Overview of software activities

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X FOOT Collaboration Meeting

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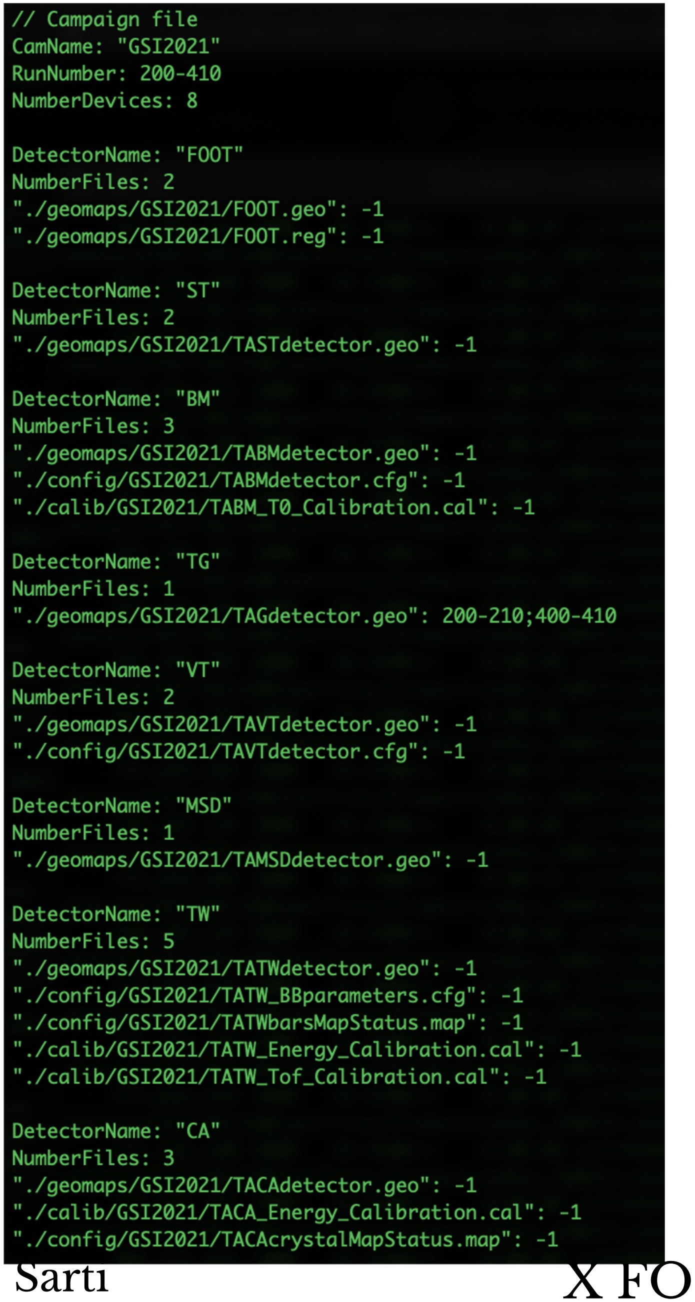
The last months..

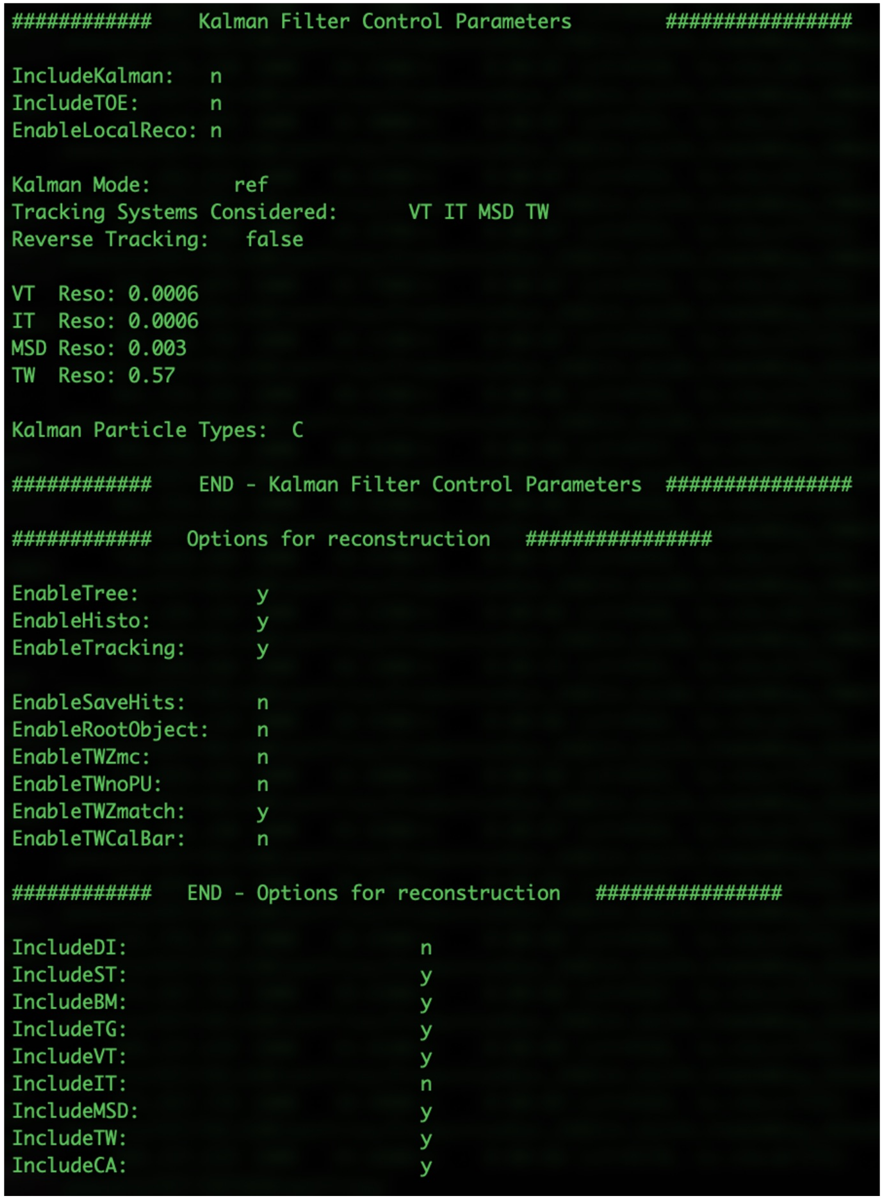
.. have been really busy! A global review of the framework was performed and the quality of the code significantly improved.

- The MC decoding has been fully integrated into the shoe framework saving decoding time and space, avoiding classes duplication and allowing a full review of the information propagation from MC to the ntuples.
- A campaign manager has been deployed to allow an easy handling of several different data and MC collections of events. The executables are now easily configured via the steering config files and an easy interface is provided to the experts in order to use different calibration files, detector configuration files and geometry conditions among the event collections of a given campaign.

An example..



```
// Campaign file
CamName: "GSI2021"
RunNumber: 200-410
NumberDevices: 8

DetectorName: "FOOT"
NumberFiles: 2
"./geomaps/GSI2021/FOOT.geo": -1
"./geomaps/GSI2021/FOOT.reg": -1

DetectorName: "ST"
NumberFiles: 2
"./geomaps/GSI2021/TASTdetector.geo": -1

DetectorName: "BM"
NumberFiles: 3
"./geomaps/GSI2021/TABMdetector.geo": -1
"./config/GSI2021/TABMdetector.cfg": -1
"./calib/GSI2021/TABM_T0_Calibration.cal": -1

DetectorName: "TG"
NumberFiles: 1
"./geomaps/GSI2021/TAGdetector.geo": 200-210;400-410

DetectorName: "VT"
NumberFiles: 2
"./geomaps/GSI2021/TAVTdetector.geo": -1
"./config/GSI2021/TAVTdetector.cfg": -1

DetectorName: "MSD"
NumberFiles: 1
"./geomaps/GSI2021/TAMSDdetector.geo": -1

DetectorName: "TW"
NumberFiles: 5
"./geomaps/GSI2021/TATWdetector.geo": -1
"./config/GSI2021/TATW_BBparameters.cfg": -1
"./config/GSI2021/TATWbarsMapStatus.map": -1
"./calib/GSI2021/TATW_Energy_Calibration.cal": -1
"./calib/GSI2021/TATW_Tof_Calibration.cal": -1

DetectorName: "CA"
NumberFiles: 3
"./geomaps/GSI2021/TACAdetector.geo": -1
"./calib/GSI2021/TACA_Energy_Calibration.cal": -1
"./config/GSI2021/TACAcrystalMapStatus.map": -1
```



```
############    Kalman Filter Control Parameters        ################

IncludeKalman:   n
IncludeTOE:      n
EnableLocalReco: n

Kalman Mode:        ref
Tracking Systems Considered:      VT IT MSD TW
Reverse Tracking:    false

VT  Reso: 0.0006
IT  Reso: 0.0006
MSD Reso: 0.003
TW  Reso: 0.57

Kalman Particle Types:  C

############    END - Kalman Filter Control Parameters  ################

############   Options for reconstruction   ################

EnableTree:          y
EnableHisto:         y
EnableTracking:      y

EnableSaveHits:      n
EnableRootObject:    n
EnableTWZmc:         n
EnableTWnoPU:        n
EnableTWZmatch:      y
EnableTWCalBar:      n

############   END - Options for reconstruction   ################

IncludeDI:                        n
IncludeST:                        y
IncludeBM:                        y
IncludeTG:                        y
IncludeVT:                        y
IncludeIT:                        n
IncludeMSD:                       y
IncludeTW:                        y
IncludeCA:                        y
```

The tutorial

The latest info on the software can be found in the latest software tutorial webpage. Here the 'newcomers' can find the info necessary to start to work with shoe.

Details on how to configure the different jobs to perform L0 and global reconstruction both on data and MC can be found here. The flexibility of shoe has been already useful for the TW and BM coding of standalone executables to be used for calibration purposes (CalibrateTof, CalibrateBm): the idea is to have a set of consistent libraries and conventions to avoid long debugging time when using input from standalone software..

Visualising our data and MC events is easy: you can see tutorial instructions for running the EventDisplay!

Ongoing work

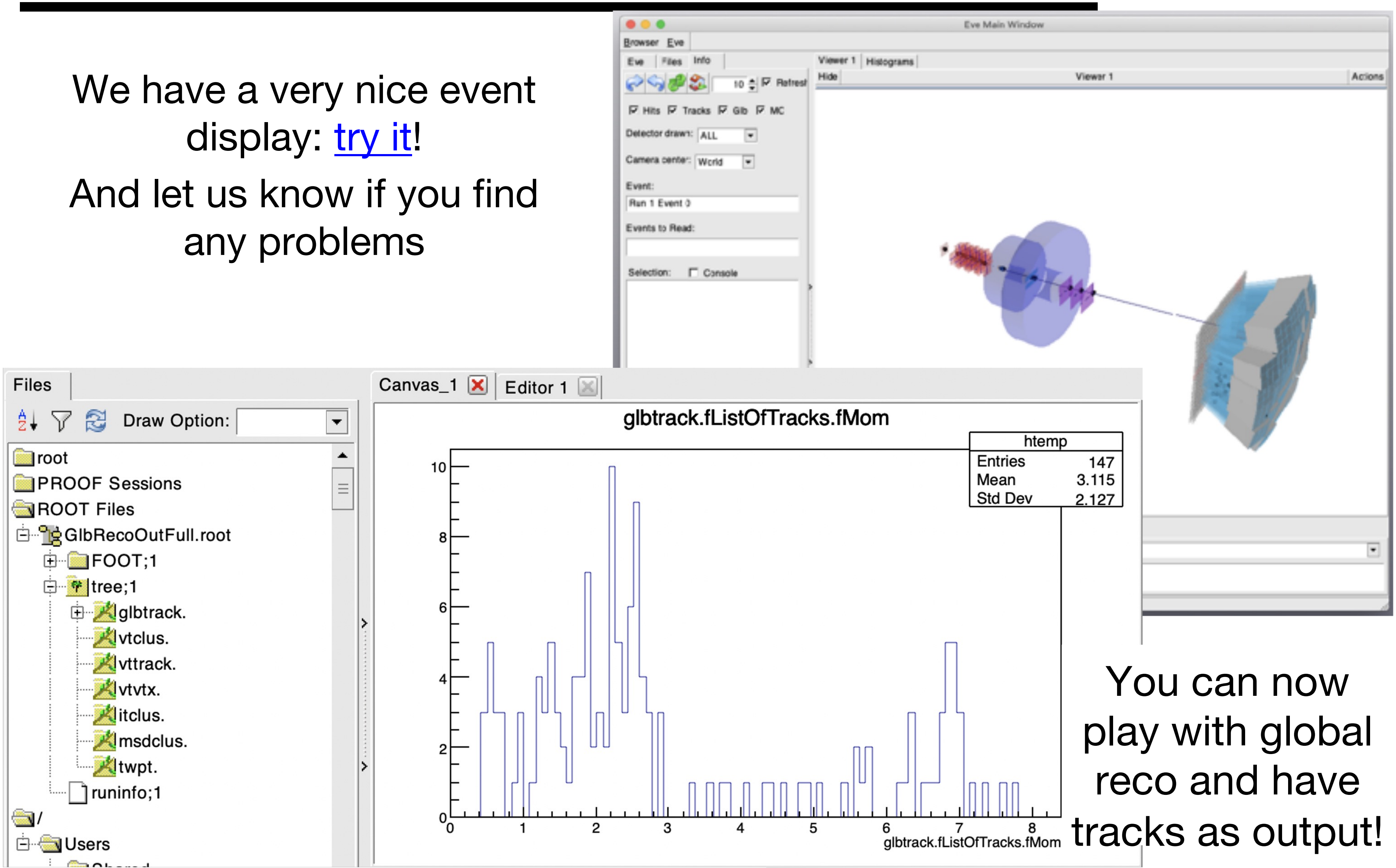
Improve documentation:

- It’s hard to understand what is available ‘navigating’ the classes. We still need to collect the input from the developers and prepare some documentation.
  - The twiki [http://arpg-serv.ing2.uniroma1.it/twiki/bin/view/Main/FOOTSoftware] and some slides will be made available during the summer…
- Finalise the integration of GenFit with shoe and integrate the two global reconstruction methods with a common track class to allow an easy and transparent switch among the fitting technologies for the users
- Finalise the coding of the global reco output storage and retrieval: all the info needed for the χ^2 and ALM algorithms needs to be provided to finalise the step of Direct and Inverse Cross Section calculations.

But … we are nearly there!

We have a very nice event display: try it!

And let us know if you find any problems



```
htemp
Entries      147
Mean       3.115
Std Dev    2.127
```

You can now play with global reco and have tracks as output!

A ‘final’ consideration

We’re approaching, finally, the interesting phase in which we will need a close cooperation btw the software team and the analysis one to discuss:

- priorities on algorithms to be explored (Ex: CALO clustering)
- which MC samples have to be produced and what are the tools needed to measure the efficiencies and tracking resolutions
- the cross section measurement strategy and the needed software tools to perform the unfolding, background subtraction, etc
- It is true even at this stage: you do not need to reinvent the wheel.. Let’s try to develop common tools..

Of course this does not means that we are getting rid of the needed redundancy in the cross section measurements. Independent attempts are always needed to X-chk the results..

What’s ahead of us..

.. the GSI data taking!

The challenge will be to provide a quasi-online feedback to the detector experts on the quality of the data we will be collecting.

To be prepared we are:

- Planning the decoding of data fragments collected using the latest DAQ implementation to check that the ‘modular’ decoding works just fine.
- Preparing the configuration and calibration files for the GSI2021 data taking: placeholder of what will be finalised during the test beam but is needed from ‘day 0’
- Preparing the histograms for the ‘quick’ checks that the expert will need and look at while taking data.

How this is going to happen

.. for sure the experts will have a direct control on each piece of info.. But what about putting everything together?

Expect to have a sftw meeting dedicated to the data taking @ end of june to review the overall status (decoding status, calibration tools, configs and mappings…) .

We will use the ‘new’ VIRGO cluster @ GSI.

- The code has been already ported there, compiles and runs. And we will be able to process ‘centrally’ the data in parallel on ~1k cores: it is important to ‘parallelise’ the data taking as much as possible. This means small runs that can be processed quickly.
- The processed files can be exported wherever it is needed.

Chris already provided the class to be used for a linear extrapolation from the VTX to the MSD and TW and CALO: tracking and evt display are ready…

main take home message:

The framework is there!

It’s ready to handle histograms, ntuples, configurations, calibrations.. etc etc..

Once you have understood what you need, if you have any question about how to do it in the framework, please ask!

I know that people usually prefers to work with ‘standalone’ macros and executables: but in the context of the very tight schedule ahead of us, this should be avoided whenever possible as it will increase the debugging time during the data taking...