Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali di Frascati

LEMRAP
Laboratory for Environmental and Medical RAdiation Physics

# EyeRAD

State of art Frascati

10-3-25

# Air Monitor System

LEMRAP
Laboratory for Environmental and Medical RAdiation Physics

INFN
Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali di Frascati

- AMS is located at 5.8 m from the offices' windows and 4 m from our laboratory
- Noise level is not producing discomfort to colleagues
- AMS parameters acquired through the company's software




# Dectector

LEMRAP
Laboratory for Environmental and Medical RAdiation Physics

INFN
Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali di Frascati

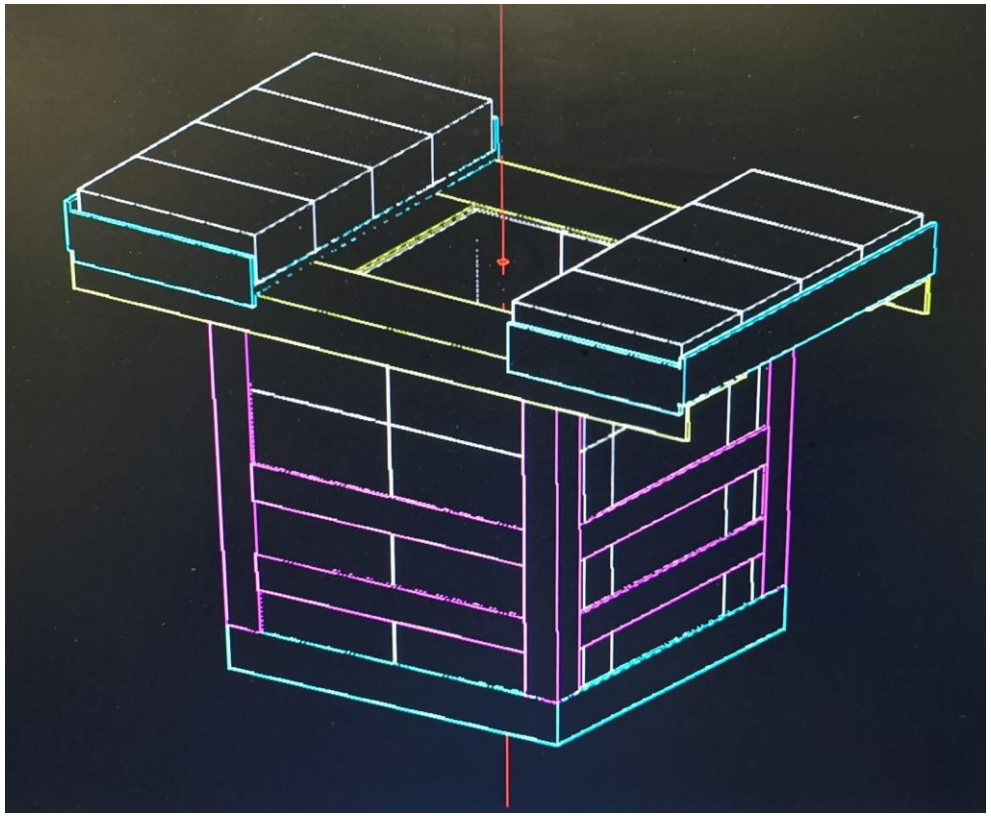
- Initial idea: use a 2” $LaBr_3(Ce)$ already in use for another experiment due to the attractive resolution (3% @ $^{137}Cs$)
- $LaBr_3$ assembled and tested in December 2024, but we realised that the intrinsic background from Lanthanum self-irradiation and (quite high) Actinium contamination requires too long measurements to detect expected air pollutants at reasonable level
- Much better performance were observed using a 3” NaI(Tl)
  - Resolution 5% @ $^{137}Cs$
  - Higher efficiency

# Shielding

LEMRAP
Laboratory for Environmental and Medical RAdiation Physics

INFN
Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali di Frascati

- Based on EYERAD support, a low background shielding was designed with decreasing Z layers (Pb – Cu)



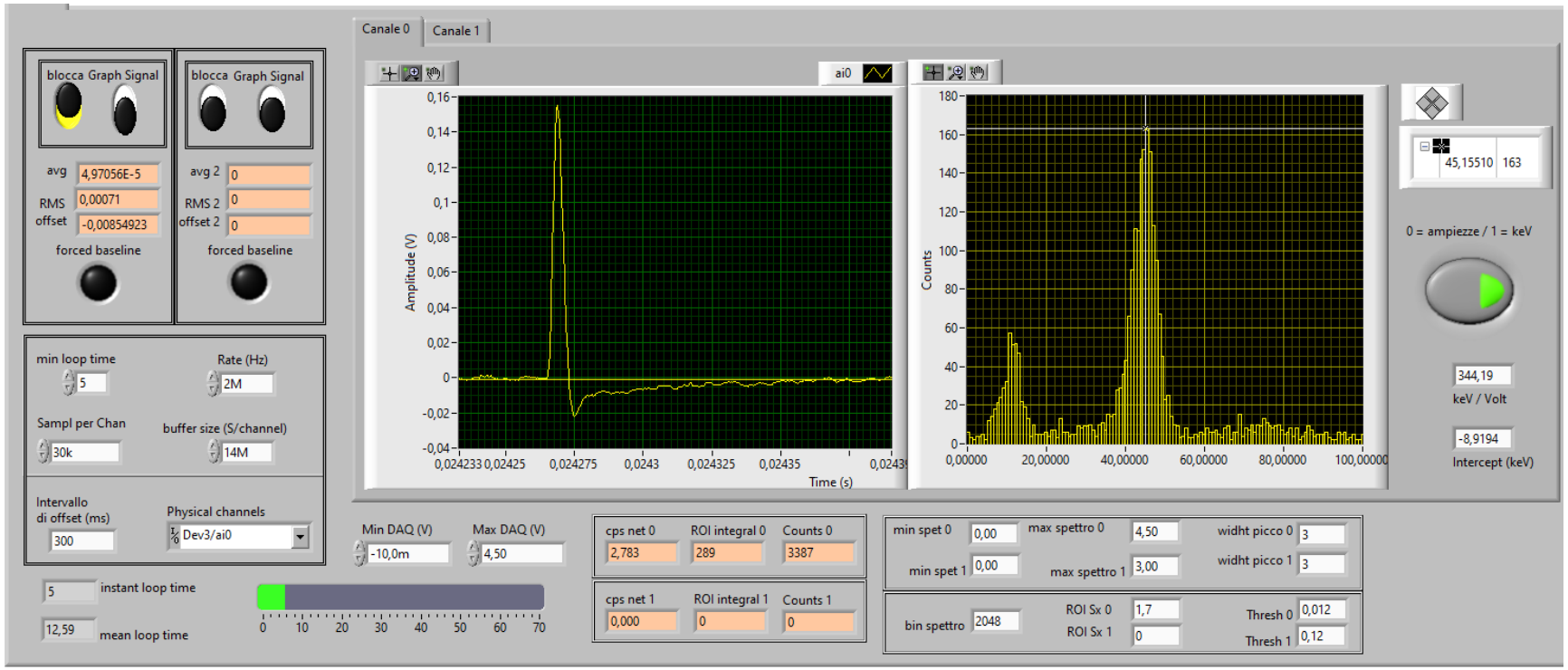
- 10 cm Pb in all directions except from the sliding aperture (5 cm)
- Internal volume 30x20x20 $cm^3$
- Expected delivery April 25

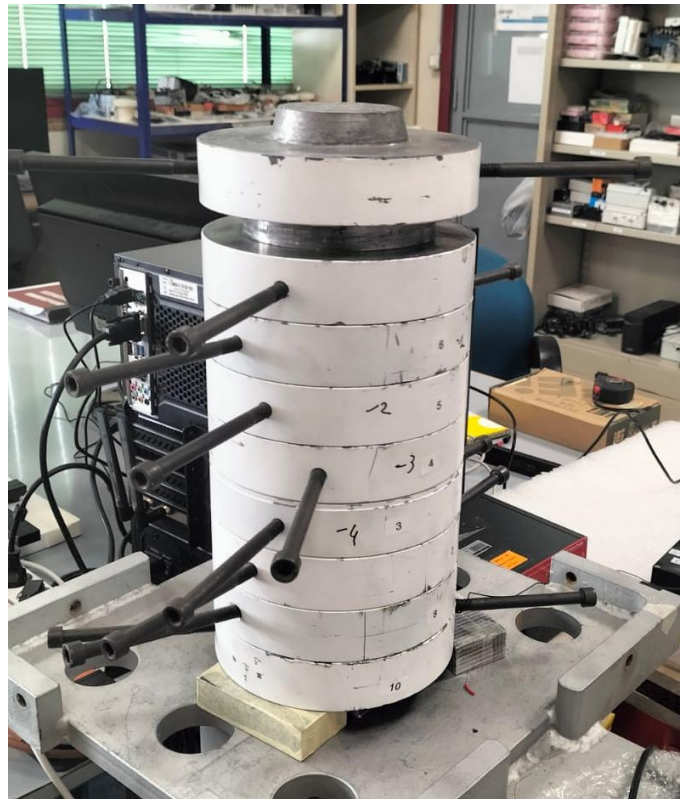
# State of art (March 25)

LEMRAP
Laboratory for Environmental and Medical RAdiation Physics

INFN
Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali di Frascati

- Temporary shielding (5 cm Pb)
- Customised analogue electronics very low noise (0.7 mV RMS)
- Customised DSP (Labview) showing real-time waveform



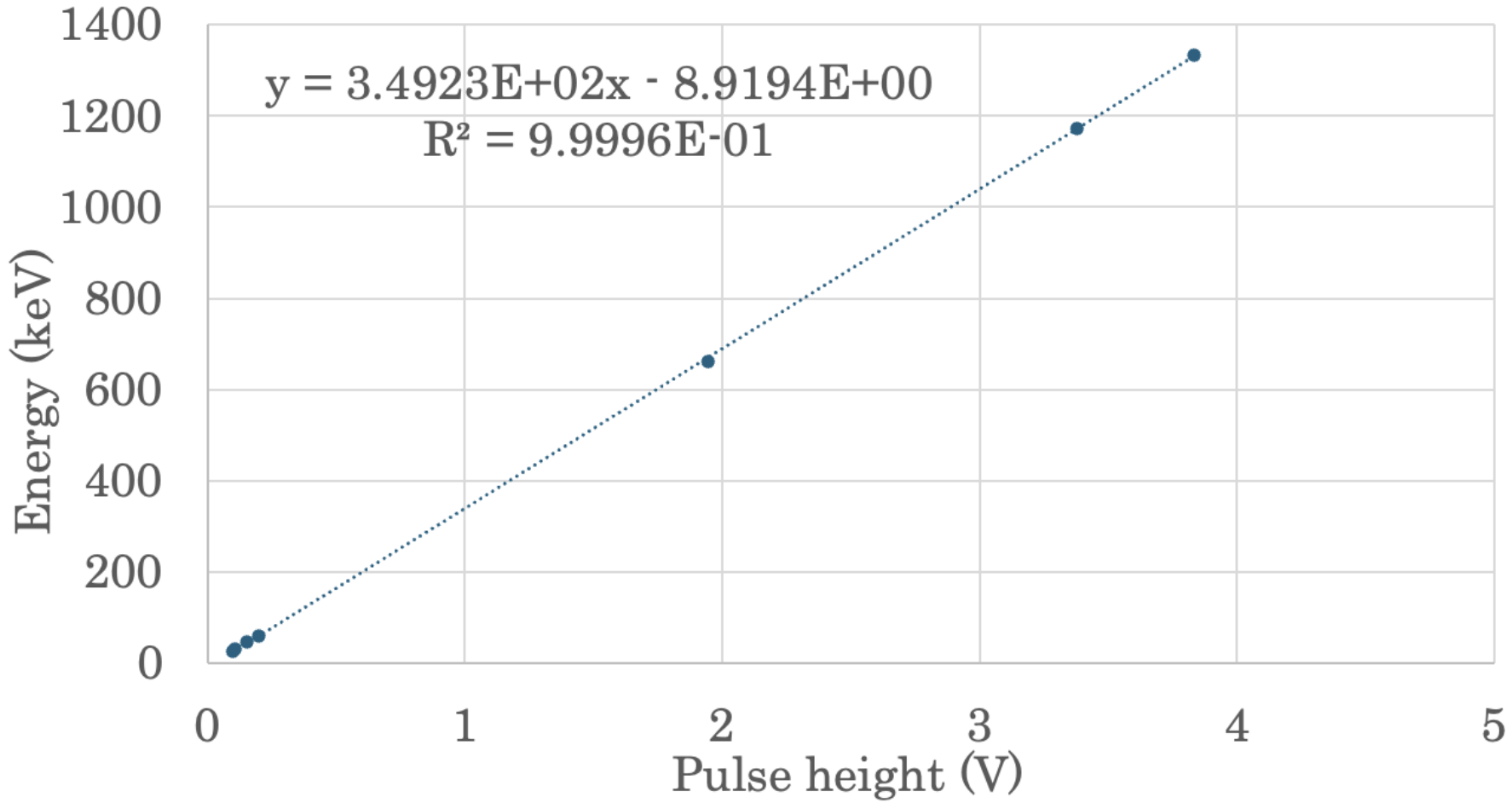



# State of art (March 25)

LEMRAP
Laboratory for Environmental and Medical RAdiation Physics

INFN
Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali di Frascati

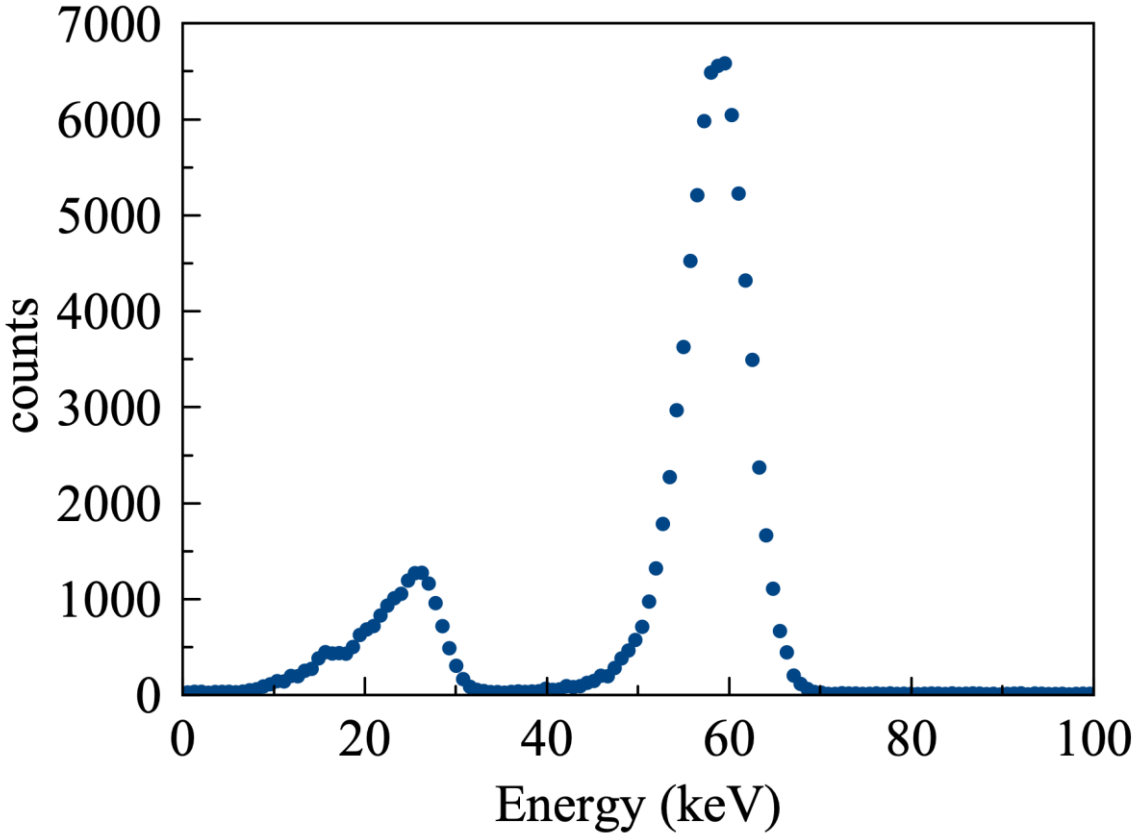
Very linear response  10 keV - 1.7 MeV



# State of art (March 25)

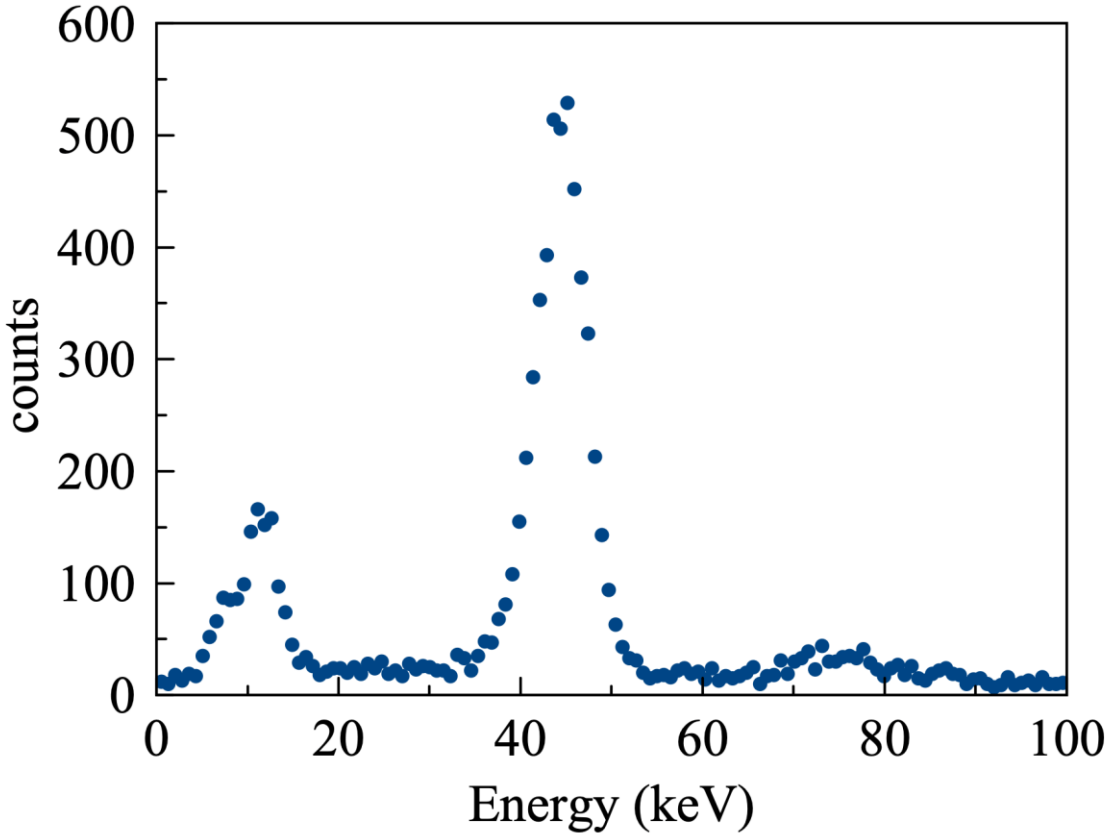
LEMRAP
Laboratory for Environmental and Medical RAdiation Physics

INFN
Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali di Frascati




$^{241}$Am

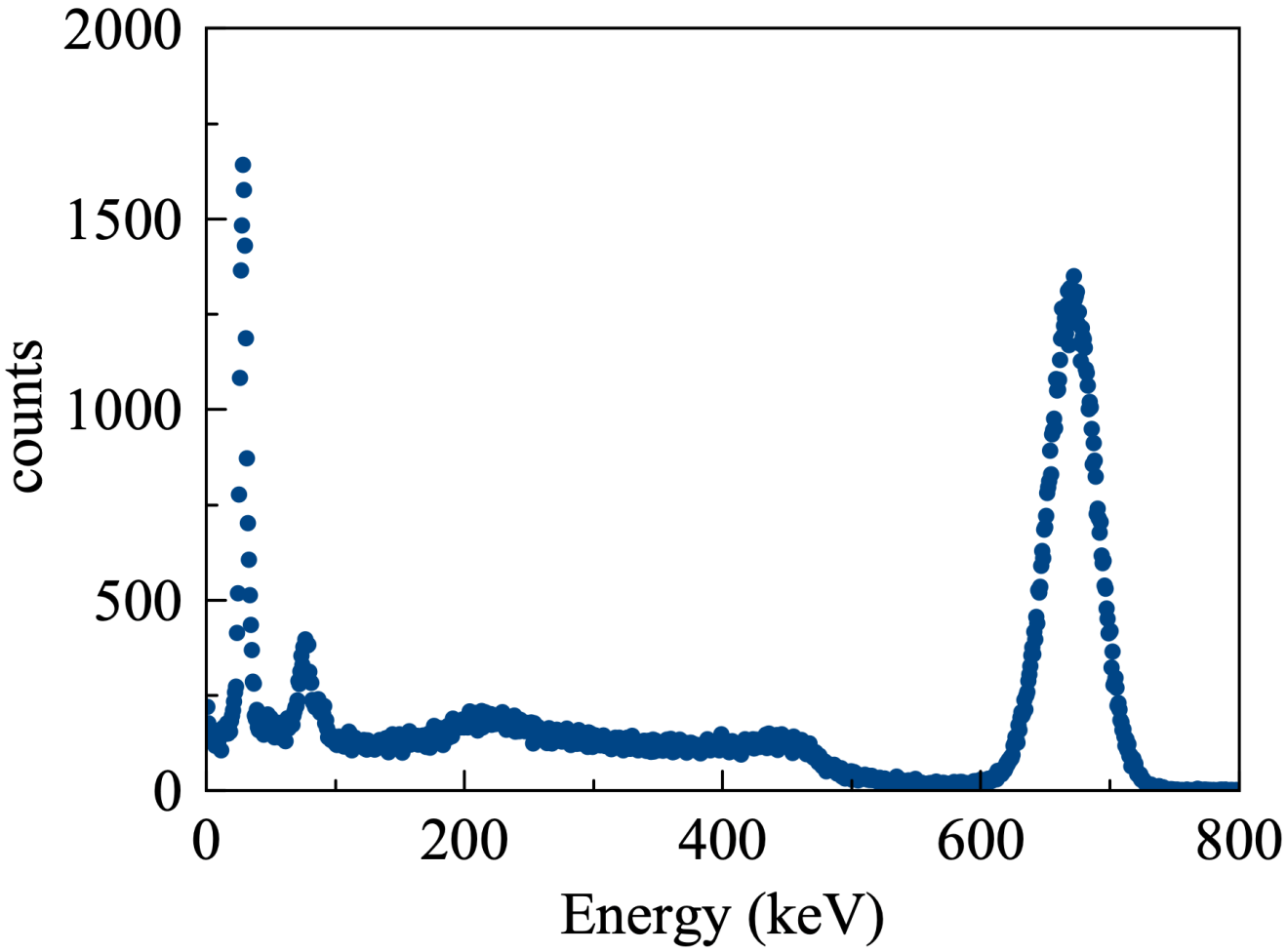
(59 keV & associated X-rays)




$^{210}$Pb

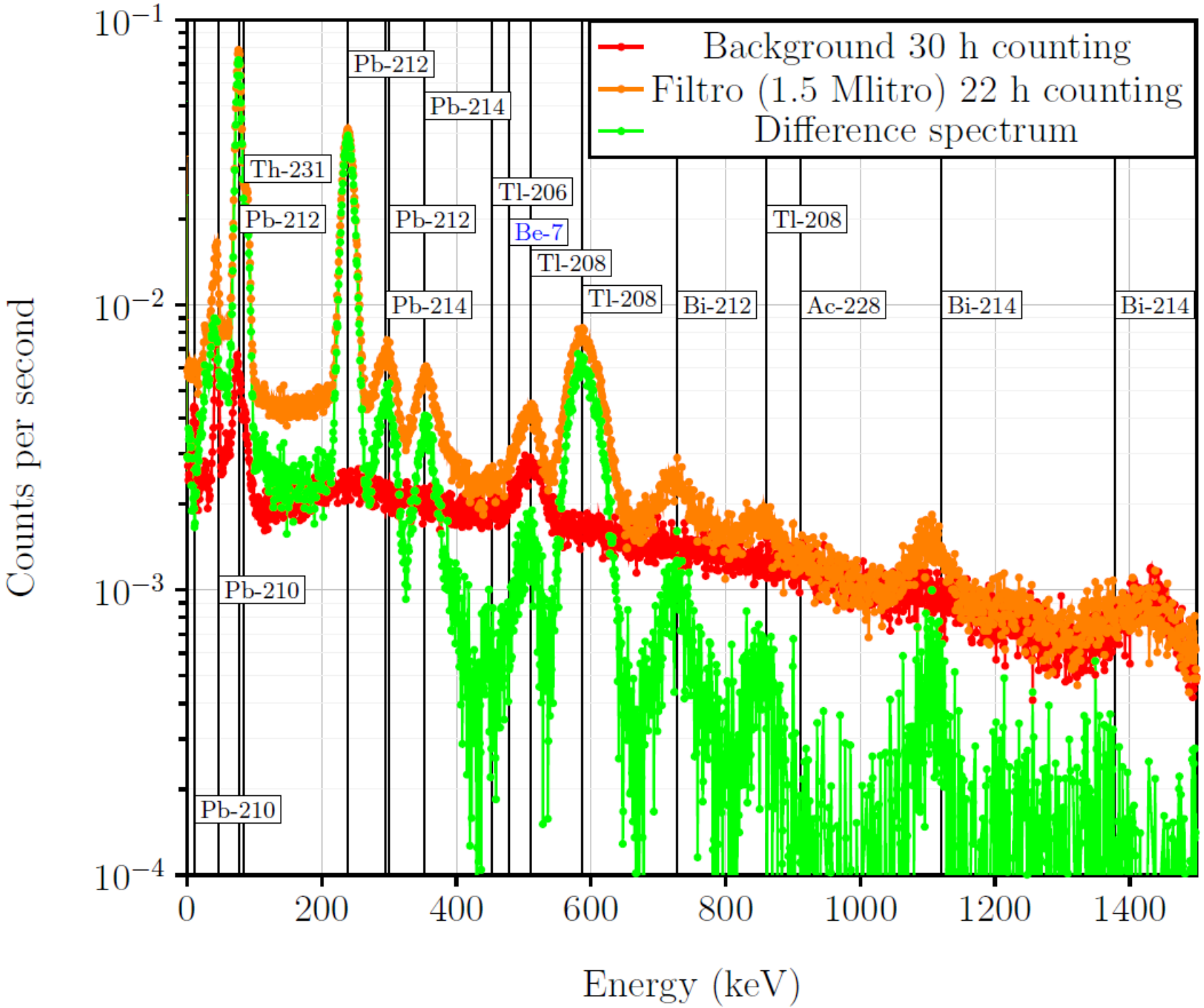
(46.5 keV & associated X-rays)

# State of art (March 25)




$^{137}Cs$

(662 keV, Lead and Barium X-rays)




LEMRAP
Laboratory for Environmental and Medical RAdiation Physics

INFN
Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali di Frascati

Air filter

- 144.5h·170 lpm
- 1.5 Mlitro
- 1 filtro/settimana (per ora)