LUXEMBOURG SPACE RESOURCES WEEK 2025

LUWEX Highlights: A Complete Process Chain Demonstration of Lunar Water Extraction and Purification

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German Aerospace Center (DLR)

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LUWEX

Validation of Lunar Water Extraction and Purification Technologies
for In-Situ Propellant and Consumables Production

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The development, integration and validation of lunar water extraction and purification technologies for in-situ propellant and consumables production for future space exploration missions

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LUWEX

Validation of Lunar Water Extraction and Purification Technologies
for In-Situ Propellant and Consumables Production

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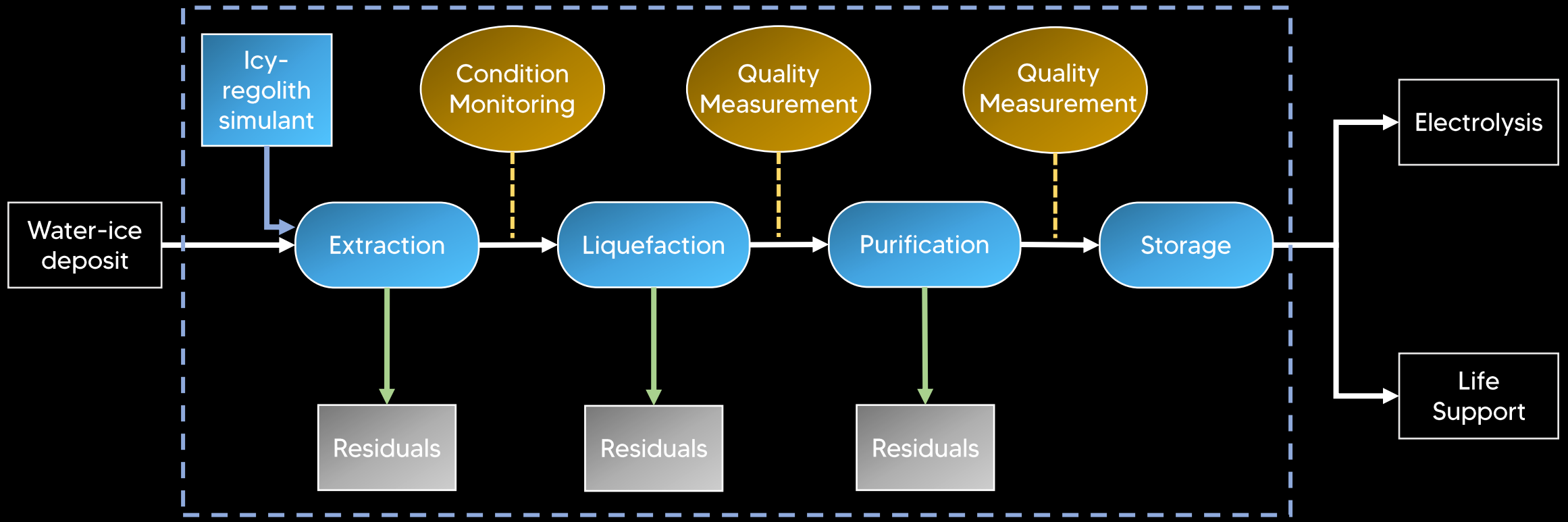

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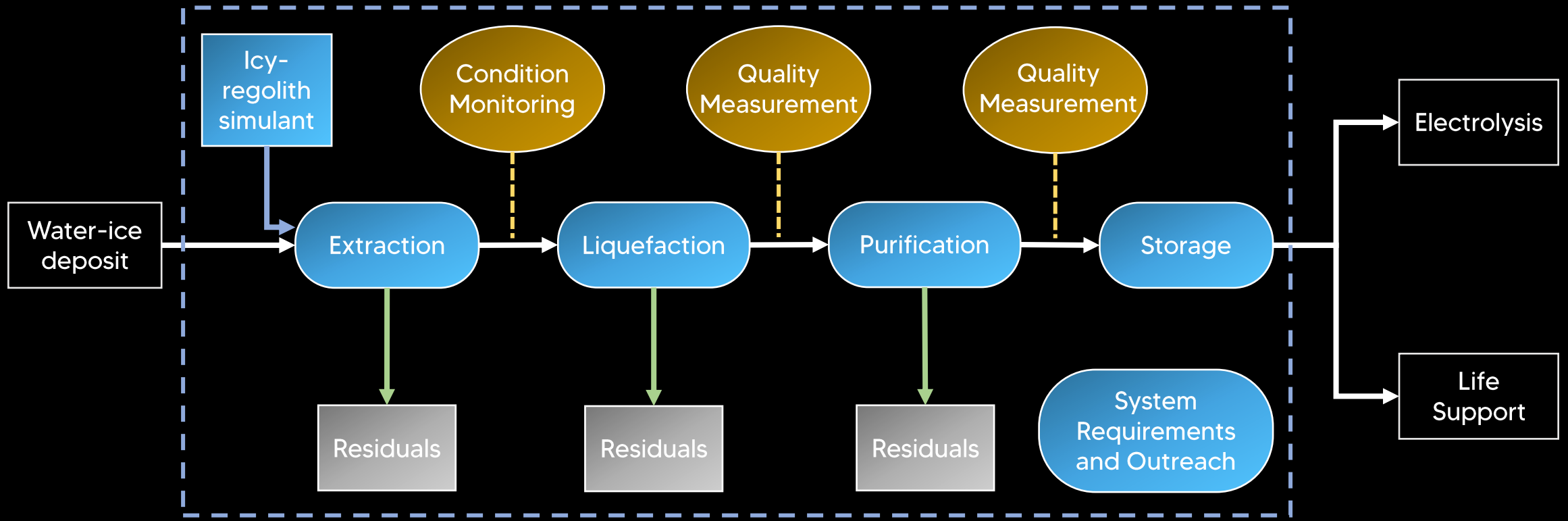

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LIQUIFER SYSTEMS GROUP

Politechnika Wrocławska

Scanway space

LUWEX

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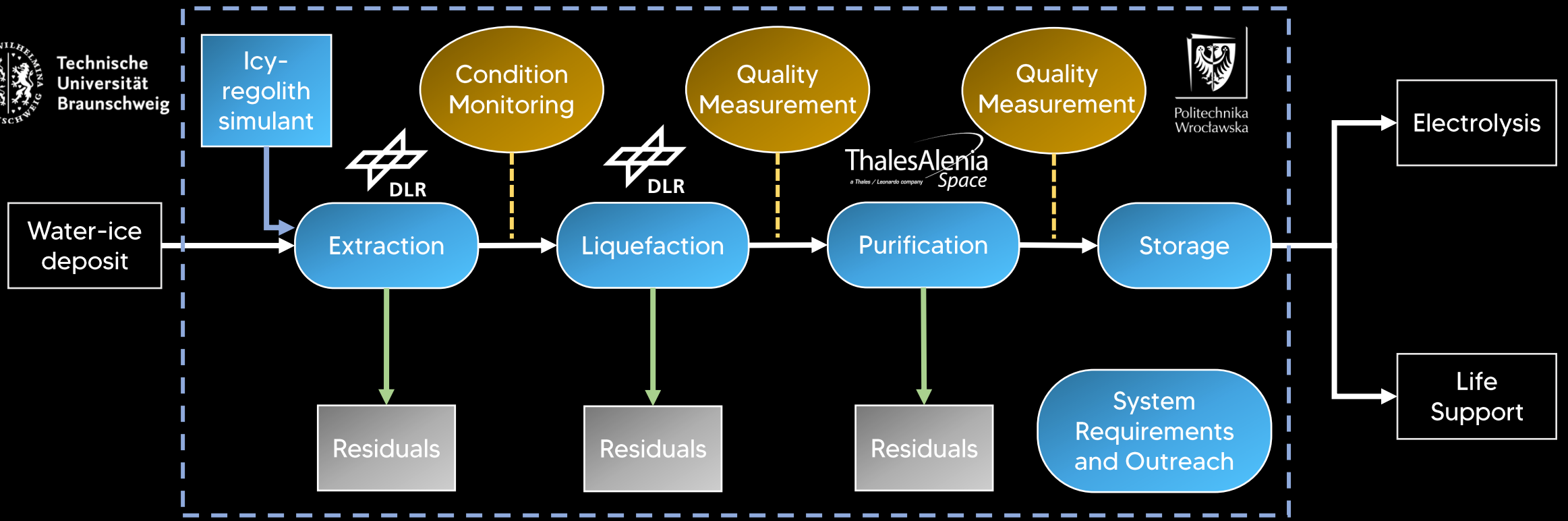

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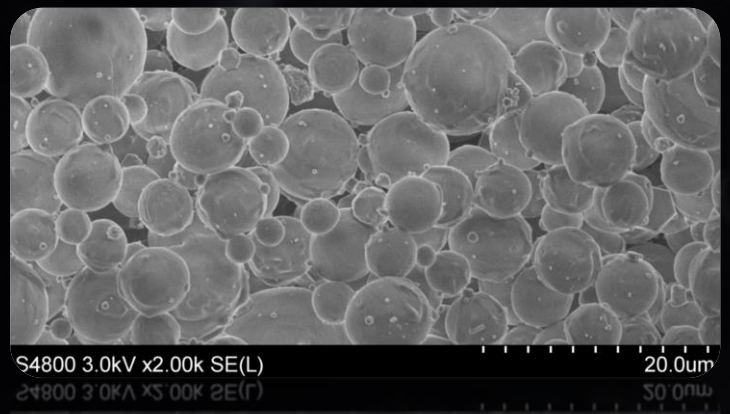
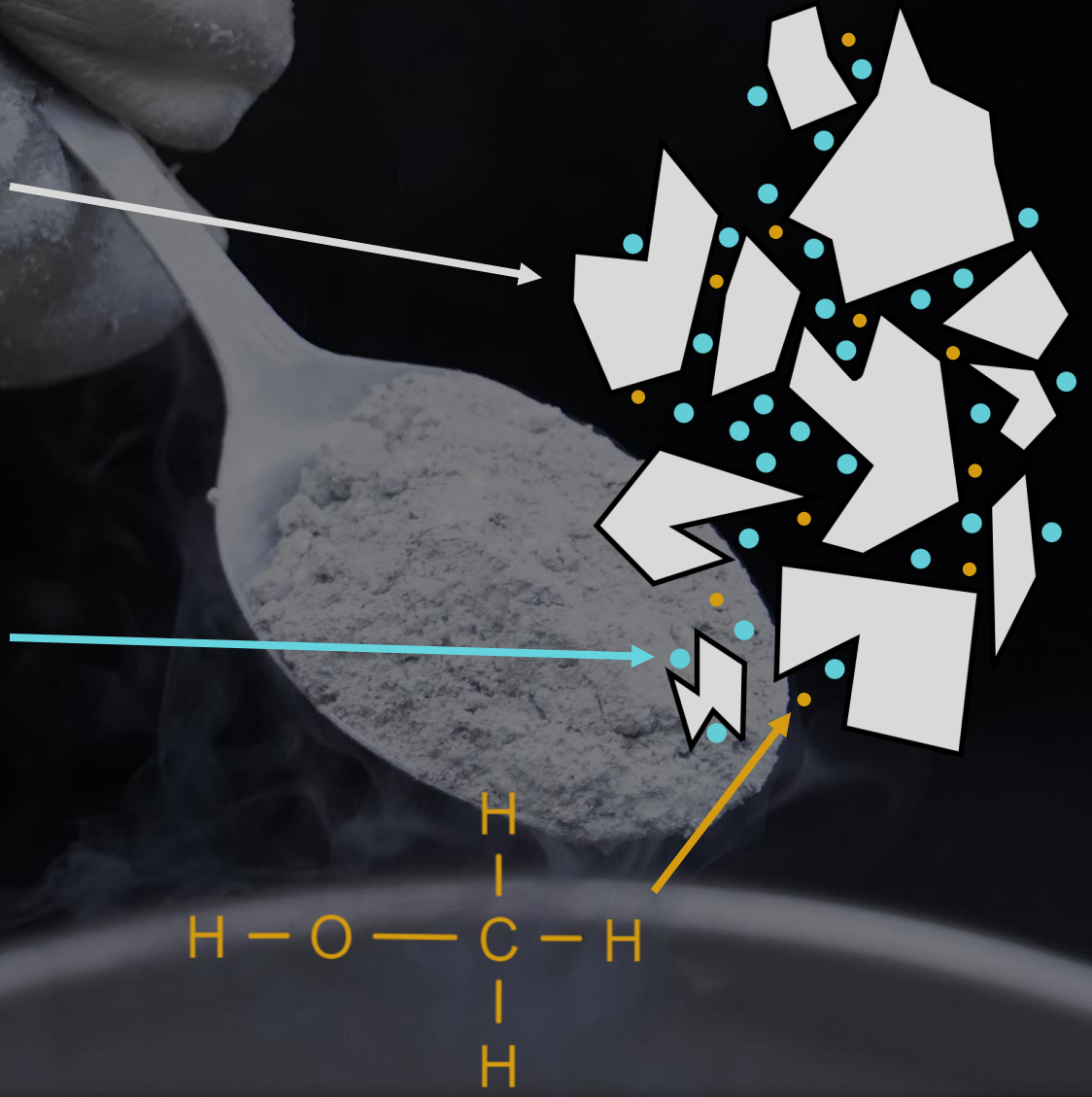
Icy-Regolith Simulant





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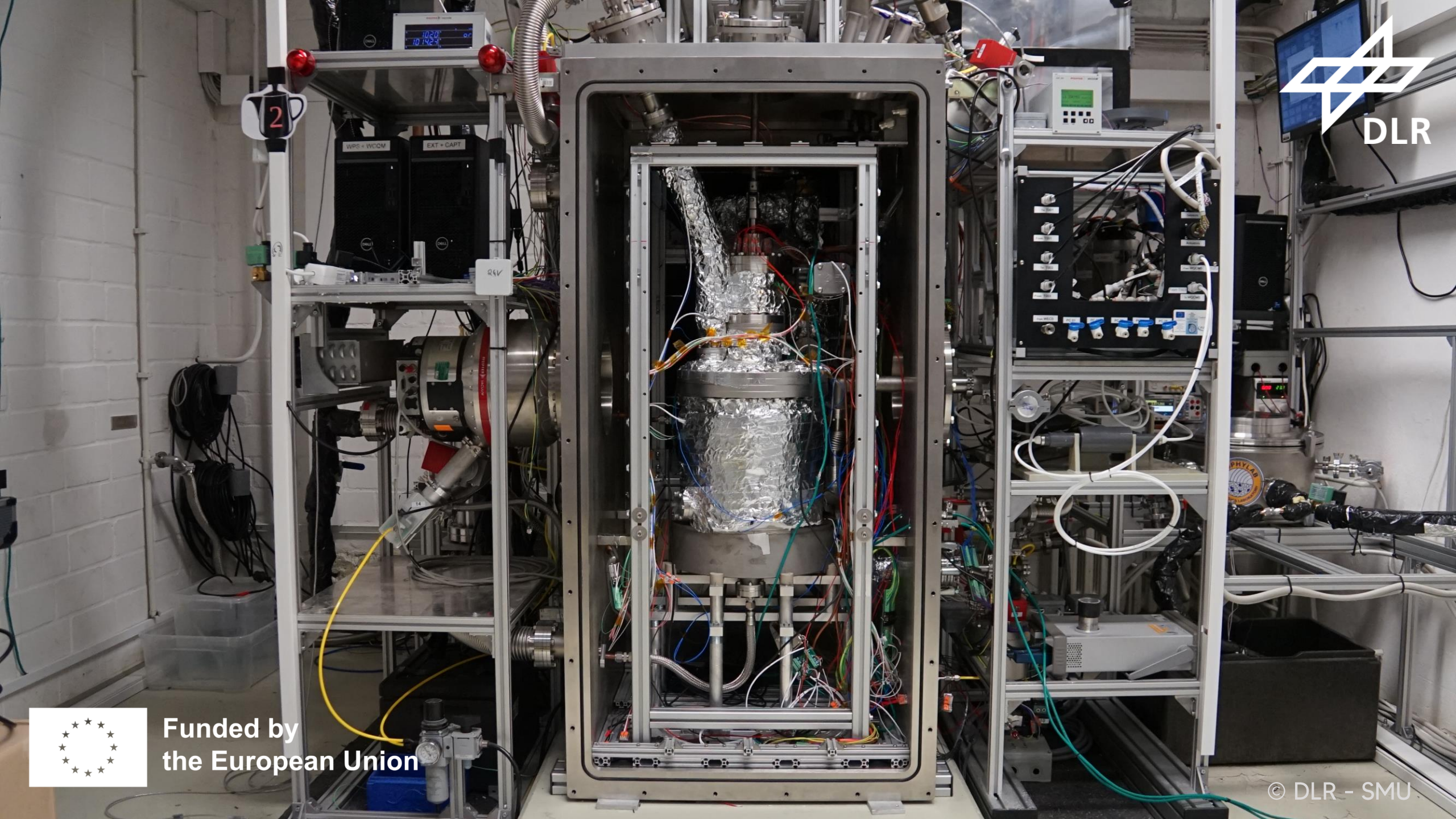
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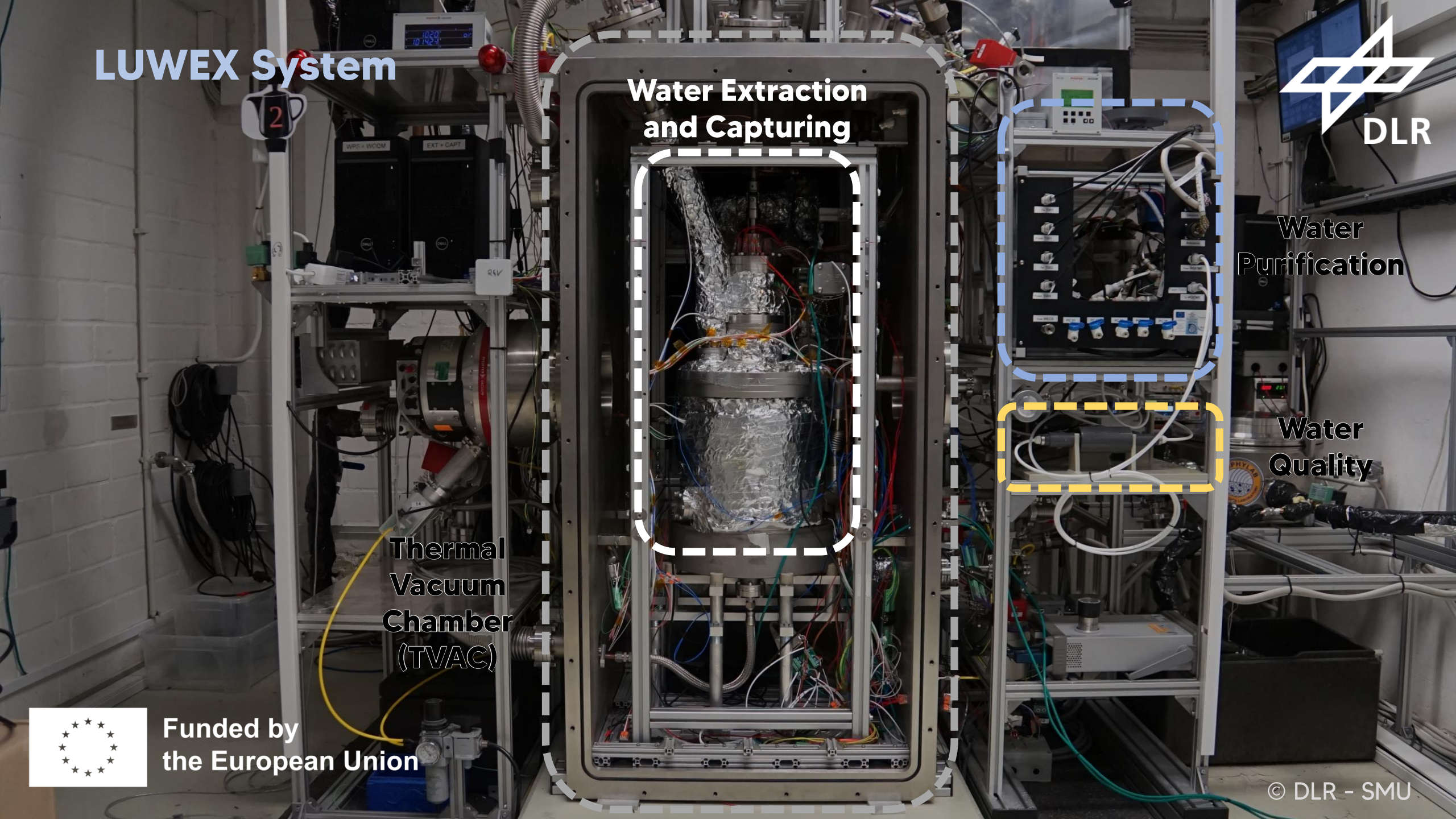
LUWEX System
Water Extraction and Capturing
Water Purification
Water Quality
Thermal Vacuum Chamber (TVAC)
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Water Extraction and Capturing

- Dusty TVAC
- Temperature ≈ 80 – 100 K
- Pressure ≈ 10e-6 mbar
- Icy regolith simulant mass up to 15 kg
- Amount of water present 5 wt.%, 750 mL (baseline)
- Presence of volatiles: CO_2 & Methanol

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Water Extraction and Capturing

- (Re)filled crucible for 12 experiments
- Successfully sublimated ice during 14 attempts
- Regolith simulant or glass beads

[redacted]

Crucible

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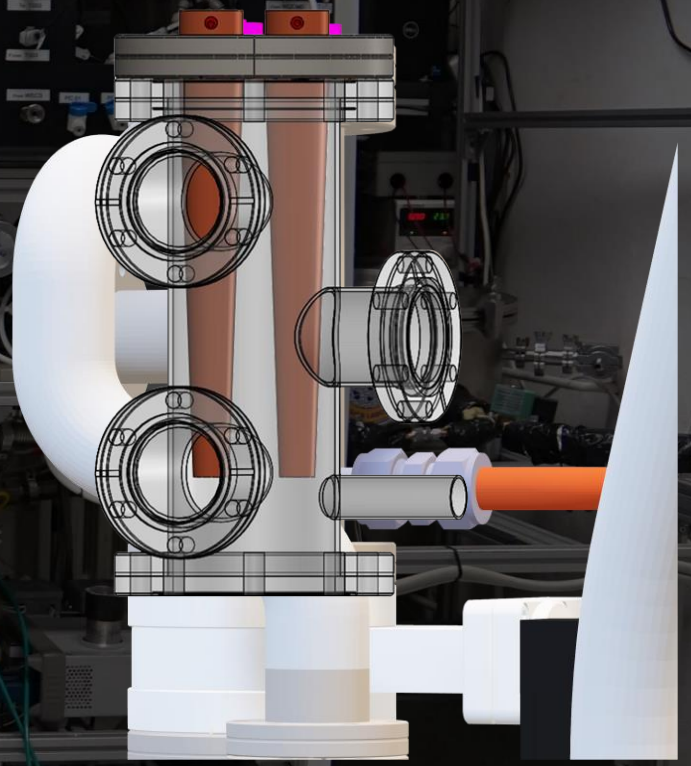
Water Extraction and Capturing

- Captured ice 14 times
- Capturing efficiency relatively high (around 90%)
- Methanol severely reduced efficiency

Cold trap



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Water Extraction and Capturing

60 kg of produced simulants

20 - 50 g of water per kWh

50 - 70% recovery efficiency

2,4 kg of water recovered

3,7 kg of ice sublimated

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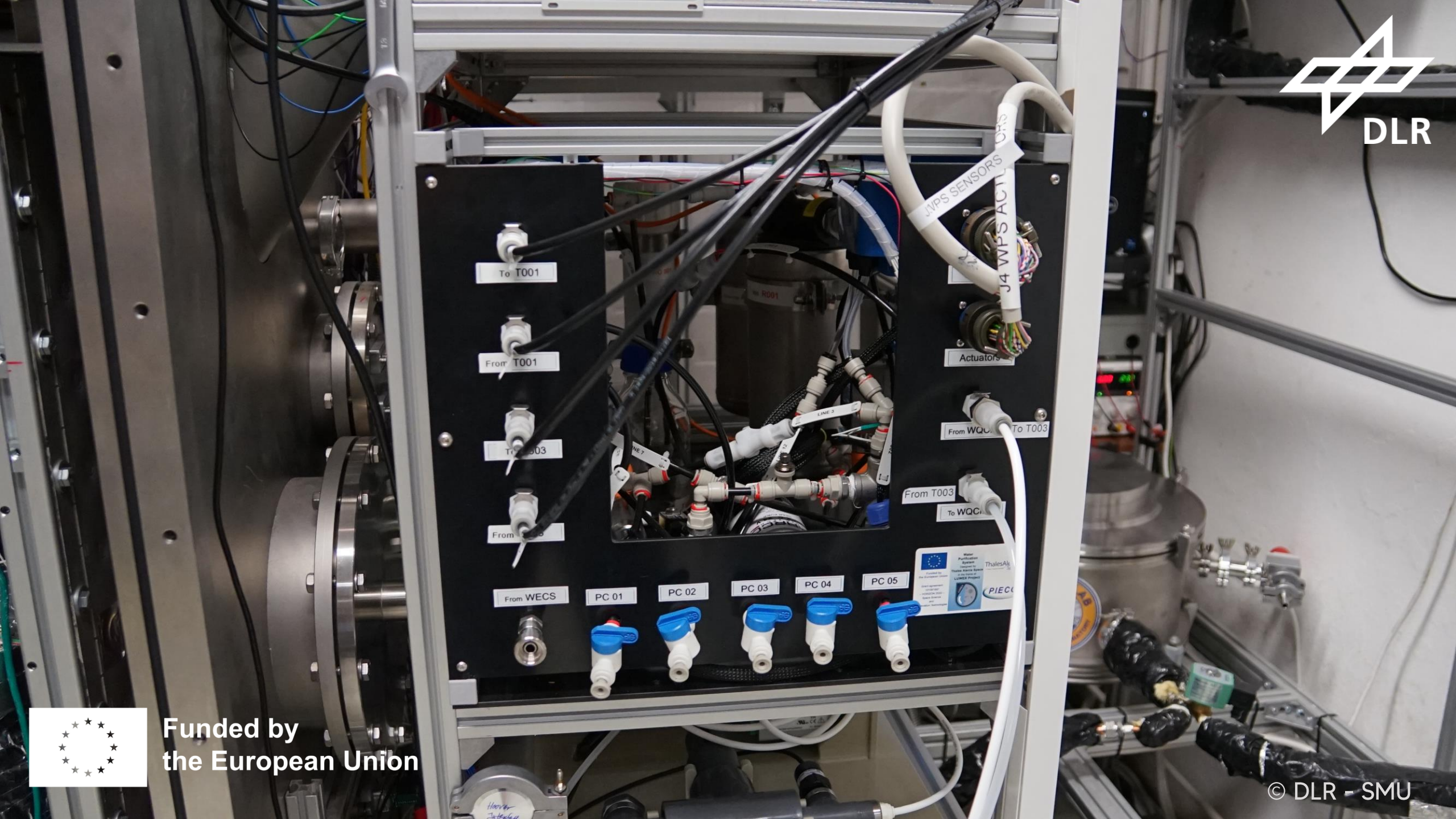
Full results yet to be published


To T001
From T001
From WECS
PC 01
PC 02
PC 03
PC 04
PC 05
Actuators
From T003
To T003
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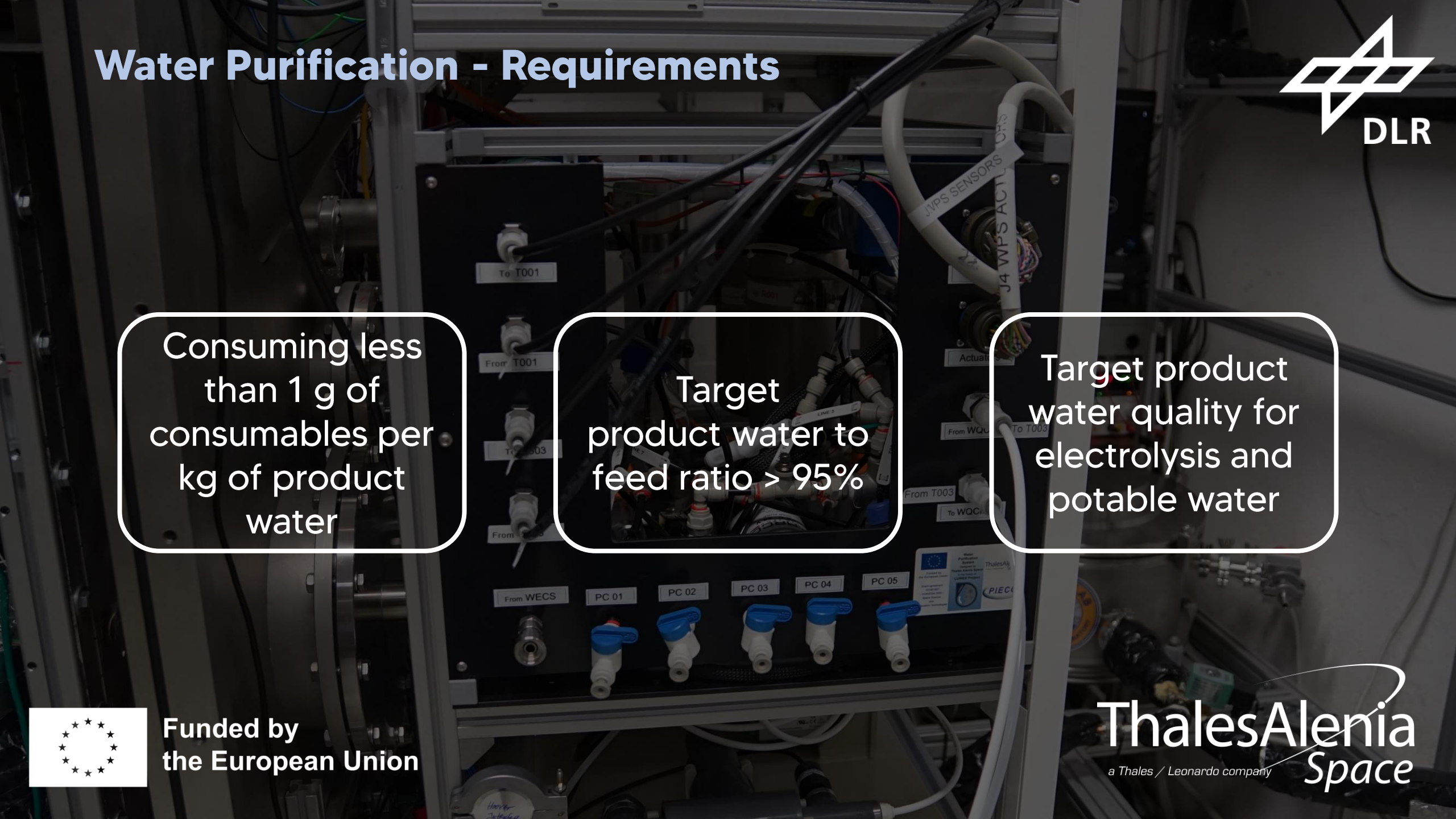
Water Purification - Requirements



Consuming less than 1 g of consumables per kg of product water

Target product water to feed ratio > 95%

Target product water quality for electrolysis and potable water

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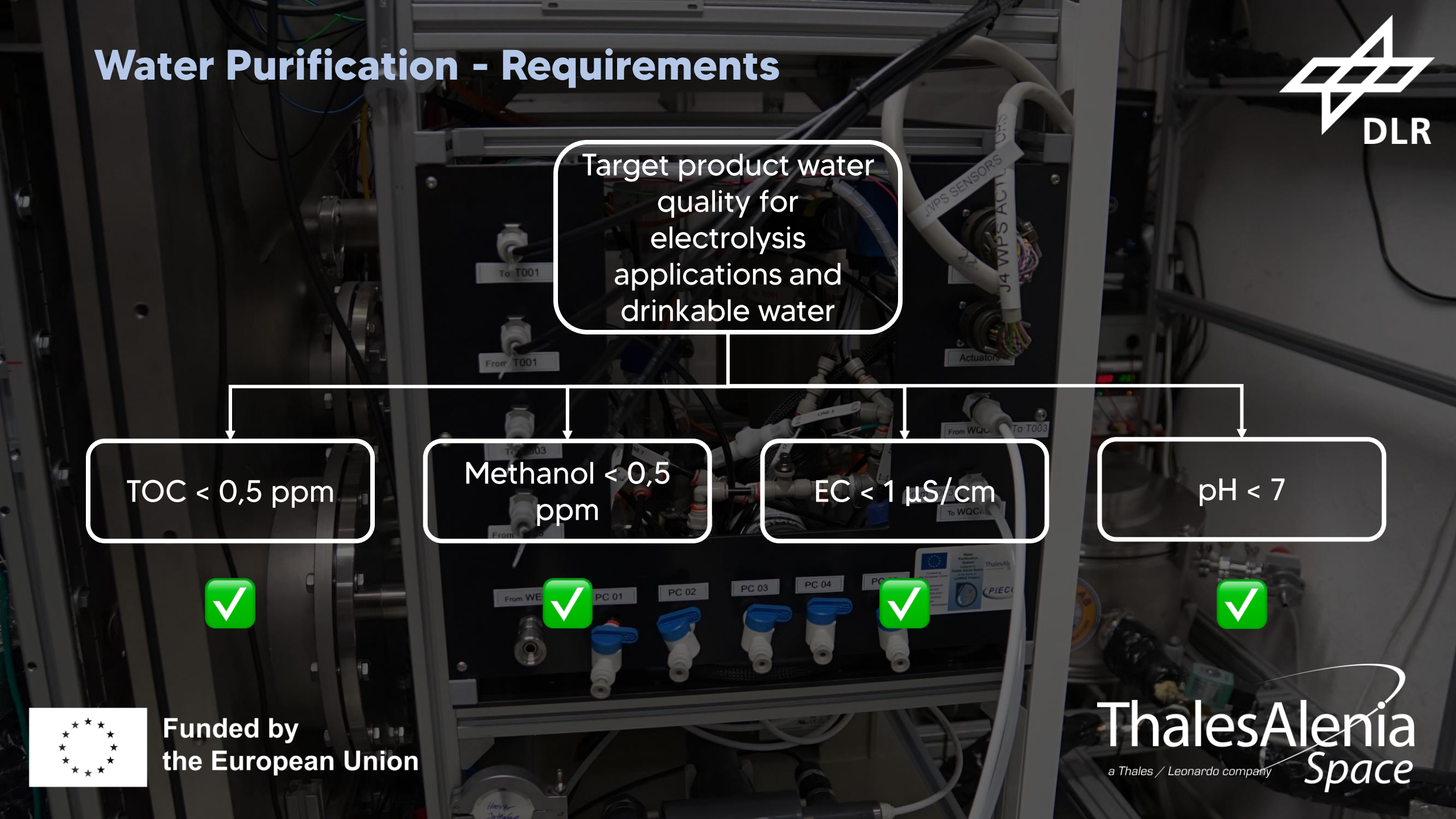
Water Purification - Requirements



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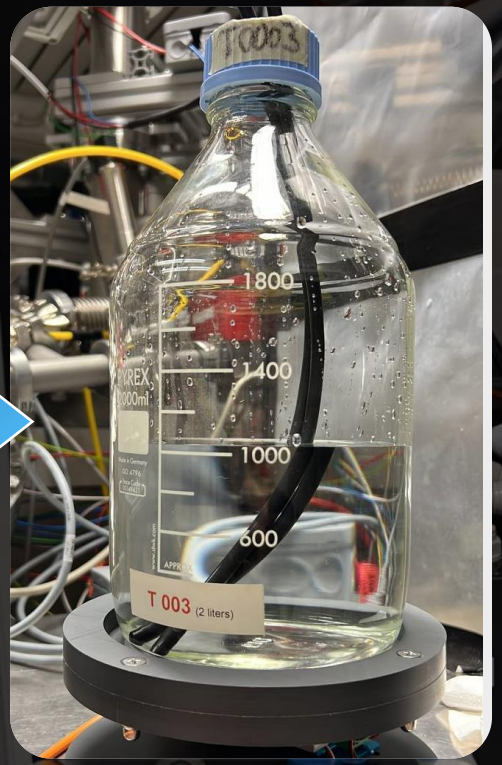
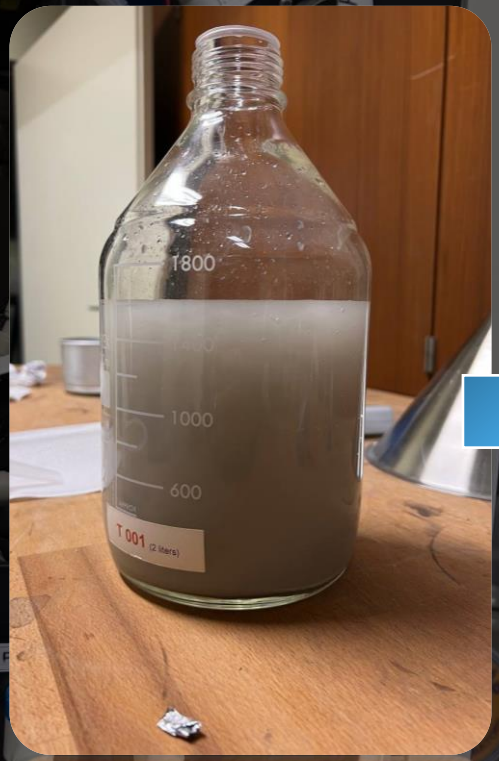
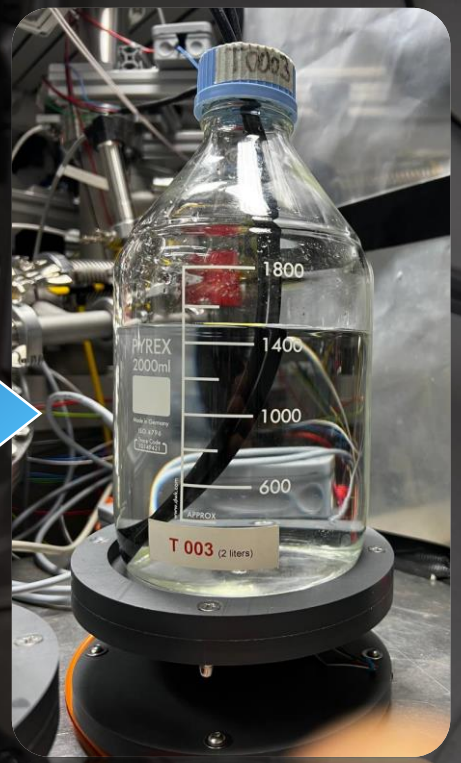
Water Purification Results

Glass beads and ice



Icy-regolith simulant





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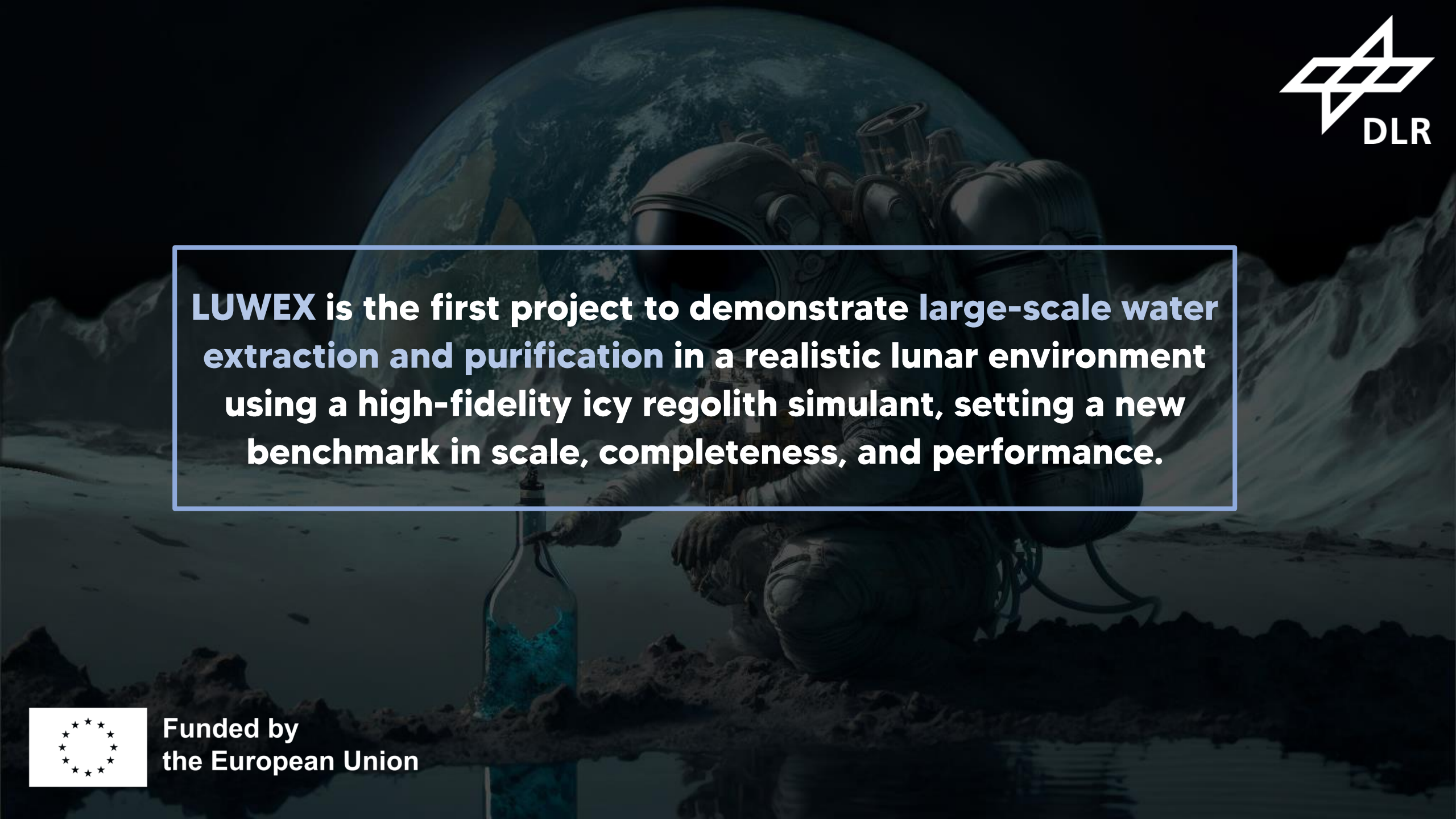
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LUWEX is the first project to demonstrate large-scale water extraction and purification in a realistic lunar environment using a high-fidelity icy regolith simulant, setting a new benchmark in scale, completeness, and performance.
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Thank you!

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Brochure

Podcast

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