

FOOT Software status

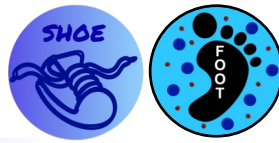
R. Zarrella (and Y. Dong 🥲)



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DAMON – XIX FOOT Collaboration Meeting, 25-28/01/2026

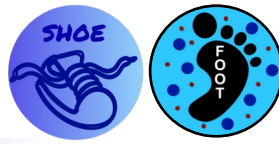
SHOE updates



As you all know by now, Yun 🇨🇳 just left so here I am!

- No big/major SHOE update since last collaboration meeting
- INFN selection + CNAO2025 slowed down the works, but we have been really busy...
 - Many code improvements and bug fixes
 - New AIR regions handling in FLUKA simulations
 - Many developments on trackers
 - New detectors included (TAVI + TABI)
 - Online Monitor parameter range check
 - Coding style convention

Reminder - SHOE development policy



Since December 2024 we started to enforce implement a new development policy

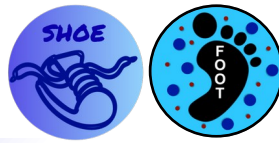
- All developers must create (and work on) their own dedicated branch
- Only few people (maintainers) can push to the “main” branch
- When a feature is completed (and tested), you can open a “merge request”
- A maintainer will check and accept/refuse the merge to “main”
- Always remember to either:
 - Delete your feature branch
 - Update it to the new version of “main” (**do this anyways every 1/2 weeks!**)



Always a clean and working version available!

*Please merge any relevant feature asap
and document your code!*

SHOE developments – Online Monitor

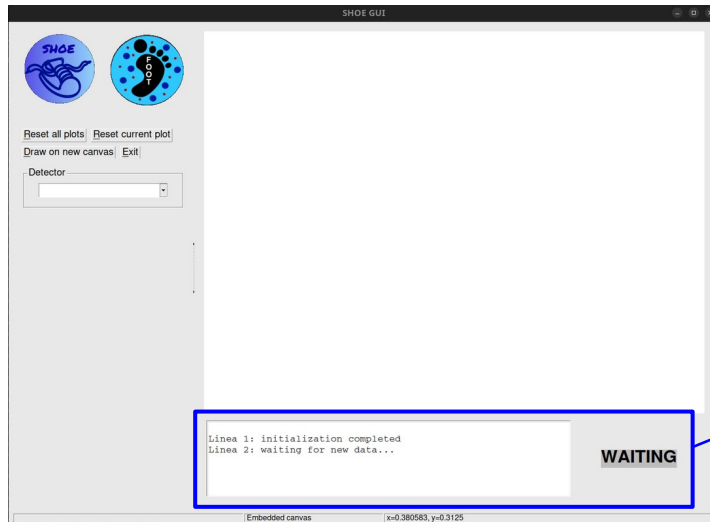


SHOE Online Monitor for data takings -> new parameter range check!

- Possibility to track parameters of monitoring plots (activate with “-readstatusfile 1”)
- Easy to implement more checks (in TAGLivePlotsManager class)

```
plotname="bmTrackTotNumber";  
fStatusRange[plotname]= std::make_pair(0.8,1.2);  
fStatusCurrent[plotname]=-999;
```

- Control histogram name
- Range of the variable to check (min, max)
- Actual control variable: implement accordingly

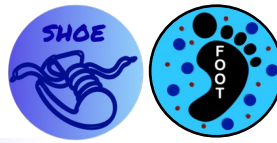


**Call to all detector experts to
implement any check they think is
important for data takings!**

Message + information panel in GUI

Implemented by Yun

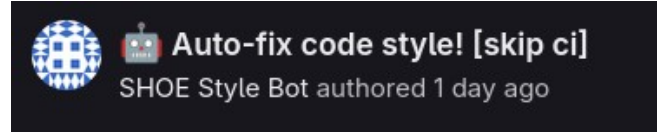
SHOE developments – Coding style



New coding style convention

- See [this presentation](#) by Chris
- Fix all code styling inconsistencies (brackets, indentation, etc.)
- Use of "astyle" tool to improve code readability
- Still not 100% fixed, but will be shown soon!
- Automatic style check in pipeline ("main" branch, every 1st day of the month at 9:00, now inactive)

Automated commit message



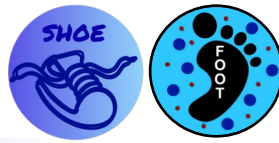
```
397 // -----
398 /// Loop over events
399 ///
400 void TAGactFastDecode::IncludeNeededClasses()
401 {
402     if( TAGrecoManager::GetPar()->IncludeBM() )
403         bmNtuTrack = (TABMntuTrack*) fpBMNtuTrack->Object();
404
405     if( TAGrecoManager::GetPar()->IncludeVT() ){
406         vtxparGeo = (TAVTparGeo*) fpVDparGeo->Object();
407         vtxNtuHit = (TAVTntuHit*) fpVTntuHit->Object();
408         vtxNtuCluster = (TAVTntuCluster*) fpVTntuCluster->Object();
409         vtxNtuVertex = (TAVTntuVertex*) fpVTntuVertex->Object();
410         vtNtuTrack = (TAVTntuTrack*) fpVTntuTrack->Object();
411     }
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413     if( TAGrecoManager::GetPar()->IncludeIT() ) {
414         itparGeo = (TAITparGeo*) fpITparGeo->Object();
415         itNtuCluster = (TAITntuCluster*) fpITntuCluster->Object();
416     }
417     if( TAGrecoManager::GetPar()->IncludeMSD() ){
418         msdparGeo = (TAMSDparGeo*) fpMSDparGeo->Object();
419         msdNtuPoint = (TAMSDntuPoint*) fpMSDntuPoint->Object();
420         msdNtuCluster = (TAMSDntuCluster*) fpMSDntuCluster->Object();
421     }
422
423     406 /// Loop over events
424     407 //
425     408 void TAGactFastDecode::IncludeNeededClasses()
426     409 {
427     410     if( TAGrecoManager::GetPar()->IncludeBM() )
428     411         bmNtuTrack = (TABMntuTrack*) fpBMNtuTrack->Object();
429     412
430     413     if( TAGrecoManager::GetPar()->IncludeVT() )
431     414     {
432     415         vtxparGeo = (TAVTparGeo*) fpVDparGeo->Object();
433     416         vtxNtuHit = (TAVTntuHit*) fpVTntuHit->Object();
434     417         vtxNtuCluster = (TAVTntuCluster*) fpVTntuCluster->Object();
435     418         vtxNtuVertex = (TAVTntuVertex*) fpVTntuVertex->Object();
436     419         vtNtuTrack = (TAVTntuTrack*) fpVTntuTrack->Object();
437     420     }
438     421
439     422     if( TAGrecoManager::GetPar()->IncludeIT() ) {
440     423         itparGeo = (TAITparGeo*) fpITparGeo->Object();
441     424         itNtuCluster = (TAITntuCluster*) fpITntuCluster->Object();
442     425     }
443     426     if( TAGrecoManager::GetPar()->IncludeMSD() )
444     427     {
445     428         msdparGeo = (TAMSDparGeo*) fpMSDparGeo->Object();
446     429         msdNtuPoint = (TAMSDntuPoint*) fpMSDntuPoint->Object();
447     430         msdNtuCluster = (TAMSDntuCluster*) fpMSDntuCluster->Object();
448     431     }
449 }
```

Many files can be modified at the same time



Remember to update your code from "main" frequently!

SHOE developments – Coding style



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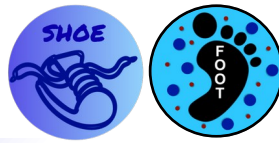
Auto-fix code style! [skip ci]
SHOE Style Bot authored 1 day ago

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815 files changed, 100190 insertions(+), 115551 deletions(-)

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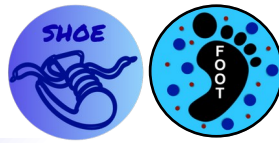
SHOE developments – Tracker updates



A lot of work done (and ongoing) on trackers!

- Two detector folders added (“VI” and “BI”) for Mimosis -> see Chris later!
- Continuous effort on MSD (from raw to Z id)
- Many efficiency studies + XS analysis with VT
- Huge work done on IT (geometry, decoding, efficiency)
- Many many many fantastic amazing spectacular stuff ongoing...

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→ BUT ←



TAGactFastDecode is not “fast” anymore!

- Not meant for efficiency studies -> will be changed in the future
- Only quick online plots useful for data-taking
- Future plan: -> dedicated "TA*actEfficiency" actions (?)
-> separate executable

Software tasks



Project/task	Contact person(s)	Branch	Work in progress
Framework	C. Finck, R. Zarrella	main	Merge from other branches
Start Counter	G. Traini		Waveform analysis + Start Counter classes stable.
Beam Monitor	S. Muraro, I. Mattei		Detector calibration and analysis
Vertex	C. Finck, M. Toppi, L. Testa		Alignment, tracking, efficiency studies. Charge ID capabilities being explored.
New Vertex - Mimosis	C. Finck, S. Rabaglia, R. Zarrella		First implementation (decoding, clustering, tracking and online monitor)
Inner Tracker	G. Traini, G. Splendiani		Detector mapping + efficiency + tracking
MSD	I. Mattei, S. Mazzolani, R. Zarrella	AleMSDStudies	Pedestals, Common noise, digitizer implementation and eta function studies
Tof Wall	A. Kraan, R. Zarrella, M. Morrocchi, M. Toppi		Working on time and charge calibrations.
Calorimeter	P. Cerello, E. L. Torres, B. Spadavecchia, B. Kharpuse	bspadavec	Full porting of geometry, clustering and calibration studies
DAQ	M. Villa, R. Ridolfi, S. Valentineti, G. Ubaldi		DAQ classes developed and stable. Update for new Vertex detector and external Flash ADC ongoing.
Global Reconstruction	R. Zarrella	GlobalGF_dev	Different parallel strategies are being developed

Tried to update, but still not a complete list...

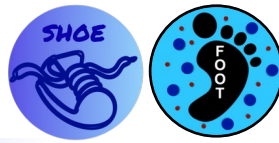
- Most of the topics are continuously covered
- Increase in the number of tasks and re-shuffle, but...
- Still not enough SHOE developers!

Relevant problem of workforce!!

Project/task	Contact person(s)	Branch	Work in progress
Simulation (FLUKA)	S. Muraro, G. Battistoni		
Simulation (G4)	M. Vanstalle		Geant4 simulation
Trigger	G. Traini		Triggering strategies implementation and study will be performed against the simulation.
Analysis	M. Dondi, G. Ubaldi	Ubaldi_temp	Analysis on GSI2021 and CNAO (>2023) cross section measurements
Alignment	G. Traini, I. Mattei	Alignment macro	Alignment of the global setup



Conclusions

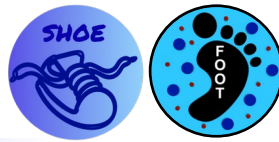


Many things happening in the software

- Lots of tasks being taken care of
- Additional to-do list:
 - New SHOE release (26.0) + new production on Tier1
 - Update of HTCondor Tier1 scripts for more flexibility
 - Discuss possibility of shared repository for DAQ libraries (submodule?)
 - Automatic test of new "main" versions on Tier1



Conclusions



Many things happening in the software

- Lots of tasks being taken care of
- Additional to-do list:
 - New SHOE release (26.0) + new production on Tier1
 - Update of HTCondor Tier1 scripts for more flexibility
 - Discuss possibility of shared repository for DAQ libraries (submodule?)
 - Automatic test of new "main" versions on Tier1



Our biggest problem is the number of people!

- Recurrent problem of workforce
- Very few people in the "core" development team
- Please avoid working outside SHOE as much as possible
We have lots of documentation (and nice people) to help you!





Backup slides