Theremino **System**

Rap47

LEG (Low Energy Gamma) detector

Rap47

Here are some tests with the new probe LEG (Low Energy Gamma) Rap47 kindly donated by George (GEO Electronics)

The probe is very well done, light and well finished to detail, combined with the thin aluminum window and 1 mm crystal scintillator is very sensitive to low energies, the probe is also suitable for XRF analysis.

*The probe RAP 47 with the Theremino PMT ADAPTER, low noise power supply*

Construction and characteristics

Detail of the head, note the thin layer of aluminum.

Specifications

- **Type** CsI (Tl) (Cesium Iodide doped with Thallium)

- **Dimensions** Diameter 25.4 crystal thickness 1.0mm

- **Energy detected** Range 8 keV to 1 MeV

- **Typical power consumption** 100% at 47keV, 80% to 100 keV

- **Construction of the probe** Anodized aluminum. Length 19 cm, diameter 3.8 cm

- **Operating Temperature** from -25 °C to 40 °C

- **Operating Humidity** from 0 to 90%

- **Weight** 178 g
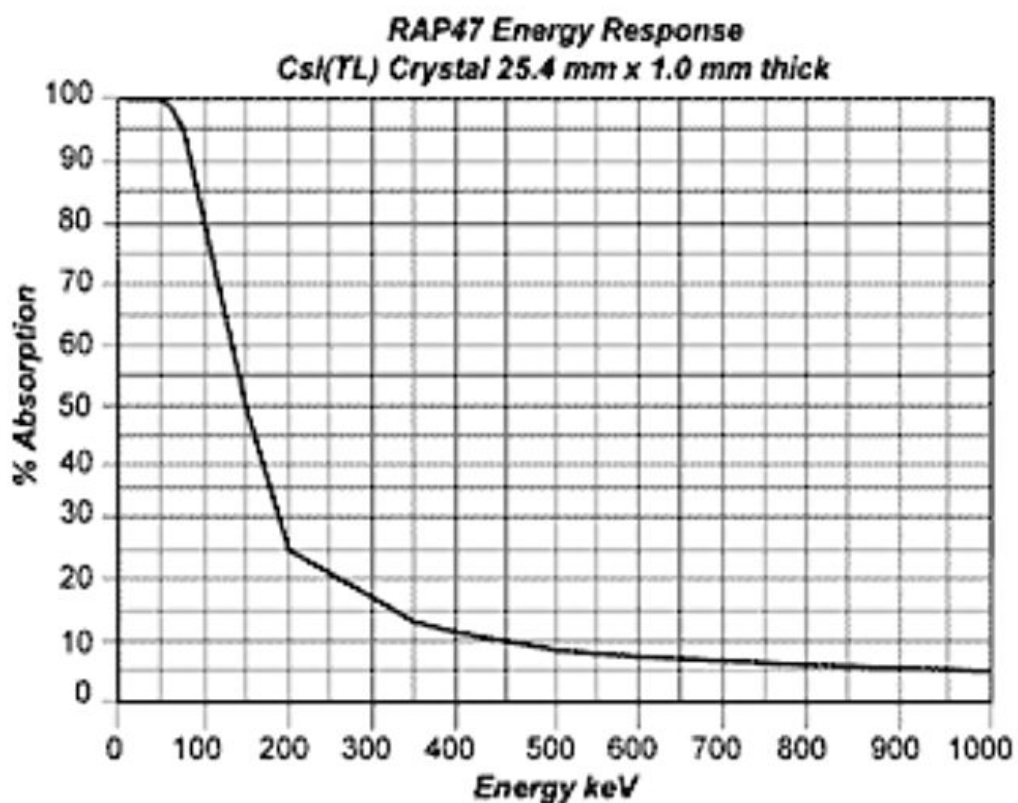
Percentage of adsorption at different energies.

Testing a key to Tritium

In the market there are a luminescent keychain (beta light) inside the glass vial filled with tritium gas, these gadgets have a very low emission and does not represent a danger to those who use them, our aim is to demonstrate the effectiveness real probe in reading the low energy range.

Normally the Tritium gas (H3) has an emission exclusive of Beta particles, the energy of these particles is 18.6 Kev. Precisely for this energy very low beta particles are shielded from both, glass vial and plastic key ring.

Despite all by making a measurement with the probe RAP47 is unable to detect a discrete peak at 18 Kev, due to the braking radiation (bremsstrahlung) Beta particle on glass ampoule.

These low-energy X-rays, are difficult to detect with standard Geiger Muller tubes or scintillators is require very thin mica pancakes or scintillators with thin windows.
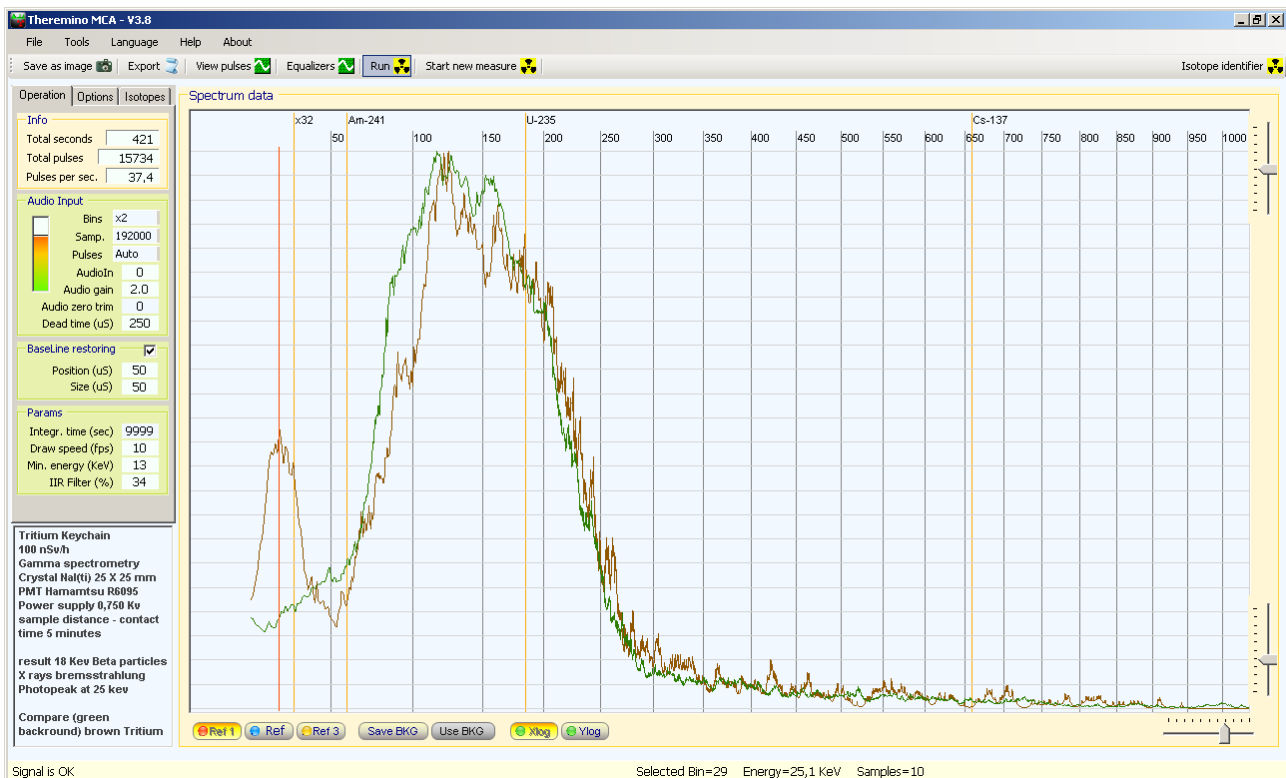
The probe Rap47 being designed for just this purpose does this job excellently.

Tritium Keychan
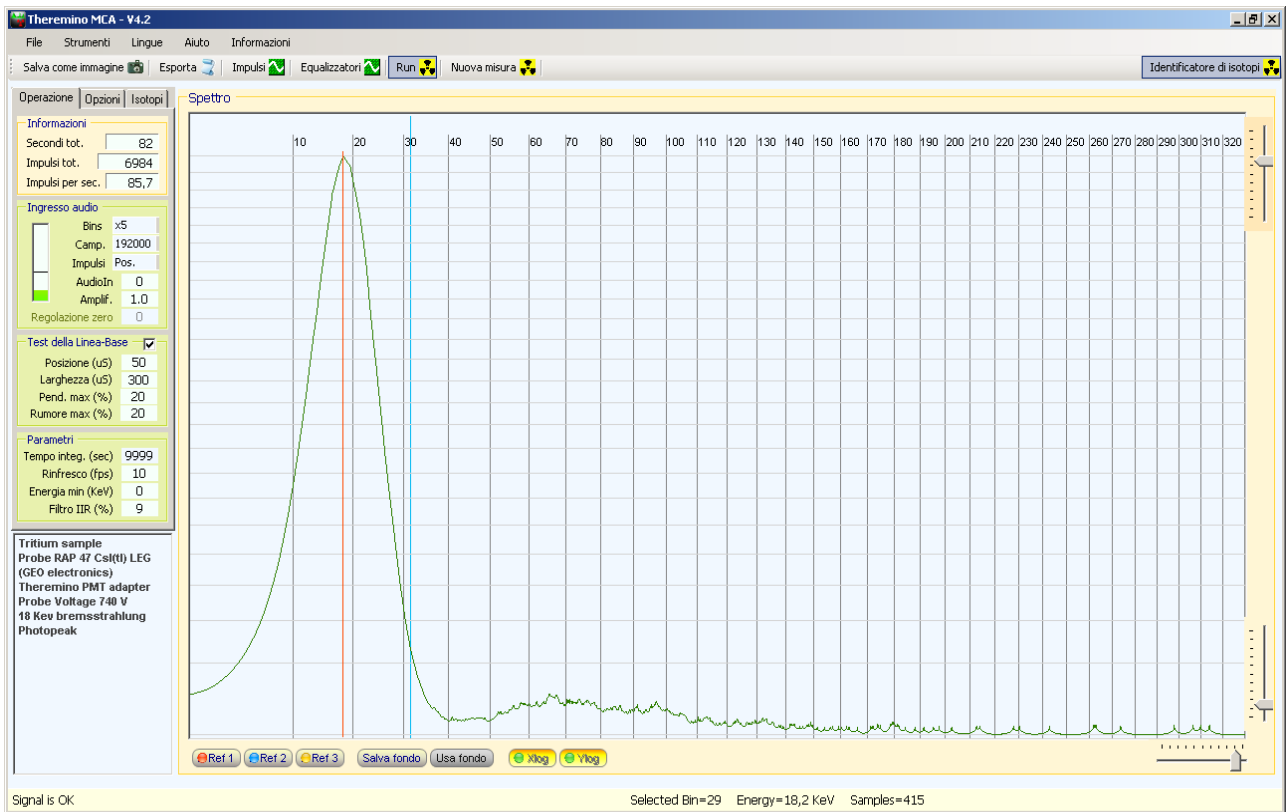
Tritium keychain test, is evident 18 Kev photopeak, note the absence of background at right side

The same test carried out with a probe NaI(Tl) from 25 X 25 mm can be seen the peak at the left smaller than the previous test and the bottom (green line)

The ionization smoke detectors

In ionization smoke detectors can find a small radioactive source. It is generally used Americium-241 with an activity less than microcuries.

The source emission is mainly Alpha, these particles are completely shielded from metal casing .


Ionization smoke detector

At the left side ionization chamber that protects access to the radioactive source

Test smoke detector with RAP47

Together with Alpha particles (not detectable from the outside) it is possible to detect an emission range that is much lower as a percentage Alpha particles contribution.

The Americium-241 in fact has two main emission range at 59 and 26 Kev, with this probe can detect very well.
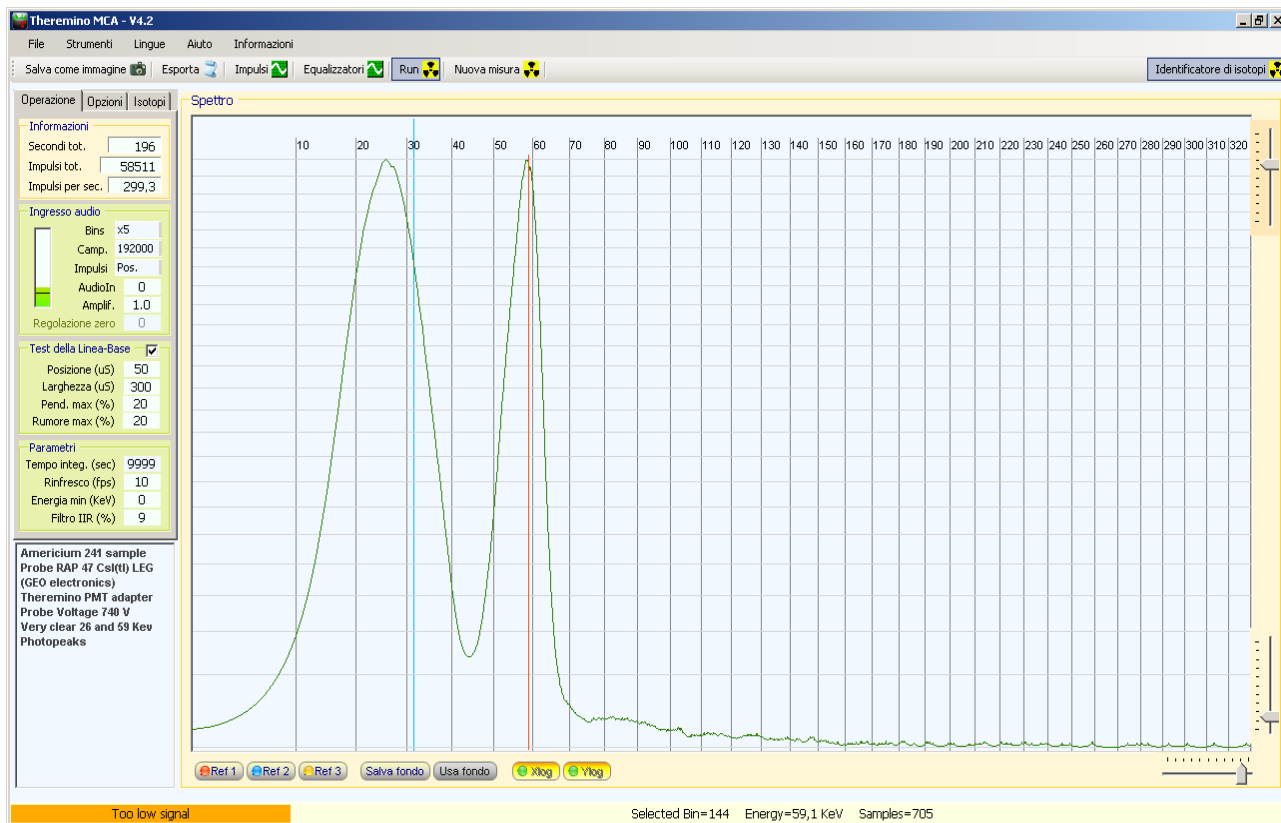
*Here is the result of the measure, are evident 26 and 59 Kev photopeaks*

Test smoke sensor probe with NaI (Tl)
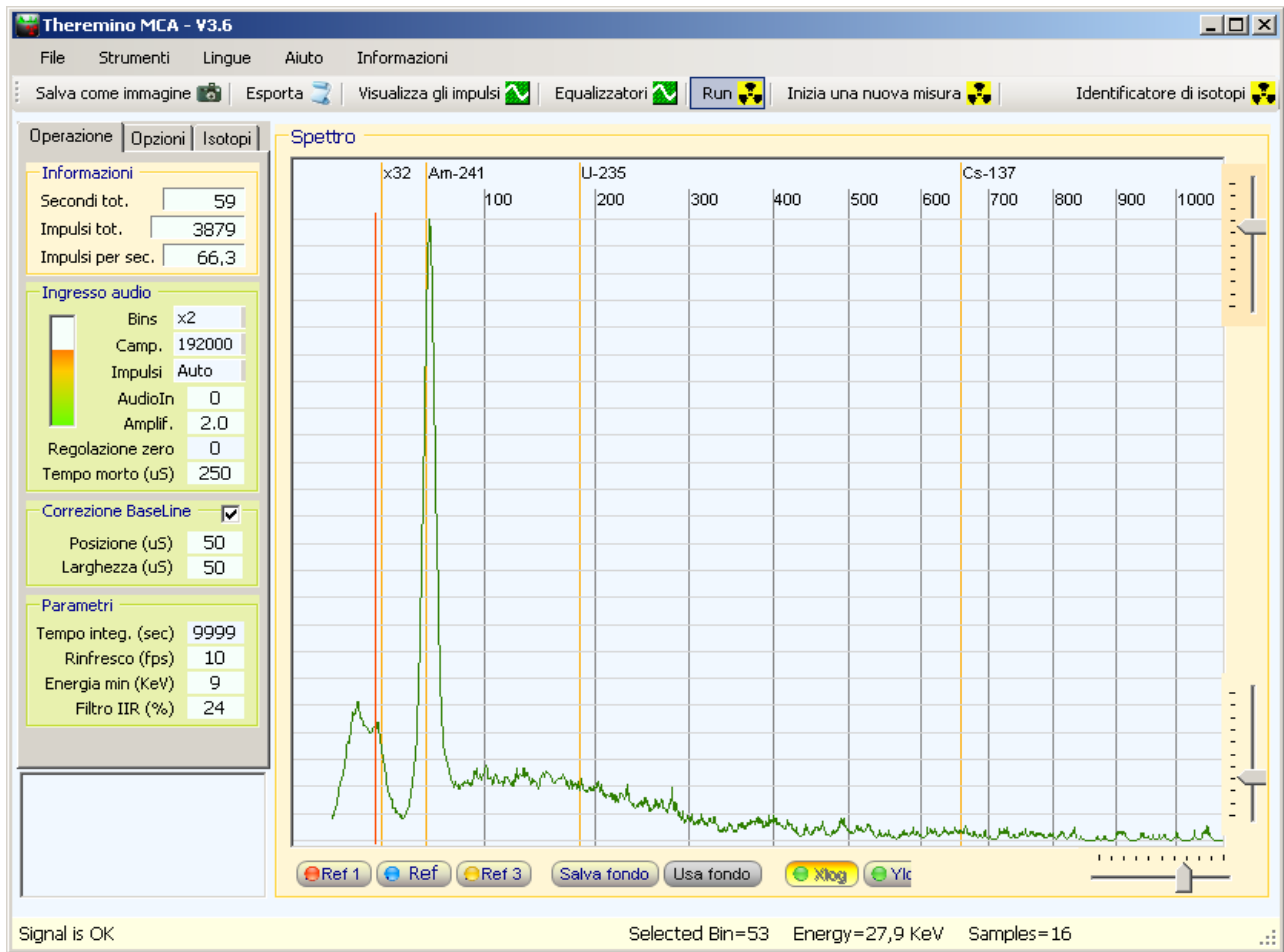
Same test probe with NaI (tl) 25 X 25 mm can be seen the peak at 59 but 26 Kev is very low.

Discharger Spark Gap tubes with traces of cesium-137

The Spark Gap valves are used for limit high voltages peaks, in fact are used in radar systems or installations where it is necessary to limit the voltage, these components are manufactured under vacuum in order to facilitate the arc an electrode is covered with a radioactive material, generally Radium-226 is used but it is also common cesium-137.
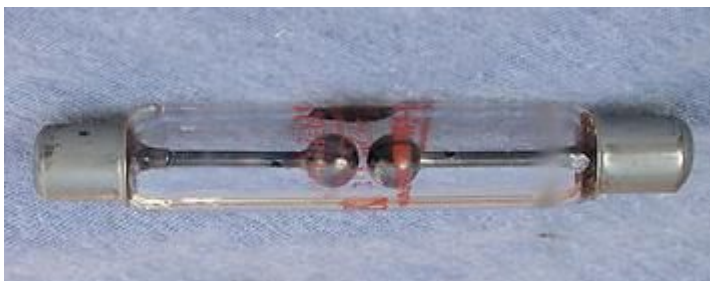
Spark gap Valve ,note the Cs-137 (dark spot) inside the glass.
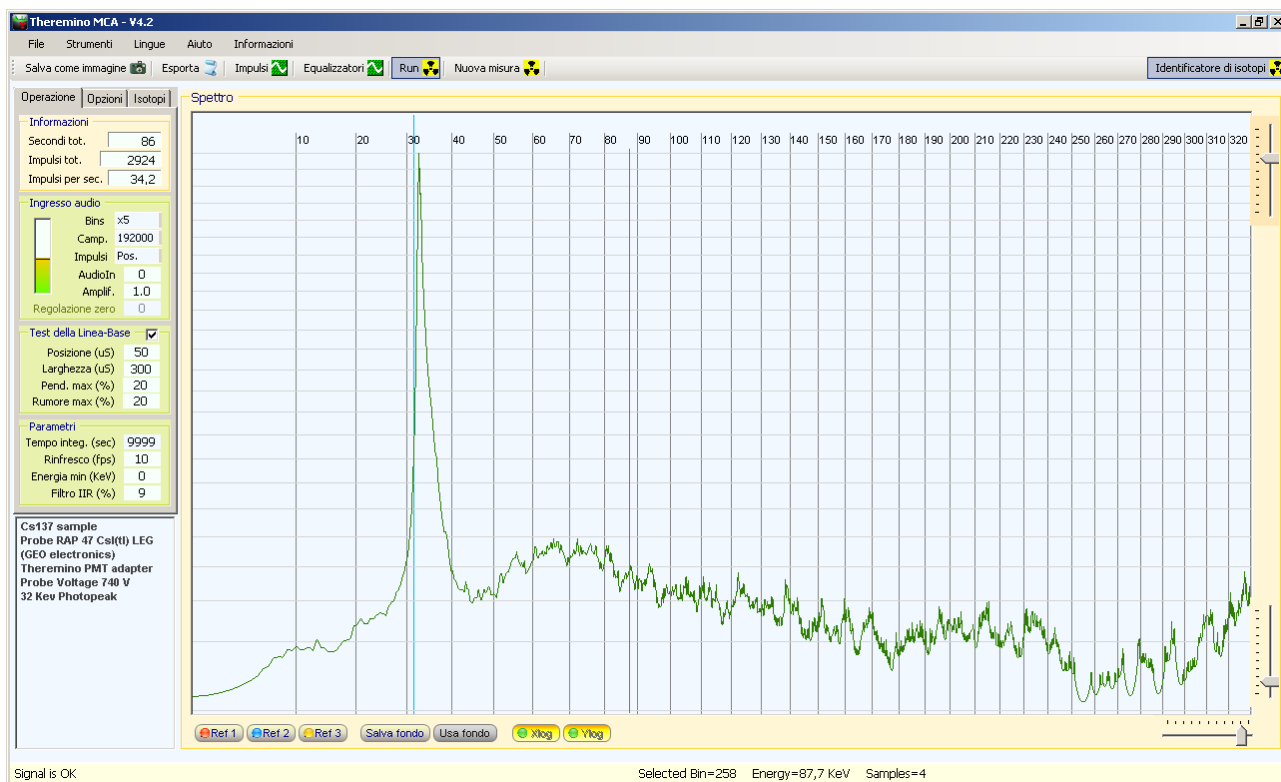
Here the result of the test is evident the photopeak to 32 Kev, RAP47 probe has a very high absorption factor on the low energies (lower than 50 Kev) but is not very sensitive to medium to high energies.

It is for this reason that the characteristic photopeak at 662 Kev is relatively low in this test was deliberately ignored.