either:

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

The AGATA Data Format (ADF)

ADF Compsite frame:

As any frame, the composite frame contains:

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

AGATA data frames

Crystal 00A

Crystal 00B

Crystal Producer

Prepocessing Filter

PSA Filter

Post-PSA Filter

Crystal Producer

Prepocessing Filter

PSA Filter

Post-PSA Filter

Event Builder

data:crystal raw traces, energies, time, id

data:ccrystal calibrated traces, energies, time, id

data:psa psa hits (id, X, Y, Z, E, T), coreE, coreT

data:psa psa hits (id, X, Y, Z, E, T), coreE, coreT

event:data:psa data:psa ... data:psa ... data:psa ... ...

PRISMA

Basic AFP

event:ranc data:ranc0 ... data:ranc1 ... ...

Event Merger

Tracking

TreeBuilder

event:data event:data:psa ... event:ranc ...

event:data event:data:psa ... event:ranc ... data:tracked ...

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 aoû 17:00 ./
drwxr-xr-x   4 dudouet  staff    128 13 aoû  2021 ../
-rw-r--r--@  1 dudouet  staff   6148 13 aoû  2021 .DS_Store
drwxr-xr-x  43 dudouet  staff   1376 16 aoû  2021 Conf/
drwxr-xr-x  45 dudouet  staff   1440 28 avr  2022 Data/
drwxr-xr-x  43 dudouet  staff   1376 11 aoû  2021 Out/
-rw-r--r--@  1 dudouet  staff    501 15 aoû 17:00 Topology.conf
-rwxr-xr-x@  1 dudouet  staff  58008 17 aoû  2021 gen_conf.py*
```

Topology file

Topology.conf — run_test

```
1   LOOP CRYS 00A 00B 00C 01A 01B 01C
2   Chain 3       CRYS
3   Producer      BasicAFP
4   Filter        PostPSAFilter
5   Dispatcher    EventBuilder
6   ENDLOOP
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)**

Offline mode

ADL path

Topology

gen_conf.py — runs_0042_to_0072

```
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  }
```

The gen_conf.py script

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

```
# The name of the used actors must correspond to one of the tuples defined in the following section.
# This requirement creates a problem for BasicAFP and BasicAFC when they are used in chains of different type
# (e.g. after PSA and after Tracking) and one wants to define chain-specific names for their input/output files.
# The solution is to suffix the name of the chain-type (e.g. _CRYSTAL or _GLOBAL or any other), to the defining tuple.
# This suffix will be silently removed from the actual name of the generated configuration files.

Actors={      # These are the xxxx.conf files to be generated
'CRYSTAL'   : "PreprocessingFilter PSAFilter PostPSAFilter",
'BUILDER'   : "EventBuilder",
'MERGER'    : "EventMerger TrackingFilter TreeBuilder",
}

ExtraFiles={  # If not already present, these files can be copied from a directory specified in the command line. CrystalPos LUT is placed at 3
    places in order to have eventually tracking at different places offline
'CRYSTAL'   : "PreprocessingFilterPSA.conf xinv_1325-1340.cal xdir_1325-1340.cal Trapping.cal RecalEnergy2.cal",
'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…**

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

The gen_conf.py script

- **Actors configuration…**

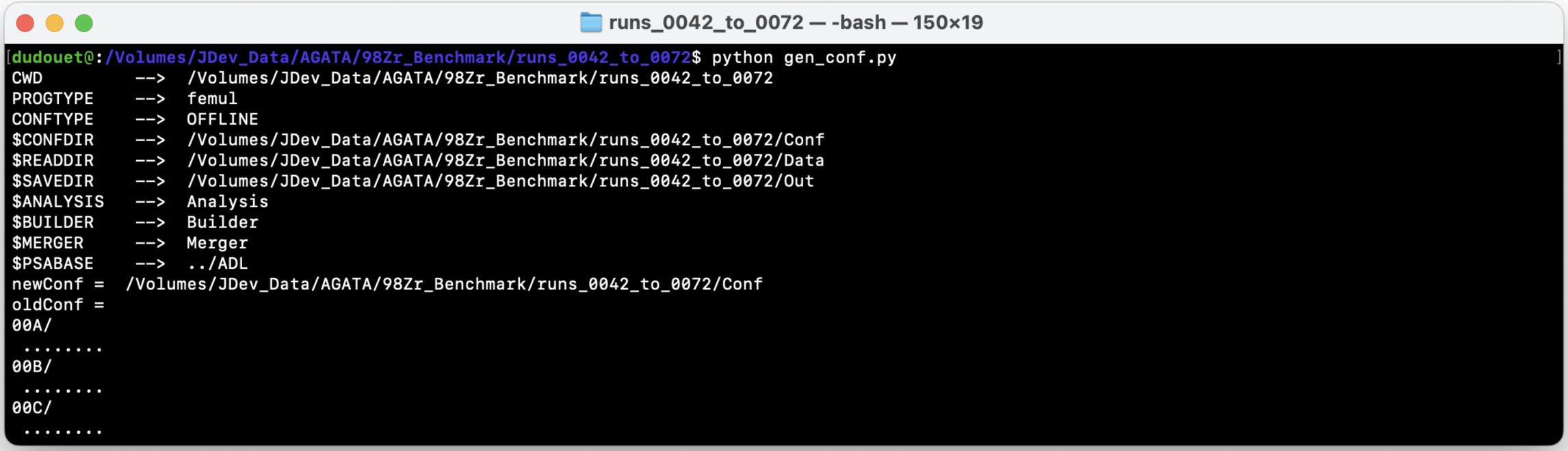
gen_conf.py — run_0018

```
447
448
449 TreeBuilder=(
450 "ActualClass    TreeBuilder",                                    # name of the used daugther 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 TB_SPIDER=(
474 "ConfPath       $CONFDIR/spider",              #Path to Prisma configuration files
475 "WriteRawTree",                                #Store the raw data in the output Tree (default 1)
476 "WriteAnaTree",                                #Store the analyzed data in the output Tree (default 1)
477 #"Verbose",                                    # Print warnings in the processing
478 )
479
480 TB_EUCLIDES=(
```

Line: 466:49 Python Soft Tabs: 4

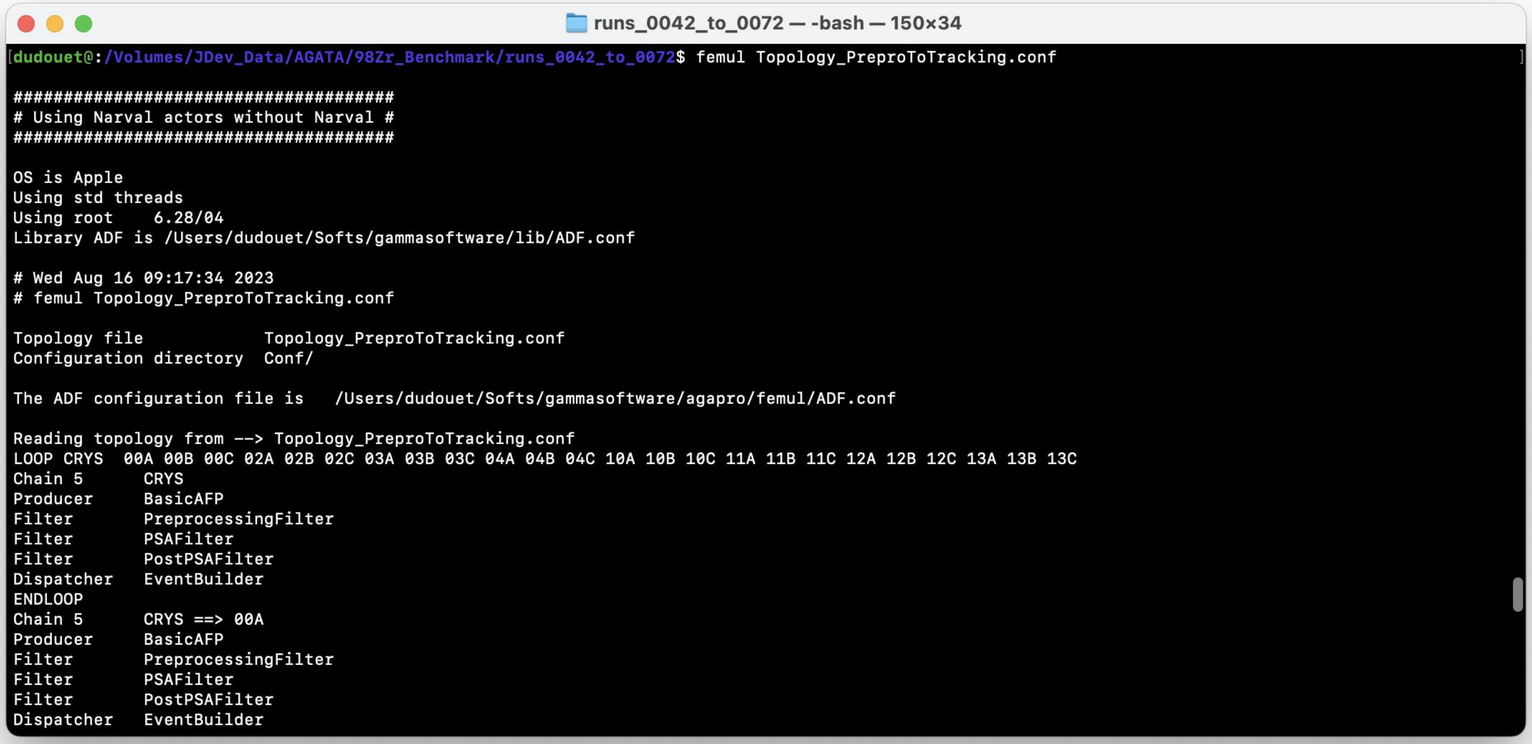
The gen_conf.py script

- **Once all is configured: script execution: "*python gen_conf.py*"**



The gen_conf.py script

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



- 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*"