

Full MPD Ecal Technological Data Base

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Warsaw

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Stages of construction of the electromagnetic calorimeter

PRODUCTION AND PURCHASE OF MATERIALS AND COMPONENTS



ASSEMBLING AND TESTING OF CALORIMETER MODULES



INSTALLATION OF MODULES IN THE MPD CALORIMETER

Brief description of the database:

❖ *The database is developed using a database management system*

Microsoft Access;

❖ *Database objects are tables, forms, queries, reports.*

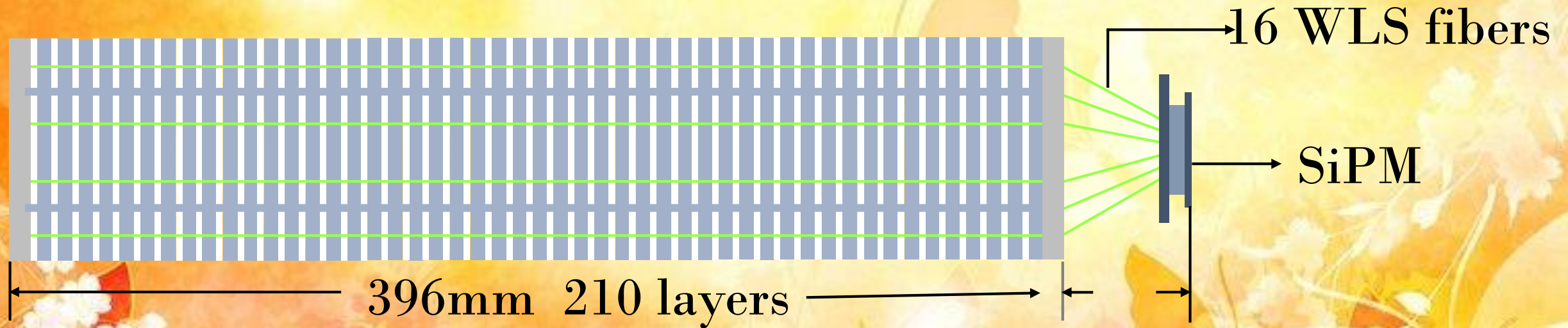
Purposes:

- ❖ *The control of incoming components;*
- ❖ *Tracking the movement of components;*
- ❖ *Systematization and storage of information about ready modules Ecal*
- ❖ *Storage of calibration constants*
- ❖ *Storage of running constants (HV, temperature coefficients...)*
- ❖ *...*

Tasks:

- ❖ *Creating tables as a database base;*
- ❖ *Creating forms for easy entry of information into the database;*
- ❖ *Creating queries, reports for quick access to the information available in the database.*

Structure of shashlyk ECal (one tower)



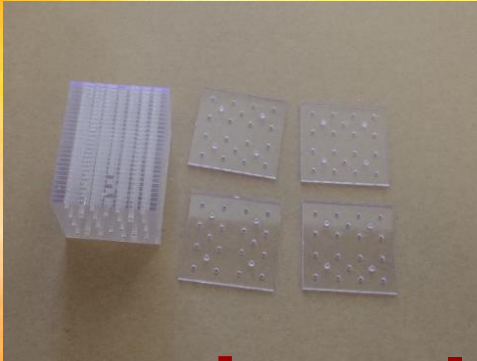
One layer : 1.5mm scintillator+0.4mm lead

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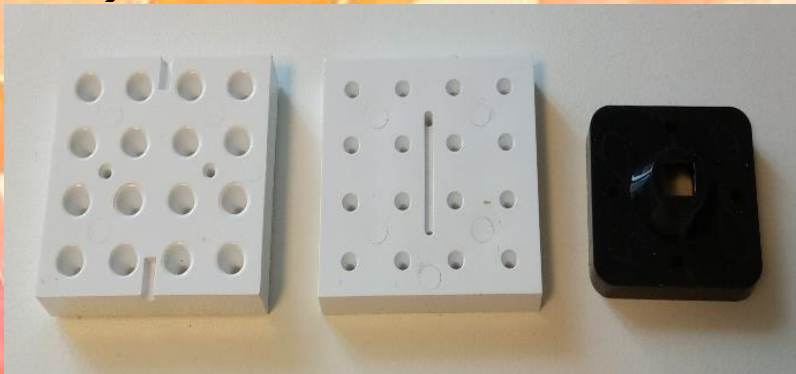
about 40,000 such towers are needed

Main components

- **Scintillator plates**
(Total amount $\approx 10^7$ plates)



- **Supporting plates and fiber bonding plates**
(40000 each)

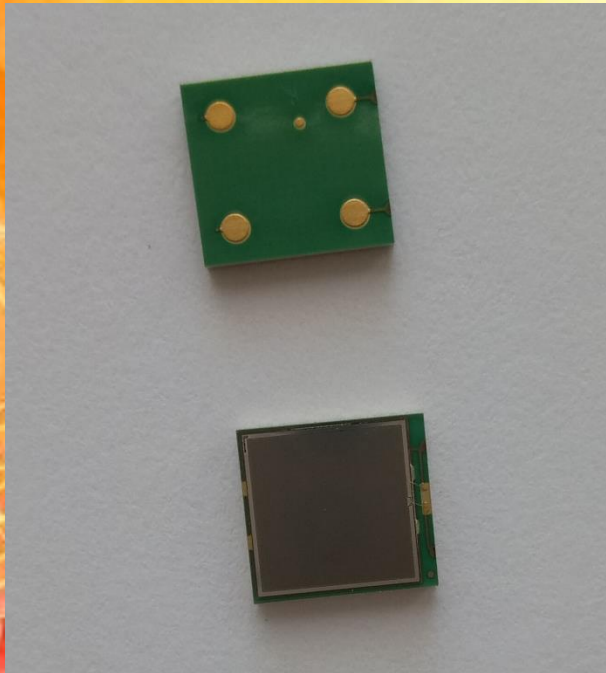


- **Lead plates**
(Total amount $\approx 10^7$ plates)
Russia (25%) and China (75%)





- **WLS fibers. Kuraray company (Japan)**
(Total amount ≈ 400 km)



- **HAMAMATSU S13360-6025PE Multi-Pixel Photon Counter**
 - * *compact - 6×6 mm² sensitive area,*
 - * *high photon detection efficiency,*
 - * *very low dead time,*
 - * *the availability on the market*

Production of scintillation plates was organized in two companies:

Polipac company (Dubna)

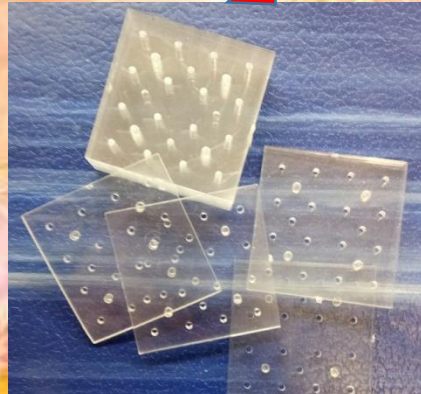


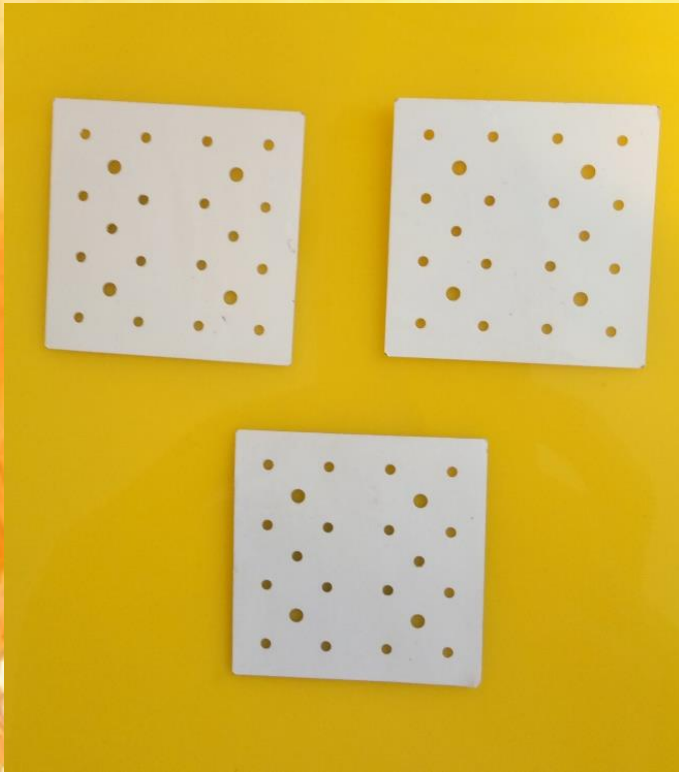
Uniplast company (Vladimir)

Plants for the manufacture of plastic products by injection molding (Polipac company)



Scintillator plates
 $40 \times 40 \times 1,5 \text{ mm}^3$





*Lead plates
which
painting and stamping
is made in the
company Armul*

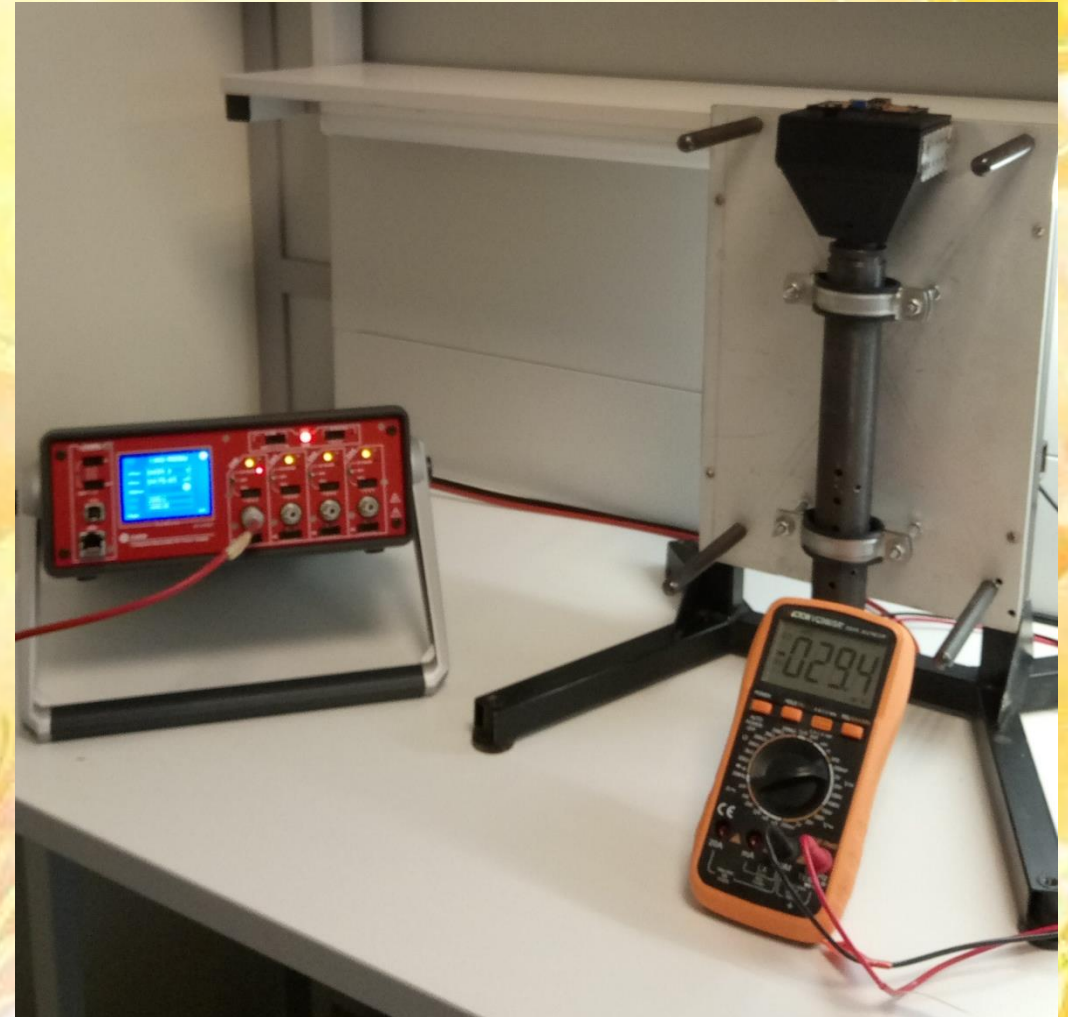
Lead plates
 $40 \times 40 \times 0,4 \text{ mm}^3$

To paint the plates, it should be used white glossy polyester powder paint Element (Turkey), RAL 9003.



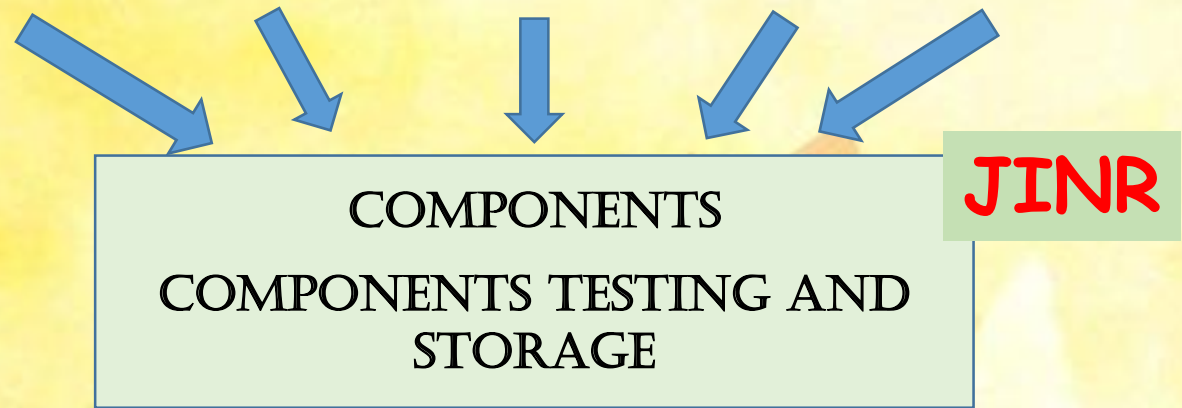
There is a special Stand used for tests:

- Scintillators light yield*
- Painted lead reflectivity*
- The reflectivity of the glue-paint*
- Lead plates thickness*



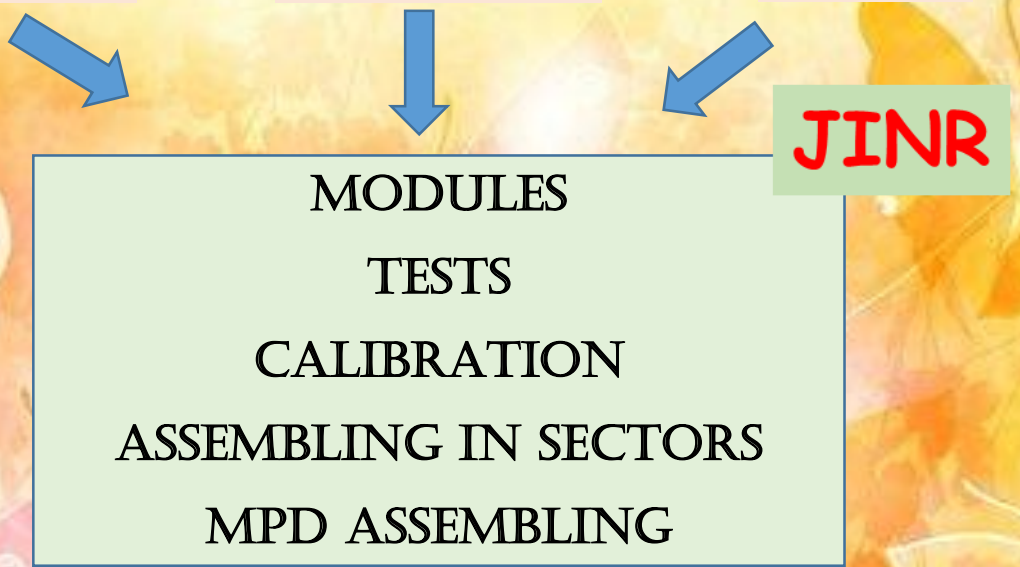
PRODUCTION OF
COMPONENTS

POLIPAC Uniplast ARMUL KURARAY others



MODULES PRODUCTION

China Protvino Tenzor



1. DB filling

2. DB filling

1. DB Filling

Incoming information-

- Component name
- Producer
- Production date
- Quantity
- Delivery date

Incoming documents-

- Shipment papers
- Factory test results
- Quality certificates

JINR tests

- Results of JINR incoming control
- Quantity of sent components
- Shipment destination
- Date of shipment
- Number of remaining components

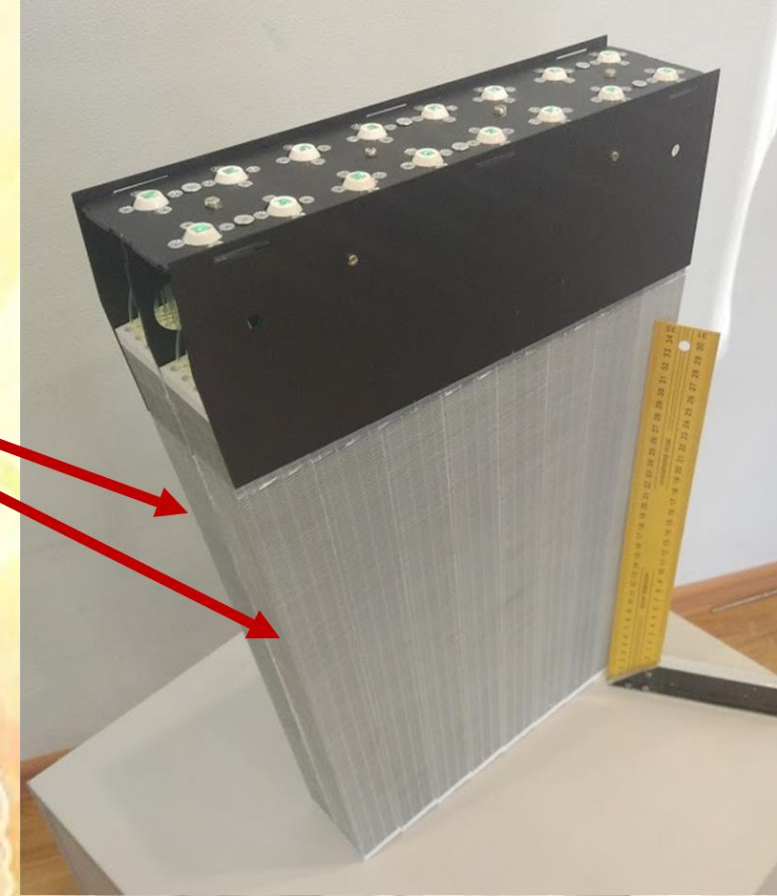
Any other data or documents

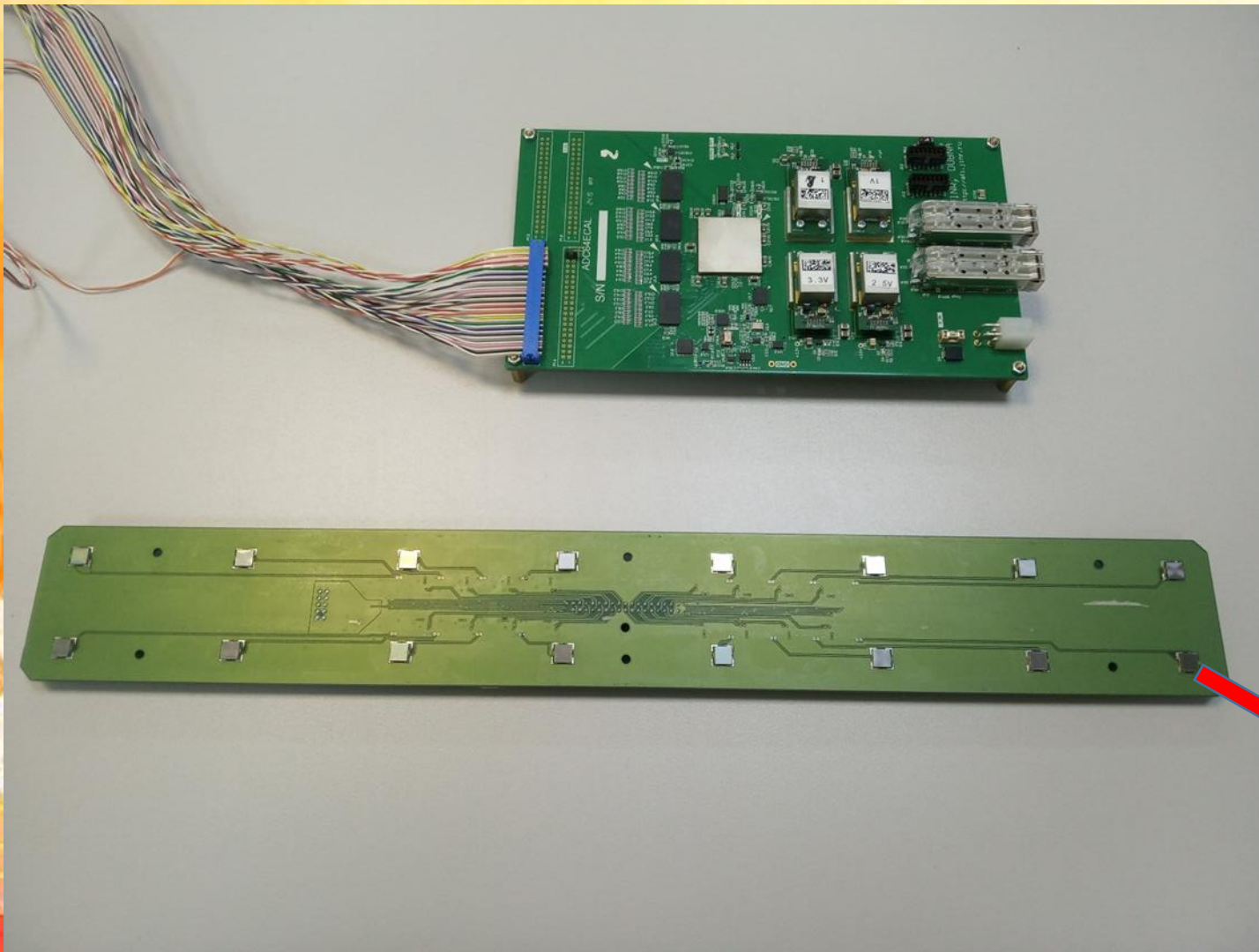
Example table

Номер	Поставщик	Наименование комплектующей	Дата изготовления	Дата поставки	Количество полу		Описание
1	ООО "Полипак"	пластина Верх	01.07.2018	01.06.2018	21000	0(0)	
2	ООО "Полипак"	пластина Ниж	01.07.2018	01.07.2018	21000	0(0)	
3	ООО "НПК "Армуд"	свинец	06.12.2018	06.12.2018	20000	0(1)	Договор 100-1158
4	ООО "Полипак"	держатель световодов	01.07.2018		19000	0(0)	
5	"Chandan Steel Limited", India	проволока			89500	0(0)	1,2 мм
6	Hamamatsu Photonics Nurden AB	SiPM		16.08.2018	4000	0(1)	
7	Hamamatsu Photonics Nurden AB	SiPM		13.04.2018	3000	0(0)	
8	Hamamatsu Photonics Nurden AB	SiPM			3000	0(1)	
9	Hamamatsu Photonics Nurden AB	SiPM			3000	0(0)	
10	Hamamatsu Photonics Nurden AB	SiPM			1139	0(0)	
11	Hamamatsu Photonics Nurden AB	SiPM		16.05.2018	3500	0(0)	
12	Hamamatsu Photonics Nurden AB	SiPM		04.07.2018	2000	0(0)	
13	Hamamatsu Photonics Nurden AB	SiPM			1750	0(0)	
14	Hamamatsu Photonics Nurden AB	SiPM		30.11.2018	3500	0(1)	
15	Kuraray	Световоды			15000	0(0)	15 бобин по 1000 м, диа
18	Hamamatsu Photonics Nurden AB	SiPM			1131	0(0)	
19	ООО "Полипак"	пластина Верх	01.07.2018	01.06.2018	0	0(0)	
20	ООО "Полипак"	пластина Ниж	01.07.2018	01.07.2018	0	0(0)	
21	"Chandan Steel Limited", India	проволока			0	0(0)	
22	ООО "Полипак"	держатель световодов	01.07.2018		0	0(0)	
23	Kuraray	Световоды			0	0(0)	
24	Hamamatsu Photonics Nurden AB	SiPM			0	0(0)	
25	Hamamatsu Photonics Nurden AB	SiPM			0	0(0)	
26	Hamamatsu Photonics Nurden AB	SiPM			0	0(0)	
27	Kuraray	Световоды			100000	0(0)	
28	Hamamatsu Photonics Nurden AB	SiPM			0	0(0)	
29	ООО "Полипак"	пластина Верх			0	0(0)	
30	ООО "Полипак"	пластина Ниж			0	0(0)	
31	ООО "Полипак"	держатель световодов			0	0(0)	
32	Kuraray	Световоды			0	0(0)	
33	ООО "НПК "Армуд"	свинец	10.07.2019	10.07.2019	100700	0(2)	
34	Hamamatsu Photonics Nurden AB	SiPM		26.07.2019	2000	0(1)	proforma invoice N11561
35	Hamamatsu Photonics Nurden AB	SiPM		26.07.2019	4000	0(1)	proforma invoice N1156
36	ООО "Полипак"	держатель световодов	01.07.2019	02.08.2019	20000	0(2)	
37	ООО "Полипак"	пластина Верх	01.07.2019	02.08.2019	20000	0(2)	
38	ООО "Полипак"	пластина Ниж	01.07.2019	02.08.2019	20000	0(2)	
39	ООО "НПК "Армуд"	свинец	08.08.2019	09.08.2019	103500	0(4)	
*	(№)				0	0(0)	

Prototype modules made in Protvino and China

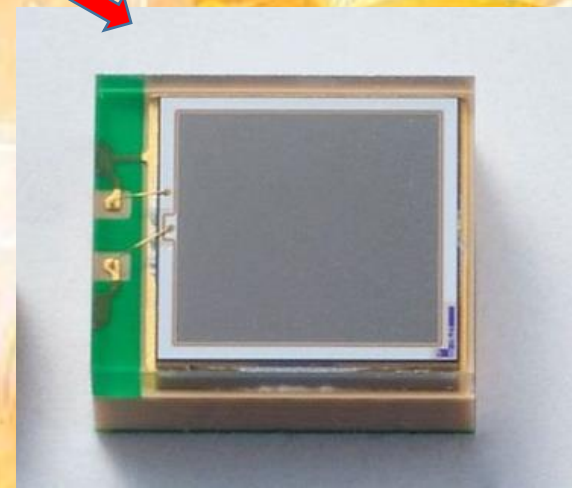
*each module consists
of 16 towers*



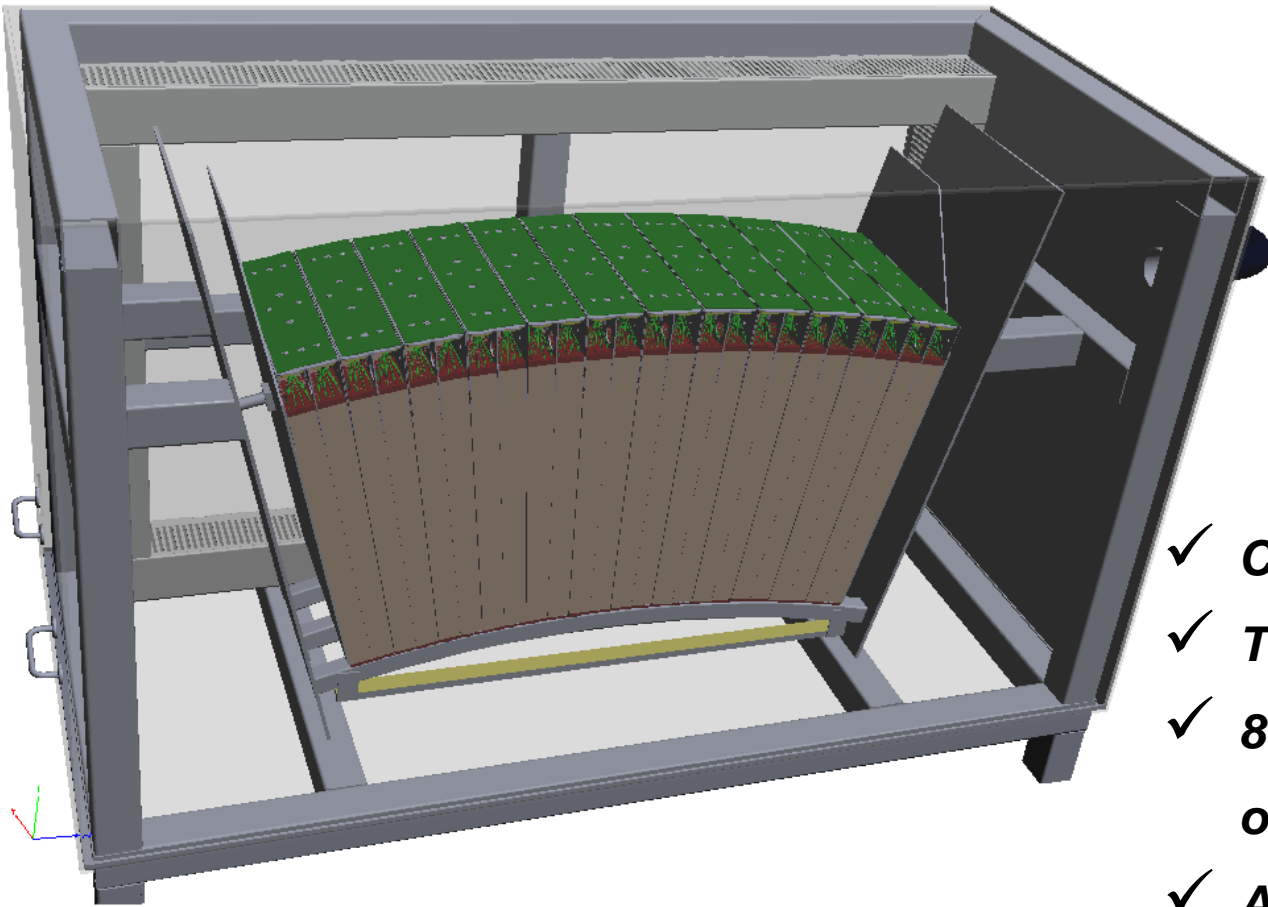


64 channel ADC

HV PreAmp. SiPM
Slow Control

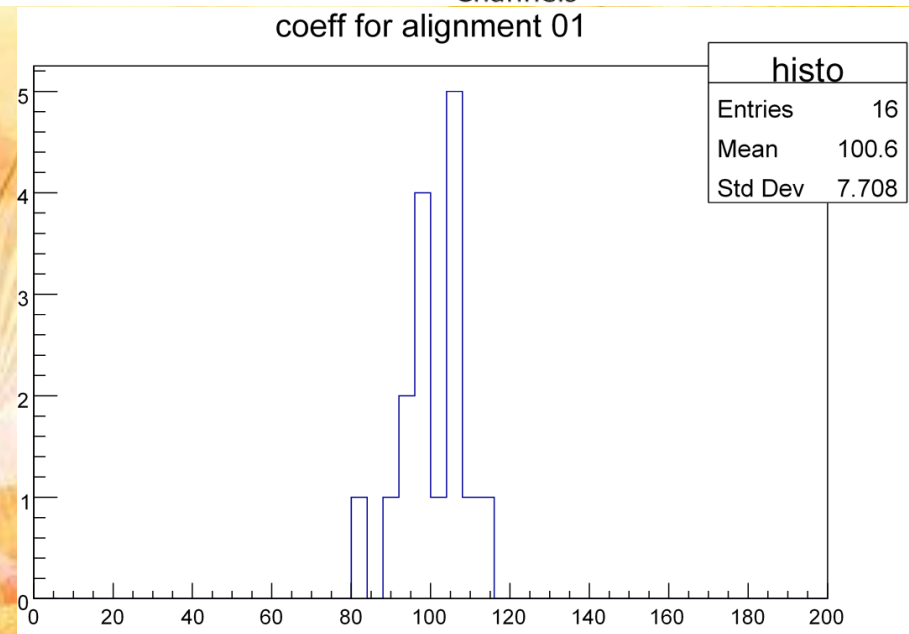
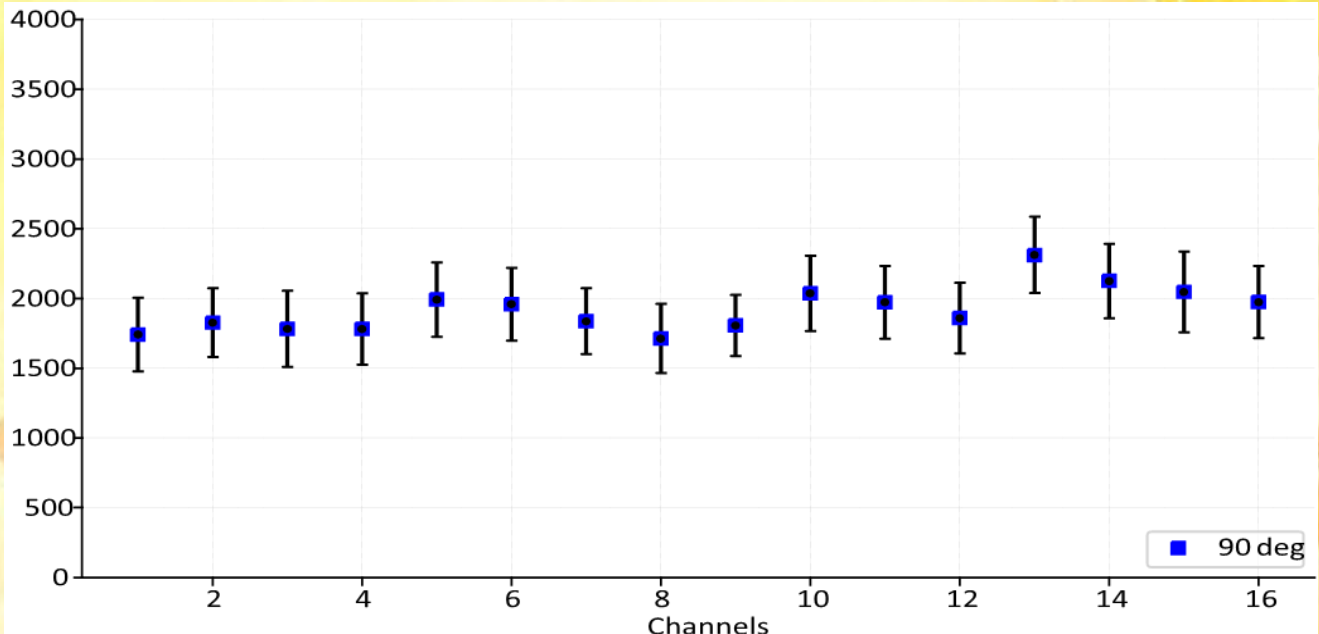
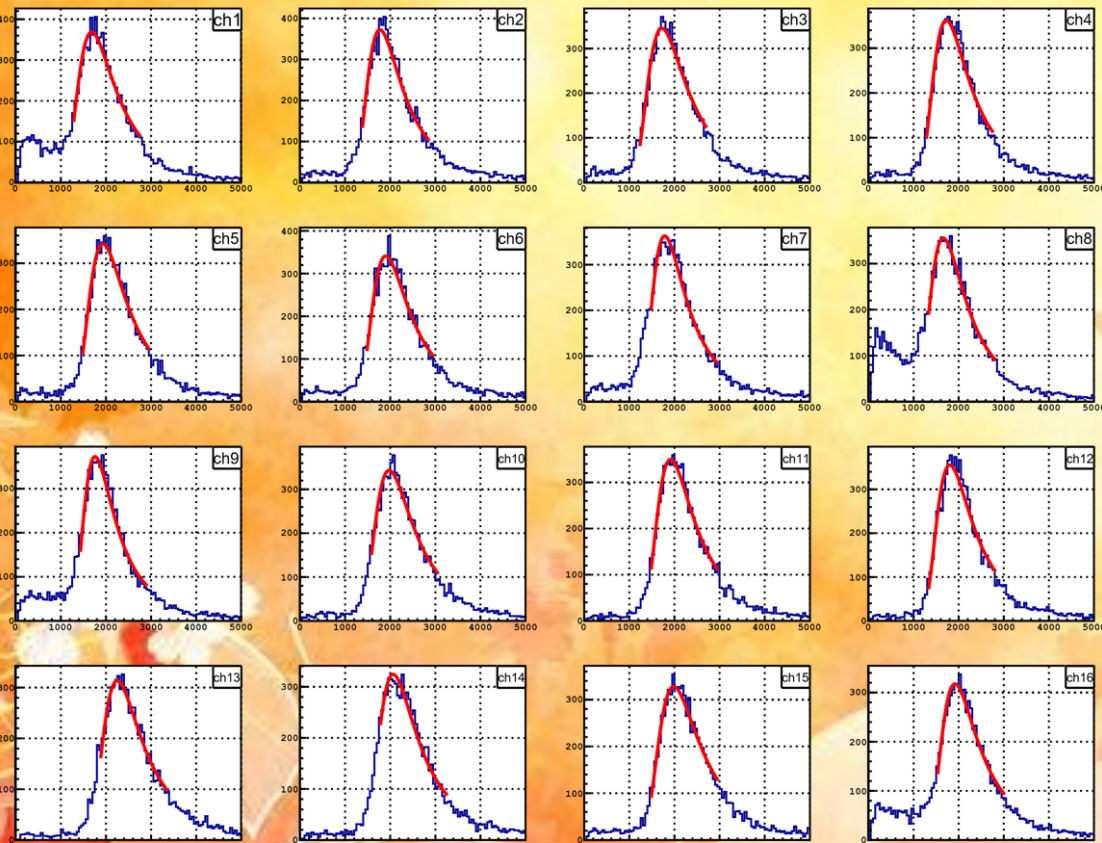


Stand for ECAL Modules Calibration



- ✓ **Cosmic rays**
- ✓ **Test one load (12 modules) in 10-14 days**
- ✓ **8 stands for 8 types of modules (with possibility of stand reconfiguration if needed)**
- ✓ **All modules test and calibration in about 1 year**

Calibration of Ecal channels with cosmic muons



2. DB Filling

Incoming information-

- Module number
- Producer
- Date of production

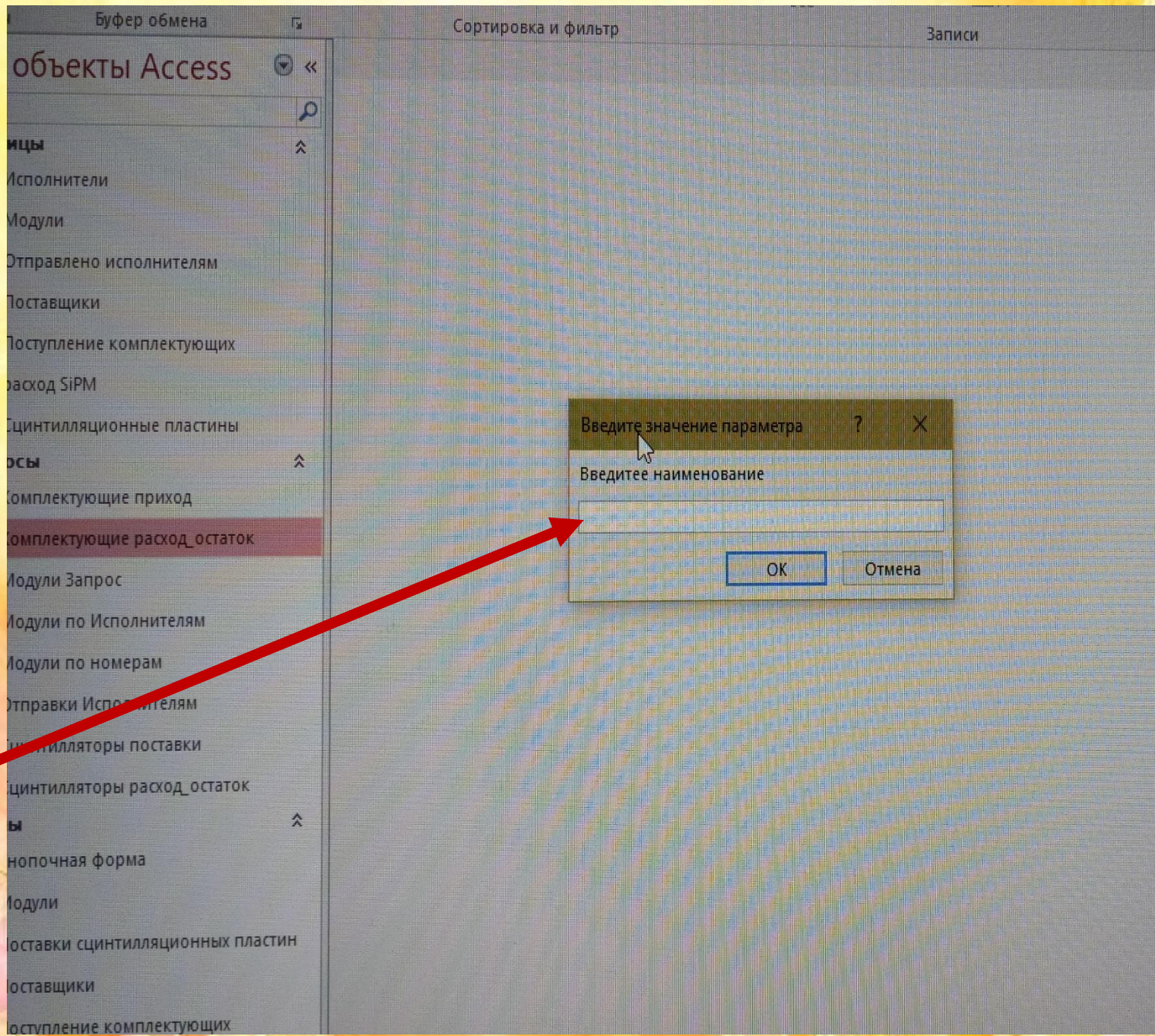
Incoming documents-

- Shipment papers
- Factory test results
- Quality certificates

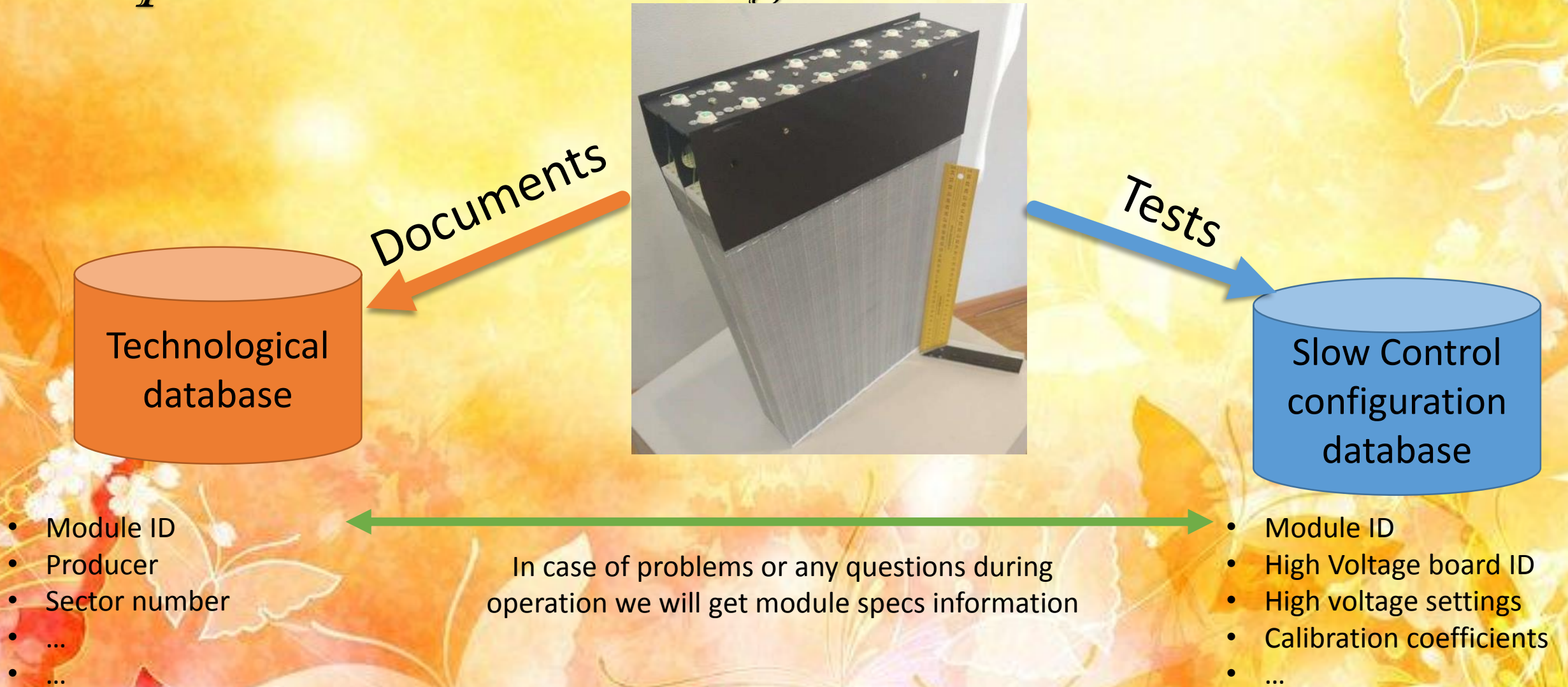
JINR tests

- Results of JINR incoming control
calibration with cosmic muons
- Operating voltages (files)
- Calibration coefficients
- Module location in sector
- Module location in MPD
geometry

A number of queries and reports have been generated. For example, a query about the movement of components with the ability to select a component



Specification and configuration DB link



Conclusions:

- ❖ *Storing different data in one source;*
- ❖ *The ability to obtain the necessary information in a short time;*
- ❖ *Data analysis by any parameters;*

❖ *Ability to get all the information about the module: from the history of the assembly up to the location in the calorimeter and calibration data and run conditions*



Thank you for attention