21.10.2021 GammaRay X -webinar

SCIENCE WITH ARCTIC ATTITUDE

Julia Puputti
University of Oulu
Kerttu Saalasti Institute

CALLIO LAB
Underground Center for Science and R & D

CALLIO LAB

Research activities coordinated by the Kerttu Saalasti Institute, University of Oulu

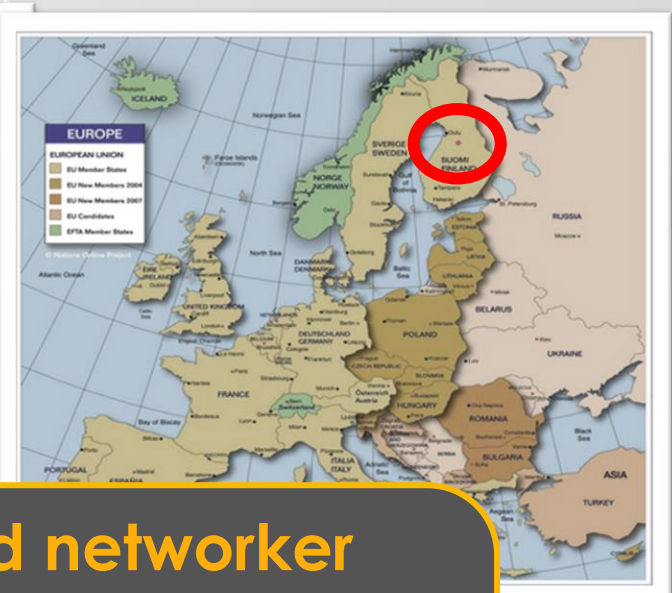
UNIQUE UNDERGROUND RESEARCH NETWORK AND INFRASTRUCTURE LOCATED AT THE 1.4 KM DEEP PYHÄSALMI MINE, PYHÄJÄRVI, FINLAND

POSTI-MINING ACTIVITIES COORDINATED BY CALLIO PYHÄJÄRVI

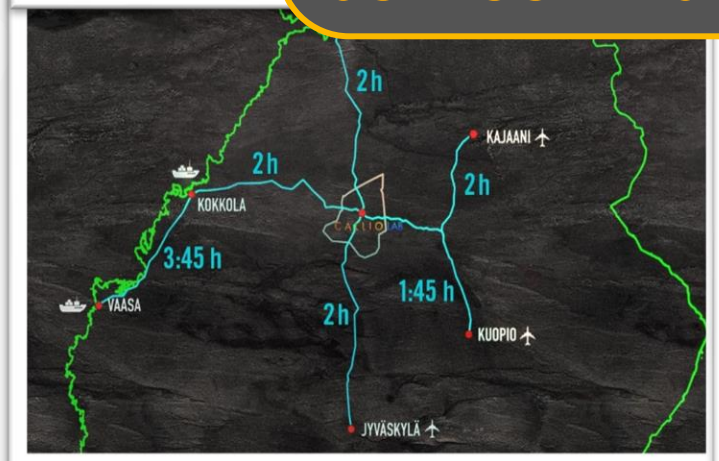
CURRENTLY SIX UNDERGROUND HALLS OR TUNNEL NETWORKS HAVE BEEN TURNED INTO MINE RE-USE FACILITIES: LABS

RESEARCH TOPICS INCLUDE:

- PARTICLE PHYSICS
- GEOTHERMAL ENERGY
- MINING & TUNNELLING
- UNDERGROUND OCCUPATIONAL SAFETY
- REMOTE SENSING AND MANY MORE



Gateway and networker between industry and research



UNIVERSITY OF OULU

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Multidisciplinary research infrastructure

- A EPOS RESEARCH INFRASTRUCTURE (ESFRI, 2020)
- A FIN-EPOS INFRASTRUCTURE (FIRI, 2020)
- A STRATEGIC RESEARCH INFRASTRUCTURE OF UNIVERSITY OF OULU
- MEMBER OF DULIA NETWORK
- FOUNDING MEMBER OF EUROPEAN UNDERGROUND LABORATORIES ASSOCIATION
- PROJECTS INCLUDE E.G. H2020 GOLDENEYE, EUL, INTERREG SPIN-OFF NEMESIS

Education and training

Mining & tunnelling

Mine reuse

Geothermal research

Working environment

Underground H&S

Future food & Underground farming

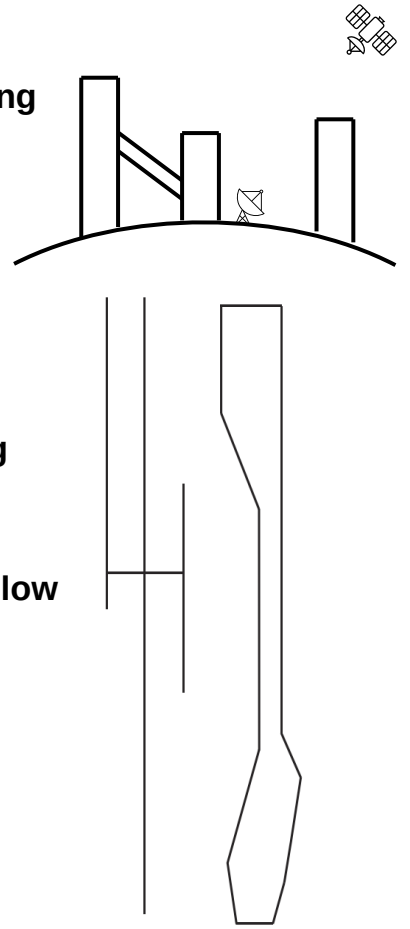
SpaceLab

Earth Observation and remote sensing

Deep underground low background facility

Particle physics

Something new?



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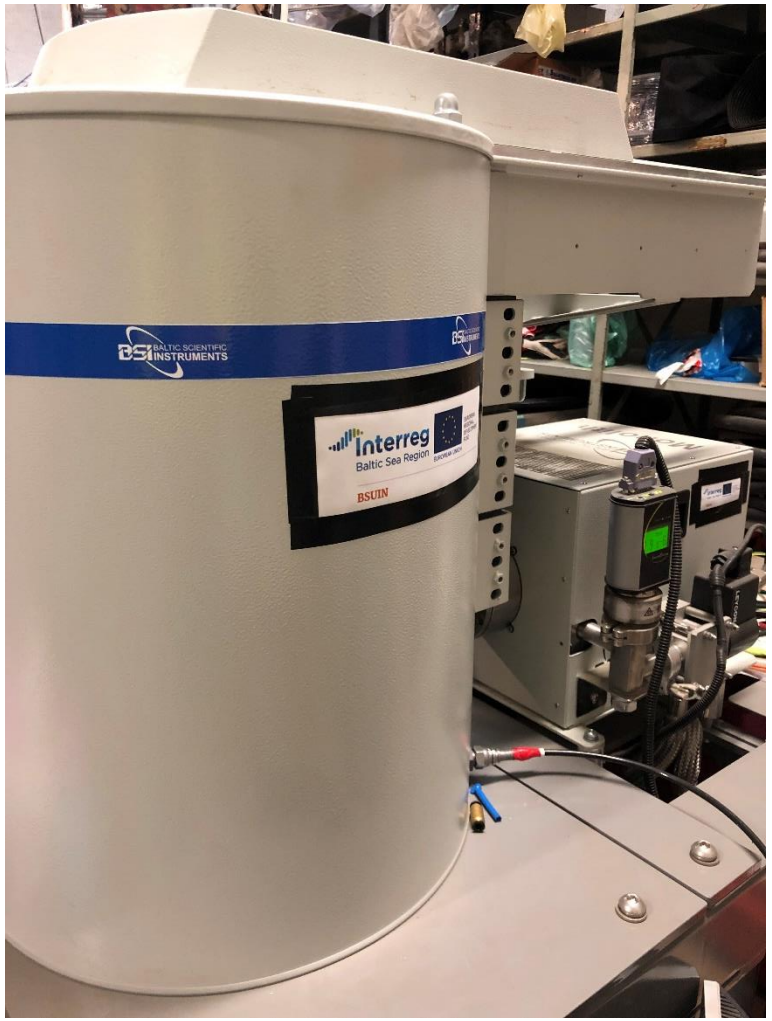
BSUIN project – continued by EUL



Baltic Sea Underground Innovation Network worked to make underground laboratories more accessible for science and innovation through methodically consistent geophysical, structural, organizational and ***natural background radiation characterization.***

Pilot measurement setup and methodology

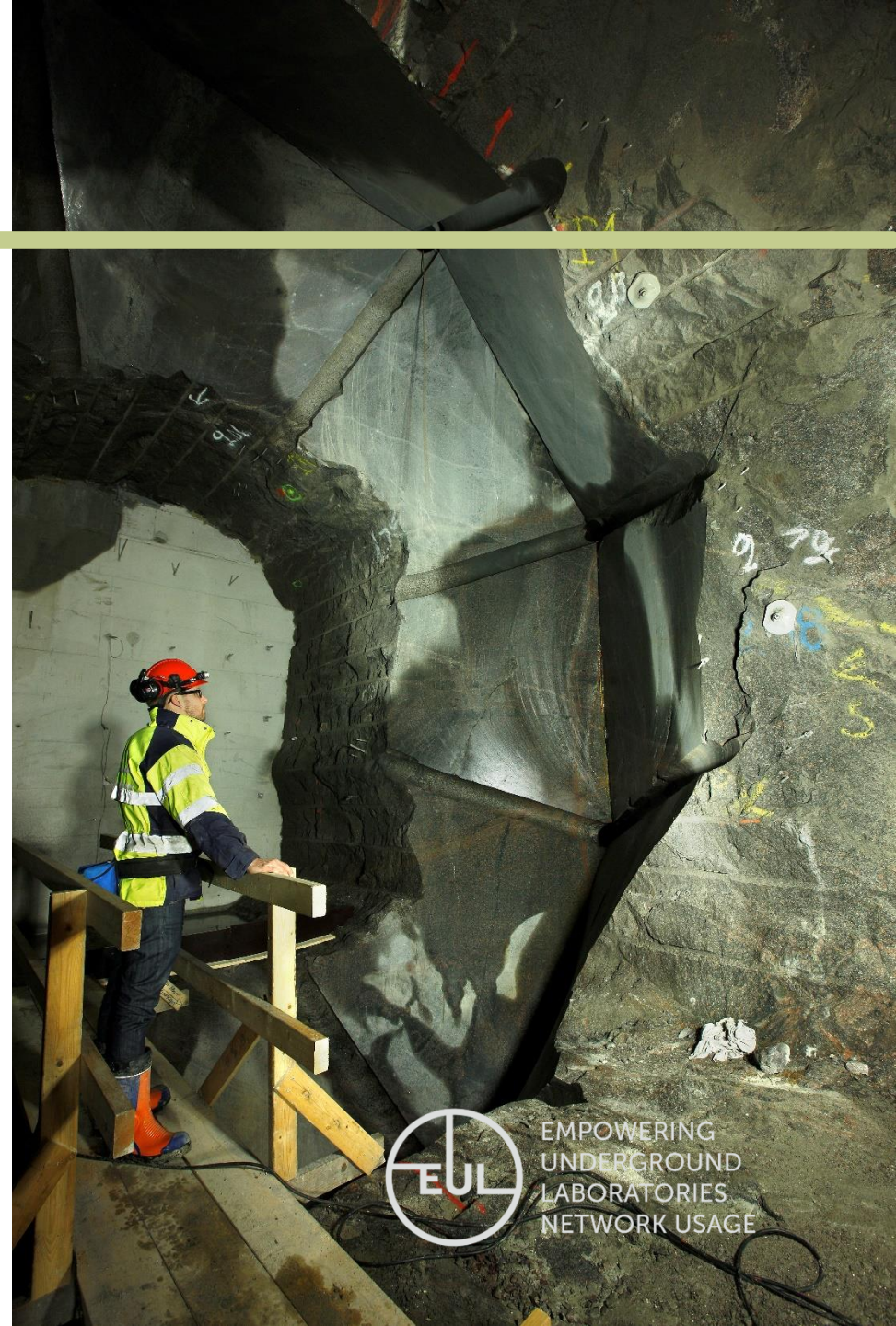
1. Detailed description of the underground space
2. Accurate mapping of the physical locations of measuring points
3. ***Measurement of gamma ray background***
4. Measurement of radon level
5. Radionuclide analysis of surrounding building materials
6. Measurement of neutron flux

Natural background radiation at Lab 2 of Callio Lab, Pyhäsalmi mine in Finland
Measurements of gamma-ray background in Pyhäsalmi Mine
Callio Lab – the deep underground research centre in Finland, Europe
Characteristics of natural radiation background at the Callio Lab (Finland) performed within the BSUIN project

EMPOWERING UNDERGROUND LABORATORIES NETWORK USAGE

The European Underground Laboratories Association (EUL) is continuing work started by the Baltic Sea Underground Innovation Network (BSUIN).

- Total applied budget 791 200 €
- Starting at 1.1.2021, ends 31.12.2021
- 13 partners from the BSUIN project
- Lead by University of Oulu, Kerttu Saalasti Institute
- Main goal: to enhance the markets, usage and usability of Underground Laboratories.



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Open to new collaborations!

We offer coordination, cooperation, networking and facilitation

UNIVERSITY OF OULU

GOLDENEYE:
EU H2020 funded project

- VTT coordinated 10.7 M€ H2020 Innovation Action –project
- Project duration 3 years
- Consortium of 16 partners including:
  - 3 Mining solution providers
  - 7 Sensor companies
  - 4 Mining sites
  - 3 Universities
  - 1 Research Institute (Coordinator)
- University of Oulu / Callio Lab is a member of the consortium
  - Responding to research questions given by the Pyhäsalmi Mine Oy

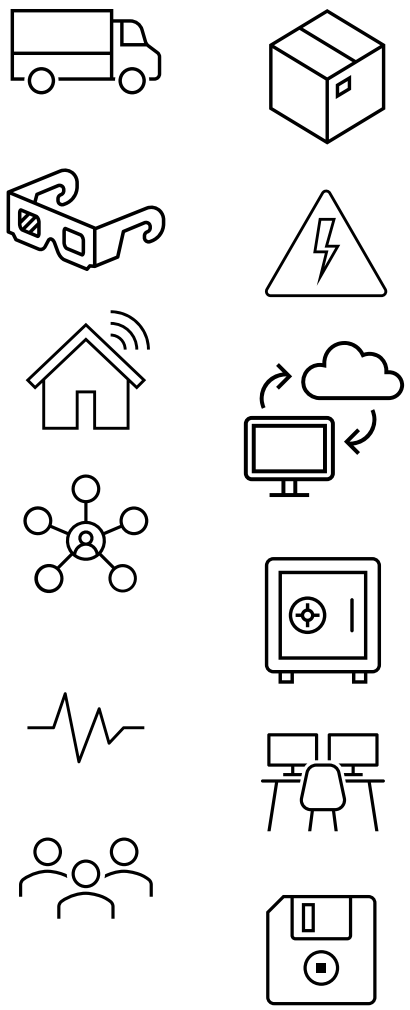
[GoldenEye website]

PROJECT CONSORTIUM

VTT
OPT/NET
timegate
beak CONSULTANTS
SITEMARK
SINERGISE
radai
CUPRUMIN
DARES
Galileo Satellite Navigation Ltd.
EARTH OBSERVING SYSTEM
UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA
AKG
SANDVIK
UNIVERSITY OF OULU

GOLDENEYE CALLIO LAB Underground Center for Science and R & D

Services & Infrastructure



- Trucks and shipments up to 20´ containers (max. width 3.5 m), can be taken through the incline
- Elevator can take 1.5 x 2.0 x 1.5 m packages
- All re-use sites have been scanned: 3D point clouds available
- Electricity easily available
- Internet access: optical base line (1+ Gb) & Wi-Fi
- HPC cloud computing services at CSC (through Finnish collaborators)
- Leaky feeder (radio phone network)
- Refuge bases (shelters) for emergencies
- Microseismic monitoring network
- Office space and meeting rooms
- Support from local team
- Extensive datasets

Future: Globally recognised underground research network and infrastructure

Scientific Advisory Board

Multi- and crossdisciplinary network of experts

- Marko Aittola, PhD in Planetary Science, Vice Chairman at Arctic Planetary Science Institute (APSI) & Director of Kokkola University Consortium Chydenius
- Marko Huttula, Professor, Head of the Nano and Molecular Systems Research Unit (NANOMO), University of Oulu
- Rauno Heikkilä, Professor of Digitalized construction and mining operations, Faculty of Technology, University of Oulu
- Jari Joutsenvaara, Project Manager, Callio Lab, Kerttu Saalasti Institute, University of Oulu
- Veiko Karu, Associative professor, Department of Geology, School of Science, Tallinn Technical University
- Jan Kisiel, Professor, Institute of Physics, University of Katowise, Silesia, Poland
- Ossi Kotavaara, Research Director, Regional Excellence, Kerttu Saalasti Institute, University of Oulu
- Bayarto Lubsandarzhiev, Doctor of Science, Leading Researcher, Experimental Physics Department, Institute of Nuclear Research, Russian Academy of Sciences, Russia
- Saija Luukkanen, Professor, Director, Oulu Mining School, University of Oulu
- Henrika Pihlajaniemi, Postdoctoral researcher, Oulu School of Architecture, University of Oulu
- Matti Muhos, Professor, Director, Kerttu Saalasti Institute, University of Oulu
- Vesa Nykänen, Research Professor, Geological Survey of Finland
- Juha Röning, Professor of Embedded System, Computer Science and Engineering, University of Oulu
- Ilya Usoskin, Professor, Head of Oulu Cosmic Ray station, Sodankylä Geophysical Observatory, University of Oulu
- Seppo Vainio, Professor in Developmental Biology, Research Unit leader Developmental Biology, Biocenter Oulu
- Marko Paavola, Senior Scientist, VTT Technical Research Centre of Finland

Open for new, active organisations

Contacts

Mr. Jari Joutsenvaara
Callio Lab Research Coordinator
KSI, University of Oulu
Tel. +358 40 5569396
Jari.Joutsenvaara@oulu.fi
contact@calliolab.com

THANK YOU!

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WWW.CALLIOLAB.COM

Dr. Mr. Ossi Kotavaara
Research director,
Adjunct Professor
KSI, University of Oulu
Tel.+358 50 5739124
Ossi.Kotavaara@oulu.fi

Ms. Julia Puputti
Callio Lab Project Engineer
MSc. Student Physics, Process Eng.
KSI, University of Oulu
Tel.+358 50 467 2371
Julia.Puputti@oulu.fi