

PHYSICS TOOLS OF SUPERB STATUS REPORT

Matteo Rama, csg meeting 5 March 2012

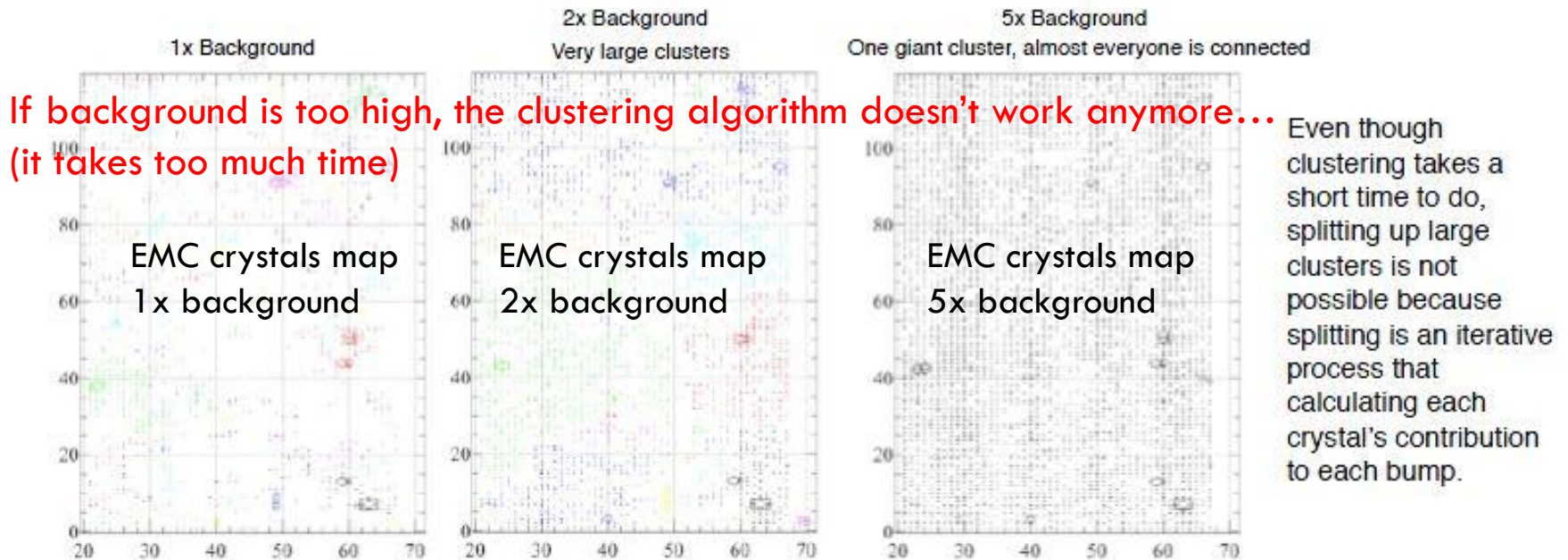
recent activity (since the Frascati meeting, Dec 2011)

- FastSim developments
 - ▣ improved subdetectors response
 - ▣ quality monitoring tools
 - ▣ skims
 - ▣ 'machine' backgrounds
 - ▣ improved documentation
- B recoil analysis, flavor tagging
- a few requests to make users's life easier
- physics tools meetings

Improved subdetectors response

□ Improved simulation of detector response for EMC and IFR

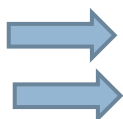
EMC: want to study EMC signal reconstruction in different background scenarios (up to 5x the nominal level)



goal: develop smarter clustering algorithm to deal with high background conditions

EMC reconstruction improvement

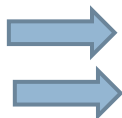
Before



CPU time per event (ms/event) consumed by modules (running 10 B0B0bar events)

Module	no bkg	1x	2x	3x	4x
PmcReconstruct	205	340	572	917	1191
PmcSimulate	60	176	290	522	625
BtaLoadMcCandidates	0	303	1671	8987	16147
PacCaloSplitMerge	1	190	3086	18178	54315
PmcRadBhabhaNeutronBkgInput	0	177	227	336	319
RacTestInput	6	80	158	317	366

**New algorithm
+ other fix**



CPU time per event (ms/event) consumed by modules (running 10 B0B0bar events)

Module	no bkg	1x	2x	3x	4x
PmcReconstruct	279	355	705	1035	1442
PmcSimulate	82	192	376	550	696
BtaLoadMcCandidates	0	34	130	243	450
PacEmcReclustering	1	4	11	15	21
PacCaloSplitMerge	0	1	1	4	11
PmcRadBhabhaNeutronBkgInput	0	171	260	291	299
RacTestInput	9	73	190	299	393

quality monitoring tools

- Need to monitor the detectors simulation output during the next production(s)
- Two parts:
 - ▣ a module for each subsystem that stores relevant information to monitor the quality in output ROOT files
 - ▣ a ROOT macro for each subsystem which produces and compares quality histograms from the ROOT file above
- Development mostly completed for all detectors
 - ▣ it will be finalized in time for the pre-production validation, when all details about the production will be defined

Skims in FastSim? Almost there...

- A *skim* is a subset of simulated data defined by a given set of selection criteria
 - ▣ example: hadronic or semileptonic tag skims, tau skims, charm skims etc..
- Skims are essential to perform physics analyses at BaBar
 - ▣ Once a skim suitable for a given analysis has been produced, one can run on the skim instead of all events, saving a factor N in time ($N=10, 10^2, 10^3, \dots$ depending on the skim)
 - ▣ for the same reason they're essential also at SuperB
- In FastSim the simulated events are not *persistent* (there are no *collections of events* saved on disk)
 - ▣ how can a skim be defined?
- Idea: define a *skim* as a collection of seeds
 - ▣ It requires that two FastSim jobs with same configuration and seed produces exactly the same output
 - ▣ It might seem trivial, but it's not: tricky changes to the FastSim code needed
- Code ready and committed. First validation tests have been successful. Validation creating realistic skims is in progress

Use of skims will have an impact on the way next productions will be organized.

Perhaps smaller impact on the coming production. I will discuss it with all relevant parties as soon as the validation is completed (assuming it's ok)

machine backgrounds

- Major issue, not only for the FastSim production (whose main goal is physics studies) but more generally for SuperB
- First simulations (Geant4) of Touschek and beam gas sources have been available for the first time recently
 - ▣ Do they give realistic estimates?
- Latest estimates of rad. Bhabhas, *pairs* and Touschek backgrounds are known to be problematic for subsystems performance (different detectors are more sensitive to different bkg sources)
 - ▣ Still open issues within the detector communities, most likely not settled before the production → Subsystems will have to make a guess on their performance assuming the 'nominal' background rates
- Touschek and beam gas backgrounds never included in FastSim so far (they were not simulated by Bruno). Work needed to include them.
- What background sources should be included in production?
 - ▣ wise balance between 'realism' and CPU time per event

Improved documentation

http://mailman.fe.infn.it/superbwiki/index.php/SuperB_fast_simulation_User_Guide

SuperB fast simulation User Guide

Welcome to the User Guide of the fast simulation of SuperB.

Contents:

- Introduction
- Simulation overview
- Getting started with FastSim
- How to install FastSim
- FastSim Releases
- How to configure the detector and machine parameters
- Generators
- Backgrounds
- Vertexing and Composition Tools
- Analysis tools
- Productions
- Tutorials
- Projects
- How to contribute, how to get help
- Obsolete pages
- HepAList migration

- FastSim simulation is improving. A few examples:
 - up to date section for beginners and new section for developers
 - Vertexing and Composition tools guides translated from BaBar
 - Analysis tools section is expanding
 - Section on skims ready but not linked till validation is complete
 - and more...
- More work (and manpower) is needed

B recoil analysis, flavor tagging

- New person (Elisabetta Baracchini, LAL) working on the semileptonic B tag tool. A. Perez available to help with the transition.
- New person (Gianluca Ingluglia, Queen Mary) working on vertexing tools.

A few requests to make users' life easier

- glimpse installed at sites
- possibility to access the complete FastSim code repository at sites
 - ▣ for example through the *PARENT* link in the workdir directory of users' test release, as in BaBar
- a minor (but still a bit annoying) problem with wiki
 - ▣ if you access to a page you might be asked to login
 - ▣ once you login, you're prompted to return to the page
 - ▣ but... the link doesn't work. It redirects you to the wiki Main Page instead

Physics tools meetings

- Regular meetings every other Thursday at 17:30 CET
- Mailing list: superb-fastsimu@lists.infn.it

agenda in Indico:

Home > Esperimenti > SuperB > Physics Meetings > Working group meetings > Tools	
♥ 2012	
February 2012	
23	 Physics tools meeting
January 2012	
26	 Physics tools meeting
12	 Physics tools meeting
♥ 2011	
November 2011	
17	 Physics tools meeting
02	 Physics tools meeting

- Development of FastSim + other physics tools (used at present with FastSim)