

Radiation Monitoring Systems at GIF++ - INRNE, Sofia, Bulgaria

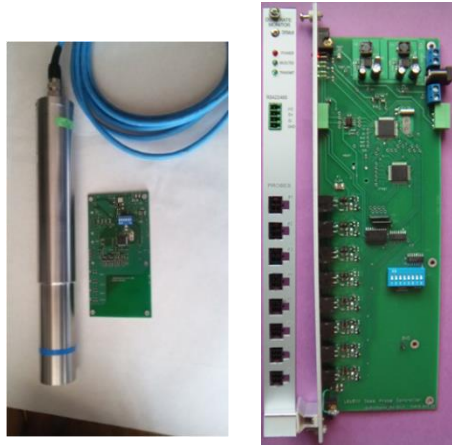
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Instantaneous dose-rate monitor (DRM) for GIF++ and test of SiPM + scintillator as a DRM for Gif++

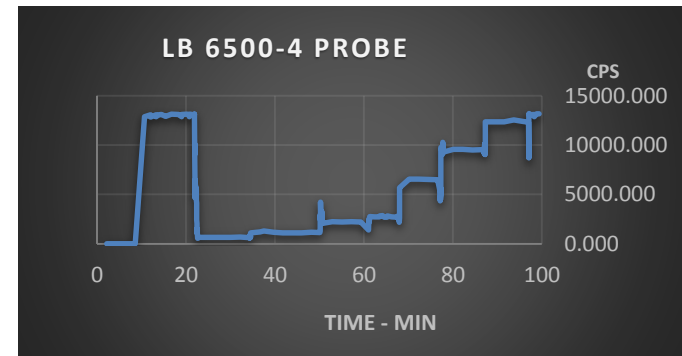
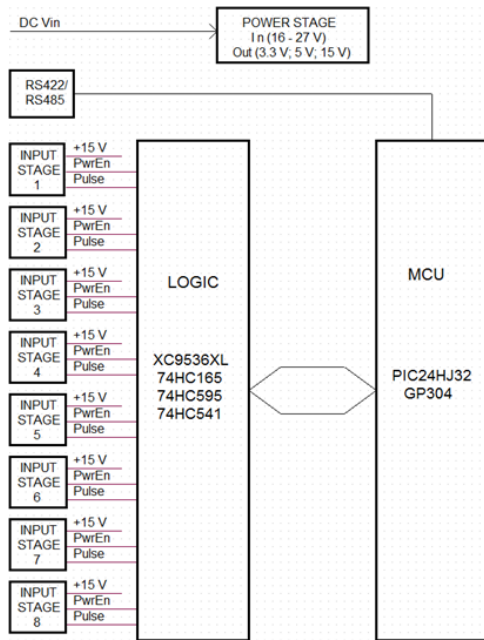
Instantaneous dose-rate monitor (DRM) for GIF++

The eight-channel version was designed and tested at GIF++ in parallel with a RADMON accumulated dose sensor. The self-adapting method of measurement was applied for the automatically selecting of pre-set time depending of input pulse rate. The Berthold LB 6500 Geiger-Mueller Dose Rate Probe was tested and compared with RADMON measurements at the same position in GIF++. The result shows good agreement in the limit of precision for the RADMON and Berthold probes.

This work was performed within the framework of **AIDA-2020 WP 15.5**.



Technical Data	Berthold GM LB6500-4 - H10
Dose Rate Range	500 nSv/h – 3 mSv/h
Energy Range	65 keV – 1.3 MeV (+/-40%) with regard to Cs-137 at 0°
Intrinsic Background	approx. 0.08cps
Calibration Factor	0.617 μSv/h per cps



Test of the Berthold LB 6500 Geiger-Mueller Dose Rate Probes at several attenuations at Gif++

The block diagram

1. TEST at INRNE of the SiPM and Plastic scintillator as a dose rate monitor – (activity during the 5th year of AIDA-2020)

Test configuration

SiPM - Hamamatsu S13360-1325CS (57.28V)

Photosensitive area: 1.3 x 1.3 mm, Pixel pitch: 25 μm , reduced crosstalk and dark count,

Gain (typ.) - 7.0×10^5

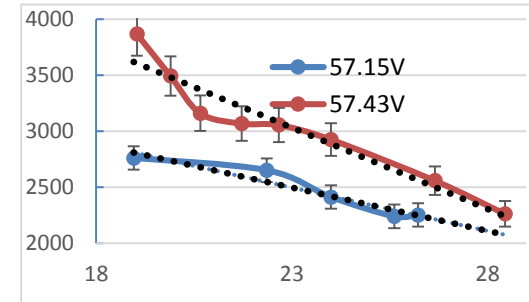
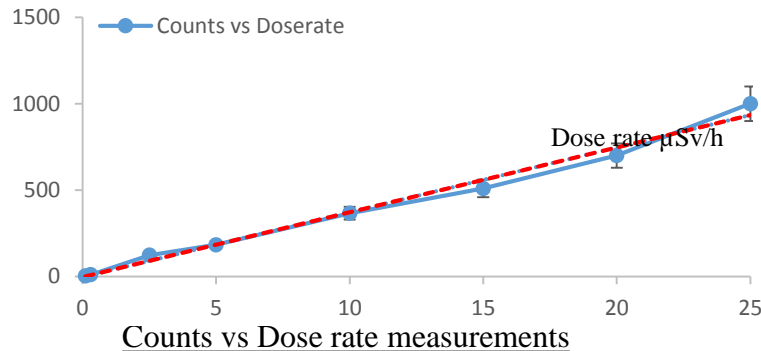
Scintillator

- $250 \times 10 \times 7 \text{ mm}^3$, extruded polystyrene bar supplemented with 1.5% paraterphenyl (PTP) and POPOP 0.01%;
- 30-100 micron layer Uniplast acting as a diffusive reflector;

- Light shifter WLS Y11 KURARAY Φ 1 mm

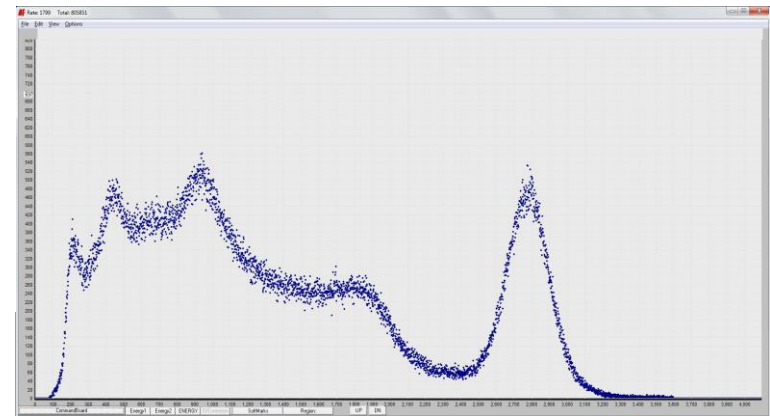
Preamp – simple 2 transistors charge sensitive ($RC = 22 \mu\text{s}$)

Amplifier - Canberra 2024, shaping 2 μs , ADC – 4k, custom made



Temperature dependences for two SiPM voltages

2. DRM with a NaI(Tl) scintillator and photomultiplier FEU-35 was assembled at INRNE for the test. The spectra of Caesium-137 measured with it is shown on the plot:



Plan to test at Gif++ in 2019:

The light yield and decay time for NaI and plastic scintillators differ significantly. The test and comparison between these 2 DRM's at Gif++ (from 10 to 10000 mGy/h) could give an information for the possible use of the DRM's at substantially different dose rate conditions.

