

# **Grid Tools for Mokka and Co.**

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# Introduction

▶ We propose to do the following centrally:

- Simulation
- Digitization
- Low-level reconstruction

on the grid for all SM processes and to provide the results for everybody.

▶ In order to do that, we have developed a set of Grid tools, databases and web interfaces, which is at the moment complete for the simulation step.

▶ In the following, we'll show how that system works.

# Simulation: introduction

- ▶ Large Mokka simulation:
  - all SM sample from SLAC;
  - both LDC01\_05Sc and LDCPrime\_01Sc;
  - priority to calibration samples and to processes needed by ongoing analysis.
- ▶ With  $50 \text{ fb}^{-1}$  of signal statistic a possible production would be:

Process	$\text{fb}^{-1}$	#events ( $*10^3$ )	Process	#events
ee->2f	20	~2500	light quark 2f at 91.2 GeV	20000
ee->4f	50	~6000		
ee->6f	50	~100	tt (6f) at 350 GeV	20000
ee->hX	50	~20		
ee-> $\gamma$ (n* $\gamma$ )	10	~600		
w (n* $\gamma$ )	20	~1700		
ee->ee	0.1	~200		
e $\gamma$ ->e $\gamma$	0.1	~650		
$\gamma$ ->X	0.1	~1000		
rest	1	~600		

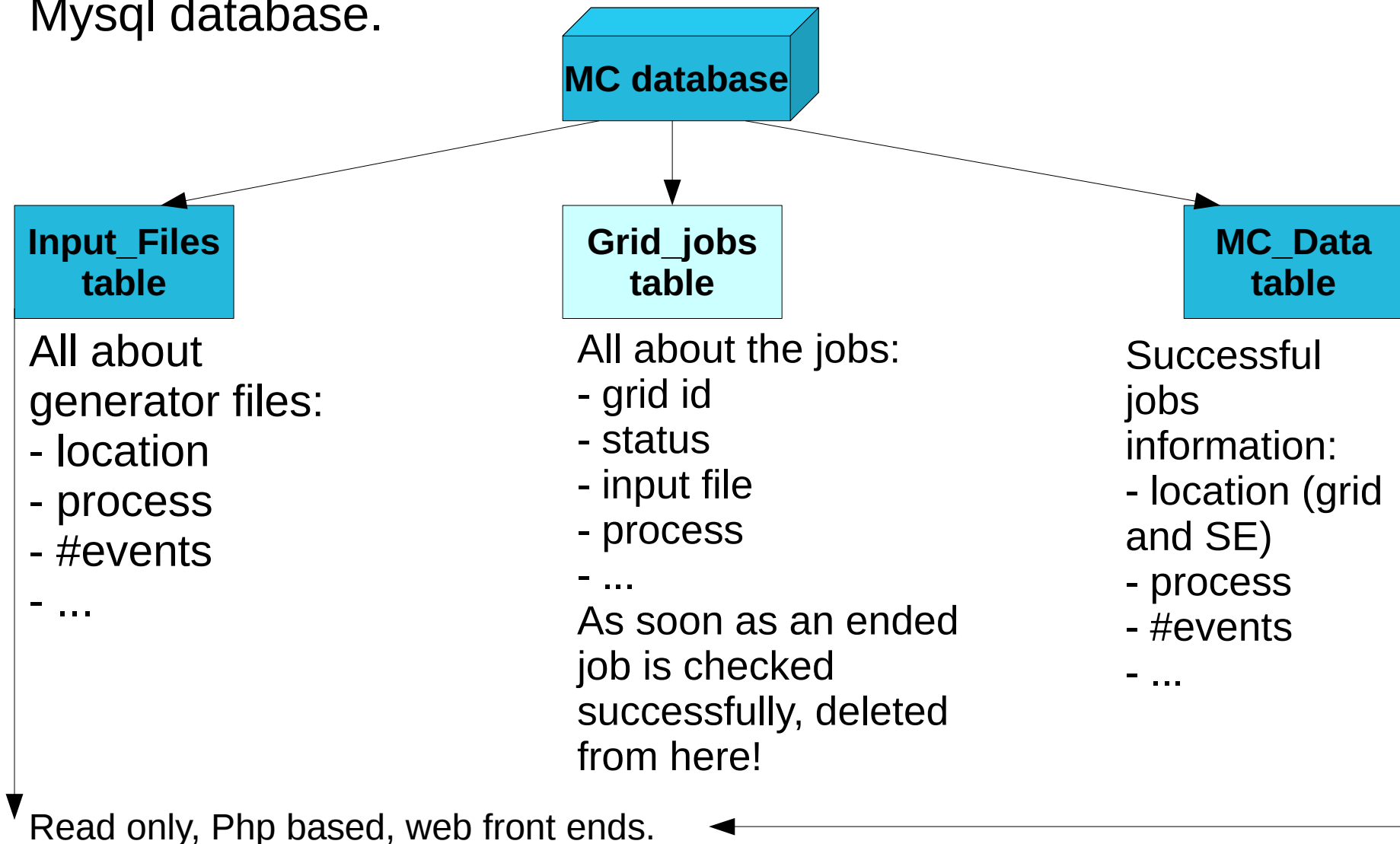
▶ This corresponds to ~14 million events for each detector model: centralized and automated production chain needed!

# Simulation: production chain

- ▶ **Automated:** scripts chain with few inputs needed.
- ▶ **Database interacting:** keep track of the generator files and the simulated .slcio files. Temporary information about the running simulations also stored.
- ▶ Mokka is run on the **Grid**:
  - Scripts download input files, Mysql, Mokka, G4 Data from SEs;
  - Dump version of the french Mokka-DB used to avoid problems of outbound connection of the CEs;
  - Simulation output stored in SEs.
- ▶ Possibility to assign production **priorities**.

# Simulation: Database structure

Mysql database.



# Input\_Files table web front

The screenshot shows a Mozilla Firefox browser window with the address bar displaying `http://www-flc.desy.de/simulation/databaseinput/`. The page title is "International Linear Collider Events File Database". Below the title are two links: [Search Database](#) and [Browse Database](#). The main heading is "Search Database".

PARAMETER	INPUT	EXAMPLE
ProcessID:	<input type="text"/>	w05323
Tag:	<input type="text"/>	Old_database, Only_a_test, New_database
Process:	<input type="text"/>	cb, n ln lh, ...
Center of Mass Energy [GeV]:	<input type="text"/>	1000, 500, ...
Cross Section[fb-1]	<input type="text"/>	Searches for cross sections not inferior to the input value
Em Polarisation [ $\pm 1.0/0.0$ ]:	<input type="text"/>	0,1,-1
Ep Polarisation [ $\pm 1.0/0.0$ ]:	<input type="text"/>	0,1,-1

The search is case insensitive.

• **Whizard nomenclature.** For the new files the process name is reported according to the Whizard nomenclature. Here a quick reminder. [WHIZARD](#)

Done

# Input\_Files table web front

International Linear Collider Events File Database – Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www-flc.desy.de/simulation/databaseinput/

Getting Started Latest Headlines

## International Linear Collider Events File Database

[Search Database](#) [Browse Database](#)

Detailed information on the selected process:

Process ID	w05448
Process	dd_o
Center of Mass Energy	500
Luminosity	57.8 fb <sup>-1</sup>
Cross Section	3545.8 fb
Number of events for this Process	1024846
Polarisation electron	1
Polarisation positron	-1

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File name	w05448_01.stdhep
Number of events	205054
Directory	/pnfs/desy.de/flc/slac/500

---

File name	w05448_02.stdhep
Number of events	204875
Directory	/pnfs/desy.de/flc/slac/500

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File name	w05448_03.stdhep
Number of events	205157

Done

# MC\_Data table web front

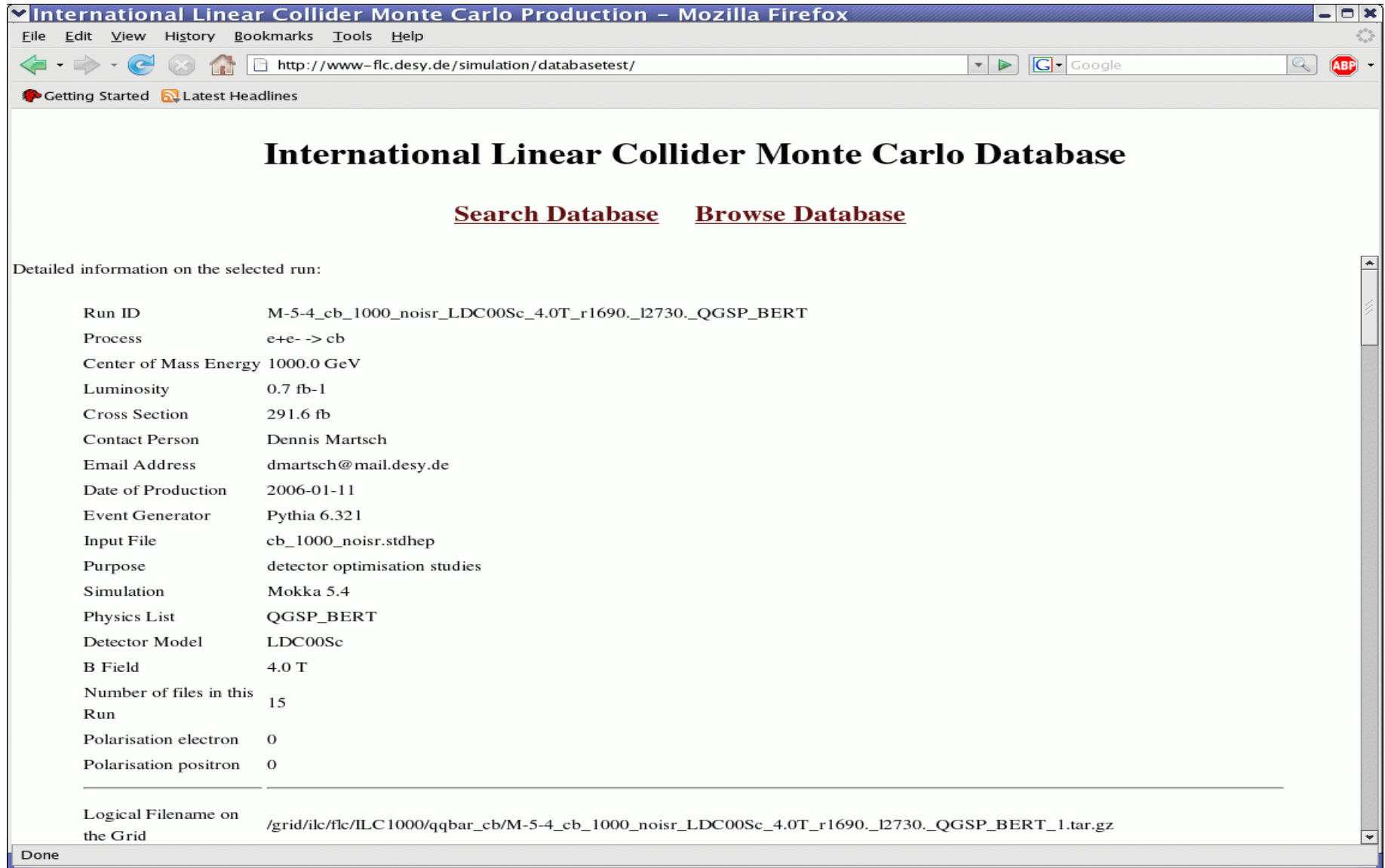
The screenshot shows a Mozilla Firefox browser window with the URL <http://www-flc.desy.de/simulation/databasetest/>. The page title is "International Linear Collider Monte Carlo Database". Below the title are two links: [Search Database](#) and [Browse Database](#). The main content is a "Search Database" form with a table of search criteria.

PARAMETER	INPUT	EXAMPLE
Run ID:	<input type="text"/>	m-5-4_cb_1000_noisr_ldc00sc_3.00t_r1690_l2730_qgsp_bert
Process:	<input type="text"/>	cb,n l n lh,...
Center of Mass Energy [GeV]:	<input type="text"/>	1000,500,...
Date of Production:	<input type="text"/>	2006-02-19,2007,12,2006-05,...
Event Generator:	<input type="text"/>	pythia,...
Detector Simulation:	<input type="text"/>	mokka,mokka 5.4,...
Detector Model:	<input type="text"/>	ldc00sc,ldc01_02sc,...
Physics List:	<input type="text"/>	qgsp_bert, lcphys,...
B Field [T]:	<input type="text"/>	3.0,4.0,...
Em Polarisation [±1.0/0.0]:	<input type="text"/>	0,1,-1
Ep Polarisation [±1.0/0.0]:	<input type="text"/>	0,1,-1

Search



# MC\_Data table web front



International Linear Collider Monte Carlo Production – Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www-flc.desy.de/simulation/databasetest/

Getting Started Latest Headlines

## International Linear Collider Monte Carlo Database

[Search Database](#) [Browse Database](#)

Detailed information on the selected run:

Run ID	M-5-4_cb_1000_noisr_LDC00Sc_4.0T_r1690_12730_QGSP_BERT
Process	e+e- -> cb
Center of Mass Energy	1000.0 GeV
Luminosity	0.7 fb-1
Cross Section	291.6 fb
Contact Person	Dennis Martsch
Email Address	dmartsch@mail.desy.de
Date of Production	2006-01-11
Event Generator	Pythia 6.321
Input File	cb_1000_noisr.stdhep
Purpose	detector optimisation studies
Simulation	Mokka 5.4
Physics List	QGSP_BERT
Detector Model	LDC00Sc
B Field	4.0 T
Number of files in this Run	15
Polarisation electron	0
Polarisation positron	0

---

Logical Filename on the Grid  
/grid/ilc/flc/ILC1000/qqbar\_cb/M-5-4\_cb\_1000\_noisr\_LDC00Sc\_4.0T\_r1690\_12730\_QGSP\_BERT\_1.tar.gz

Done

# MC\_Data table web front

International Linear Collider Monte Carlo Production - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www-flc.desy.de/simulation/databasetest/

Getting Started Latest Headlines

## International Linear Collider Monte Carlo Database

[Search Database](#) [Browse Database](#)

Steering File	M-5-4_cb_500_noisr_LDC00Sc_4.0T_r1690._l2730._QGSP_BERT_9.steer
Macro File	M-5-4_cb_500_noisr_LDC00Sc_4.0T_r1690._l2730._QGSP_BERT_9.g4
Log File	M-5-4_cb_500_noisr_LDC00Sc_4.0T_r1690._l2730._QGSP_BERT_9.log
Number of events	200
Comments	All Steering-, Macro- and Log-Files can be found in the tar-archive on the GRID

---

List all files on the Grid

- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_1.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_10.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_11.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_12.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_13.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_14.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_15.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_2.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_3.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_4.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_5.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_6.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_7.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_8.tar.gz
- /grid/ilc/flc/ILC500/qqbar\_cb/M-5-4\_cb\_500\_noisr\_LDC00Sc\_4.0T\_r1690.\_l2730.\_QGSP\_BERT\_9.tar.gz

List all .slcio files on the Grid

Done

# Grid: inputs

- ▶ The input for a new simulation is a text file with the **process** (or a specific file), the **number of events** and the **start-event** wanted.

```
ww_500_noisr.stdhep max 1000  
w05565 20000 0
```

Other requirements like detector model, physics list, ... to be set just once.

- ▶ The number-of-events is splitted into jobs automatically, according to default values (that can be changed).
- ▶ Jobs are submitted to the Grid.

# Grid: job status

- ▶ The status of the jobs together with the number of failures in their submission is updated and registered in the temporary Grid\_jobs table.

MySQLCC - [MCAdmin@flcweb01.desy.de:3306] Query Window

ob	Output_File_Name	Status	Mokka_Version	Geant4_V	Co	M	Date	Pesubnum	Col
235	rid-MCVS_2007_12_07_c	checked	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2007-12-07	0	
236	rid-MCVS_2007_12_07_c	checked	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2007-12-07	0	
237	rid-MCVS_2007_12_07_c	checked	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2007-12-07	0	
238	rid-MCVS_2007_12_07_c	Submitted	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2008-01-07	2	
239	rid-MCVS_2007_12_07_c	checked	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2007-12-07	0	
240	rid-MCVS_2007_12_07_c	new	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2007-12-07	0	
241	rid-MCVS_2007_12_07_c	checked	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2007-12-07	0	
242	rid-MCVS_2007_12_07_c	checked	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2007-12-07	0	
243	rid-MCVS_2007_12_07_c	checked	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2007-12-07	0	
244	rid-MCVS_2007_12_07_c	checked	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2007-12-07	0	
245	rid-MCVS_2007_12_07_c	Submitted	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2008-01-07	3	
246	rid-MCVS_2007_12_07_c	checked	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2007-12-07	0	
247	rid-MCVS_2007_12_07_c	checked	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2007-12-07	0	
248	rid-MCVS_2007_12_07_c	Submitted	cvsHEAD_2007_12_07	9.0version	i.mai	ivar	2008-01-07	3	

Result 1

350 rows in set (0.02) sec  
Query OK, 1 row affected (0.00) sec

Messages / History / Explain

Executing Query | Read Only

# Grid: checks and output

- ▶ The jobs are checked automatically. In the log file with the output from Mokka, the last event expected is required to be scanned. The .slcio file size is also checked.

```
>>> Event 9999, scanning sub-detectors
```

```
VXDCollection from the VXD sensitive detector has 347 hits.  
SITCollection from the SIT sensitive detector has 162 hits.  
FTDCollection from the FTD sensitive detector has 52 hits.
```

- ▶ If a job is checked successfully, information on the simulated file is written in the MC\_Data table, otherwise it is resubmitted.

# Comments

- ▶ The set of tools for the simulation has been tested and works.
- ▶ Development of similar tools for digitization and reconstruction ongoing. Same structure:
  - Running jobs on the grid;
  - Database-oriented;
  - Automated.
- ▶ Other institutes are invited to share these tools with us, to split the burden of the simulation in a coordinated way.
- ▶ The output, grouped into proper datasets, will be provided on the grid. The web interface of the database will provide location and all the information about the files.