



DULIA-BIO - Bio Sciences in Deep Underground Laboratories

19–22 Aug 2024
The Guildhall, York
Europe/London timezone

Welcome!



Boulby Underground
Laboratory

Sean Paling. Boulby Underground Lab. 2024



DULIA-BIO - Bio Sciences in Deep Underground Laboratories

19–22 Aug 2024
The Guildhall, York
Europe/London timezone

Enter your search term

DULIA-bio is a series of workshops focussing on Biology and Bio-science related research undertaken in the world's deep underground science facilities. This 3rd edition of DULIA-bio will be held at the Guildhall, York, in the United Kingdom and is organized in association with the UK's Boulby Underground Laboratory.

The purpose of this workshop is to showcase, review and discuss ongoing and future Bio-science related research in underground laboratories. It also aims to facilitate discussion of future plans for improved inter/intra subject collaboration and communication, and to explore requirements for future infrastructures to best support underground Bio-science research.

Topics

Life in extreme environments

Astrobiology and Planetary Exploration

Beyond-Earth Human Habitation

Life in low background radiation

Misc other subterranean Bio-science studies and discussion topics.

The workshop will run from **Monday 19th to Wednesday 21st August 2024** (3-days).

Overview

[Conference Agenda](#)

[Contribution List](#)

[Registration](#)

[Registration Fee \(In Person Attendance\) Link](#)

[Participant List](#)

[Accommodation](#)

[Location](#)

[Visas](#)

[Organising Committee](#)

[Boulby Underground Laboratory](#)

[York - Useful information / Things to Do](#)

[Remote Participants Zoom Link](#)

[Dinner Menu - Tuesday 20th August](#)

DULIA-Bio 2024: Bio Sciences In Deep Underground Laboratories

Topics

- Life in extreme environments
- Life in low background radiation
- Astrobiology and Planetary Exploration
- Beyond-Earth Human Habitation
- Misc other subterranean Bio-science studies and discussion topics.

(DULIA = Deep Underground Laboratories Integrated Activity)



Previous Workshops

DULIA-Bio 2019 –
Gran Sasso
(LNGS) Italy

Workshop on
Deep Underground Laboratory Integrating Activity
in biology (DULIA-bio)
Canfranc, Spain
October 13-14 (2015)

Advisory Committee
Ivo Apralià (IN2P3)
Aurelio Bertone (INFN)
Charles Couderc (Laboratoire UJ)
Alfonso Ferraresi (LNGS)
Carlos F. Gomez (IFIC)
Aldo Ianni (LSC)
Kazuo Kato (Daresbury UJ)
Tom Kuhl (Purdue University)
Tullio Orecchia (Princeton UJ)
Soren Palmy (IKF)
Fabrice Rogues (LDM)
Sofiane Rogues (LNGS)

Programs
Astrobiology
Extremophile Biotechnology
Life in Deep Biosphere
Life in Low Radioactivity Environments

Workshop website
www.dulia-bio.org

Sponsored by: INFN, LNGS, LSC, IFIC

13-14 Oct 2015
Europe/Zurich timezone

Enter your search term

Overview

Scientific Programme

Contributing Abstracts

Timetable

Contribution List

Author List

Registration

Participant List

Accommodation & Transportation

Support

webmaster@lsc-canfran...

The workshop DULIA-bio (Deep Underground Laboratories Integrated Activities in biology) will take place in Canfranc (Spain) on Oct 13 and 14, 2015. The aim of the workshop is to establish a common path for European underground laboratories in deep life studies and its application to astrobiology. The workshop goals are to spread interest in this research field, put together a new community working in underground laboratories and be the first of a series of meetings to be held in the four deep underground labs in Europe.

Starts 13 Oct 2015, 08:00
Ends 14 Oct 2015, 14:30
Europe/Zurich

dulia-bio.pdf
DULIA-bio.zip

Pictures
20151013_144437.jpg
IMG_20151014_114349.jpg

Astrobiology, Extremophile Biotechnology, Life in deep biosphere, Life in low radioactivity environments

DULIA-Bio 2015 – Canfranc (LSC) Spain

DULIA-bio 2019
2nd INTERNATIONAL WORKSHOP ON
DEEP UNDERGROUND LABORATORY INTEGRATING ACTIVITY
IN BIOLOGY

November 4-5, 2019
Laboratori Nazionali del Gran Sasso
Assergi (L'Aquila), ITALY

INFN LNGS
Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali del Gran Sasso

ISTITUTO SUPERIORE DI SANITÀ

LSC
Laboratorio Sotterraneo di Canfranc

DULIA-Bio: Bio Sciences In Deep Underground Laboratories





DULIA-BIO - Bio Sciences in Deep Underground Laboratories

19–22 Aug 2024
The Guildhall, York
Europe/London timezone

Enter your search term

DULIA-bio is a series of workshops focussing on Biology and Bio-science related research undertaken in the world's deep underground science facilities. This 3rd edition of DULIA-bio will be held at the Guildhall, York, in the United Kingdom and is organized in association with the UK's Boulby Underground Laboratory.

The purpose of this workshop is to showcase, review and discuss ongoing and future Bio-science related research in underground laboratories. It also aims to facilitate discussion of future plans for improved inter/intra subject collaboration and communication, and to explore requirements for future infrastructures to best support underground Bio-science research.

Topics

Life in extreme environments

Astrobiology and Planetary Exploration

Beyond-Earth Human Habitation

Life in low background radiation

Misc other subterranean Bio-science studies and discussion topics.

The workshop will run from **Monday 19th to Wednesday 21st August 2024** (3-days).

Overview

[Conference Agenda](#)

[Contribution List](#)

[Registration](#)

[Registration Fee \(In Person Attendance\) Link](#)

[Participant List](#)

[Accommodation](#)

[Location](#)

[Visas](#)

[Organising Committee](#)

[Boulby Underground Laboratory](#)

[York - Useful information / Things to Do](#)

[Remote Participants Zoom Link](#)

[Dinner Menu - Tuesday 20th August](#)

DULIA-Bio 2024: Bio Sciences In Deep Underground Laboratories

Purpose (2024):

- Share and discuss ongoing research activities
- **Networking: Create contacts within and between subject areas**

Also...

- Consider / discuss future collaboration opportunities
- Consider / discuss possible future scientific activities. In current and future facilities



		Mon 19/08	Tue 20/08	Wed 21/08	Thu 22/08	All days
		Print PDF Full screen Detailed view Filter Session legend				
		<input checked="" type="radio"/> Registration <input type="radio"/> Welcome and Topic Overviews				
12:00	Registration	Registration				
	<i>Riverside Lounge, The Guildhall, York</i>					12:00 - 12:30
	Lunch	Lunch				
13:00		<i>Riverside Lounge, The Guildhall, York</i>				12:30 - 13:30
	Welcome and Context - (in-person)	<i>Sean Paling</i>				
	<i>Council Chamber, The Guildhall, York</i>					13:30 - 14:00
14:00	Underground Laboratories: A Brief Review - (in-person)	<i>Aldo Ianni</i>				
	<i>Council Chamber, The Guildhall, York</i>					14:00 - 14:30
	Biology, astrobiology and planetary exploration studies at Boulby Underground Lab - (in-person)	<i>Charles Cockell</i>				
	<i>Council Chamber, The Guildhall, York</i>					14:30 - 15:00
15:00	Coffee Break	Coffee Break				
	<i>Riverside Lounge, The Guildhall, York</i>					15:00 - 15:30
	Overview of Life in low background radiation studies - (in-person)	<i>Carlos Garay</i>				
	<i>Council Chamber, The Guildhall, York</i>					15:30 - 16:00
16:00	Beyond Earth Human Habitation Studies Underground - (in-person)	<i>Alex Iordachescu</i>				
	<i>Council Chamber, The Guildhall, York</i>					16:00 - 16:30
	Earth/Moon/Mars studies of Extreme Environments - (remote)	<i>Bernard Foing</i>				
	<i>Council Chamber, The Guildhall, York</i>					16:30 - 17:00
17:00	Bioscience at SURF - (remote)	<i>Marcus Horn</i>				
	<i>Council Chamber, The Guildhall, York</i>					17:00 - 17:30

20 Talks. 45 Registrations: 25 in person, 20 online

DULIA-Bio 2024: Agenda

Day 1:

- Introduction & Overview talks

Day 2:

- Underground lab Bioscience programmes 1
- Life in low background radiation 1
- Deep underground microbiology studies
- Life in low background radiation 2

Day 3:

- Life in low background radiation 3
- Underground lab Bioscience programmes 2
- Discussions
 - Future networking / collaboration
 - Future science activities
 - Specifications for a purpose-built underground Biosciences Lab

Day 1:



	<input checked="" type="radio"/> Deep Underground Microbiology	<input type="radio"/> Studies of Life in Low	<input type="radio"/> Underground Labs Science	
09:00	SNOLAB: Underground Facilities for Biological Experiments - (in-person)		Shaun Hall	
	Council Chamber, The Guildhall, York			09:00 - 09:30
	Biosciences at Callio Lab - (in-person)		Jari Joutsenvaara	
	Council Chamber, The Guildhall, York			09:30 - 10:00
10:00	Prospects of Bio Science Research in Deep Underground Laboratories in Africa: Botswana Perspective - (in-person)			
	Tebogo Kwape			
	Coffee Break			
	Riverside Lounge, The Guildhall, York			10:30 - 11:00
11:00	The REPAIR project: investigating the effects of sub-natural background radiation exposure within SNOLAB - (in-person)		Chris Thome	
	Adaptive and evolutionary responses of microalgae to ultra-low radioactivity at the Modane Underground Laboratory - (in-person)		Vincent Breton	
12:00	Effects of microgravity and below-background radiation in the pathogenesis of Orsay virus infection of Caenorhabditis elegans - (remote)		Santiago Elena	
	Lunch			
13:00	Riverside Lounge, The Guildhall, York			12:30 - 13:30
	Tracking ancient and modern microbial life in salt and brines of Boulby Mine (N Yorkshire) or: What to look out for on Mars - (in-person)		Jens Holtvoeth	
14:00	Biological habitats in the Subsurface - (remote)		Scott Perl	
	Council Chamber, The Guildhall, York			14:00 - 14:30
	Biophysical and microbiological research at the deep underground low radiation background laboratory (DULB-4900) and tunnel of Baksan Neutrino Observatory - (remote)		Mikhail Zarubin	
15:00	How statistical physics limits microbial life under extreme conditions: foraging and motility		Laurence Wilson	
	Council Chamber, The Guildhall, York			15:00 - 15:30
	Coffee Break			
	Riverside Lounge, The Guildhall, York			15:30 - 16:00
16:00	Investigating the effect of low background radiation in the origin of animals - (remote)		Patricia Suárez Ara	
	Council Chamber, The Guildhall, York			16:00 - 16:30
	DISCOVER22 radiobiology project at Gran Sasso National Laboratory - (remote)		Patrizia Morciano	
	Council Chamber, The Guildhall, York			16:30 - 17:00
17:00	Microdosimetry of low dose radiation fields in the framework of the DISCOVER22 project - (remote)		Anna Bianchi	

Day 2:

DULIA-Bio 2024: Agenda

Day 1:

- Introduction & Overview talks

Day 2:

- Underground lab Bioscience programmes 1
- Life in low background radiation 1
- Deep underground microbiology studies
- Life in low background radiation 2

Day 3:

- Life in low background radiation 3
- Underground lab Bioscience programmes 2
- Discussions
 - Future networking / collaboration
 - Future science activities
 - Specifications for a purpose-built underground Biosciences Lab



Boulby Underground Laboratory

<input type="radio"/> Boulby Underground Laboratory <input checked="" type="radio"/> Discussion and Future Planning <input type="radio"/> Studies of Life in Low		
<input checked="" type="radio"/> Underground Labs Science		
09:00	The Effect of Natural Background Radiation on Stem Cell Biology - (in-person) <i>Council Chamber, The Guildhall, York</i>	<i>Umberto Galderisi</i> 09:00 - 09:30
	Stem cells long term preservation - (remote) <i>Council Chamber, The Guildhall, York</i>	<i>Guillaume Warot</i> 09:30 - 10:00
10:00	Does ionizing radiation affect HIV release from human macrophages? - (remote) <i>Council Chamber, The Guildhall, York</i>	<i>David Nkwe</i> 10:00 - 10:30
	Coffee Break <i>Riverside Lounge, The Guildhall, York</i>	10:30 - 11:00
11:00	Opportunities and challenges of deep underground science facilities and research laboratories: An extended review of current status - (in-person) <i>Goabaone Gaobotse</i>	
	Bioscience and Beyond Outreach at Boulby - (in-person) <i>Council Chamber, The Guildhall, York</i>	<i>Jonathan Gutteridge</i> 11:30 - 12:00
12:00	Lunch <i>Riverside Lounge, The Guildhall, York</i>	12:00 - 13:00
13:00	DISCUSSION: Reproducibility and networking for future underground bio-sciences - (in-person) <i>Carlos Garay et al.</i>	<i>Council Chamber, The Guildhall, York</i> 13:00 - 13:45
	DISCUSSION: Future of bioscience research and the role of underground laboratories <i>ALL (Organising Committee)</i>	<i>Council Chamber, The Guildhall, York</i> 13:45 - 14:30
14:00	Coffee Break <i>Council Chamber, The Guildhall, York</i>	14:30 - 14:45
	DISCUSSION: Specifications and requirements for a future underground bio-sciences lab <i>Emma Meehan et al.</i>	<i>Council Chamber, The Guildhall, York</i> 14:45 - 15:30
15:00	Boulby Underground Laboratory H&S Induction <i>Council Chamber, The Guildhall, York</i>	<i>Sean Paling</i> 15:30 - 16:00
16:00		

Day 3:

DULIA-Bio 2024: Agenda

Day 1:

- Introduction & Overview talks

Day 2:

- Underground lab Bioscience programmes 1
- Life in low background radiation 1
- Deep underground microbiology studies
- Life in low background radiation 2

Day 3:

- Life in low background radiation 3
- Underground lab Bioscience programmes 2
- Discussions
 - Future networking / collaboration
 - Future science activities
 - Specifications for a purpose-built underground Biosciences Lab



Boulby Underground Laboratory

DULIA-Bio 2024: Agenda

Day 4: Thurs 22nd

- Optional trip to Boulby Underground Lab

Schedule

6am - Bus Pick up - York Guild Hall

7:30 am: Arrival at Boulby, induction and getting changed.

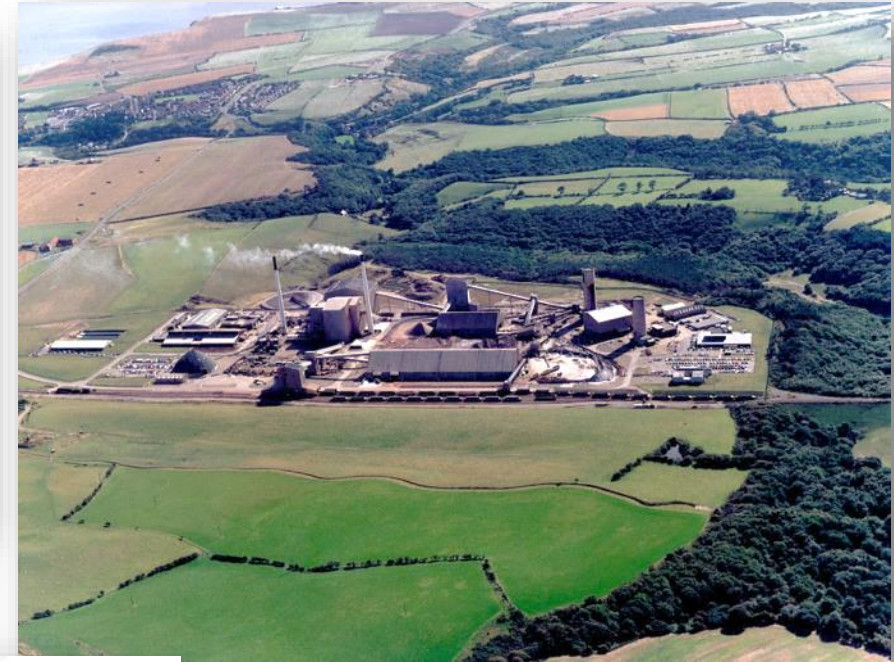
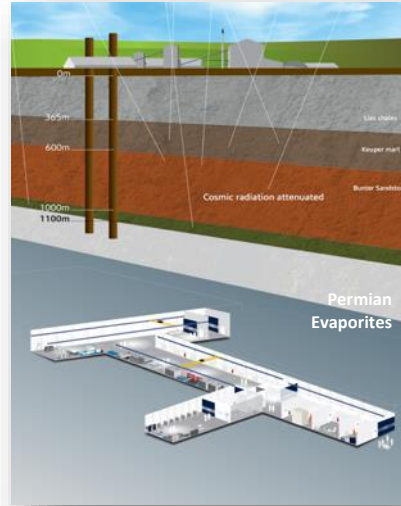
9am: Ride underground

9:30–1:30: Tour Underground Lab

2pm: Return to surface, change and lunch

2:45pm: Leave to return to York

4:15pm: (Approx): Arrive in Yorkunderground Biosciences Lab



DULIA-Bio 2024: Agenda

Evening Activities

- Monday: Free
- Tues - 7pm: Workshop
Dinner - THE IVY, St Helens Square, York YO1 8QP
- Wed: Free



The Ivy, St Helen's Square, York, YO1 8QP

Workshop Dinner: Please get your menu selections in to Sue this MORNING...



DULIA-BIO - Bio Sciences in Deep Underground Laboratories

19–22 Aug 2024
The Guildhall, York
Europe/London timezone

Enter your search term

DULIA-bio is a series of workshops focussing on Biology and Bio-science related research undertaken in the world's deep underground science facilities. This 3rd edition of DULIA-bio will be held at the Guildhall, York, in the United Kingdom and is organized in association with the UK's Boulby Underground Laboratory.

The purpose of this workshop is to showcase, review and discuss ongoing and future Bio-science related research in underground laboratories. It also aims to facilitate discussion of future plans for improved inter/intra subject collaboration and communication, and to explore requirements for future infrastructures to best support underground Bio-science research.

Topics

Life in extreme environments

Astrobiology and Planetary Exploration

Beyond-Earth Human Habitation

Life in low background radiation

Misc other subterranean Bio-science studies and discussion topics.

The workshop will run from **Monday 19th to Wednesday 21st August 2024** (3-days).

Overview

Conference Agenda

Contribution List

Registration

Registration Fee (In Person Attendance) Link

Participant List

Accommodation

Location

Visas

Organising Committee

Boulby Underground Laboratory

York - Useful information / Things to Do

Remote Participants Zoom Link

Dinner Menu - Tuesday 20th August

DULIA-Bio 2024: Bio Sciences In Deep Underground Laboratories

Thanks to the Organising Committee:

- Aldo Ianni – LNGS
- Carlos Peña Garay - LSC
- Silvia Scorza - LSM
- Jari Joutsenvaara – Callio lab
- Laurence Wilson - York
- Charles Cockell – Edinburgh
- Julia Puputti - Boulby
- Sue Armstrong – Boulby
- Sean Paling - Boulby

Please ask the local (Boulby) team if you have any questions.





Science and
Technology
Facilities Council

Boulby Underground Laboratory: Status and plans for the UK's deep underground science facility.

Sean Paling
Boulby Underground
Laboratory, UK

UKRI Science and Technology Facilities Council
Boulby Underground Laboratory

Sean Paling
STFC Boulby Underground Science Facility

Astroparticle physics & ultra low background studies

The search for Dark Matter & beyond

Earth and environmental science, Astrobiology and planetary exploration

Boulby Underground Laboratory:
The UK's deep underground science facility. Current status and future plans

Underground lab @ Boulby

Boulby Mine



A working polyhalite and rock-salt mine on the North East coast of England.

Owned by Israel Chemicals Ltd. (ICL-UK). Locally operated as Cleveland Potash Ltd.

Major local employer: ~500 direct staff and 2000 indirect employment.

Polyhalite:
 $K_2Ca_2Mg(SO_4)$



Ships worldwide for agricultural fertiliser



Deepest mine in Britain: 1300km



12 miles North of Whitby, N. Yorks



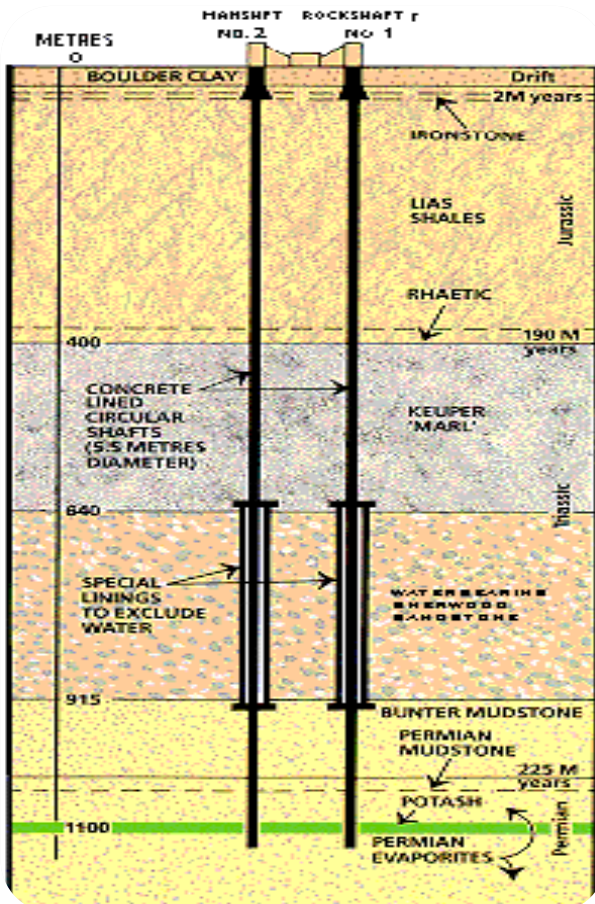
View from Staithes

The world's first polyhalite mine

Boulby Geology & Mining

Excavations are in Salt (NaCl), Potash (KCl) and Polyhalite ($K_2Ca_2Mg(SO_4)$). Permian evaporite layers left over from the Zechstein Sea (250m.yrs past).

Over 40 kms of tunnel mined each year (now >1,000kms in total), the long-lived roadways being cut in the lower NaCl layer.



Polyhalite



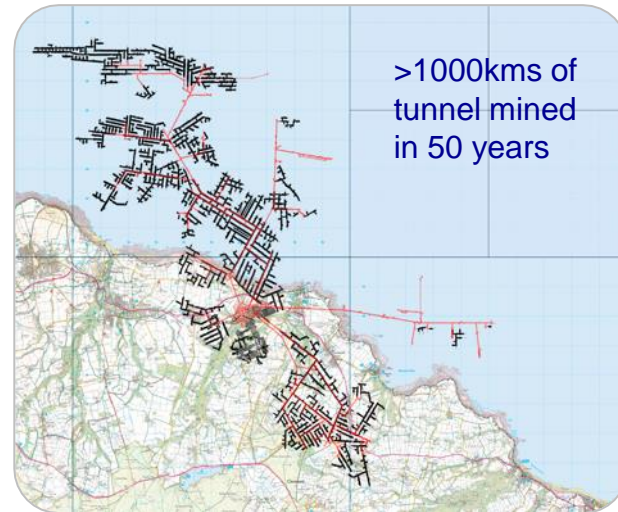
Potash



Rock-Salt



Low activity salt
U ~67 ppb,
Th ~125 ppb



Typical Boulby Salt Roadway



Zechstein Sea



Boulby Underground Laboratory

The UK's deep underground science facility operating in a working potash and salt mine.

1.1km depth (2805 mwe). With low background surrounding rock-salt

Operated by the UK's Science & Technology Facilities Council (STFC) in partnership with the mine operators ICL-UK



Outside Experimentation Area (OEA)

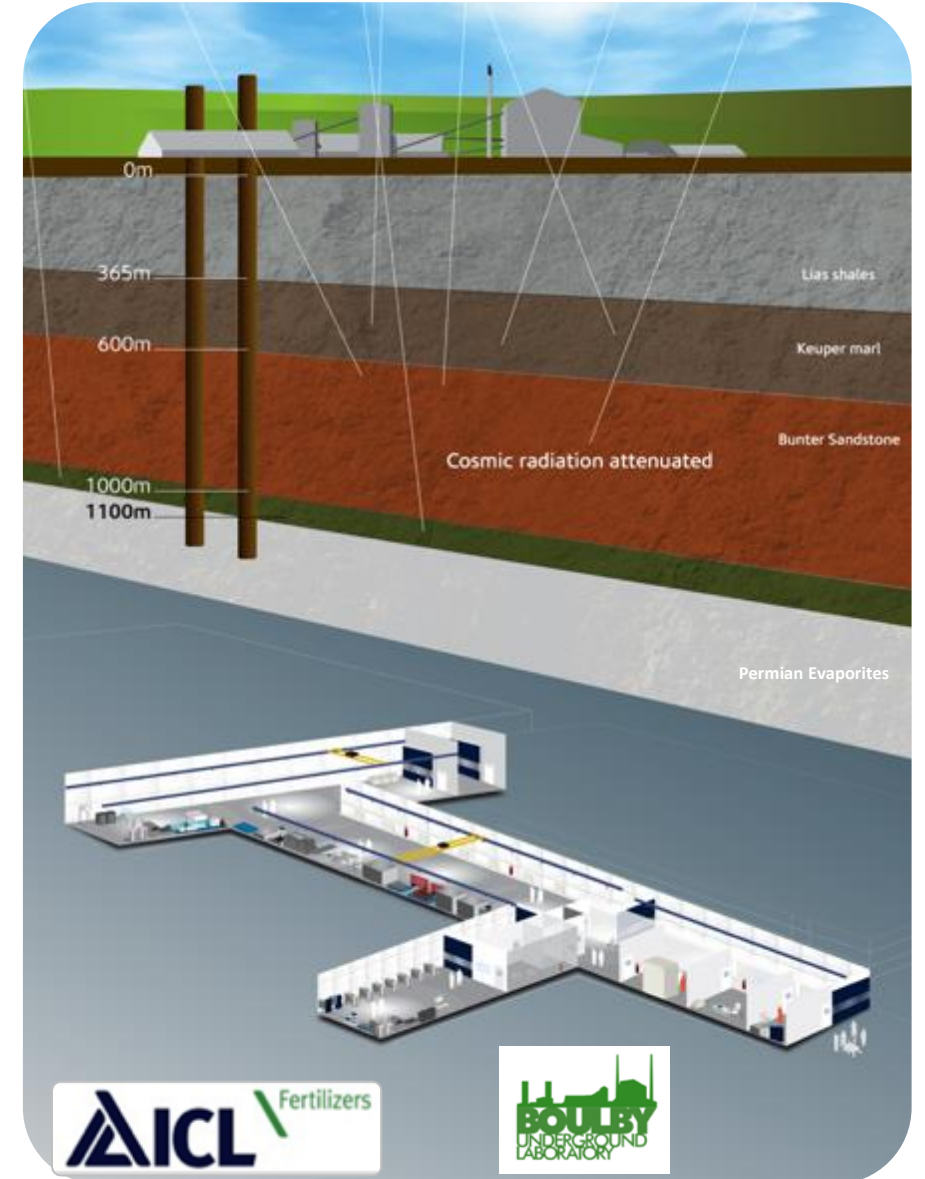


4000m³ class 10k and 1k clean lab space



Lab entrance

Factor ~10⁶ reduction in cosmic ray flux vs. surface



A **QUIET** place in the Universe



Surface support and staging building



Office space, chemistry & clean prep lab, storage and staging space, IT room, conference room,

Supported access to surrounding geology & UG environs. Power, wifi/internet.



3000m³ Outside Experimentation Area



BUGS Material screening

Boulby Underground Lab Facilities 2023: >4000m³ class 1k & 10k (ISO 6 & 7) clean room lab space. 10Gb Internet. AC, air filtration, 5T & 10T lifting, LN generation, fume hood & clean prep space. 3000m³ Outside Experimentation Area (OEA) with power & internet. Supported access to wider mine environs.



Old lab collapsed to create 'outside experimentation area'



Lighting, 240/110V power, Internet / WIFI. Ventilation, doors, MINAR Base Station Hut

'Outside Science'
Geology & Geophysics
Astrobiology,
MINAR, Mars
Analogue space



Outside Experimentation Area (OEA)



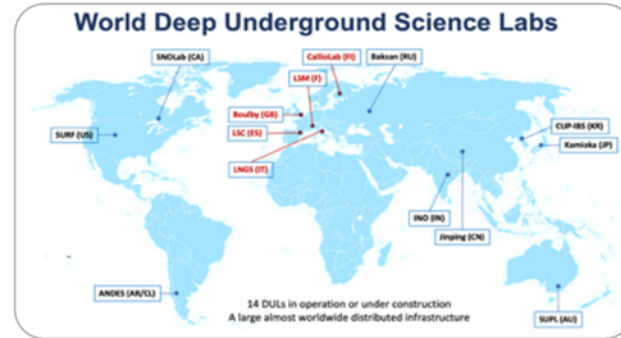
Boulby Underground Laboratory (UK)



Boulby Facility Details...



- The UK's deep underground science facility. One of 5 in Europe, <15 in the world.
- Supports work of >10 collaborative projects (astrophysics to climate, geology, environment etc), >40 institutions, >170 scientists & students.
- Facility funded and operated by the Science & Technology Facilities Council (STFC).
- Operations, H&S & science programme managed by 17 (+2) onsite staff and supported by Rutherford Appleton Lab (PPD).
- Mine operators ICL-UK provide wide-ranging operational & high level support.

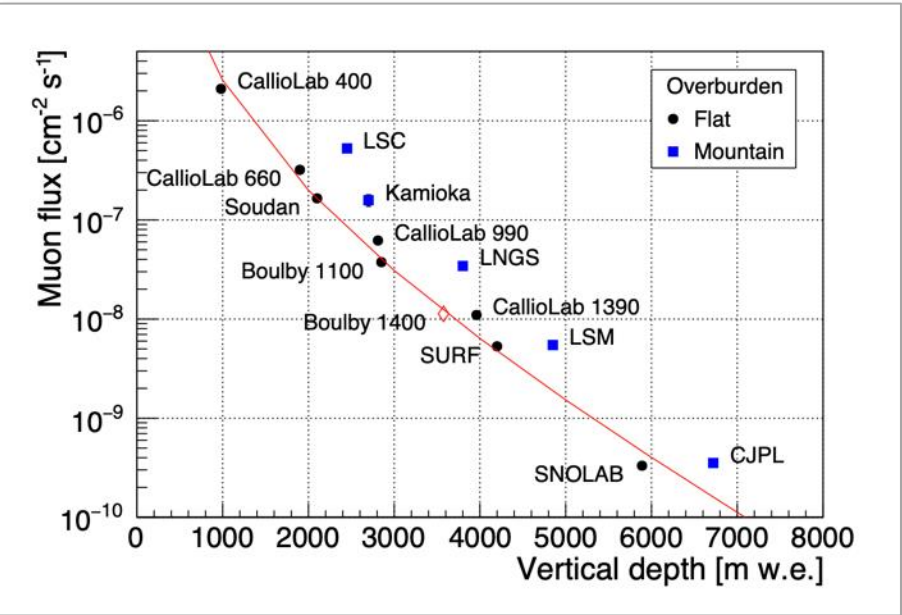


How does Boulby Compare?

- Low Radon levels (3 Bq/m³)
- Diverse science programme.
- Science and Industry partnership



And more...



Science Programme Status & Plans.

- Astroparticle & Low Background Science
- Earth & Environmental Science
- Astrobiology & Planetary Exploration Studies
- Outreach & Education



Boulby Science Now & Future

Particle physics and ultra-low background studies

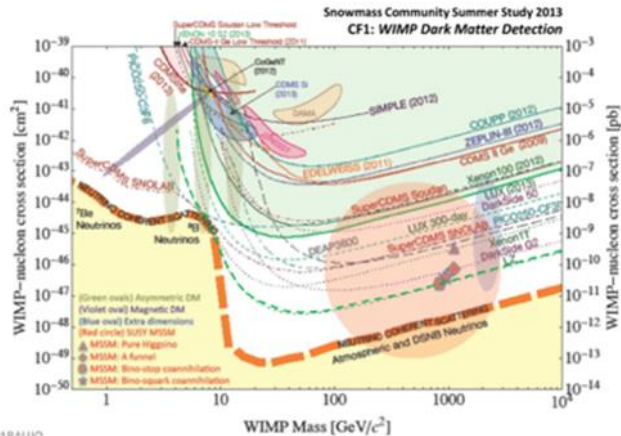
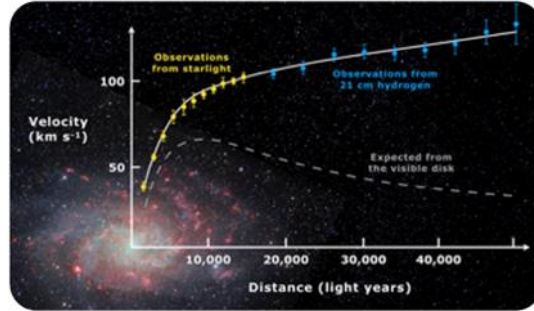


Boulby Dark Matter Studies...

Boulby has hosted **Dark Matter search** studies for over two decades. Including the **NAIAD**, **DRIFT** & **ZEPLIN** experiment programmes.

Boulby now hosts **CYGNUS** directional DM programme, **NEWS-G/Dark-Sphere** R&D and providing ULB material screening for other studies, inc **LUX-ZEPLIN (LZ)**

Galactic rotation curves



ZEPLIN-II & III:
The world's first
2-phase Xenon
dark matter
detectors
(Finished 2011)

World DM particle search limits and future projections



ZEPLIN-III @ Boulby

XIA alpha particle counter
 <0.0001 alphas/cm²/hr

8 ULB Ge detector systems, 2 XIA alpha counters, Rn emanation, ICPMS to come

BUGS (Boulby UnderGround Screening). World-class material screening for current and future ULB experiments. Towards PPT sensitivity for G3 DM and Neutrino experiments

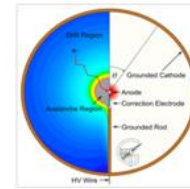
LZ PMTs

Aiming for **ALL** key ULB screening systems under one (1.1km) roof.

NEWS-G

Spherical Proportional Counter (SPC) studies @ Boulby

k. Nikolopoulos, I. Katsioulas, P. Knights, T. Need, R. Ward
University of Birmingham
And wider NEWS-G Collab.



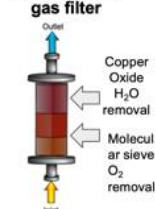
SPC concept: Variable target Low E_{th}, Low mass sensitivity

Simulation study of neutron interactions in the S30 at Boulby



AI-S30 R&D Detector

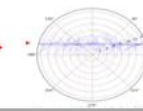
Purpose-made gas filter



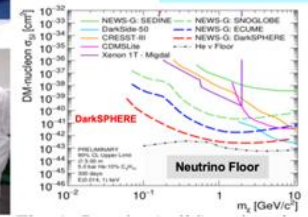
11-anode sensor



Neutron Beam
4 MeV

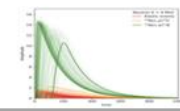


SPC Sensitivities



Direction of R&D at Boulby

- Instrumentation development for NEWS-G at SNOLAB
 - Multi-anode sensor
 - Gas filtration
 - Rate effect studies
- Neutron spectroscopy (N₂)
 - Neutron BG surveys
 - Industrial applications
- Towards scaled-up detector at Boulby, 3m diam. 5 Bar He-CH₄H₁₀: **DarkSPHERE**



Multidisciplinary Science

Applied low background particle physics, Earth and Environmental science, Astrobiology & Planetary Exploration Technology Development.

MINAR:

Astrobiology and planetary exploration technology development

NASA-JPL
Signatures of life studies

MINAR VII & VIII.
2018 - 2021

Lulea University
KORE rover 3D area
mapping

Birmingham University
BIOSPHERE Human Habitability Studies

Edinburgh University
MUFFHINS water activity
monitoring payload

Coord. X

1.587891
1.281006
0.974121
0.667236
0.360352
0.053467
-0.253418
-0.560303
-0.867188
-1.174072
-1.480957
-1.787842
-2.094727
-2.401611
-2.708496
-3.015381
-3.322266

2.5

Astrobiology & Planetary Exploration

MINAR - Habit
Sampling life in Boulby
Brine

MINAR - XRF
Subsurface Astrobiology Laboratory

BISAL
Boulby International Subsurface Astrobiology Lab

A base for studies of
life in Boulby rock –
studies of limits of life
on earth and on other
planets

Life in
Boulby
salt

ALSO: An important 'Mars Analogue site' –
with geology & conditions to allow
explorations & astrobiology technique &
instrumentation development

Led by Edinburgh,
UKCA

MINAR - Pancam
Mining &
extraterrestrial
exploration
instrumentation
development

Boulby and Instrumentation for
Earth and Space Exploration

sean.paling@stfc.ac.uk

MINAR: MINE Analogue Research



The Boulby Development Project (BDP)...

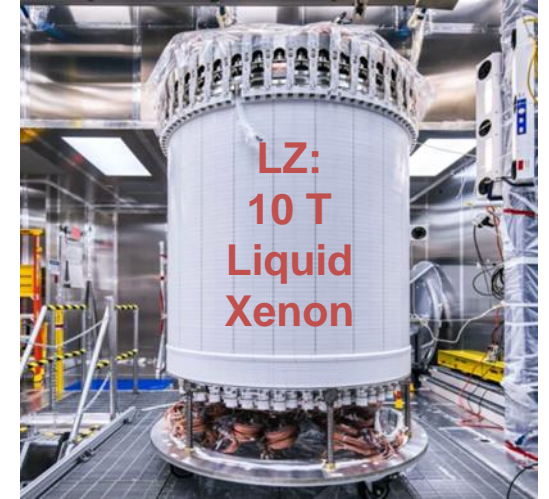
“Towards a major new underground science facility in the North East, with the potential to host a major international science infrastructure, such as a next generation dark matter experiment.”



A **LARGER** and more **ADVANCED** lab is needed for major new science to be hosted in the UK

A new world-leading UK underground science facility hosting next-generation science 2030+

- Searches for Dark Matter (inc. XLZD)
- Neutrino studies
- Quantum Sensors, Quantum Computing
- Pure & applied low background particle physics
- Earth and Environmental Sciences
- Astrobiology & planetary exploration.
- Outreach, Education and more...



Next Generation (XLZD: 50-100T) to operate in the UK?

Government 'fit': Levelling Up, Strength in Places, UK Science Superpower...

**Boulby Development Project (BDP)
3-year Preliminary IF-funded study**

Led by STFC/UKRI & UK science community

~£3M from 2022-2025

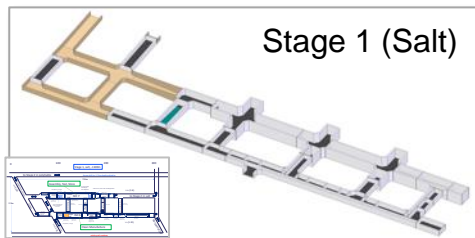
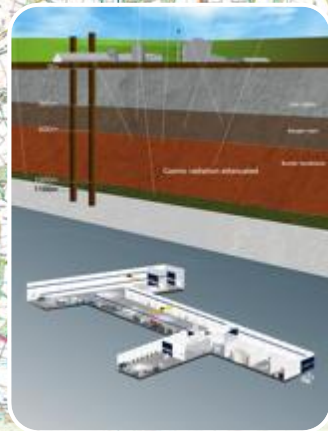
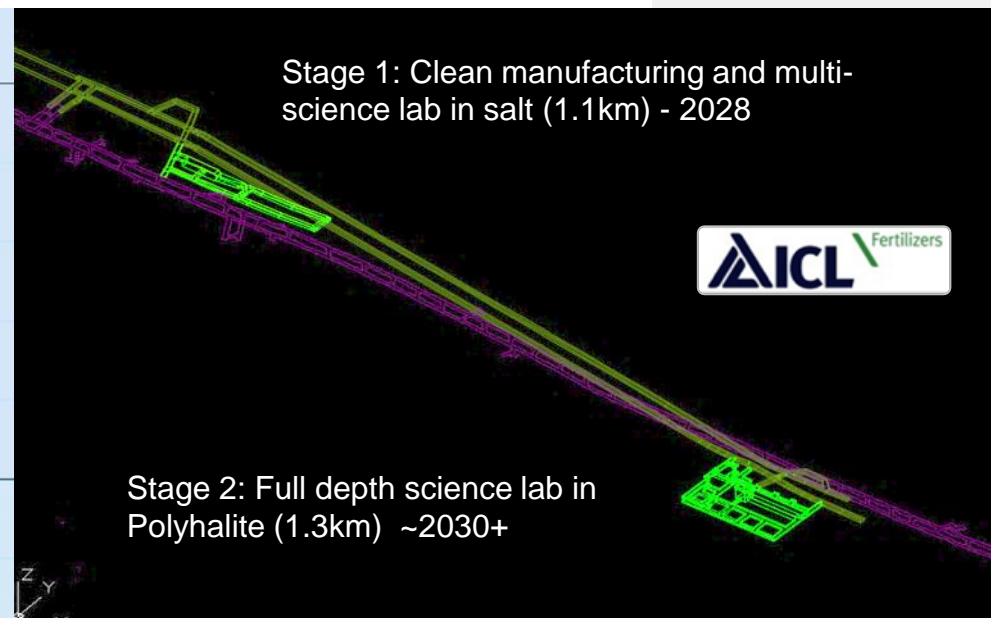
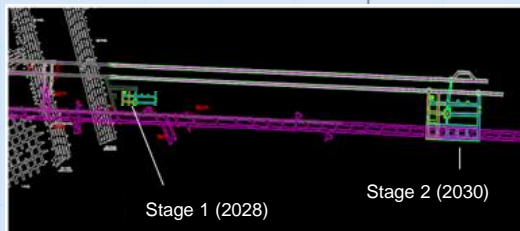
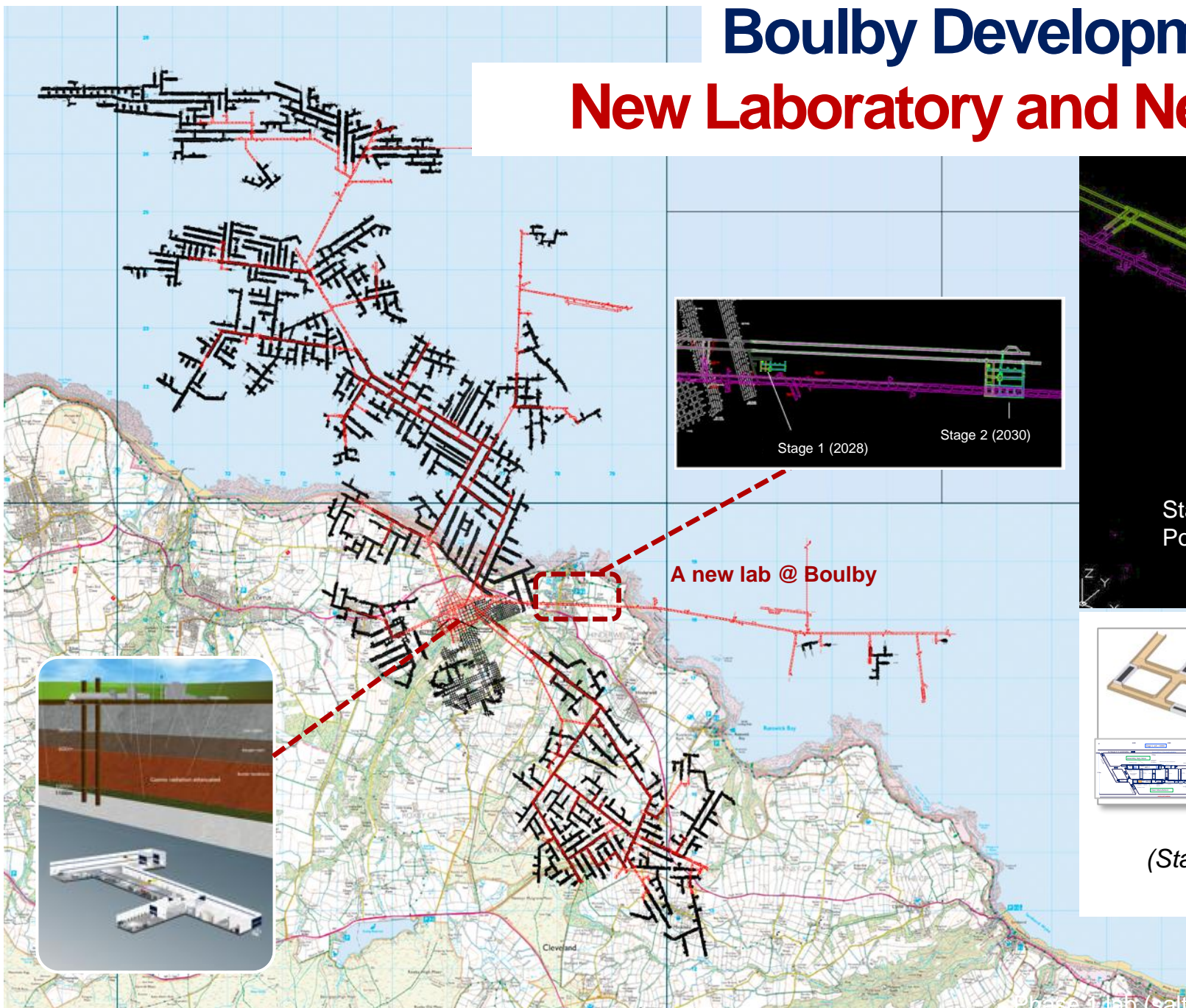
- Site & facility development
- Science prog development
- Business case development
- Stakeholder liaison

A new UK facility will bring:

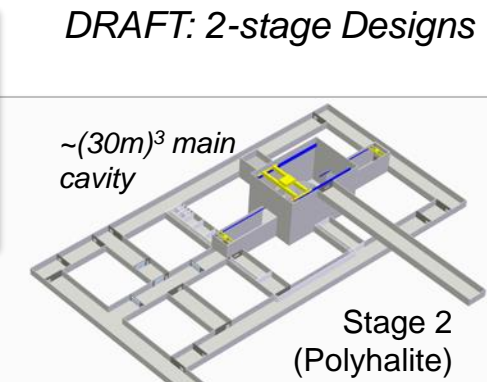
- HIGH-impact, world-leading science
- LARGE multi-national collaborations
- BIG fundamental science questions
- MAJOR local & national investment, employment, impact and visibility

Boulby Development Project

New Laboratory and New Science.



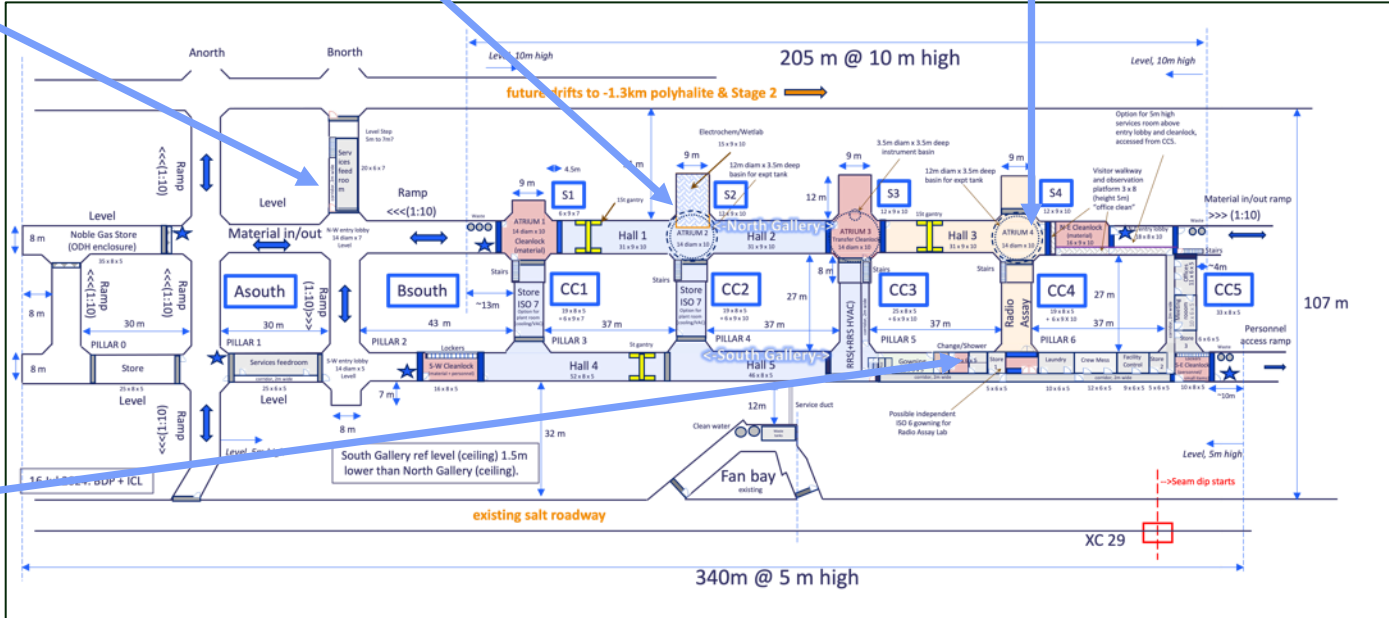
Total volume (Stage 1 + stage 2) ~120,000m³



Excavations for stage 1 of expansion currently expected to begin mid-2024.

Boulby Development Project: Stage 1 Excavation

Progress
August 2024



Stage 1
Functional
Design

Excavation well underway. Completion mid 2025 (Outfitting ~2028)



DULIA-BIO - Bio Sciences in Deep Underground Laboratories

19–22 Aug 2024
The Guildhall, York
Europe/London timezone

Welcome!



Boulby Underground
Laboratory

Sean Paling. Boulby Underground Lab. 2024