



# Activities Report

## Service Task

### *“DCS Archive Simulator”*

Juan Carlos Cabanillas N.

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# General Features of the Simulation

- Two types of simulations are defined:
  - ALICE Detectors Run: Specifying the DPs number by type in each detector.
  - General Run: Entering a specific number of DPEs by type with no detectors defined.

# General Features of the Simulation

- ALICE detectors included in the simulation:

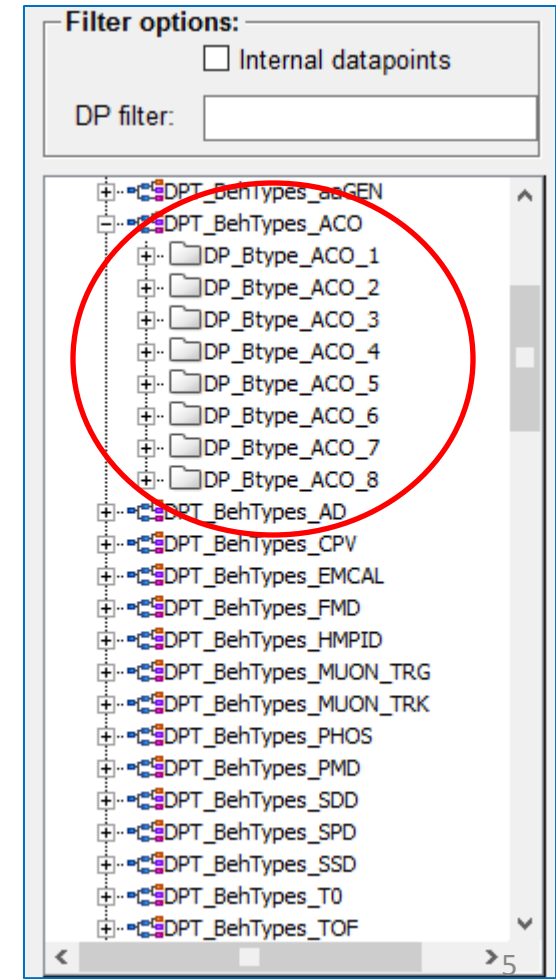
ALICE detectors		
ACO	MUON TRK	TOF
AD	PHOS	TRD
CPV	PMD	TPC
EMCAL	SSD	V0
FMD	SPD	ZDC
HMPID	SDD	
MUON TRG	T0	

# Creation, definition and initialization of the DPT, DP and DPI behavior by type in a user panel

# Defining behavior conditions

Classification of the DPs by types according to the most common parameters used in the DCS

Description of the DPs types	DPs
HV Voltage	DP_Btype_DET_* <sub>1</sub>
HV Current	DP_Btype_DET_2
LV Voltage	DP_Btype_DET_3
LV Current	DP_Btype_DET_4
Temperature sensors	DP_Btype_DET_5
Pressure Sensors	DP_Btype_DET_6
Electronic Value 1	DP_Btype_DET_7
Electronic Value 2	DP_Btype_DET_8

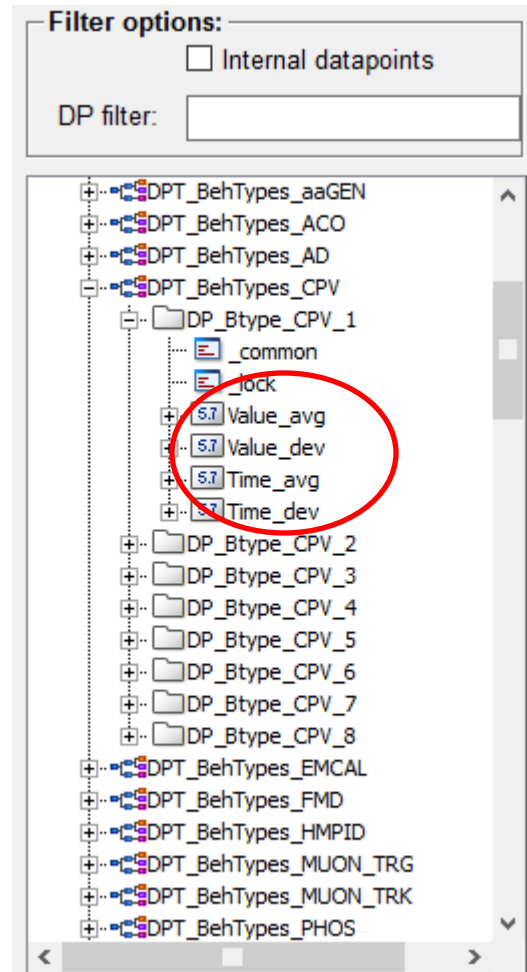


\* **DET**: Code of the detector name o general run (19 detector and one general run without defining any detector)

# Defining behavior conditions

Parameters to define behavior conditions of the DPs of each type:

Parameters of behavior conditions	DPEs
<i>Average nominal value of the DPs types</i>	Value_avg
<i>Percentage of deviation of the nominal value</i>	Value_dev
<i>Average time of sending to the DCS archiving</i>	Time_avg
<i>Percentage of deviation of the sending time to the DCS archiving</i>	Time_dev



# Defining behavior conditions

## Data Point Types (DPT)

- **DPT\_BehTypes\_DET** (*Behavior panel*) => **DPT**

**DP:**

DP\_Btype\_DET<sup>\*</sup>\_1  
.  
.  
.  
DP\_Btype\_DET<sup>\*</sup>\_8

**DPE:**

Value\_avg  
Value\_dev  
Time\_avg  
Time\_dev

\* **DET**: Code of the detector name o general run

DPTs/DPs/DPEs to define the behavior of the ACORDE Detector in the simulation

**DPT\_BehTypes\_ACO**

\*\*Each DET has its own configurable behavior parameters

- DP\_Btype\_ACO\_1
- DP\_Btype\_ACO\_2
- DP\_Btype\_ACO\_3
- DP\_Btype\_ACO\_4
- DP\_Btype\_ACO\_5
- .
- .
- .
- DP\_Btype\_ACO\_8

Value\_avg  
Value\_dev  
Time\_avg  
Time\_dev

Value\_avg  
Value\_dev  
Time\_avg  
Time\_dev

Value\_avg  
Value\_dev  
Time\_avg  
Time\_dev

Value\_avg  
Value\_dev  
Time\_avg  
Time\_dev

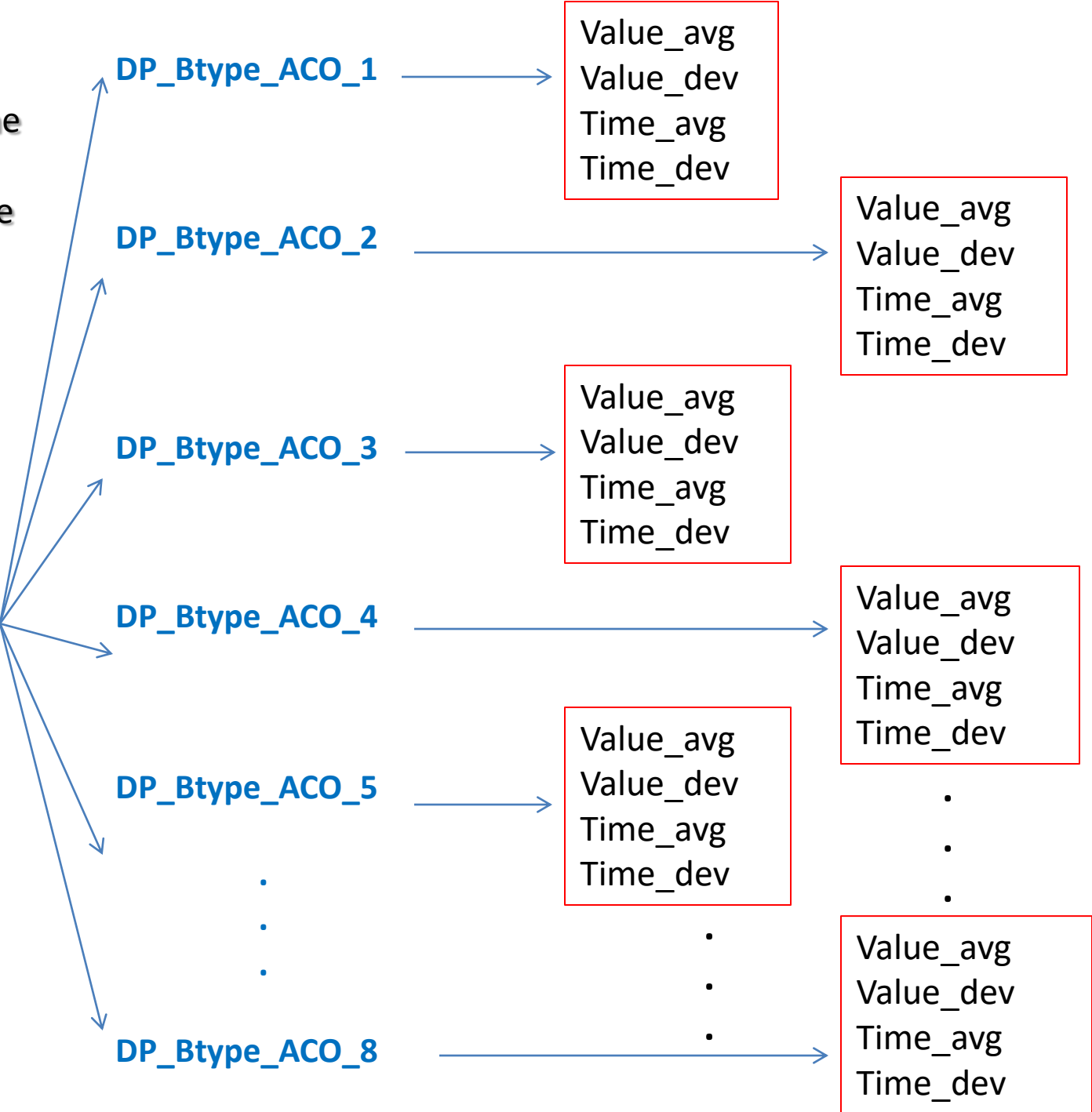
Value\_avg  
Value\_dev  
Time\_avg  
Time\_dev

.

.

.

Value\_avg  
Value\_dev  
Time\_avg  
Time\_dev





# Entering the behavior conditions using a user interface (General Run)

**Simulator Main User Panel**

**Detectors**

- ACO
- AD
- CPV
- EMCAL
- FMD
- HMPID
- MUON TRG
- MUON TRK
- PHOS
- PMD
- SSD
- SPD
- SDD
- T0
- TOF
- TRD
- TPC
- V0
- ZDC

**DPs Types**

Voltage (HV)	10
Current (HV)	10
Voltage (LV)	10
Current (HV)	10
Temperature Sensors	10
Pressure Sensors	10
Electronic Value 1	10
Electronic Value 2	10

**Simulation Type**

Detector by detector  Direct

**Number of DPs**

Assign values per detector


Assign general values

**DET Conditions**

**GEN Conditions**

**Number of DCS Archiving**

**Trending plot**



1. Click in the GEN Conditions button to open the behavior conditions panel

# Entering the behavior conditions using a user interface (General Run)

2. Update the nominal values and/or sending time to the DCS archiving of the DP's by Type

DETECTOR:  *Behavior Definition Panel*

DPs Types	DPs Average Value				Average Period of sending to the DCS Archive			
	Value		Deviation [%]		Time [sec]		Deviation [%]	
Voltage - HV	<input type="text" value="1000"/>	V <input type="button" value="OK"/>	<input type="text" value="1"/>	<input type="button" value="OK"/>	<input type="text" value="20"/>	<input type="button" value="OK"/>	<input type="text" value="0.05"/>	<input type="button" value="OK"/>
Current - HV	<input type="text" value="200"/>	uA <input type="button" value="OK"/>	<input type="text" value="0.5"/>	<input type="button" value="OK"/>	<input type="text" value="15"/>	<input type="button" value="OK"/>	<input type="text" value="0.06"/>	<input type="button" value="OK"/>
Voltage - LV	<input type="text" value="6"/>	V <input type="button" value="OK"/>	<input type="text" value="0.6"/>	<input type="button" value="OK"/>	<input type="text" value="8"/>	<input type="button" value="OK"/>	<input type="text" value="0.02"/>	<input type="button" value="OK"/>
Current - LV	<input type="text" value="100"/>	mA <input type="button" value="OK"/>	<input type="text" value="0.1"/>	<input type="button" value="OK"/>	<input type="text" value="5"/>	<input type="button" value="OK"/>	<input type="text" value="0.03"/>	<input type="button" value="OK"/>
Temperature Sensors	<input type="text" value="35"/>	°C <input type="button" value="OK"/>	<input type="text" value="0.2"/>	<input type="button" value="OK"/>	<input type="text" value="10"/>	<input type="button" value="OK"/>	<input type="text" value="0.2"/>	<input type="button" value="OK"/>
Pressure Sensors	<input type="text" value="50"/>	Pa <input type="button" value="OK"/>	<input type="text" value="0.5"/>	<input type="button" value="OK"/>	<input type="text" value="2"/>	<input type="button" value="OK"/>	<input type="text" value="0.5"/>	<input type="button" value="OK"/>
Electronic Value 1	<input type="text" value="0"/>	Bit <input type="button" value="OK"/>			<input type="text" value="15"/>	<input type="button" value="OK"/>	<input type="text" value="2"/>	<input type="button" value="OK"/>
Electronic Value 2	<input type="text" value="0"/>	Bit <input type="button" value="OK"/>			<input type="text" value="20"/>	<input type="button" value="OK"/>	<input type="text" value="5"/>	<input type="button" value="OK"/>

# Entering the behavior conditions using a user interface (General Run)

3. Press the OK button to enter new values

DETECTOR:  *Behavior Definition Panel*

DPs Types	DPs Average Value				Average Period of sending to the DCS Archive			
	Value		Deviation [%]		Time [sec]		Deviation [%]	
Voltage - HV	<input type="text" value="1000"/>	V	<input type="text" value="1"/>	OK	<input type="text" value="20"/>	OK	<input type="text" value="0.05"/>	OK
Current - HV	<input type="text" value="200"/>	uA	<input type="text" value="0.5"/>	OK	<input type="text" value="15"/>	OK	<input type="text" value="0.06"/>	OK
Voltage - LV	<input type="text" value="6"/>	V	<input type="text" value="0.6"/>	OK	<input type="text" value="8"/>	OK	<input type="text" value="0.02"/>	OK
Current - LV	<input type="text" value="100"/>	mA	<input type="text" value="0.1"/>	OK	<input type="text" value="5"/>	OK	<input type="text" value="0.03"/>	OK
Temperature Sensors	<input type="text" value="35"/>	°C	<input type="text" value="0.2"/>	OK	<input type="text" value="10"/>	OK	<input type="text" value="0.2"/>	OK
Pressure Sensors	<input type="text" value="50"/>	Pa	<input type="text" value="0.5"/>	OK	<input type="text" value="2"/>	OK	<input type="text" value="0.5"/>	OK
Electronic Value 1	<input type="text" value="0"/>	Bit		OK	<input type="text" value="15"/>	OK	<input type="text" value="2"/>	OK
Electronic Value 2	<input type="text" value="0"/>	Bit		OK	<input type="text" value="20"/>	OK	<input type="text" value="5"/>	OK

4. Press the Close Panel button to finish

# Entering the behavior conditions using a user interface (Detectors)

1. Select a detector in the Radiobox menu

**Simulator Main User Panel**

**Detectors**

- ACO
- AD
- CPV
- EMCAL
- FMD
- HMPID
- MUON TRG
- MUON TRK
- PHOS
- PMD
- SSD
- SPD
- SDD
- T0
- TOF
- TRD
- TPC
- V0
- ZDC

**DPs Types**

Voltage (HV)	10
Current (HV)	10
Voltage (LV)	10
Current (HV)	10
Temperature Sensors	10
Pressure Sensors	10
Electronic Value 1	10
Electronic Value 2	10

**Simulation Type**

- Detector by detector
- Direct

**Number of DPs**

Assign values per detector

Assign general values

**DET Conditions**  **GEN Conditions**

**Number of DCS Archiving**

**Trending plot**

2. Click in the DET Conditions button to open the behavior conditions panel of the selected detector

# Entering the behavior conditions using a user interface (Detectors)

DETECTOR:  *Behavior Definition Panel*

DPs Types	DPs Average Value				Average Period of sending to the DCS Archive			
	Value		Deviation [%]		Time [sec]		Deviation [%]	
Voltage - HV	<input type="text" value="1000"/>	<input type="text" value="v"/> <input type="button" value="OK"/>	<input type="text" value="1"/>	<input type="button" value="OK"/>	<input type="text" value="20"/>	<input type="button" value="OK"/>	<input type="text" value="0.05"/>	<input type="button" value="OK"/>
Current - HV	<input type="text" value="200"/>	<input type="text" value="uA"/> <input type="button" value="OK"/>	<input type="text" value="0.5"/>	<input type="button" value="OK"/>	<input type="text" value="15"/>	<input type="button" value="OK"/>	<input type="text" value="0.06"/>	<input type="button" value="OK"/>
Voltage - LV	<input type="text" value="6"/>	<input type="text" value="v"/> <input type="button" value="OK"/>	<input type="text" value="0.6"/>	<input type="button" value="OK"/>	<input type="text" value="8"/>	<input type="button" value="OK"/>	<input type="text" value="0.02"/>	<input type="button" value="OK"/>
Current - LV	<input type="text" value="100"/>	<input type="text" value="mA"/> <input type="button" value="OK"/>	<input type="text" value="0.1"/>	<input type="button" value="OK"/>	<input type="text" value="5"/>	<input type="button" value="OK"/>	<input type="text" value="0.03"/>	<input type="button" value="OK"/>
Temperature Sensor	<input type="text" value="35"/>	<input type="text" value="°C"/> <input type="button" value="OK"/>	<input type="text" value="0.2"/>	<input type="button" value="OK"/>	<input type="text" value="10"/>	<input type="button" value="OK"/>	<input type="text" value="0.2"/>	<input type="button" value="OK"/>
Pressure Sensor	<input type="text" value="50"/>	<input type="text" value="°C"/> <input type="button" value="OK"/>	<input type="text" value="0.5"/>	<input type="button" value="OK"/>	<input type="text" value="2"/>	<input type="button" value="OK"/>	<input type="text" value="0.5"/>	<input type="button" value="OK"/>
Electronic Value 1	<input type="text" value="0"/>	<input type="text" value="Bit"/> <input type="button" value="OK"/>			<input type="text" value="15"/>	<input type="button" value="OK"/>	<input type="text" value="2"/>	<input type="button" value="OK"/>
Electronic Value 2	<input type="text" value="0"/>	<input type="text" value="Bit"/> <input type="button" value="OK"/>			<input type="text" value="20"/>	<input type="button" value="OK"/>	<input type="text" value="5"/>	<input type="button" value="OK"/>

**3. Update the nominal values and/or sending time to the DCS archiving of the DP's by Type**

# Entering the behavior conditions using a user interface (Detectors)

3. Press the OK button to enter new values

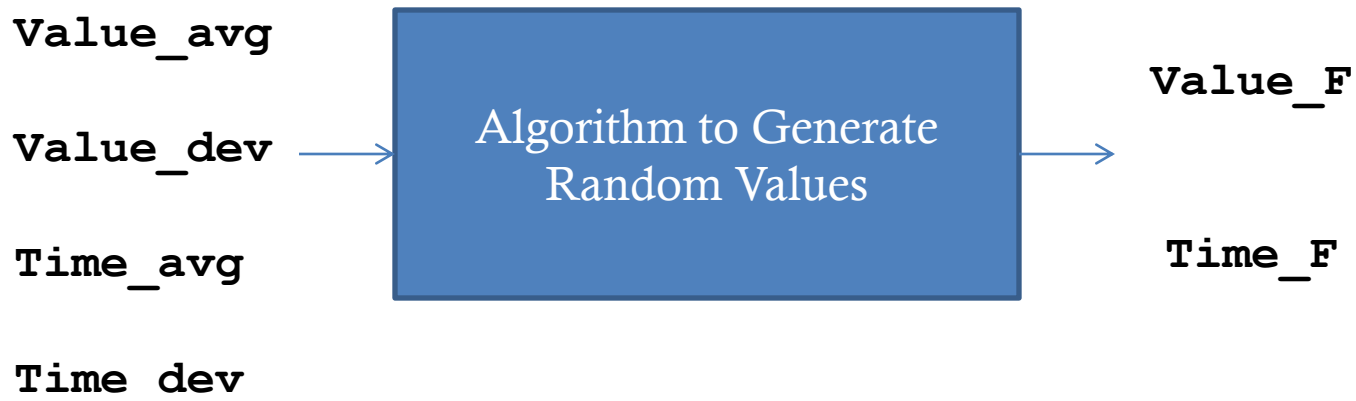
DETECTOR:  Behavior Definition Panel

DPs Types	DPs Average Value				Average Period of sending to the DCS Archive			
	Value		Deviation [%]		Time [sec]		Deviation [%]	
Voltage - HV	<input type="text" value="1000"/>	V <input type="button" value="OK"/>	<input type="text" value="1"/>	<input type="button" value="OK"/>	<input type="text" value="20"/>	<input type="button" value="OK"/>	<input type="text" value="0.05"/>	<input type="button" value="OK"/>
Current - HV	<input type="text" value="200"/>	uA <input type="button" value="OK"/>	<input type="text" value="0.5"/>	<input type="button" value="OK"/>	<input type="text" value="15"/>	<input type="button" value="OK"/>	<input type="text" value="0.06"/>	<input type="button" value="OK"/>
Voltage - LV	<input type="text" value="6"/>	V <input type="button" value="OK"/>	<input type="text" value="0.6"/>	<input type="button" value="OK"/>	<input type="text" value="8"/>	<input type="button" value="OK"/>	<input type="text" value="0.02"/>	<input type="button" value="OK"/>
Current - LV	<input type="text" value="100"/>	mA <input type="button" value="OK"/>	<input type="text" value="0.1"/>	<input type="button" value="OK"/>	<input type="text" value="5"/>	<input type="button" value="OK"/>	<input type="text" value="0.03"/>	<input type="button" value="OK"/>
Temperature Sensor	<input type="text" value="35"/>	°C <input type="button" value="OK"/>	<input type="text" value="0.2"/>	<input type="button" value="OK"/>	<input type="text" value="10"/>	<input type="button" value="OK"/>	<input type="text" value="0.2"/>	<input type="button" value="OK"/>
Pressure Sensor	<input type="text" value="50"/>	°C <input type="button" value="OK"/>	<input type="text" value="0.5"/>	<input type="button" value="OK"/>	<input type="text" value="2"/>	<input type="button" value="OK"/>	<input type="text" value="0.5"/>	<input type="button" value="OK"/>
Electronic Value 1	<input type="text" value="0"/>	Bit <input type="button" value="OK"/>			<input type="text" value="15"/>	<input type="button" value="OK"/>	<input type="text" value="2"/>	<input type="button" value="OK"/>
Electronic Value 2	<input type="text" value="0"/>	Bit <input type="button" value="OK"/>			<input type="text" value="20"/>	<input type="button" value="OK"/>	<input type="text" value="5"/>	<input type="button" value="OK"/>

4. Press the Close Panel button to finish

# Algorithm to generate random values using behavior conditions parameters

- A nominal function to generate random nominal values (**Value\_F**) and random times (**Time\_F**) for the DPs Types was developed using:
  - *Average nominal values of the DPEs types (Value\_avg) and their deviations (Value\_dev)*
  - *Average time of sending to the DCS archiving (Time\_avg) and their deviations (Time\_dev).*



# Creation, definition and initialization of the number of DP's by type in a user panel



# Entering the DPEs Number by type (General Run)

1. Define the number of DP's for the  
detector

Simulator Main User Panel

**Detectors**

- ACO
- AD
- CPV
- EMCAL
- FMD
- HMPID
- MUON TRG
- MUON TRK
- PHOS
- PMD
- SSD
- SPD
- SDD
- T0
- TOF
- TRD
- TPC
- V0
- ZDC

**DPs Types**

Voltage (HV)	10
Current (HV)	10
Voltage (LV)	10
Current (HV)	10
Temperature Sensors	10
Pressure Sensors	10
Electronic Value 1	10
Electronic Value 2	10

**Simulation Type**

Detector by detector

Direct

**Number of DPs**

Assign values per detector


Assign general values

**DET Conditions**

**GEN Conditions**

**Number of DCS Archiving**

**Trending plot**



2. Press the  
Confirmation  
button to  
enter the  
new number  
of DPs values  
for each type

# Entering the DPEs Number by type (Detectors)

2. Define the number of DP's for each type of the general run

1. Select the detector of the Radiobox menu

The image shows a software interface titled "Simulator Main User Panel". It is divided into several sections:

- Detectors:** A vertical list of detector types with radio buttons. The "ACO" option is selected. This section is circled in red.
- DPEs Types:** A table with 10 rows, each representing a detector type and its corresponding DP count. The counts are all set to "10". This section is also circled in red.
- Number of DPs:** Two panels for assigning values per detector and general values, each with a "CONFIRMATION" button.
- DET Conditions:** A panel with an "OPEN" button.
- GEN Conditions:** A panel with an "OPEN" button.
- Simulation Type:** Two radio buttons: "Detector by detector" (selected) and "Direct". A "START SIMULATION" button is located below.
- Number of DCS Archiving:** A large empty rectangular box.
- Trending plot:** A small icon of a graph with a red line.
- CLOSE PANEL:** A button at the bottom center.

Annotations include a purple arrow pointing to the "Detectors" list and another purple arrow pointing to the "DPEs Types" table.

DPs Types	Value
Voltage (HV)	10
Current (HV)	10
Voltage (LV)	10
Current (HV)	10
Temperature Sensors	10
Pressure Sensors	10
Electronic Value 1	10
Electronic Value 2	10

# Entering the Number of DP's by type (Detectors)

**Simulator Main User Panel**

**Detectors**

- ACO
- AD
- CPV
- EMCAL
- FMD
- HMPID
- MUON TRG
- MUON TRK
- PHOS
- PMD
- SSD
- SPV
- SDD
- T0
- TOF
- TRD
- TPC
- V0
- ZDC

**DPs Types**

Voltage (HV)	<input type="text" value="10"/>
Current (HV)	<input type="text" value="10"/>
Voltage (LV)	<input type="text" value="10"/>
Current (HV)	<input type="text" value="10"/>
Temperature Sensors	<input type="text" value="10"/>
Pressure Sensors	<input type="text" value="10"/>
Electronic Value 1	<input type="text" value="10"/>
Electronic Value 2	<input type="text" value="10"/>

**Simulation Type**

Detector by detector

Direct

**Number of DPs**

Assign values per detector


Assign general values

**DET Conditions**

**GEN Conditions**

**Number of DCS Archiving**

**Trending plot**



**3. Press the Confirmation button to enter the new number of DPs values for each type**

**NOTE:** Repeat last three steps again if you to change the number of DP's by type of other detector.

# Entering the Number of DP's by type

## Data Point Types (DPT)

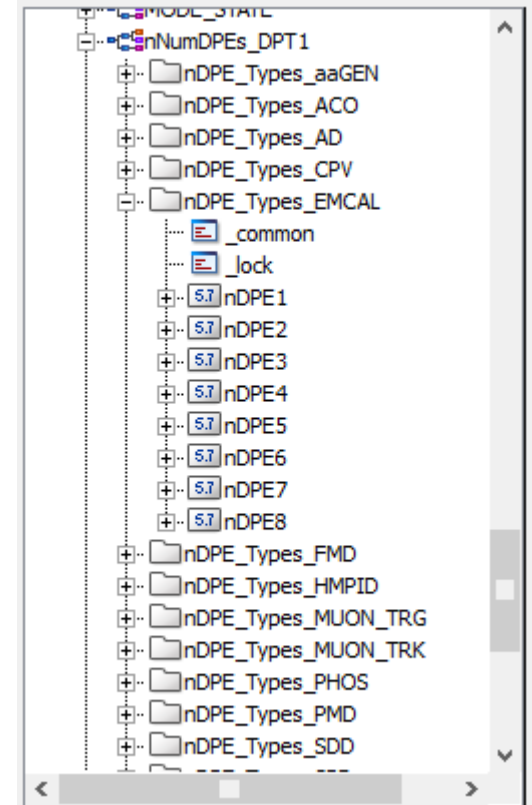
- **nNumDPEs\_DPT1** ( *Main panel* ) => **DPT**

**DP:**

nDPE\_Types\_aaGEN  
nDPE\_Types\_ACO  
.  
.  
.  
nDPE\_Types\_ZDC

**DPE:**

nDPE1  
.  
.  
.  
nDPE8



Number of DPs for the  
different types in the  
ACO detector  
simulation

**nDPE\_Types\_ACO**

**nDPE1**  
(M-elements)

DPE\_ACO\_1  
...  
DPE\_ACO\_M

**nDPE2**  
(N-elements)

DPE\_ACO\_1  
...  
DPE\_ACO\_N

**nDPE3**  
(O-elements)

DPE\_ACO\_1  
...  
DPE\_ACO\_O

**nDPE4**  
(P-elements)

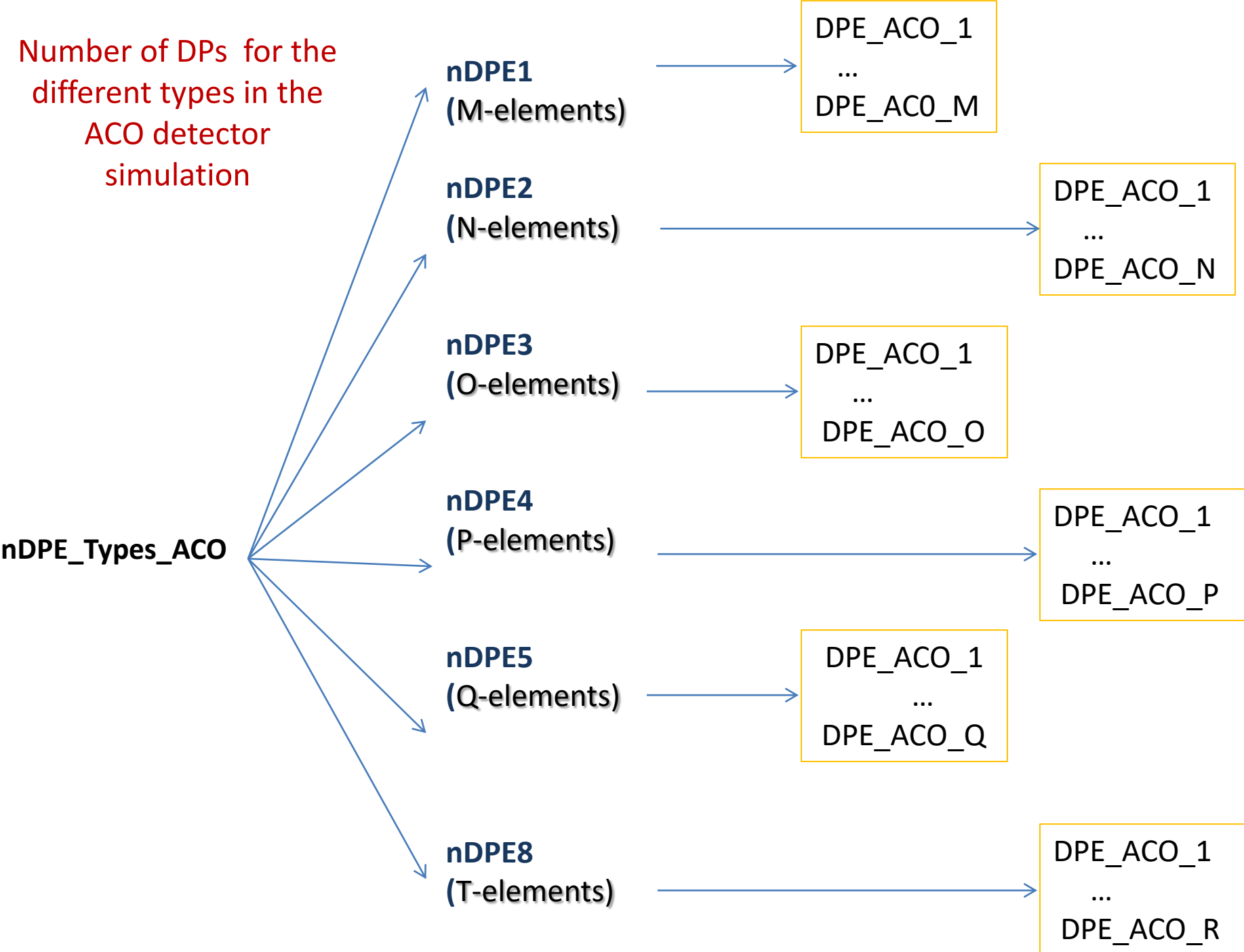
DPE\_ACO\_1  
...  
DPE\_ACO\_P

**nDPE5**  
(Q-elements)

DPE\_ACO\_1  
...  
DPE\_ACO\_Q

**nDPE8**  
(T-elements)

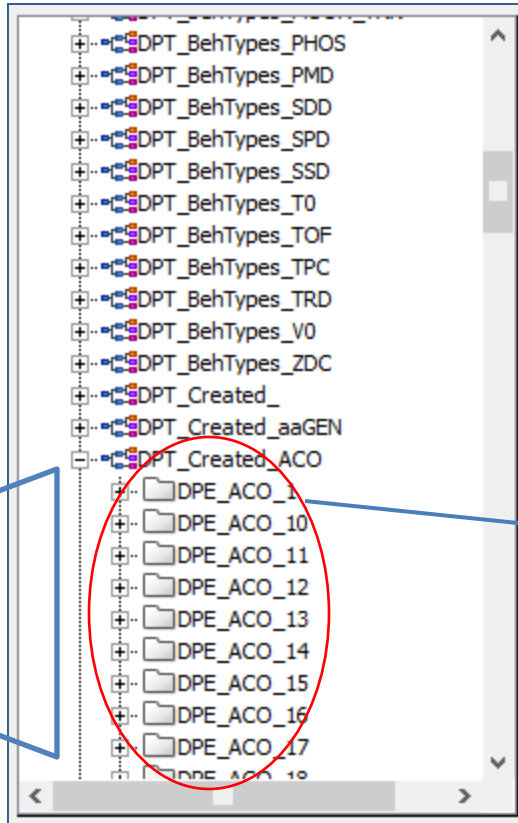
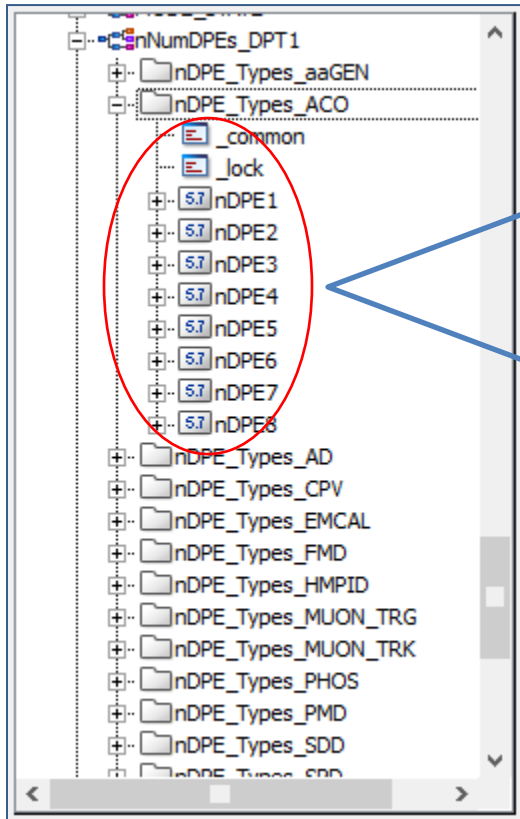
DPE\_ACO\_1  
...  
DPE\_ACO\_R



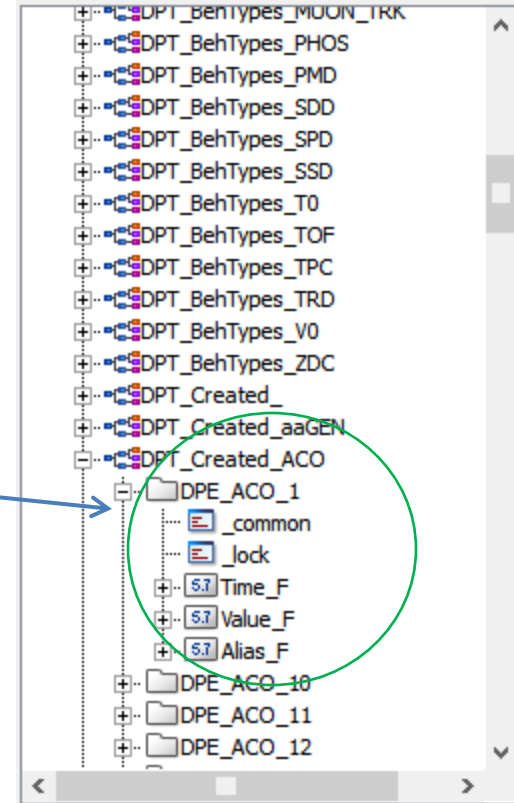
# Entering the DPEs Number by type

- Examples of generated DPs / DPEs for simulation in WinCC OA:

Number of DPs defined for type in a detector



Number of DPs created for the simulation of a detector

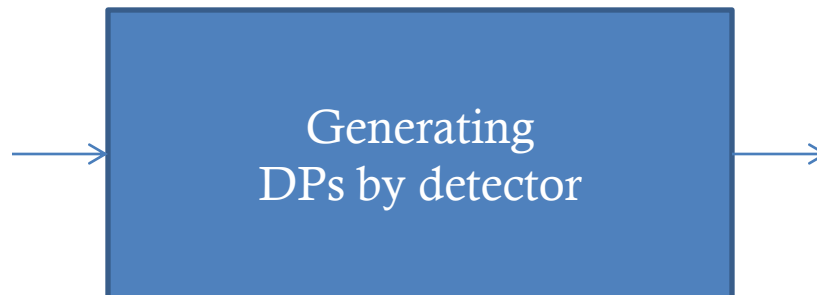


Elements of a DP detector

# Algorithm to generate DPEs by detector

- Develop a function to add the following elements to the DP's:
  - Alias
  - Random nominal value (**Value\_F**)
  - Random time value (**Time\_F**)

Tipo DPE  
nDPE  
Value\_F  
Time\_F  
DET\_name



Alias: DET\_###  
Value\_F  
Time\_F

# Starting a Simulation



# Starting a Simulation (General Run)

**Simulator Main User Panel**

**Detectors**

- ACO
- AD
- CPV
- EMCAL
- FMD
- HMPID
- MUON TRG
- MUON TRK
- PHOS
- PMD
- SSD
- SPD
- SDD
- T0
- TOF
- TRD
- TPC
- V0
- ZDC

**DPs Types**

Voltage (HV)	10
Current (HV)	10
Voltage (LV)	10
Current (HV)	10
Temperature Sensors	10
Pressure Sensors	10
Electronic Value 1	10
Electronic Value 2	10

**Simulation Type**

Detector by detector

Direct

**Number of DPs**

Assign values per detector

Assign general values

**DET Conditions**

**GEN Conditions**

**Number of DCS Archiving**

**Trending plot**

1. Select the simulation type in the Radiobox menu
  - a) Using detectors
  - b) Direct (General Run)

2. Click the Start Simulation Button

# Starting a Simulation (General Run)

**Manage Plots and Pages**

Create New Page/Plot

Trending Page

Page/Plot Data Point Name	Page/Plot Title	Type	Model
dist_155:DCS_ARCHIVE_GEN	DCS ARCHIVING GEN	Trending Plot	Value over time
dist_155:DCS_ARCHIVE_ACO	DCS ARCHIVING ACO	Trending Plot	Value over time
dist_155:DCS_ARCHIVE_AD	DCS ARCHIVING AD	Trending Plot	Value over time
dist_155:DCS_ARCHIVE_CPV	DCS ARCHIVING CPV	Trending Plot	Value over time
dist_155:DCS_ARCHIVE_EMCAL	DCS ARCHIVING EMCAL	Trending Plot	Value over time
dist_155:DCS_ARCHIVE_FMD	DCS ARCHIVING FMD	Trending Plot	Value over time
dist_155:DCS_ARCHIVE_HMPID	DCS ARCHIVING HMPID	Trending Plot	Value over time
dist_155:DCS_ARCHIVE_MUON_TRK	DCS ARCHIVING MUON TRK	Trending Plot	Value over time
dist_155:DCS_ARCHIVE_MUON_TRG	DCS ARCHIVING MUON TRG	Trending Plot	Value over time
dist_155:DCS_ARCHIVE_PHOS	DCS ARCHIVING PHOS	Trending Plot	Value over time
dist_155:DCS_ARCHIVE_PMD	DCS ARCHIVING PMD	Trending Plot	Value over time

Filter

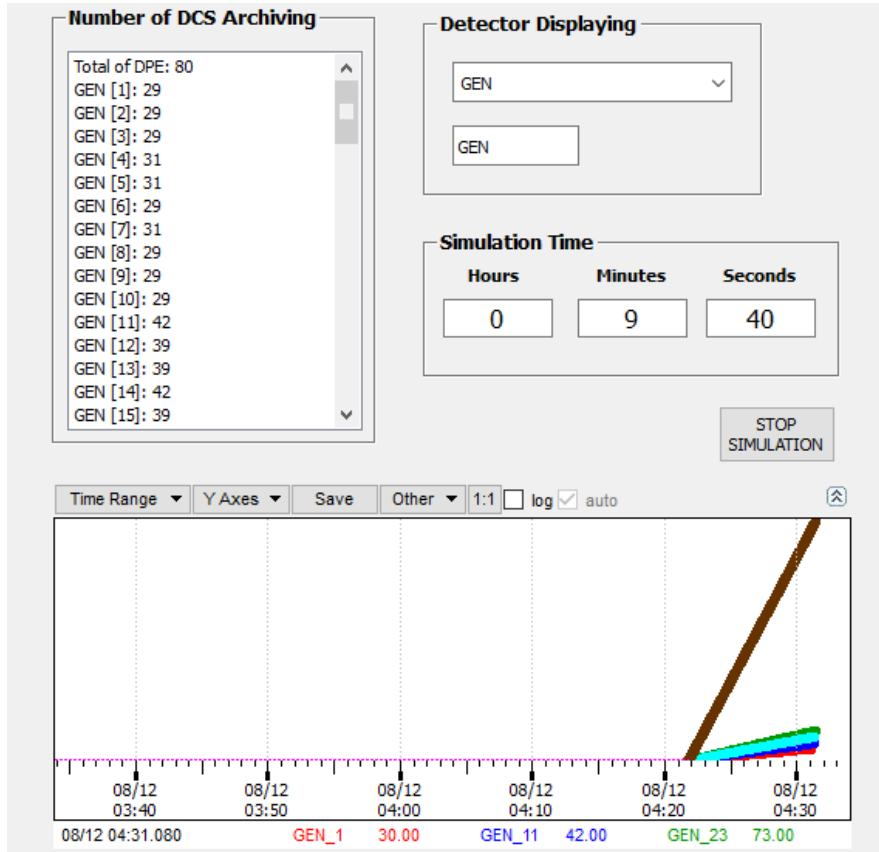
Page/Plot Dp Name:  Page/Plot Title:  Type:

Before a run is necessary to selected a detector/general to display in the trending plot from Manages Plots and Pages (JCOP Framework Trending Tool).

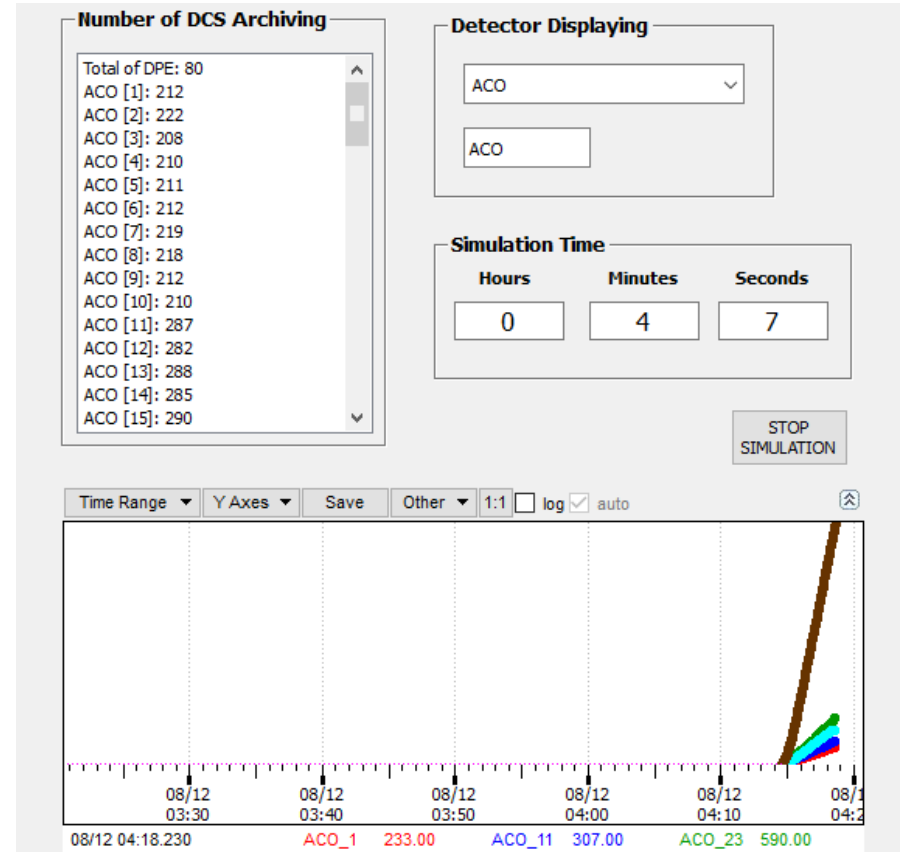
# Results Panel

# Results Panel

After the run simulation has begun and all parameters have been initialized then the results panel appears



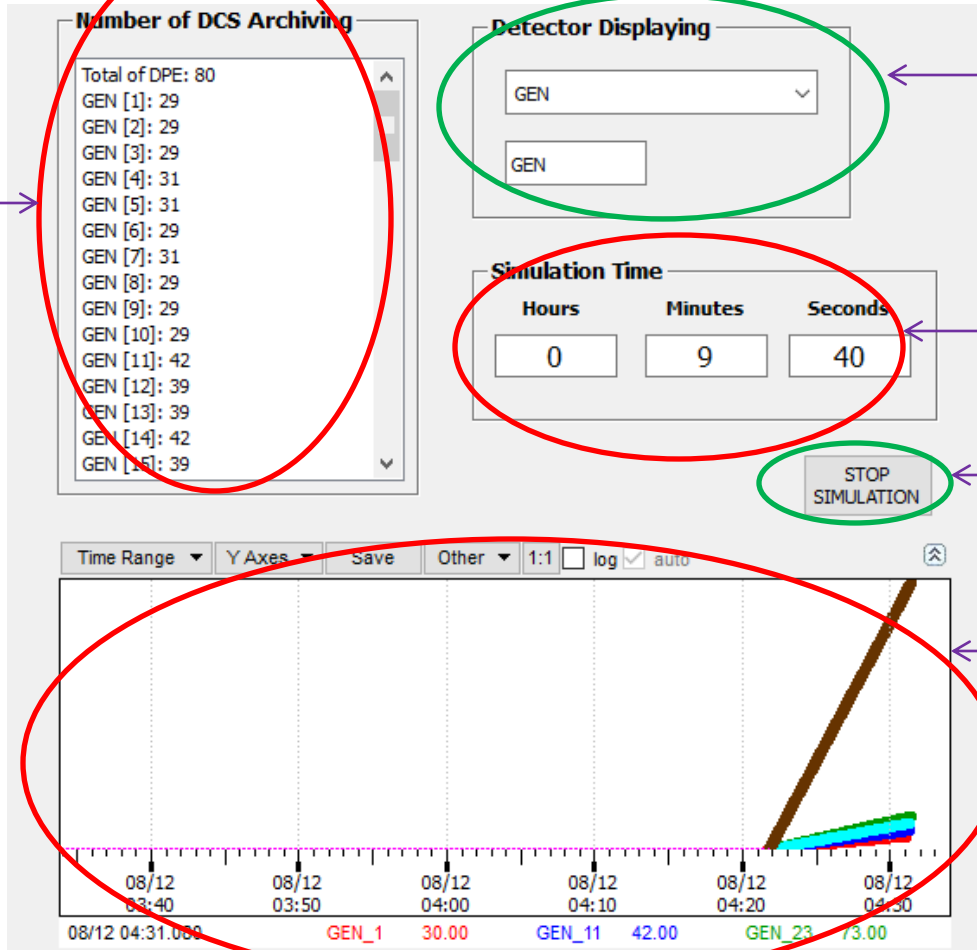
*Results panel for a general run simulation*



*Results panel for a run simulation considering detectors*

# Results Panel

Number of DPs sent to the DCS Archiving for a general run or a detector in specific



Show the selected detector or general run (GEN)

Simulation time for a run

Stop simulation button

Trending plot of the number of DPs sent to the DCS archiving for a selected detector or general run

# Results in the main panel

**Simulator Main User Panel**

**Detectors**

- ACO
- AD
- CPV
- EMCAL
- FMD
- HMPID
- MUON TRG
- MUON TRK
- PHOS
- PMD
- SSD
- SPD
- SDD
- T0
- TOF
- TRD
- TPC
- V0
- ZDC

**DPs Types**

Voltage (HV)	10
Current (HV)	10
Voltage (LV)	10
Current (HV)	10
Temperature Sensors	10
Pressure Sensors	10
Electronic Value 1	10
Electronic Value 2	10

**Simulation Type**

- Detector by detector
- Direct

**Number of DPs**

Assign values per detector

Assign general values

**DET Conditions**  **GEN Conditions**

**Number of DCS Archiving**

```
Total of DPE: 80
GEN [1]: 32
GEN [2]: 32
GEN [3]: 32
GEN [4]: 34
GEN [5]: 34
GEN [6]: 32
GEN [7]: 34
GEN [8]: 32
GEN [9]: 32
```

**Trending plot**

Click on the right mouse button over this list to display DCS archiving results too

Click on this plot button to display the selected trending plot