Computing report

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for the Computing group
A bit of history

• one year ago (SuperB Workshop at SLAC):
  – still exploring options on what to do to provide a fast simulation tool for SuperB
  – still discussing basic issues about full simulation, like how to describe the detector geometry
  – starting to think about tools to support code development
Now Fast Sim is delivering

$\Delta t$ resolution

$B \rightarrow K_s \pi^0$: $K_s$ f.l. resolution vs. SVT geometry

Filling the gap between SVT and DCH

- Expand L4 and L5 up to maximum allowed:
  - Layer 4: 12.2$\rightarrow$17.4
  - Layer 5: 14.2$\rightarrow$20.2 (DCH S.T. is at 21.3cm)
**missing features are being implemented**

**Status of some important items**

<table>
<thead>
<tr>
<th>name</th>
<th>description</th>
<th>status</th>
</tr>
</thead>
<tbody>
<tr>
<td>hit confusion</td>
<td>parametrization of effects given by pattern recognition</td>
<td>covered, work in progress</td>
</tr>
<tr>
<td>dE/dx</td>
<td>energy loss is simulated in FastSim, but not its measurement</td>
<td>not covered, but 1 person from next week!</td>
</tr>
<tr>
<td>tagging</td>
<td>need to setup it in FastSim and possibly implement new features</td>
<td>now 1 person!</td>
</tr>
<tr>
<td>PID selectors</td>
<td>needed to do analysis and optimization studies</td>
<td>work started, need complete set of PID info</td>
</tr>
<tr>
<td>tag vertex</td>
<td>see if we can exploit better vertex resolution</td>
<td></td>
</tr>
<tr>
<td>Vertex and kinematic fits</td>
<td></td>
<td>ok</td>
</tr>
<tr>
<td>tuning of EMC response</td>
<td></td>
<td>work in progress</td>
</tr>
<tr>
<td>IFR response</td>
<td>need to find a way to improve IFR response</td>
<td>work in progress</td>
</tr>
<tr>
<td>forw. PID</td>
<td>implement response</td>
<td>work started</td>
</tr>
</tbody>
</table>
outlook is very promising

Conclusions

- SuperB FastSim V0.0.2 is ready
  - Useful studies already possible
- Remaining features needed for TDR under development
  - Hope to make progress on key issues here
- Aim for full functionality by April 2009 Physics Workshop
- Users and contributors are welcome!
full sim is delivering too

Example results

Of course plots are preliminary and unvalidated: axis units hidden on purpose

SVT rad. Length vs eta

EMCA rad. Length vs eta
background production

- goal set in December (bkg production by Feb. WS) not achieved
  - MC truth, generators, physics list, farm in Padova: OK
  - but geometry not ready
- new goal dictated by next Mini-Mac meeting
  - second half of April
- bkg production done by end of March
  - new IR elements will be inserted
    - requires migration to new GDML release to handle elliptical shapes
Full Sim: short term plan

- Migration to latest G4/GDML (Roberto + Eugenio)
  - Insert Mike P4 IR design (Eugenio)

- Final checks on geometry consistency (Andrea + subdetectors experts)

- Release of Bruno V00-00-01

- Run background production @PD (Roberto + Giuliano)
  - evaluation at CNAF (Armando)

2 weeks from now
3 weeks from now
5 weeks from now
**Full Sim: longer term plan**

- Code clean-up & splitting in packages (Andrea + Eugenio + Roberto) **2.5 months from now**

- Parallel geometries and scoring volumes (Andrea) **3.5 months from now**

- Review configurability and Python interface evaluation (Andrea + ?? ) **4.5 months from now**

- Q/A policy and tools: Physics, computing, geometry, code. (only with new people + Subdetectors Experts)

Sub-detectors digitizers can be contributed any time from this point on by Subdetectors Experts
Input from subdetectors

- The subdetector groups will be asked soon:
  - what are the use cases of Full Sim for the TDR production?
    - besides the ones already known, like bkg studies or IFR optimization
  - what detectors need digitization?
  - what additional functionality is needed?
- A questionnaire, with a description of the current plans of the full sim group, will be circulated asking for feedback
  - we miss a contact person from the PID group
    - we would at least like to have the material budget OK
Computing groups activities so far

• main current effort: provide tools and support for the successful production of the detector (and machine) TDR
  - Fast simulation
  - Full simulation
  - Collaborative tools
  - Code developments tools

• longer term effort: preparation of the computing TDR
  - current activity: SuperB Computing planning group
Baseline time profile

- **Phase 0**: [now --> mid-2009]
  - definition of R&D plan; report to an all-hands SuperB workshop mid-2009; continued development of simulation tools
- **Phase 1**: [mid-2009 --> mid-2011]
  - major R&D program for SuperB computing; invitation to new people/ideas; continued support and development of simulation tools
  - at the end, computing TDR complete or largely so
- **Phase 2**: [mid-2011 --> end-2013]
  - integration of R&D program results into a complete SuperB software system; major online software development gets under way; series of data challenges; retirement (?) of phase 0 tools
- **Phase 3**: [end-2013 --> 2015]
  - scaling tests and development; converging on final full-scale system; acquisition of hardware
- **First beams**
What's new since December

- much will be presented in the following talks
- let me just mention some good news
- first of all we have tried to:
  - boost the effort on collaborative and administrative tools
  - start setting up a computer core SuperB team at LNF
- made good progress on both aspects with the involvement of a new group led by Fabrizio Murtas
  - Fabrizio has been already collaborating with SuperB for the luminosity measurements at Dafne
  - he is the person in charge of the INFN Data Web group which manages several central services (INFN Web portal and associated services, scientific databases, outreach, Indico, etc.)
This is for example what we have done for INFN Administration description.
Assignments of roles

This is for example what we have done for INFN roles assignments
The SuperB collaboration members will be registered in the same INFN user database structure.
GRID and distributed computing

• more good news
  - a new team formed with colleagues from :
    • Ferrara, consolidated Grid expertise (E. Luppi, L. Tomassetti)
    • at CNAF - Tier1 (A. Fella)
  - short term goals (months):
    • provide access to standard SuperB simulation tools
      - to have a site (CNAF) where any SuperB user can login and run simulation jobs
      - exploit in parasitic mode CNAF Tier1 resources
    • start exploiting the INFN and worldwide GRID
      - be ready for possible very large full simulation production
      - investigate why not using the GRID to run also SuperB machine simulations
Computing WBS

- Two identified so far:
  - Computing support
    - Structure at level 3 established; responsibilities assigned
    - No time before the WS for the coordinators to fill it
    - Our commitment: produce the first version in a week from now
      - Requires in many cases expansion at least one level deeper
  - Computing TDR
    - We may provide the structure and a first version with educated guesses in a couple of weeks
    - The real exercise will require a longer time scale (and more people involved)
- TDR for Computing facilities and services?
  - Good opportunity to cooperate with experts from computing centers outside Italy
Current structure (V 1.2)

Management (Morandin)
  computing coordination
  operation management
  offline coordination
  (online coordination)

Fast-full coordination (Di Simone, Brown)
  full simulation background into fast simulation
  enforce consistency the fast and full simulations

Fast simulation (Rama)
  Coordination
  Core development
  Sub-detector simulation code dev. & maint.

Geant4 simulation (Bianchi, Paoloni)
  Coordination
  Core dev. & maint.
  Sub-detector simulation code dev. & maint.

Operation (Stroili)
  Validation and quality assurance tools developme
  Validation and quality assurance operation
  Periodic build and release distribution
  Simulation production

Offline infrastructure (Brown)
  Software release tools dev. & maint.
  Development of infrastructure packages
  BaBar code migration

Distributed computing (Fella, Luppi)
  GRID software management
  GRID services deployment
  Data distribution
  Bookkeeping information service
  R&D developments

Administrative tools and central AAI (Gianoli, Mur)
  Collaboration DB dev. & manag.
  AAI system (LDAP) dev. & maint.
  User support / documentation

Collaborative tools (Gianoli, Murtas)
  Web site
  Tools configuration and maintenance
  Tools developemnt
  Tools AAI integration
Computing support activities '09-'10

- developments mainly taking place in 2009
  - decreasing in 2010, but maintenance will continue
  - we expect computing professionals to partially shift to R&D for the computing TDR when developments are over

- what planning tools do we foresee for comp. support activities?
  - WBS sheet: Yes, the minimum
    - complemented by documents describing in more detail the deliverables; first one on simulation tools
  - Gannt chart: desirable, maintenance requires real work
New computing structure?
Summary

• A lot has happened in the SuperB computing field in the last months to prepare the tools needed for detector and physics studies
  – new people and groups have joined the effort with enthusiasm
  – for a collaboration that doesn't exist yet, we are already in a pretty good shape

• Computing support is entering a "production" phase
  – we will need more people and dedicated computing professionals do deliver the services that SuperB needs

• There is a lot we have to digest and to act upon after this meeting that we'll keep up busy in the near future

• Join the excitement!