

# Simulation

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ALICE Offline Week  
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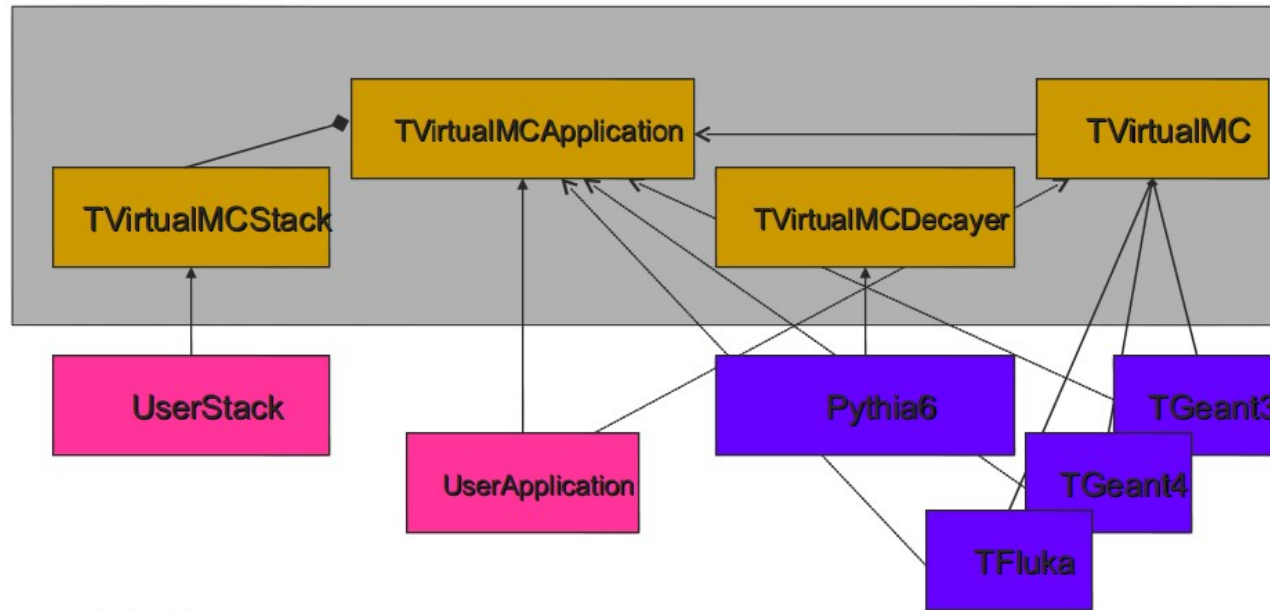
# Organization

- PWG-PP Monte Carlo
  - L. Cunqueiro, M. Kowalski, I. Das
  - Mailing list: alice-pwg-pp-mc
  - Support and development
    - Event Generators
    - MC truth interfaces in the analysis framework
    - (Geant3)
- O2 CWG8
  - A.M
  - Regular meetings Thu 16h, mailing list alice-o2-cwg8
  - Simulation for RUN III
    - Geant4
      - Physics Validation
      - Multi Threading
    - Fast Simulation
    - Digitization (Continuous read-out, space charge)

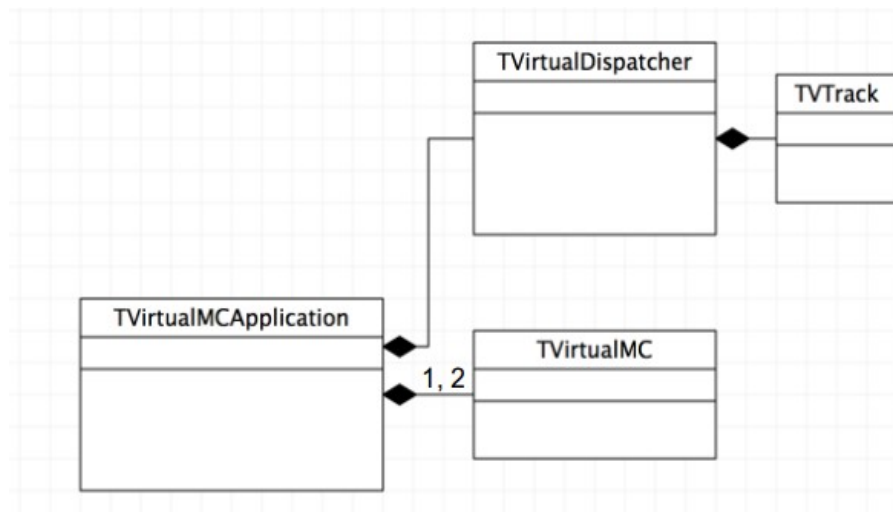
# Fast Simulation

- Full Fast Simulation (**Ideas**)
- Parametric Simulation (**prototyped**)

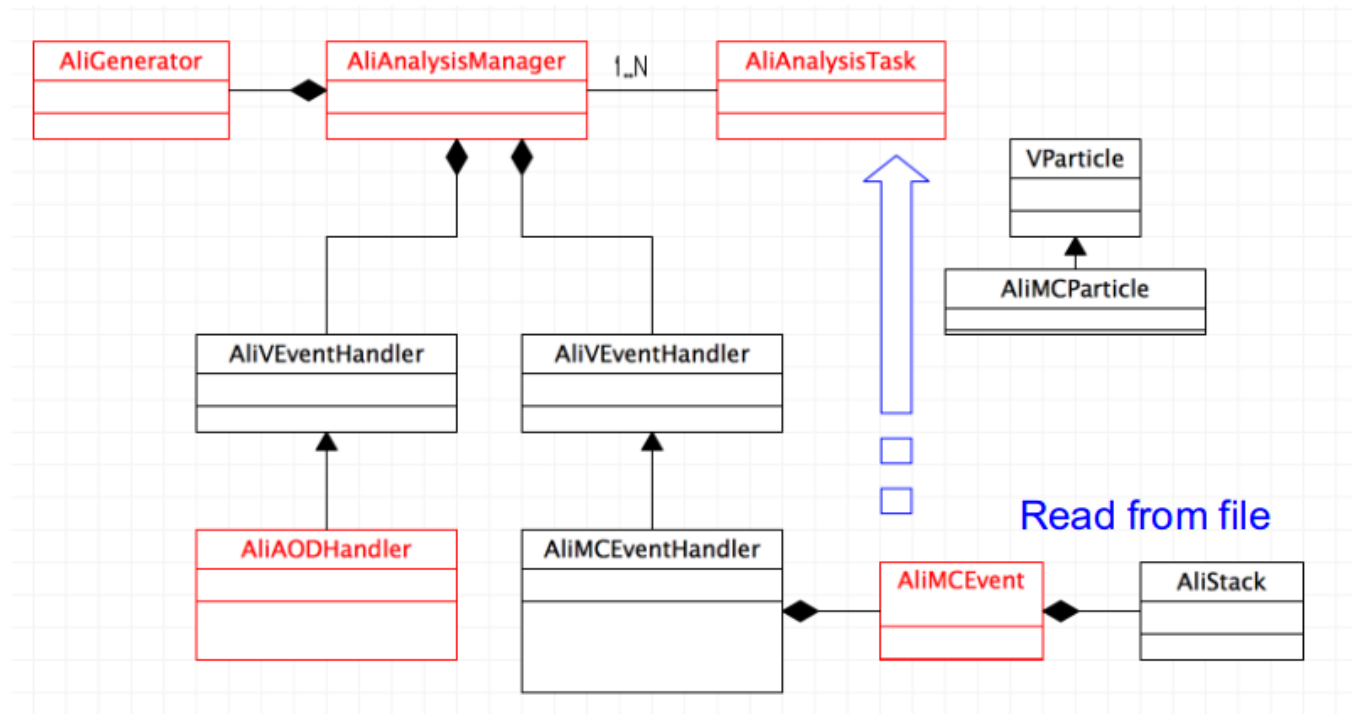
# Full Fast Simulation



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# Parameterized Fast Simulation



Current Implementation tested on the GRID (Johannes Stiller):

Primary particle generation

- Fast reconstruction
- ESD
- AOD running
- Analysis

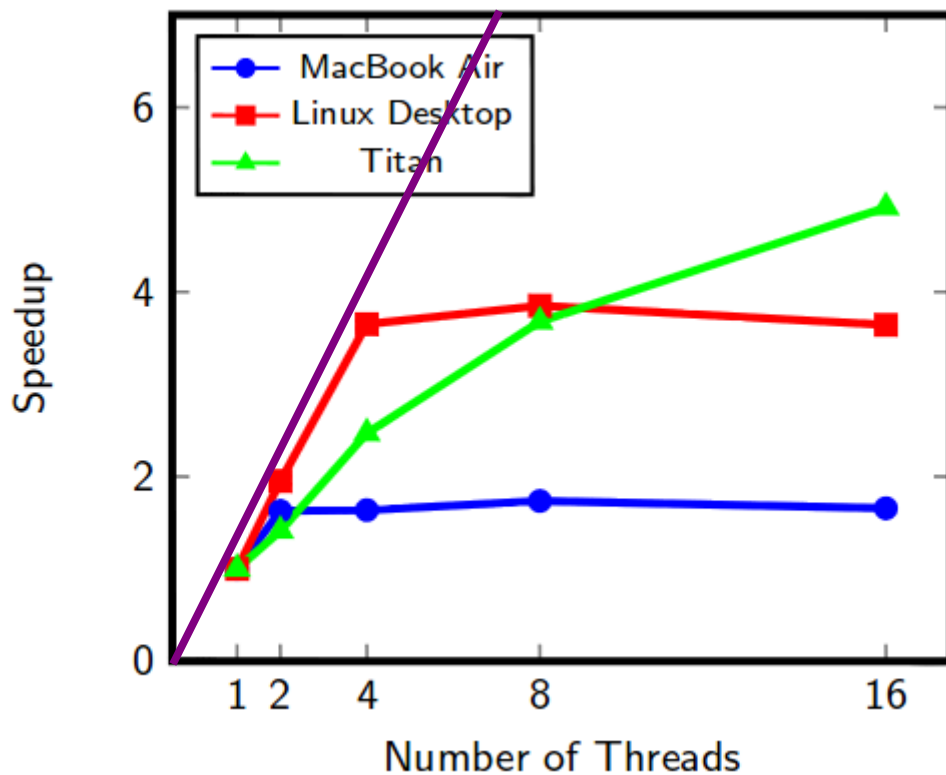
# Geant4

- Transition 3 to 4 planned for Run II
  - Maintenance and support
  - Profit from specialized parallel architectures
  - But also: state of the art tool (education), community tool (support)
- See also presentation during last Offline week (Ivana, FCA)
- Since then
  - First basic MT scaling tests
  - Geant4 v10 validation started

# Geant4 v10 MT

## first basic tests ...

Platform	OS	CPU	#Cores
MacBook Air	OS X 10.9.2	1.7 GHz Intel Core i7	2
Linux Desktop	Ubuntu 13.10	3.4 GHz Intel Core i7	4
Titan	Cray Linux	2.2GHz AMD Opteron 6274 (Interlagos)	16



Study (Supada, ORNL) ongoing with improved profiling tools.

# Geant4 v10 Physics Validation

- Plans
  - First test production (**done**)
    - Pythia6, pp, 7 TeV
    - Physics list: FTFP\_BERT\_EMV(\_OPTICAL)
  - Standard QA (**ongoing**)
  - Analysis QA involving PWGs
  - Detailed Data MC comparison for MB and hard probes (PWG-PP)



# Test production LHC14f2

Job parameters				Application software			Details			
Run# ▾	PID	Owner	Events	ROOT	ALIROOT	GEANT	Date	Staged	Output dir	Type of job
127712:130519		aliproduct					- All -	- All -		p-p, 7 TeV, Pythia, Geant4 v10...
130519	393975814	aliproduct	210500	v5-34-08-6	v5-04-Rev-20		21.06.2014 07:49		/alice/sim/2014/LHC14f2/130519	p-p, 7 TeV, Pythia, Geant4 v10...
127712	392823225	aliproduct	213100	v5-34-08-6	v5-04-Rev-20		18.06.2014 01:23		/alice/sim/2014/LHC14f2/127712	p-p, 7 TeV, Pythia, Geant4 v10...
2 runs	2 jobs		<b>423600</b>						Export folders	

# Performance

Both G4 productions have the same performance:

1. time per event: **2 min**
2. failure rate: 2.3% ERROR\_V (G4 abort), 0.4% EXPIRED (memory overrun).
3. memory: resident average 1.8GB, max 2.2GB; virtual average 4.6GB, max: 10GB

comparable G3 production:

1. time per event **1min 5sec**
2. failure rate: 2% ERROR\_V (segfault in QA AliTRDinfoGen.cxx), 0.7% EXPIRED (memory overrun)
3. memory: resident average 2.1GB, max 3.7GB; virtual average 5.15GB, 8GB

The time in G3 and G4 is for the total event (transport/digitisation/reconstruction)

# Warnings from Geant4

## Warning messages that need attention

```
> ----- WWWWW ----- G4Exception-START ----- WWWWW -----  
> * G4Exception : GeomNav1002  
> issued by : G4PropagatorInField::ComputeStep()  
> Particle is stuck; it will be killed.  
> Zero progress for 51 attempted steps.  
> Proposed Step is 1.42936e-05 but Step Taken is 1.42936e-05  
> in volume TPC_WBAR  
> * This is just a warning message. *
```

This warning message appears for volumes TPC\_WBAR and TPC\_Drift

2014-06-13 The word "killed" leads to an invalidation of the jobs. The message is ignored by the new validation script. (C. Grigoras)

# Crashes

```
EEEE ----- G4Exception-START ----- EEEE -----  
* G4Exception : GeomNav0003  
issued by : G4MultiLevelLocator::EstimateIntersectionPoint()  
Too many substeps!  
Convergence is requiring too many substeps: 10002  
Abandoning effort to intersect.  
Found intersection = 0  
Intersection exists = 1  
Undertaken only length: 1568.27 out of 10000 required.  
Remaining length = 8431.73  
* Fatal Exception * core dump ***
```

---

```
EEEE ----- G4Exception-END ----- EEEE -----
```

---

```
EEEE ----- G4Exception-START ----- EEEE -----  
* G4Exception : GeomField0003  
issued by : G4MagInt_Driver::AccurateAdvance()  
Invalid run condition.  
Proposed step is negative; hstep = -1.79553e-08.  
Requested step cannot be negative! Aborting event.  
* Event Must Be Aborted ***
```

---

```
EEEE ----- G4Exception-END ----- EEEE -----
```

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```
TG4PrimaryGeneratorAction::TransformPrimaries:  
G4ParticleTable::FindParticle() failed for D*+ pdgEncoding=413.  
* TG4Exception: Aborting execution ***
```

Navigation

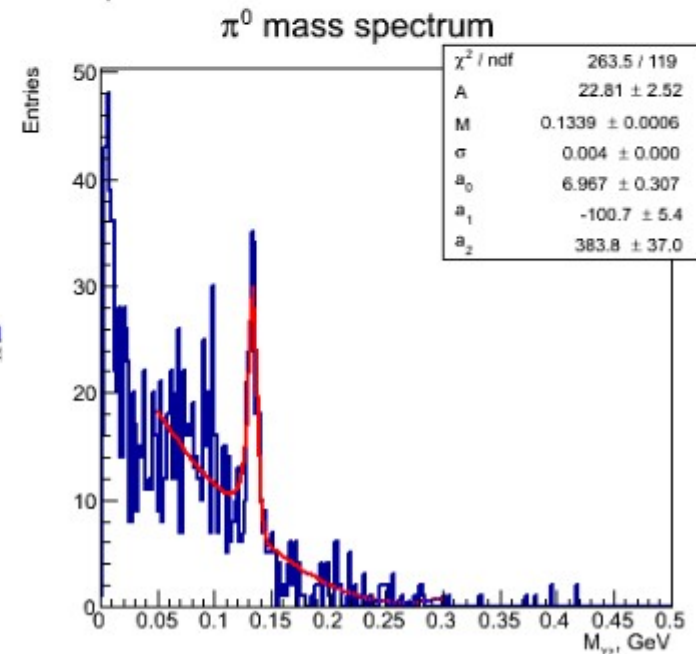
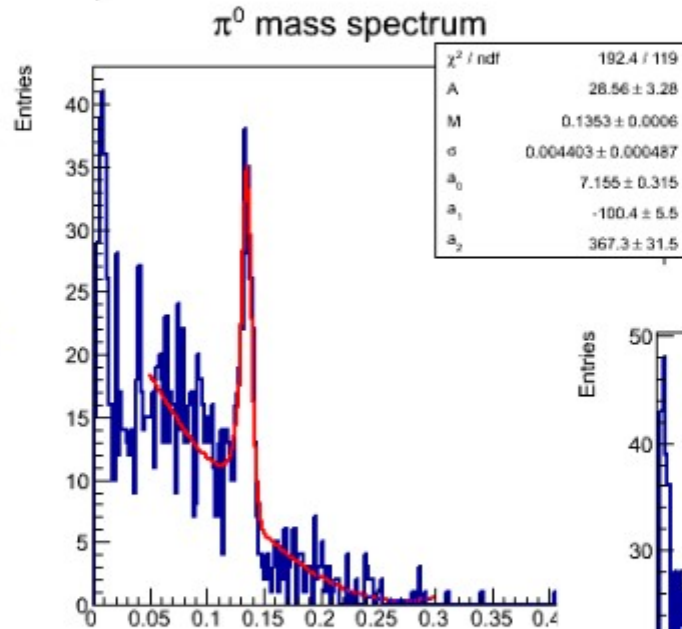
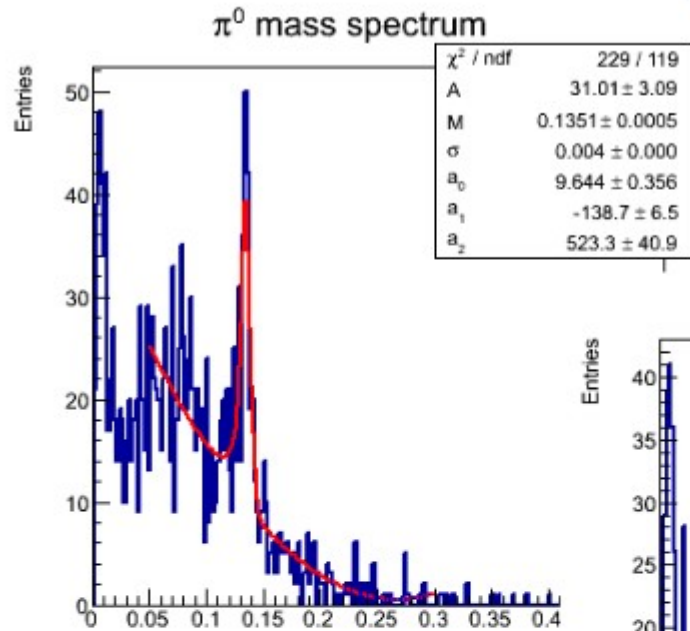
Decay

# Quality Assurance

- (So far) limited response to my QA request
  - PHOS ok
  - HMPID ok, but smaller number of protons
    - To be understood
  - EMCAL no QA output
    - To be understood
  - FMD ok

# PHOS

## Calibration



Peak positions and peak widths are OK