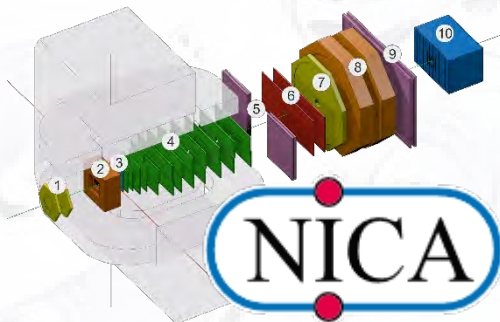


Integration of the Geometry Database for the BM@N experiment

Akishina E.P.¹, Alexandrov E.I.¹, Alexandrov I.N.¹,
Chebotov A.I.¹, Filozova I.A.¹, Gertsenberger K.V.¹,
Ivanov V.V.¹

¹JINR, Dubna



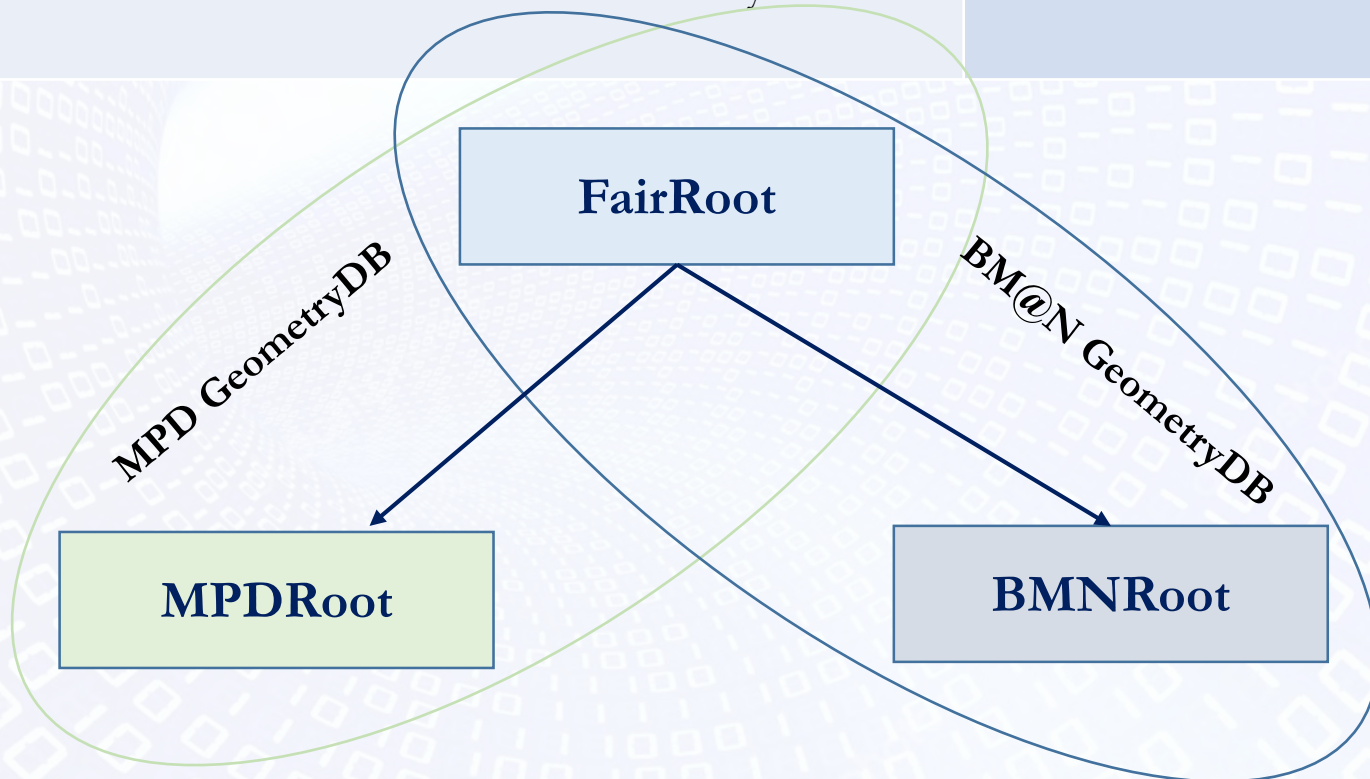
11th Collaboration Meeting of the
BM@N, 28-30 November 2023



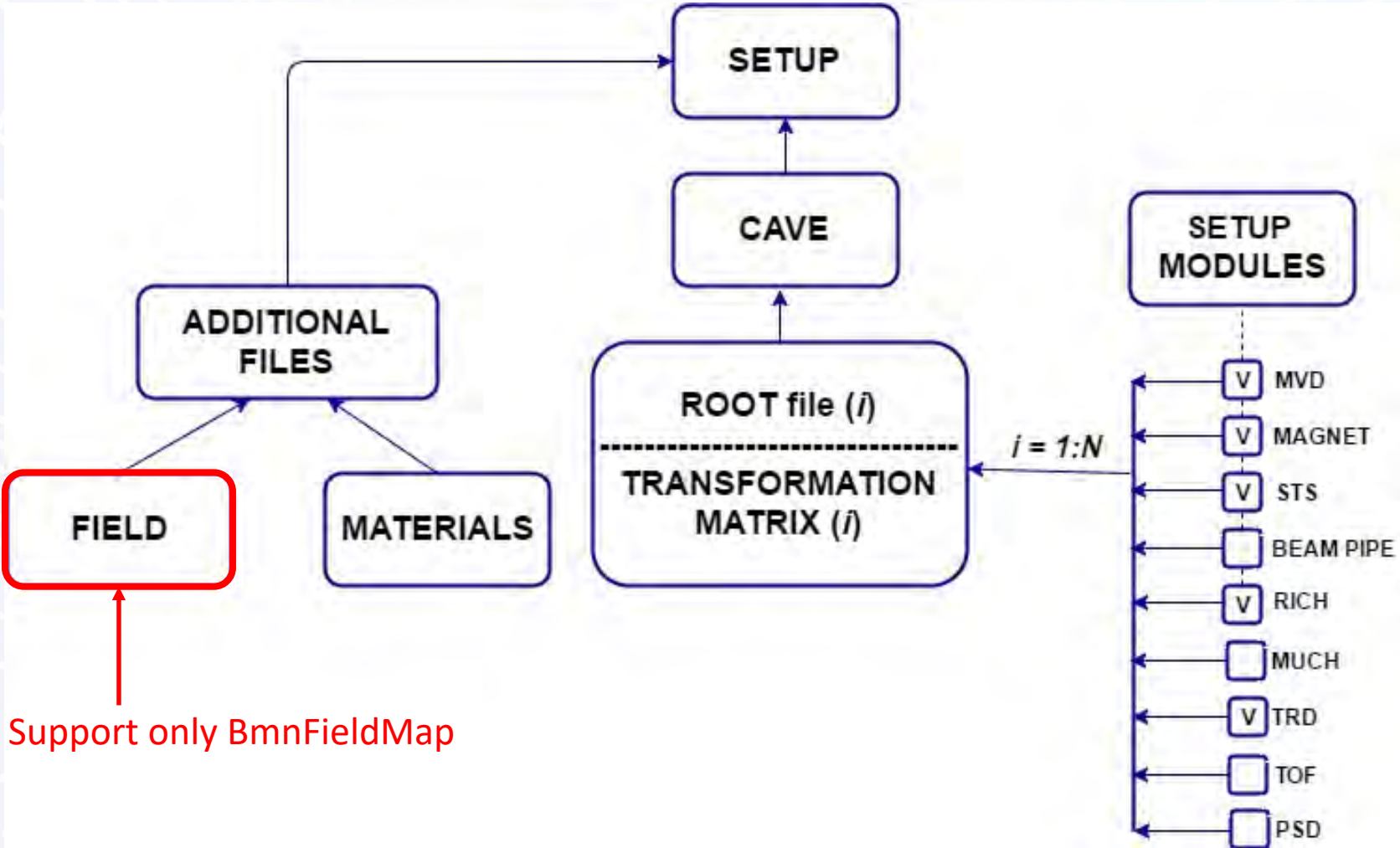
Joint Institute for Nuclear Research

BM@N & MPD

Common features	Differences
Approaches to the methods of simulations and reconstructions	The sets of Detectors
Software: FAIRSOFT, FAIRROOT RunManager: <ul style="list-style-type: none">➤ FairRunSim for the simulation runs➤ FairRunAna for the reconstruction or analysis runs	



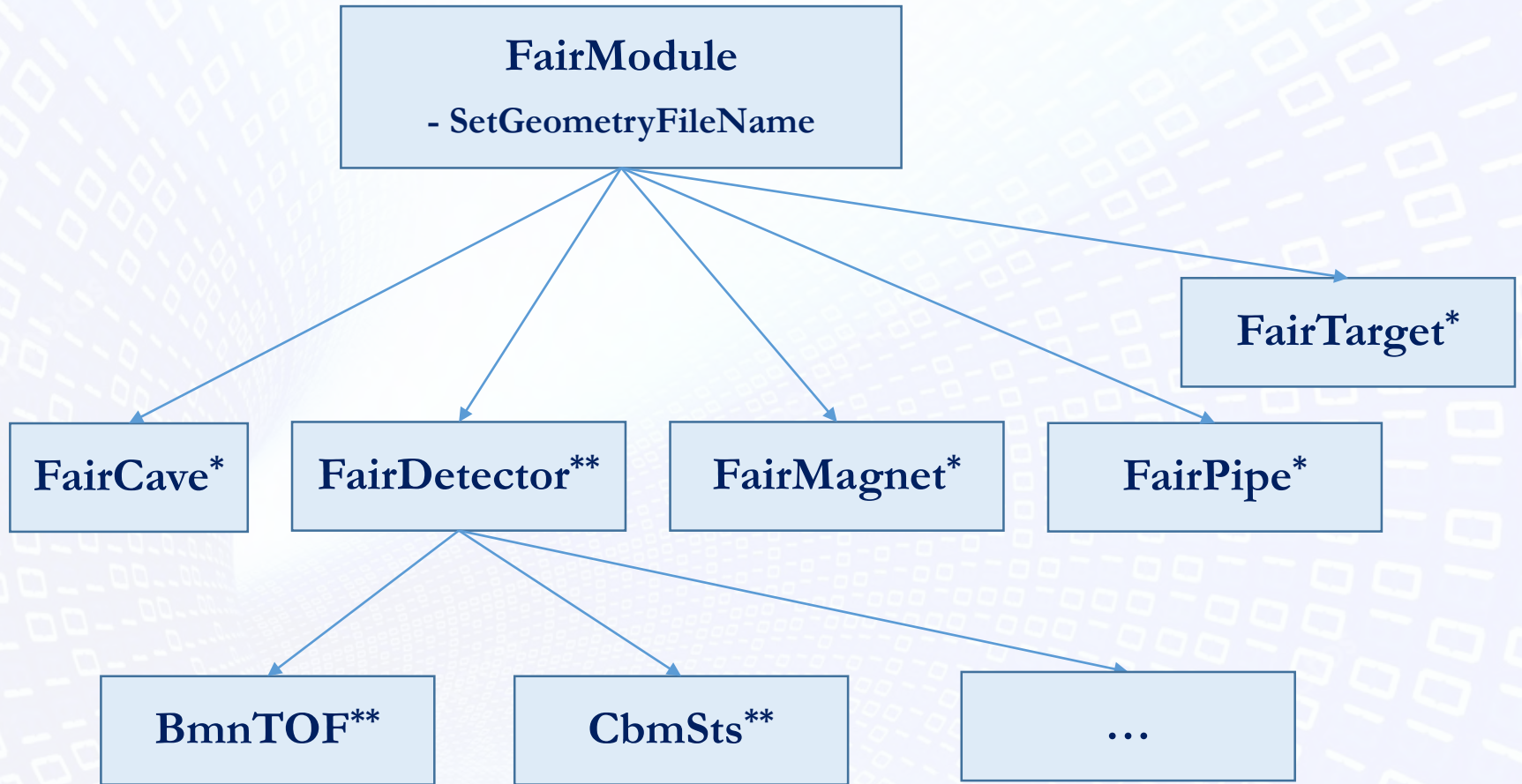
Setup Structure



Support only BmnFieldMap

For run <8:
Setup can not have more than 1 instance of each module.

Inheritance diagram of FairModule

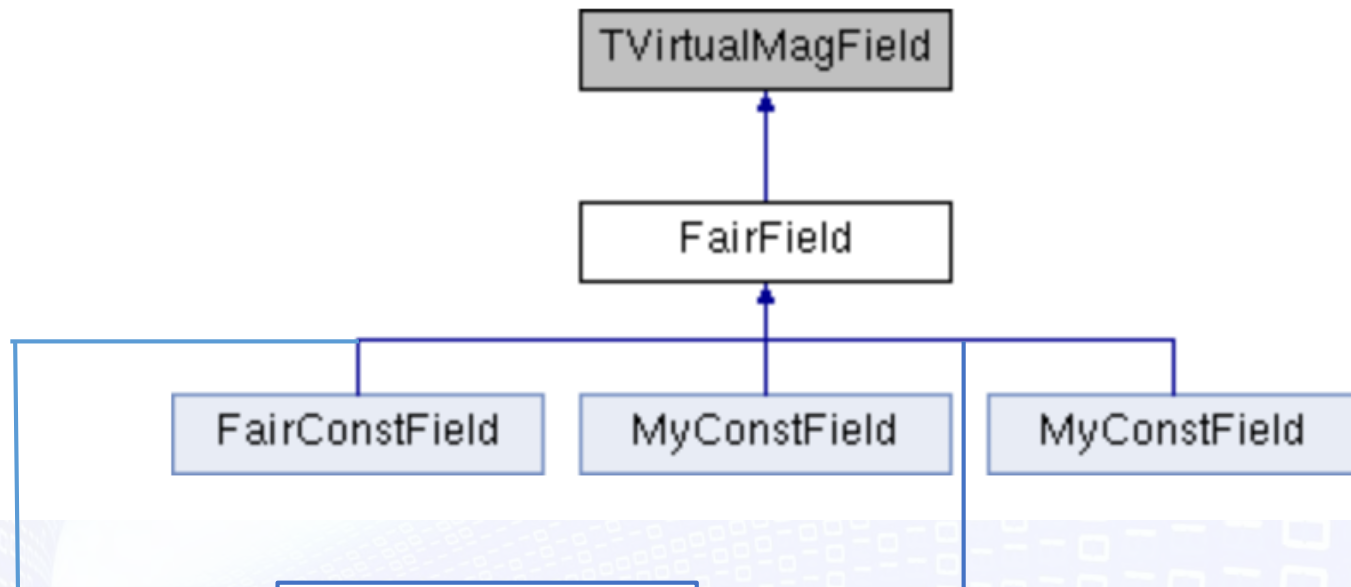


* It has constructor with 1 String parameter (name)

** It has constructor with 1 String parameter (name) and 1 Boolean parameter (active)

Field class map

Inheritance diagram for FairField:



BmnFieldConst

```
Const char* name
Double_t xMin
Double_t xMax
Double_t yMin
Double_t yMax
Double_t zMin
Double_t zMax
Double_t bX
Double_t bY
Double_t bZ
Bool_t flsOff
```

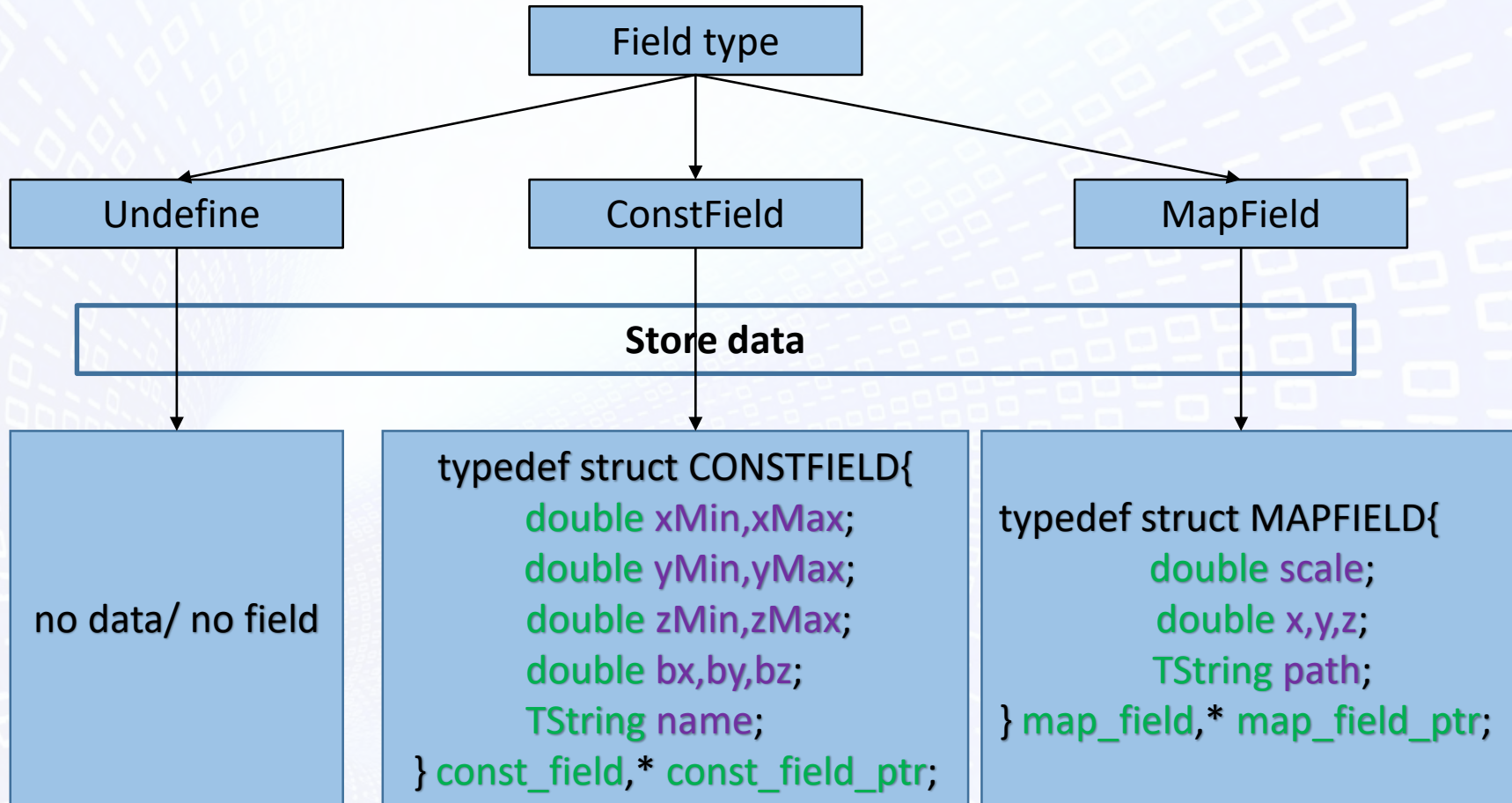
FairConstField

```
Const char* name
Double_t xMin
Double_t xMax
Double_t yMin
Double_t yMax
Double_t zMin
Double_t zMax
Double_t bX
Double_t bY
Double_t bZ
```

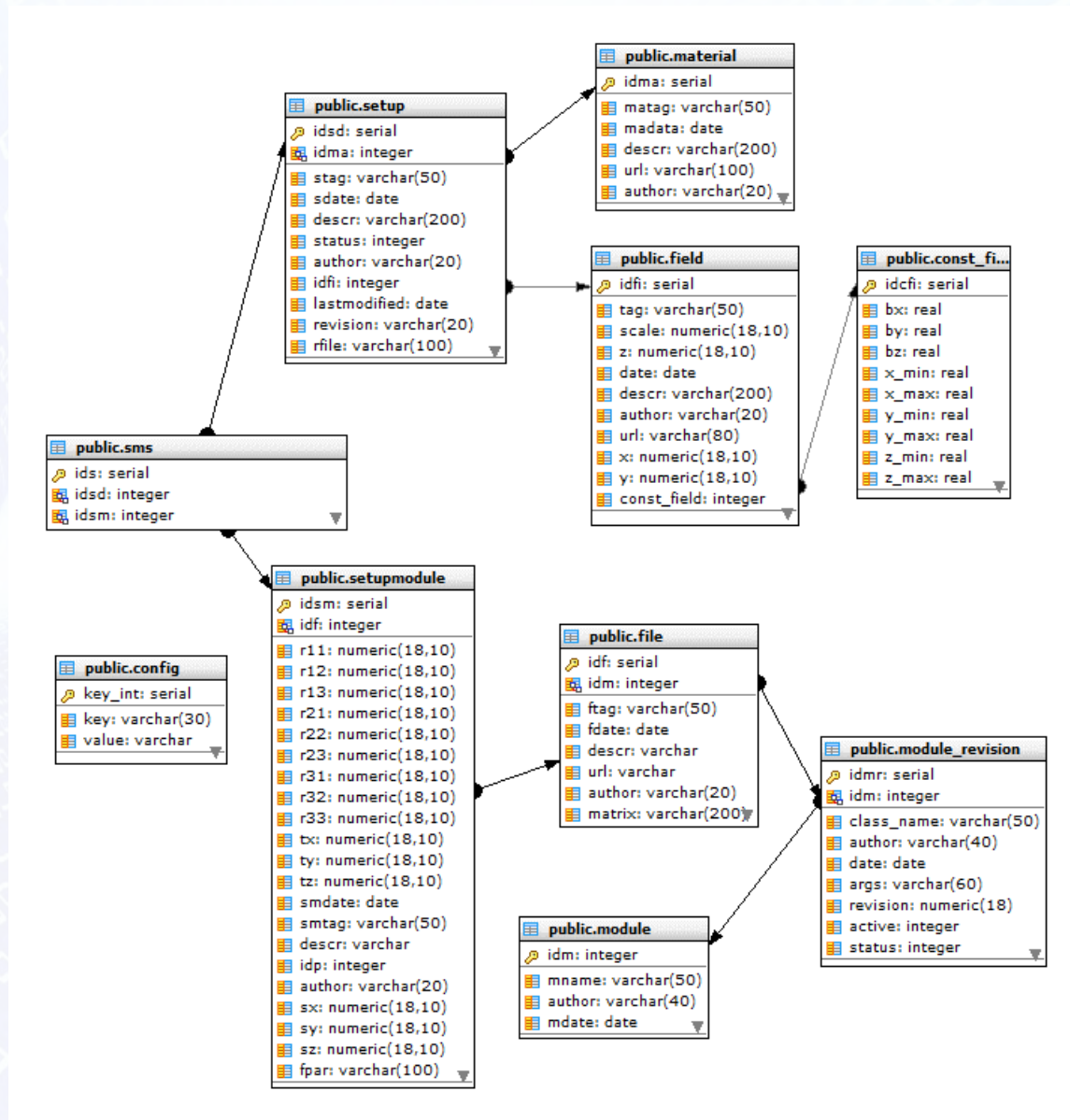
BmnFieldMap

```
void ReadAsciiFile(const char* fileName);
void ReadRootFile(const char* fileName);
...
```

Geo Database Fields



Object model of the Geometry DB



GUI: Edit Magnetic Fields

Magnetic Fields

You can edit the **Description** field. A new value is saved when the focus is lost.

[CREATE NEW FIELD](#)

Magnetic Field Tag	Date	Author	X	Y	Z	Scale	Description	
FieldMap_1900	2023-04-25	aleksand	0	0	0	0.929	1.861 for 900 A, 0.929 for 1900 A	✗
field_sp41v5_ascii_Extrap	2021-09-26	aleksand	0	0	0	1	field_sp41v5_ascii_Extrap.root	✗
field_sp41v5_ascii_Extrap.root	2023-04-25	aleksand	0	0	0	0.929	field_sp41v5_ascii_Extrap.root	✗

Magnetic Const Fields

You can edit the **Description** field. A new value is saved when the focus is lost.

[CREATE NEW CONST FIELD](#)

Magnetic Field Tag	Date	Author	bx	by	bz	xmin	xmax	ymin	ymax	zmin	zmax	Description	
field_sp41v4_ascii_Extrap	2021-04-16	aleksand	0	0	0	0	0	0	0	0	0	field_sp41v4_ascii_Extrap.root	✗

GUI: Add Const Magnetic Fields

Magnetic Field Tag*		Description*	
<input type="text"/>		<input type="text"/>	
Region of Field (Global Coordinates)			
Xmin: <input type="text" value="0"/>	Ymin: <input type="text" value="0"/>	Zmin: <input type="text" value="0"/>	
Xmax: <input type="text" value="0"/>	Ymax: <input type="text" value="0"/>	Zmax: <input type="text" value="0"/>	
Field Values [kG]			
Bx: <input type="text" value="0"/>	By: <input type="text" value="0"/>	Bz: <input type="text" value="0"/>	
<input type="button" value="ADD CONST FIELD"/>		<input type="button" value="CANCEL"/>	

GUI: Add Field to setup

DCH +

HODO +

Magnetic Fields

	Tag	Date	Author	X	Y	Z	Scale	Description
<input type="radio"/>	test	2023-11-27	glafira	0.000	0.000	0.000	1.000	new ttt
<input type="radio"/>	FieldMap_1900	2023-04-25	aleksand	0.000	0.000	0.000	0.929	1.861 for 900 A, 0.929 for 1900 A
<input type="radio"/>	field_sp41v5_ascii_Extrap.root	2023-04-25	aleksand	0.000	0.000	0.000	0.929	field_sp41v5_ascii_Extrap.root
<input type="radio"/>	field_sp41v5_ascii_Extrap	2021-09-26	aleksand	0.000	0.000	0.000	1.000	field_sp41v5_ascii_Extrap.root
<input type="radio"/>	field_sp41v4_ascii_Extrap	2021-04-16	aleksand	0.000	0.000	0.000	1.000	field_sp41v4_ascii_Extrap.root

Magnetic Const Fields

	Tag	Date	Author	X	Y	Z	Field Values	Description
<input checked="" type="radio"/>	field_sp41v4_ascii_Extrap	2021-04-16	aleksand	Xmin: 0.000 Xmax: 0.000	Ymin: 0.000 Ymax: 0.000	Zmin: 0.000 Zmax: 0.000	Bx: 0.000 By: 0.000 Bz: 0.000	field_sp41v4_ascii_Extrap.root

Geometry Materials

	Tag	Date	Author	Description
<input checked="" type="radio"/>	4	2023-04-25	aleksand	Media 17.04.2023
<input type="radio"/>	3	2021-09-28	aleksand	01.09.2021
<input type="radio"/>	2	2020-02-07	aleksand	версия 2019 года
<input type="radio"/>	1	2018-07-03	aleksand	Base version of media

Geometry Setups

BM@N Geometry DataBase



User: Aleksand

[CONFIGURE USER ACCESS](#)

[LOGOUT](#)

Geometry Setups

Tag	Revision	Date	Description	Author	Status	Last Modified	Download Setup	Download Root File
run8	dev_28.04.2023	2023-05-12	Dev version from 01.05.2023	Aleksand	Approved	2023-05-16	Download	Download
run8	dev_27.11.2023	2023-11-27	Dev version from 01.05.2023	Aleksand	Approved	2023-11-27	Download	Download
run7	dev_28.04.2023	2023-04-28	Update to f detector (was wrong)	Aleksand	Approved	2023-05-18	Download	Download
run7	21.08.0	2021-09-14	21.08	Aleksand	Approved		Download	Download
run7	19.10.0	2021-09-13	Run7 version	Aleksand	Approved		Download	Download
run7	19.05.0	2021-07-27	Run7a version	Aleksand	Approved		Download	Download

Tags:

run8

run7

Revisions:

dev_27.11.2023

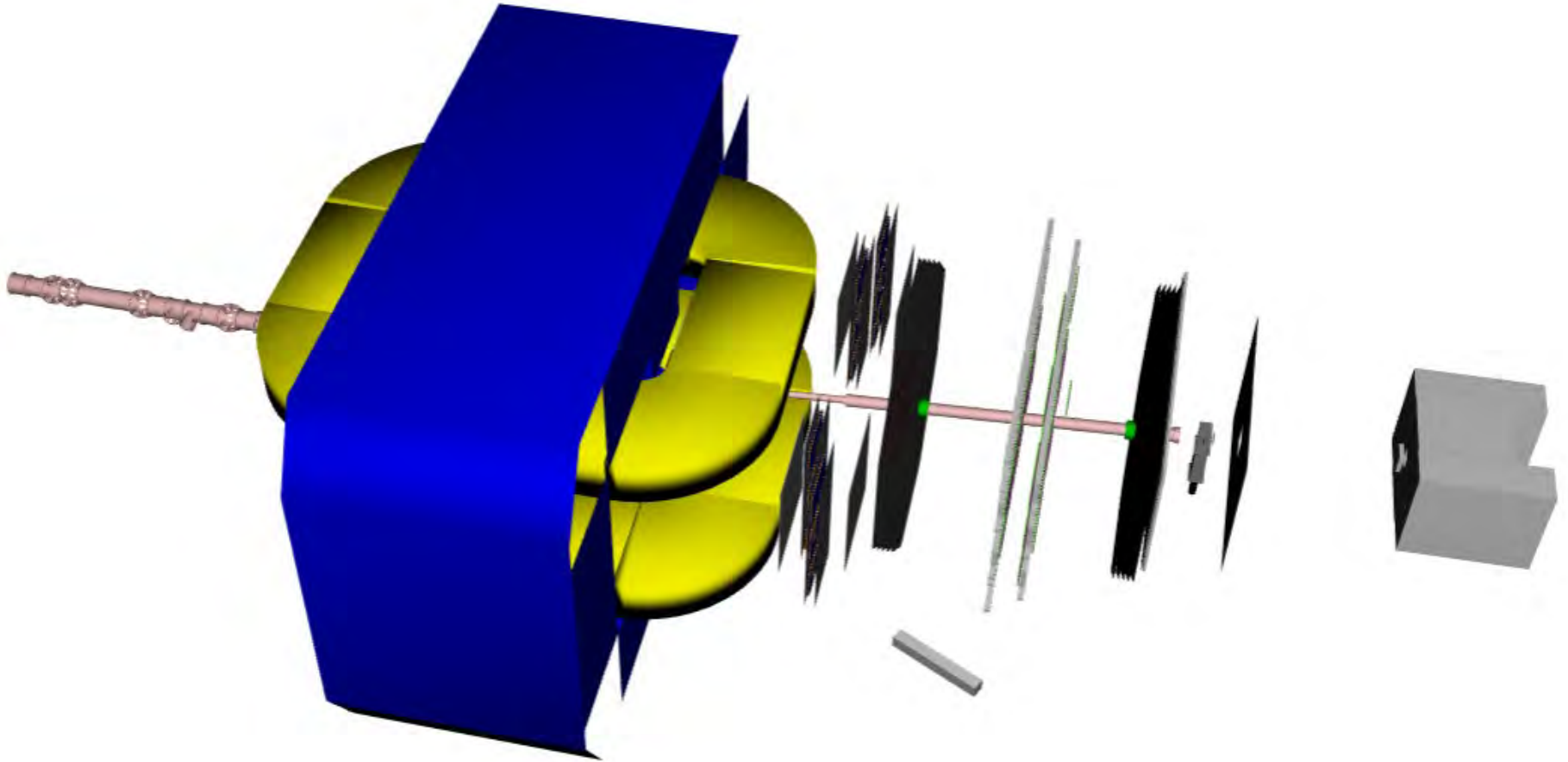
dev_28.04.2023

21.08.0

19.10.0

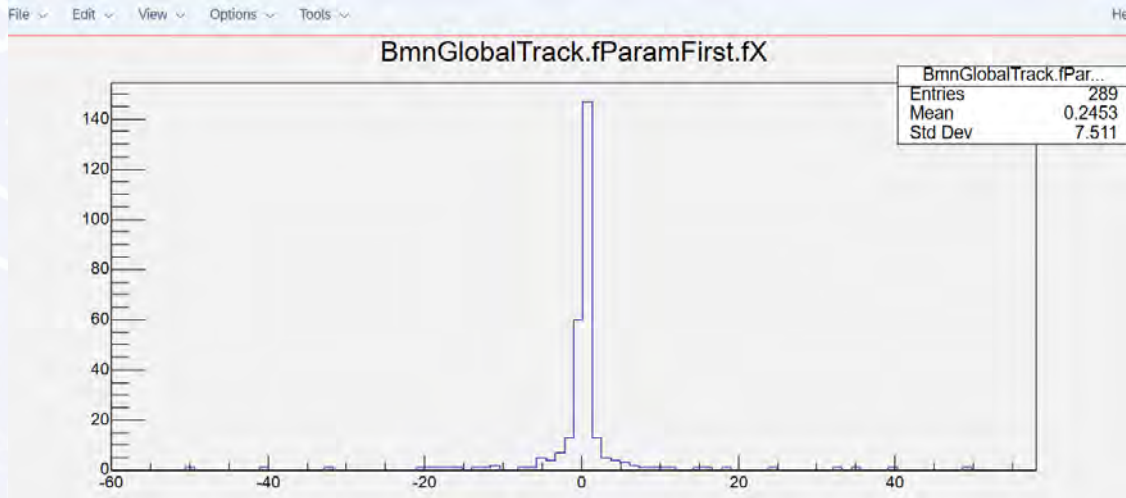
19.05.0

Geometry of Run8



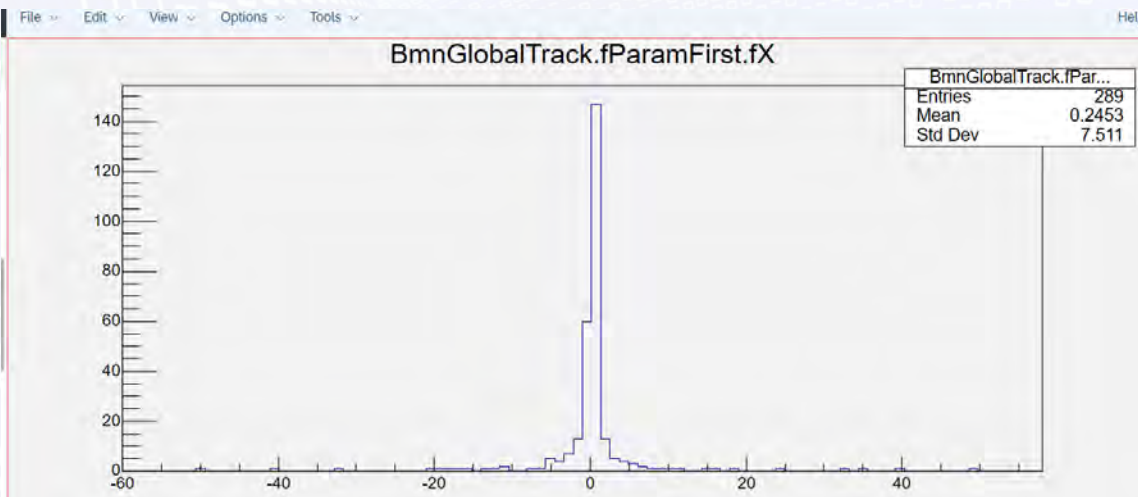
CheckOverlaps error still exist!

Verification geometry of Run8



Run: 8
Revision: dev_28.04.2023
Use DB: YES

Identical



Run: 8
Revision: Dev
Use DB: NO

C++ implementation

Class GeoSetup

```
static GeoSetup* Instance();  
const char* getParFilePath(TString& mName);  
const_field_ptr getConstFieldData();  
map_field_ptr getFieldMapData();
```

Load for simulation

```
bool loadSimSetupFromServer(const char*  
setupTag, const char* url, const char*  
revision = NULL);  
bool loadSimSetup(const char* setupTag,  
const char* revision = NULL, const char*  
localSettings = NULL);
```

Load for reconstruction

```
bool loadRecoSetupFromServer(const  
char* setupTag, const char* url, const  
char* revision = NULL);  
bool loadRecoSetup(const char* setupTag,  
const char* revision = NULL);
```

Examples of using

- Load setup

```
GeoSetup* gSetup = GeoSetup::Instance();
```

```
gSetup->loadSimSetup("src_run7", "21.08.0");
```

- Get/load magnetic field data for BmnFieldMap

```
map_field_ptr sField = gSetup->getFieldMapData();
```

```
BmnFieldMap* magField = new BmnNewFieldMap(sField->path);
```

```
magField->SetScale(sField->scale);
```

```
fRun->SetField(magField);
```

- Get Parameter file

// at the moment it is only possible to get the full path to the file,
because there is no general use case

```
gSetup->getParFilePath("csc");
```

Next steps

- **Move to new server and new DB**
- **Add new revision after creating**
- **Test C++ implementation**
- **Implement REST version**