Status of the first Si-plane based on STS modules
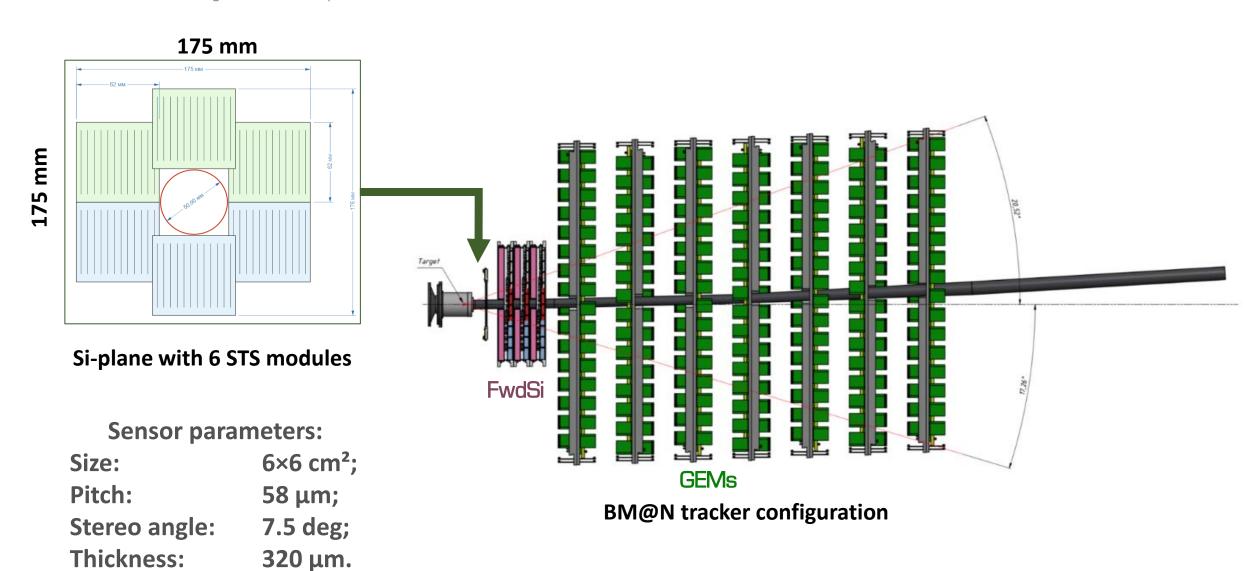
D.Dementev, D. Andreev, R. Arteche Diaz, A. Kolozhvari, V. Leontyev, A. Sheremetev, M. Shitekow, and Yu. Murin

BM@N Collaboration Meeting, Dubna, May 13-15, 2025

Si-plane based on STS modules

175 mm

175 mm

Si-plane with 6 STS modules

Sensor parameters:

Size:	6×6 cm²;
Pitch:	58 µm;
Stereo angle:	7.5 deg;
Thickness:	320 µm.

Total number of channels (6 modules): 12 288

FwdSi

GEMs

BM@N tracker configuration

2

Si-tracker of the BM@N

FSD + STS plane

Two half-planes of STS

Mainframe

*Design of the Mainframe was developed by D. Andreev and A. Sheremetev
in close cooperation with FSD team (O. Tarasov and E. Zubarev)*

Installation of the Mainframe for the Si-Tracker

Old Mainframe with FSD

New Mainframe

Fixation inside the magnet

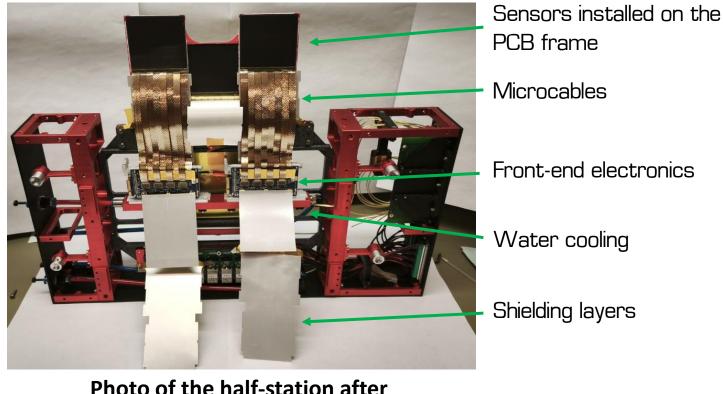*Installation of the Mainframe was done with the help of S. Novozhilov*

STS half-stations

Sensors installed on the PCB frame

Microcables

Front-end electronics

Water cooling

Shielding layers

Photo of the half-station after installation of the modules

Two half-stations before installation inside the magnet

✓ *Functional tests*
✓ *Calibration of the Fast & Slow discriminators*
✓ *Noise map*

Installation inside the magnet

STS
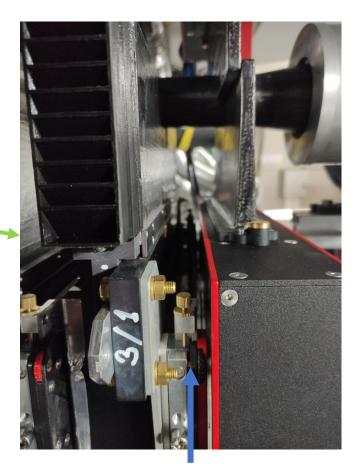
FSD+STS
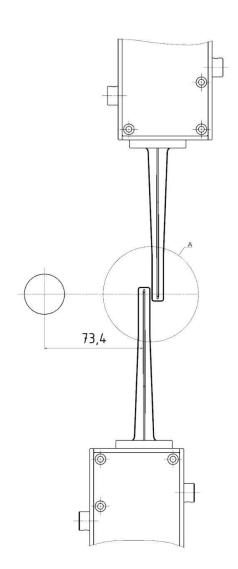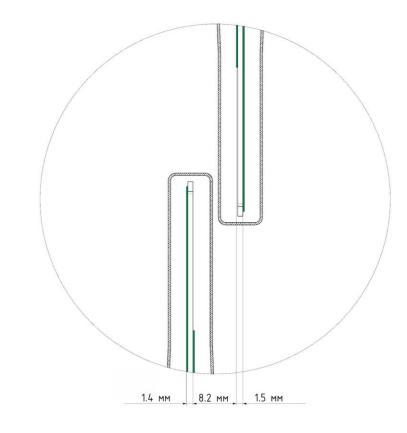
3mm clearance between STS and 1st FSD

Distance from the target

1.4 мм 8.2 мм 1.5 мм

Root geometry: VSP_Run9.root needs to be updated

➢ **Angular acceptance: ~ from 20 to 50 Deg.**

➢ **Geant simulations for Bi + Bi @ 2.5 AGeV: av. occupancy is close to 10%**

73,4

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Alignment and metrology measurements

Crossmark

Crossmark

Alignment marks

N-side

STS Top

STS Bottom

4x alignment marks per half-station

8

Metrology measurements

Position
of the alignment marks
on the **half-stations**
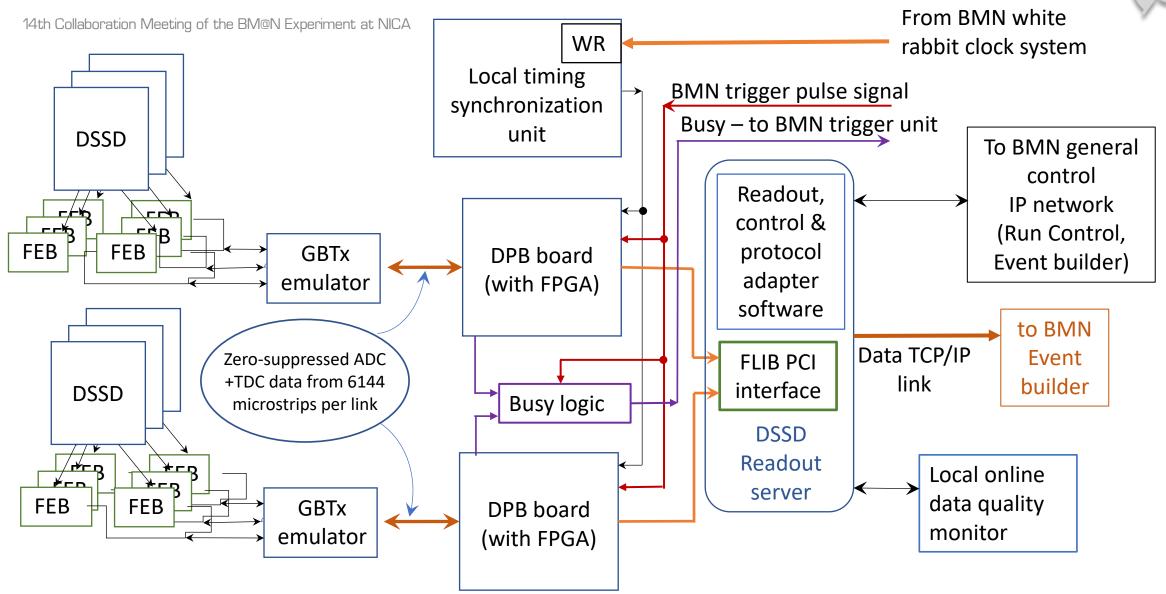
Position
of the fiducial marks
on the **sensors**

Position
of the **strips**

DAQ scheme

Slide by A. Kolozhvari

Event Builder and Run Control
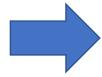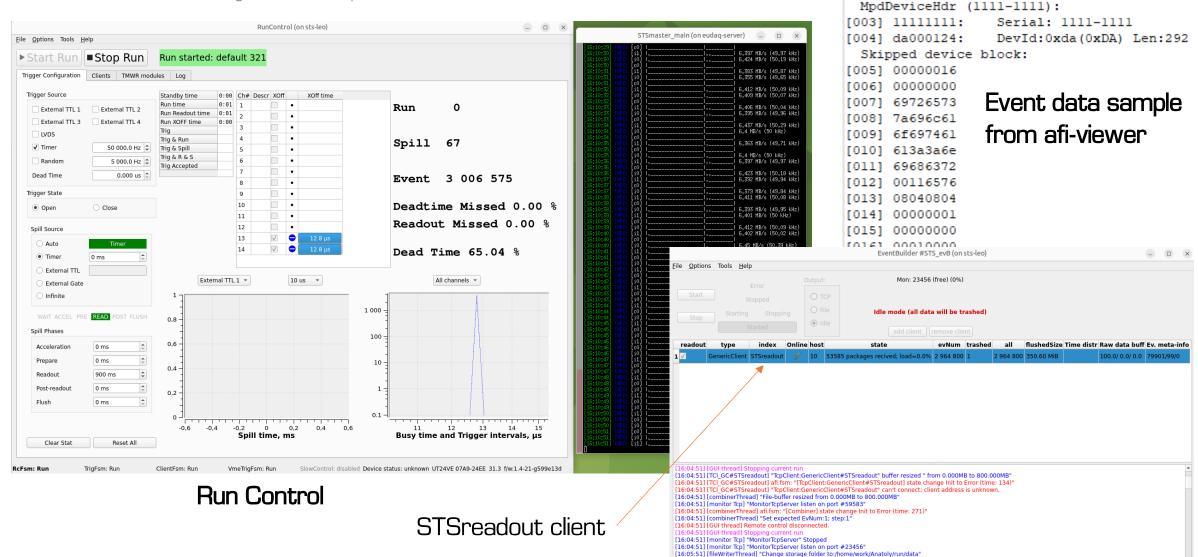
14th Collaboration Meeting of the BM@N Experiment at NICA

Run Control

STSreadout client

Event Builder

Event data sample from afi-viewer

```
MpdHdr:
[000] 2a50d5af:     SyncWord: Event
[001] 00000130      len:304
[002] 00000f02      evNum:3842
  MpdDeviceHdr (1111-1111):
[003] 11111111:     Serial: 1111-1111
[004] da000124:     DevId:0xda(0xDA) Len:292
  Skipped device block:
[005] 00000016
[006] 00000000
[007] 69726573
[008] 7a696c61
[009] 6f697461
[010] 613a3a6e
[011] 69686372
[012] 00116576
[013] 08040804
[014] 00000001
[015] 00000000
[016] 00010000
```

Tests with Ru-106

Positions of the Ru-106

Barrel detector

Hit map

Correlations between hit amplitudes at p-and n- sides

12

Summary

➢ Mainframe: designed, produced, installed and aligned inside the magnet.

➢ STS detector was assembled and installed inside the magnet;

➢ Alignment and metrology were done;

➢ Cooling and cabling done and tested;

➢ Integration in the BM@N DAQ was done;

➢ Functional tests, calibration and noise measurements were done;

➢ TBD: Integration of the slow control data into Tango database.

Thank you for your attention!