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Gauss current and future developments

The topics on this page are being migrated to the savannah task list. This page will become a list of supporting documentation for the savannah tasks with the number of the task indicated and that will be cross referenced from there.

Work in Progress / Open and long term topics / Closed topics

Gauss configurable

Last update : 02 October 2009

Gloria is working on this. A first version of the Gauss() configurable was made available with v37r3(p1), but not all control parameters yet. In particular the generator of non pp collisions (pgun and mib) have been reactivated with a special control in v37r4, but merging with min bias is still off. There is some issues as where to put the monitoring subphases for Generation and Simulation as part of the top level Gauss sequence (more appropriate when reading) or of the Generation and Simulation sub-sequence (more appropriate when the corresponding sub-sequence are executed). Victor Coco is working on the segmented control of geometry and simulation response of the sub-detectors.

A list of the existing control parameters and some of foreseen new one, their meaning as well as status of the implementation is available in a dedicated page

QMTests

Last update : 04 January 2010

Silvia has prepared the QMTests running the default for few events. This is in from Gauss v37r0. She has also committed a SAM test for checking the installation on remote sites, for Gauss, as the G4 geometry (hence the access) is done during the first event this means running one event.

Need to check that problems reported by Stuart of not being able to run the tests because written in 'release area' has been fixed: Marco Cl. should have modified the system to allow to write the output in other temporary directories.

A test at generator level for 1000 events has also been introduced.

Need to prepare a list of additional QMTests that may be useful, eg. some at generator level for the various generators and for signal to test EvtGen.

Test with Gauss-2008.py has been removed (obsolete file), probably a test at different energies/beam settings would also be useful.

Update: QMTests at generator-only level added in the repository for the following eventtypes (running only on 10 evts):

- 10000000
- 14103000
- 22112000
- 42112002
- 14143011 (BcVegPy)

- 60001008 (Hijing)

AppConfig and job specifications

Last update : 05 October 2009

AppConfig v3rX is used by Gauss v37r3 and higher to set the Simulation Conditions specifying the 'SIMCOND' settings and the beam settings. A list of the available steering options for is provided here.

For the MC09 detector they need to be used with Conditions/MC09-....py for the Upgrade detector with Conditions/Upgrade-....py

Additional options can be put in upon request for productions.

Spill-over and configurables

Last update : 02 October 2009

Patrick has prepared a first version of python steering for producing spillover, Gloria took this as one of the inputs to prepare the Gauss configurable and it is available in Gauss v37r3(p1).

The whole "Gauss-event" is not written out when any one of the "25nsec slots events" is failing in G4. The containers of empty events of possible spill-over are not written at all. The GenHeader and the MCHheader are written for all possible spill-over slots.

It is not possible to generate events with special generators and spill-over as the initialization of Pythia would need to be redone in this case (as the underlying code is fortran and the same, so no instances with different initializations). A mechanism similar to that of the pileup for special events will need to be put in place.

Gauss read and configurable

Raluca has provided a GaussRead.py, Gloria has began to look into it to adapt it the the generic case and it will be available as a Gauss() option.

GENSER split and re-commission extra generators

Last update : 02 October 2009

No work yet in GENSER split.

Jibo He has re-commissioned BcVegPy and extended it to work in a single release providing pdf data for 3.5+3.5TeV, 5+5TeV and 7+7TeV. The choice of PDF is now possible.

Beam settings in GenHeader and in transient SIMCOND

Last update : 02 October 2009

Patrick will look into this.

MC09 compatible ? The data members in GenHeader will be removed and methods will get them via access to class `BeamParameter` Proposed list of data members is

Energy (or Pz)
RMS bunch length (sigma_s)

GaussDevelopment < LHCb < TWiki

Normalized emittance (epsilon_n)
Revolution frequency (fixed at 11.245 kHz) (cannot be settable)
Total cross section
Effective crossing angle (better that to set external and calculate internal from Pz and mag field
Beta*
Bunch spacing (for subsequent trains, i.e. 25 nsec, 50 nsec, etc. to give possible spill-over) ?
Luminous region mean position (x,y,z)

Methods derived from above quantities:

Relativistic gamma
Relativistic beta (is it really necessary?)
Emittance (not normalized vs. E)
RMS bunch size in x
RMS bunch size in y
RMS luminous size in x for beam-beam collisions
RMS luminous size in y
RMS luminous size in z (should handle also beam gas large spread...)
Luminosity per bunch
Average number of interactions per bunch
Position of interaction in x, y and z

Investigate putting this data in FSR as it will be the same for all events in the same job.

CP violation in new EvtGen

Last update : 08 January 2010

CPV models had temporarily been switched off to prevent their use before validating them. Mark Whitehead found problems looking into the model provided by EvtGen and found solutions. They have been introduced in Gauss v38r1 and v37r3. A conversation with Anders Rys will take place on this sometime in January and we should also discuss when we want to make the new 'stable' EvtGen available to LCG Generators Service. The VHCP model written by Tristan duPree has been rechecked with the new EvtGen by Greig Cowan, and some adaptation have been introduced.

Last update : 04 January 2010

New model for leptonic B decays by Nikolai (see Gauss meeting in April). Introduced in EvtGenExtras (Gauss v37r5). Additional new models and modification by Nikolai expected soon. Some changes committed to CVS by Will Reece for models he introduced: investigate as no entries in release notes.

Anders Rys asked to give him the changes we made to EvtGen, Patrick will organize a meeting beginning of January to discuss with him and Mark Whitehead & Paul Harrison, as they did the changes. Also request by LCG Generator Service to make out version available once things have been ironed out. Should foresee a presentation by Mark to LCG monthly meeting when we deem the code can be given to them.

New Decfiles

Last update : 08 January 2010

Various new DecFiles added as necessary. The script generating automatic options should be modified to write them in configurable python form. Can the extension be kept as `.opts` ? This would simplify backward compatibility for production system.

SHERPA interface

Julian and Tobias from Dortmund, private build of new version of sherpa. In CVS but will wait to put in a release for official build of necessary version by LCG. Julian was able to generate inclusive b events with Sherpa as production engine. He observes differences in the rapidity distribution for all particles and for B mesons with respect to Pythia.

New particle property service

For next version of Gauss based on Gaudi v21r*. Backward compatible for MC09. Old one will disappear from Gaudi v22.

Hijing: 64 bits and random seeds

Last update : 02 October 2009

Plamen is looking into this.

Validation reports and checks, tuning.

Last update : 08 January 2010

Silvia worked on using the Data Quality and OMALib infrastructure, large effort. She made changes to make it work with latest Gauss v38r* and Boole v20r*. People should be in charge/define both for physics and detectors what plots to check. Silvia will look into some general ones to verify processes like gamma conversions, etc. are as observed in the data. Automatic mails when big differences? Material checks should be part of this at least for what can be done with existing code (see below for rad lenght and overlaps).

Monitors of time/steps

Stefania committed code from Olga for muons. It needs some clean up and to be extended to all detectors, an older version for that (what Olga took as guideline) exists made by one of Gloria old summer students

Material scans in parallel geometry

Silvia will prepare options to be run with current geometry structure. Once the restructuring of the LHCb -->G4 geometry is done and allow parallel geometry, this will make use of the parallel geometry. In DDDDB it will already be prepared in a parallel structure.

New mechanism for geometry 'conversion' from LHCb to G4

Last update : 08 January 2010

Marco P. is looking into this. He has began to move the converters to service methods/tools. He obtains identical material scans with this than with the converters. Next step will be to clean up the code and then to take the DetectorElement misalignment information into account more fully. Checking of overlaps at construction should/could also be introduced as an option. investigated. For the moment material checks should be included in standard tests when geometry is modified.

Overlaps in geometry

Velo group has been notified for overlap in its detector. Tom (Latham) and Mark (Whitehead) are working on the VELO overlaps and remarked that david only works for simple solids. They have found one overlap upstream of the VELO with the beam pipe. Gloria will dig up the CDD drawings for this area.

Marco (Pappagallo) is also running david when switching on the "BeforeMagnet" region and has found some overlap there.

For beam pipe cables and T envelope, Gloria will look for somebody that could do it.

Generator statistics, script and FSR

For MC09 will need to keep using the script, in the long term the FSR should be used. Need somebody (more than a summer student) to work on this.

Choice of settings (delta rays, physics lists, etc)

Last update : 08 January 2010

Delta rays have been switched on everywhere from Gauss v38r0. Possible issues. Currently we are using LHEP for hadronic physics. Known issues with this. Need to investigate other physics lists. Decide which one are worth investigating. Also known issues in processes for K \pm interactions.

Windows and builds

Work done in the past by Karl Harrison for win32 for default generator (still some problems when running). May become a problem due to availability of fortran compiler on win32. Asked to deploy/build also herwig, etc. No generators libraries on MacOS, will request it formally.

Repackaging

Idea is to separate all interfaces and base classes in a separate package for both generators and simulation. Separate LHCb specific parts from generic GiGa parts.

Revision of Tutorial

Revision of User Guide

Dark matter under RICH1

In DC06 there was the issue of some interactions being produced in the beam pipe vacuum in the RICH1 region. This was reported by Thomas R. that observed them in pp elastic collisions. Sajan think this may be due to an error in geometry where the vacuum is not put in and the gas of RICH1 is left in a small area. Sajan checked this and verified all materials (including vacuum) are correctly put in. Thomas will investigate once more statistics is available if there is still an issue for MC09.

UPDATE:

Thomas investigated using MC09 (see his slides in: <http://indico.cern.ch/conferenceDisplay.py?confId=60170>). The Z distribution of these observed proton-vacuum interactions was quite homogeneous between -4m and +1m (despite removing overlaps between DC06 and MC09, at present it seems that these interactions have increased).

Checks performed by Gloria and Silvia revealed that:

Overlaps in geometry

- the simulation in Gauss is activated starting from "BeforeMagnetRegion/Velo", i.e. from -4m to ~-1m there is no detector simulation taken into account. The interactions in that region were occurring with the Air inside the Universe.
- moving from DC06 to MC09 the way the Velo geometry is activated in Gauss has changed. The envelope "BeforeMagnetRegion/Velo" (which is filled with "vacuum" and contains all the Velo sub-elements) is no longer activated in order to avoid double counting of the Velo sub-elements (which are instead individually activated due to misalignment requirements). The result is that the mother of the sensors (and the other Velo sub-elements) is no longer "Velo" but the Universe/World (i.e. filled with Air).

Ganga doesn't put development into the tarball of the job

Last update : 04 January 2010

Jibo He reported that Ganga doesn't put BcVegPyData into the tarball of the job if one is developing its own copy. Ganga only takes care of the lib files and not of data packages built privately. Such function may also be needed for other data like the Magnetic field map. Make a feature request to the Ganga people?

Activate multiple magnetic fields

Last update : 04 January 2010

Need to integrate in Gauss() the options from Magnus Lieng. Use simcond tags or better leave it as options?

The options are:

```
GiGaGeo.FieldMgr.LHCbField.MagneticFieldService = "MultipleMagneticFieldSvc";

MultipleMagneticFieldSvc.MagneticFieldServices = { "MagneticFieldSvc", "MagneticFieldSvc/MBXWHFie

//MagneticFieldSvc.UseConditions = false;
MBXWHFieldSvc.UseConditions = false;
MBXWS1R8FieldSvc.UseConditions = false;
MBXWS1L8FieldSvc.UseConditions = false;

//MagneticFieldSvc.FieldMapFile = "$FIELDMAP";
MBXWHFieldSvc.FieldMapFile = "$FIELDMAPROOT/cdf/compensator.MBXWH.001.cdf";
MBXWS1L8FieldSvc.FieldMapFile = "$FIELDMAPROOT/cdf/compensator.MBXWS.1L8.001.cdf";
MBXWS1R8FieldSvc.FieldMapFile = "$FIELDMAPROOT/cdf/compensator.MBXWS.1R8.001.cdf";

MBXWS1L8FieldSvc.ScaleFactor = -1;
```

Selectively switch off geometry/simulation/monitor

Last update : 04 January 2010

Use Gauss().DetGeometry, etc... to selectively switch off/on geometry, simulation and monitoring of generator, detectors&infrastructures. At the moment the controls does not quite works. Partly because of configuration of algorithms, etc. Old style forcing does work as in extra python files provided.

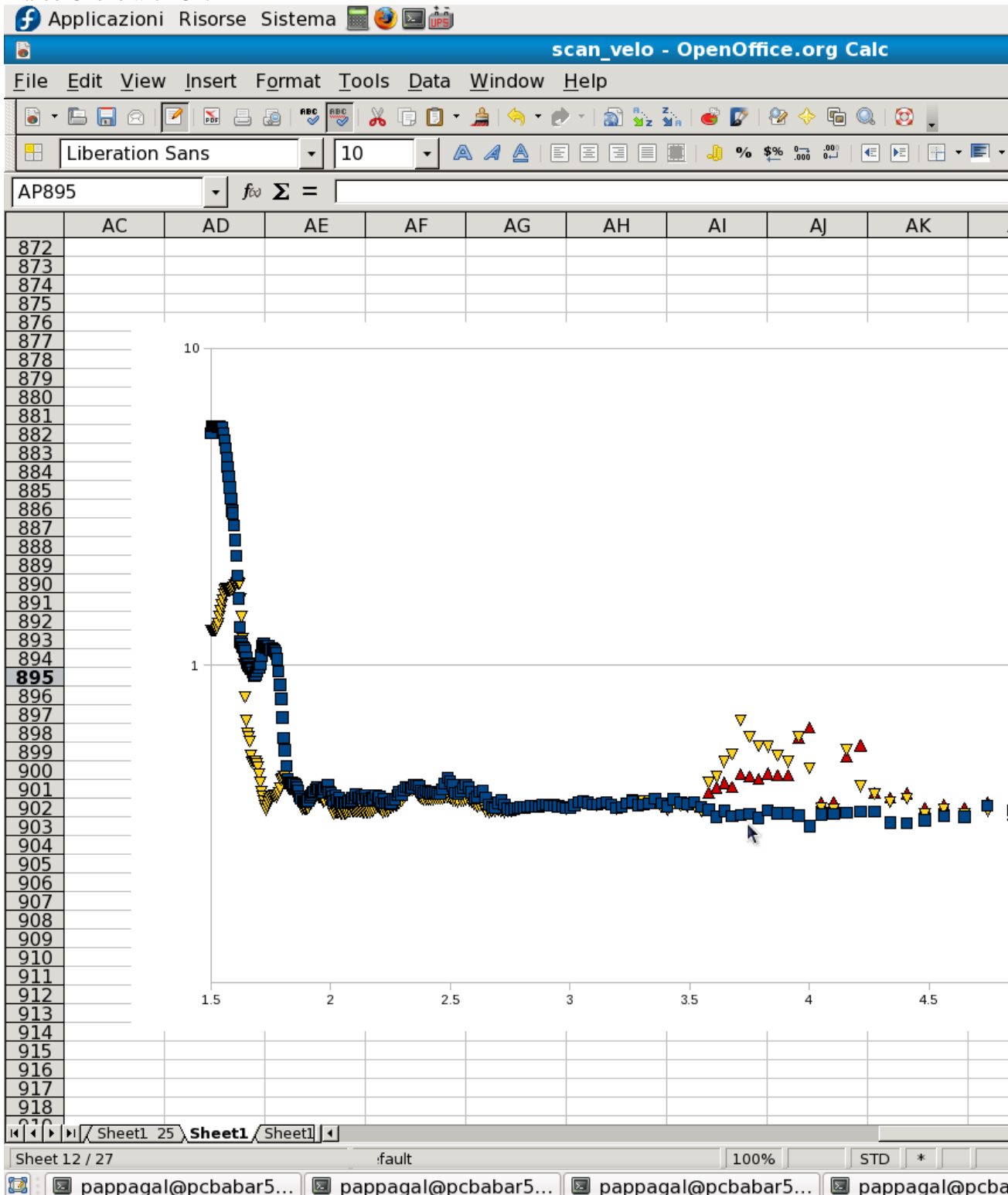
VELO new geometry

Last update : 14 January 2010

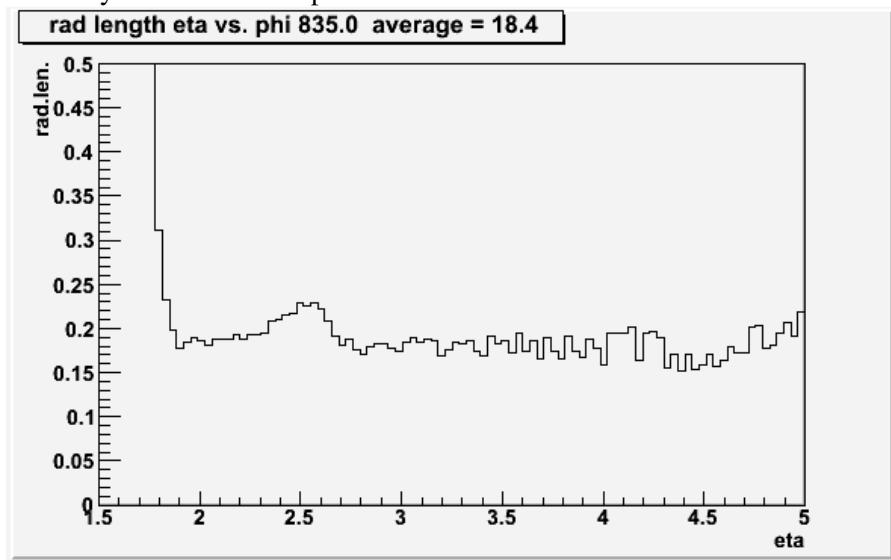
A new geometry has been introduced for the VELO in DDDDB (velo) to get closer to the really installed one by Tom Latham and Mark Whitehead. At the same time they also reviewed the VELO vacuum tank and

integrated in the VELO description the interface part to the beam pipe and RICH1 (a.k.a. Velo2Rich1). This had to be picked up by Gauss by changing the configurable when the new tag is used to include new detector elements and remove the old Velo2Rich1. This new description gave too much material as seen by the LHCb detector description and too little in the Geant4 description in Gauss. The problem has been tracked down to overlaps in the interface region and they have been fixed. At the same time Tom and Mark introduced detectors elements for all passive structures so that everything would be correctly simulated for all positions of the VELO. See

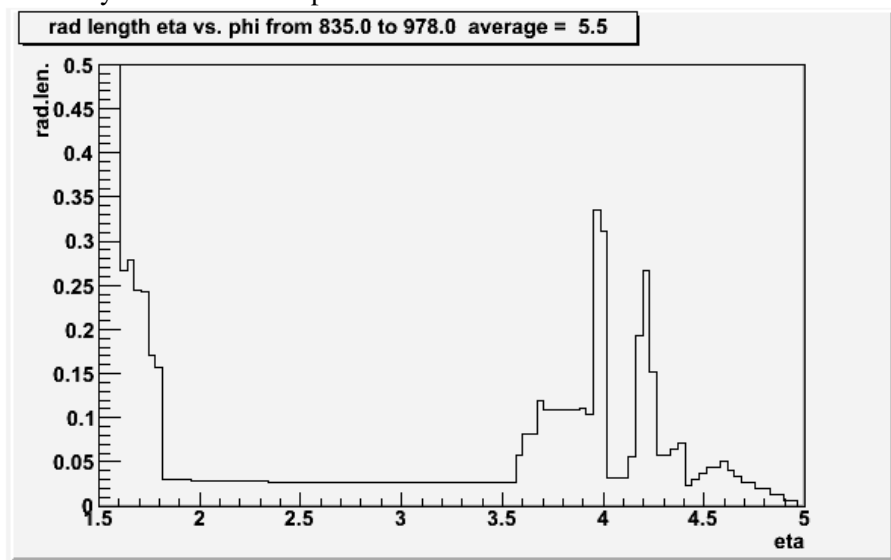
- Silvia checks with Gauss, for summary with what seen by Gauss with material scans with particle guns (Silvia)
- Marco Cheks with G4:



- Check by Tom with Transport Service before 835mm:



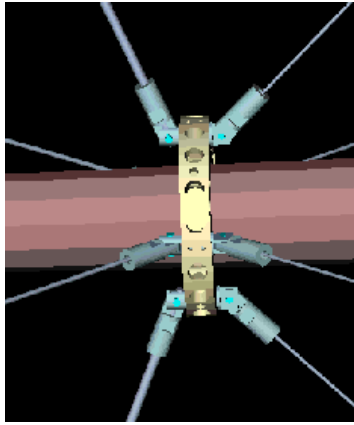
- Check by Tom with Transport Service between 835-978mm:



A new DDDDB tag will be released with this geometry and a new version of Gauss that will pick up the complete list of detector elements for this new geometry and support the older one as well.

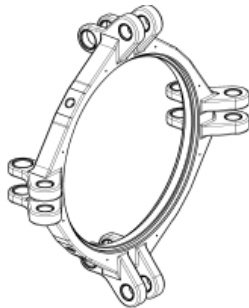
Cable attachments in beam pipe magnet supports

Last update : 27 April 2012



The current geometry for the beam pipe supports has been implemented, and has been released in DDDDB under the global tag head-20120413.

The geometry for the upgrade will look like:



This is made of beryllium and contains less material. Jimmy (Birmingham) is currently writing the xml for this geometry.

Geometry and mis-alignment for simulation

Conditions for Simulation

Migration to HepMC2

Old issues

See:

- Gloria's talk [↗](#) on 20th June 2008 (33rd software week)
- Gloria's talk [↗](#) on 30th June 2008 (TRec meeting)
- Patrick's talk [↗](#) on 2nd July 2008 (Flavour Physics meeting)

-- GloriaCorti - 22 Apr 2009

This topic: LHCb > GaussDevelopment

Topic revision: r28 - 2012-04-27 - JimmyMcCarthy



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