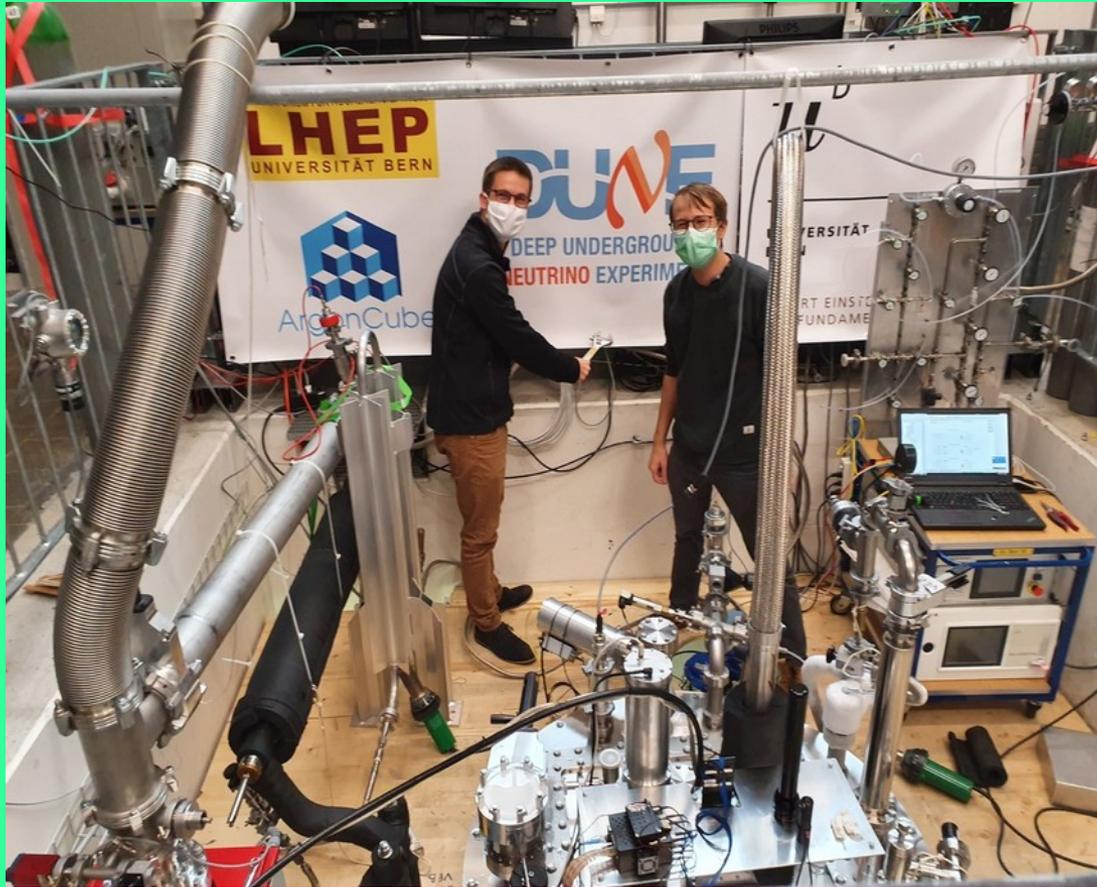
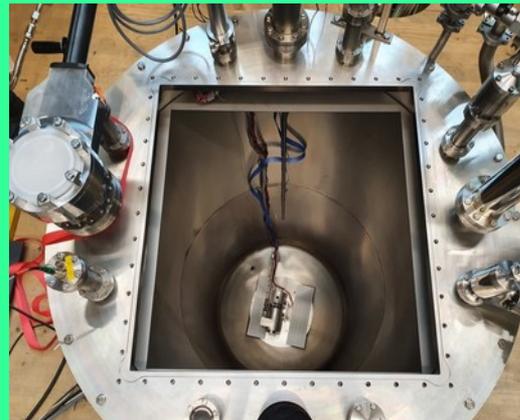


## ArgonCube Test Facility (ACTF) Bern, March 17 2021



## Mission

1. Built in 2006 for extensive R&D on large liquid argon detectors (ArgonTube, 5-m long drift)
2. Provides an environment for the R&D on cryogenics and detector components.
3. Assembly and performance tests of 2x2 modules
4. Assembly and performance tests of full size ND modules



## Available assets

Laboratory area - 250 m<sup>3</sup>, ~8m tall

Cryostat pit, ~3x3 m, 7m deep

Local supply of LN<sub>2</sub>, 10m<sup>3</sup> external storage cryostat

Local supply of LAr, 4.6m<sup>3</sup> external storage cryostat

Cryostat for 2x2 module  
(10 psi, 38.9" ID, 82" useful depth, ~2.1 m<sup>3</sup>)

Cryostat for detector R&D ~300 liters

Process control PLC (Fermilab, replication is in progress)

Clean power motor-generator

Compressed air, 8bar

Overhead crane, 2 tons max load

Ventilation system with ODH sensors and automatic shutoff of cryogenics supply

Access to loading/unloading ramp (truck access)

Qualified and experienced personnel



## Available assets

LAr purification cryogenic system

LN2-cooled recirculation filter

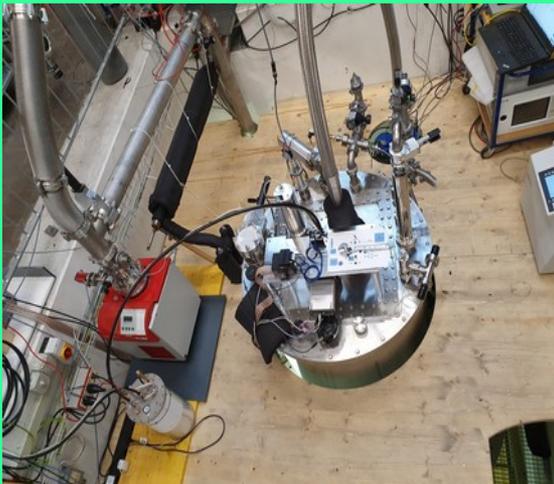
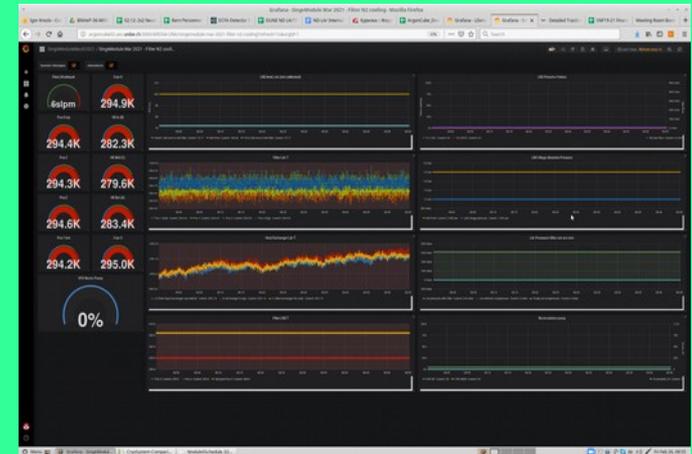
LAr recirculation pump (<2000 l/h)

Process control with PLC (pressures, temperatures, flow -> valves)

Process monitoring system (Influxdb, Grafana)

Vacuum pumping system (<10<sup>-6</sup> mbar)

LDetek gas chromatograph  
(0-50 ppm O<sub>2</sub>, N<sub>2</sub>, H<sub>2</sub>, H<sub>2</sub>O, CH<sub>4</sub>)



## Scope and schedule

Assembly and qualification tests of 2x2 modules - current mode

Performed:

SingleCube tests (Oct. 2020)

SingleModule tests, 1/8 of R/O instrumentation (Nov. 2020)

In preparation:

2x2 module 1 test (March-April 2021)

2x2 modules 2, 3 and 4 (and 5?) (by late 2021)

Next:

Assembly and qualification of full-size ND modules - start major upgrade in 2022, when all 4 modules of the 2x2 demonstrator are tested and delivered to FNAL.

Planning and placing ordered started in 2021

Upgrade steps:

New cryogenic pump, ordered, expected in Aug. 2021

New control PLC, delivered, assembly complete in May 2021

Upgrade of external LAr storage cryostat to 10m<sup>3</sup> (mid-2022)

Full-size cryostat (~7m<sup>3</sup>, 1.5m ID, 4m useful depth) design needs to be complete in 2021, delivery by mid-2022

## Resources

Supported by cantonal funding (general framework)

Supported by SNSF research grants and FLARE grant, no resource gaps expected

## Risks

Substantial delay in DUNE ND schedule may trigger questions from funding agency.

Delays in ACTF operation may result in gaps in expertise (University specifics)