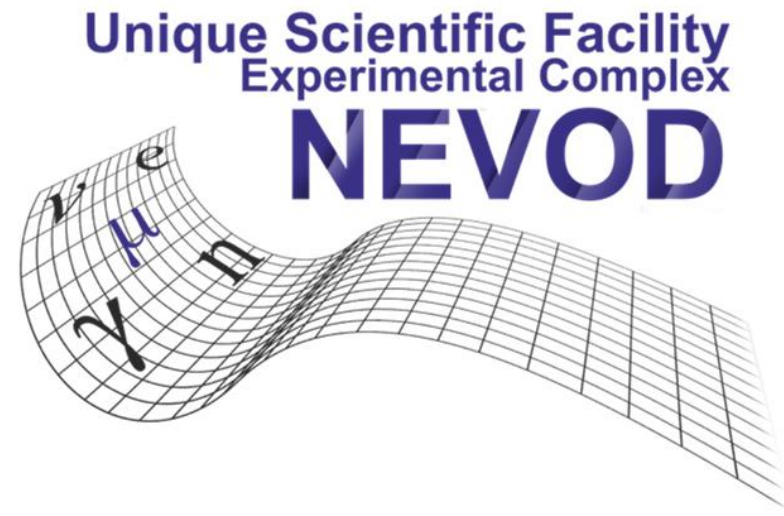


# Multisector scintillation detector of the NEVOD-EAS project



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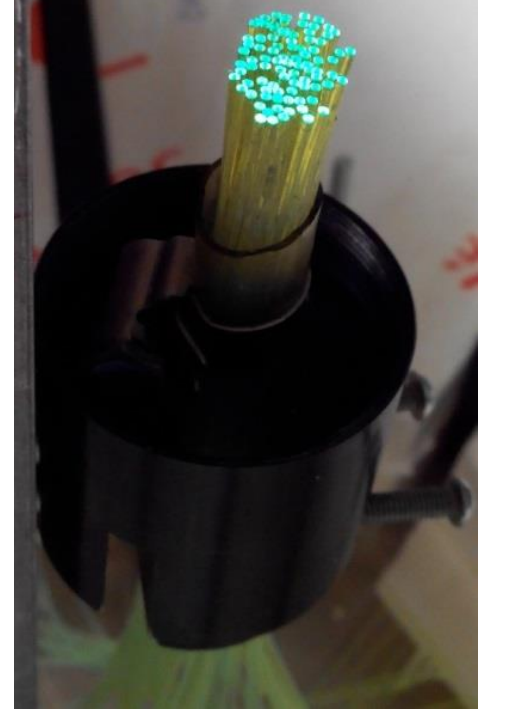
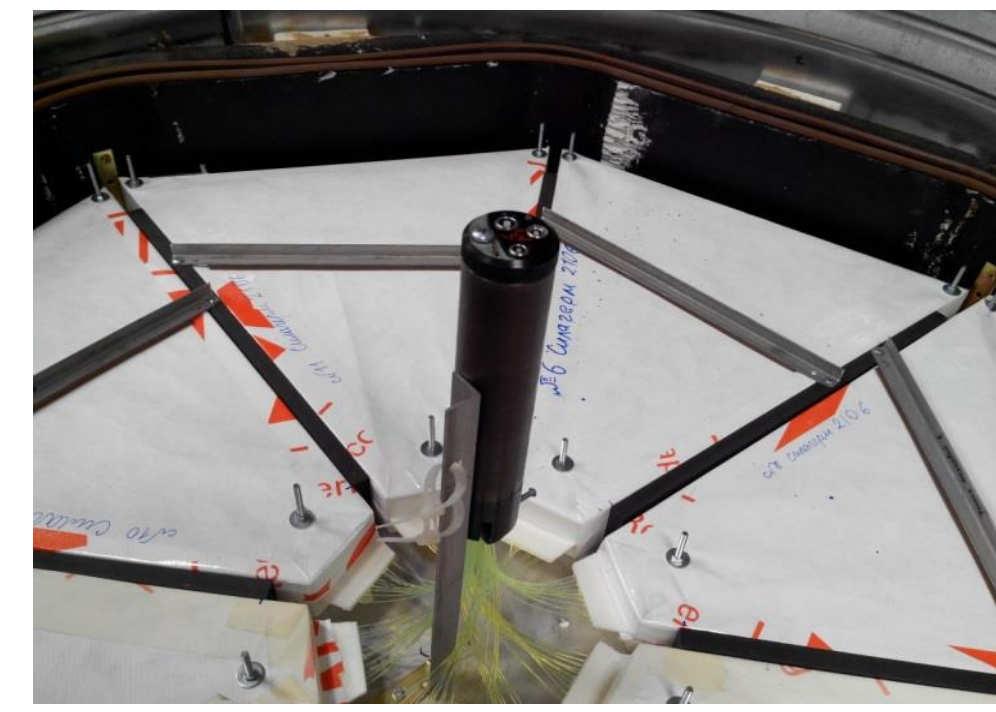
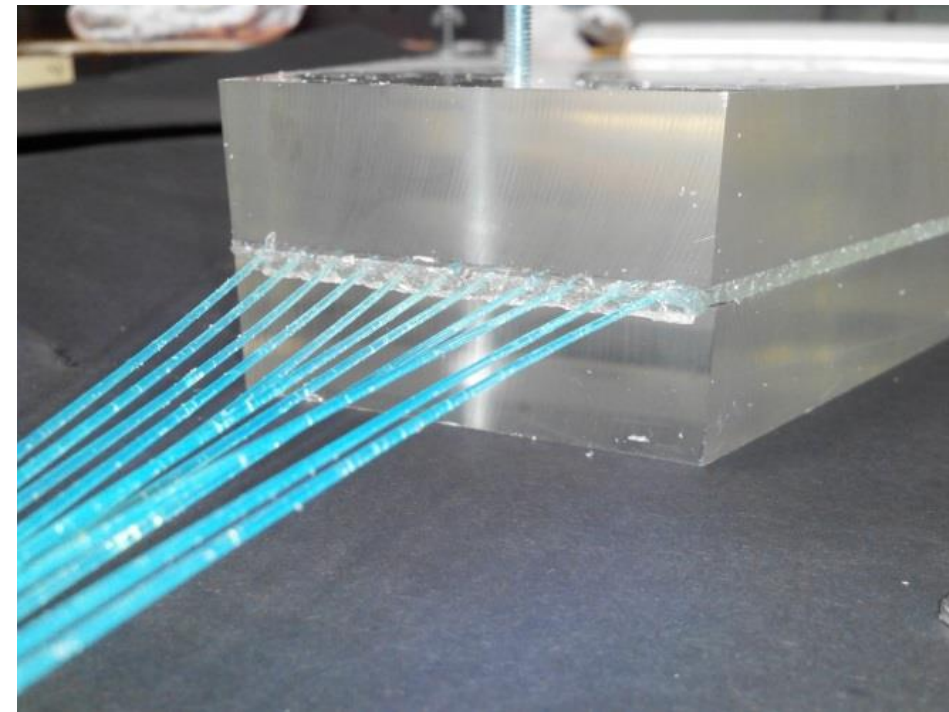
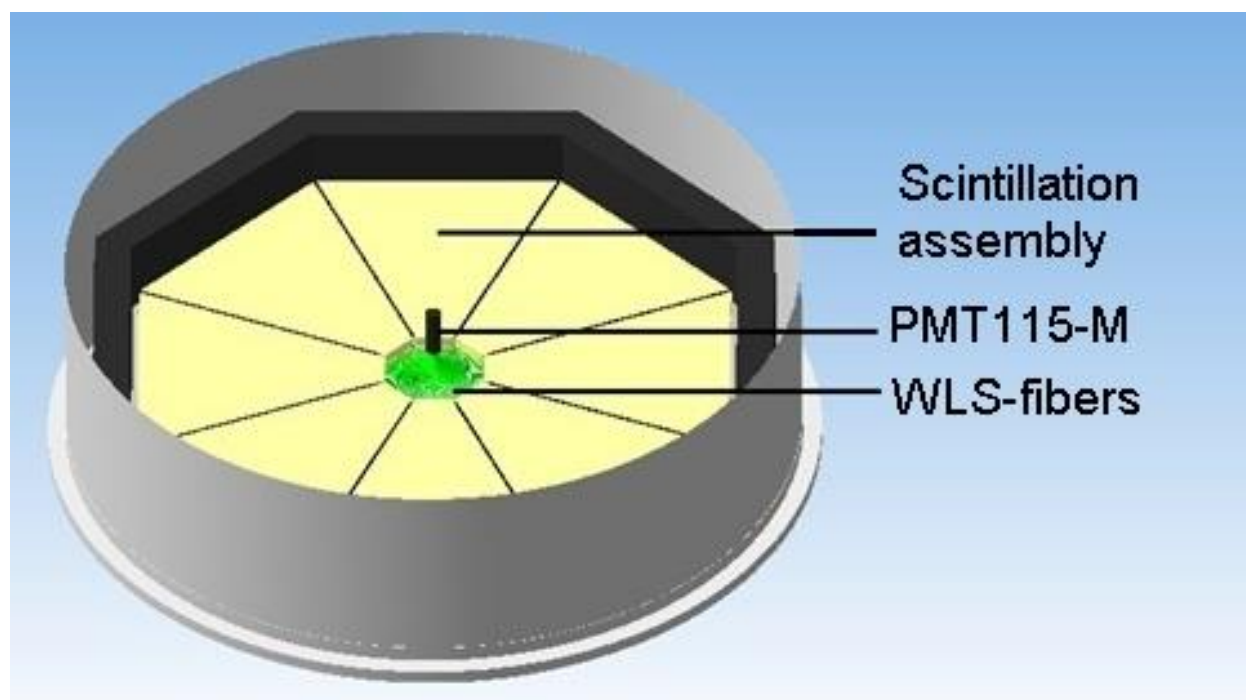
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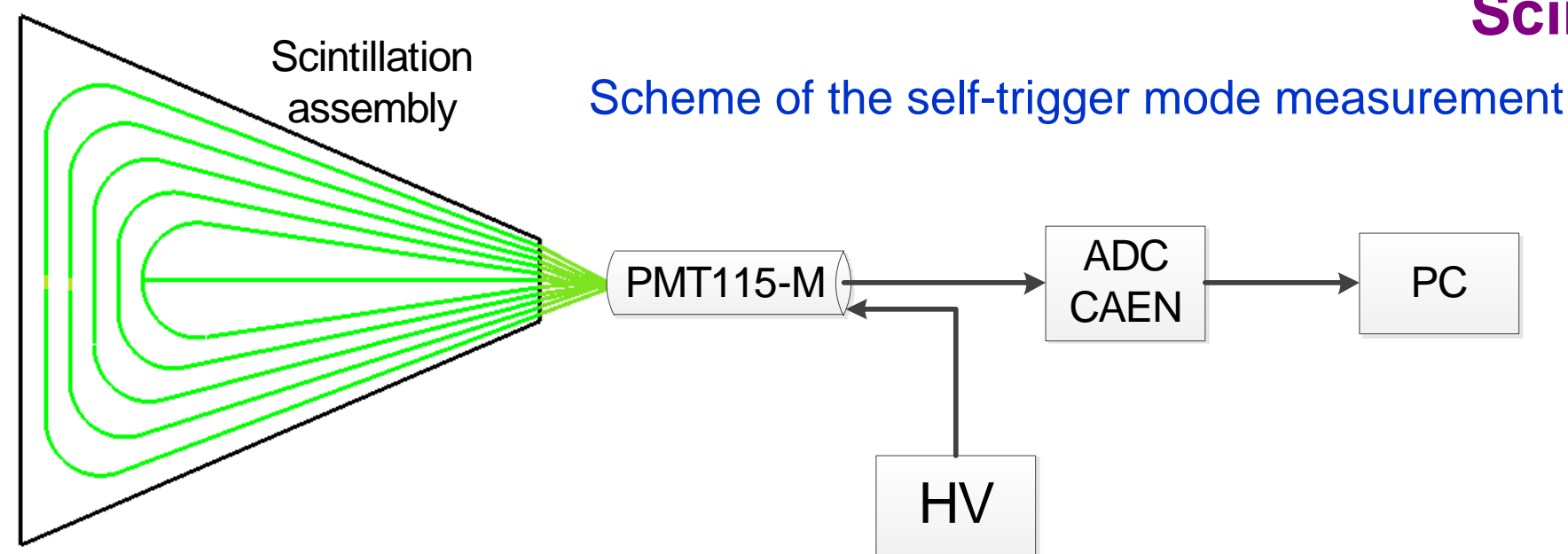
## NEVOD-EAS

The NEVOD-EAS array is being deployed in the campus of MEPhI. This project was developed for the registration of the EAS with energies of  $10^{15} - 10^{17}$  eV. The measurement system has a cluster structure. The NEVOD-EAS consist of 12 clusters. One cluster represents four detection stations with four scintillation detectors in each. Detector stations are placed on the roofs of laboratory buildings of MEPhI and on the ground. The distance between detector stations is  $\sim 20$  m. The total area of the facility is  $\sim 2 \times 10^4$  m<sup>2</sup>. The new scintillation detector was developed to extend the effective registration area.

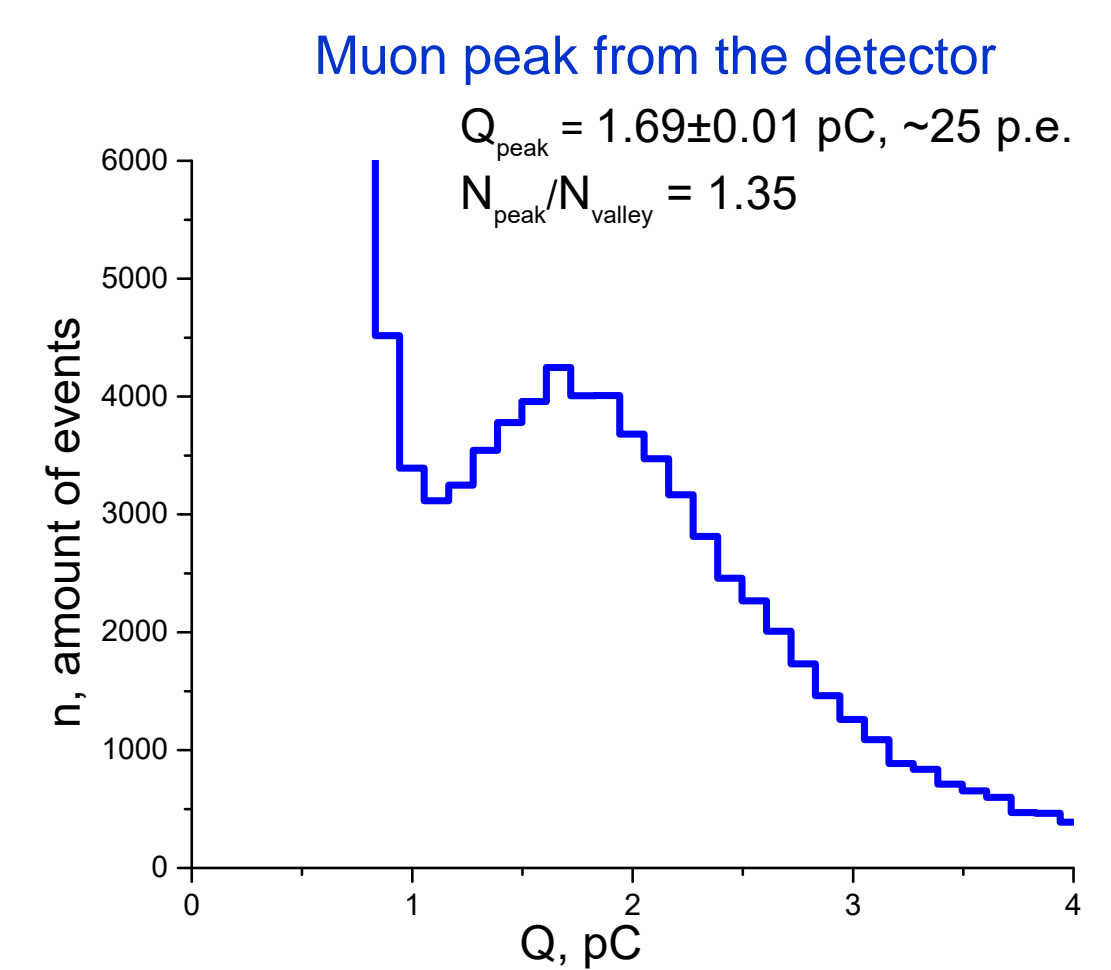
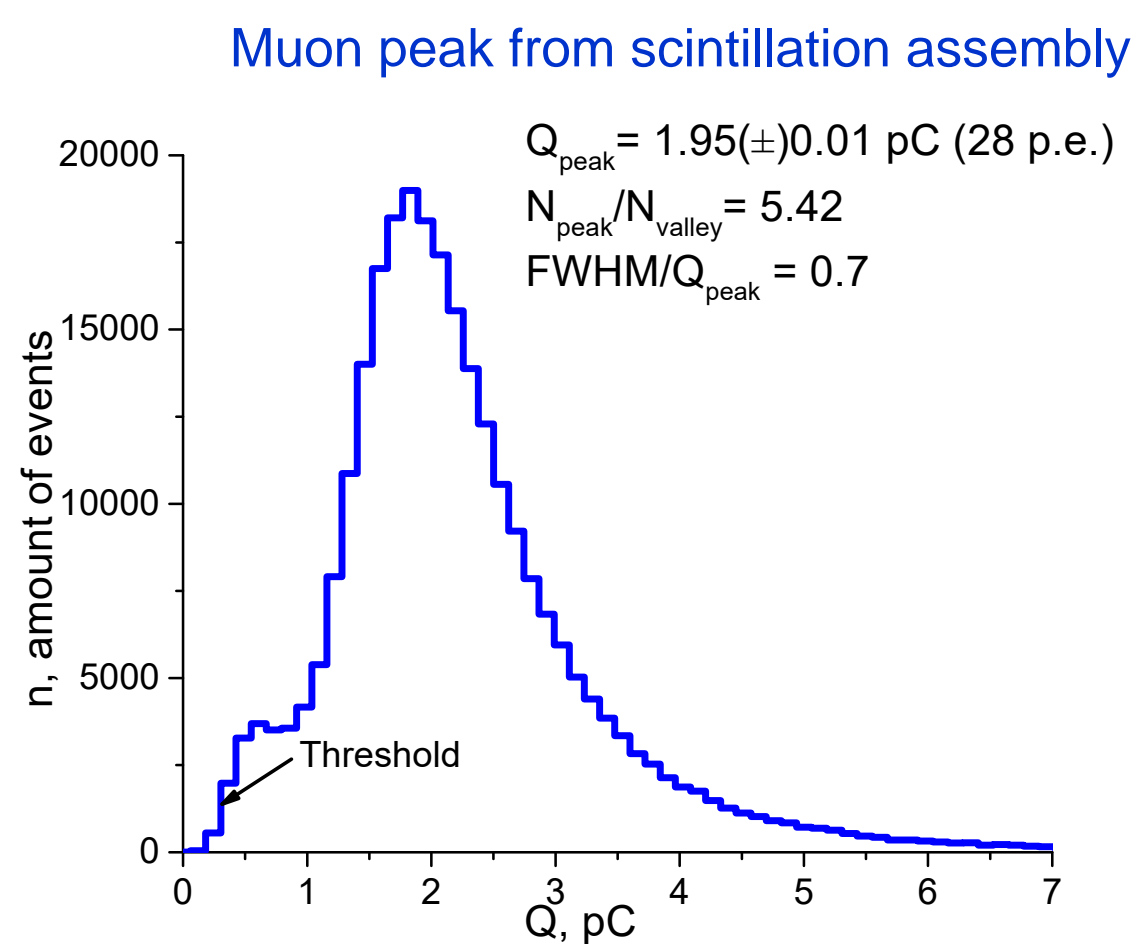
### Multisector scintillation detector



### Scintillation assembly characteristics

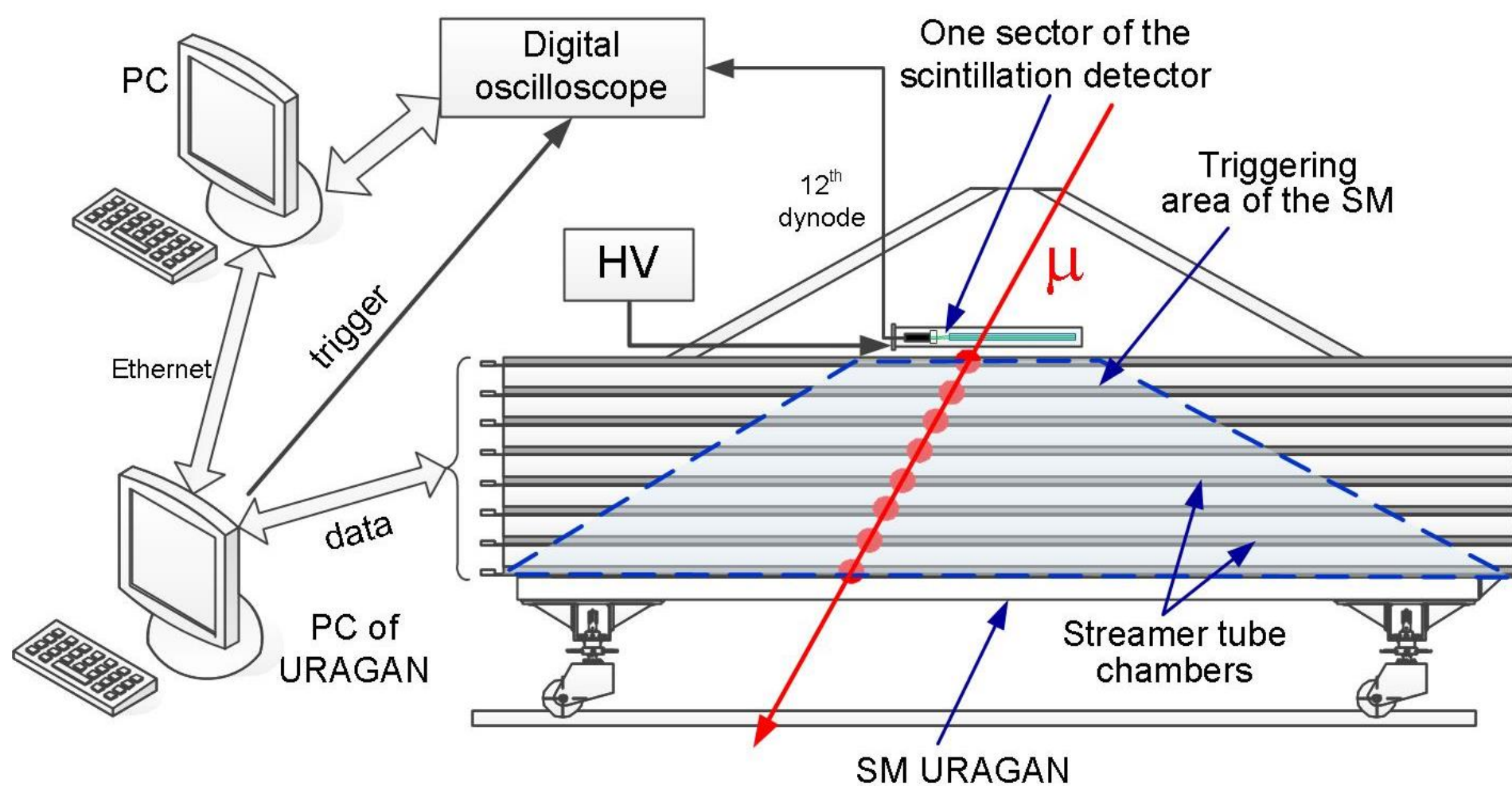


Spectra of responses that exceed the preset threshold during certain time gates are recorded. The light output of the scintillation assembly is being determined with the position of the muon peak. For 8 assemblies, the difference of the light outputs is from  $\sim 23$  to  $\sim 30$  photoelectrons.



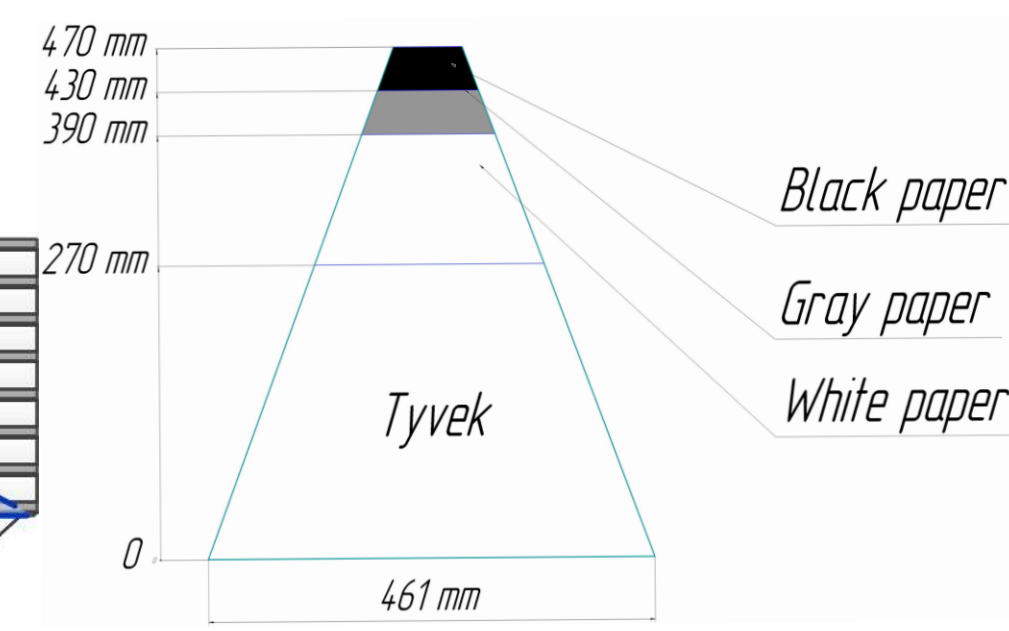
### Light collection non-uniformity measurements

The non-uniformity of the sectors an detector in whole were made with the help of the muon hodoscope URAGAN. The hodoscope has a high spatial and angular resolution (about 1 cm and 0.8°, respectively). URAGAN supermodule detect muons and reconstructs their tracks by determining the coordinates of the point through which the particle passed, in a plane passing through the middle of the assembly. The entire area tested by the URAGAN was divided into 2x2 cm cells. After the completion of the exposure, the efficiency and the average charge were calculated for each cell. Thus, the result of measurement is the matrix-muonography of the trigger counts and the average charge of responses from muons registered over the entire area of the scintillation assemblies.

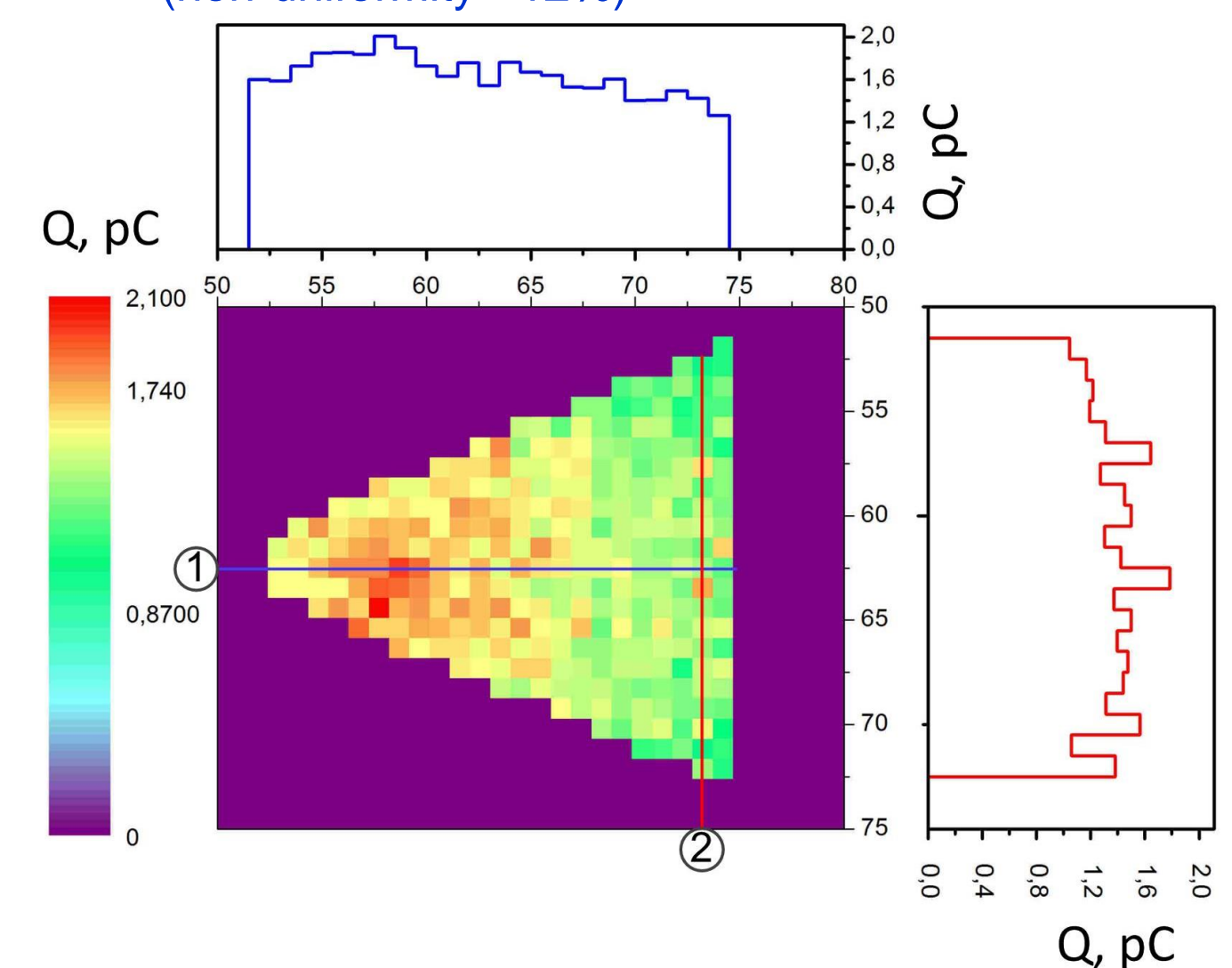


### Detector non-uniformity

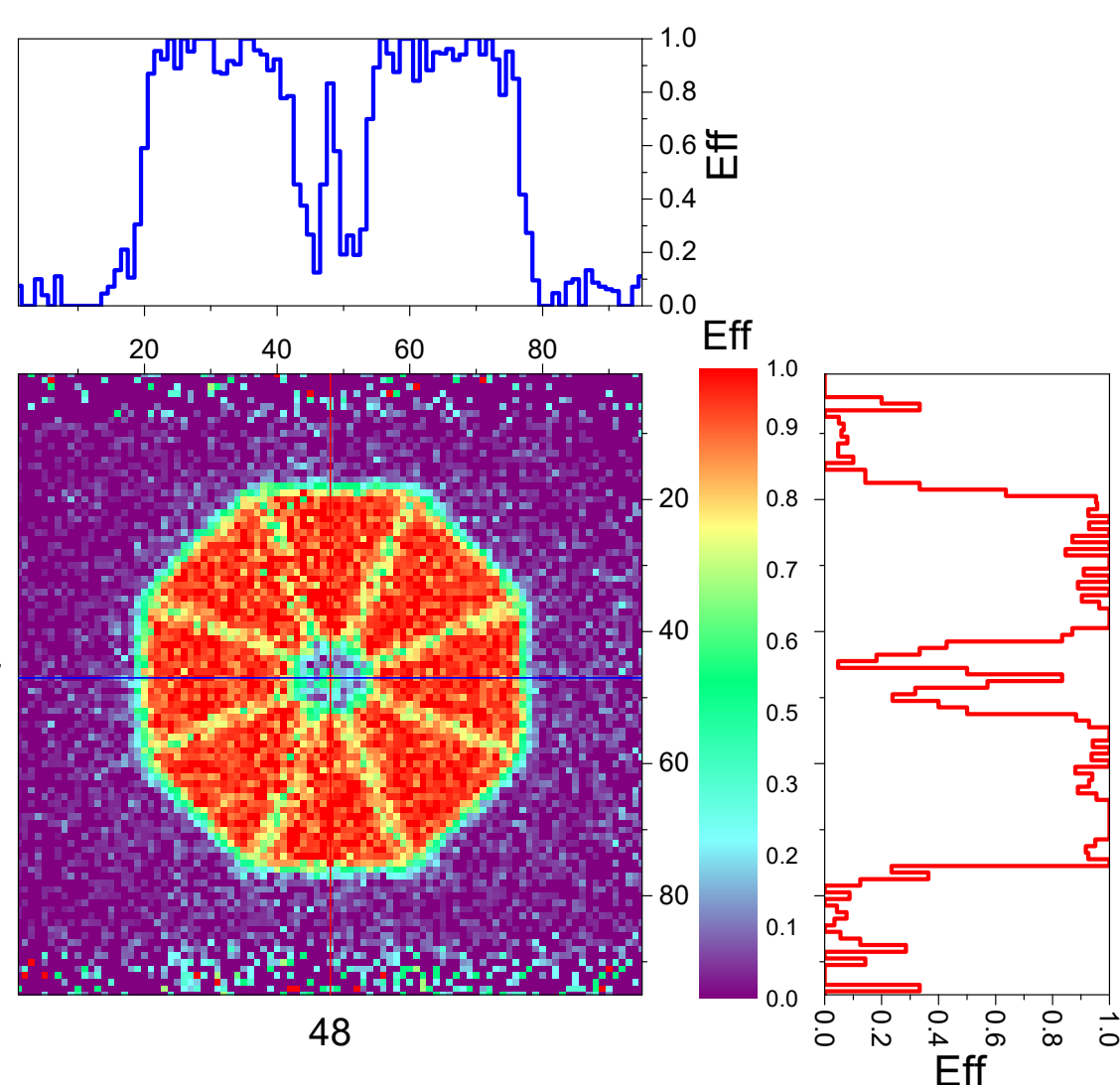
#### Correction mask for the non-uniformity improvement



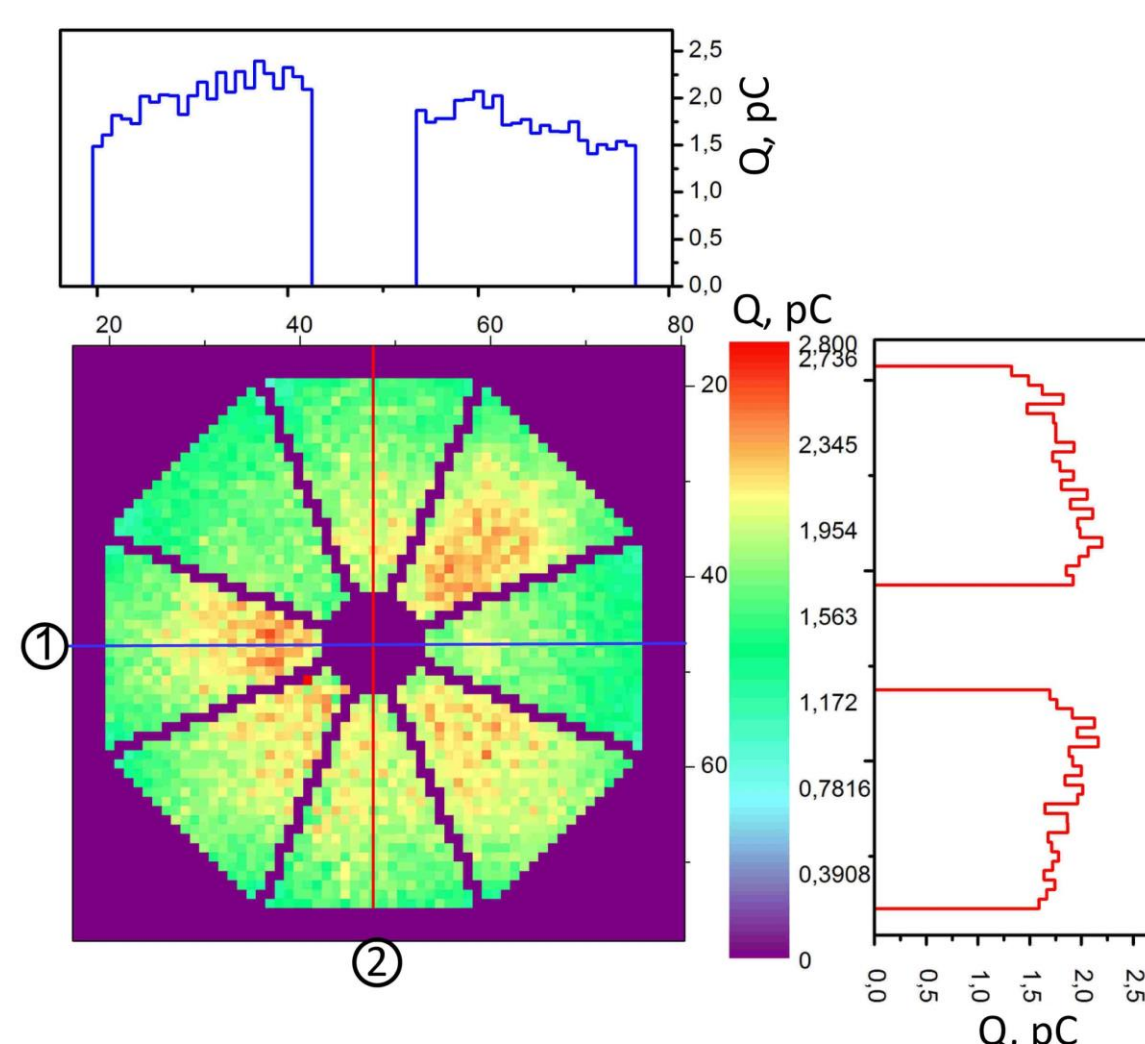
#### Muonogram of the scintillation assembly (non-uniformity ~12%)



#### Registration efficiency matrix



#### Detector muonogram (non-uniformity ~15%)



### Conclusion

- Characteristics of the scintillation assembly are measured. The assembly inhomogeneity without correction mask is  $\sim 18\%$ , with the mask  $\sim 12\%$ .
- Characteristics of eight assemblies are measured. Difference of the peaks on self-triggered spectra are from  $\sim 1.6$  to  $\sim 2.0$  pC. The peak on the self-triggered spectrum for the detector is  $\sim 1.7$  pC (peak/valley ratio  $\sim 1.4$ ).
- Non-uniformity of the multisector scintillation detector is measured. The non-uniformity of the detector is  $\sim 15\%$ . Values of assembly's non-uniformities are in the interval of 9% - 15%.

The work was performed at the Unique Scientific Facility "Experimental complex NEVOD" with the support of the Ministry of Education and Science of the Russian Federation (grant RFMEFI59114X0002 and MEPhI Academic Excellence Project of August 27, 2013, no. 02.a03.21.0005)