

## REST-for-Physics Framework

### 2.3 Accessing data in REST-for-Physics

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Any file generated by a REST-for-Physics event processing chain will contain a TRestRun instance.

The TRestRun instance provides basic run information, such as run time start/end, number of event entries registered, run type, run tag, input/output filenames, etc.

It provides access to the different metadata classes stored inside the file.

```
TRestRun::GetMetadata( name or classname)
```

It includes other helper methods to (for example) get a list of events that satisfy certain criteria.

```
TRestRun::GetEventEntriesWithConditions( condition)
```

It provides coherent access to the event and analysis tree entries.

```
TRestRun::GetEntry( n)
```

```
TRestRun::GetNextEntry()
```

```
TRestRun::GetEventWithID( id)
```

On top of that, TRestRun contains version metadata members as any other metadata class.

TRestEvent and TRestMetadata define common *virtual* methods that must be re-implemented in the inherited class.

This means that any event or any metadata class will have those public methods available.

Some of the methods that we will use during this lecture:

- **TRestEvent**
  - **PrintEvent:** Prints out on screen the contents of the active event.
  - **DrawEvent:** Draws in an existing canvas the event data.
  
- **TRestMetadata**
  - **PrintMetadata:** Prints out on screen the metadata values in a human readable fashion.

# Contents of a REST processed file

EventTree (TTree) for event storage

TRestRun object for run management

```

root [0] .ls
TFile**      R01185_00000_SignalToTrack_Ar2Iso_CalibWith9VetosFe55_cristina_2.3.4_vetoTh500_vetoTime190300.root
TFile*      R01185_00000_SignalToTrack_Ar2Iso_CalibWith9VetosFe55_cristina_2.3.4_vetoTh500_vetoTime190300.root
OBJ: TTree   EventTree          TRestTrackEventTree : 0 at: 0x55cfeccd0f80
OBJ: TRestAnalysisTree AnalysisTree REST Process Analysis Tree : 0 at: 0x55cfecf8f500
KEY: TRestRun IAXOD0-2021;2      IAXOD0 2021 data taking
KEY: TRestProcessRunner   Signals;1      Signal to track analysis
KEY: TRestDetectorSignalToHitsProcess signalToHits;1 A Signal To Hits reconstruction template.
KEY: TRestDetectorHitsAnalysisProcess hitsAna;1      Hits analysis template
KEY: TRestDetectorHitsGaussAnalysisProcess hitsAnaGauss;1 defaultTitle
KEY: TRestDetectorHitsToTrackProcess hitsToTrack;1
KEY: TRestTrackAnalysisProcess tckAna;1          Track analysis template
KEY: TTree   EventTree;1      TRestTrackEventTree
KEY: TRestAnalysisTree   AnalysisTree;1 REST Process Analysis Tree
KEY: TRestProcessRunner  RawSignals;1    Raw processing and analysis
KEY: TRestRawMultiFEMINOSToSignalProcess virtualDAQ;1 defaultTitle
KEY: TRestRawVetoAnalysisProcess veto;1    defaultTitle
KEY: TRestRawSignalAnalysisProcess sAna;1
KEY: TRestRawZeroSuppresionProcess zS;1
KEY: TRestDetectorSignalChannelActivityProcess crActivity;1 Channel activity process
KEY: TRestDetectorReadout iaxo_readout;2 IAXO-D0 readout 0.5 mm-Pitch 120+120 channels
root [1]
  
```

AnalysisTree (TRestAnalysisTree) for analysis observables

Analysis process metadata for traceability

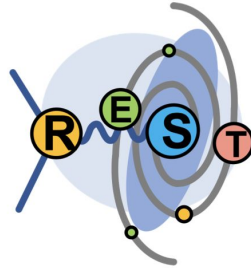
We will see in the next session more details about event data processing, but for now we need to quickly overview the following TRestProcessRunner event data storage options that affect the amount of data we will find in our output file.

**inputEventStorage (default:false):** If it is enabled the event data processing will not only store the last output event state, but it will also store all previous intermediate event states in the same output file.

**outputEventStorage (default:true):** If disabled, the output event will not be written to disk, as a consequence only the analysis tree will be available and no further event processing will be possible.

**eventsToProcess (default:0):** The maximum number of events to be processed. If 0 it will process all the events found in the input file.

```
<TRestProcessRunner name="RawSignals" title="Raw processing"
  <parameter name="eventsToProcess" value="100" />
  <parameter name="inputEventStorage" value="false" />
  <parameter name="outputEventStorage" value="true" />
```



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Time for exercises!

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