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SiPM power supply unit

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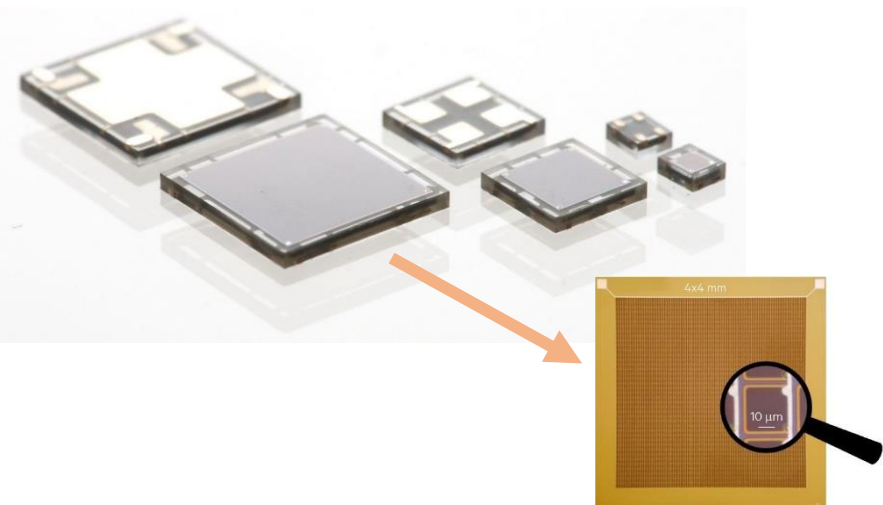
AYSS-2022 24 - 28 October, JINR, Dubna



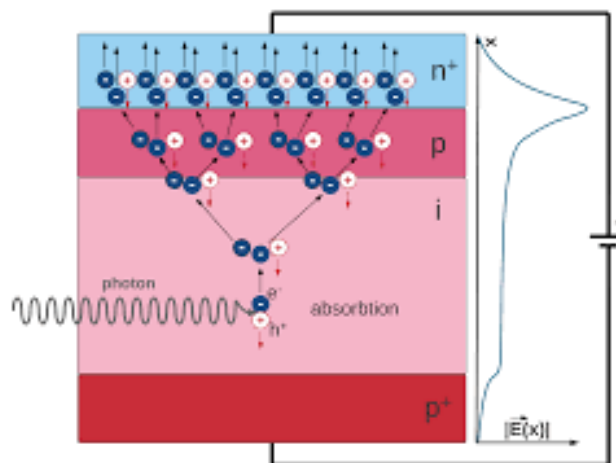
- Introduction
- SiPM power supply unit
- SiPM power supply unit's control system
- Status and Plans



SiPM (Silicon Photomultiplier)

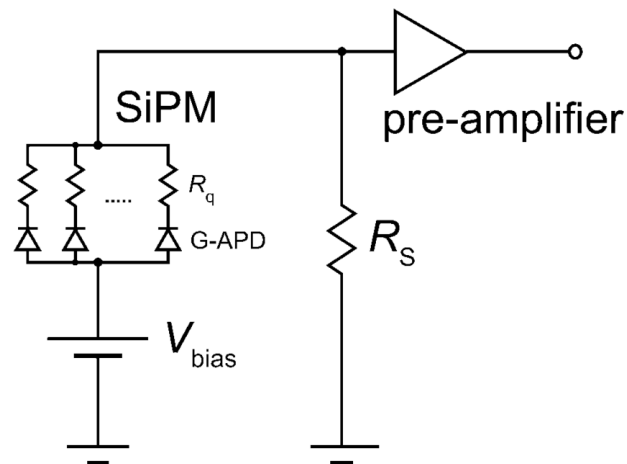


A SiPM die



Different doped layers of a reverse biased APD

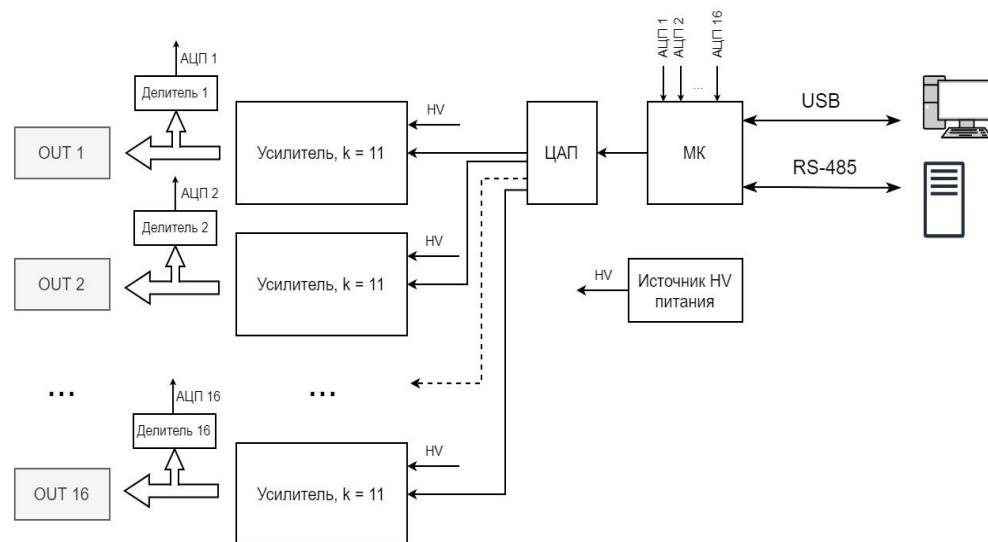
- ✓ Compact device
- ✓ Low operating voltage (30 – 120V)
- ✓ Resolution – Single photon detection
- ✓ Response time – ~ 100 ps
- ✓ High gain – 10^6
- ✓ High quantum efficiency – 90%
- ✓ High photon detection efficiency – 60%
- ✓ Immunity to magnetic field



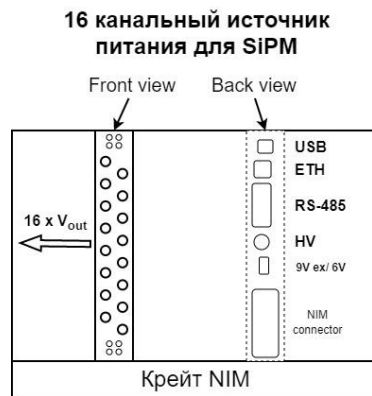
Schematic overview of a SiPM and its readout circuit.



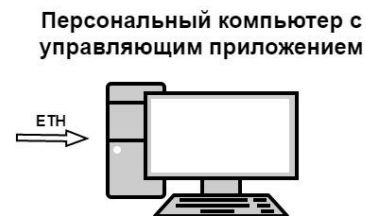
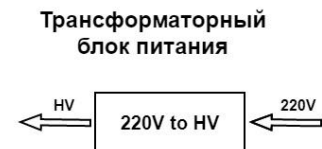
A view of the power supply module



A functional scheme of the power supply module



A scheme of the power supply module





Features of SiPM power supply

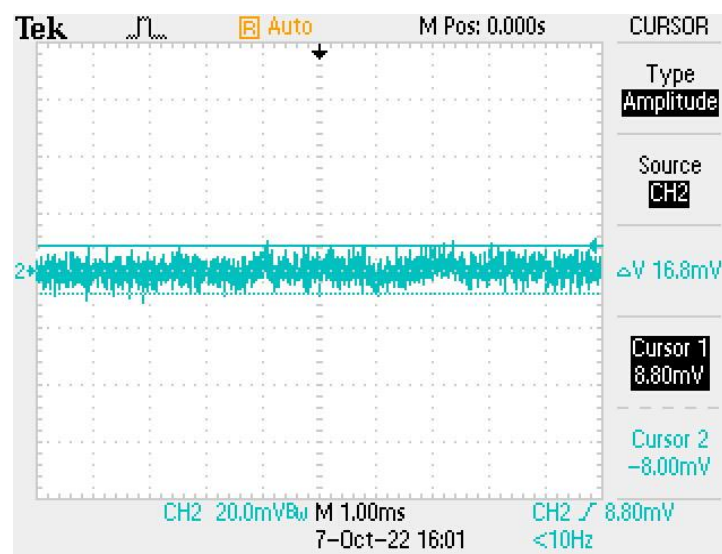
The Power Supply unit provides two options for generating a base voltage of 32.5 V:

- ☐ a built-in converter 12V to 35V
- ☐ an external transformer power supply 220V to 32.5V



A view of the external transformer power supply

Number of channels	16
Output voltage range, V	24 - 28
Step, mV	8
Max output current, mA	50
Voltage setting accuracy, mV	~14
Communication interfaces	USB_2.0, RS-485, Fast Ethernet



Noise from the SiPM power supply's channel



Control system

□ Control (main page)

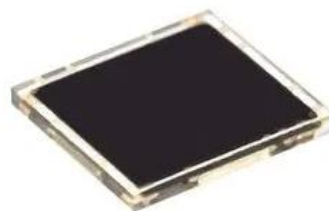
□ Calibration

□ Settings



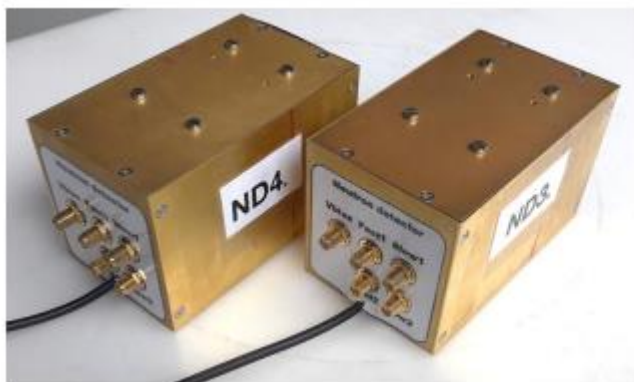


A view of barrel detector strip assembly with SiPMs board



MICROFC-60035-SMT-TR1
Silicon Photomultiplier (SiPM), C-Series

Barrel detector	
Number of channels	40
United groups of channels	8
SiPM	SiPM Micro FC-60035-SMT
Operation in magnetic field, B	0.9 T



A view of neutron detectors



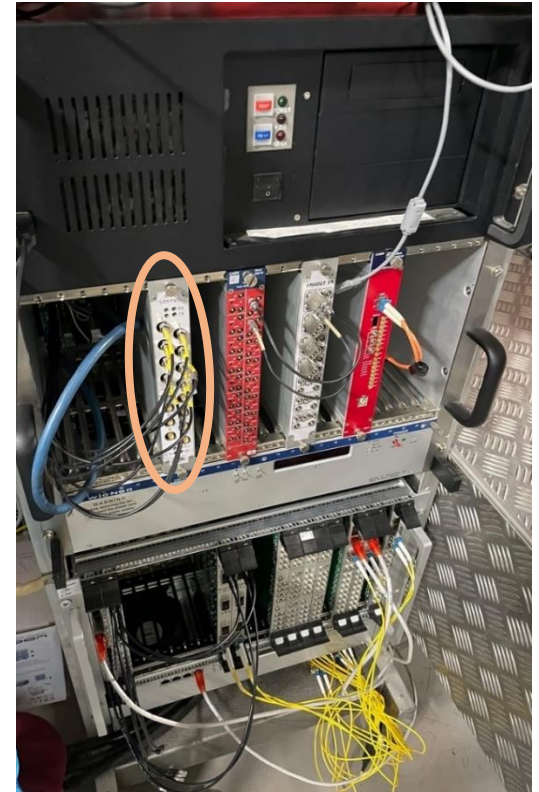
Neutron detectors	
Quantity of detectors	5

Present status:

- ✓ SiPM power supply – produced and tested.

Plans:

- ✓ Produced a built-in converter 12V to 35V;
- ✓ Upgrade the SiPM power supply unit by increasing the number of available channels for new BM@N set up.



A view of the power supply unit
of the BM@N setup

Thank you for your kind attention!

