Analysis and Software

M. Tenti [INFN - BO]

DUNE – Italy Week

29/10/2024

The Contributors

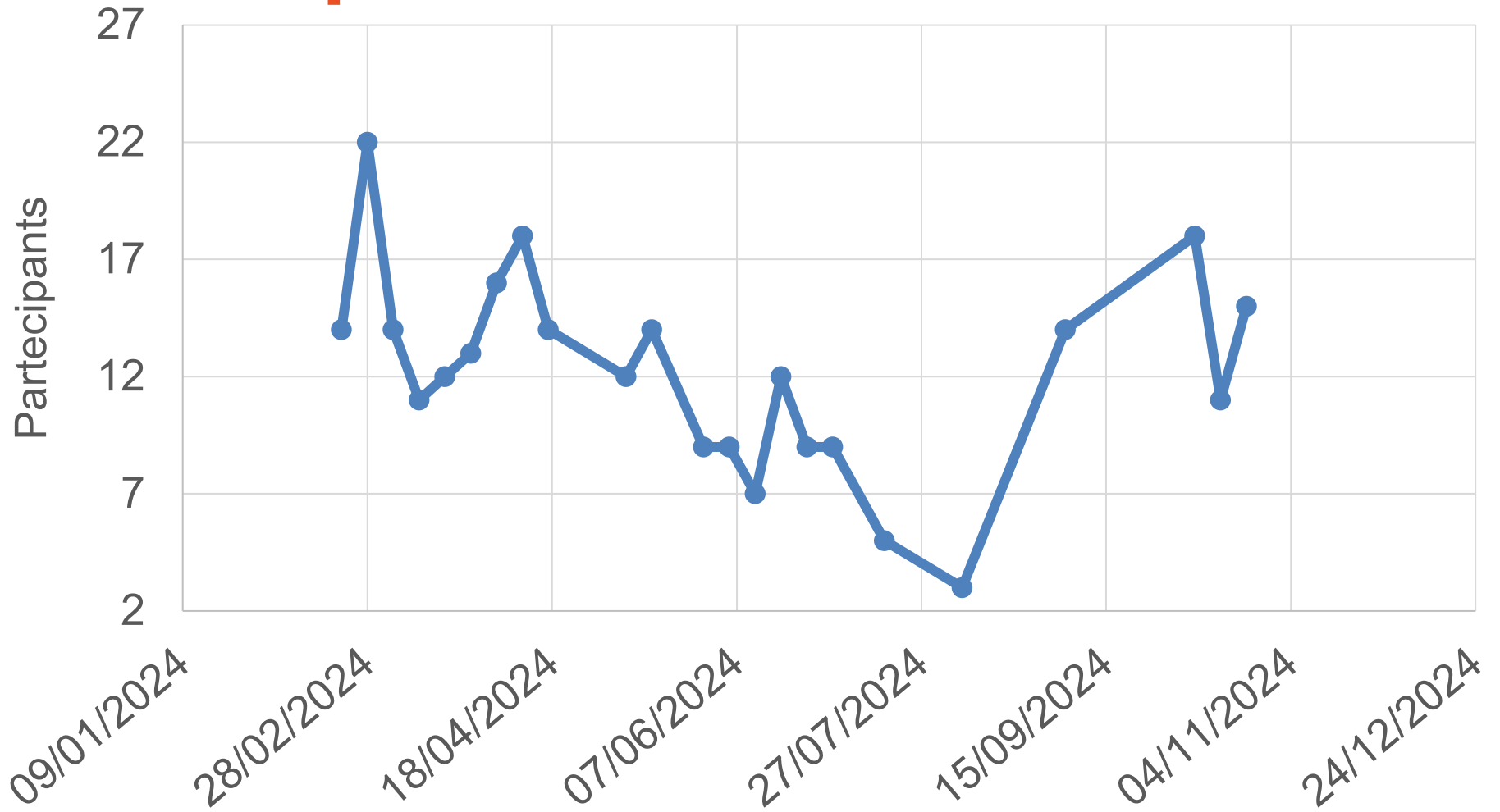|			
Paolo Gauzzi	Sapienza/Roma1	Valerio Pia	Bologna
Grigory Vorobyev	JINR	Giulia Lupi	Bologna
Artem Chukanov	JINR	Gianfranco Ingratta	Bologna
Paolo Bernardini	Lecce	Valentina Cicero	Bologna
Antonio Surdo	Lecce	M. Tenti	Bologna
Francesca Alemanno	Lecce	Matteo Sorbara	Roma2
Denise Casazza	Ferrara	Antonio Giosiosa	Roma2
Riccardo D'amico	Ferrara	Lea Di Noto	Genova

16 people in total

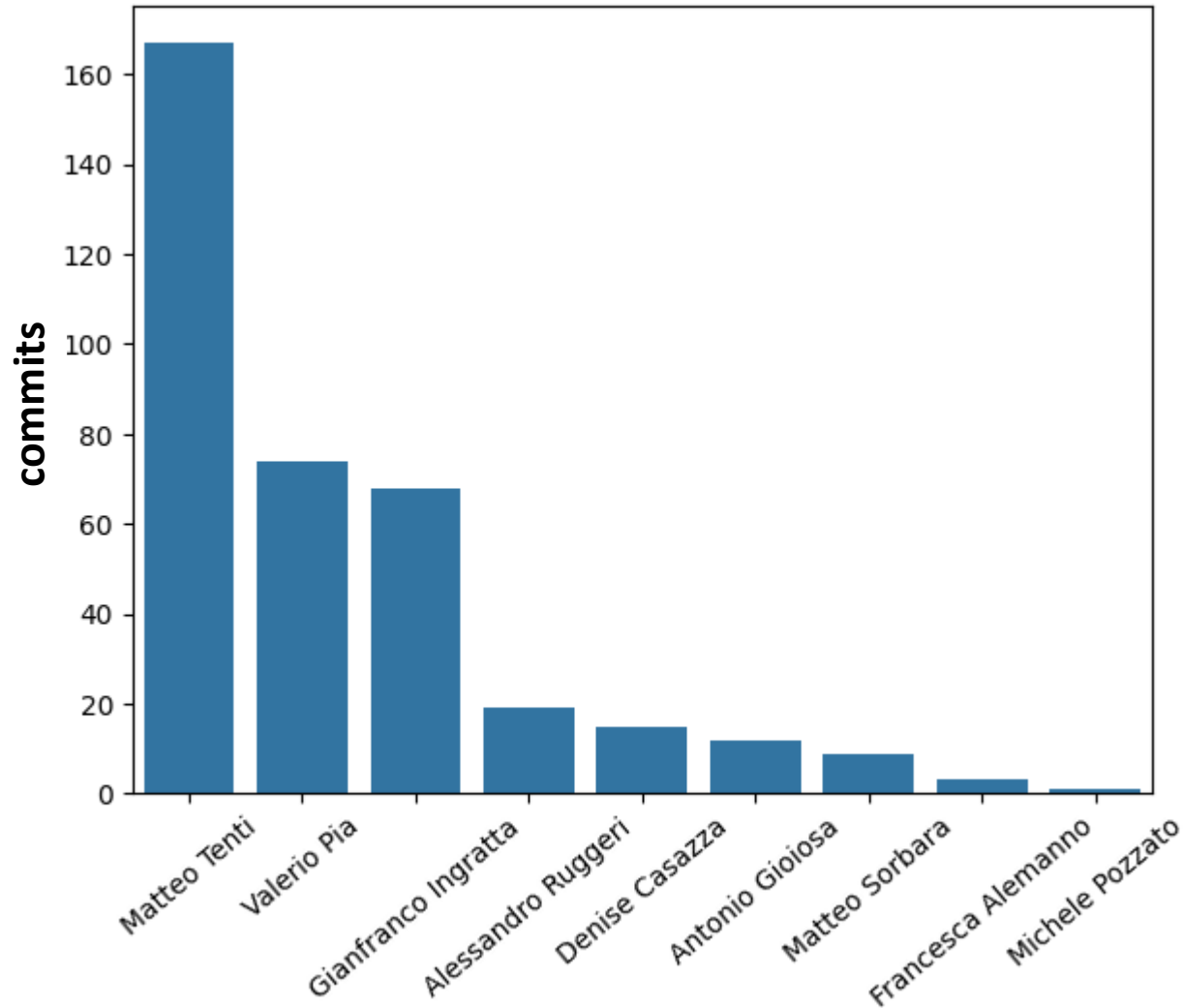| ECAL clustering + PID w/ ECAL	Kalman Filter	Kalman Filter w/ GENFIT	H sample w/ fast reco	Straw -VS drift- based tracker	Event reconstruction	CAF	Integration
D. Casazza R. D'amico P. Gauzzi	V. Pia G. Lupi	A. Chukanov G. Vorobyev	G. Ingratta	M. Sorbara A. Gioiosa	P. Bernardini A. Surdo F. Alemanno	L. Di Noto	M. Tenti

Meetings

- Starting from 21/02 we have regular weekly meetings

- A shared google docs is used to take notes [here the folder]

- Meetings are recorded [here the folder]

- A list of action items is produced and checked during the meeting

- Notes, video and action items can be found in the corresponding indico agenda

Participants

Presenter Name | Presentation Title

sandreco contributors [2024]

Presenter Name | Presentation Title

sandreco active branches

Branch	Updated
20-update-sandgeomanager-for-the-eca…	4 days ago
63-modified-scintillation-time-funct…	last week
62-update-analyze-to-work-with-new-e…	
25-Track-Reco-With-Circunferences-fi…	last week
25-Track-Reco-With-Circunferences-fi…	last week
47-standardize-drift-and-stt-outputs…	last week
25-integrate-clusteringcpp	3 weeks ago
26-integrate-wire-based-reconstructi…	last month

Integration of new endcap geometry

sandreco active branches

Branch	Updated
20-update-sandgeomanager-for-the-eca…	4 days ago
63-modified-scintillation-time-funct…	last week
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ECAL simulation and reconstruction

Presenter Name | Presentation Title

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Tracker simulation and reconstruction

Presenter Name | Presentation Title

sandreco active branches

Tracker options comparison

Presenter Name | Presentation Title
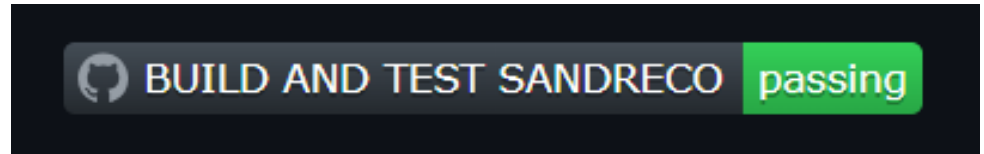
sandreco CI

- Automatically run a workflow to check *sandreco* compiles and runs

  1. All the dependecies are built

  2. Current version of SAND geometry is built

  3. *sandreco* is built

  4. 1k μ in FV are simulated

  5. *digitization* and *reconstruction* are run
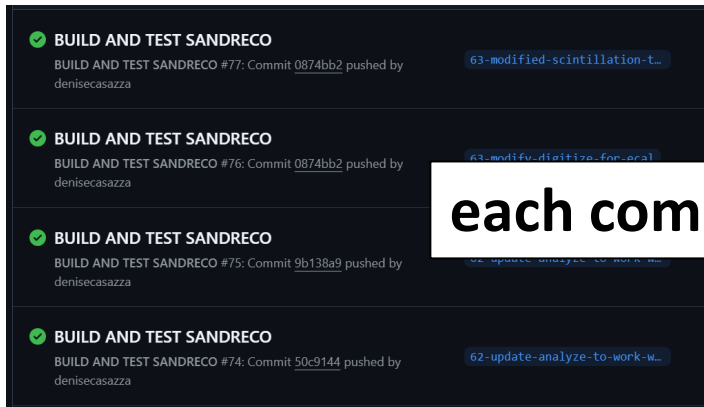
each commit
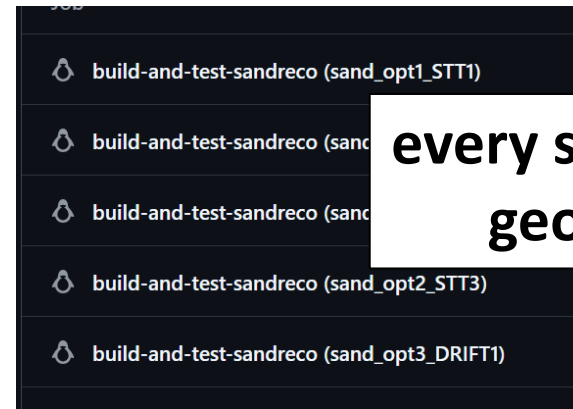
every supported geometry

Presenter Name | Presentation Title

Software management

- Sandreco begin to be enough mature

  - ECAL clustering is in develop branch

  - Soon KF will be as well

- Is time to start to think how to manage the software in a more structurated way:

  - Periodic *release*: twice a year?

  - Building and setup with *SPACK*:

    - A basic SPACK script is already in place for this purpose

    - But, what is best way to do it: FNAL and/or DUNE support?

  - Distribution with *CVMFS*:

    - We have access to the CVMFS stratum-0: cvmfsdune@oasiscfs01

    - We can manually publish the release there but

    - It there an automatic way to do it?

  - We need a *SOFTWARE MANAGER* and *SUPPORT from FNAL/DUNE*

Reconstruction Chain: Full

SAND Products

Executable/Algorithm

Data Formats

GDML GEOMETRY FROM DUNENDGGD

EDEP-SIM: *Particle propagation*

SAND-RECO: *Detector response simulation*

SAND-RECO: *Event reconstruction (currently not full)*

ND_CAFMaker: *Event Summary*

input for the analyses

T2K_ROOTRACKER FILE FROM **GENIE**

EDEP-SIM FORMAT

STT DIGITS ECAL CELLS

RECO OBJECTS: TRACKS, CLUSTERS, VERTEX

CAF FORMAT

Ref. GENIE Manual

Ref. EDEP-SIM output

Ref. sand-reco wiki

Ref. sand-reco wiki

Ref. ND_CAFMaker repo

In my opinion, SAND CAF is very important for SAND and DUNE and is an item where we should invest more resources

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CAF: strategy

1. We can have a look at the other ND subdetector
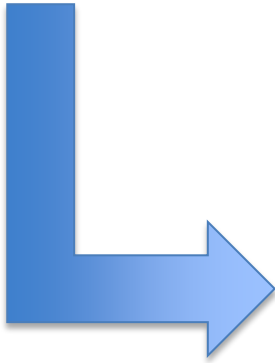
```
TMSRecoTree->SetBranchAddress("EventNo",              &_EventNo);
TMSRecoTree->SetBranchAddress("SliceNo",              &_SliceNo);
TMSRecoTree->SetBranchAddress("SpillNo",              &_SpillNo);
TMSRecoTree->SetBranchAddress("nTracks",              &_nTracks);
TMSRecoTree->SetBranchAddress("nHits",                _nHitsInTrack);
TMSRecoTree->SetBranchAddress("Length",               _TrackLength);
TMSRecoTree->SetBranchAddress("Momentum",             _TrackMomentum);
//TMSRecoTree->SetBranchAddress("Charge",             _TrackCharge); // TODO: U
TMSRecoTree->SetBranchAddress("EnergyRange",          _TrackTotalEnergy);
TMSRecoTree->SetBranchAddress("EnergyDeposit",        _TrackEnergyDeposit);
//TMSRecoTree->SetBranchAddress("Occupancy",          _Occupancy); // TODO: Un

TMSRecoTree->SetBranchAddress("TrackHitPos",          _TrackRecoHitPos);
TMSRecoTree->SetBranchAddress("StartPos",             _TrackStartPos);
TMSRecoTree->SetBranchAddress("KalmanPos",            _TrackHitPos);
TMSRecoTree->SetBranchAddress("EndPos",               _TrackEndPos);
TMSRecoTree->SetBranchAddress("StartDirection",       _TrackStartDirection);
TMSRecoTree->SetBranchAddress("EndDirection",         _TrackEndDirection);
```

2. and maybe it is worth to have a dedicated task force for them

To Do

- Detector response:
  - Implement simulation of subdetector front-end

- Reconstruction:
  - Event Builder starting from spill
  - STT Kalman Filter, ECAL Clustering, Tracking and Calorimetry from GRAIN: comparison of tracker solutions
  - GRAIN + STT+ ECAL matching
  - Particle ID:
    - e- ID in ECAL: need for TR?
    - μ/π separation: need for downstream μ catcher?
  - Vertexing
  - Integration with PANDORA

To Do: Analyses

- Reproduce analyses w/ full reconstruction:
    see docdb-13262

- Use CAF as input for the analyses

    - Update analyses

> + finalize **integration** with DUNE «infrastructure»

- Setup automatic end-to-end chain from MC production to analysis result

DUNE Computing & CNAF

17/10/2024

Hi Matteo

The compute side of CNAF has been operational for some time and we have been using it.

I just have to add the xrootd protocol which we successfully tested to our rucio server configuration and then the storage element can be considered fully operational as well and I will push our

testing person to add it to the testing as soon as he can.

Steve Timm

DUNE SC&C

Dear Matteo,

I am sending emails to each Computing Consortium Board representative to confirm that they are the correct person as a member of the consortium board (taken from spreadsheet here), and also request their participation in the DUNE CS&C week at Fermilab, November 6-8, 2024.

https://indico.fnal.gov/event/66478/

We are inviting National representatives to make presentations at the end of the workshop regarding what responsibilities they would propose to take on as a nation for the coming two years within DUNE CS&C. Since no formal MOU is currently in place concerning DUNE Computing, we are hoping that in the near future these presentations for now, will go towards establishing Statements of Work, or similar documents without the legal rigor of an MOU. Let me know if you have any questions and if you will be able to participate.

I also would propose a formal meeting of the Consortium Board with Thursday or Friday morning at 8:00 am FNAL time for one hour to discuss consortium business and policies. Let me know if you would be available at one of those times.

Kind regards,
Kirby

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