



**Stellenbosch**

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**PAUL General Meeting**  
**27 Sept 2023**

**Richard Newman\***  
**PAUL Project Manager**

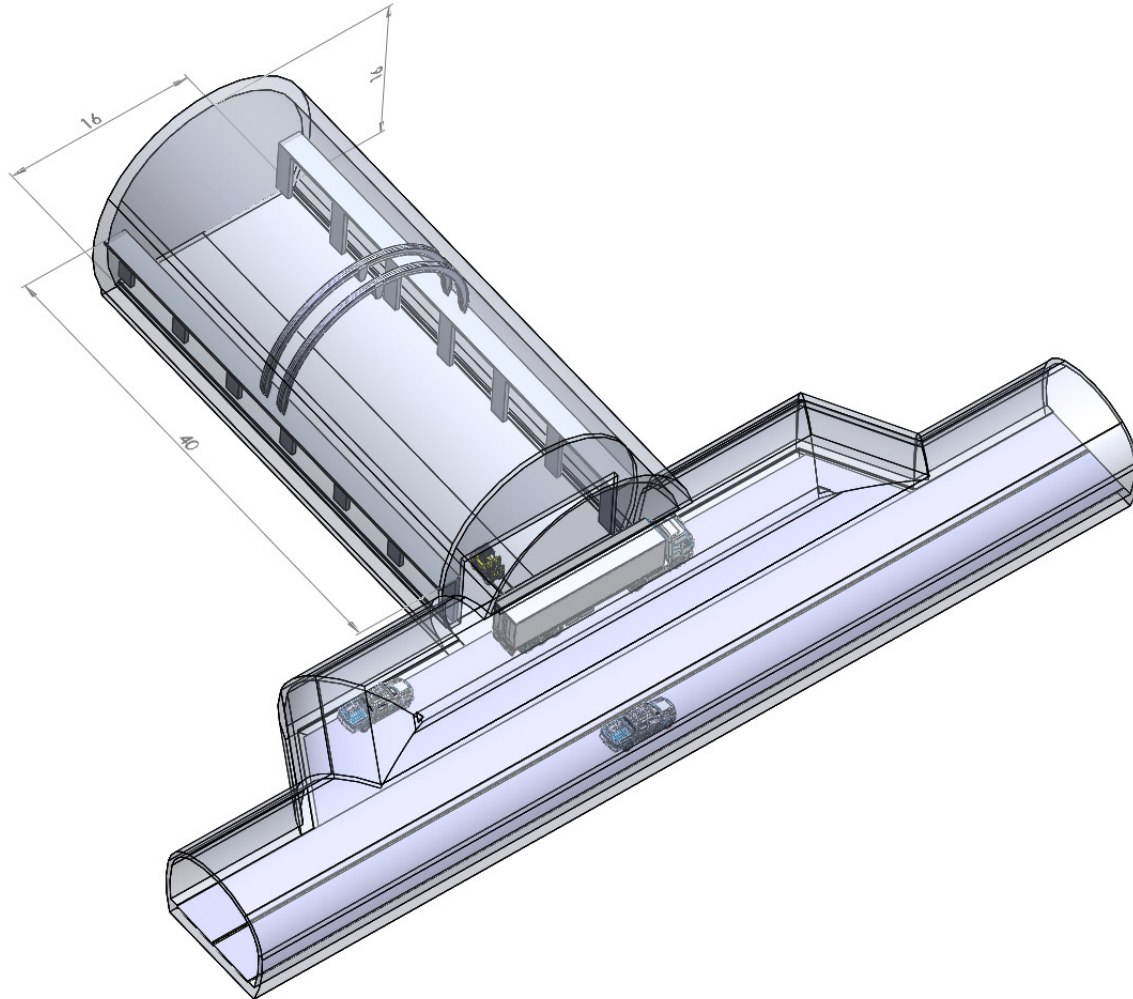
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## Reviewers

- Dr Aldo Ianni (LNGS, Italy),
- Dr Jeter Hall (SNOLAB, Canada), and
- Prof. Azwinndini Muronga (Nelson Mandela University, South Africa)
- review period 8 - 28 August 2023
- reviewed PAUL arXiv paper and basic engineering design guidelines document

# PAUL Concept Design



Floor space: 640 m<sup>2</sup>

Volume: 10240 m<sup>3</sup>

# Scientific reviews of PAUL

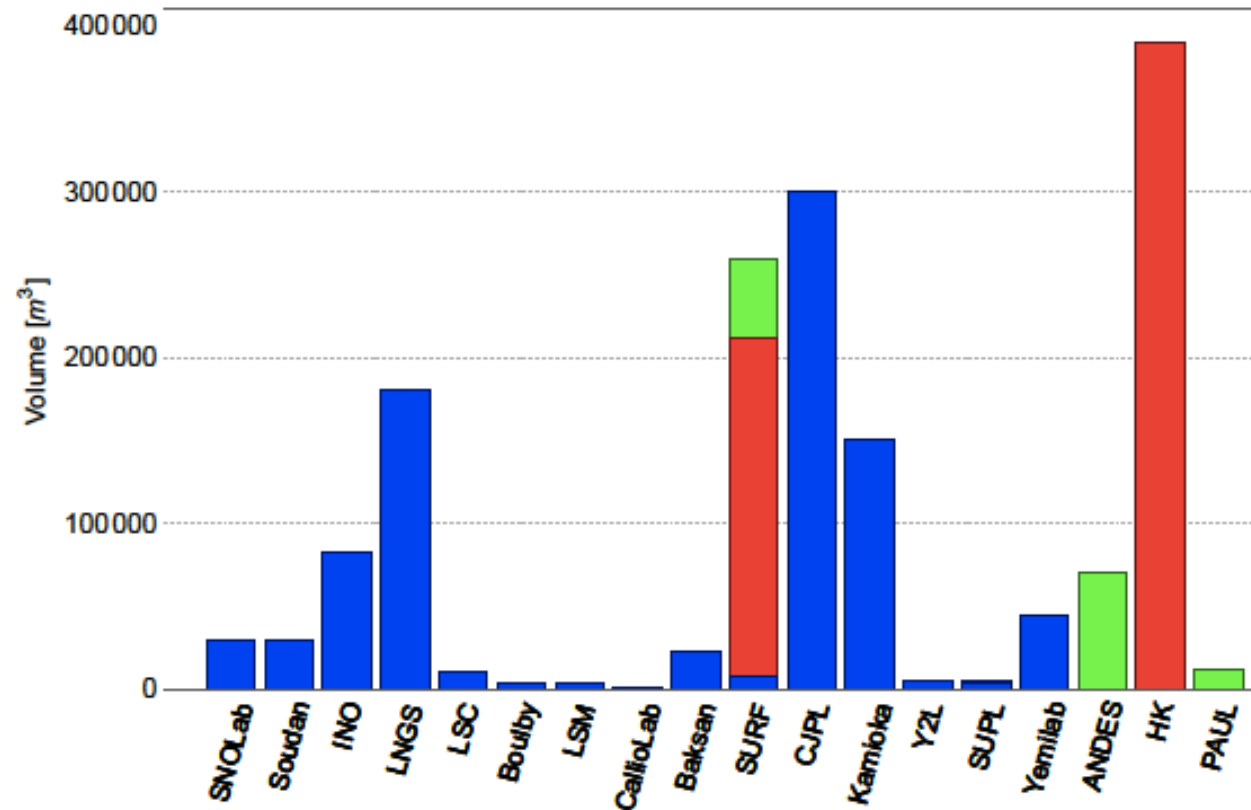


Fig. 1. Excavated volume in existing and planned ULs. Blue: in operation. Red: being excavated. Green: planned.

Source: A. Ianni report

# Scientific reviews of PAUL

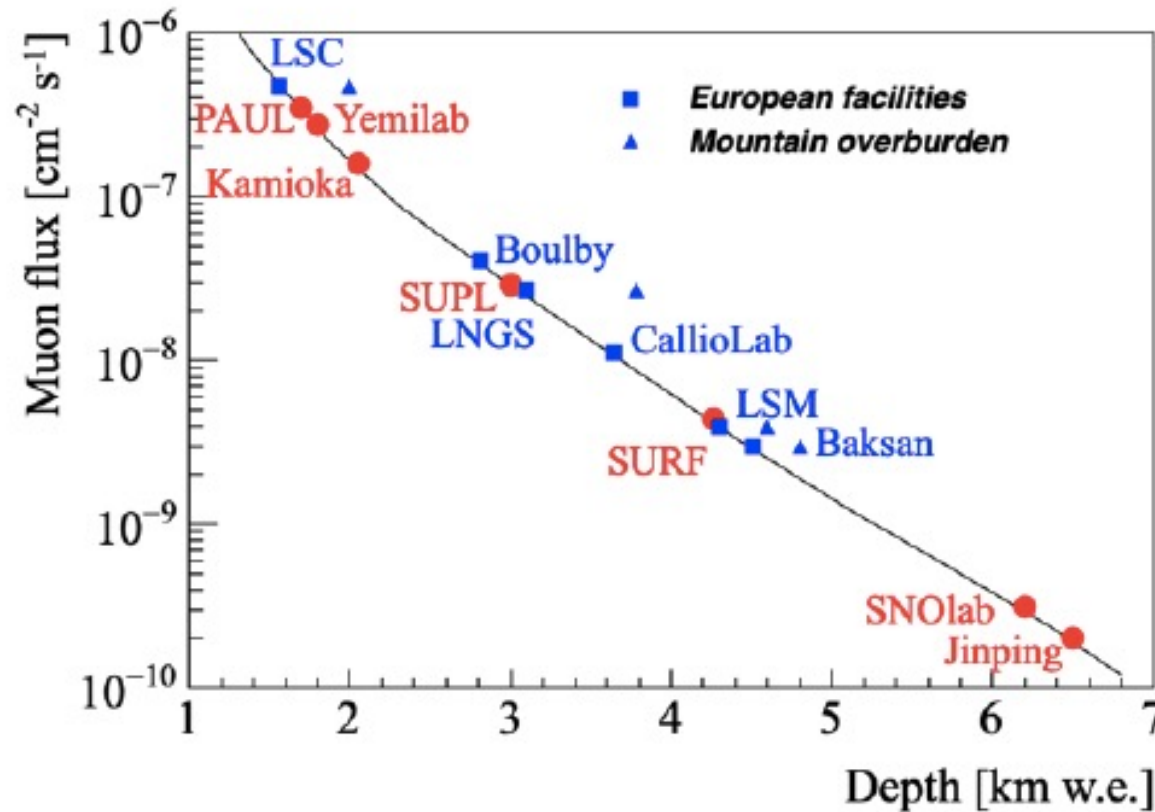


Fig. 2 Cosmic muons flux in ULs. The solid line shows the flux under a flat surface. The approximate position of PAUL in this line is shown. For ULs under a mountain the maximum overburden is also reported (this will also be the case for PAUL – here not shown).

Source: A. Ianni report

# Scientific reviews of PAUL: notable quotes

Dr Aldo Ianni (LNGS, Italy),

- “PAUL will be located in the Southern hemisphere and this point is **valuable.**”
- “...any experimental activity on DM ... has to be equipped with a **muon veto detector.**”
- “It is recommended that all materials being used in making PAUL will be selected through **radio-purity assay.**”
- “Considering the size and depth, with a **clean room standard** infrastructure at ISO6 PAUL could offer a more valuable opportunity for future science activities.”

# Scientific reviews of PAUL: notable quotes

Dr Jeter Hall (SNOLAB),

- “The proposed Paarl Africa Underground Laboratory (PAUL) would be a **valuable addition** to the African and global research enterprise.”
- “ ... so there are **scientific niches** that have not been exploited in many of the areas listed in the PAUL concept paper.”
- “There are scientific opportunities in **combining** the most sensitive underground searches with the most detailed astronomical surveys to narrow down the possibilities for dark matter, and to gain the most insights into any discoveries regarding the dark matter problem.”

## Prof. Azwinndini Muronga (NMU),

- “I would like to emphasize that an Underground Laboratory (UL) facility in South Africa will unleash the county’s untapped resources and capability in science and technology. Tapping into the UL space will open new avenues of innovation which will spin off into sectors such as archaeology, health, agriculture, mining, and future underground infrastructure.”



- Assume excavation rate (drill and blast):

30 m<sup>3</sup> per day

# PAUL Project Timelines



- Assume excavation cost (drill and blast):

100 US\$ per m<sup>3</sup>

- According to plan fully serviced laboratory to be completed by end of 2027.

# PAUL Project Budget

										01-Aug-23
item	total volume	cost per m <sup>3</sup>	US\$/R	total floor area	cost per m <sup>2</sup>	assumed cost per m <sup>2</sup>	cost	cost		Ask from SA gov
	m <sup>3</sup>	US\$			US\$	US\$	US\$	Rands		
excavation	10240	100	20		(from ChatGBT)		1024000	20480000	1,00E+07	2,20E+07
structural reinforcement				600	1000 - 3000	2000	1200000	24000000		2,40E+07
foundation work				600	500 - 1500	1000	600000	12000000		1,20E+07
utilities				600	500 - 2000	1200	720000	14400000		1,44E+07
interior finishes				600	1000-5000	2500	1500000	30000000		3,00E+07
Ultra-low background facility								8000000		
Dark Matter Facility							400000	8000000		
Biological Science Facility								5000000		
above ground offices/workshops								5000000		5,00E+06
						Grand Total		126880000	105880000	1,07E+08
										1,29E+08
								Rands		1,30E+08
								US\$		6,50E+06

- SMEC Engineering contracted by SANRAL (SA National Roads Agency Limited) to do design of upgrade of North Bore of Huguenot Tunnel
- Waiting for SMEC Engineering to give quotation/proposal for doing engineering feasibility study for PAUL

# PAUL engagement with SA government

- made presentations to, and in discussion with SANRAL (SA National Roads Agency Limited) which falls under the Department of Transport
- made presentations to, and in discussion with Department of Science and Innovation (DSI)
- Key goal: to get formal support for PAUL from both the Department of Transport and DSI

# PAUL engagement with SA government

- submitted a request to Department of Science and Innovation (DSI) for R 5 million on 14 September 2023
- this will be discussed at the DSI Executive Committee meeting in next 2 - 3 weeks.
- visit to Huguenot Tunnel by DSI, week of 23 October.
- (1 US\$ ~ R 20)

# Symposium on Science at PAUL

- dates: 14 - 18 January 2023
- venue: Du Kloof Lodge, Du Toitskloof Mountains (just outside the Huguenot Tunnel)
- Confirmed invited speakers:
  - Dr Jodi Cooley (SNOLAB)
  - Prof Elisabetta Barberio (SUPL)
  - Dr Sylvia Scorza (CNRS)
  - Dr Aldo Ianni (LNGS)
  - Dr Marcello Messina (LNGS)
  - Dr Matthias Laubenstein (LNGS)



# SSP venue



# Symposium on Science at PAUL

- call for abstracts (deadline 14 Oct 2023)
- come and form collaborations around specific research topics

Thank you

