

# CBM Geometry Database

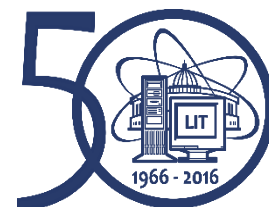
6 July 2017, GSI, Darmstadt

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# Geometry Database Requests

- Store and retrieve the geometry of the CBM modules in TGeo format (binary);
- No need to be more granular (within module geometry)
  - typical size of ROOT file is small (several 10 kB);
- Two-dimensional versioning (time, context);
- Manage setups (combinations of module geometries);
- Direct interface to CBMRoot for geometry building;
- High availability, good performance for online access (during CBMRoot run);
- Possibility to create a full TGeo file for a given setup (for offline use).  
Can be also realized within CBMRoot;
- Modular access patterns (read/write) on group/user levels.

# Geometry Database

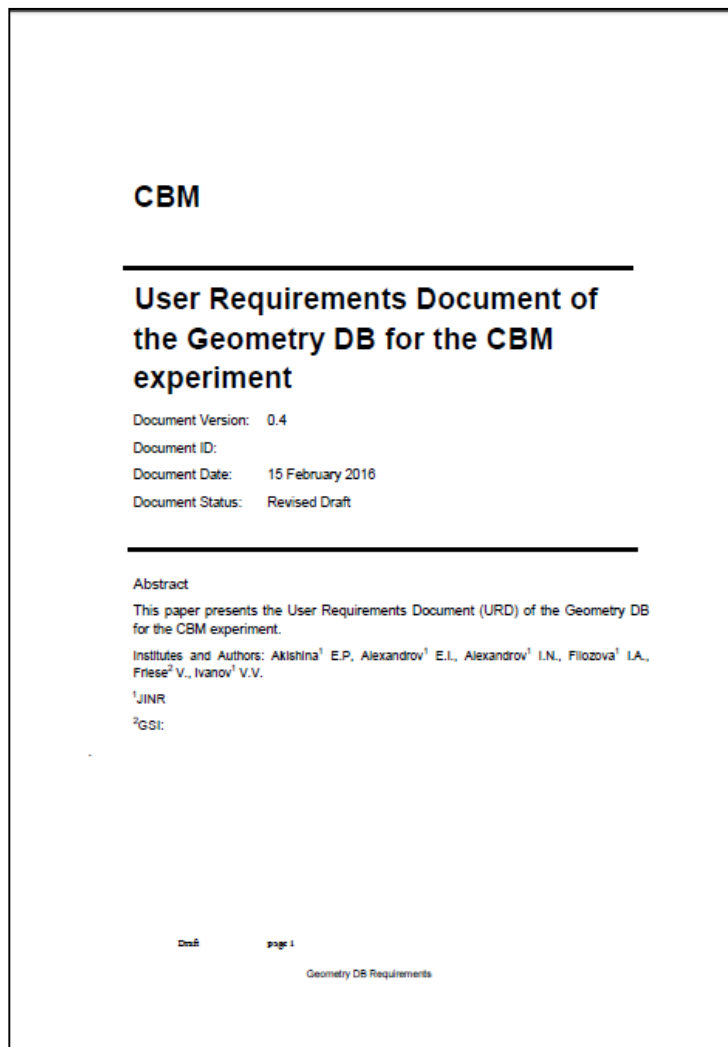
Geometry Database is the information system to:

- store the modules of CBM;
- load the geometry modules for setup construction;
- construct setup from the stored modules;
- support different versions of setup.

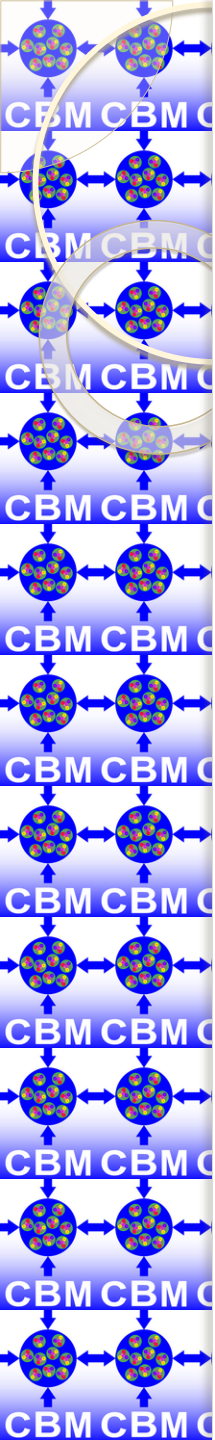
# Geometry DB. User Requirements

Basis for Geometry DB development:

*User Requirements Document of Geometry DB for the CBM experiment*



<http://lt-jds.jinr.ru/record/69336?ln=en>



# Basic definitions

## Geometry Module

File in ROOT format with content of detector geometry

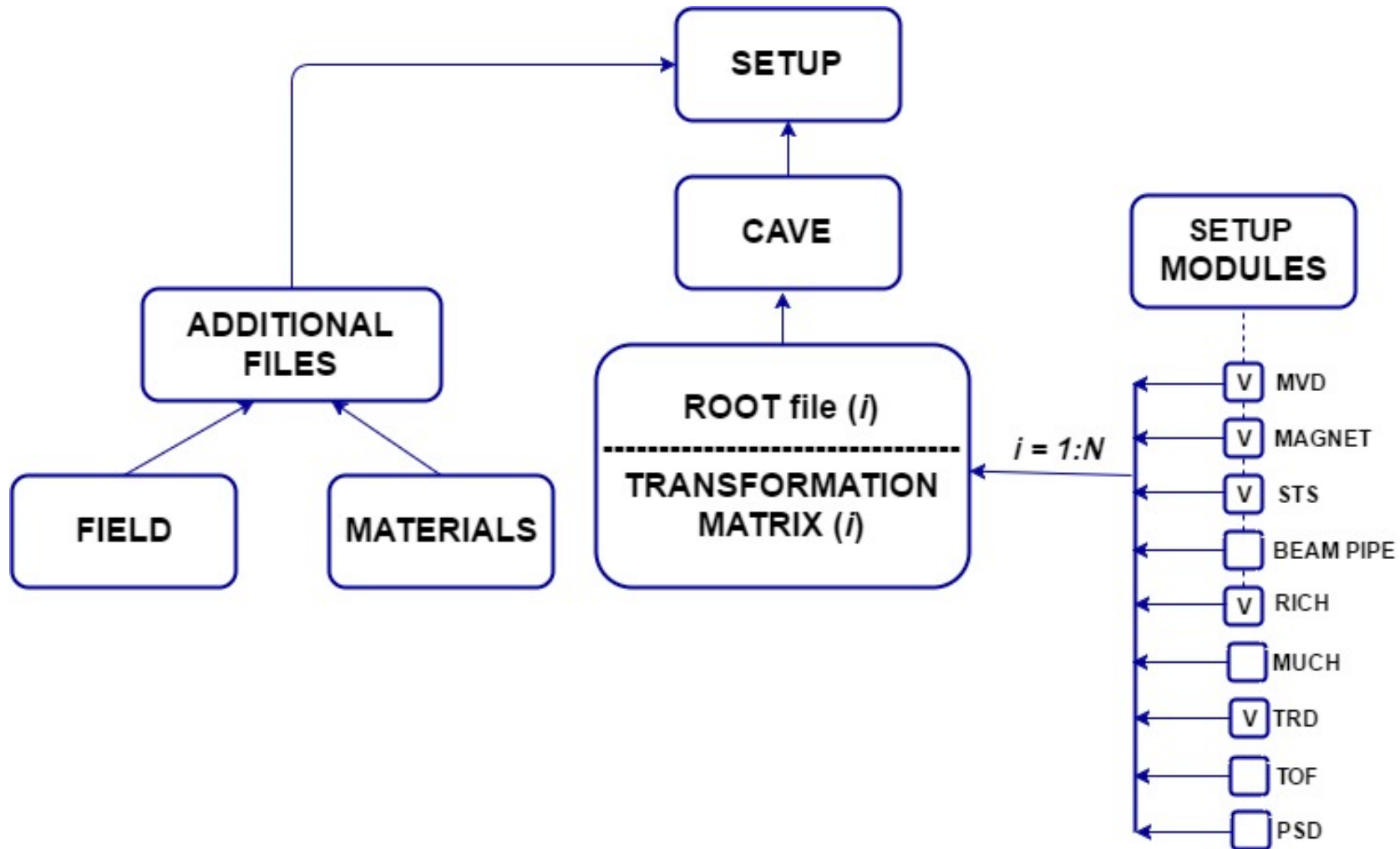
## Setup Module

Geometry module, link to the mother geometry module, its placement in the mother module (transformation matrix or object of class TGeoMatrix)

## Setup

Combination of setup modules which represents the full CBM geometry

# Setup Structure



# Users



## **Lead Developer**

coordinator and responsible person for the entire CBM geometry



## **Developer**

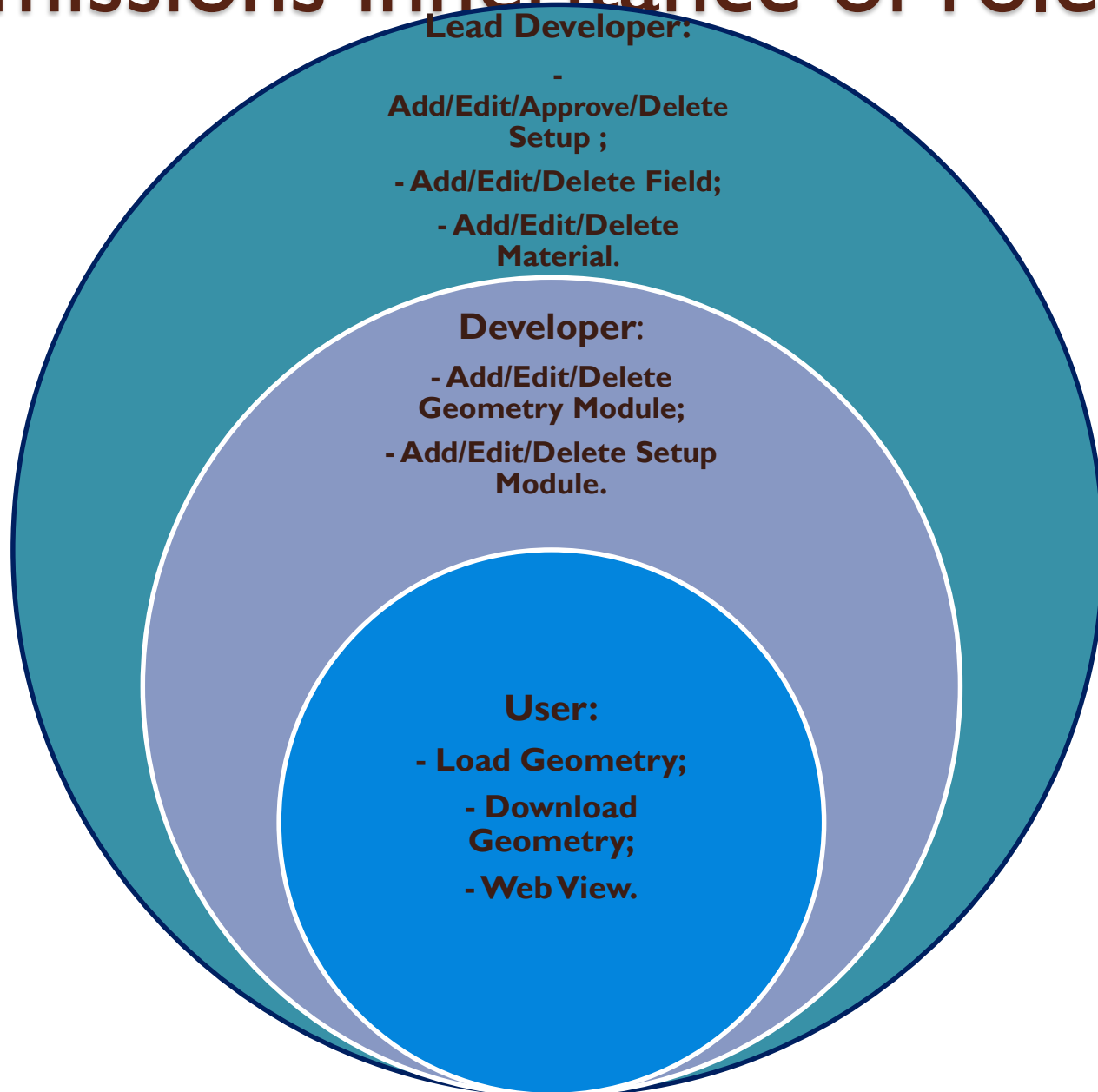
the responsible developer for one of modules



## **CBM user**

CBM user can only read data. CBM user can be a human using GUI or an application using API

# Permissions inheritance of roles





# Status of development

## Operation

**Load Geometry**

**Download Geometry**

**Web View**

**Add/Edit/Delete Geometry Module**

**Add/Edit/Delete Setup Module**

**Add/Edit/Delete Setup**

**Approve Setup**

**Add/Edit/Delete Field**

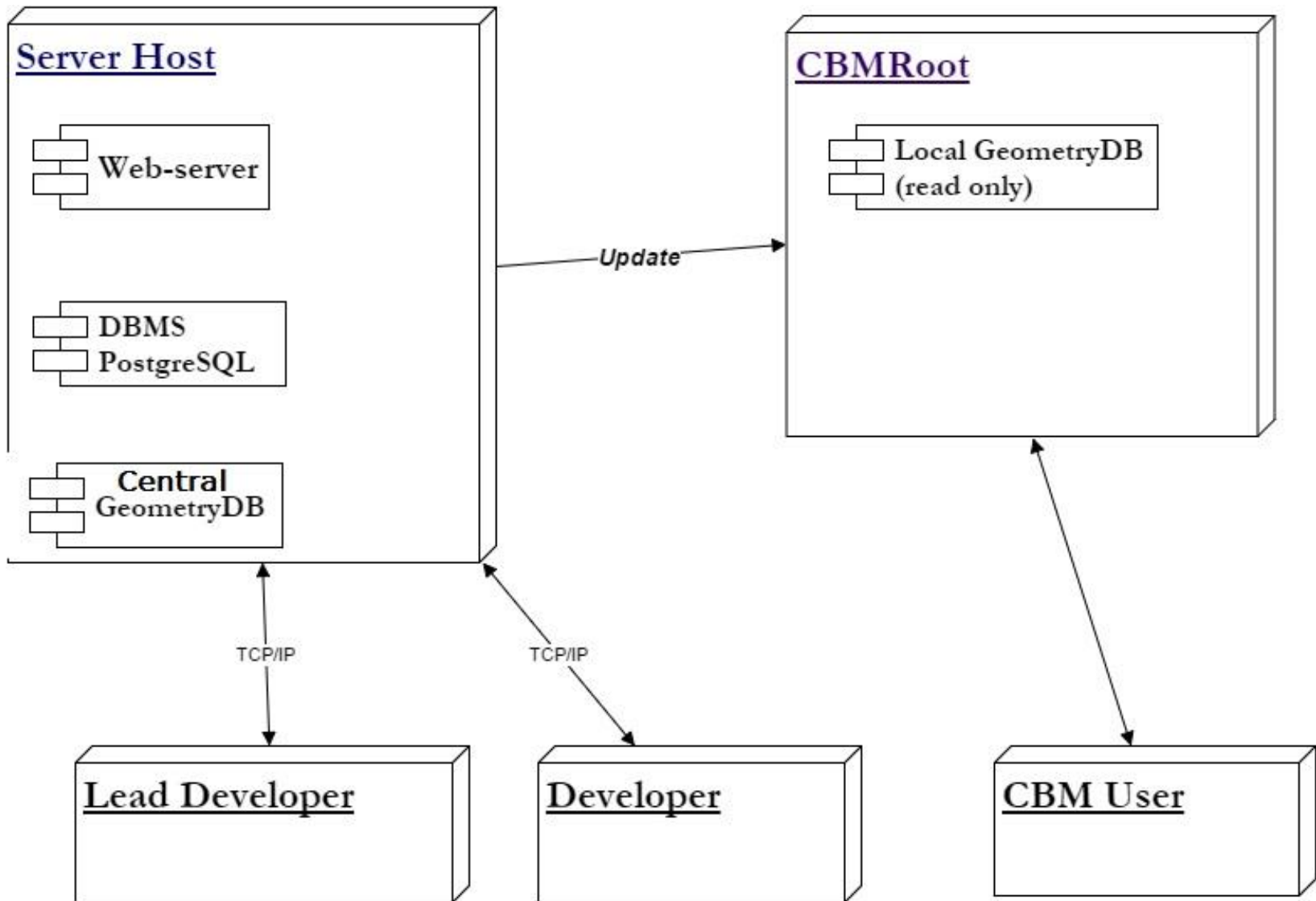
**Add/Edit/Delete Material**

**Implemented**

**Not Implemented**

**Partially Implemented**

# Component Diagram

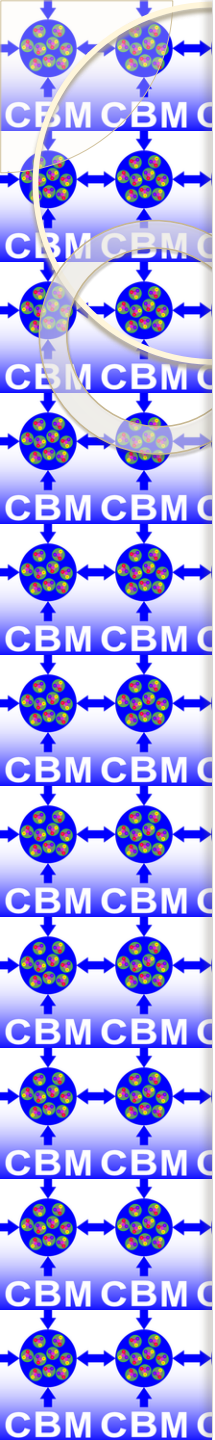



# The implementation of GUI and API

All type of Users can view the information from Geometry Database. **Lead Developer** and **Developer** use Database to update data files corresponding to any object of Geometry DB. They can use:

- **GUI (Graphical User Interface)** - supported through Web-Server that is implemented by Apache server and PHP scripts.
- **API (Application Programming Interface)** - implemented as macros of the ROOT environment. Any macro can be used as executable file or can be called from other ROOT macros. There are 2 types of macros: *Upload* and *Download*.

# Web-interface.View Mode.





**CBM**  
Compressed Baryonic Matter experiment

Geometry DataBase

### Available Setups

Tag	Date	Description	Status	Author
sis100_electron	2016-06-23	sis100_electron test	Created	evgeny
sis7888999	2016-11-22	test test	Created	superuser

Setup	Tag	Date	Status	Author	Description
Setup	sis100_electron	2016-06-23	Created	evgeny	sis100_electron test

	Tag	Date	Author	Description
sts	sts_v16c	2016-06-20	evgeny	
magnet	v15a	2016-06-20	evgeny	
pipe	pipe_v141	2016-06-20	evgeny	
mvd	mvd_v15a	2016-06-20	evgeny	
rich	rich_v16a_1e	2016-06-20	evgeny	
trd	trd_v15a_1e	2016-06-20	evgeny	
tof	tof_v16a_1e	2016-06-20	evgeny	
psd	psd_geo_xy	2016-06-20	evgeny	
Field	v12b	2016-06-22	evgeny	sis100_electron test
Material	v1.10	2016-06-22	evgeny	

**mvd / mvd\_v15a**

Transformation	Scale	Translation	File Tag
100 010 001	1;1;1	0;0;0	v15a

**Field Tag: v12b**

X	Y	Z	Scale
0	0	40	1

View.Setup

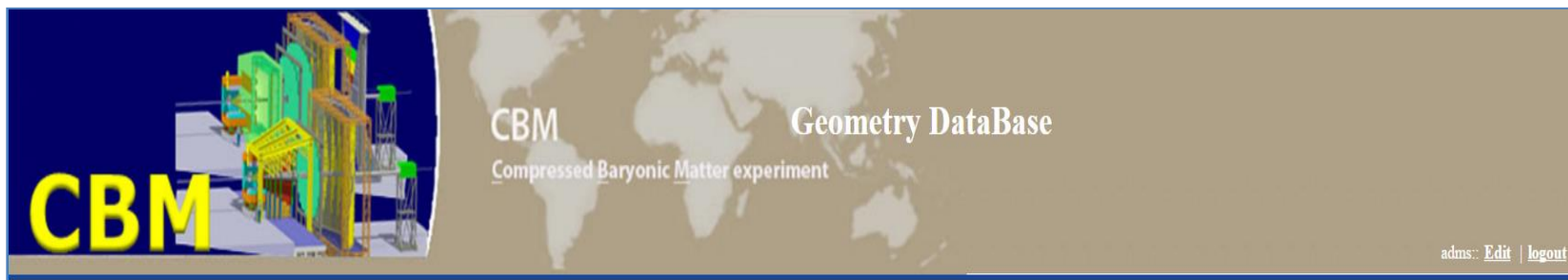
View.Setup.Modules

View.Files

View.Materials

View.Fields

# Web-interface. Edit Mode.



Edit Admin

Tag	Date	Description	Status	Author		
sis100_electron	2016-06-23	sis100_electron test	Created	evgeny	<input type="button" value="OK"/>	<input type="button" value="X"/>
sis7888999	2016-11-22	test test	Created	superuser	<input type="button" value="OK"/>	<input type="button" value="X"/>

Please, enter new value for tag:

**Edit Admin Interface**

**Selection for Edit Admin**

**Edit Setup**  
To configure and edit setup.

**Edit Material**  
To configure and edit material.

**Edit Field**  
To configure and edit field.

**Form for Setup Compiling**



# Web-interface. Setup Compilation.

Add Setup

Setup Tag: s111 Author: fia@jinr.ru

Description:

### Available Setup Modules

- magnet +
- pipe +
- mvd +
- sts -
- rich +
- trd +
- tof +
- psd +
- platform +

On/Off	Type	Tag	Date	Author	File Tag	Transformation	Translation	Parent	Description
<input checked="" type="radio"/>	sts	sts_v16c	2016-06-20	evgeny	v16c	100 010 001	0;0;65	cave	
<input type="radio"/>	sts	sm_1	2016-03-31	evgeny	1	100 010 001	0;0;120	cave	

### Available Fields

On/Off	Tag	Date	Author	X	Y	Z	Scale	Description
<input checked="" type="radio"/>	v12b	2016-06-22	evgeny	0	0	40	1	

### Available Materials

On/Off	Tag	Date	Author	Description
<input checked="" type="radio"/>	v1.10	2016-06-22	evgeny	

Cancel Add Setup

# Web-interface. Add/Edit Material.

**CBM** Geometry DataBase  
Compressed Baryonic Matter experiment

**Edit Admin Interface**

Selection for Edit Admin

**Edit Setup**  
To configure and edit setup.

**Edit Material** →  
To configure and edit material.

**Edit Field**  
To configure and edit field.

Available Materials

Tag	Date	Author	Description
v1.10	2016-06-22	evgeny	test

You may edit the field **Description**. To save new value press button OK!

Please, enter new value for tag:  
tag: m222

Cancel Create New Material

OK

**Material Tag:** m222

**File URL:** /home/sites/who-is-who\_jinr\_ru/www/cbm/geomtest3/storage/04072017\_014041\_83.pdf  
Выберите файл 83.pdf

**Description:\*** test material m222

**Author:** fia@jinr.ru

*Upload Status:*  
**File has been uploaded successfully**

Cancel Add Material

# Web-interface. Configure Access.

[Configure WebAccess](#)

Code	Name	Actions	Users
LDV	Lead Developer	Full Set	<a href="#">Grant / Revoke</a>
CBM	CBM User	Read Only	<a href="#">Grant / Revoke</a>
DVP	Developer	MVD	<a href="#">Grant / Revoke</a>
DVP	Developer	PIPE	<a href="#">Grant / Revoke</a>
DVP	Developer	STS	<a href="#">Grant / Revoke</a>
DVP	Developer	RICH	<a href="#">Grant / Revoke</a>
DVP	Developer	MAGNET	<a href="#">Grant / Revoke</a>
DVP	Developer	TRD	<a href="#">Grant / Revoke</a>
DVP	Developer	TOF	<a href="#">Grant / Revoke</a>
DVP	Developer	PSD	<a href="#">Grant / Revoke</a>
DVP	Developer	PLATFORM	<a href="#">Grant / Revoke</a>

Connect user to role Developer

Select user:

Connected users to role Developer MVD:  
are absent!

Grant this role to some user

Found 2 matching users:

ID	email	Developer/PIPE/
3	axion2rv@gmail.com	<a href="#">Revoke</a>
15	wwq21@yyyyyy.com	<a href="#">Revoke</a>

**WebAccess Admin**

**Selection for WebAccess Admin**

- Role Area** - To configure administration rights and authorization rules.
- User Area** - To configure administration rights for the users.
- Manage Accounts** - To manage user accounts

[Accounts Overview](#)

[Create New Account](#)

[Edit Account](#)

**User Administration**

Enter part of the user Nickname or Email:

Found 5 matching users:

ID	email	Nickname	Role
1	fia@jinr.ru	adms	<a href="#">show details</a>
4	aleksand@jinr.ru	susu	<a href="#">show details</a>
10	axion2rv@gmail.com		<a href="#">show details</a>
12	fira@cv.jinr.ru		<a href="#">show details</a>
14	ivanov@jinr.ru	Ivanov	<a href="#">show details</a>

Roles connected to user *aleksand@jinr.ru*:

Code	Name	Actions	Role
LDV	Lead Developer	Full Set	<a href="#">Revoke</a>
CBM	CBM User	Read Only	<a href="#">Revoke</a>
			<a href="#">Grant</a>





# Upload Type Macros

API is implemented as macros of the ROOT environment.

*Upload* type macros can be used by **Lead Developer** and **Developer** to load the geometry into the Central Geometry DB according to access privileges.

# Download Type Macros

*Download* macros are used by CBM users to obtain information about existing Setups and to load the needed Setup from Local Geometry DB into the memory of applications.

```
$root -b -q 'getSetupList.C("test2.db")'
```

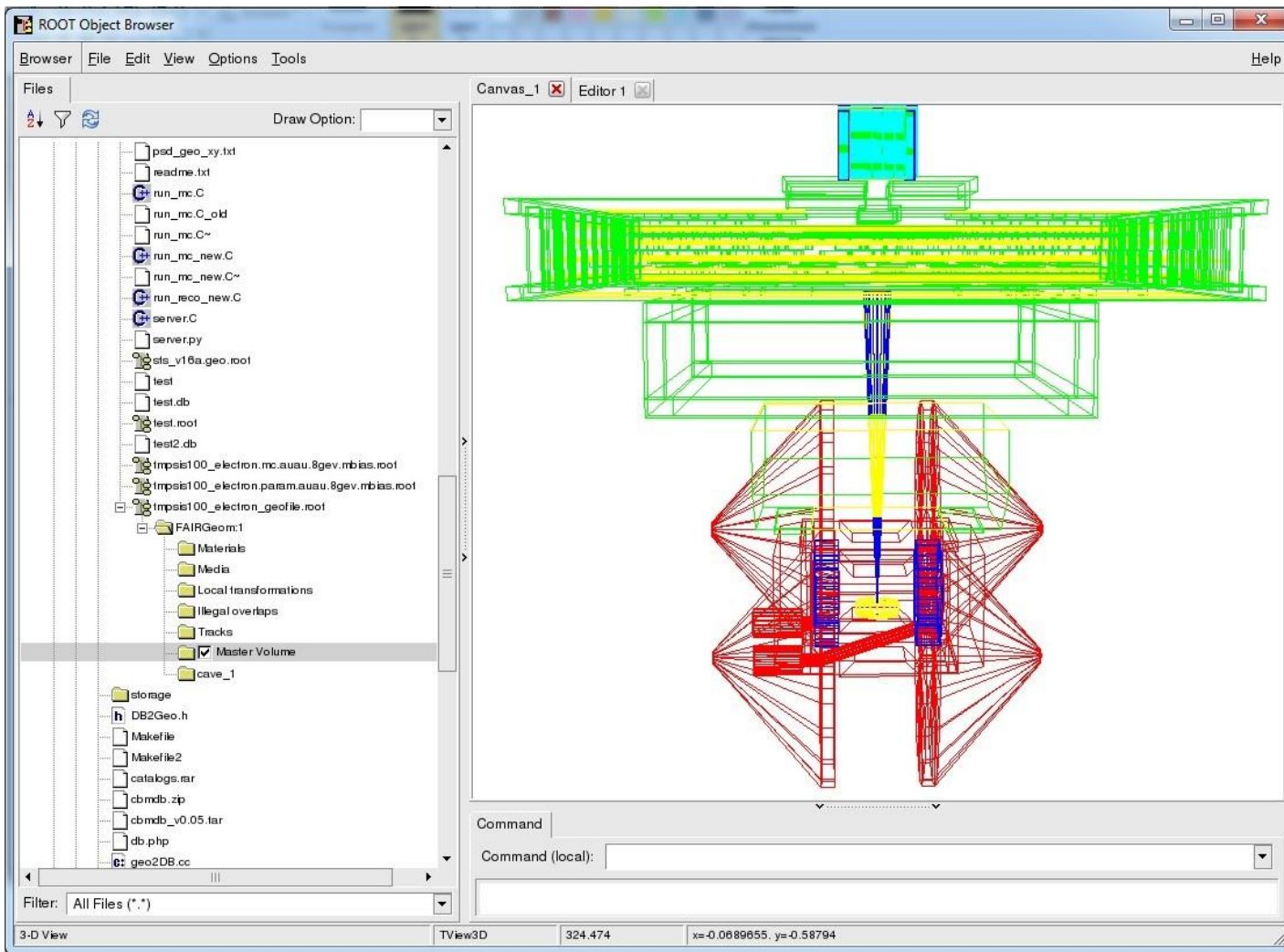
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Setup list:

Tag	Date	Author	Description
sis100_electron	23.06.2016	<u>evgeny</u>	<u>desc</u> sis100_electron

# Load Setup Macro

```
gROOT->LoadMacro("loadSetup.C");  
loadSetup("sis100_electron");
```



# Conclusion and Next Steps

- Geometry DB for storing and retrieving the geometry of CBM modules is developed in PostgreSQL DBMS
- Most of GUI (Graphical User Interface) tools were implemented
- Most of API (Application Programming Interface) tools as a set of ROOT macros (Upload and Download) were implemented

- To develop GUI and API:
  - Approve Setup
- To upgrade GUI:
  - Add/Edit/Delete Geometry Module
  - Add/Edit/Delete Setup Module
  - Add/Edit/Delete Field
  - Download Geometry
- Improve web-interface