

Parallel 7A

Technical Aspects related to Hadronics



Contributions

Andrea Dotti: Status of fast-cross-section

Andrea Dotti: Report from CALICE collaboration meeting

Tatsumi Koi: Deletion of physics processes for MT

Out of time for extra talks from Vladimir Grichine on “Validation of low-mass single diffraction model” and “Validation of kaon-proton elastic scattering”

Fast Cross Section

Reminder of findings from ASCR: hadronic cross-sections 10% CPU in FullCMS w/ complex events

Extend current caching strategy for reusing last called cross-section to a real cache (90% of calls are only from 100/18k combinations of {particle,material,process})

Possible to implement a fast-path (based on Peucker-Douglas algorithm): binned cross-section pre-built at initialization

- code should be in place for 10.2, but switched off by default
- then validate, measure performance and evaluate cases where it can be (optionally) turned on (via UI command)

Fast Path Usage

Particle: neutron

Material: materials_StainlessSteel

Process: G4Neutron InelasticXS

Slow path only:

	Cycles	Calls	Cycles/Call
Slow Path	6,133,110,476	6,278,517	977

Fast path with lazy computation of slow path:

	Cycles	Calls	Cycles/Call
Slow Path	223,362,860	94,876	2,354
Fast Path	1,059,541,332	5,887,001	179
Total	1,282,904,192	5,981,877	214

Possible ~5x speed up of cross section calculation

Report from CALICE

High granularity calorimeters measuring details of shower shapes

Conclusions:

- version 10.x is an improvement w.r.t. 9.6
- showers are too (laterally) compact w.r.t. data: Bertini does a better job w.r.t. $FTF < 10 \text{ GeV}$
- showers are just a bit too long or just right (there is one case that points to the opposite)
- also EM showers show some issues (too compact, some longitudinal issues), but cannot exclude yet detector effects

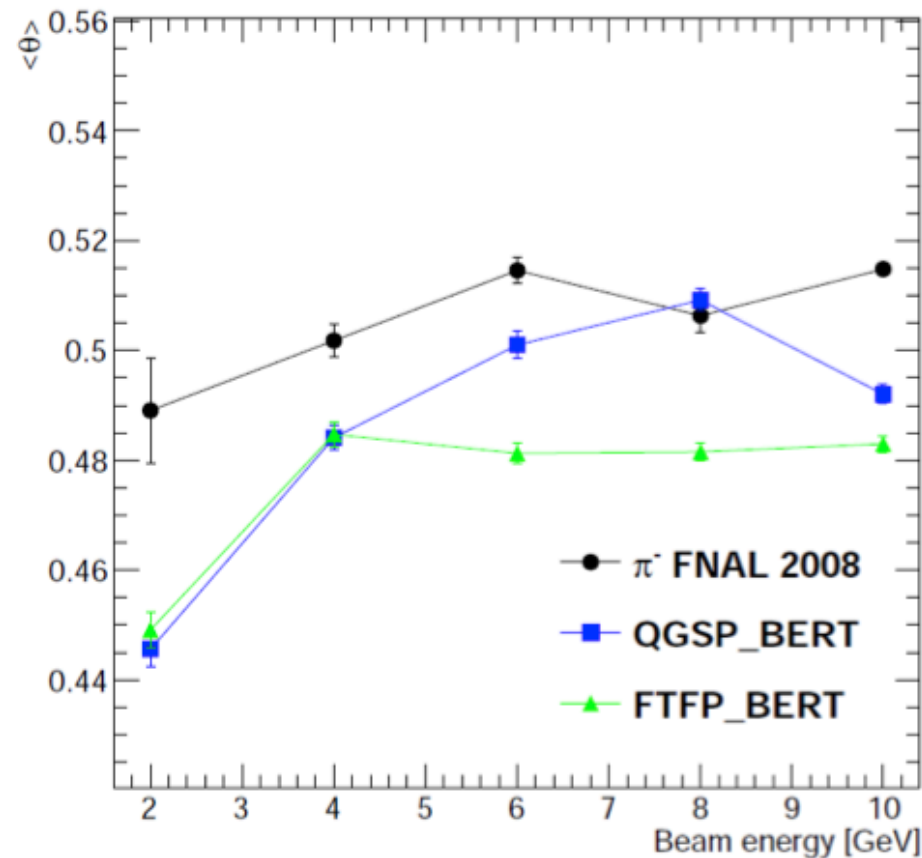
We believe that we need to look now at validation of forward production (angular distributions) in Fritiof

Thin target data are the main validation tool, can we complement them with some very well understood thick target data? (e.g. SATIF)

Angular distribution of tracks

<https://agenda.linearcollider.org/event/6741/session/9/contribution/9>

Si/W



- Average values of θ angles for the data and two simulation models. Both physics lists describe the data within 12% precision.

Deletion policy of processes for MT

Issue: lifetime and ownership of physics objects (processes, models, cross-section) is not clear in our framework

- general design is to register these type of objects in a registry that will (almost always) delete the objects

MT has complicated the things even more

- an object created in thread X shouldn't be deleted by thread Y: this is what happens now with registries!

No solution identified (yet), but at least we are aware of the problem...

- will require further discussion, and possibly a small group of people to further study the issue

Need to investigate C++11 smart pointers that can help in some cases

Is this design reasonable?

SLAC

Lifetime of object

step

track

event

run

application

Boundary sometimes becomes unclear

Changing PhysicsList between run

Mike pointed out problem in his Tuesday presentation