



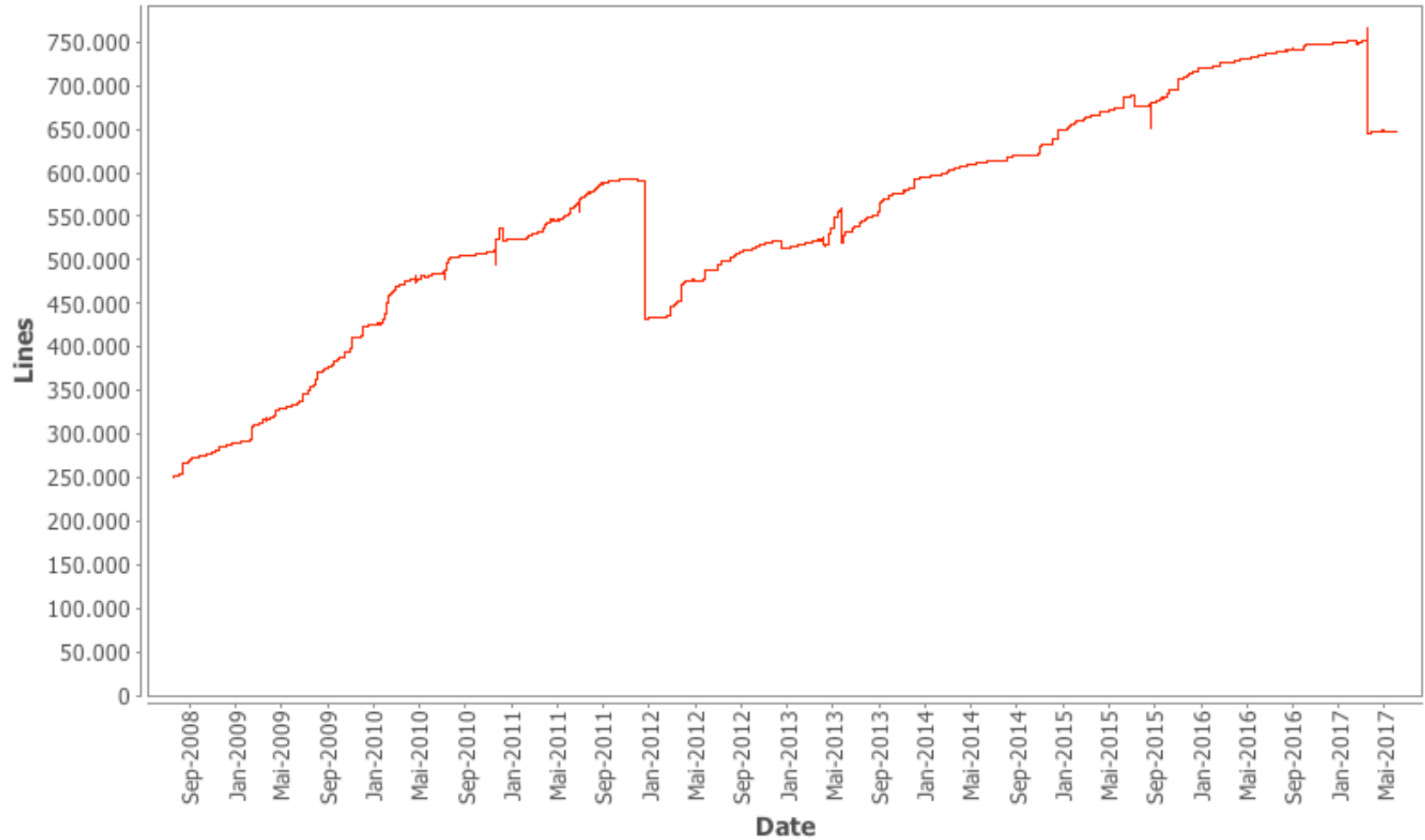
# Introduction

## PANDA Computing School 2017 - SUT

Juli 3, 2017

- 3<sup>rd</sup> generation PANDA framework
- Born around 2005, official since 2006
- Initiated by Giessen, Jülich, Pavia, and Torino
- Derived from CBMroot, today FairRoot
  
- Aims for full simulation and reconstruction, low-threshold usage, ROOT+VMC-based, modular and virtual design, platform independent, dynamic data structure, ...

## /pandaroot/trunk: Lines of Code



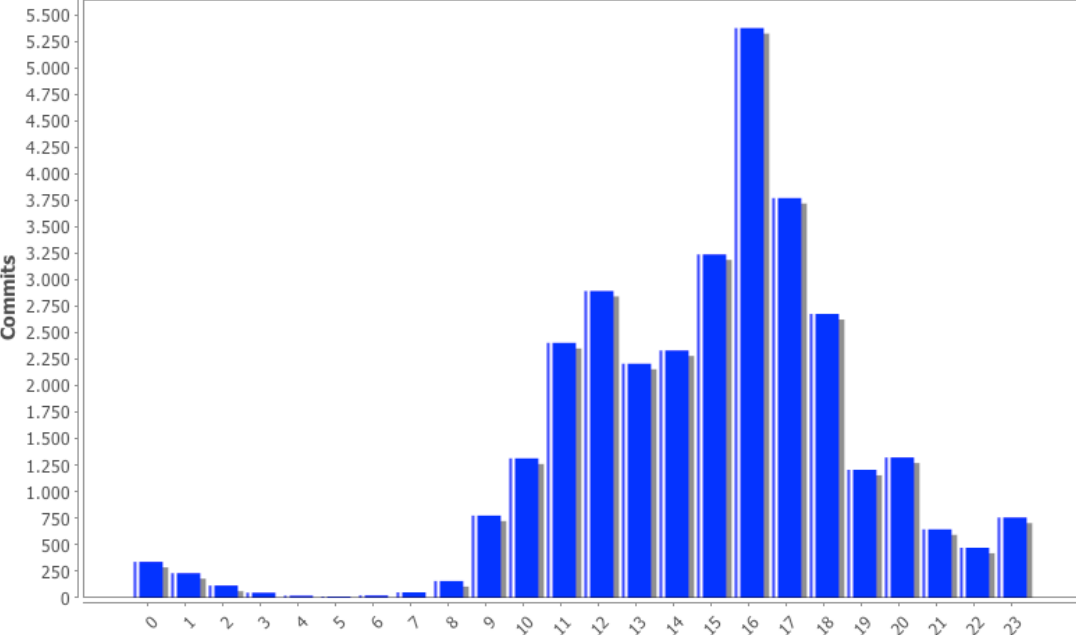
# Developers

Number of Developers:  
74

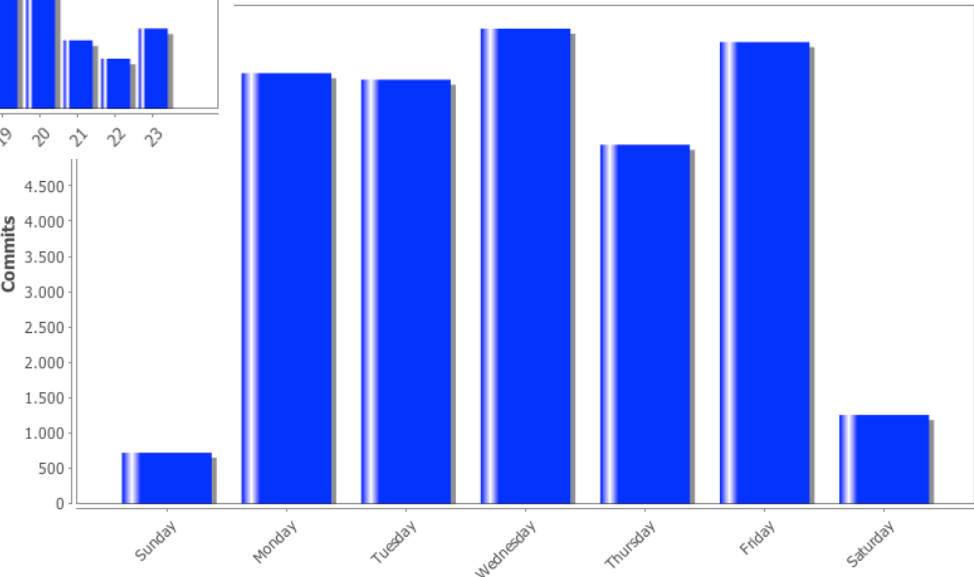
Author	Author Id	Changes	Lines of Code	Lines per Change
<a href="#">tstockm</a>	<a href="#">tstockm</a>	3214 (10.4%)	139807 (10.8%)	43.4
<a href="#">gboca</a>	<a href="#">gboca</a>	1004 (3.3%)	136869 (10.5%)	136.3
<a href="#">ralfk</a>	<a href="#">ralfk</a>	4563 (14.8%)	100531 (7.7%)	22.0
<a href="#">sneubert</a>	<a href="#">sneubert</a>	467 (1.5%)	88367 (6.8%)	189.2
<a href="#">lia</a>	<a href="#">lia</a>	1247 (4.0%)	75541 (5.8%)	60.5
<a href="#">kgoetzen</a>	<a href="#">kgoetzen</a>	849 (2.8%)	63634 (4.9%)	74.9
<a href="#">turany</a>	<a href="#">turany</a>	4019 (13.0%)	63162 (4.9%)	15.7
<a href="#">fboehmer</a>	<a href="#">fboehmer</a>	824 (2.7%)	52754 (4.1%)	64.0
<a href="#">spataro</a>	<a href="#">spataro</a>	2805 (9.1%)	50042 (3.8%)	17.8
<a href="#">pflueger</a>	<a href="#">pflueger</a>	1228 (4.0%)	47715 (3.7%)	38.8
<a href="#">mbabai</a>	<a href="#">mbabai</a>	2118 (6.9%)	45361 (3.5%)	21.4
<a href="#">rhoher</a>	<a href="#">rhoher</a>	269 (0.9%)	37552 (2.9%)	139.5
<a href="#">karabowi</a>	<a href="#">karabowi</a>	845 (2.7%)	32544 (2.5%)	38.5
<a href="#">carsten</a>	<a href="#">carsten</a>	787 (2.6%)	26440 (2.0%)	33.5
<a href="#">soeren</a>	<a href="#">soeren</a>	73 (0.2%)	25889 (2.0%)	354.6
<a href="#">asanchez</a>	<a href="#">asanchez</a>	254 (0.8%)	21968 (1.7%)	86.4
<a href="#">karavdina</a>	<a href="#">karavdina</a>	466 (1.5%)	20846 (1.6%)	44.7
<a href="#">hoepfner</a>	<a href="#">hoepfner</a>	395 (1.3%)	20747 (1.6%)	52.5
<a href="#">johan</a>	<a href="#">johan</a>	467 (1.5%)	19459 (1.5%)	41.6
<a href="#">gorbunov</a>	<a href="#">gorbunov</a>	74 (0.2%)	17320 (1.3%)	234.0
<a href="#">MartinJGaluska</a>	<a href="#">MartinJGaluska</a>	416 (1.4%)	16721 (1.3%)	40.1
<a href="#">bkopf</a>	<a href="#">bkopf</a>	180 (0.6%)	16152 (1.2%)	89.7
<a href="#">rklasen</a>	<a href="#">rklasen</a>	209 (0.7%)	15367 (1.2%)	73.5
<a href="#">sdorheim</a>	<a href="#">sdorheim</a>	325 (1.1%)	14649 (1.1%)	45.0
<a href="#">dimam</a>	<a href="#">dimam</a>	323 (1.0%)	13634 (1.0%)	42.2
<a href="#">Jojo1987</a>	<a href="#">Jojo1987</a>	435 (1.4%)	13587 (1.0%)	31.2
<a href="#">steinen</a>	<a href="#">steinen</a>	65 (0.2%)	11491 (0.9%)	176.7
<a href="#">mpatsyuk</a>	<a href="#">mpatsyuk</a>	170 (0.6%)	11435 (0.9%)	67.2
<a href="#">lwoerner</a>	<a href="#">lwoerner</a>	185 (0.6%)	10565 (0.8%)	57.1
<a href="#">rdzhygado</a>	<a href="#">rdzhygado</a>	219 (0.7%)	9459 (0.7%)	43.1
<a href="#">beloborodov</a>	<a href="#">beloborodov</a>	121 (0.4%)	8142 (0.6%)	67.2
<a href="#">jasinski</a>	<a href="#">jasinski</a>	72 (0.2%)	7695 (0.6%)	106.8
<a href="#">garzia</a>	<a href="#">garzia</a>	88 (0.3%)	6648 (0.5%)	75.5
<a href="#">chammann</a>	<a href="#">chammann</a>	121 (0.4%)	6587 (0.5%)	54.4
<a href="#">mamichel</a>	<a href="#">mamichel</a>	87 (0.3%)	5560 (0.4%)	63.9
<a href="#">vanni</a>	<a href="#">vanni</a>	226 (0.7%)	5421 (0.4%)	23.9
<a href="#">mustafa</a>	<a href="#">mustafa</a>	57 (0.2%)	4296 (0.3%)	75.3
<a href="#">bianco</a>	<a href="#">bianco</a>	83 (0.3%)	3830 (0.3%)	46.1
<a href="#">awronska</a>	<a href="#">awronska</a>	169 (0.5%)	3224 (0.2%)	19.0
<a href="#">tsito</a>	<a href="#">tsito</a>	211 (0.7%)	2743 (0.2%)	13.0

<a href="#">sesch</a>	<a href="#">sesch</a>	73 (0.2%)	2329 (0.2%)	31.9
<a href="#">abiegun</a>	<a href="#">abiegun</a>	32 (0.1%)	1904 (0.1%)	59.5
<a href="#">nsaito</a>	<a href="#">nsaito</a>	13 (0.0%)	1869 (0.1%)	143.7
<a href="#">uhlig</a>	<a href="#">uhlig</a>	161 (0.5%)	1676 (0.1%)	10.4
<a href="#">peterk</a>	<a href="#">peterk</a>	29 (0.1%)	1629 (0.1%)	56.1
<a href="#">aherten</a>	<a href="#">aherten</a>	24 (0.1%)	1583 (0.1%)	65.9
<a href="#">xzhang</a>	<a href="#">xzhang</a>	12 (0.0%)	1564 (0.1%)	130.3
<a href="#">ddutta</a>	<a href="#">ddutta</a>	20 (0.1%)	1448 (0.1%)	72.4
<a href="#">liangyt</a>	<a href="#">liangyt</a>	22 (0.1%)	1389 (0.1%)	63.1
<a href="#">kmakonyi</a>	<a href="#">kmakonyi</a>	12 (0.0%)	1335 (0.1%)	111.2
<a href="#">DominikSteinschaden</a>	<a href="#">DominikSteinschaden</a>	73 (0.2%)	1290 (0.1%)	17.6
<a href="#">mzyzak</a>	<a href="#">mzyzak</a>	11 (0.0%)	1282 (0.1%)	116.5
<a href="#">kkoop</a>	<a href="#">kkoop</a>	107 (0.3%)	1193 (0.1%)	11.1
<a href="#">dmorozov</a>	<a href="#">dmorozov</a>	32 (0.1%)	691 (0.1%)	21.5
<a href="#">susanna</a>	<a href="#">susanna</a>	31 (0.1%)	661 (0.1%)	21.3
<a href="#">M.Babai</a>	<a href="#">M.Babai</a>	61 (0.2%)	610 (0.0%)	10.0
<a href="#">acecchi</a>	<a href="#">acecchi</a>	51 (0.2%)	590 (0.0%)	11.5
<a href="#">reinecke</a>	<a href="#">reinecke</a>	49 (0.2%)	557 (0.0%)	11.3
<a href="#">huagen</a>	<a href="#">huagen</a>	38 (0.1%)	432 (0.0%)	11.3
<a href="#">DavidPohl</a>	<a href="#">DavidPohl</a>	35 (0.1%)	418 (0.0%)	11.9
<a href="#">vandenbm</a>	<a href="#">vandenbm</a>	35 (0.1%)	358 (0.0%)	10.2
<a href="#">vmichael</a>	<a href="#">vmichael</a>	36 (0.1%)	271 (0.0%)	7.5
<a href="#">bspruck</a>	<a href="#">bspruck</a>	25 (0.1%)	261 (0.0%)	10.4
<a href="#">mertens</a>	<a href="#">mertens</a>	11 (0.0%)	234 (0.0%)	21.2
<a href="#">lackermann</a>	<a href="#">lackermann</a>	10 (0.0%)	217 (0.0%)	21.7
<a href="#">dkhaneft</a>	<a href="#">dkhaneft</a>	7 (0.0%)	206 (0.0%)	29.4
<a href="#">rodionov</a>	<a href="#">rodionov</a>	9 (0.0%)	201 (0.0%)	22.3
<a href="#">dariusch</a>	<a href="#">dariusch</a>	12 (0.0%)	197 (0.0%)	16.4
<a href="#">mberger</a>	<a href="#">mberger</a>	12 (0.0%)	64 (0.0%)	5.3
<a href="#">fcusanno</a>	<a href="#">fcusanno</a>	10 (0.0%)	52 (0.0%)	5.2
<a href="#">prencipe</a>	<a href="#">prencipe</a>	4 (0.0%)	31 (0.0%)	7.7
<a href="#">NazilaDivani</a>	<a href="#">NazilaDivani</a>	4 (0.0%)	11 (0.0%)	2.7
<a href="#">moini</a>	<a href="#">moini</a>	4 (0.0%)	8 (0.0%)	2.0
<a href="#">andrea</a>	<a href="#">andrea</a>	2 (0.0%)	0 (0.0%)	0.0
Totals		30797 (100.0%)	1300315 (100.0%)	42.2

/pandaroot/trunk: Activity by Hour of Day



/pandaroot/trunk: Activity by Day of Week



analysis array base build calculation **change** charge check class classe clean  
cluster cmakelist **code comment** commented compilation constructor correct corrected  
correction cosmetic cout **data** debug default delete detector digi **error** event example fairlink  
**file** finder first **fixed** fixes fixing flag function genfit geometry hits ideal  
implementation implemented improve **include** info initialization leak line list **macro** memory  
**method** minor **missing** modification modified move name number obsolete only option  
**output** parameter part photon plane plot pndtrack pndtrackcand point position print problem  
propagation reco **remove** removing root setting simulation **small** stuff **task** test  
time **track** **update** using value variable **version** warn working wrong

# USEFUL TOOLS

- The place to find all different kind of information
- <https://panda-wiki.gsi.de/cgi-bin/view/Computing>

Sie sind hier: PANDA Wiki > Computing Web > WebHome (14 Jun 2017, TobiasStockmanns)

Editieren Anhang

## Computing

- ↓ Computing
  - ↓ PandaRoot
  - ↓ PandaGrid
  - ↓ PandaSoftwareWorkPackages
  - ↓ PandaSlowControl
  - ↓ CadConverter
  - ↓ PandaComputingCommittee
  - ↓ PandaComputingModel
  - ↓ PandaComputingDetectorContactPersons

### PandaRoot

**PandaRoot** is PANDA experiment's simulation and reconstruction software package. The first **PandaRoot** simulation-reconstruction chain was successfully tested on the **PANDA Grid** in **February 2007**.

### PandaGrid

**PANDA Grid** is based on **AliEn2** gridware.

### PandaSoftwareWorkPackages

This page is obsolete. We have moved to Pandamine as an issue tracker which can be found [here](#)

### PandaSlowControl

Slow controls are part of the detector control system (**DCS**). The **PandaSlowControl** wiki contains a few ideas from the computing group's point of view.

### CadConverter

The **Cad Converter** is a tool to convert STEP files coming from a CAD program into ROOT files. These ROOT files can be used as a geometry file in **PandaRoot**

### PandaComputingCommittee

The **Panda Computing Committee** is an advisory board for the computing activities. The main task of this committee is to assist the computing coordinator as described in more detail in the Panda Governance Rules.

### PandaComputingModel

The **Panda Computing Model** provides a model of the computing infrastructure for Panda and to be used for internal and external references. In particular, it will be used as input for a white paper describing the computing infrastructure for the FAIR facility.

### PandaComputingDetectorContactPersons

The **Panda Computing Detector Contact Persons** are responsible for the (sub-)detector specific code inside **PandaRoot** and should stay in close contact with the detector developing groups of their (sub-)detector



Sie sind hier: PANDA Wiki > Computing Web > PandaRoot (18 May 2017, TobiasStockmanns)

## PandaRoot

- ↓ PandaRoot
  - ↓ Suggested version of the code
  - ↓ Basics
  - ↓ HOWTO's for running PandaRoot
  - ↓ Structure of Code (Class Inheritance)
  - ↓ Status of Code
  - ↓ Reconstruction and Analysis
  - ↓ Additional Information
  - ↓ Meetings and Workshops
  - ↓ Organisation
  - ↓ The PANDA Computing Model
  - ↓ Useful External Links on Coding and Debugging
  - ↓ Obsolete

The simulation and reconstruction software framework for the Panda experiment at the FAIR accelerator at GSI.

- [Meeting minutes are here](#)

## Suggested version of the code

### For ANALYSIS

- FairSoft [may16p1](#)
- FairRoot [v-16.06b](#)
- PandaRoot release [feb17p1](#)
- [ROOT version 5](#)
- (updated on 24/02/2017)

Here you can find a virtual machine with this settings: <https://seafiler.kfa.juelich.de/f/66b3f35a54/>

### For CODE DEVELOPMENT **NEW**

- FairSoft [may16p1](#)
- FairRoot [v-17.03 or dev](#)
- PandaRoot [trunk](#)
- [ROOT version 6](#)
- (updated on 18/05/2017)

## Basics

- [Getting started with PandaRoot](#)
- [HOWTO install PandaRoot](#)
- [HOWTO upgrade PandaRoot](#)
- [HOWTO use subversion](#)

## PandaComputingDetectorContactPersons

The task of the contact person is:

- to improve the communication between the software developers and the detector developers
- to organize the sub-detector specific code development inside [PandaRoot](#)
- to constantly compare the implementation of the sub-detector in [PandaRoot](#) with recent developments like test beam results or new readout electronics and keep the software up to date

## List of Computing Detector Contact Persons

System	Name
Magnets	
Targets	
Silicon detectors	
Pixels	<a href="#">Tobias Stockmanns</a>
Strips	<a href="#">Tobias Stockmanns</a>
Luminosity Detector	<a href="#">Stefan Pflüger</a>
Trackers	
STT	<a href="#">Gianluigi Boca</a>
Endcap GEM	<a href="#">Take Saito</a>
Forward trackers	vacant
EMC	<a href="#">Bertram Kopf</a>
Barrel	<a href="#">Bertram Kopf</a>
Backward Endcap	<a href="#">Bertram Kopf</a>
Forward Endcap	<a href="#">Bertram Kopf</a>
Forward Shashlyk	<a href="#">Dmitry Morozov</a>
Charged Particle ID	
Barrel DIRC	<a href="#">Roman Dzygadlo</a>
Disc DIRC	<a href="#">Mustafa Schmidt</a>
Forward RICH	<a href="#">Konstantin Beloborodov</a>
SciTil (Barrel TOF)	<a href="#">Dominik Steinschaden</a>
Forward TOF (FTOF)	<a href="#">Denis Veretennikov</a>
Muon System	<a href="#">Alexander Verkheev</a>
Hypernuclei equipment	
Hyp	<a href="#">Sebastian Bleser</a>
HypGe	<a href="#">Marcell Steinen</a>
Electronics	
Frontend Electronics	<a href="#">Myroslav Kavatsyuk</a>
DAQ/Trigger	<a href="#">Sören Lange</a>
Control systems	<a href="#">Mario Bragandireanu</a>
Software Trigger	<a href="#">Klaus Götzen</a>

-- [TobiasStockmanns](#) - 05 Nov 2014

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[Home](#) » [PANDA](#) » **PandaRoot**

Forum	Messages	Topics	Last message
<b>PandaRoot - PANDA Software</b>			
<a href="#">General</a> Moderators: <a href="#">Johan Messchendorp</a> <a href="#">Ralf Kliemt</a>	1817	392	Tue, 21 March 2017 By: <a href="#">Dominik Steinschaden</a> ↕
<a href="#">Bugs, Fixes, Releases</a> Moderators: <a href="#">Johan Messchendorp</a> <a href="#">Ralf Kliemt</a>	3693	643	Fri, 19 May 2017 By: <a href="#">Tobias Stockmanns</a> ↕
<a href="#">Tracking</a> Moderators: <a href="#">Johan Messchendorp</a> <a href="#">Ralf Kliemt</a>	1301	208	Mon, 22 May 2017 By: <a href="#">NazilaDivani</a> ↕
<a href="#">Event Generators</a> Moderators: <a href="#">Johan Messchendorp</a> <a href="#">Ralf Kliemt</a>	488	94	Wed, 10 May 2017 By: <a href="#">Klaus Götzen</a> ↕
<a href="#">Meetings</a> Moderators: <a href="#">Johan Messchendorp</a> <a href="#">Ralf Kliemt</a>	1044	323	Fri, 02 June 2017 By: <a href="#">Tobias Stockmanns</a> ↕
<a href="#">Particle Identification</a> Moderators: <a href="#">Johan Messchendorp</a> <a href="#">Ralf Kliemt</a>	79	20	Tue, 21 February 2017 By: <a href="#">Alexandros</a> ↕
<a href="#">Analysis</a> Moderators: <a href="#">Johan Messchendorp</a> <a href="#">Ralf Kliemt</a>	790	98	Mon, 13 March 2017 By: <a href="#">Ralf Kliemt</a> ↕
<a href="#">Monte Carlo Engines</a> G3, G4, Fluka, VMC Moderators: <a href="#">Johan Messchendorp</a> <a href="#">Ralf Kliemt</a>	136	34	Mon, 14 September 2015 By: <a href="#">Ajay Kumar</a> ↕
<a href="#">EMC</a> Moderators: <a href="#">Johan Messchendorp</a> <a href="#">Ralf Kliemt</a>	427	110	Fri, 02 September 2016 By: <a href="#">Marcel Tiemens</a> ↕
<b>Hypernuclear Simulation</b>			
<a href="#">MVD</a> Moderators: <a href="#">Johan Messchendorp</a> <a href="#">Ralf Kliemt</a>	75	23	Wed, 24 July 2013 By: <a href="#">Stefano Spataro</a> ↕
<a href="#">Fast Simulations</a> Moderators: <a href="#">Klaus Götzen</a> <a href="#">Ralf Kliemt</a>	197	28	Fri, 27 March 2015 By: <a href="#">Klaus Götzen</a> ↕

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Our users have posted a total of **10049 messages** inside **1975 topics**.  
Most users ever online was **833** on **Mon, 19 December 2011 21:04**  
We have **749** registered users.  
The newest registered user is [Izanetti](#)  
Last message on the forum: [Re: Computing Session at PANDA Meeting 17/2](#)

### Legend

New messages since last read No new messages since last read Redirection

<https://forum.gsi.de/index.php?t=index&cat=26&>





## Overview

[+ New subproject](#) [Close](#)

- Homepage: <https://panda-wiki.gsi.de/foswiki/bin/view/Computing/PandaRoot>
- Subprojects: [Analysis](#), [FTS Tracking](#)

### Issue tracking

- **PM:** 1 open / 2
- **Bug:** 5 open / 10
- **Feature:** 72 open / 75
- **Support:** 2 open / 7

[View all issues](#)

### Members

Manager: Ralf Kliemt, Tobias Stockmanns

Entwickler: Aida Galoyan, Alaa Dbeyssi, Albrecht Gillitzer, Alexander Verkheev, Anastasios Belias, Bertram Kopf, Christoph Schmidt, Denis Veretennikov, Dmitry Khaneft, Dmitry Morozov, Dominik Steinschaden, Florian Uhlig, Gianluigi Boca, Karoly Makonyi, Klaus Götzen, Konstantin Beloborodov, Ludovico Bianchi, Marc Pelizäus, Marcel Tiemens, Mathias Michel, Michael Papenbrock, Mustafa Schmidt, Paul Bühler, Ralf Kliemt, Roman Dzhygado, Stefano Spataro, Test User, Tobias Stockmanns, Udo Kurilla

Reporter: Aida Galoyan, Alaa Dbeyssi, Albrecht Gillitzer, Alexander Verkheev, Anastasios Belias, Bertram Kopf, Christoph Schmidt, Denis Veretennikov, Dmitry Khaneft, Dmitry Morozov, Dominik Steinschaden, Florian Uhlig, Gianluigi Boca, Karoly Makonyi, Klaus Götzen, Konstantin Beloborodov, Ludovico Bianchi, Marc Pelizäus, Marcel Tiemens, Mathias Michel, Michael Papenbrock, Mustafa Schmidt, Paul Bühler, Ralf Kliemt, Roman Dzhygado, Stefano Spataro, Test User, Tobias Stockmanns, Udo Kurilla

### Latest news

New release feb17 for day1 production campaign (1 comment)  
Added by Ralf Kliemt 3 months ago

[View all news](#)

# Pandamine – Issue Tracker

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Overview Activity **Issues** New issue Dashboard News Repository Settings

## Standard View

[Edit](#) [Delete](#)

→ Filters

→ Options

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Estimated time: **0.00 Hours**

✓	#	Tracker	Status	Category	Priority	Subject	Assignee	Updated	% Done
<b>Analysis Tools</b> <span>5</span>									
<input checked="" type="checkbox"/>	314	Feature	In Bearbeitung	Analysis Tools	Hoch	Development of Tree Fitter	Ralf Kliemt	03/22/2017 04:33 PM	<div style="width: 100%;"></div>
<input type="checkbox"/>	225	Feature	Neu	Analysis Tools	Normal	MCTM separate from PndAnalysis, use FairLinks		03/13/2017 10:34 AM	<div style="width: 0%;"></div>
<input type="checkbox"/>	230	Feature	Neu	Analysis Tools	Normal	Tree Fitter photon losses		03/13/2017 10:34 AM	<div style="width: 0%;"></div>
<input type="checkbox"/>	244	Feature	Neu	Analysis Tools	Normal	Vertexing	Ralf Kliemt	03/13/2017 10:33 AM	<div style="width: 0%;"></div>
<input type="checkbox"/>	431	Feature	In Bearbeitung	Analysis Tools	Normal	Daughter-daughter correlatoins in fitters	Ralf Kliemt	06/12/2017 03:32 PM	<div style="width: 100%;"></div>
<b>Barrel DIRC</b> <span>2</span>									
<input type="checkbox"/>	261	Feature	Neu	Barrel DIRC	Normal	Barrel DIRC Probability distribution of particle types	Roman Dzhygado	03/09/2017 12:15 PM	<div style="width: 0%;"></div>
<input type="checkbox"/>	262	Feature	Neu	Barrel DIRC	Normal	Barrel DIRC Time based Reconstruction	Roman Dzhygado	03/09/2017 12:16 PM	<div style="width: 0%;"></div>
<b>Disc DIRC</b> <span>1</span>									
<input type="checkbox"/>	263	Feature	Neu	Disc DIRC	Normal	Disc DIRC Time based Reconstruction		03/09/2017 09:44 AM	<div style="width: 0%;"></div>
<b>EMC</b> <span>15</span>									
<input type="checkbox"/>	265	Feature	Neu	EMC	Hoch	EMC Geometry Upgrade		03/09/2017 09:15 AM	<div style="width: 0%;"></div>
<input type="checkbox"/>	266	Feature	Neu	EMC	Hoch	EMC Error Matrices		03/08/2017 12:25 PM	<div style="width: 0%;"></div>
<input type="checkbox"/>	268	Bug	Neu	EMC	Hoch	Energy crystal calibration	Bertram Kopf	06/01/2017 11:02 AM	<div style="width: 0%;"></div>
<input type="checkbox"/>	267	Feature	Neu	EMC	Normal	EMC G3/G4 Tuning		03/08/2017 12:27 PM	<div style="width: 0%;"></div>
<input type="checkbox"/>	269	Feature	Neu	EMC	Normal	EMC Online Calibration		03/09/2017 09:21 AM	<div style="width: 0%;"></div>
<input type="checkbox"/>	270	Feature	Neu	EMC	Normal	EMC VPT Digitization		03/09/2017 09:21 AM	<div style="width: 0%;"></div>
<input type="checkbox"/>	271	Feature	Neu	EMC	Normal	Development/testing of Bump Splitting Algorithm		03/09/2017 09:23 AM	<div style="width: 0%;"></div>
<input type="checkbox"/>	272	Feature	Neu	EMC	Normal	EMC Pre-Shower Detection and Correction		03/09/2017 09:24 AM	<div style="width: 0%;"></div>
<input type="checkbox"/>	273	Feature	Neu	EMC	Normal	EMC Split-Off Recognition		03/21/2017 10:39 AM	<div style="width: 0%;"></div>

## Feature #273

[Edit](#) [★ Watch](#) [📄 Copy](#) [🗑 Delete](#)

### EMC Split-Off Recognition

[« Previous](#) | 14 of 80 | [Next »](#)

Added by [Tobias Stockmanns](#) 3 months ago. Updated 3 months ago.

<b>Status:</b>	Neu	<b>Start date:</b>	03/09/2017
<b>Priority:</b>	Normal	<b>Due date:</b>	
<b>Assignee:</b>	-	<b>% Done:</b>	<div style="width: 0%;"><div></div></div> 0%
<b>Category:</b>	EMC		
<b>Target version:</b>	-		

#### Description

[Quote](#)

Due to fluctuations in hadronic and electromagnetic showers often too many clusters in EMC are reconstructed, which are not associated with any primary particles. Shower shape analysis allow to discriminate such clusters from the photon clusters. In Babar framework for the Panda EMC hadronic split-off recognition was implemented based on Artificial Neural Network, however alternative technics can be also implemented.

#### Subtasks

[Add](#)

#### Related issues

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## History

Updated by [Tobias Stockmanns](#) 3 months ago

#1

- **Tracker** changed from *Bug* to *Feature*

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[Last Change](#) | [Revision Log](#)

source: **pandaroot @ 30052**

View revision:

Name ▲	Size	Rev	Age	Author	Last Change
↑ ../					
▶  development		30050	12 days	xsong	my PndTutAnaTask?.cxx_bak
▶  outdated		29810	3 months	tstockm	Moving obsolete code
▶  pub		29103	13 months	kgoetzen	Added macros for release note RN-QCD-2016-002
▶  release		29896	3 months	tstockm	Introducing PndMissingPzClenaerTask?
▶  stable		12414	6 years	johan	update stable
▶  trunk		30052	3 hours	kgoetzen	Updated quickkana.C and quicksimana.C

**Note:** See [TracBrowser](#) for help on using the repository browser.



Powered by **Trac 0.12.5**  
By [Edgewall Software](#).

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GSI Helmholtzzentrum für Schwerionenforschung GmbH | Planckstr. 1 | 64291 Darmstadt  
Phone: +49-6159-71-0 | E-mail: [web-service@gsi.de](mailto:web-service@gsi.de)

<https://subversion.gsi.de/trac/fairroot/browser/pandaroot>





## PANDA at FAIR



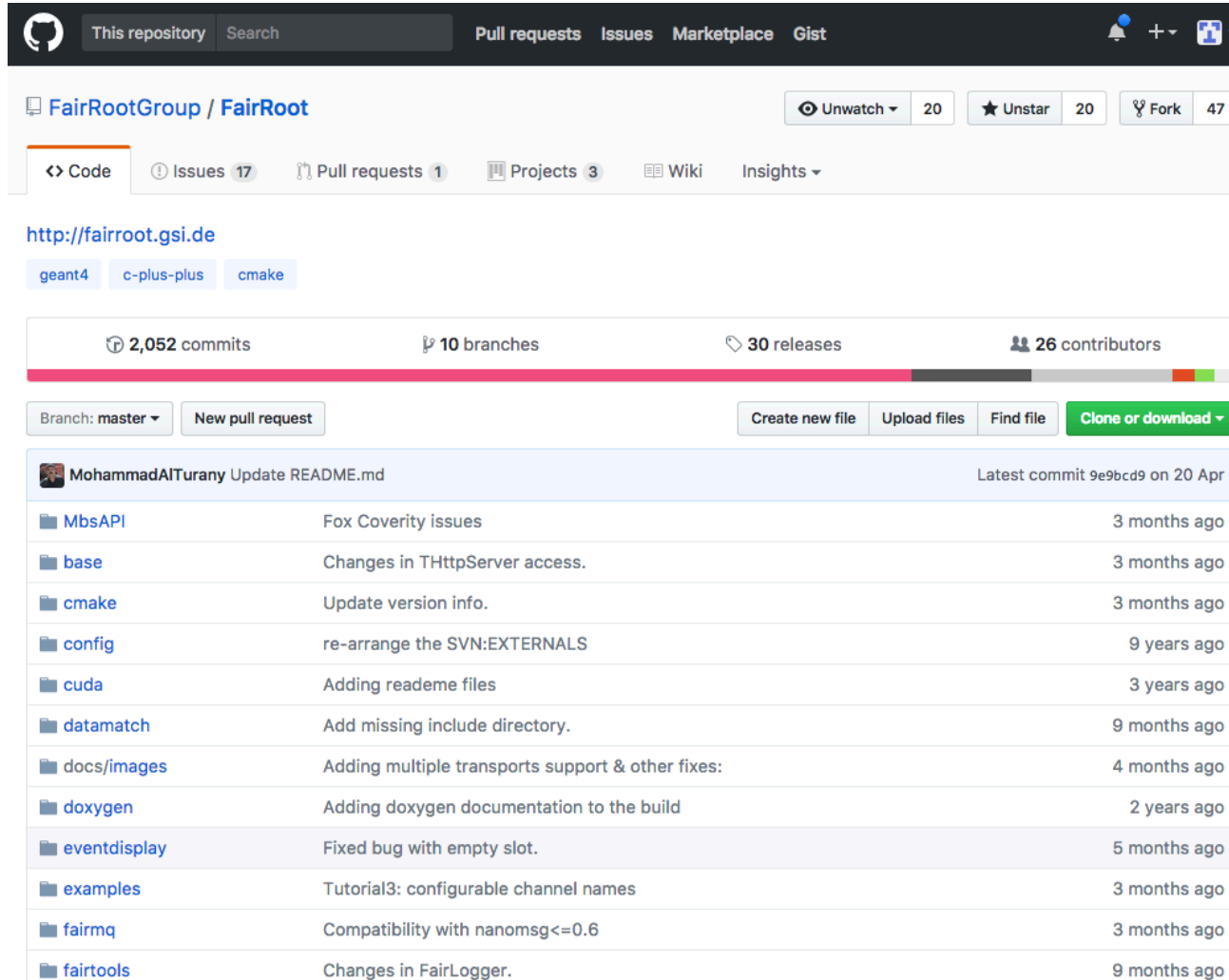
<...>

<b>Sign in</b>	Register
Username or email	
<input type="text"/>	
Password	
<input type="password"/>	
<input type="checkbox"/> Remember me	<a href="#">Forgot your password?</a>
<input type="button" value="Sign in"/>	

Didn't receive a confirmation email? [Request a new one.](#)

[https://pandaatfair.githost.io/users/sign\\_in](https://pandaatfair.githost.io/users/sign_in)





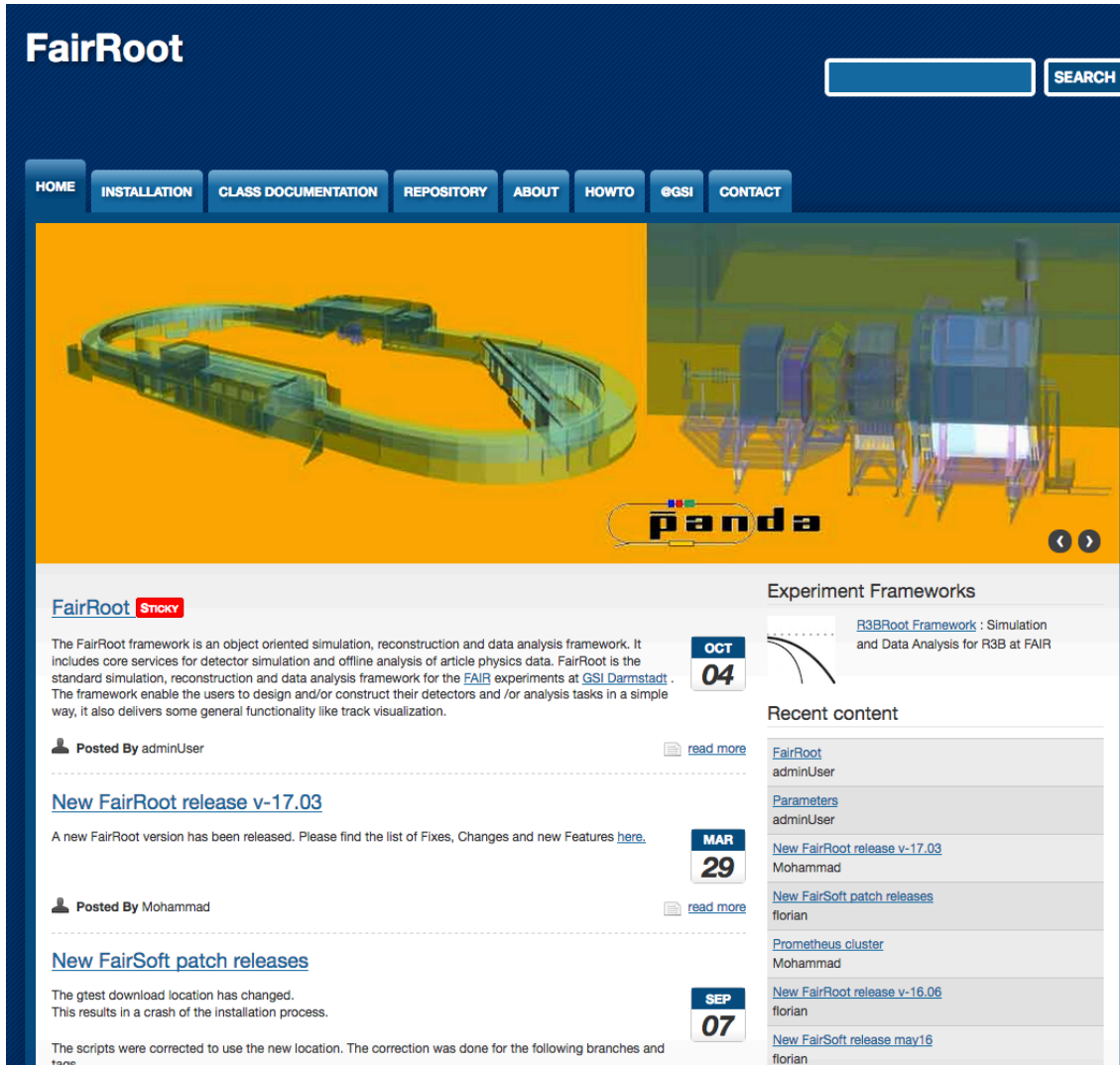
The screenshot shows the GitHub repository page for FairRootGroup/FairRoot. The repository is on the master branch and has 2,052 commits, 10 branches, 30 releases, and 26 contributors. The repository is currently on the master branch. The repository is currently on the master branch. The repository is currently on the master branch.

Branch: master ▾ New pull request

Create new file Upload files Find file Clone or download ▾

Commit	Message	Time ago
MohammadAITurany	Update README.md	Latest commit 9e9bcd9 on 20 Apr
MbsAPI	Fox Coverity issues	3 months ago
base	Changes in THttpServer access.	3 months ago
cmake	Update version info.	3 months ago
config	re-arrange the SVN:EXTERNALS	9 years ago
cuda	Adding reademe files	3 years ago
datamatch	Add missing include directory.	9 months ago
docs/images	Adding multiple transports support & other fixes:	4 months ago
doxygen	Adding doxygen documentation to the build	2 years ago
eventdisplay	Fixed bug with empty slot.	5 months ago
examples	Tutorial3: configurable channel names	3 months ago
fairmq	Compatibility with nanomsg<=0.6	3 months ago
fairtools	Changes in FairLogger.	9 months ago

<https://github.com/FairRootGroup/FairRoot>



The screenshot shows the FairRoot Wiki homepage. At the top, there is a search bar and a navigation menu with links for HOME, INSTALLATION, CLASS DOCUMENTATION, REPOSITORY, ABOUT, HOWTO, @GSI, and CONTACT. Below the navigation is a large banner image featuring a 3D visualization of a particle detector structure, with the 'panda' logo at the bottom center. The main content area is divided into two columns. The left column contains a 'FairRoot' sticky post with a description of the framework, a 'Posted By adminUser' notice, and two other posts: 'New FairRoot release v-17.03' and 'New FairSoft patch releases'. The right column features an 'Experiment Frameworks' section with a link to 'R3BRoot Framework', a 'Recent content' section listing recent updates, and a date indicator for 'OCT 04'. A date indicator for 'SEP 07' is also visible at the bottom of the right column.

<https://fairroot.gsi.de/>

Information about stability and validity of the newest PandaRoot subversion revision.

No update data as of **Tuesday, June 13 2017 - 00:00 CEST**

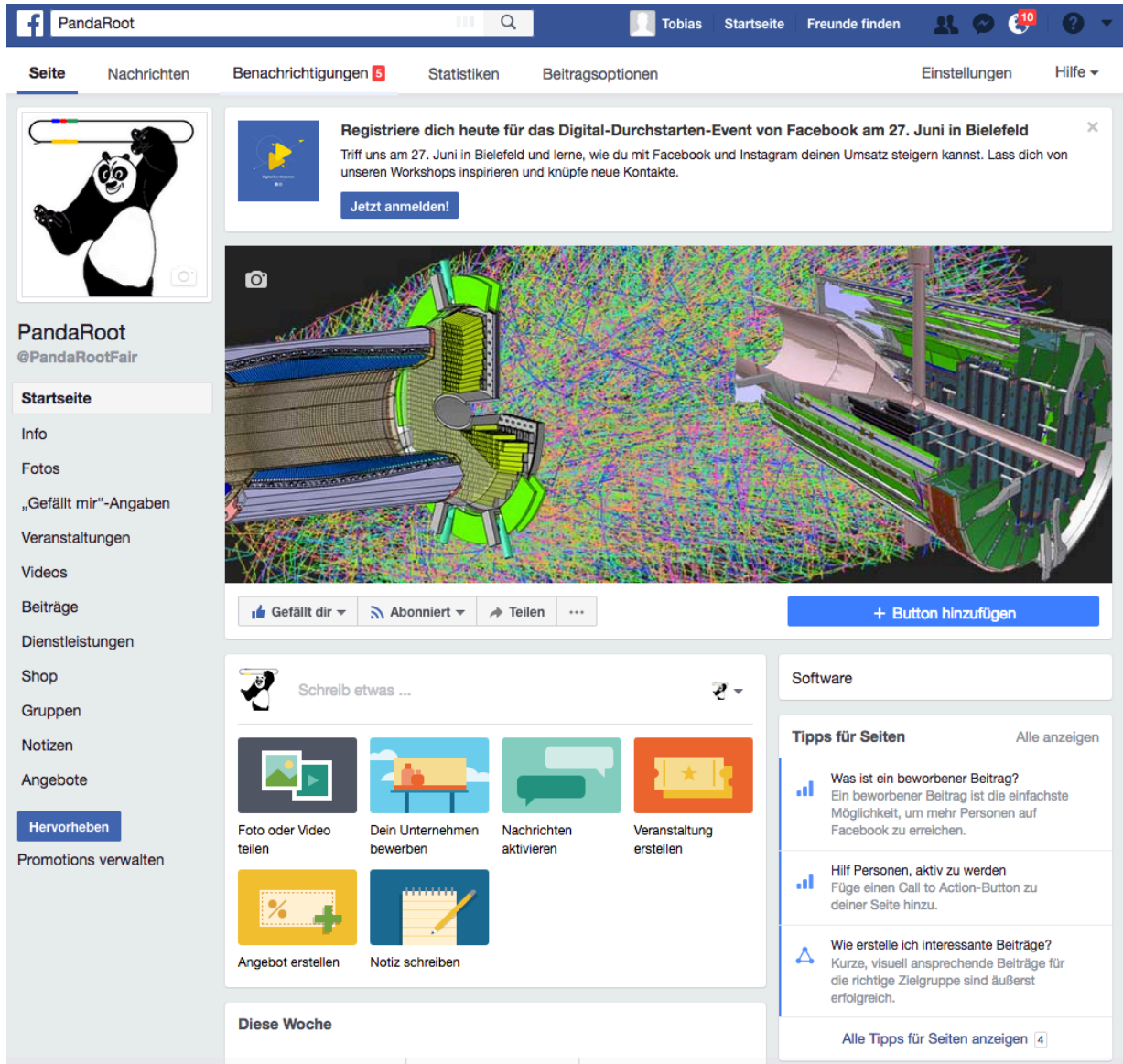
- 6 hours ago:** 25 tests failed on Debian GNU\_Linux 8.8 (jessie)-local-linux-x86\_64-gcc4.9.2-fairsoft\_may16root6p1-fairroot\_dev
- 6 hours ago:** 68 warnings introduced on Debian GNU\_Linux 8.8 (jessie)-local-linux-x86\_64-gcc4.9.2-fairsoft\_may16root6p1-fairroot\_dev
- 7 hours ago:** 373 warnings introduced on Jessie64-linux-x86\_64\_usr\_bin\_g++4.9.2-fairsoft\_mar17\_root6-fairroot\_dev
- 7 hours ago:** 18 tests failed on Debian GNU\_Linux 8.8 (jessie)-local-linux-x86\_64-gcc4.9.2-fairsoft\_may16root6p1-fairroot\_master
- 7 hours ago:** 68 warnings introduced on Debian GNU\_Linux 8.8 (jessie)-local-linux-x86\_64-gcc4.9.2-fairsoft\_may16root6p1-fairroot\_master

[See full feed](#)

Nightly										
Site	Build Name	Update	Configure		Build		Test			Build Time
		Files	Error	Warn	Error	Warn	Not Run	Fail	Pass	
lxg0156.gsi.de	Debian GNU_Linux 8.8 (jessie)-linux-x86_64-gcc4.9.2-fairsoft_may16root6-fairroot_v-16.06a	4	0	0	0	68	0	88	2	Jun 13, 2017 - 00:30 CEST
briareos	Ubuntu16-04-linux-x86_64-gcc5.4.0-fairsoft_may16p1-root6-fairroot_v-16.06b_trunk	4	0	0	0	70	0	16 <sup>+5</sup>	74 <sup>-5</sup>	Jun 13, 2017 - 02:01 CEST
lxbuild05.gsi.de	Jessie64-linux-x86_64_usr_bin_g++4.9.2-fairsoft_may16_root6-fairroot_dev	0	0	0	0	373	0	15 <sup>+2</sup>	75 <sup>-2</sup>	Jun 13, 2017 - 02:10 CEST
briareos	Ubuntu16-04-linux-x86_64-gcc5.4.0-fairsoft_may16-root6-fairroot_v-16.06	4	0	0	0	92	0	13 <sup>-1</sup>	77 <sup>+1</sup>	Jun 13, 2017 - 01:01 CEST
lxbuild05.gsi.de	Jessie64-linux-x86_64_usr_bin_g++4.9.2-fairsoft_mar17_root6-fairroot_dev	0	0	0	0	373	0	12 <sup>+12</sup>	78 <sup>+78</sup>	Jun 13, 2017 - 02:28 CEST
briareos	Ubuntu16-04-linux-x86_64-gcc5.4.0-fairsoft_may16p1-root6-fairroot_v-17.03_trunk	4	0	0	0	70	0	12 <sup>+1</sup>	78 <sup>+2</sup>	Jun 13, 2017 - 04:00 CEST
lxg0342.gsi.de	Debian GNU_Linux 8.8 (jessie)-local-linux-x86_64-gcc4.9.2-fairsoft_may16root6p1-fairroot_dev	0	0	0	0	68	0	12 <sup>+1</sup>	78 <sup>+15</sup>	Jun 13, 2017 - 04:20 CEST
lxg0342.gsi.de	Debian GNU_Linux 8.8 (jessie)-local-linux-x86_64-gcc4.9.2-fairsoft_may16root6p1-fairroot_master	0	0	0	0	68	0	12 <sup>-1</sup>	78 <sup>+1</sup>	Jun 13, 2017 - 02:21 CEST

<https://cdash.gsi.de/CDash/index.php?project=PandaRoot>





**PandaRoot**  
@PandaRootFair

**Startseite**

- Info
- Fotos
- „Gefällt mir“-Angaben
- Veranstaltungen
- Videos
- Beiträge
- Dienstleistungen
- Shop
- Gruppen
- Notizen
- Angebote

**Hervorgehoben**

Promotions verwalten

**Registriere dich heute für das Digital-Durchstarten-Event von Facebook am 27. Juni in Bielefeld**

Triff uns am 27. Juni in Bielefeld und lerne, wie du mit Facebook und Instagram deinen Umsatz steigern kannst. Lass dich von unseren Workshops inspirieren und knüpfe neue Kontakte.

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**Foto oder Video teilen**

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**Nachrichten aktivieren**

**Veranstaltung erstellen**

**Angebot erstellen**

**Notiz schreiben**

**Software**

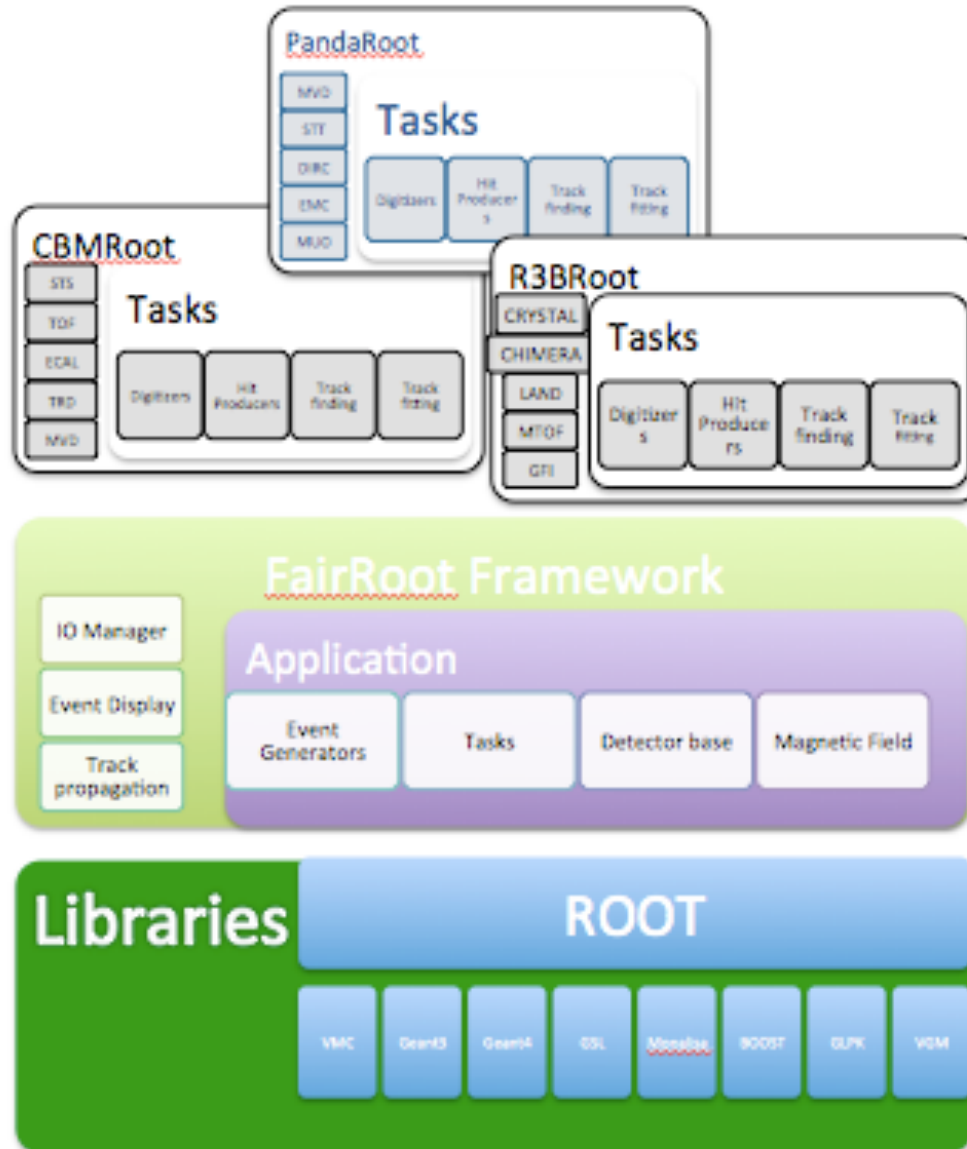
**Tipps für Seiten** Alle anzeigen

- Was ist ein beworbener Beitrag?**  
Ein beworbener Beitrag ist die einfachste Möglichkeit, um mehr Personen auf Facebook zu erreichen.
- Hilf Personen, aktiv zu werden**  
Füge einen Call to Action-Button zu deiner Seite hinzu.
- Wie erstelle ich interessante Beiträge?**  
Kurze, visuell ansprechende Beiträge für die richtige Zielgruppe sind äußerst erfolgreich.

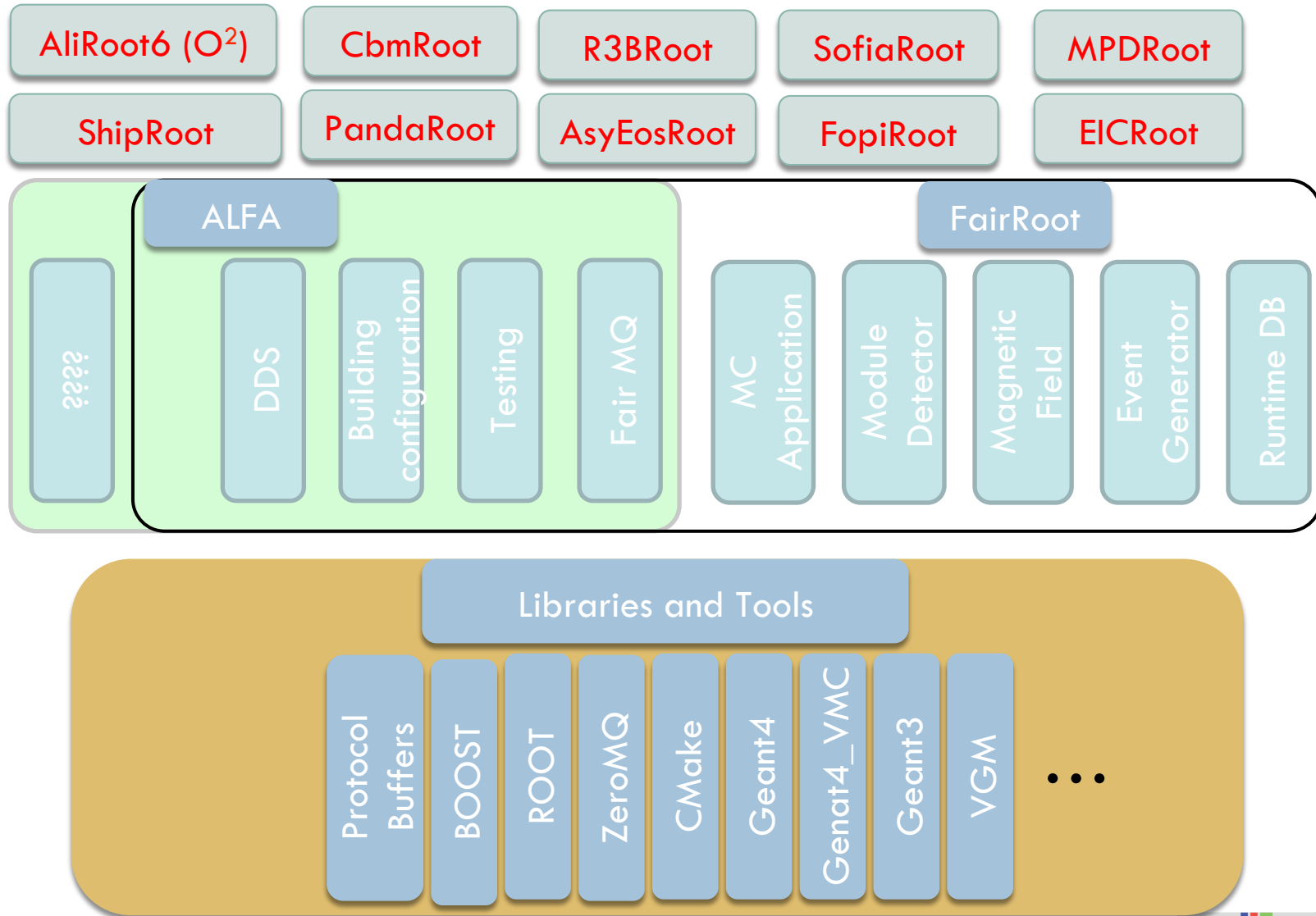
**Diese Woche**

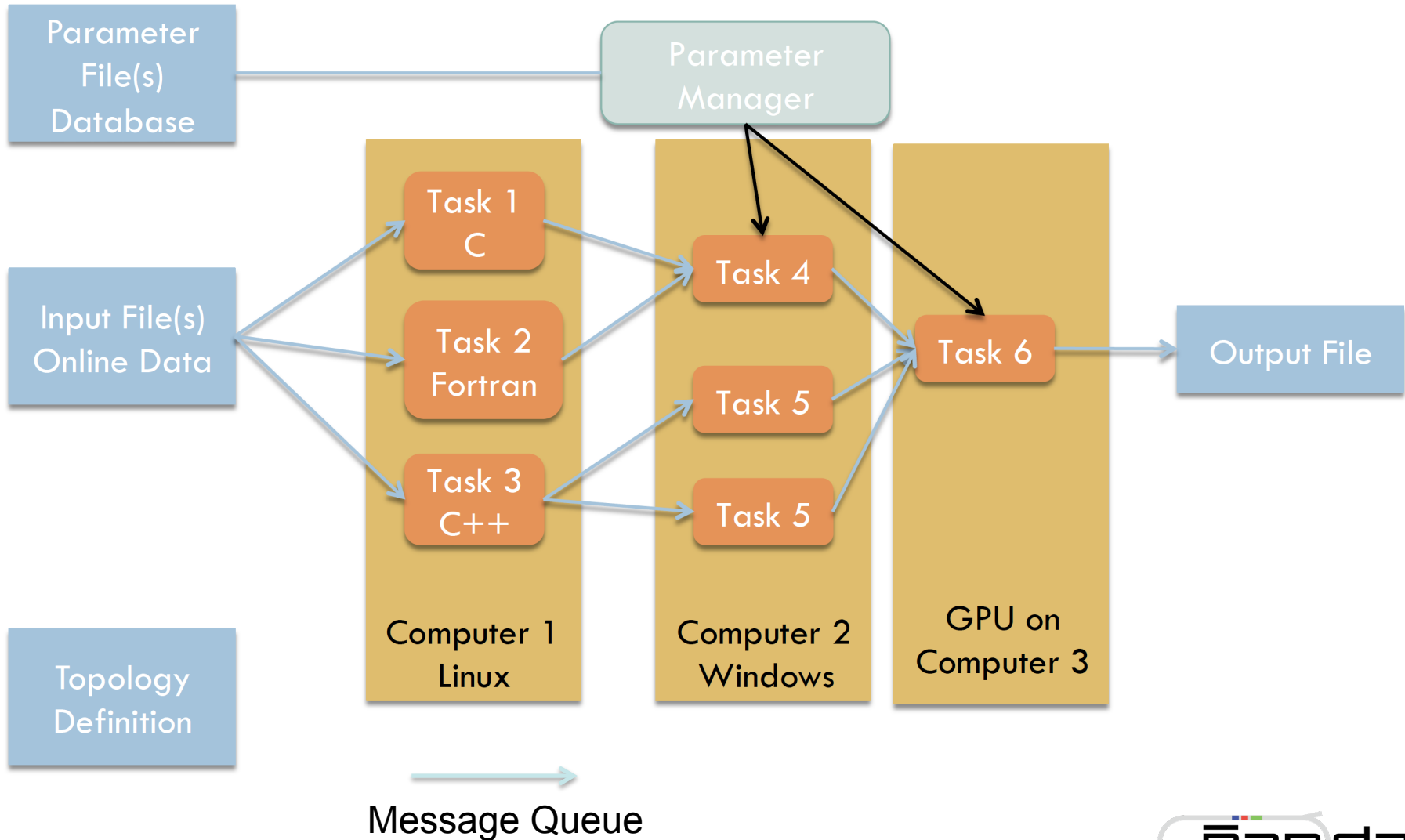
**Alle Tipps für Seiten anzeigen** 4

# PANDAROOT



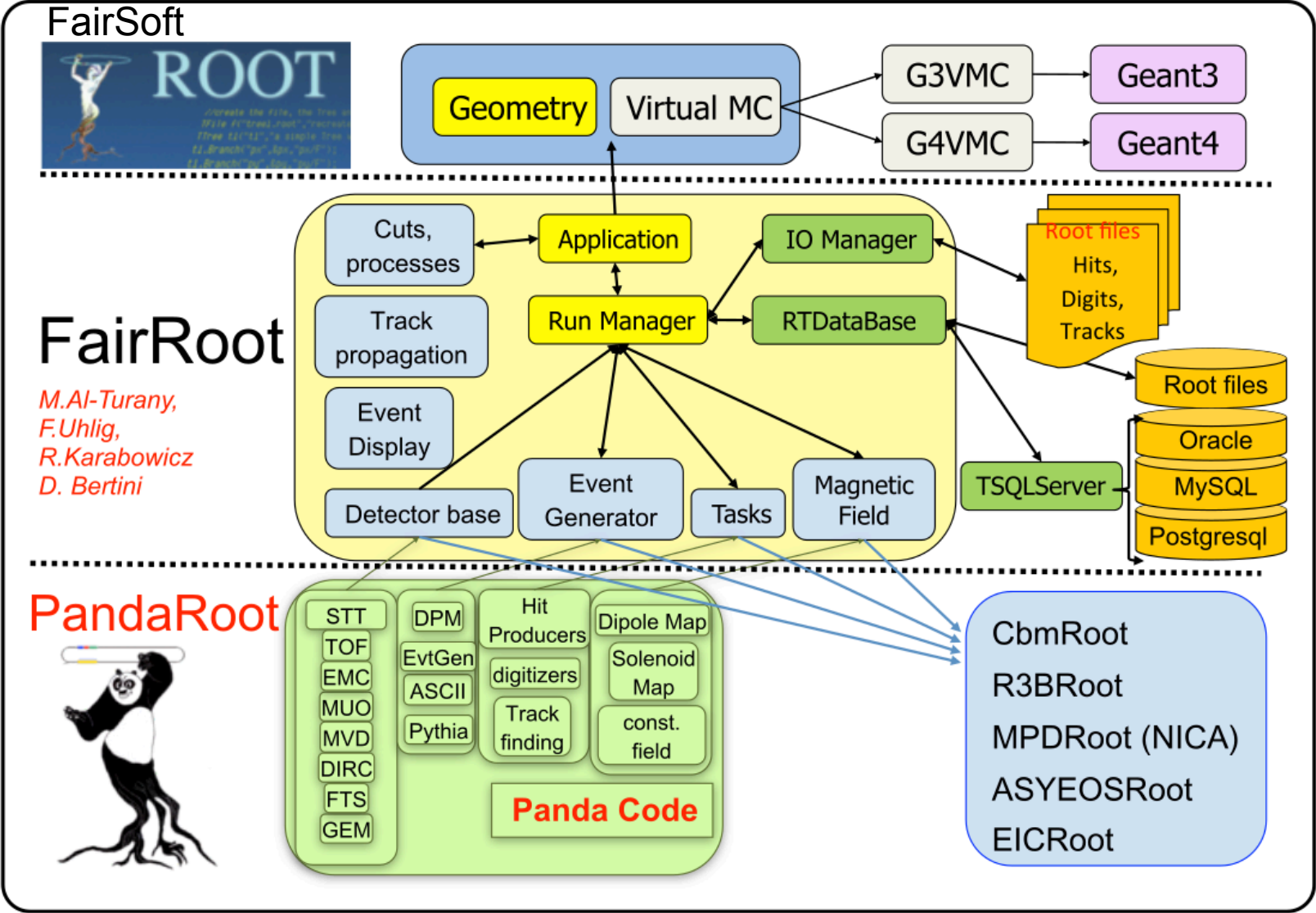
# FairRoot → ALFA



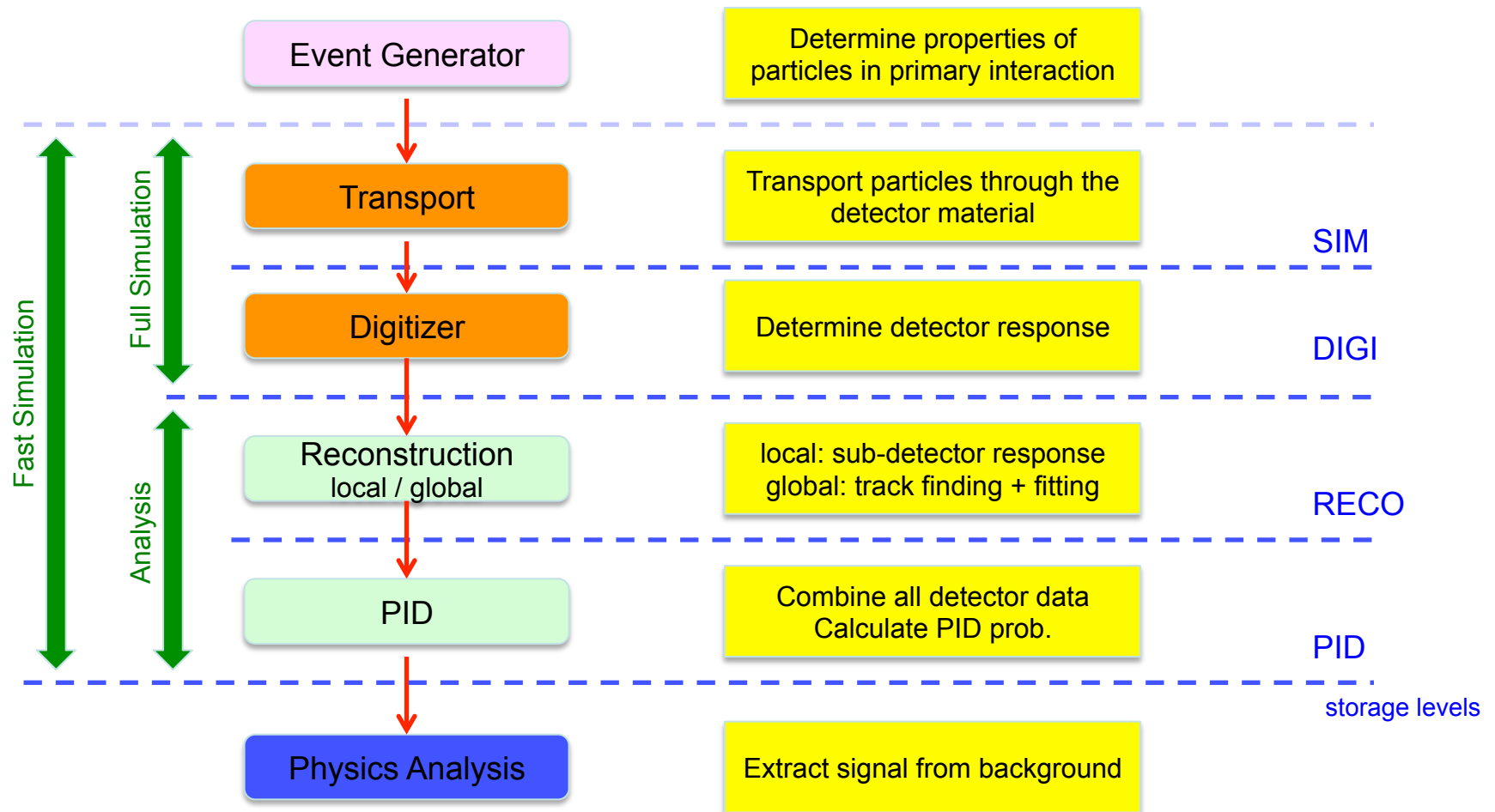




# Structure of Code

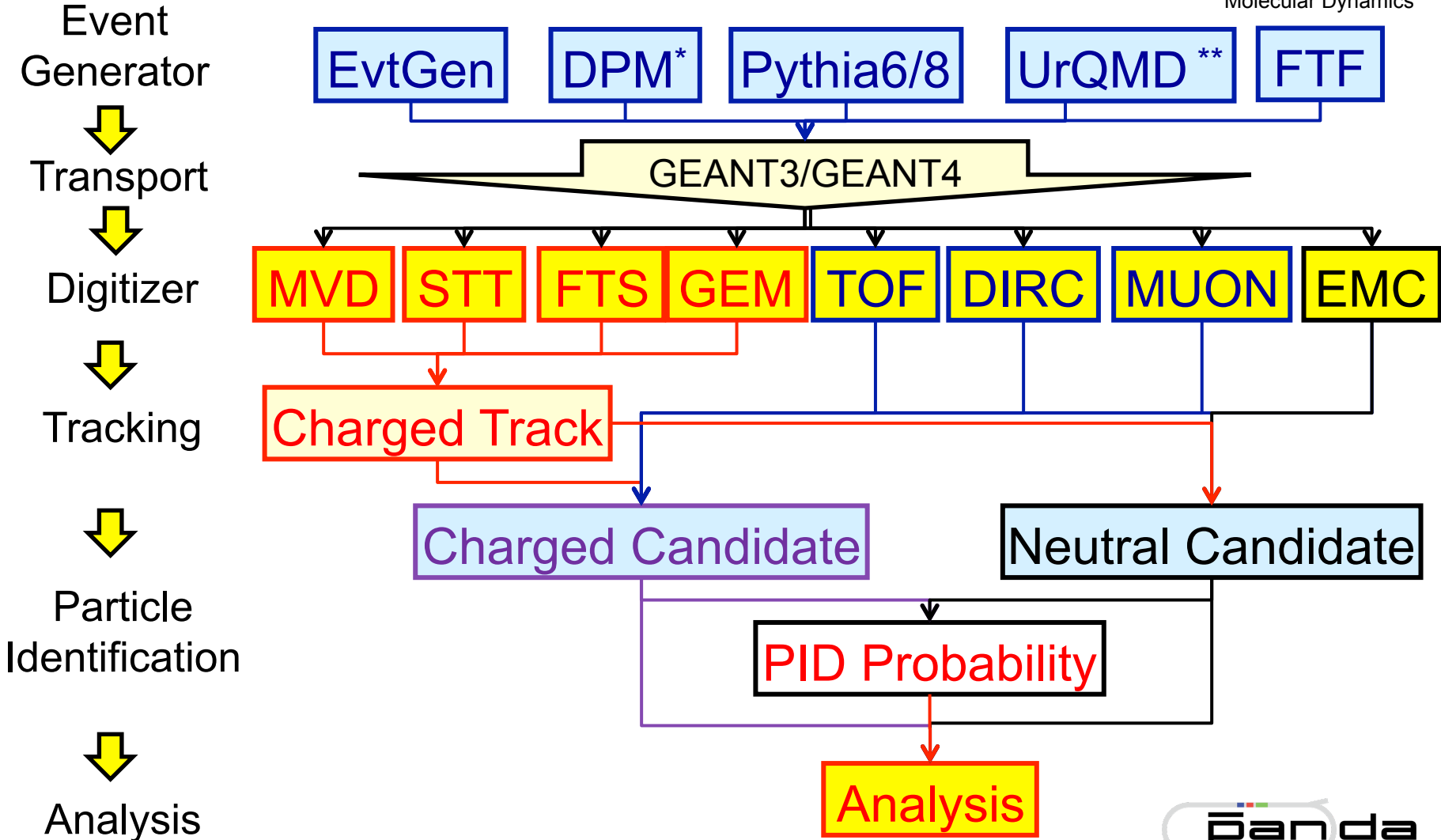


# The Mission

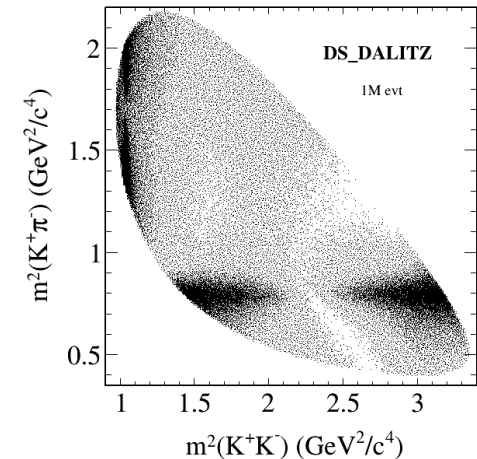


# PANDA Data Flow

\* Dual parton Model  
\*\* Ultra Relativistic Quantum Molecular Dynamics

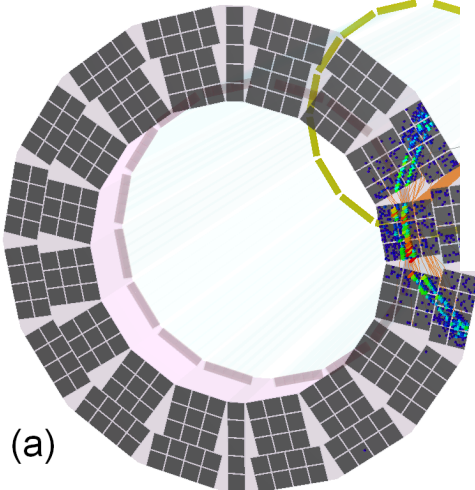


- Many different event generators available
  - EvtGen:
    - *Simulation of dedicated physics channels*
    - *Can be extended by individual decay models*
  - Dual-Parton-Model (DPM):
    - *Background generator for anti-proton – proton interactions*
  - UrQMD:
    - *Background generator for anti-proton – nucleus interactions*
  - FTF generator:
    - *New development of a combined background generator by Vladimir Uzhinsky and Aida Galoyan*
  - Box generator:
    - *Particle gun*

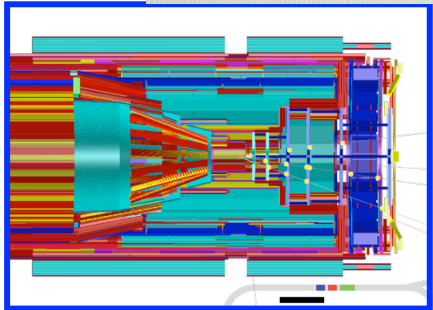
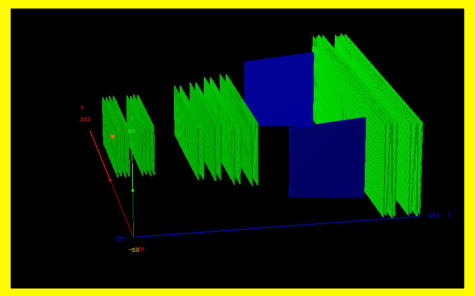
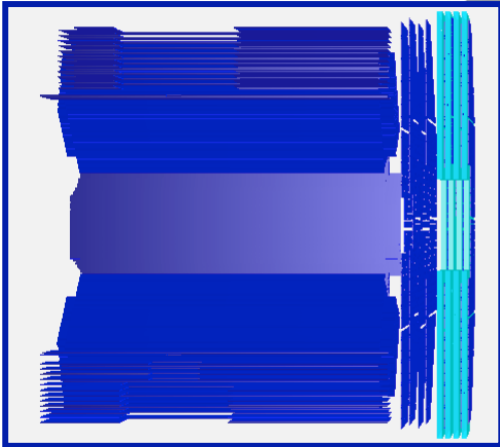
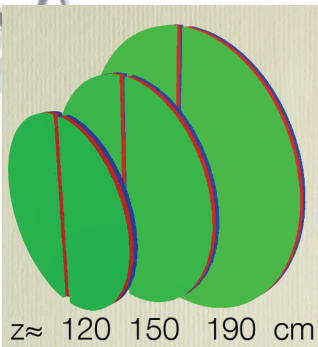
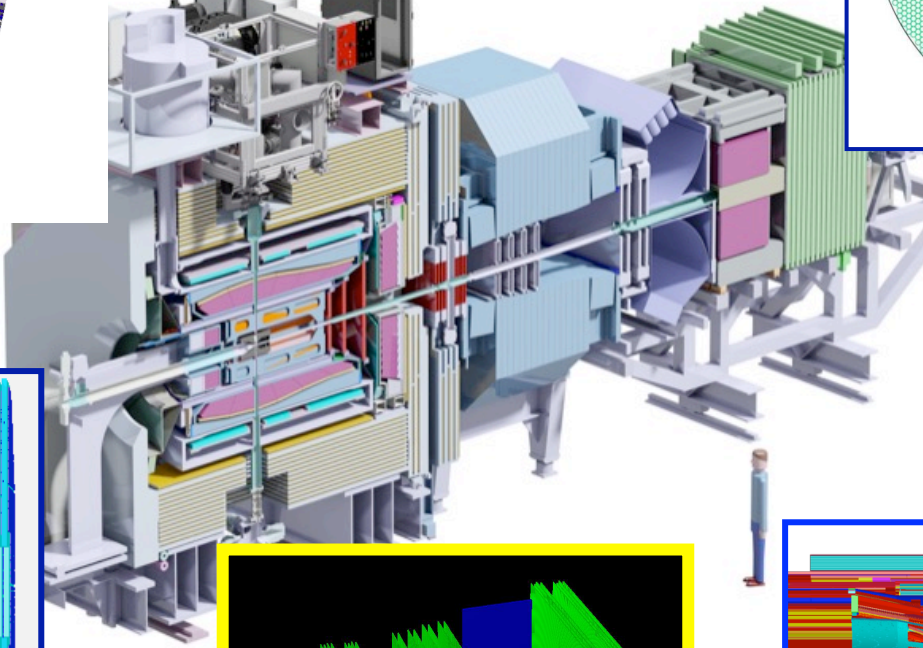
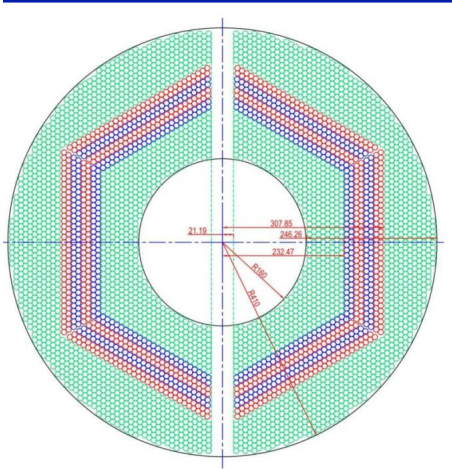
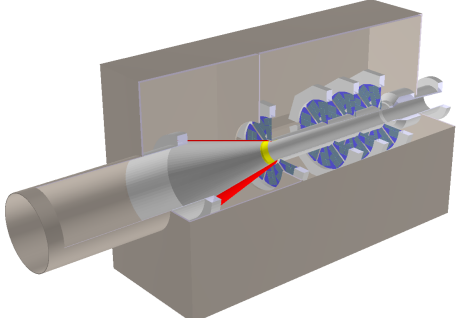
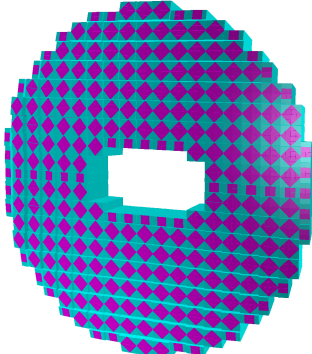


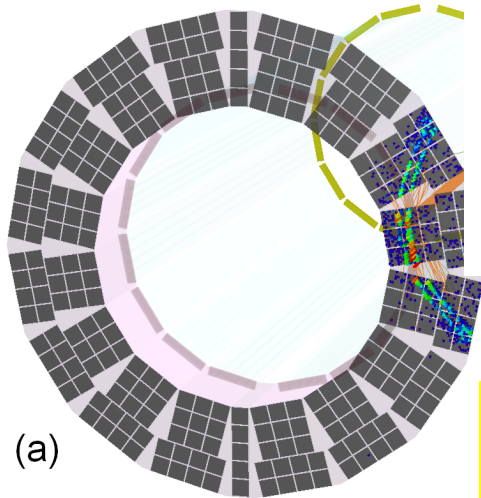
- Usage of Virtual Monte Carlo allows seamless change of propagation engine
- Available:
  - Geant3
  - Geant4
  - (Fluka)
- Same geometry description in propagation and reconstruction of events by using the same geometry engine from root

# Geometry description

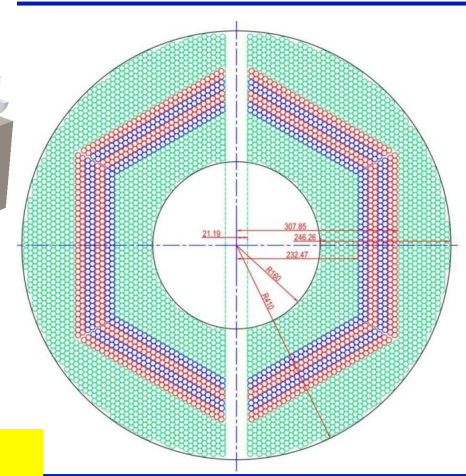
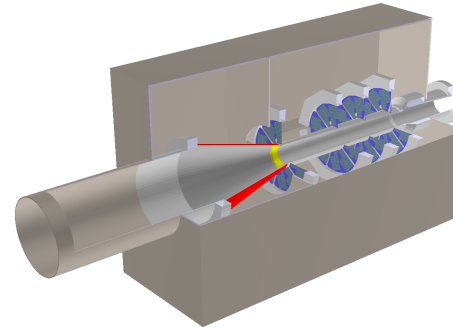
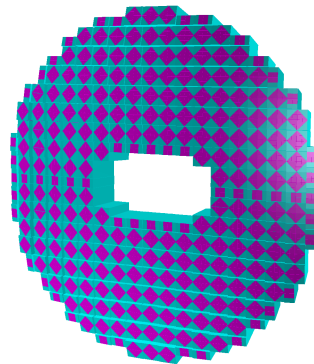


(a)

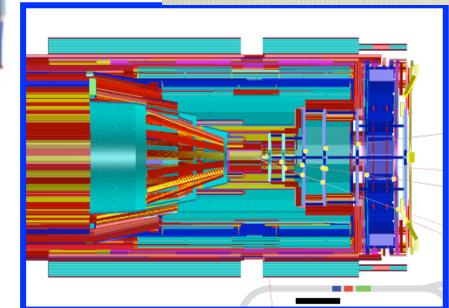
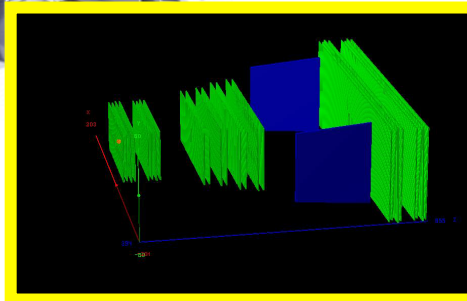
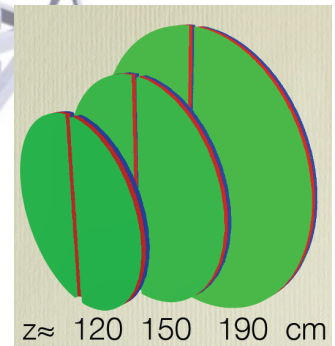
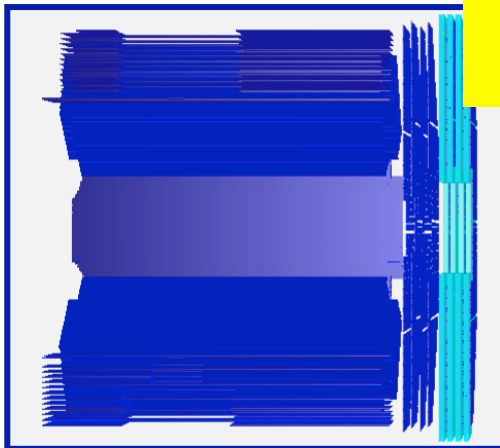




(a)

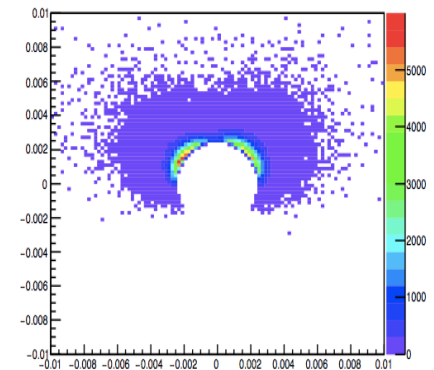


- All detectors in simulation
- Strongly varying level of detail, e.g.
  - MVD: All materials including support structures, cooling, active and passive electronic
  - EMC: only crystals

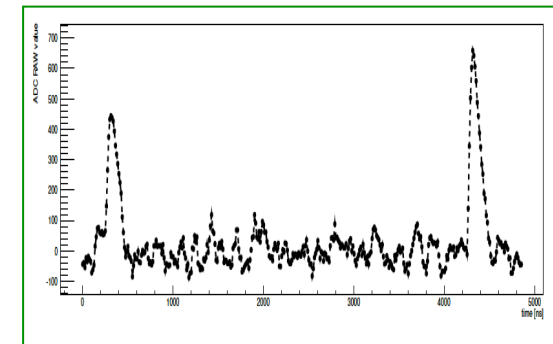


- Translates ideal detector data into realistic data stream
  - 3D space points into channel number
  - Deposited energy into ADC values
  - Adding noise and inefficiencies
  - Charge sharing between neighboring detector elements
  - Dead times and electronics properties
- Data should look like as coming from the final experiment

Avalanche Simulation  
in MDT



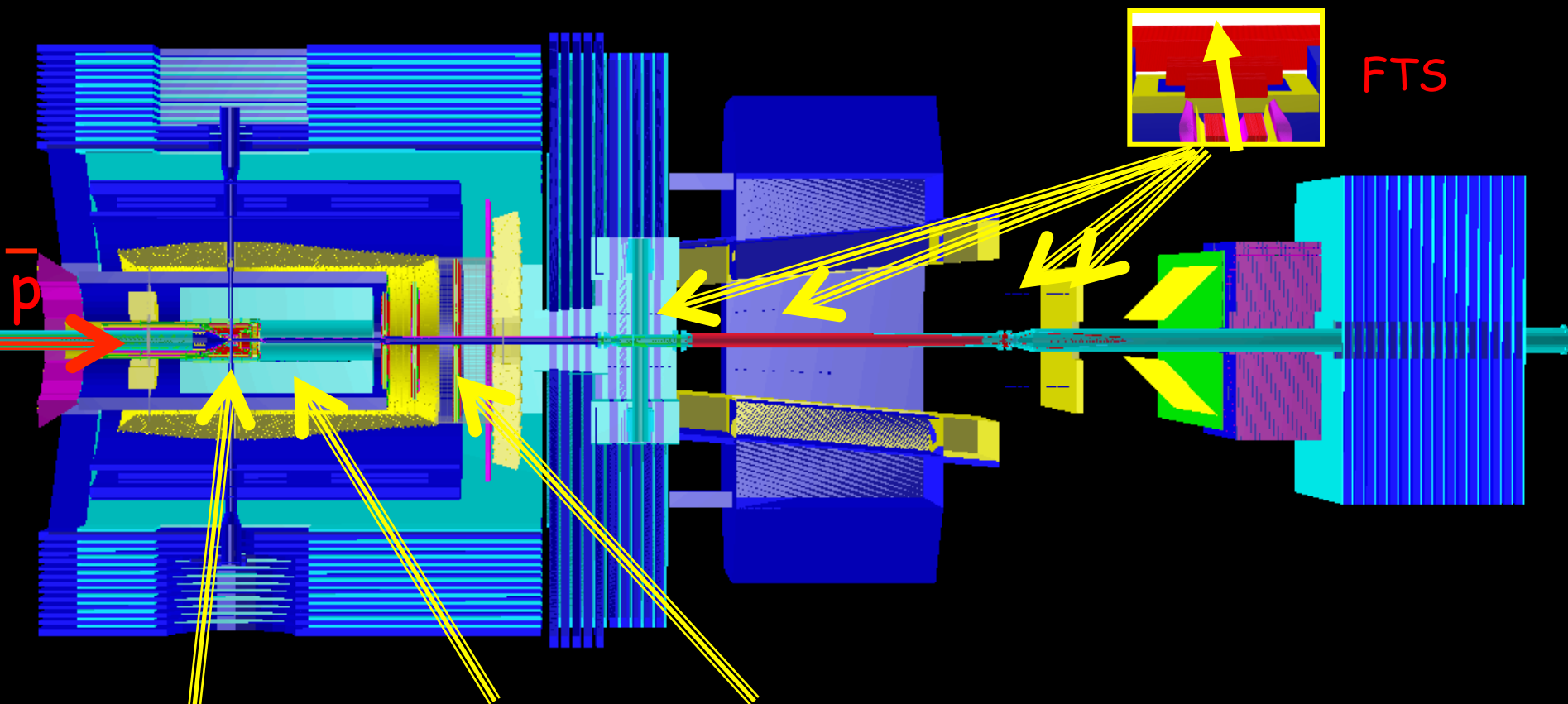
Simulated EMC waveform



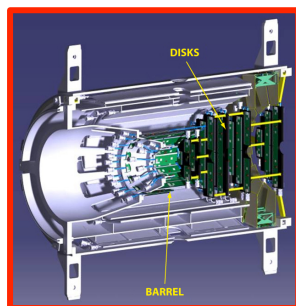


- Local reconstruction for each sub-detector
  - Translation from detector data into physical parameters (from channel number to space point, ADC to energy)
  - Calibration
  - Cluster formation
  - Reconstruction algorithms
- Various different algorithms implemented for each sub-detectors
- Compared with test beam data
- PandaRoot used to reconstruct test beam data

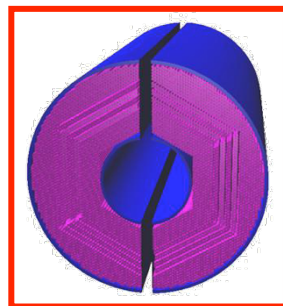
- Global reconstruction
  - Combining different sub-detectors
  - Tracking
  - PID
  - Event building



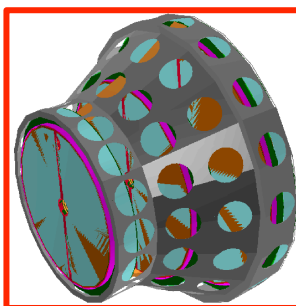
MVD



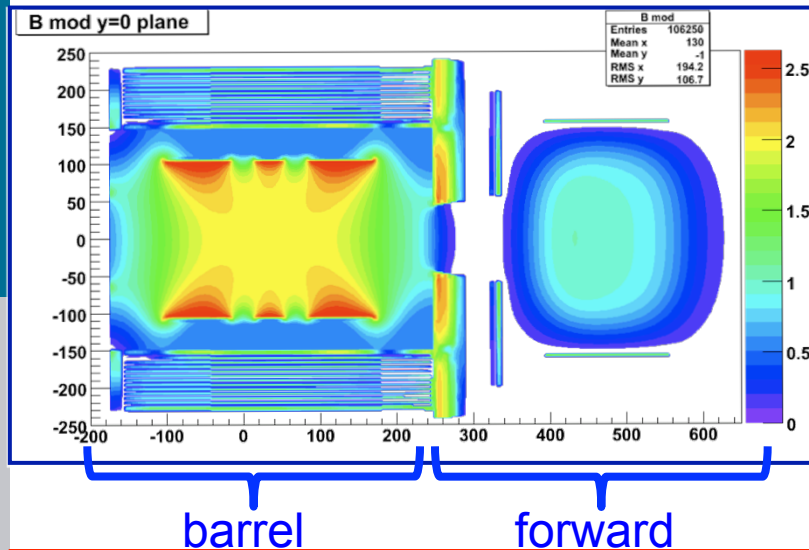
STT



GEM



# Tracking: Global Fit



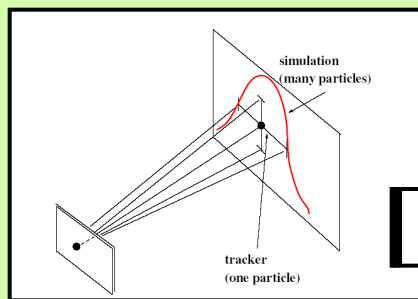
Energy loss  
Not homogeneous magnetic field  
Different detector hits

- planar hits – MVD/GEM
- tube + drift time – STT/FTS

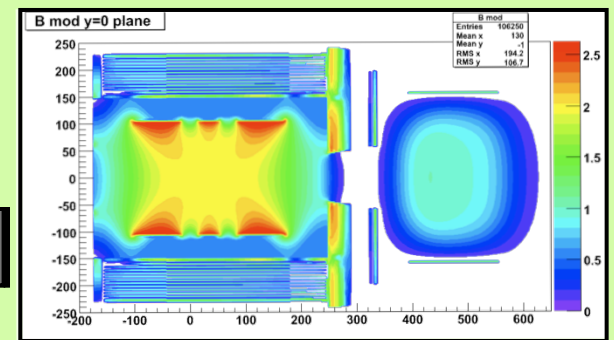
Prefit Track

Kalman Filter  
(GENFIT)

Detector Hits

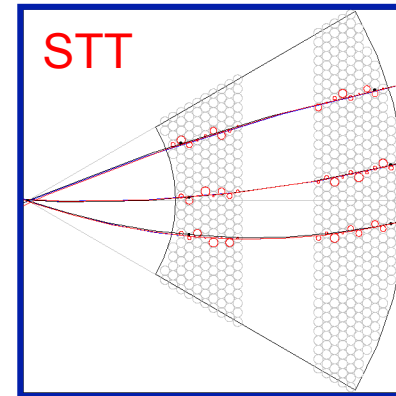
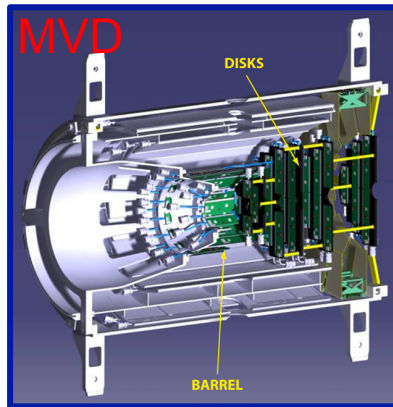


Track Follower  
(GEANE)

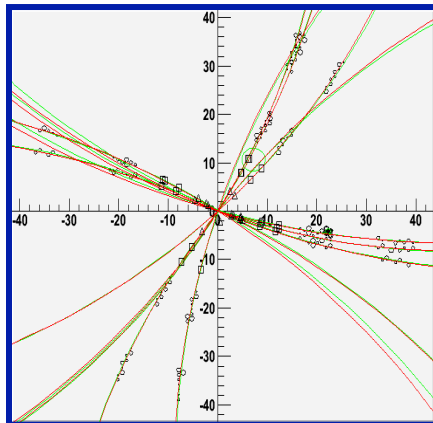


same geometry for simulation and track following

1° step – MVD/STT **local** pattern recognition

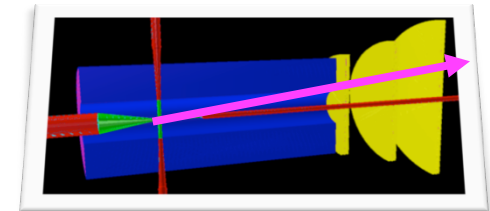


2° step – Correlation of **STT** & **MVD** tracklets  
- Correlation with STT/MVD spurious hits

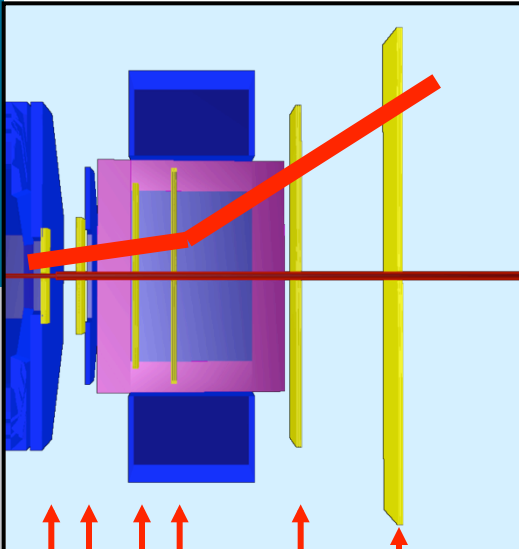


3° step – Extrapolation to **GEM** planes

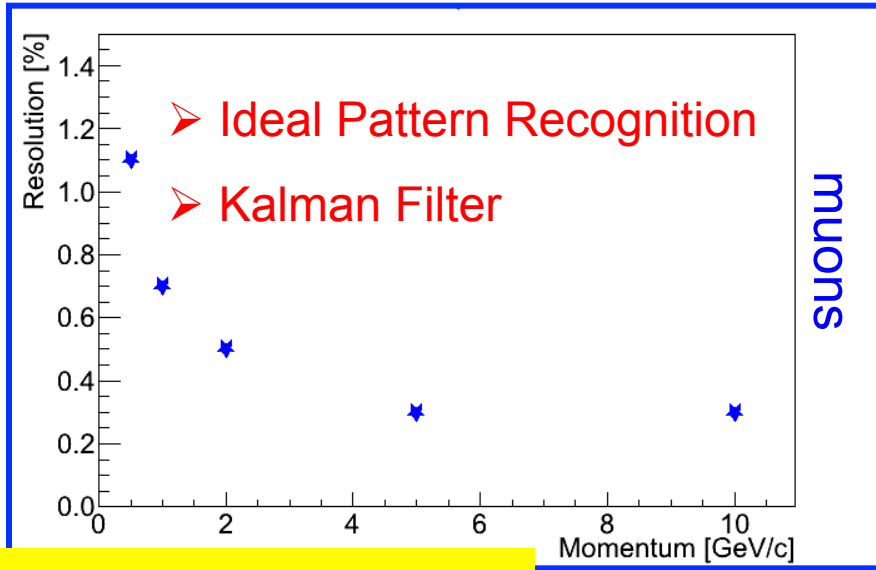
4° step – Kalman Filter



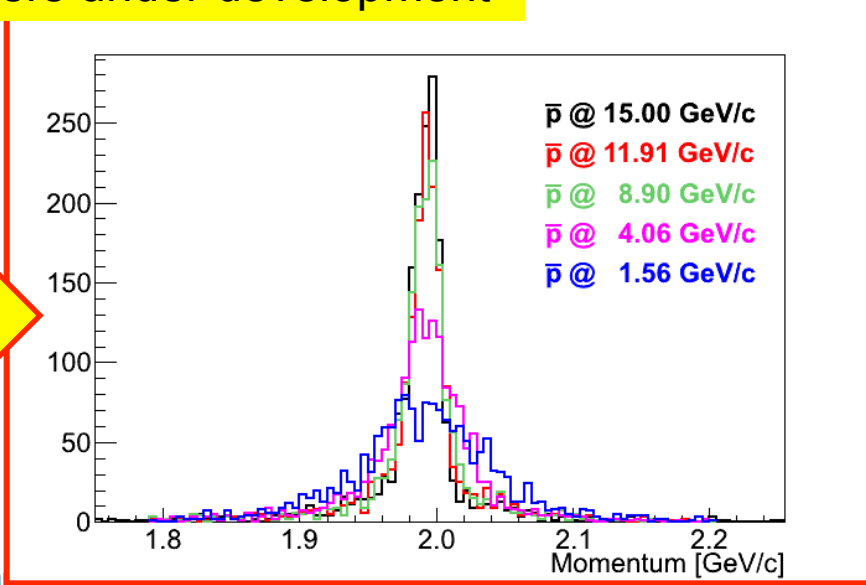
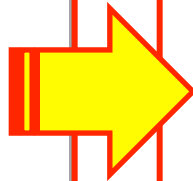
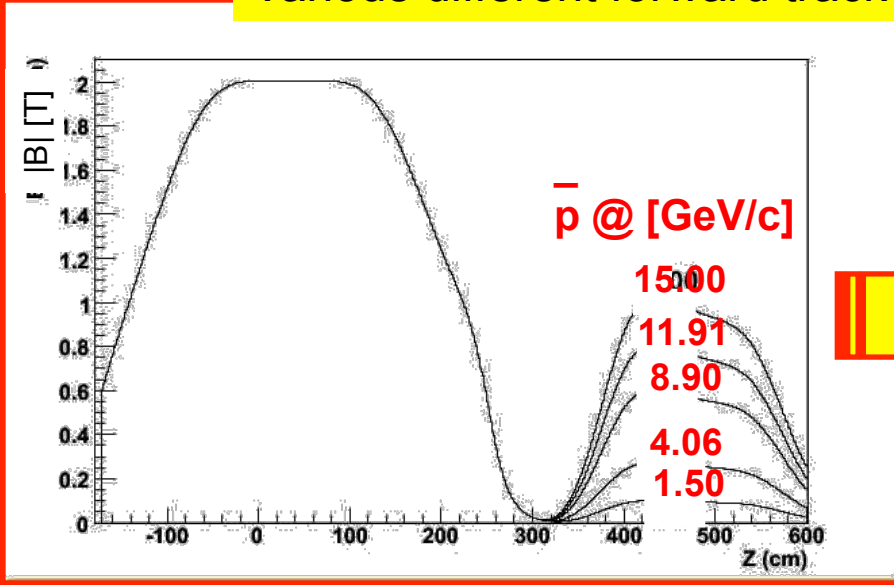
# Forward Tracking



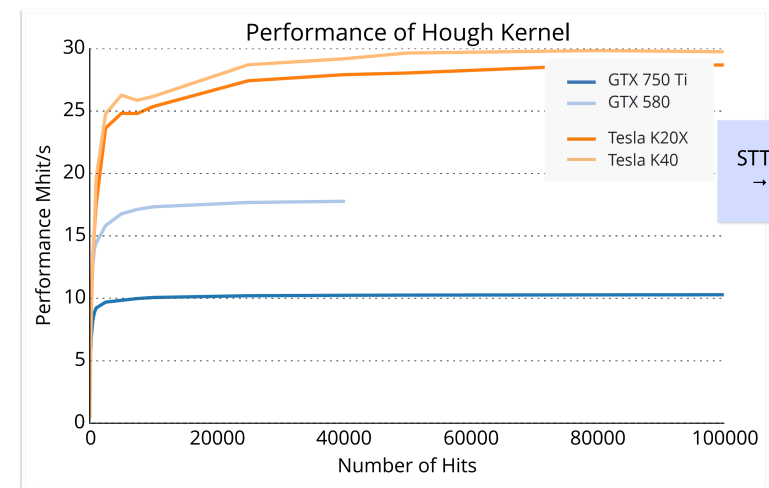
FTS  
+  
MVD  
+  
GEM



Various different forward track finders under development



- Find and fit tracks with the production speed at Panda (10 - 20 MHz in high luminosity mode)
- Alternative hardware:
  - FPGA:
    - *Helix tracking algorithm*
  - GPGPU:
    - *Cellular automaton*
    - *Hough transformation*
    - *Triplet finder*
    - *Riemann transformation*

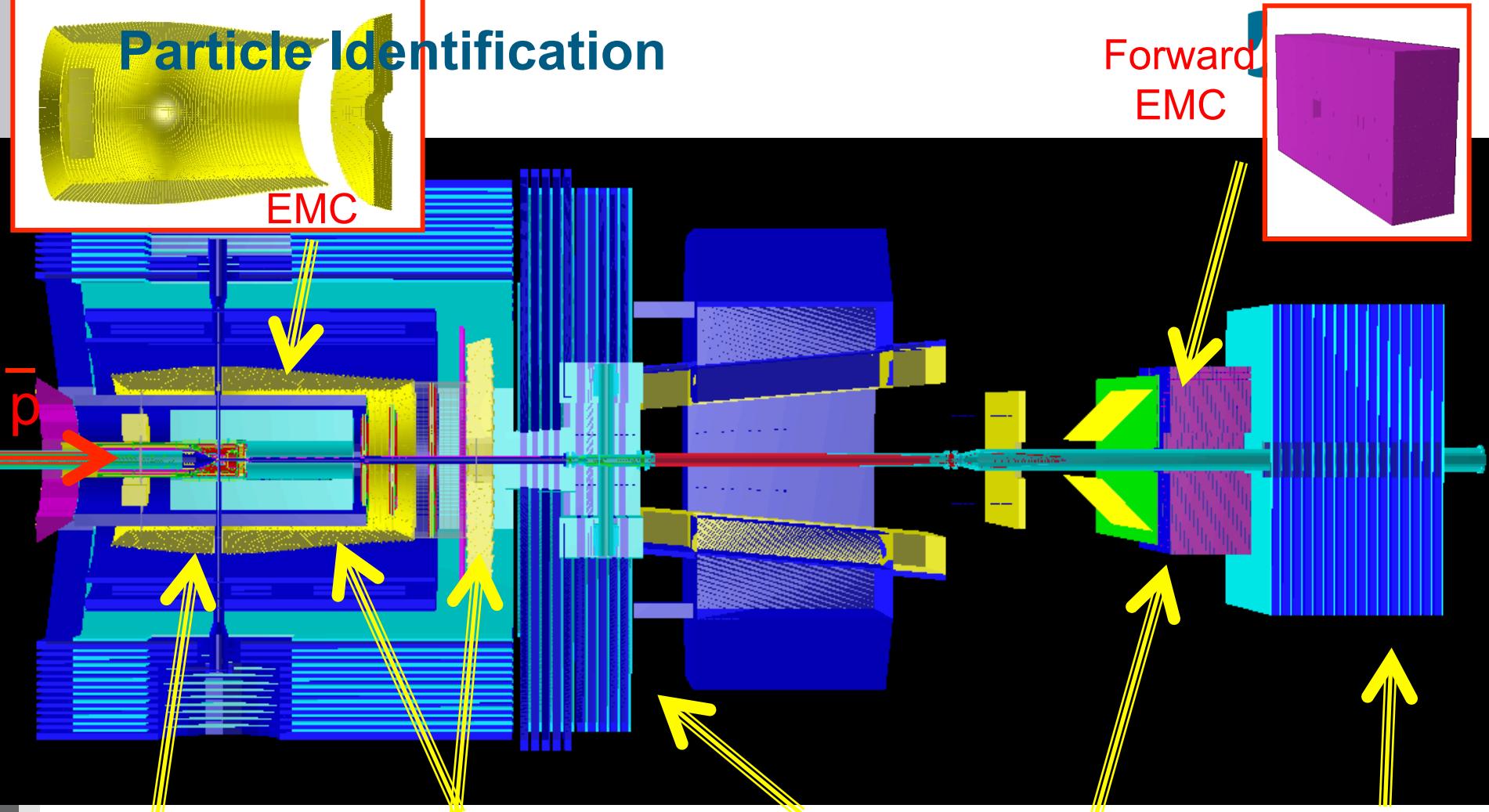


- *Direct switch in PandaRoot between CPU and GPU*

# Particle Identification

EMC

Forward  
EMC



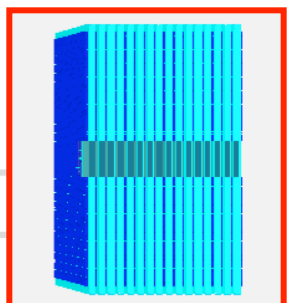
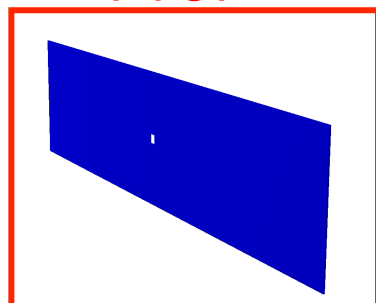
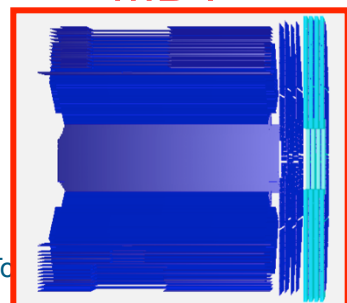
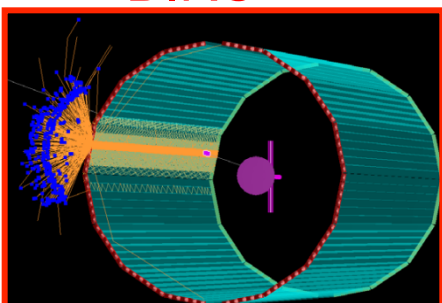
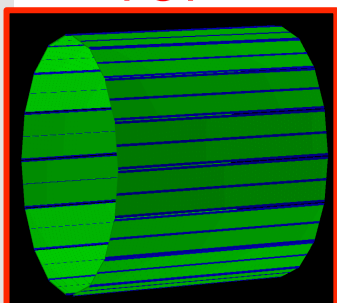
TOF

DIRC

MDT

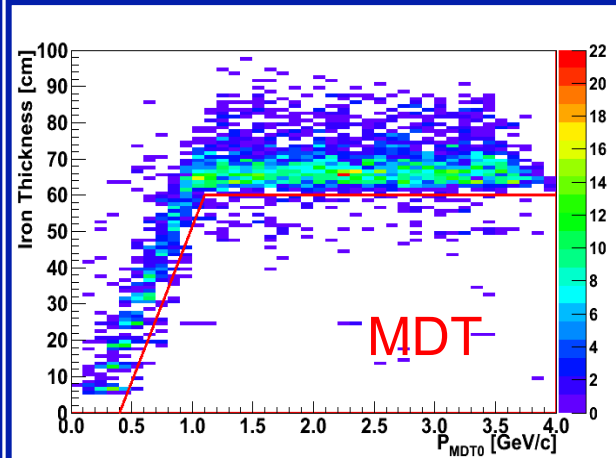
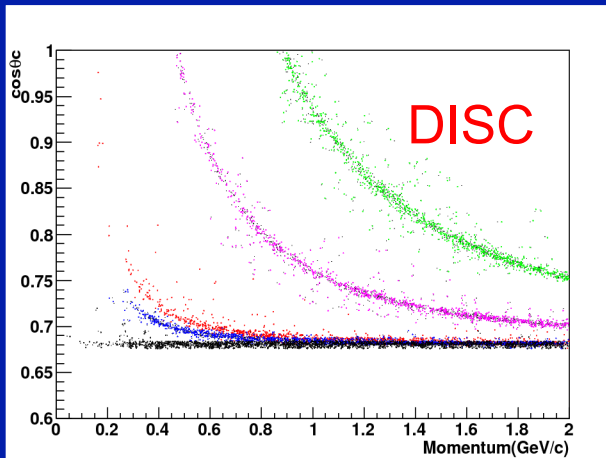
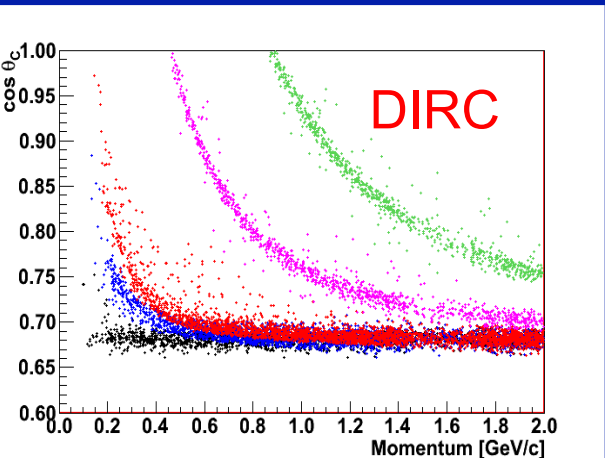
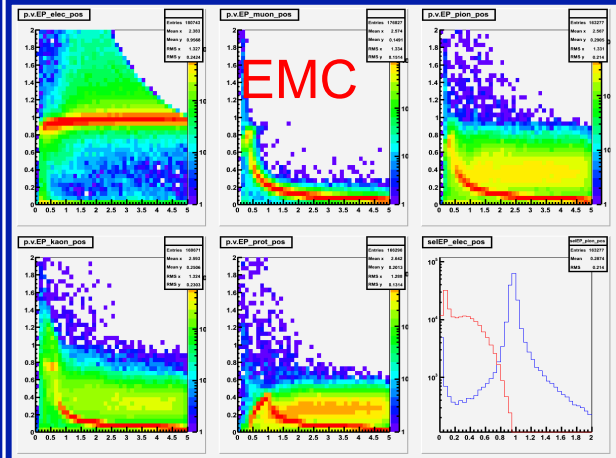
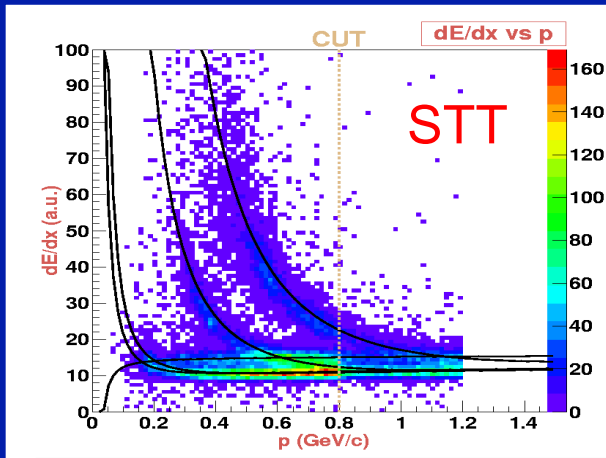
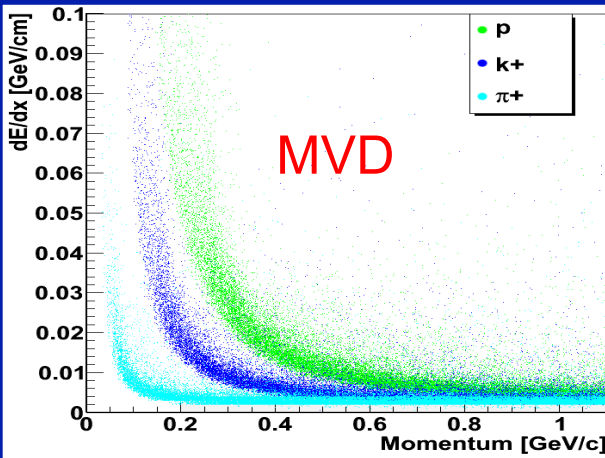
FTOF

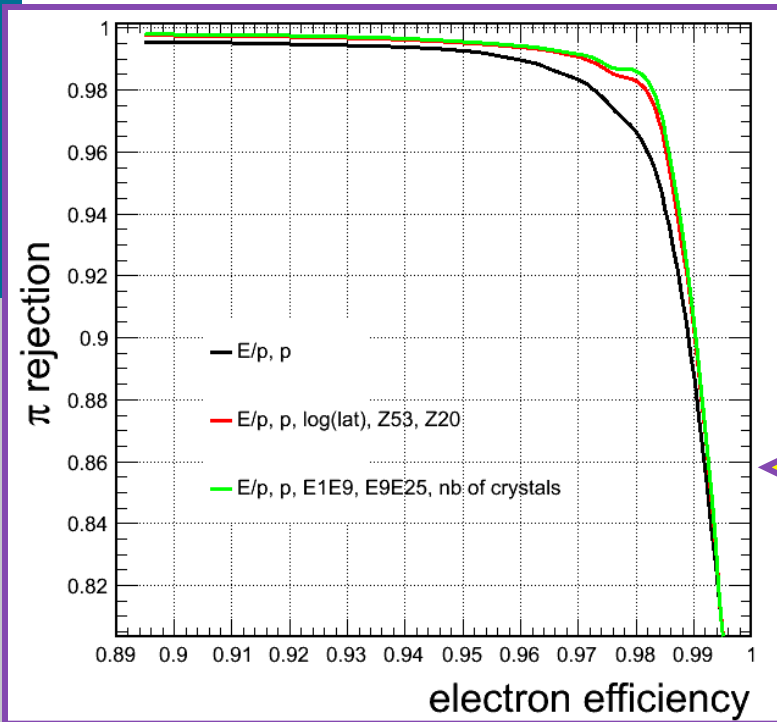
FWDMDT





## Implemented PDFs for many detectors (Bayes)



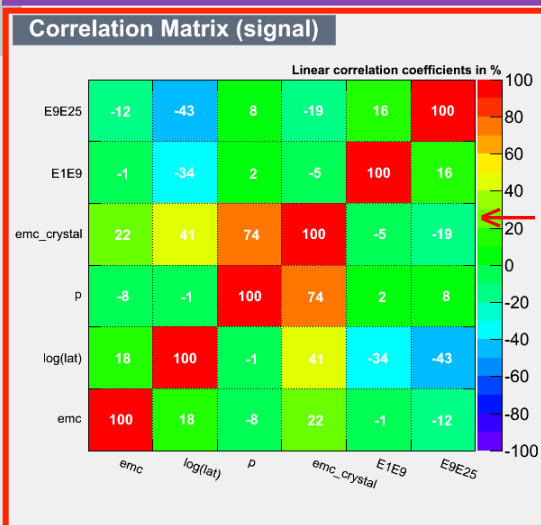


implementation of **TMVA** methods

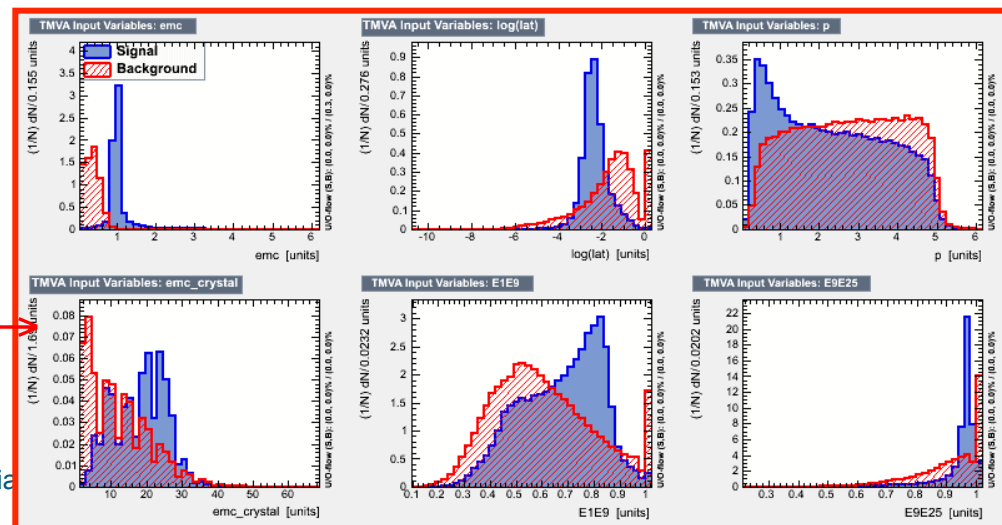
➤ **EMC** shower shape analysis

$e/\pi$   
 separation in  
 EMC

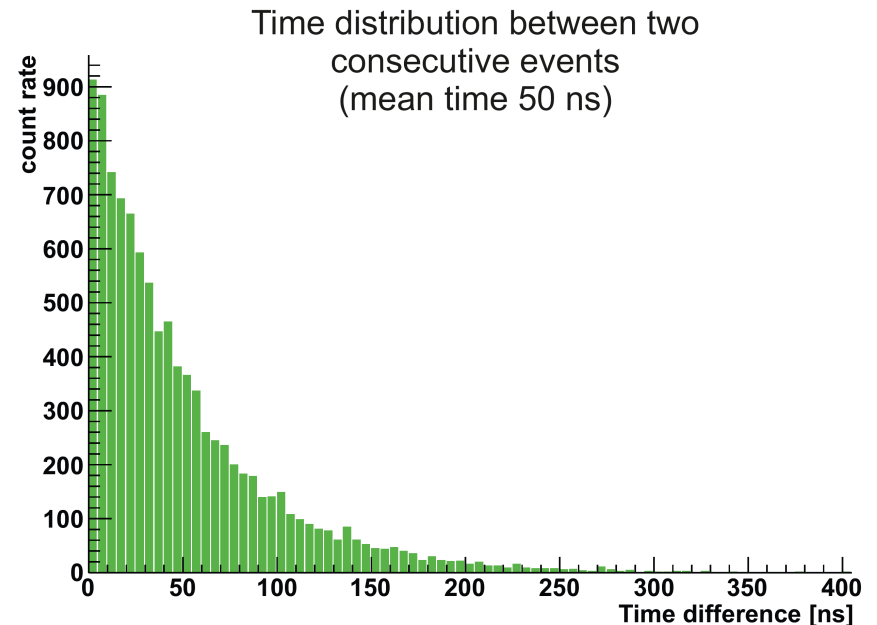
preliminary tests for muons (MDT)

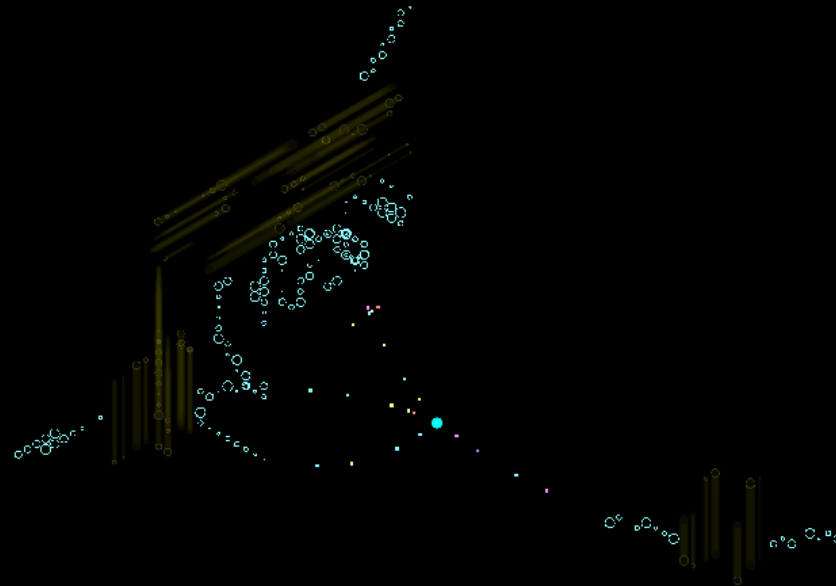


Correlation Variables

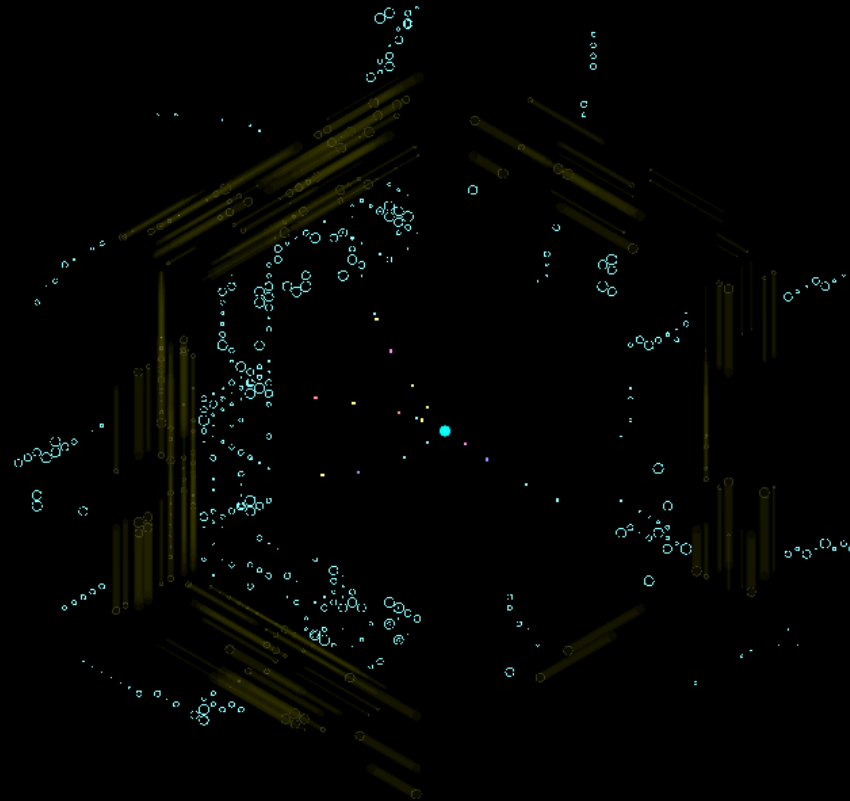


- Signal and background-events very similar → no hardware trigger possible
- Quasi continuous beam with maximum interaction rate of 20 MHz → Poisson distribution
- Raw data rate of 200 GByte/s
- Reduction of 1000 needed for permanent storage  $O(\text{PByte}/\text{year})$  → Online Event Filter

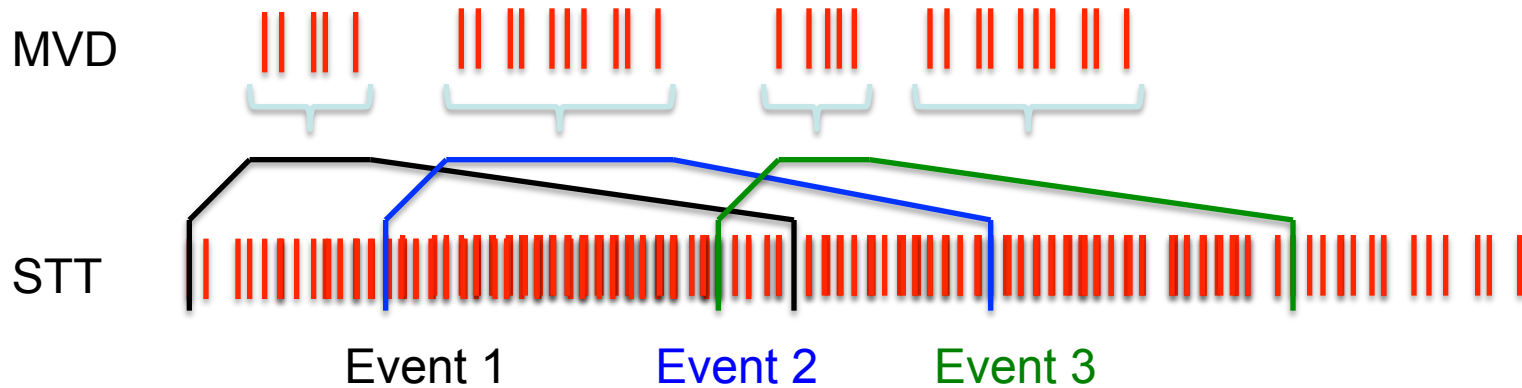




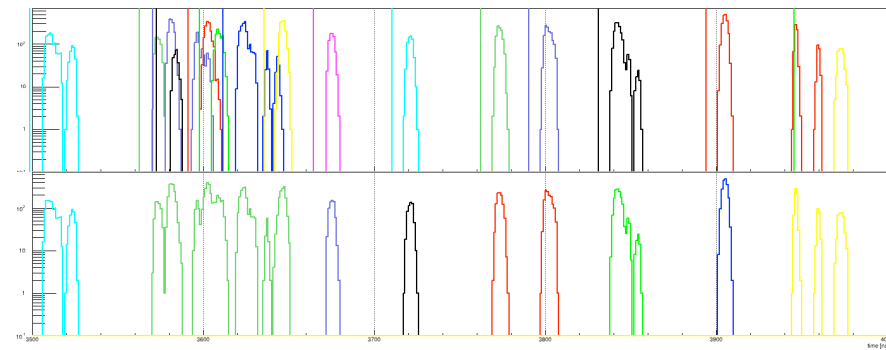
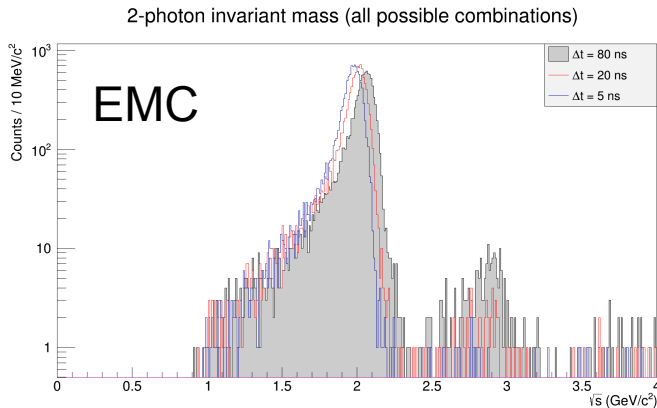
Single Event



20 MHz overlap



## Activities on the central tracker MVD + STT + GEM + EMC



# Analysis example

- Rho package
  - Combine hits
  - Fit with constraints
  - Apply cuts

