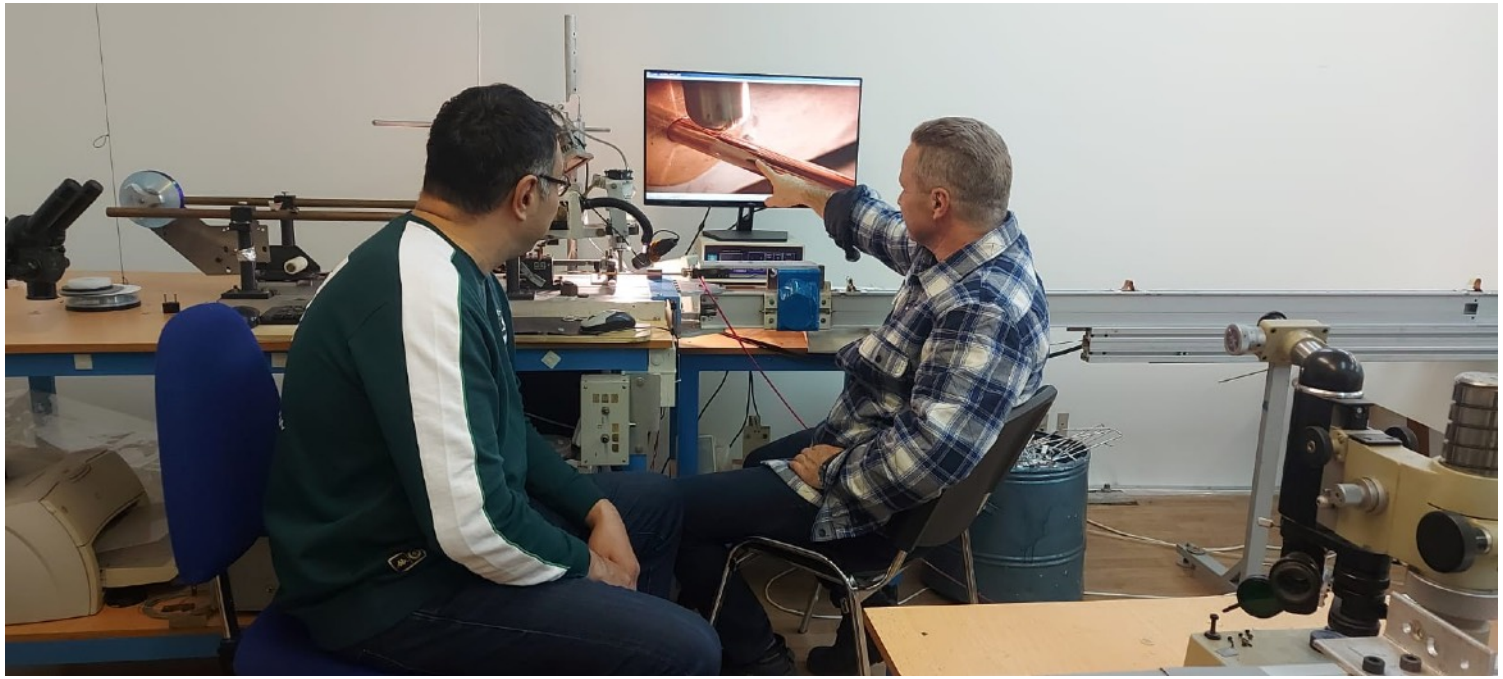
Статус работ по ST-barrel и планы на 2024
29.02.2024

T.Enik

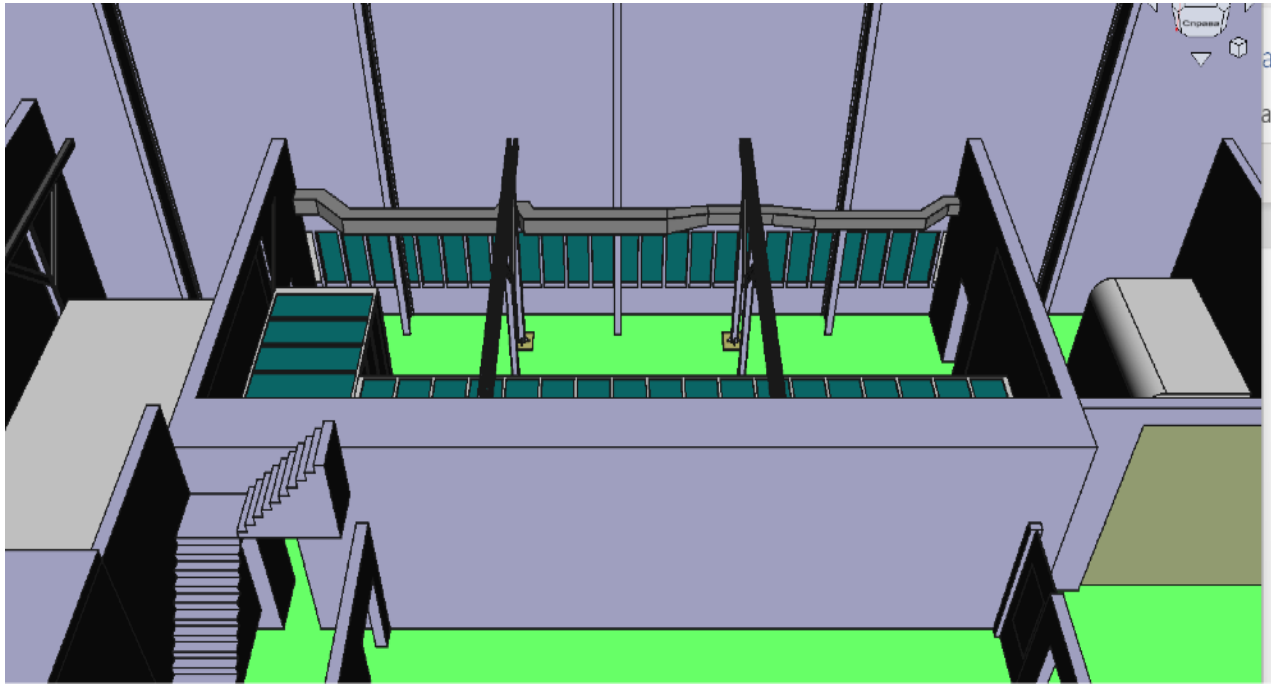
STRAW production line

- Производительность- 1м/мин
- Длина- 5.5м
- Диаметр-от 10
- Толщины пленки-36 мкм
- Пленка доступна в РФ
- Толщина напыления 50-100нм
- Напыление производится в РФ

- Изготовлено ~20км straw
- Установленно ~8000 straw
- После 10 лет эксплуатации неработающих- 3 straw
- Число сотрудников-10FTE

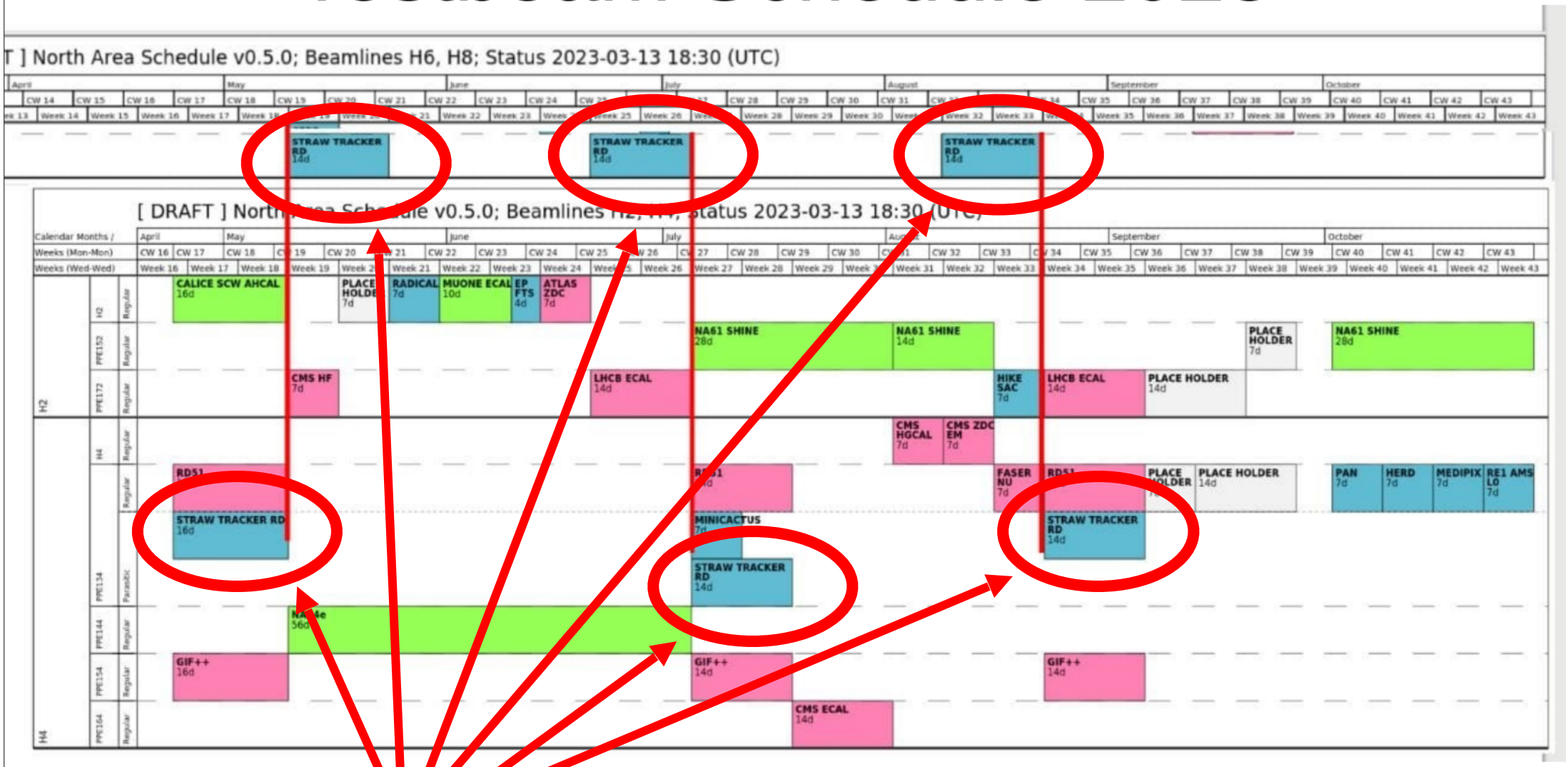


NEW STRAW production line and assembling place



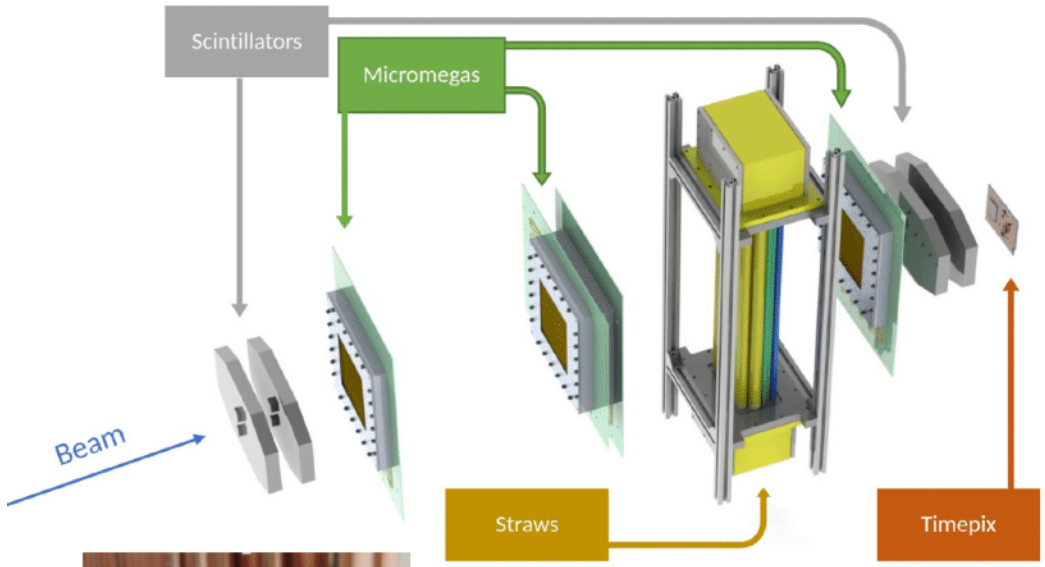
- Площадь ~200 кв.м., чистое помещение~100кв.м
- Длина производственной линии~12м
- Срок сдачи –начало 3 квартала 2024 года
- Пуско-наладочные работы-начало 4 квартала 2024 года
- Закуплены небходимые материалы и оборудование
- Планируемый объем ~60км straw

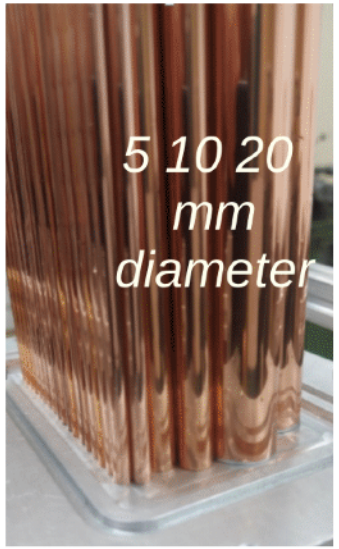
Testbeam Schedule 2023



STRAW TRACKER R&D

The setup:





Reference tracking:

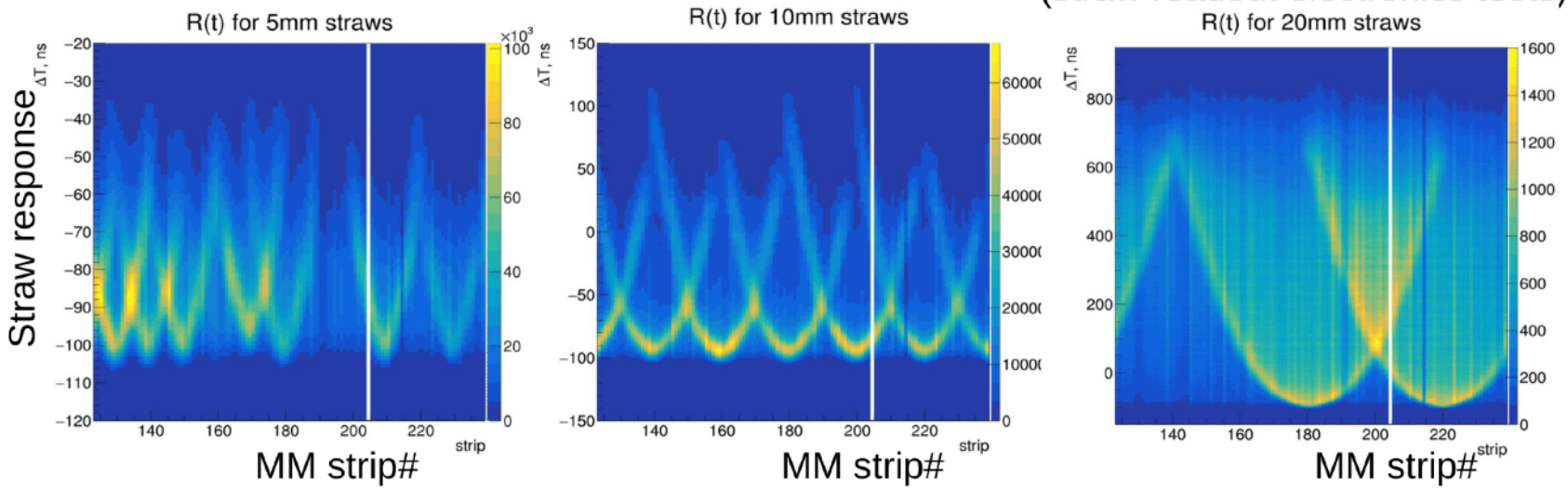
- MM detectors (250 um) + Tiger readout (Torino University)
- Timepix4 – 50um x 50um (many thanks to LHCb VELO colleagues Martin van Beuzekom and Kevin Heijhoff for helping us to get the data!)

Under test: a combined straw tracker prototype with the Tiger readout

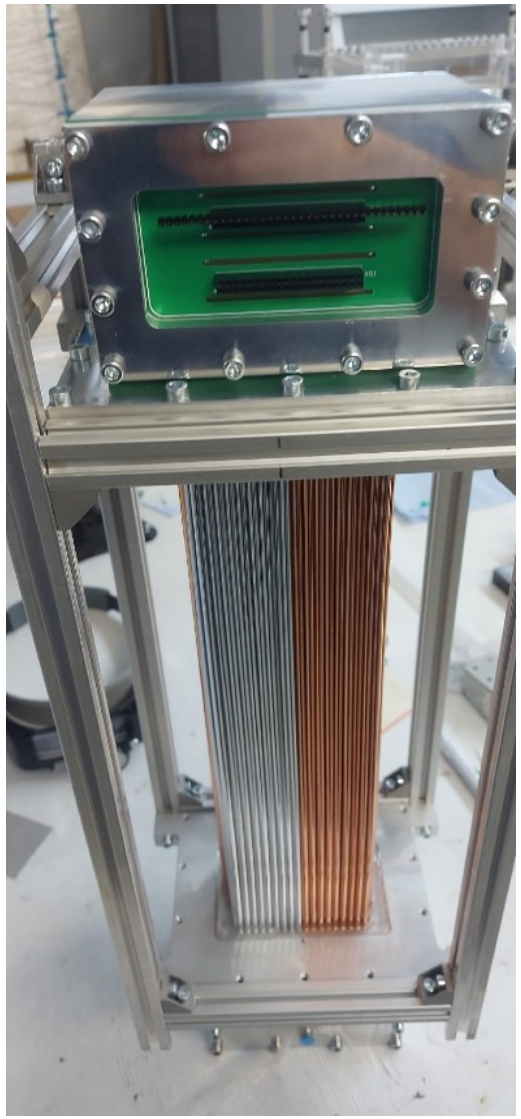
Good data taking with MM+straw and success in integrating the Timepix4

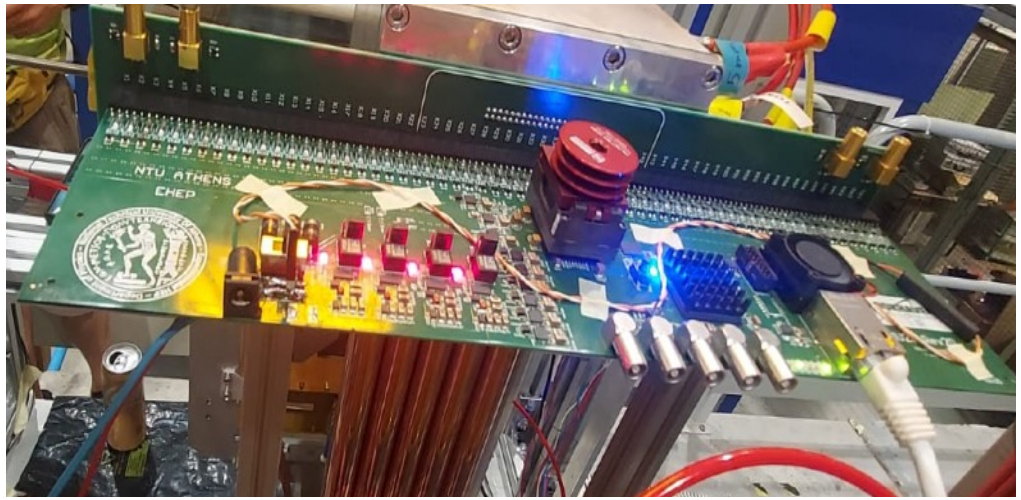
And as usual many thanks to the RD51 team!

(straw readout electronics tests)



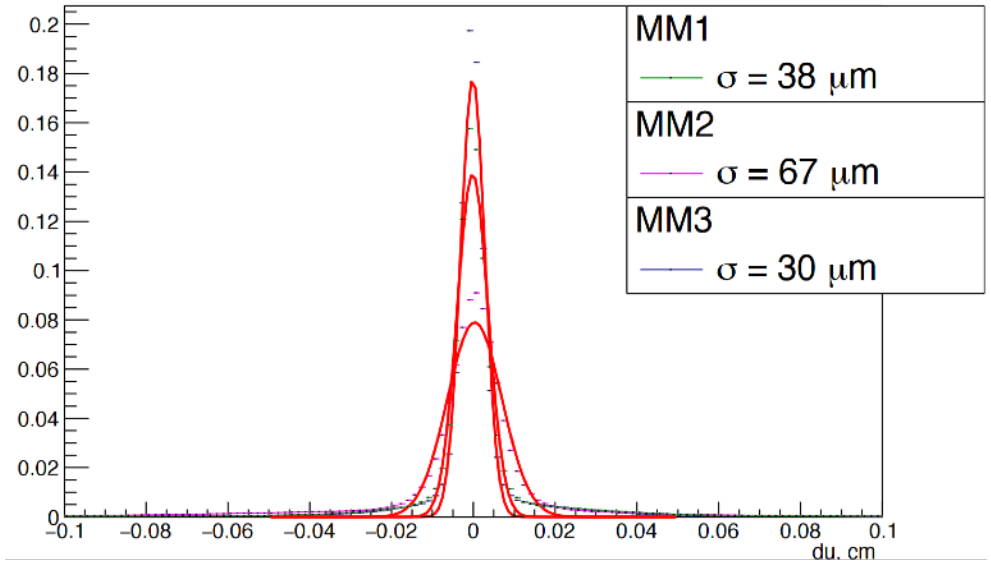
Текущая активность. TIGER vs VMM3



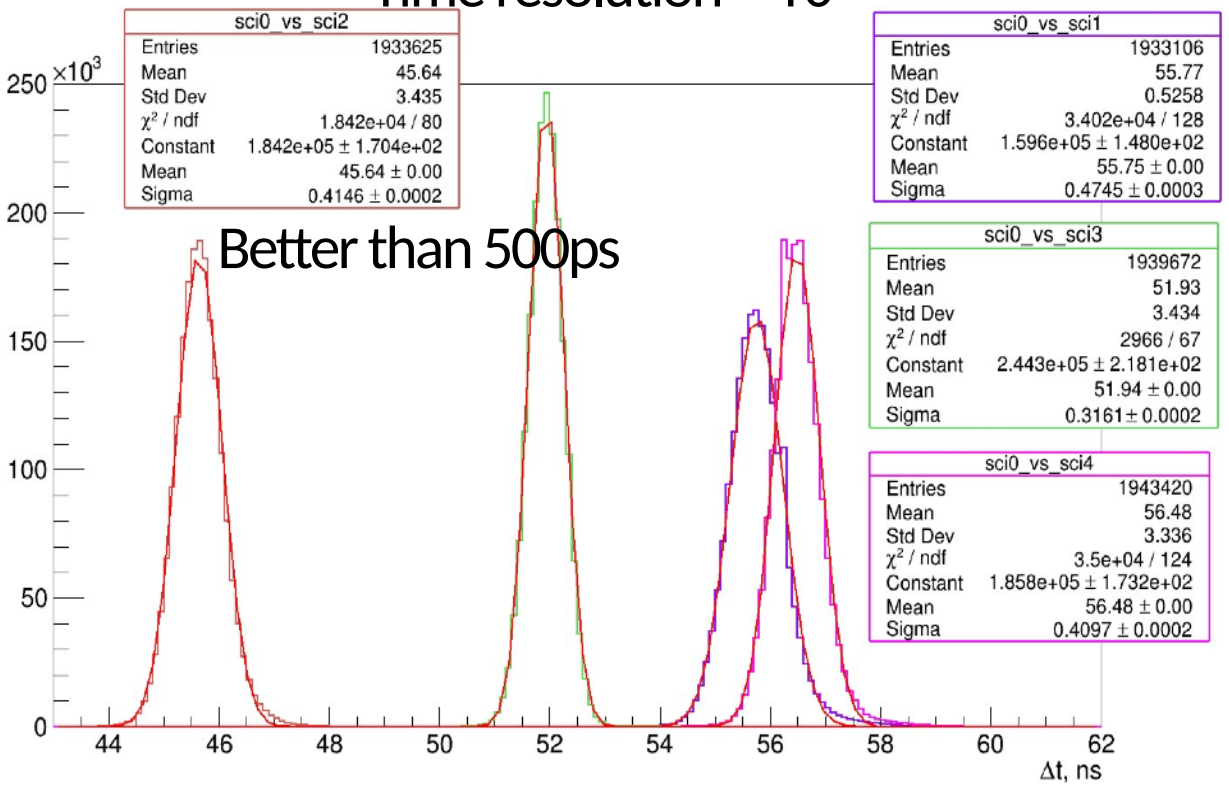


Reference tracking and timing

Reference tracking -- residuals



Time resolution -- T0



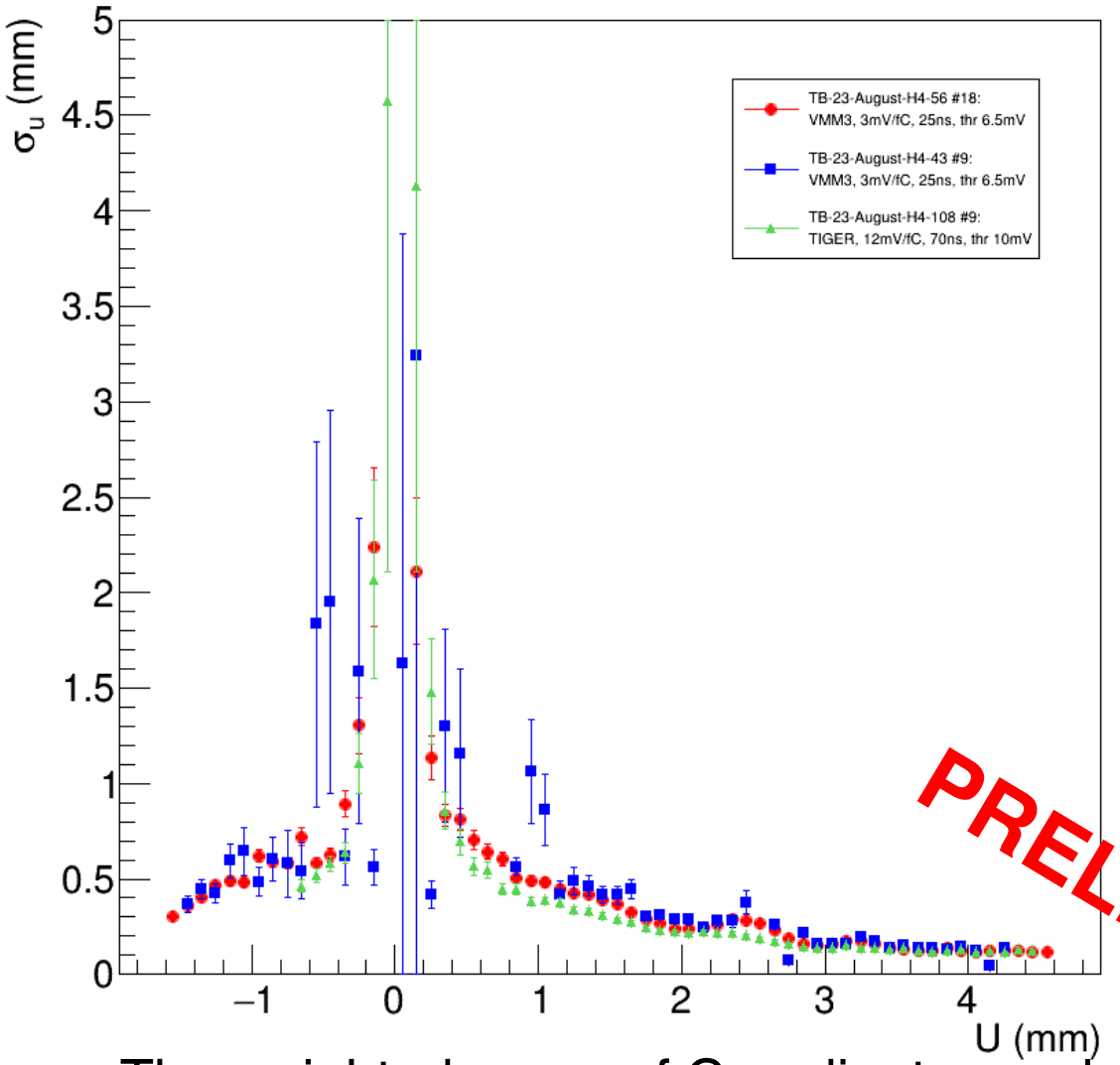
Better than 500ps

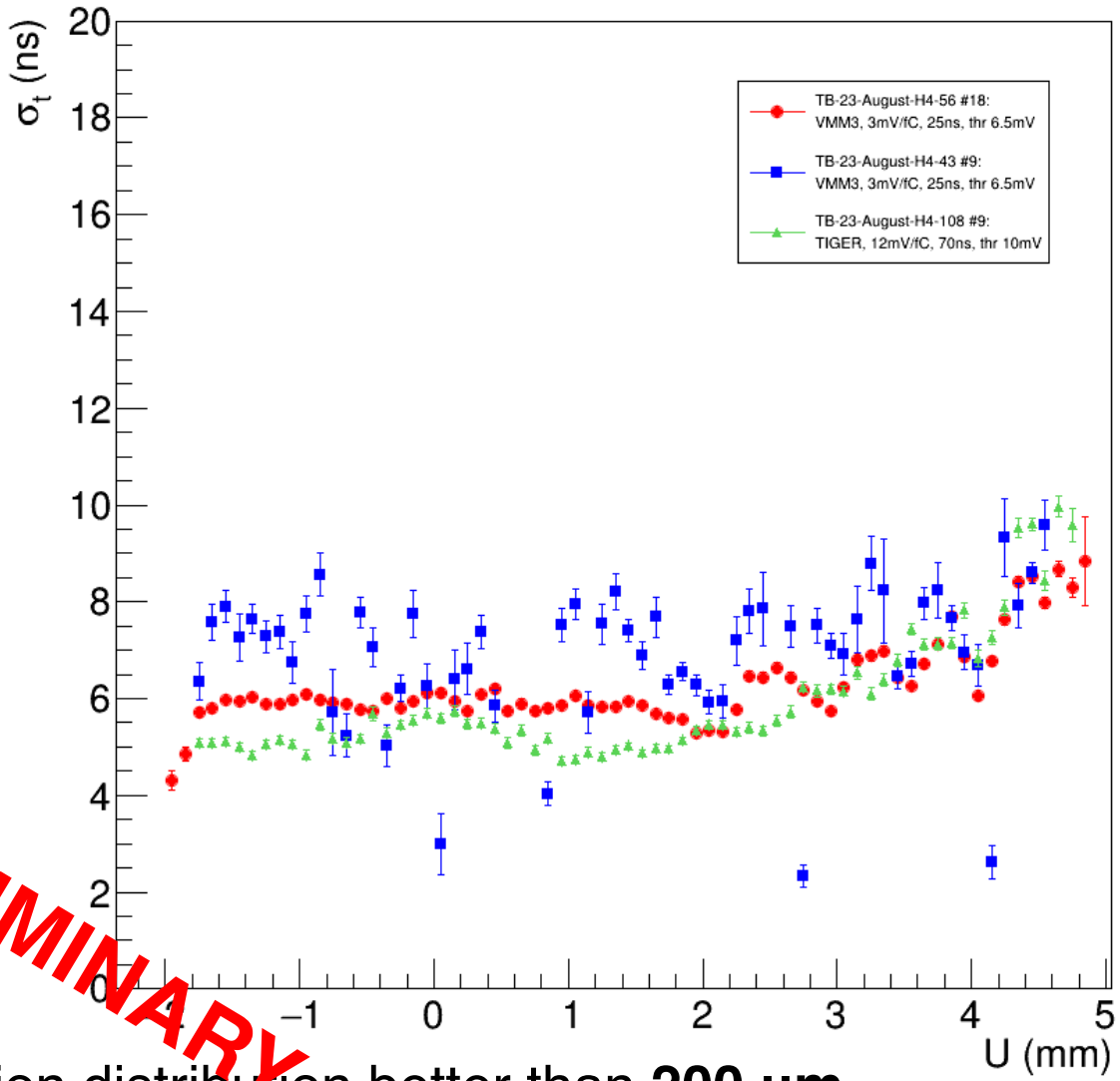
Work ongoing:

- accounting for the reference system uncertainty in the TB analysis

- improvement of the reference tracking resolution

10mm Straw Resolution





PRELIMINARY

The weighted mean of Coordinate resolution distribution better than **200 µm**

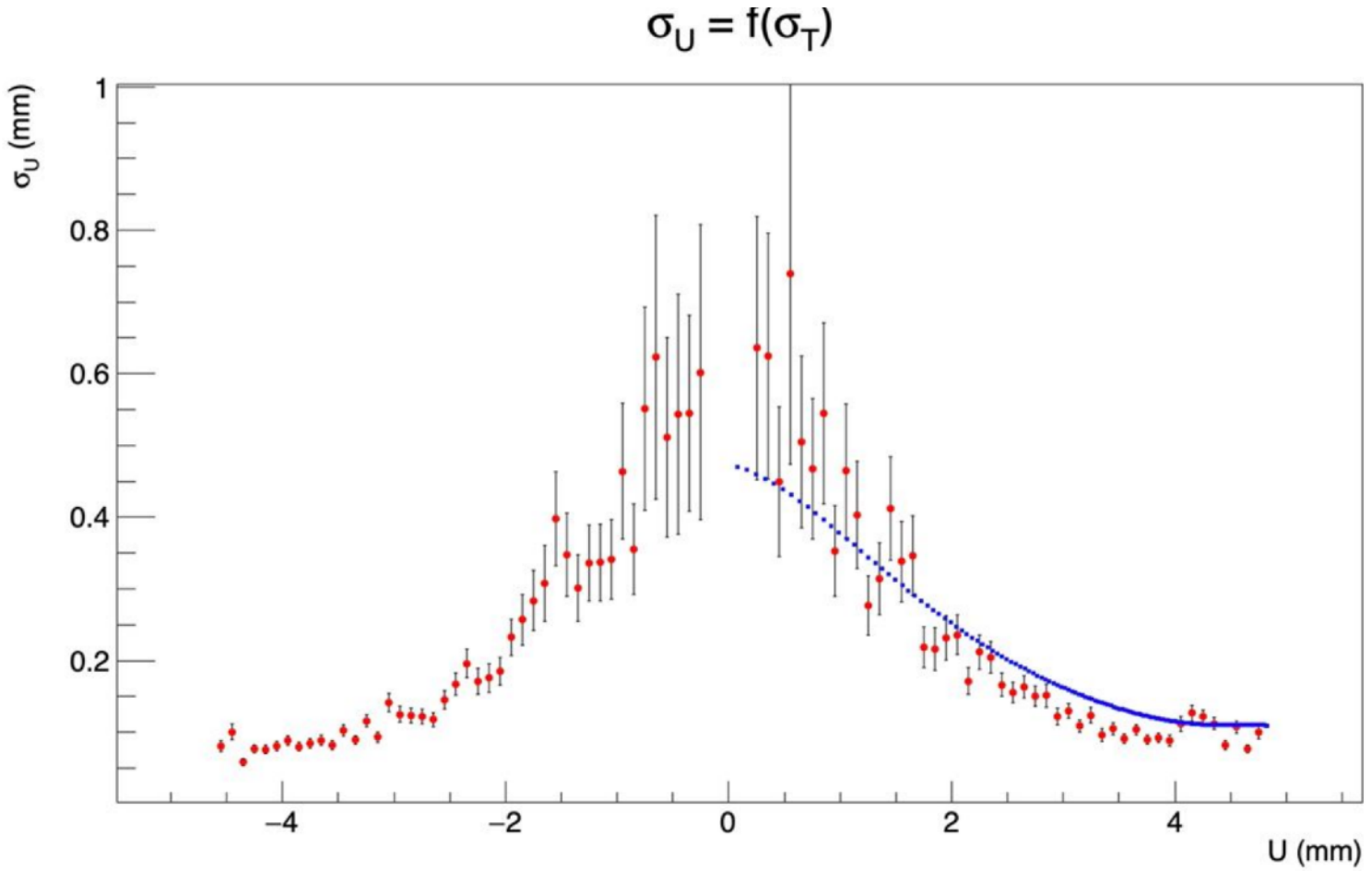
The best time ‘resolution’ is about **4-5 ns**

Analysis ongoing

Validation with NA62 data

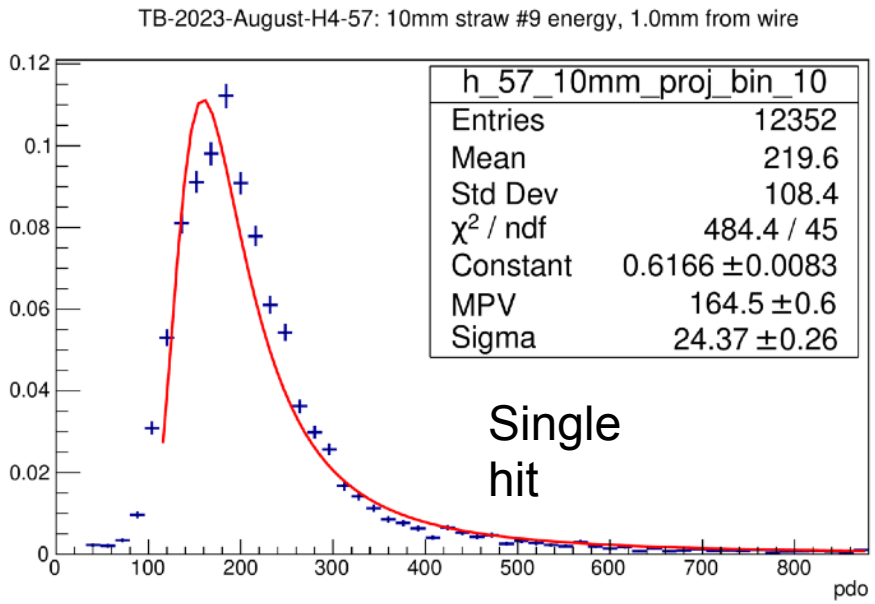
- good agreement between two independent analysis methods

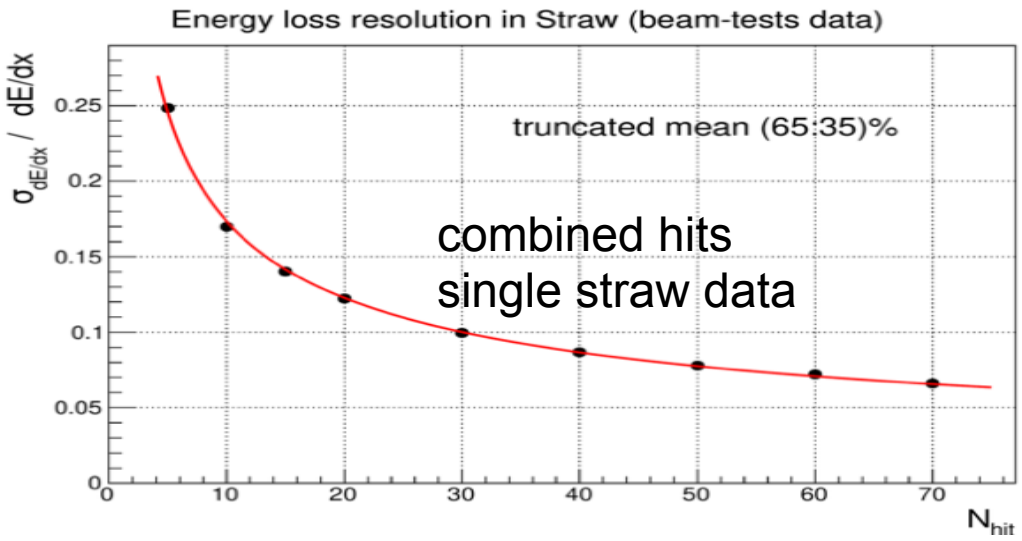
- results similar to the resolution obtained with straw prototype and VMM3/TIGER



Charge measurements – work in progress

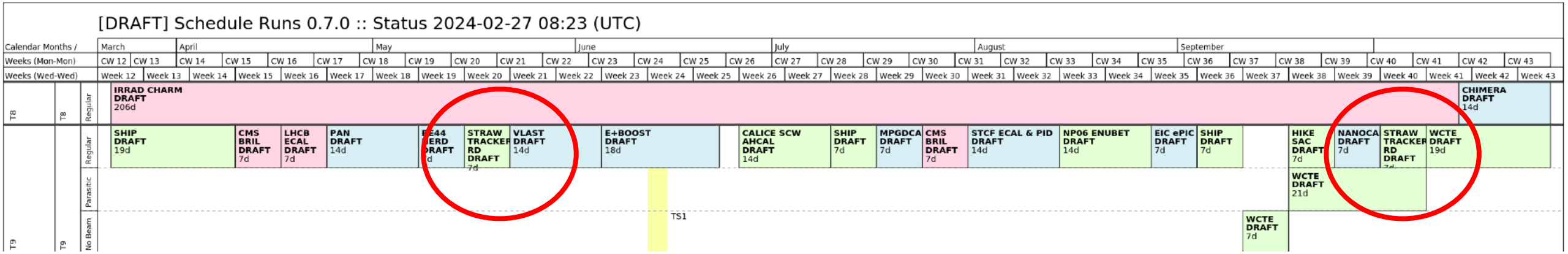
MIP with VMM3 (not calibrated response)





Simulation studies (Geant4) are ongoing for MIP and other particles @subGeV

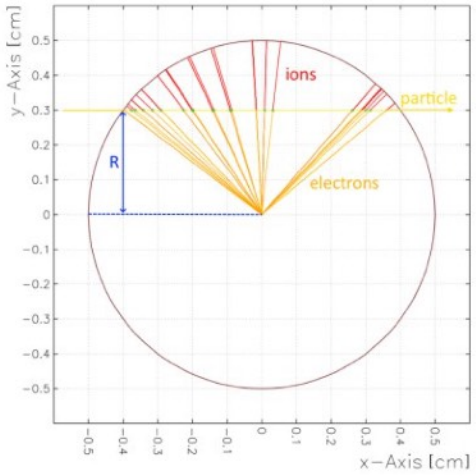
Measurements @subGeV are scheduled at PS T9

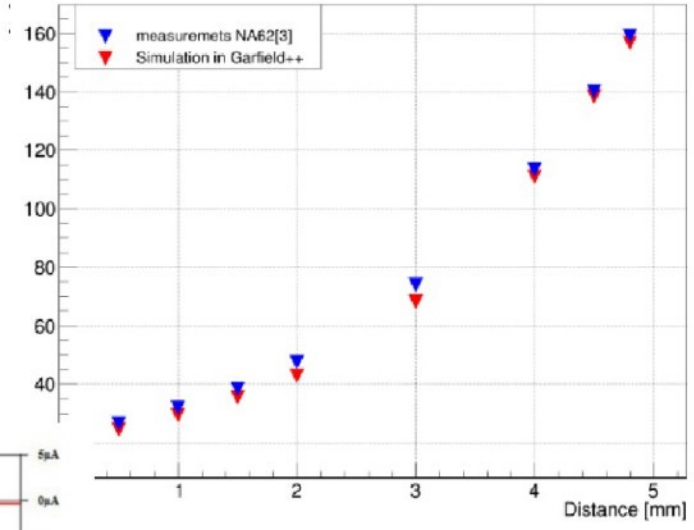


MC simulation and comparison to the data

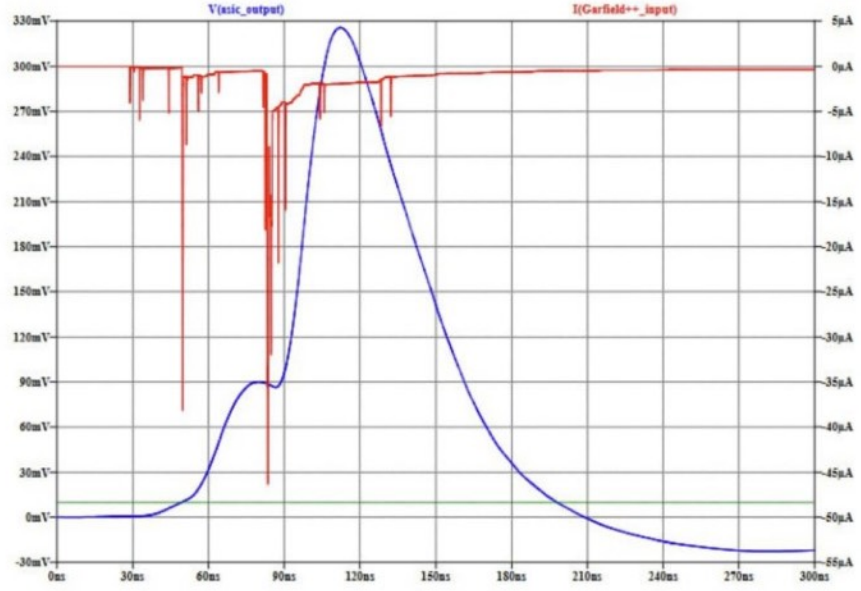
GARFIELD + LTSpice

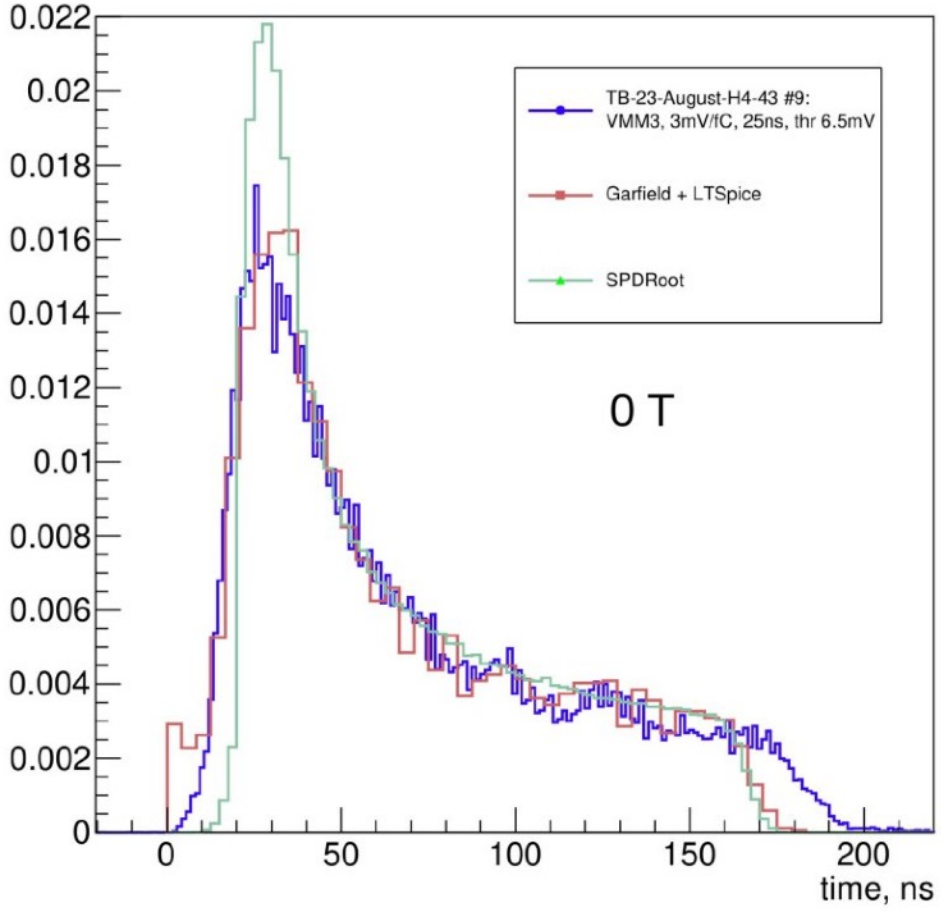
ISSCAST-2023
Journal of Physics: Conference Series **2642** (2023) 012005 doi:10.1088/1





re 7. MPV from distance to wire.

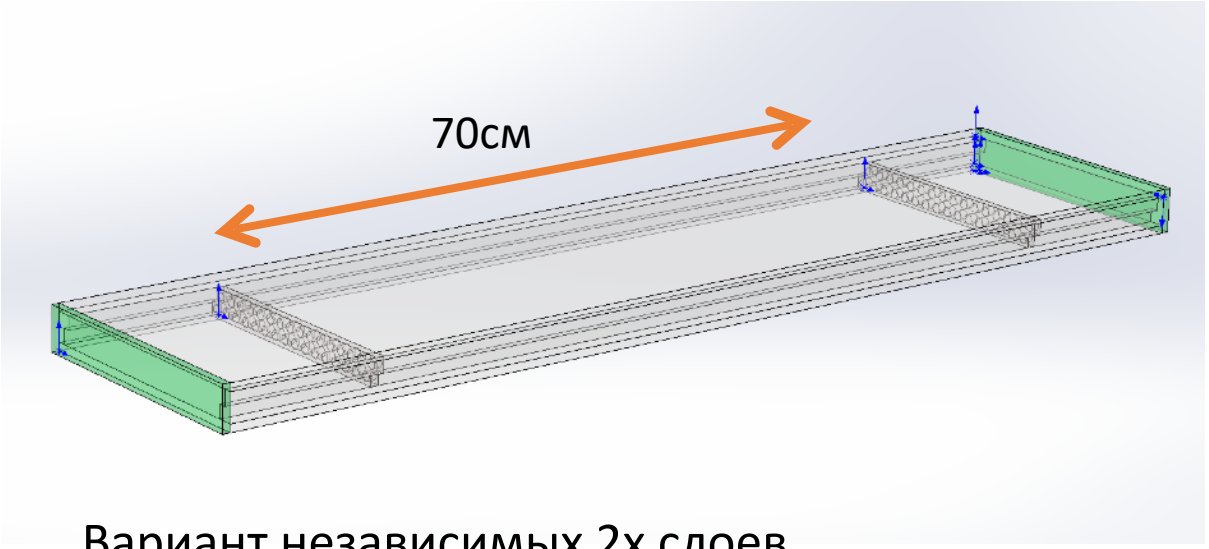




Work ongoing:

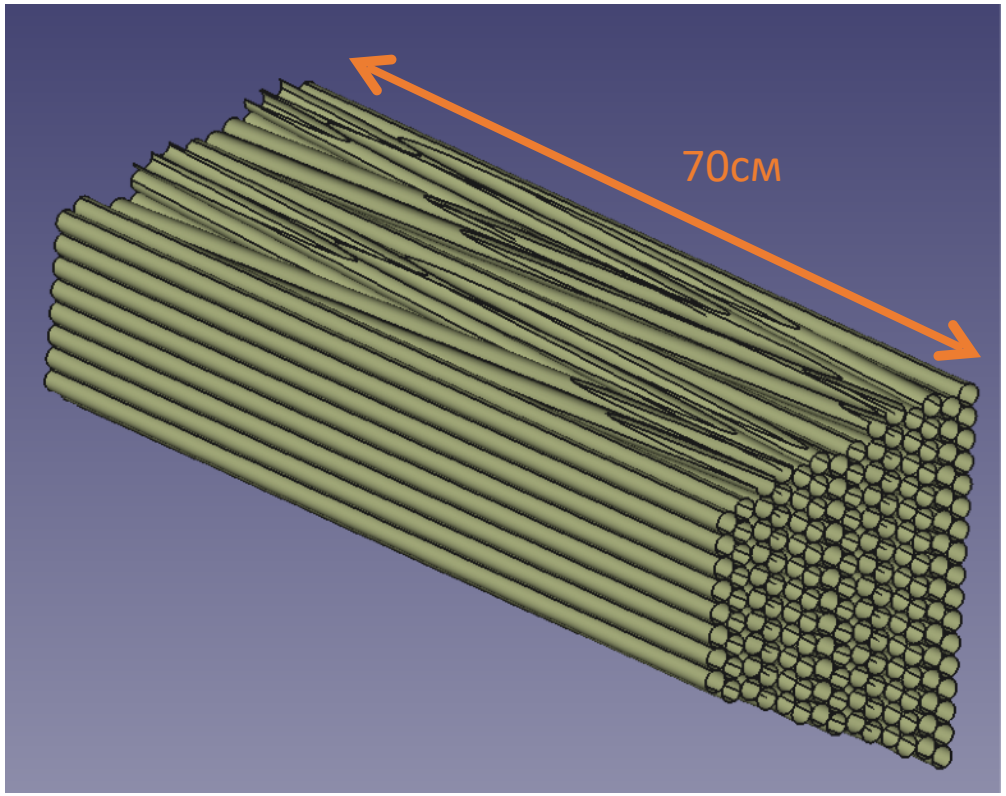
- better description of the straw impedance in LTSpice
- different electronics models
- better description on the charge

Прототипирование



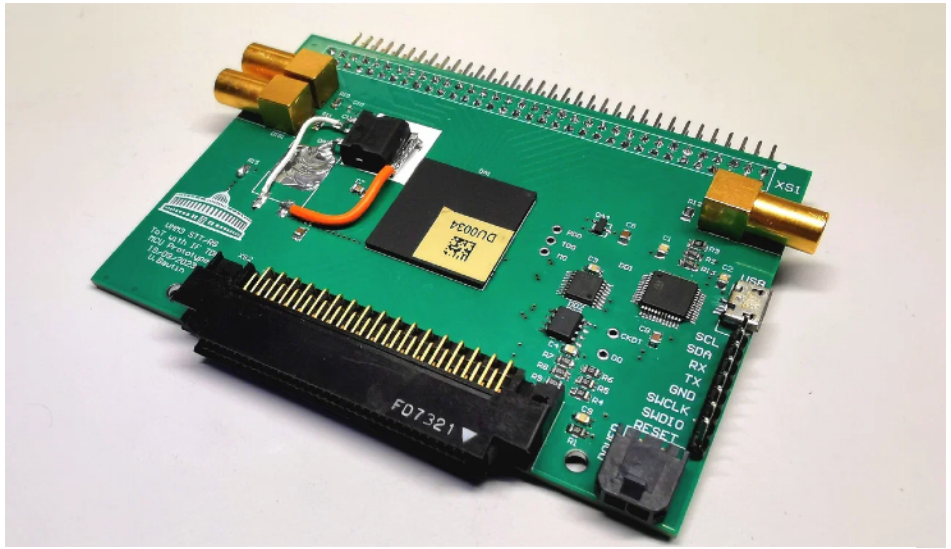
Вариант независимых 2х слоев

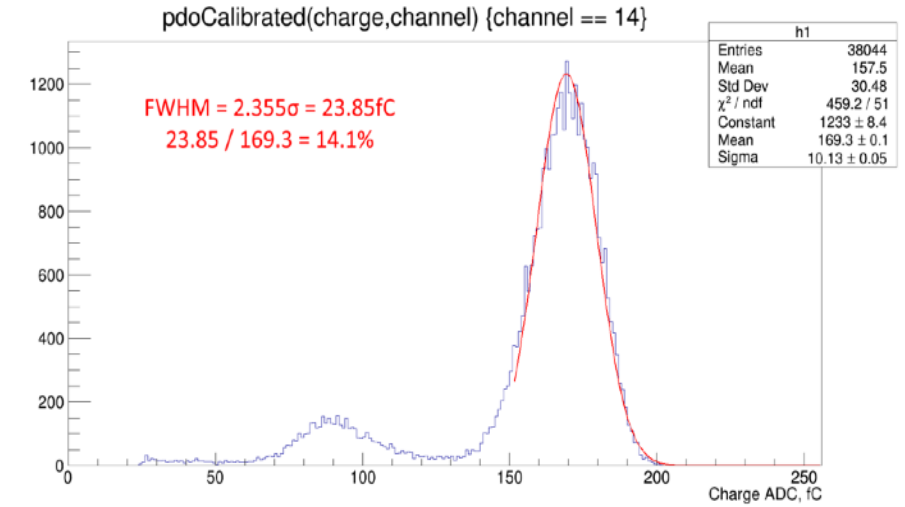
Вариант уменьшенной пирамиды

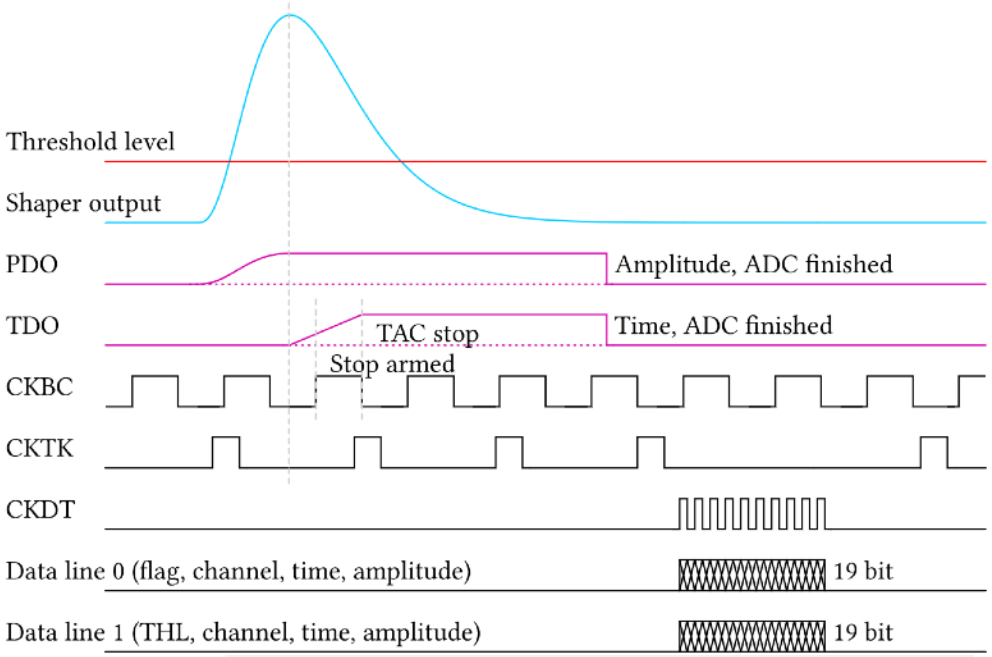


Электронное R&D

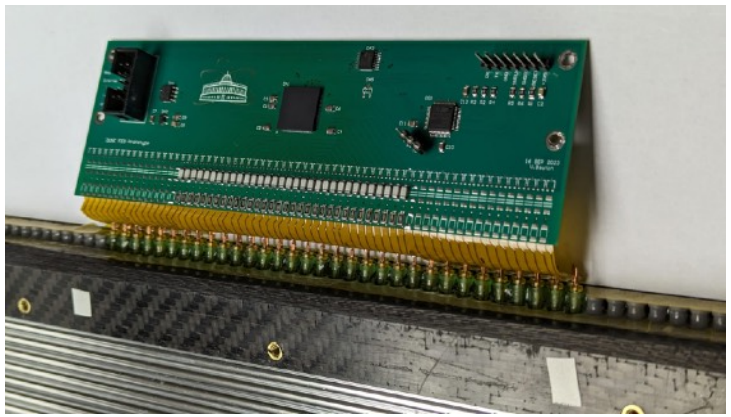
Плата на VMM3(3a) на микроконтролле.

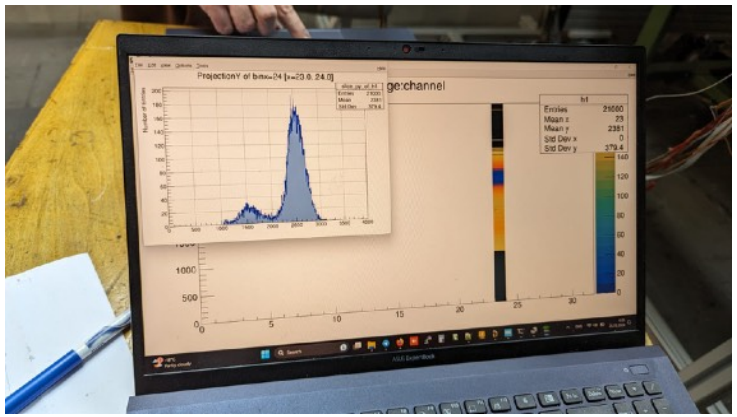


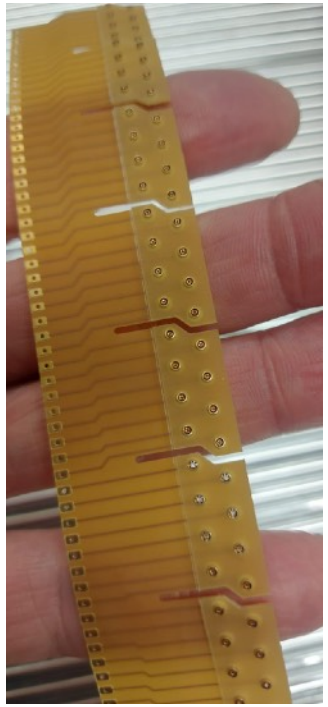




FEE на noname чипе







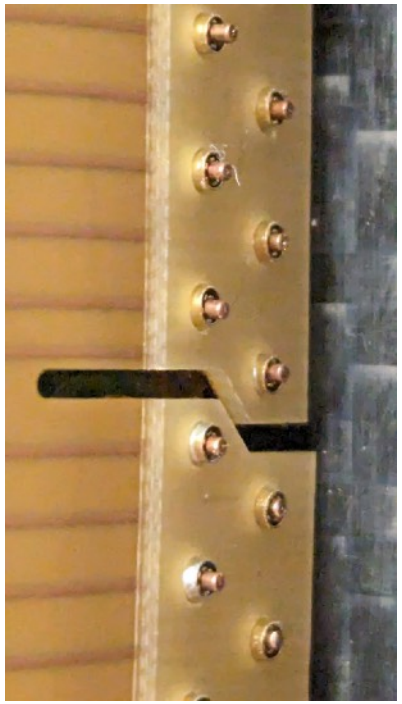
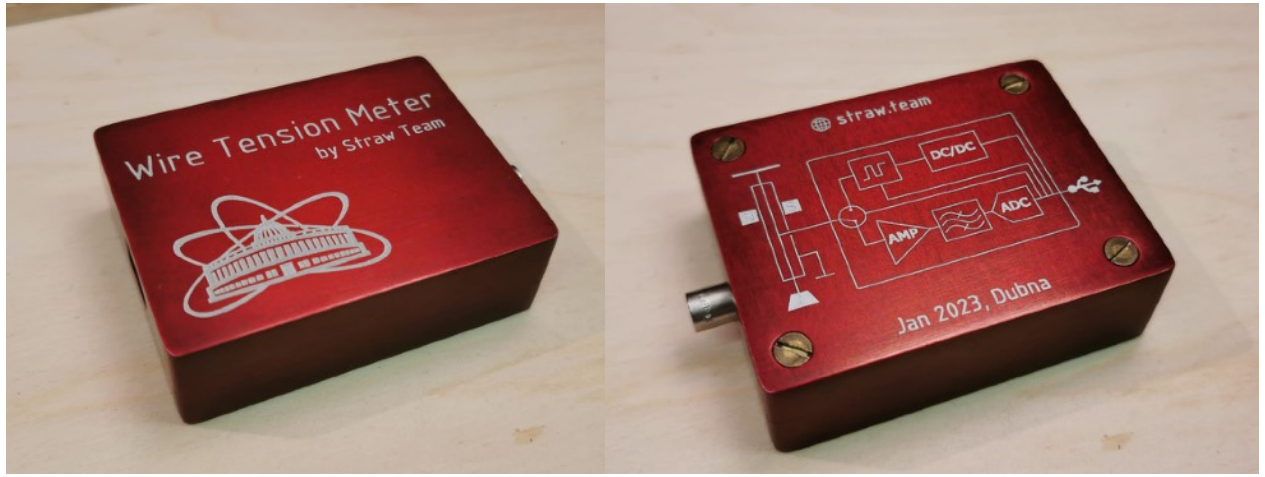


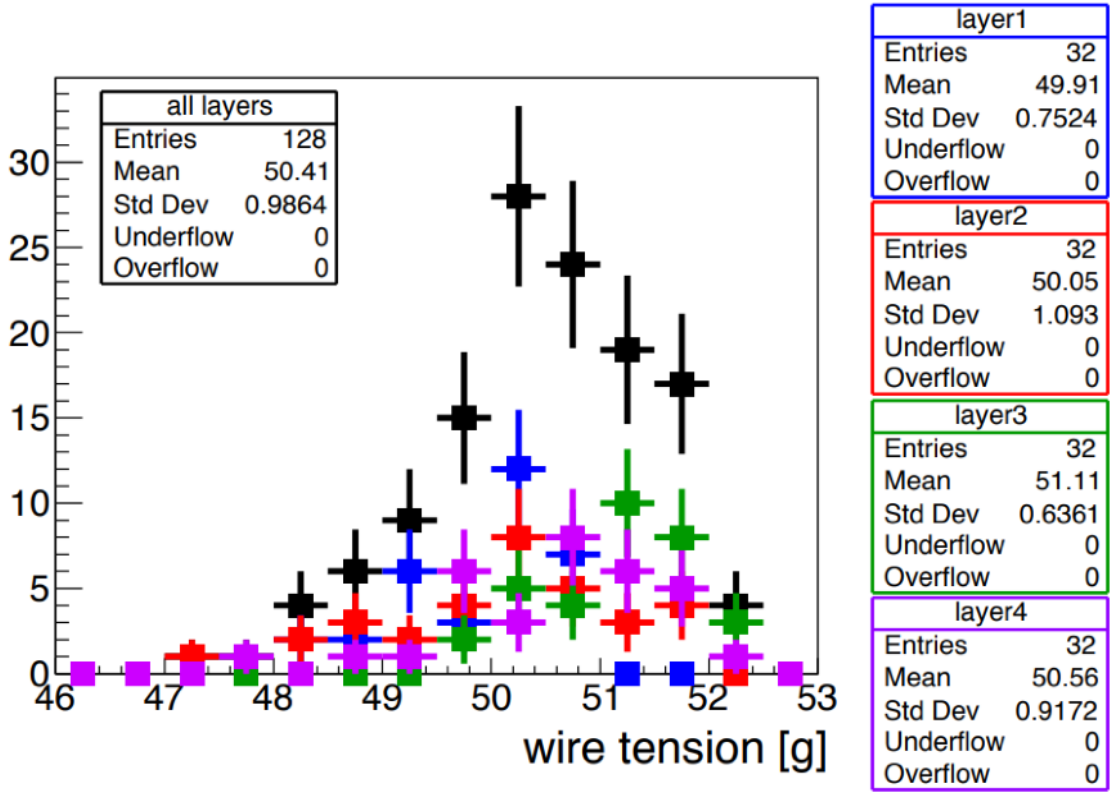
Table 1. **ADC features on STM32G4 Series**

Features	Values for STM32G4 Series
Number of ADCs	Up to 5
Resolution	12 bits (or 10, 8, 6 bits), 16 bits with oversampling
Number of input channels	Up to 42
ADC principle	Successive approximation register (SAR)
ADC clock frequency	Up to 60 MHz (up to 52 MHz in multiple-ADC operation case)
Sampling rate	Up to 4 Msps (up to 3.46 Msps in multiple-ADC operation case)
Sampling time	2.5 to 640.5 [ADC clock periods]
Supply voltage	V_{DDA} = 1.62 V to 3.6 V
Reference voltage	On dedicated VREF+ pin(1) (internal or external), V_{REF+} = 1.62 V to V_{DDA} (see datasheet)
Triggers	From external pins or internal peripherals (timers)
Conversion modes	Single, continuous, scan-selected channels, discontinuous mode
Others	Offset calibration, analog watchdog, hardware oversampling, offset compensation, gain compensation, interleaved mode (two ADCs coupled), sampling time controlled by trigger edges, bulb mode sampling

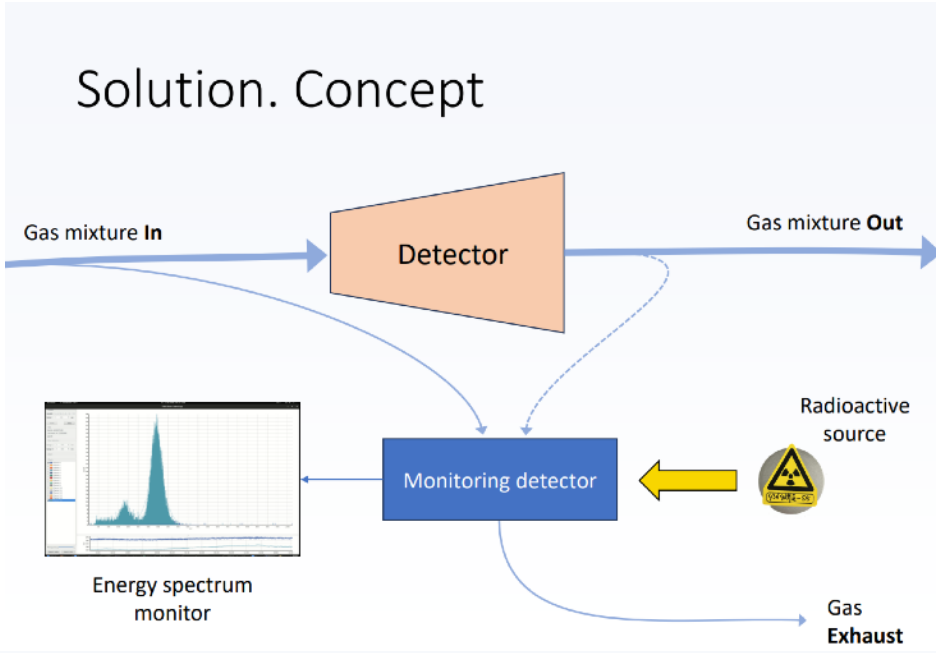
1. *In the LQFP128-pin packages, two VREF+ pins are available.*

Измеритель натяжения анодной нити





Gas Gain Monitor



Built for NA-62

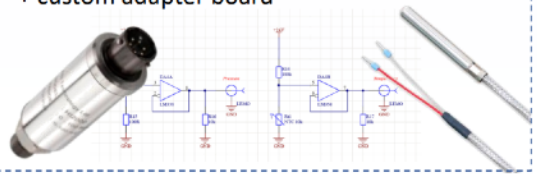
Straw chamber & ^{55}Fe

Integrating amplifier

CAEN Digitizer

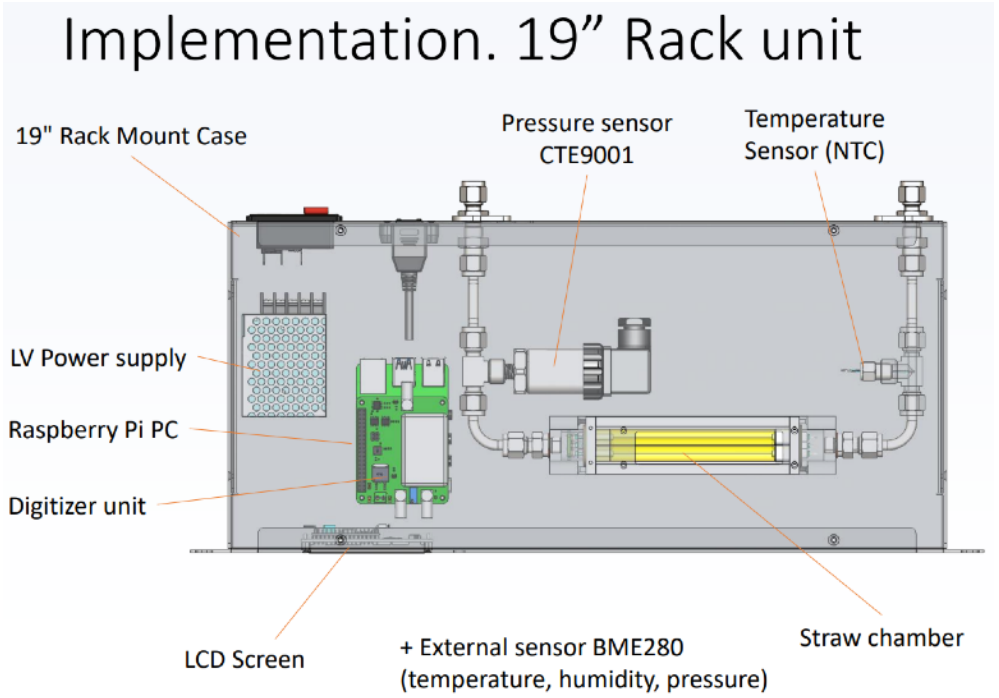
CAEN HV (+ NIM crate)

Pressure & Temperature sensors + custom adapter board

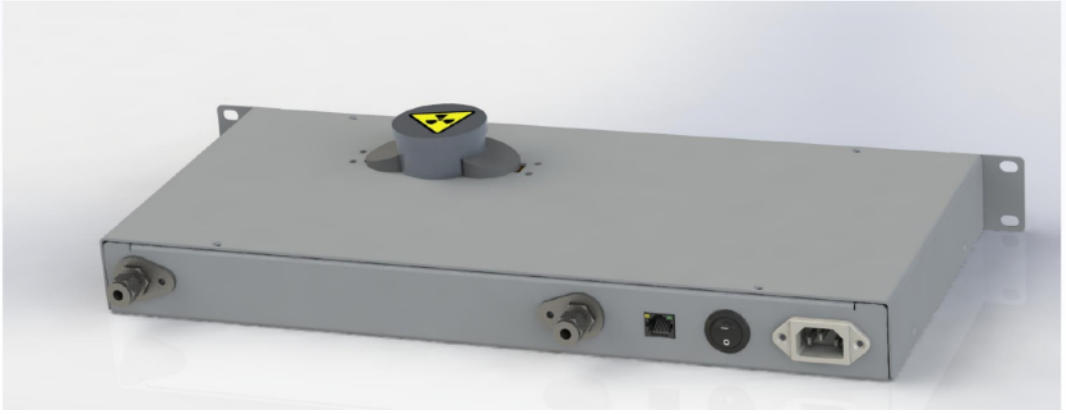


LV PS (4 ch.)

Computer



- Swagelok 6mm (In & Out)
- Ethernet (+ Wi-Fi antenna)
- 220V (C13)
- Socket for environment sensor (front panel)



Сотрудничество

- ПИЯФ-анализ, data taking, моделирование, работа на пучках и т.д.
- ИЯФ(Казахстан)-моделирование, straw production, assembling
- Питерский политех – DAQ
- Томский политех-FFE
- Минск(Солин)-FFE
- Группа Каржавина(JINR) – aging и система газообеспечение
- Переговоры с индийскими коллегами

  (a) IIT Guwahati Contact: Prof. Bipul Bhuyan (bhuyan@iitg.ac.in)

  (b) Panjab University Contact: Prof. Vipin Bhatnagar (vipin@fnal.gov);

  (c) NISER Bhubaneswar Contact: Prof. Sanjay Swain (sanjay@niser.ac.in).

Публикации за 2023г

Testbeam Measurements and Realistic Simulation for the SPD Straw Drift Tubes
•November 2023
•Physics of Atomic Nuclei 86(5):832-837

Straw signal modeling using Garfield++ interface to LTSPICE
•November 2023
•Journal of Physics Conference Series 2642(1):012005

Online Gas Gain Monitoring System
•October 2023
•Physics of Particles and Nuclei Letters 20(5):1240-1242

•VMM3 ASIC as a potential front end electronics solution for future Straw Trackers, NIM,Volume 1047,2023,

Планы 2024г

1.Создание 2х прототипов straw trackera

2.Восстановление стенда miniSPD

3. Пуско-наладка прототипов электроники

4.Участие в пучковых экспериментах на H4 SPS и PS с целью оптимизации FEE.

5.Проработка вариантов участия на пучках ускорителей в ПИЯФ(Гатчина) и ИЯФ(Алматы)

6. Проработка системы газообеспечения детектора