



Strategic Development European Underground Labs



Currently Working Members

Underground Labs

LNGS, Ezio Previtalli and Aldo Ianni (also in APPEC JS)

LSC, Carlos Peña Garay (also in APPEC GA and JS)

LSM, Jules Gascon; **LSBB**, Ignacio Lázaro

Boulby, Sean Paling

CallioLab, Julia Puputti

VIRGO, Massimo Carpinelli

Institutions:

Germany: Daniel Bemmerer (Felsenkeller). **Portugal**: Cristina Maria Bernardes Monteiro (LIBPhys-UC). **Romania**: Alexandru Gherghel-Lascu (IFIN-HH). **Poland**: Leszek Roszkowski (Copernicus Astronomical Center); Grzegorz Zuzel (Jagiellonian University). **Czech Republic**: Ivan Stekel (Technical University Prague); Marie Davidková (National Radiation Protection Institute). **Ukraine**: Fedor Danevich (Institute for Nuclear Research). **Slovakia**: Fedor Simkovic (Faculty of Mathematics, Physics and Informatics, Bratislava); Martin Plesch (Institute of Physics, Bratislava). **Serbia**: Dejan Joković (Institute of Physics Belgrade)

GOALS

establish a robust **cooperation and coordination in key services**

establish a **European trans-national (TA) access** policy

coordinate existing facilities to support research by a **Virtual Coordination Office**

coordinate ULs strategy for **future investments**

ACTIONS

1st common Workshop at LNGS in 2022

Joint participation in EU calls (APOGEIA, ...)

NEW. Joint proposal submitted to 2023 COST Action

NEW. Coordinated activities by ULs worldwide

- Frontiers: Science and Technology in ULs

- Dedicated Session to ULs coordination in TAUP 2023 meeting.

NEW. Establish TA and Research Coordination agreements between Laboratories. First step by LNGS and LSC.



Agreement between LSC and LNGS (to be signed in July 2022)

Research Collaboration on low radioactivity services to match larger DM and 2b experiments
and
Transnational Access to LNGS and LSC staff and collaboration members

New HPGe service **underground** at $\mu\text{Bq/kg}$ level (LSC, LNGS)

New ICP-MS service **underground** at **ppq** level (LSC)

Additive manufacturing: New Cu e-forming, atomizing, and printing (LNGS, LSC)

New **cryogenic infrastructure** for superconducting circuits and testing new bolometers (LNGS, LSC)

New SiPM based photodetector **assembly facility** (LNGS)

High purity **crystals development** underground (LSC)

Radon abatement and Radon emanation services (LNGS,LSC)

Cosmic Silence **Biology Platform** (LSC)

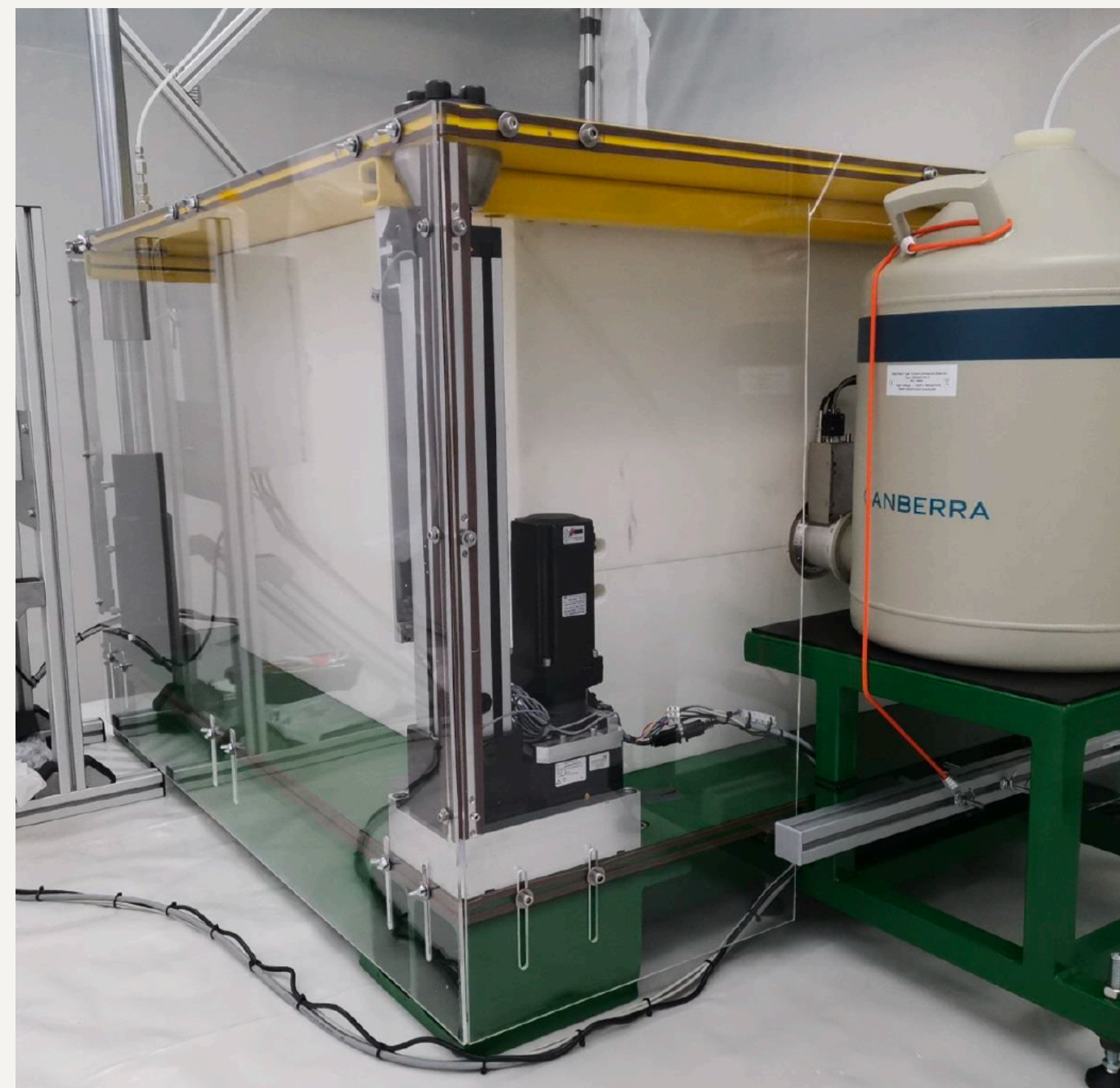
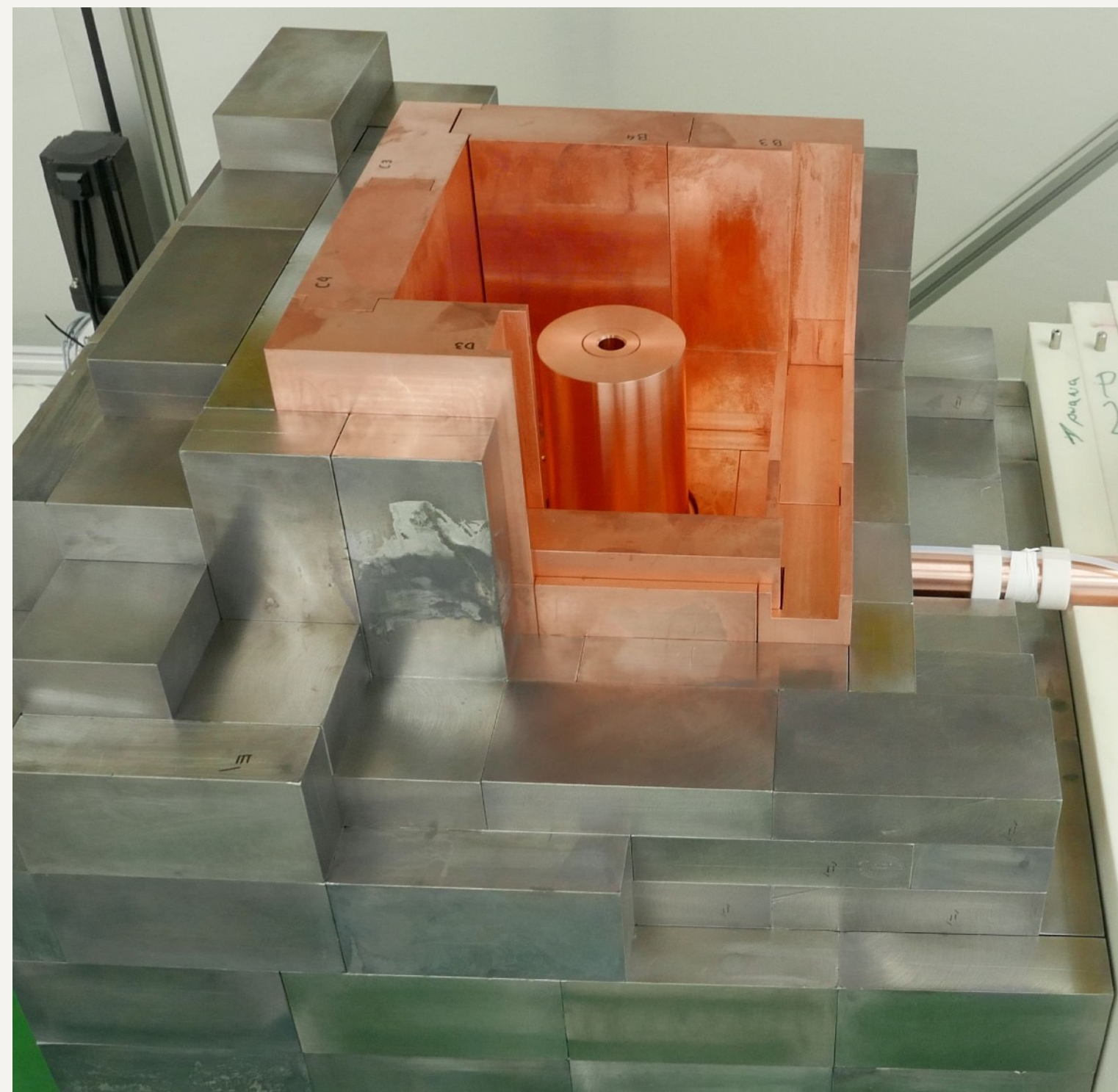


UJ (Poland) & LSC (Spain) COOPERATION

Rysy is a mountain in the crest of the High Tatras, lying on the border of Poland and Slovakia. Rysy has three summits.

This project, led by G. Zuzel (UJ), started in early 2018, with the goal to reach $\mu\text{Bq/kg}$ sensitivity.

GeRysy is the **New** lowest background **record** in screening HPGe, with $1 \mu\text{Bq/kg}$ sensitivity, efficient for small samples.



Detector	M_{act} [kg]	V_{cham} [L]	Lab	in	
				40 - 2700	60%
GeRysy	2.27	15	LSC	64 ± 1	$74 \pm$
GeMPI	2.21	15	LNGS	66 ± 1	< 3
GATOR	2.20	15	LNGS	$103 \pm 1^*$	$99 \pm$
GeOroel	2.31	10 ?	LSC	179	190



Investments and Operation Costs for EULs

DUL	Infrastructures and services [M€]	Operational costs (infrastructures and personnel) [M€/yr]	Operational costs (infrastructures no personnel) [M€/yr]
Boulby	4.52*	1.5	0.7
CallioLab	0.1 (Clab)/2.5 (entire underground infrastructure)**	0.3	0.05
LSC	10.7*	1.4	0.6
LNGS	38.0*	13.6	5.4
LSBB	6.450*	770	122
LSM	0.7*	0.75	0.25
TOTAL	62.87	18.32	7.12

*Investments in new plants and facilities since 2017

**Research space is rented from mine reuse operator on a project-basis. Upkeep of entire underground infrastructure approx. 2.5M€, responsibility of mine reuse operator.

WHAT WE NEED FROM APPEC

1. Prioritize the European Underground Laboratories coordination (research in services and transnational access) within the APPEC strategy.
2. Active support from APPEC within the consortium and with EU Institutions. Prepare and present a dedicated portfolio on the EULs coordination project.
3. APPEC prioritization of this initiative in EU calls which may financially support this coordination:
 - ULs activities are 100% supported by its host country
 - Goals could not be reached unless significant EU support is obtained.

Laboratorio Subterráneo Canfranc



Broader ULs

