

# Test Beam models in Mokka

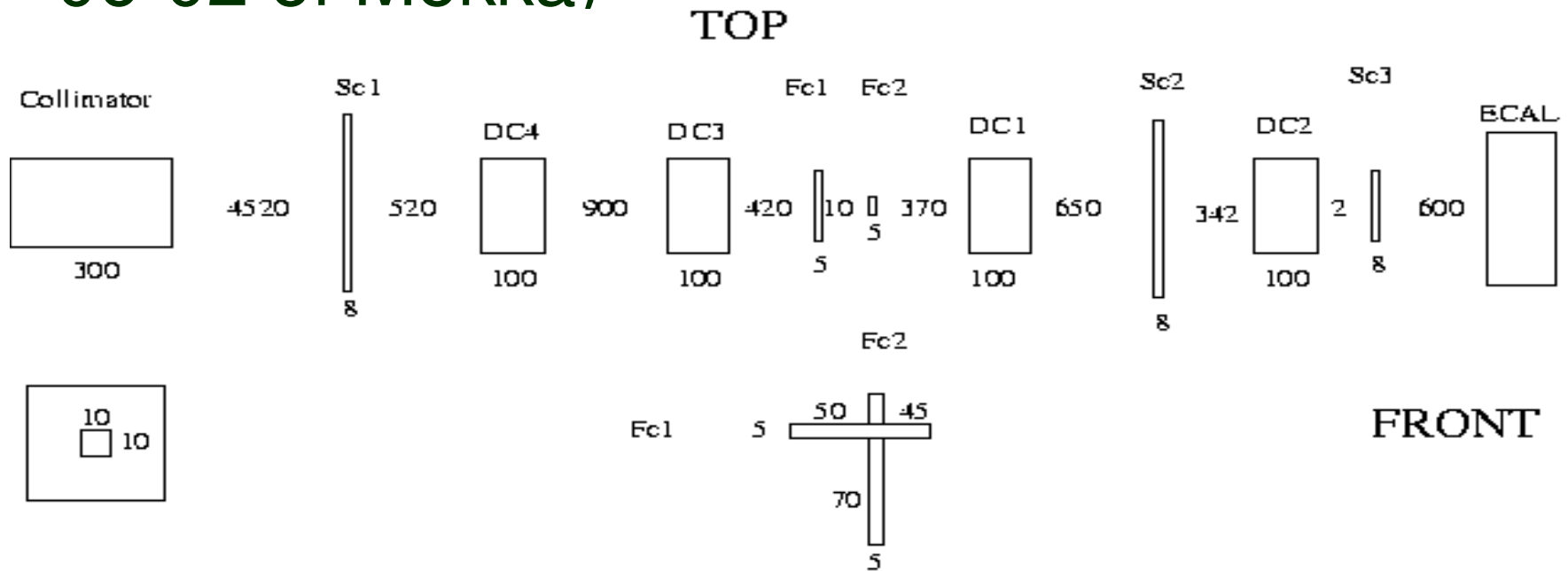
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Gabriel Musat (LLR)

Paulo Mora de Freitas (LLR)

# Desy 2006 test beam

- New model for the simulation of the Desy test beam will soon be available (in release 06-02 of Mokka)

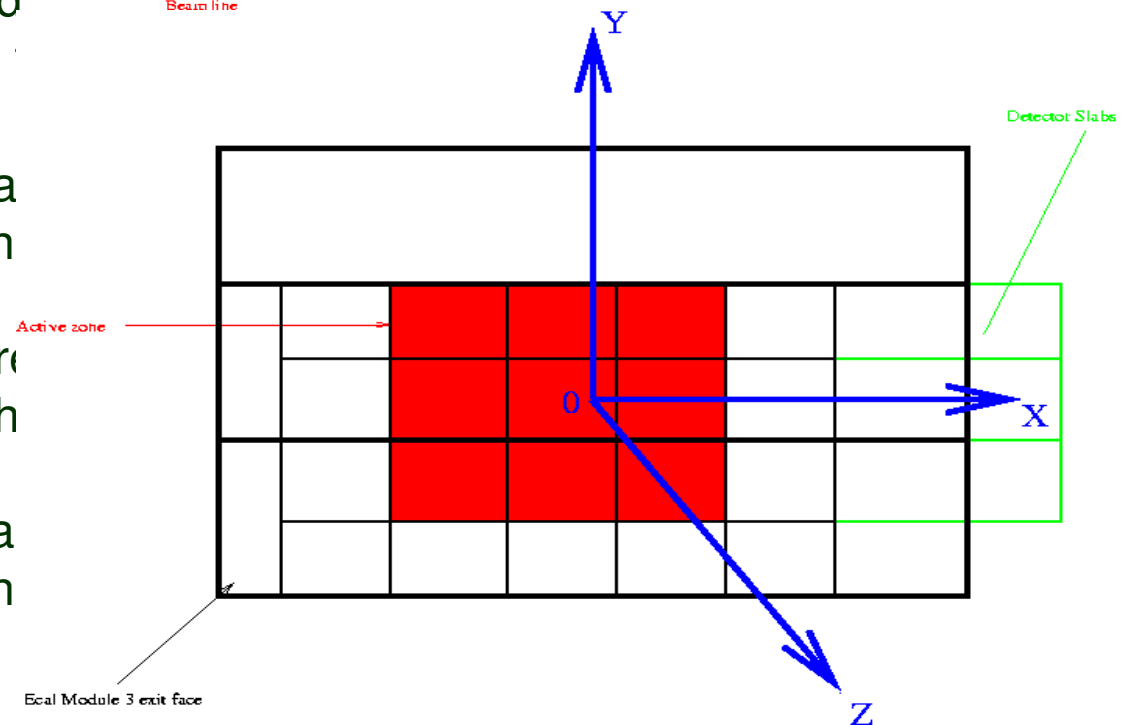
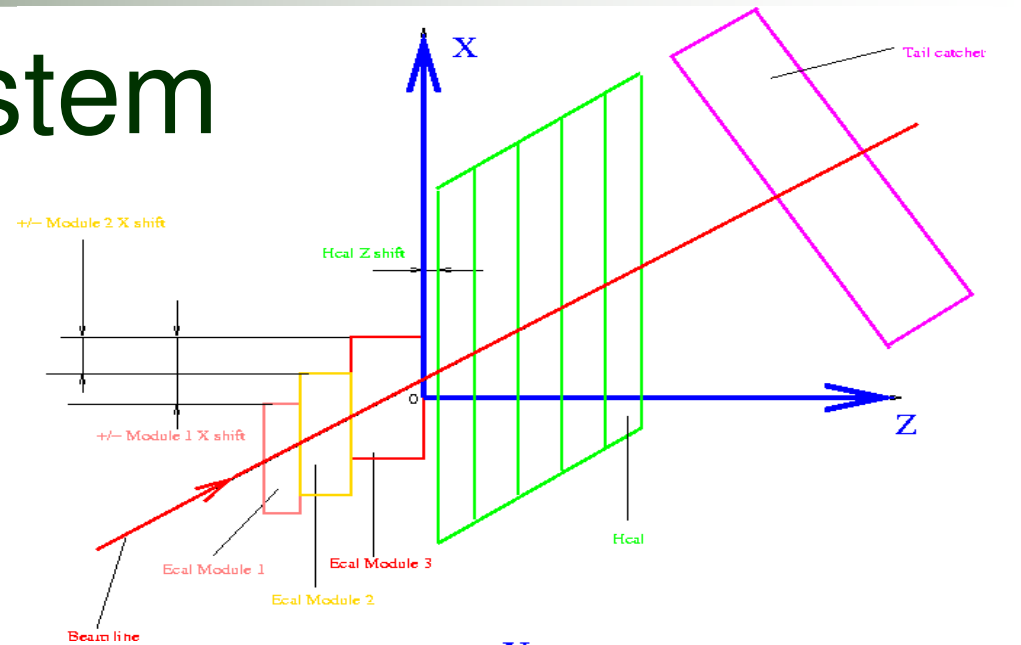


Sc1 and Sc2 are 200x200  
Sc3 is 120x120

All distances are in mm

# Coordinate system

- The  $Z = 0$  plane is the module 3 carbon fiber exit face. Since some of the beam tests are done by using only the Ecal, the coordinate system has to be tied to the Ecal rather than to the Hcal. When testing different angular positions, the modules 1 and 2 are shifted with respect to module 3 along  $\pm X$  axis.
- The  $(X, Y)$  origin of the coordinate system is a point on the carbon fiber exit face of module 3 that corresponds in  $Y$  with the centre of the active area, and in  $X$  with the symmetry centre of the module 3 exit face. The slabs are staggered along the  $X$  direction





# Detector model TBDesy0506 -I

## ■ Drift Chambers (FS):

- installed by our Japanese collaborators for the 05 test beam
- gas mixture is non-flammable (96% Ar, 4% Ethane)
  - 4 drift chambers (72x72x88 mm<sup>3</sup>)
  - hits written out in LCIO format
    - To reduce number of hits, only hits with  $E_{rel} > 0.001$  are written in output

## ■ Trigger scintillators (FS):

- 3 scintillators (one 120x120x8 mm<sup>3</sup>, two 200x200x8 mm<sup>3</sup>) used in the trigger
- hits written out in LCIO format
  - To reduce number of hits, only hits with  $E_{rel} > 0.01$  are written in output



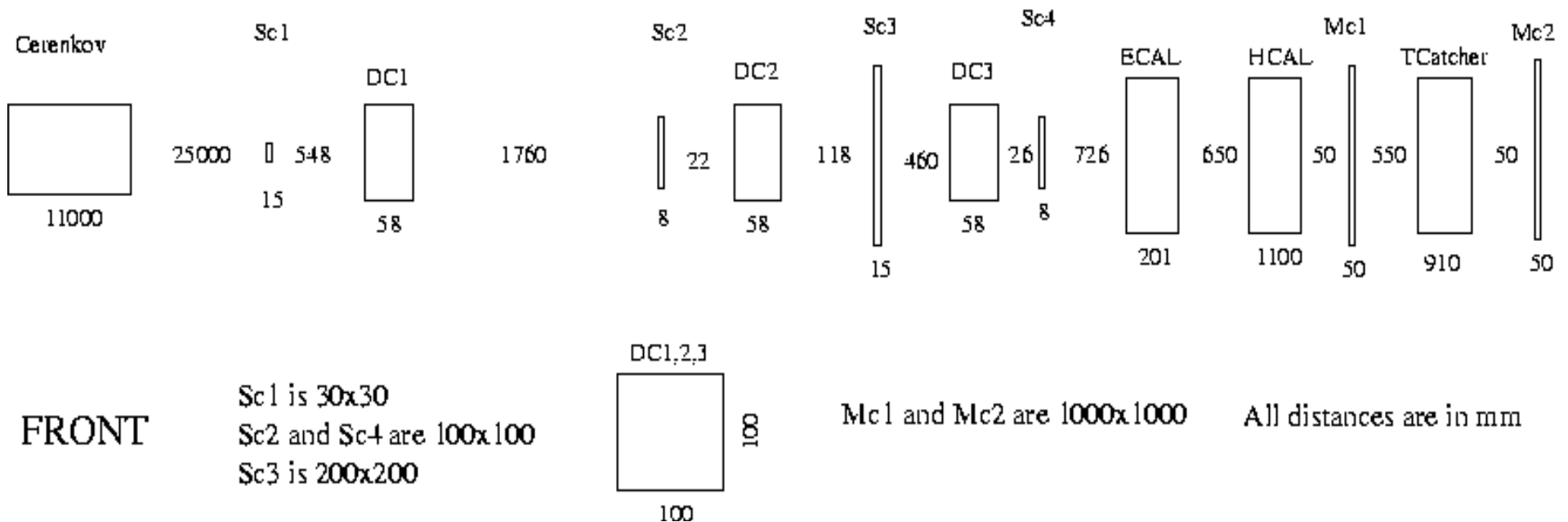
# Detector model TBDesy0506 -II

- Finger counters (FS):
  - 2 scintillators ( $5 \times 100 \times 5 \text{ mm}^3$ ) placed in T shape to monitor beam position
  - hits written out in LCIO format
    - To reduce number of hits, only hits with  $E_{\text{rel}} > 0.01$  are written in output
- ECAL (G.Musat):
  - 3 modules (5 slabs)
    - tungsten thicknesses = 1.4, 2.8, and 4.2 mm.
    - silicon planes divided into wafers
      - 6x6 cells ( $10 \times 10 \text{ mm}^2$ ), guard-rings (1 mm width).
      - Two separate hits collections, one for hits in cells and the other for hits in guard-rings.

# CERN 2006 test beam

- New model for the simulation of the CERN test beam will soon be available (in release 06-02 of Mokka)

TOP



- Same coordinate system of TBDesy0506



# Detector model TBCern0806 -I

- Cerenkov detector (FS):
  - It is upstream of the first trigger scintillator (~25 m)
    - 100x100x11000 mm<sup>3</sup>, 180μ mylar windows, helium gas
    - Only the material is simulated
- Drift Chambers (FS):
  - provided by CERN (50% Ar, 50% CO<sub>2</sub>)
    - 3 drift chambers (108x108x44 mm<sup>3</sup>)
    - hits written out in LCIO format
      - To reduce number of hits, only hits with  $E_{rel} > 0.001$  are written in output
- Trigger scintillators (FS):
  - 3 scintillators used in the trigger (one 30x30x15 mm<sup>3</sup>, two 100x100x15 mm<sup>3</sup>)
  - One veto scintillator (200x200x15 mm<sup>3</sup>)
  - hits written out in LCIO format
    - To reduce number of hits, only hits with  $E_{rel} > 0.01$  are written in output



# Detector model TBCern0806 -II

- ECAL (G.Musat):
  - same as for TBDesy0506
- HCAL (R.Poeschl, O.Wendt):
  - 39 layers (900x900x30 mm<sup>3</sup>). Each layer is composed by an iron absorber and scintillating material and is sub-divided into 90x90 mm<sup>2</sup> cells of 10x10mm<sup>2</sup> (virtual cell scheme)
    - Cell numbering scheme (from lower left corner of each layer)
      - $i = \text{row}, j = \text{column}, k = \text{layer}.$
- TailCatcher (J.McCormick, G.Lima):
  - 16 layers (absorber+air+readout module)
    - 2 different absorber thicknesses (19 mm - layers 1 to 8, 101 mm – layers 9 to 16). Readout modules: 9.5 mm. X,Y dimensions: 1168x1168 mm<sup>2</sup>
    - All absorbers in place, but only 8 readout modules (1, 4, 7, 10 – vertical strips, 2, 5, 8, 11 – horizontal strips)
- Muon Counters (FS):
  - 2 scintillators (1000x1000x50mm<sup>3</sup>)
  - hits written out in LCIO format
    - To reduce number of hits, only hits with  $E_{\text{rel}} > 0.01$  are written in output





# Comments

- Desy model: some material on the beam line not yet implemented
  - Collimator: should not be crucial when generating MC events for this setup
- CERN model: work is still in progress to finalize some of the drivers
  - TailCatcher: still some discrepancy (e.g. air gaps) between the real prototype and simulation
- Almost ready to start MC production !

# The new MOKKA web site

<http://polywww.in2p3.fr:8081/MOKKA>



The screenshot shows the MOKKA web site in a Mozilla Firefox browser window. The browser's address bar displays the URL <http://polywww.in2p3.fr:8081/MOKKA>. The browser's toolbar includes icons for back, forward, home, and search. The browser's bookmark bar shows several sites, including mozilla.org, mozdev.org, GoogleSearch, and Google. The browser's tab bar shows several tabs, including UNIVERSITY OF OXFORD, Fabrizio SALVATORE Home Page, La Repubblica.it » Homepage, BBC SPORT, and Mokka - MOKKA. The Mokka - MOKKA tab is active, and the browser's status bar shows "Done".

The Mokka - MOKKA web site features a navigation menu with links for home, members, news, events, detector models, software, database, and download. A search bar is located in the top right corner. The main content area displays the title "Mokka" and a sub-header "A detailed Geant4 simulation for the International Linear Collider detectors". The text describes the simulation and its history, mentioning the TESLA project and the Mokka geometry database. A list of links is provided, including "History and old stuff", "Detector models simulated by Mokka", "Geometry Database", "Documentation for users and developers", and "Download Mokka".

On the right side of the page, there is a "news" section with a link to "mokka-06-01" dated "2006-07-20" and a "More news..." link. Below the news section is a calendar for "September 2006" with a grid of dates. The date "12" is highlighted in a red box.

In the bottom right corner of the page, the names "Paulo Mora de Freitas", "Gabriel Musat", and "Fabrizio Salvatore" are listed.

# All info about detector models

The screenshot shows a Mozilla Firefox browser window with the address bar displaying `http://polywww.in2p3.fr:8081/MOKKA/detector-models`. The browser's toolbar includes icons for home, back, forward, stop, refresh, and search. The website's navigation menu includes links for home, members, news, events, detector models, software, database, and download. The main content area is titled "Detector models" and contains the following text:

**Detector models**  
▲ Up one level

**Models in the Mokka database availables for simulation.**

- [Detector Models](#) by Paulo Mora de Freitas — last modified 2006-09-04 16:59  
We describe here some of the actual models in the Mokka database availables for simulation.
- [LDC](#) by Paulo Mora de Freitas — last modified 2006-07-19 17:46  
LDC models.
- [SiD](#) by Paulo Mora de Freitas — last modified 2006-07-19 17:52  
SiD models.
- [Tesla](#) by Paulo Mora de Freitas — last modified 2006-07-20 11:47  
Tesla Models
- [Test beams](#) by Paulo Mora de Freitas — last modified 2006-09-08 15:44

The "Test beams" link is circled in red. On the right side of the page, there is a "news" section with a link to "mokka-06-01" dated "2006-07-20" and a "More news..." link. Below that is a calendar for "September 2006" with the date "12" highlighted. The browser's status bar at the bottom shows "Done".

# Test Beam models

Test beams — MOKKA - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://polywww.in2p3.fr:8081/MOKKA/detector-models/test-beams/test-beams/

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## Test beams

by Fabrizio Salvatore — last modified 2006-09-12 15:03  
Contributors: mora, musat

**Description of the test beam models that have been implemented in Mokka in spring/summer 2006**

Models are available to generate MC events simulating the detectors and beam conditions at the Desy (05/06) and Cern (08-09/06) test beams. These models are called **TBDesy0506** and **TBCern0806** respectively and are described below.

**TBDesy0506.** A sketch of the test beam area can be found at the following URL:  
<http://www.pp.rhul.ac.uk/~calice/fab/TestBeams/DesytbArea.ps>. The coordinate system is left-handed, with the z axis along the beam line. The backside of the ecal defines the z=0 of our setup. The detectors that have been simulated on the beam line (starting from the upstream collimator) are described in the following.

**Sc1, Sc2, Sc3:** trigger scintillators; dimensions: 200x200x8 mm (120x120x8 mm for **Sc3**). Sc3 is placed between the last drift chamber (**DC2**) and the ECAL module (see sketch of the tb area and below for more description). Sc1 is placed in front of the first drift chamber (**DC4**), 4520 mm after the exit window of the collimator. Hits in the scintillators are simulated as 'tracker hits'. The format of the output from the drivers that build these detector is standard LCIO. In order to output only primary hits, only hits with a deposited energy greater than 0.01 are stored.

**DC1, DC2, DC3, DC4:** drift chambers; dimensions: 72x72x88 mm. The gas mixture used is 96% Argon and 4% Ethane. The front and back windows (20 micron) are made of mylar. For convention, the drift

news

- mokka-06-01  
2006-07-20

More news...

September 2006

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Done



# Not just dm, though....

- Useful ‘tabbed’ browsing allows users to gather information about:
  - Software: documentation, installation guide, user’s guide;
  - Database: description of the detector’s db;
  - News about MC releases;
  - Download: Mokka and Mokka-related tags
- Work is still in progress but a lot of useful information is already available



# What can users do....

## ■ Use it !

- All information about the various detector model that are implemented in Mokka will be kept updated
- Give us feedback on what information you would like to have, what is missing or incomplete.

## ■ Join in !

- Help us filling out the missing bits and keeping all relevant information for all members of the collaboration



# Other improvements in Mokka 06-02 -I

- SEcal01 super driver is now available to build the Ecal modules with three different thicknesses for the radiator layer (P.Mora de Freitas)
  - Two new database parameters were introduced:
    - Ecal\_nlayers3: Number of layers in the last section of the Ecal (closer to HCAL);
    - Ecal\_radiator\_layers\_set3\_thickness: radiator thickness of the last Ecal\_nlayers3 layers.
    - Defaults set to 0 (standard models use just two different sets of radiator thickness for the Ecal)
- Run Mokka in Batch Mode (P.Mora de Freitas)
  - /Mokka/init/BatchMode true
    - the users can now launch Mokka in batch mode, without an interactive session
    - If BatchMode is set in the given steering file, Mokka executes just the macro file specified in it and exits



# Other improvements in Mokka 06-02 -II

- Location of MySQL-related files in Makefile (A.Vogel):

- Use MYSQL\_INCLUDEDIR and MYSQL\_LIBDIR
- Use MYSQL\_PATH, if defined (default in v06-01 and before)
- Use the "mysql\_config" tool (if it is in \$PATH)
- Use "/usr/lib/mysql" and "/usr/include/mysql" as a default
- For further information:

<http://forum.linearcollider.org/index.php?t=tree&th=227>

<http://dev.mysql.com/doc/refman/5.0/en/installation-layouts.html>

<http://dev.mysql.com/doc/refman/5.0/en/mysql-config.html>

- TPC improvements (P.Krstonosic):

- tpc\_skin introduced to have momenta at entrance and exit of TPC
- Simulation of central plate - dead region at exactly 90 degrees
- End plate with gem-tower: shorter (160 mm), to reflect DOD design

- Yoke and Muon system (P.Krstonosic):

- Yoke geometry fixed and preliminary muon system added





# Other improvements in Mokka 06-02 -III

- Bug fixed in MokkaGEAR output for TPC (F.Gaede, R.Lippe)
  - The values for the pad width and the pad height are now set to zero in order to indicate that the driver makes no assumption about the size of the readout pads
- Added MokkaGEAR Output for Vertex (VXD00+VXD01) (F.Gaede, R.Lippe)
  - Requires GEAR v00-03
  - Writes Gear description for the vertex detector(s) based on a ladder layout
    - For VXD00, 36 ladders are written out to approximate the cylindrical shape
- New plugin: see [Mokka/source/Plugin/JDoePlugin/Readme](#)
- Improved Error Handling for MySQL NULL Values (A.Vogel)
  - The methods "Database::fetchDouble", "fetchInt", and "fetchString" will now abort with a meaningful error message when they encounter an unexpected MySQL NULL value instead of just crashing with a segmentation fault



# Summary

- New version of Mokka (06-02) will be available soon, with several important improvements and new detectors for the simulation of Desy and CERN test beam data
  - Ready to start producing MC events to compare with data taken this summer
- New Mokka WEB page, will provide up-to-date information on all detector models, software, database, etc...
  - Join in to help us improving it !