

*Logistic, Consulting & Management for α - β - γ -ray Spectrometry and for Radiation Protection.
Reference Systems and Software Packages for In Vivo, In Vitro and In Situ Applications.
Virtual Modelling and Simulation of Real Scenarios.*



ULLS-02

Ultra Low-Level γ -Spectrometer

- First ultra low-level system for ground (sea) level
- Lowest limit of detection levels in the shortest measuring time
- Based on a new design using the ISuS detector-sample-shielding technology

We have committed all of our experience in Spectrometry as well as all of our enthusiasm to realize systems which are „state-of-the-art“



ULLS-02 Ultra Low-Level γ -Spectrometer

Description

Ultra low-level background in vitro γ -spectrometers (ULB) are designed for the direct assessment of extremely low sample activities (contaminations), e.g., environmental samples. As an important element in the field of radiological protection, the evaluation of low radiation activity requires the best lower limit of detection. The measured spectra are mainly influenced by the construction of the spectrometer, i.e. the detector, the shielding, the sample and the detection geometry. To achieve the lowest limit of detection LLD (or MDA) in the shortest possible counting time we have to consider and optimize not only the basic radiation sources, the radiation detectors, and the shielding techniques but also the radiation interaction.

The concept and performance of our ULB spectrometers are designed to achieve results approaching those measured with spectrometers in underground laboratories - but at ground level - thus enabling the comfort of a ground level laboratory with fast and easy sample changes allowed by easy access to the sample measuring chamber of the lead shield.

To achieve such state-of-the-art spectrometers, our design for ULB spectrometers takes into account:

firstly the origin of the different background contamination and signals,
secondly the different types of background sources and radiation and
thirdly latest methods for background suppression and signal selection.

It closes a gap in measuring technique!

Most underground laboratories are designed to achieve the lowest limit of detection and best sensitivity for lowest activity sample measurements in field of research application.

With our design

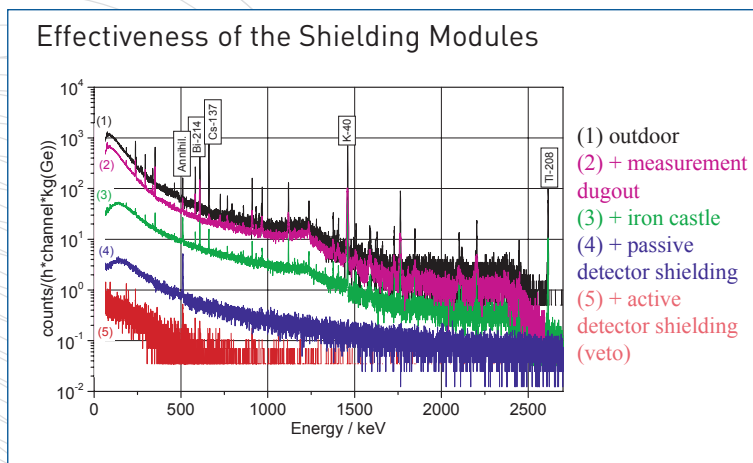
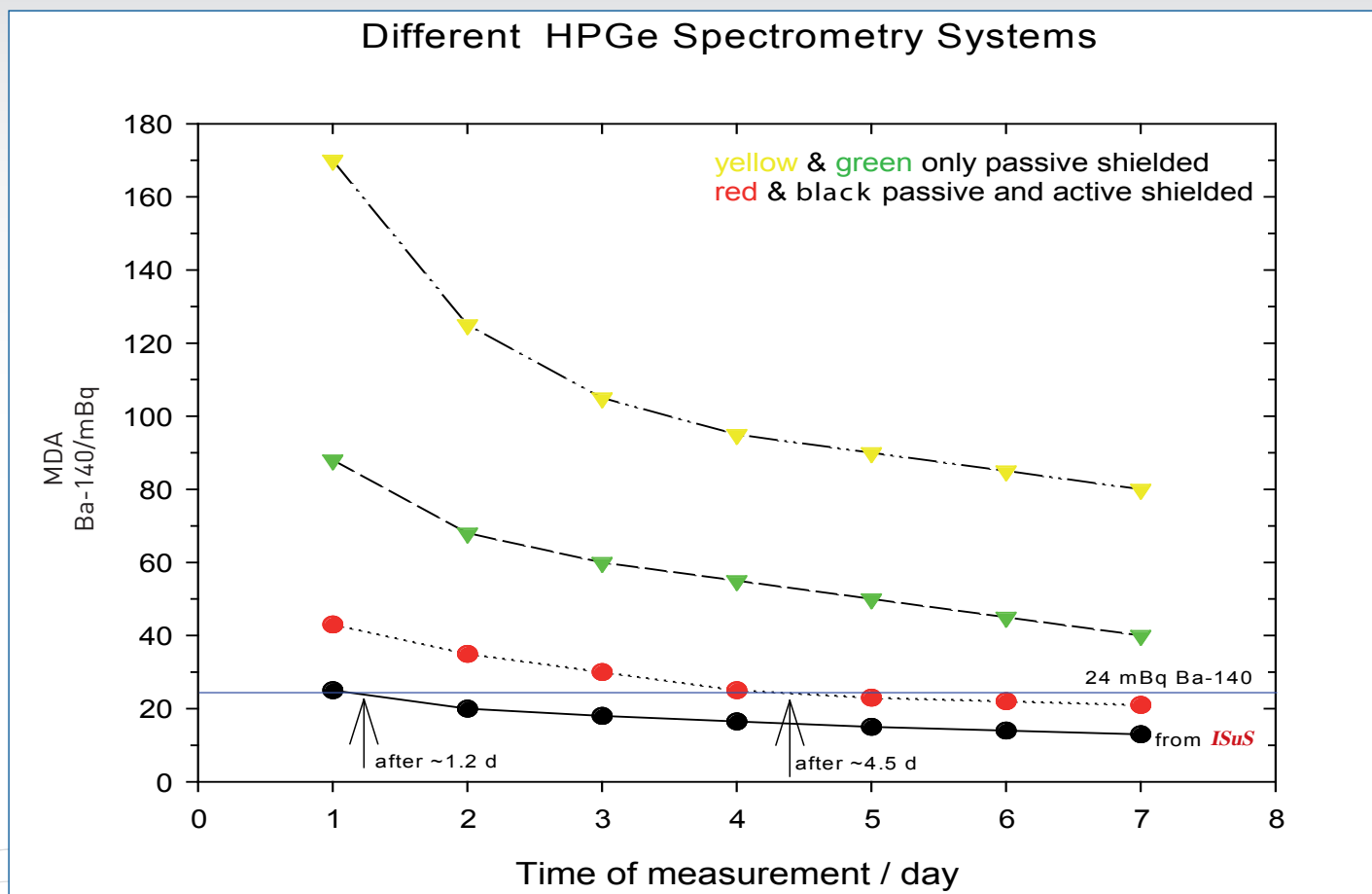
small LLD's, normally are only achievable in underground research laboratories can now easily be achieved at ground level for routine applications.

Therefore existing standard infrastructures can be used to

obtain effective savings in time and costs through minimal preparation and handling expenditure, due to the **ISuS** design.



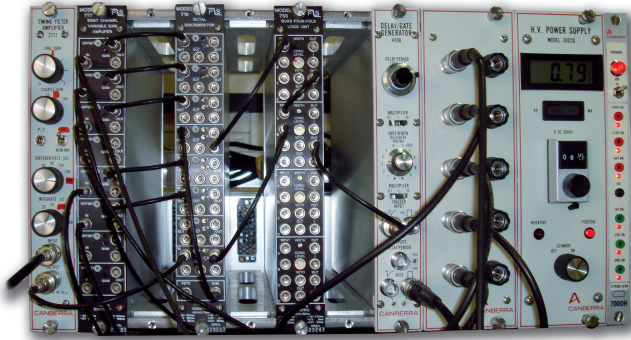
Review the results example



Time is Money!

As an example of minimum detectable activity (MDA), the CTBTO laboratory criterion of 24 mBq ^{140}Ba (in 7 days measuring time) will be achieved with our design of ULB γ -spectrometer systems installed on ground level laboratories in lower than 1.2 days (black line and dots).

Our systems are the current world wide reference at ground level and comparable with underground laboratory systems.



ULLS-02

Ultra Low-Level γ -Spectrometer

Performance

ULB HPGe γ -Detectors

- Large coaxial crystals
 - Large planar crystals
 - Ultra low background (ULB) version
- Efficiency: from 60 % up to 150 %
Diameter: 5, 7, 8 cm; Thickness: 1.5, 2, 3 cm

Sample Geometry

- Large coaxial crystals
 - Large planar crystals
- Optimal for Marinelli beakers and big bottles
Optimal for point & filter sources & Petrie shells

Spectrometry Electronic, Hardware and Software

- State-of-the-Art digital spectrometry electronic
- High performance PC system
- Perfect analysis software solution

ULB Sandwich Shielding Design

- Excellent passive sandwich lead shield for photon absorption
- Highly efficient shield for secondary neutron reduction
- State-of-the-Art veto-shield to separate cosmic particles (including electronics)

Additional

- Installation
- Training
- Handbooks

Typical Results

For a 60% n-type ULB HPGe-detector as an example:

The total background reduction ratio

- is close to **1.000**

The typically background count rate

- is **0.15** down to **0.05 cps/kg Ge** for big detectors

over the energy range 40 keV – 2700 keV

The separate shielding factors for

- ^{137}Cs , ^{214}Bi , ^{208}Tl -approximately **4.000**
- ^{40}K > **6.000**
- annihilation radiation > **100**