

Event Simulation

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Outline

1 Current situation

2 Upgrade plan



Current Simulation Chain

- detector simulation: GEANT3-based, native
- largely separate from the main chain
- geometry: custom DB back-end
- event generators:
 - primary interactions: VENUS directly, others via ASCII input; full beam mode
 - secondary interactions: GHEISHA, GCALOR, GFLUKA+GHEISHA, GFLUKA+MICAP
- reconstruction components: standard NA49/NA61 clients
 - $\vec{E} \times \vec{B}$ distortions
 - readout simulator
 - raw-data generator/embedder
 - matching
- steering: shell scripts
- output format: DSPACK



Problems

- code: complex, largely undocumented, a mixture of C and non-standard Fortran — difficult to maintain and extend
- not fully operational!
 - result of changes in raw data, other software-chain components
- inadequate physics
 - outdated models in GEANT3
 - especially important for PSD simulations
 - problematic in beam mode and/or at higher energies



Main Points of Upgraded Software

- based on VMC, TGeo (GDML?) for increased flexibility
- main detector simulator: Geant4-based
- use existing geometry
- model interface via UniGen or HepMC
- better integration with the main chain — steering, I/O *etc.* consistent with the new framework
- FLUKA support?



Existing Resources

- Existing basic Geant4-based NA61 simulator
- Existing beam-line simulator
- Miscellaneous smaller projects
- Most authors still present
- Geant4 know-how from Auger



Upgrade Plan

- ① Convert geometry to TGeo/GDML
- ② Identify required features of GEANT3-based simulator
- ③ Appropriately extend existing Geant4-based simulator
- ④ Run comparative simulations with both tools
- ⑤ Successively rewrite reconstruction-time clients



THANK YOU

