Prototype of light collection module for LAr TPC (ArgonCube)

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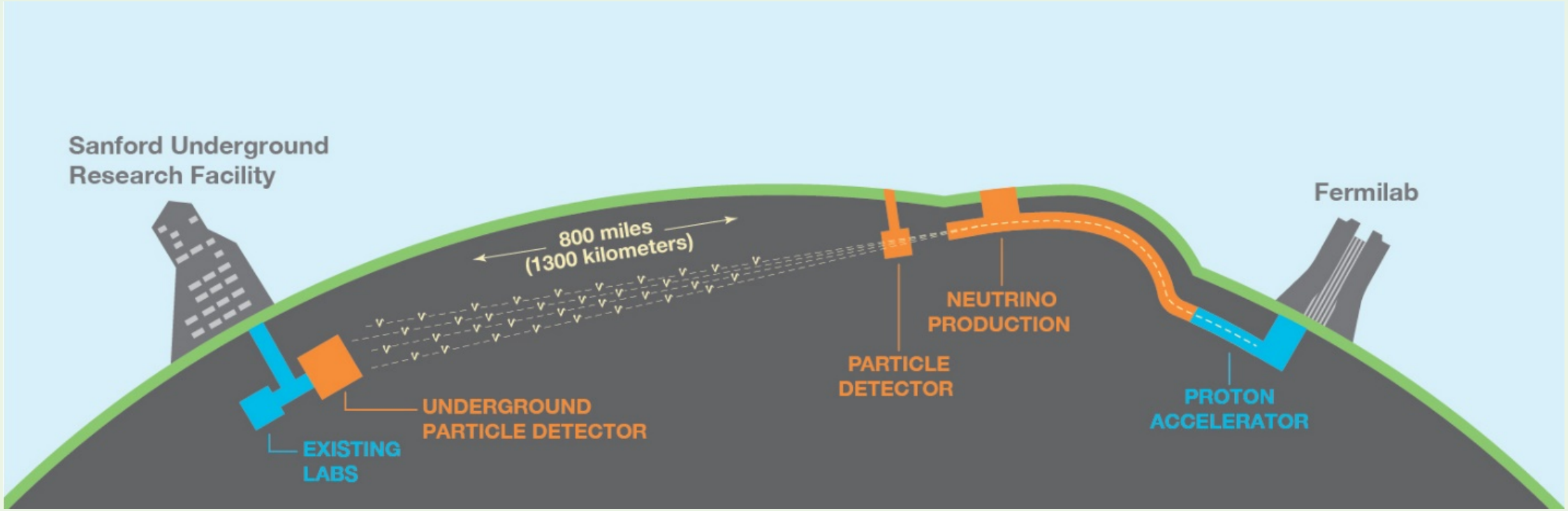
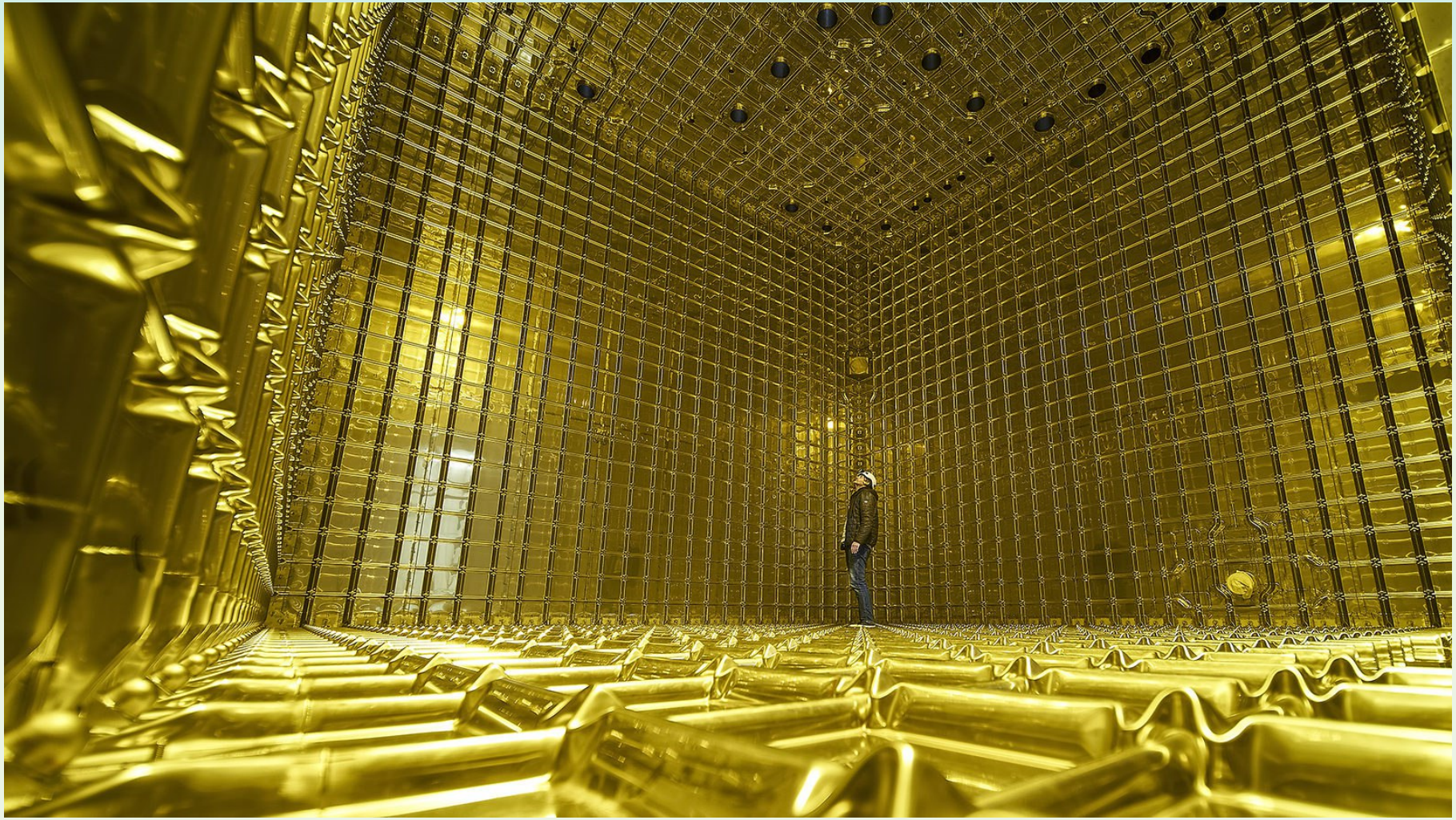
Deep Underground Neutrino Experiment (DUNE)



The distance between the far detector and the source of the beam will be 1300 kilometers.

Far detector prototype



Inside the far detector prototype (CERN).

ArgonCube is the DUNE near detector prototype

The liquid nitrogen-cooled and vacuum-insulated cryostat that will host the ArgonCube 2x2 Demonstrator module.

ArgonCube 2x2 Demonstrator module

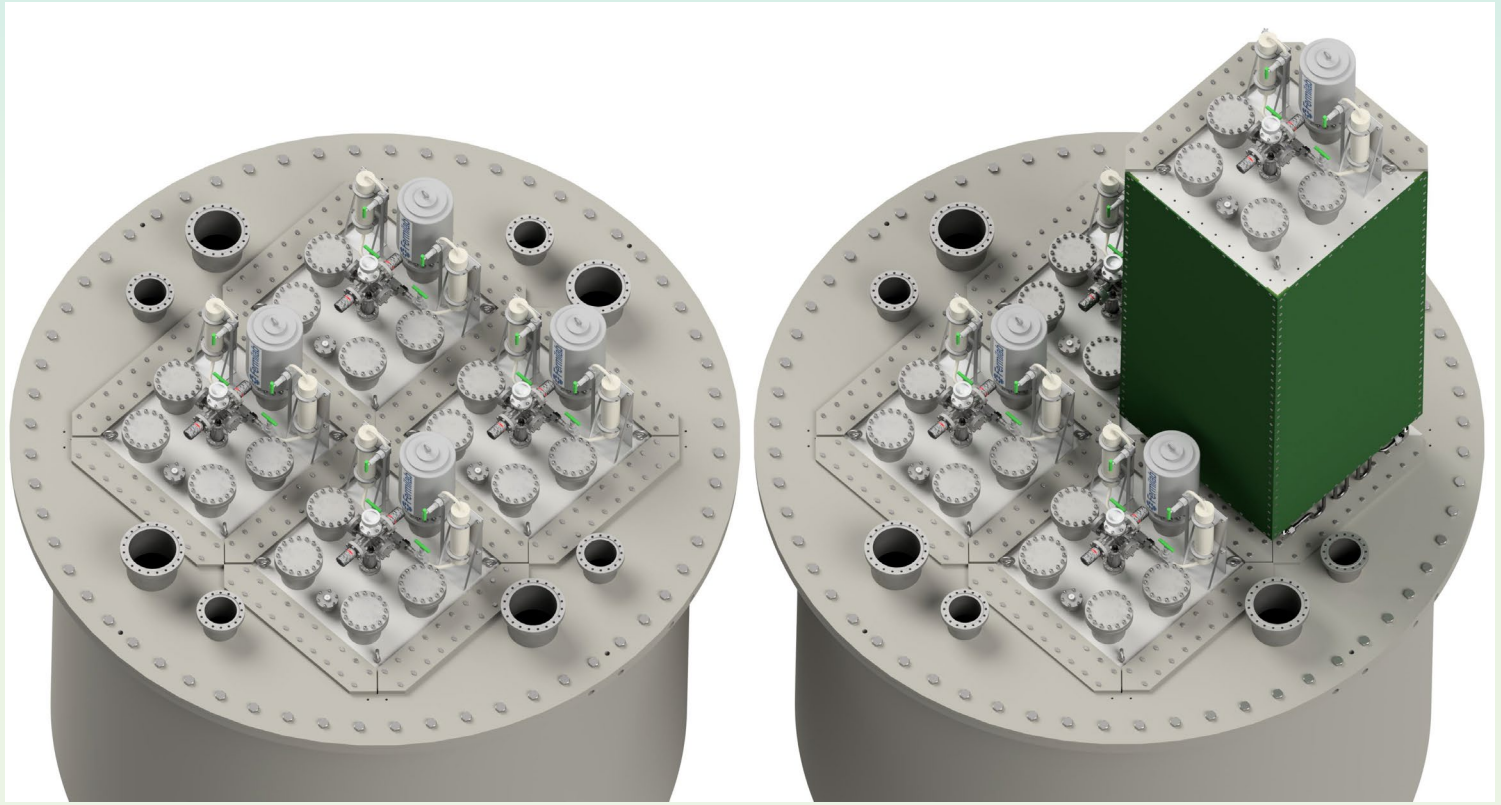
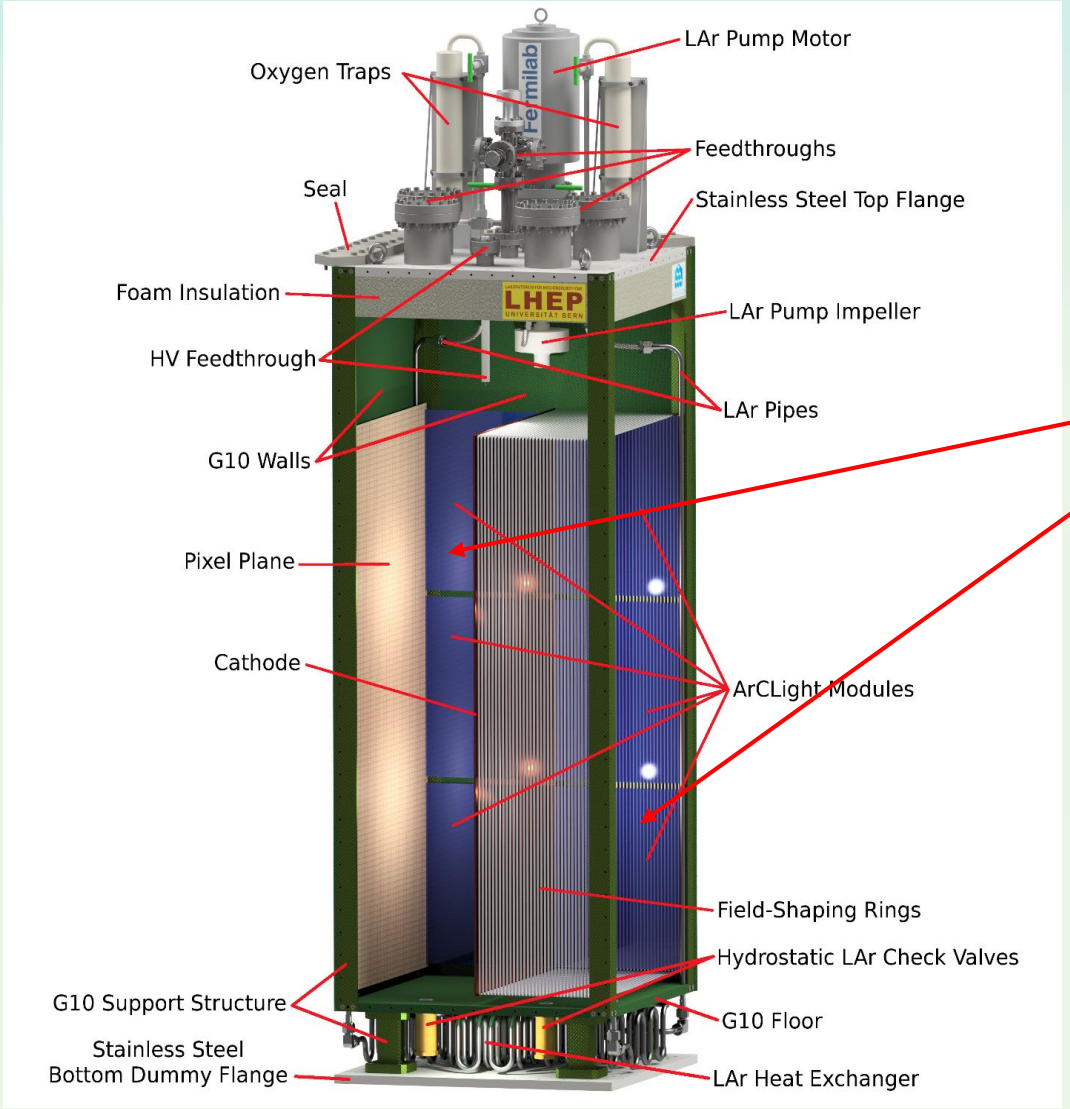


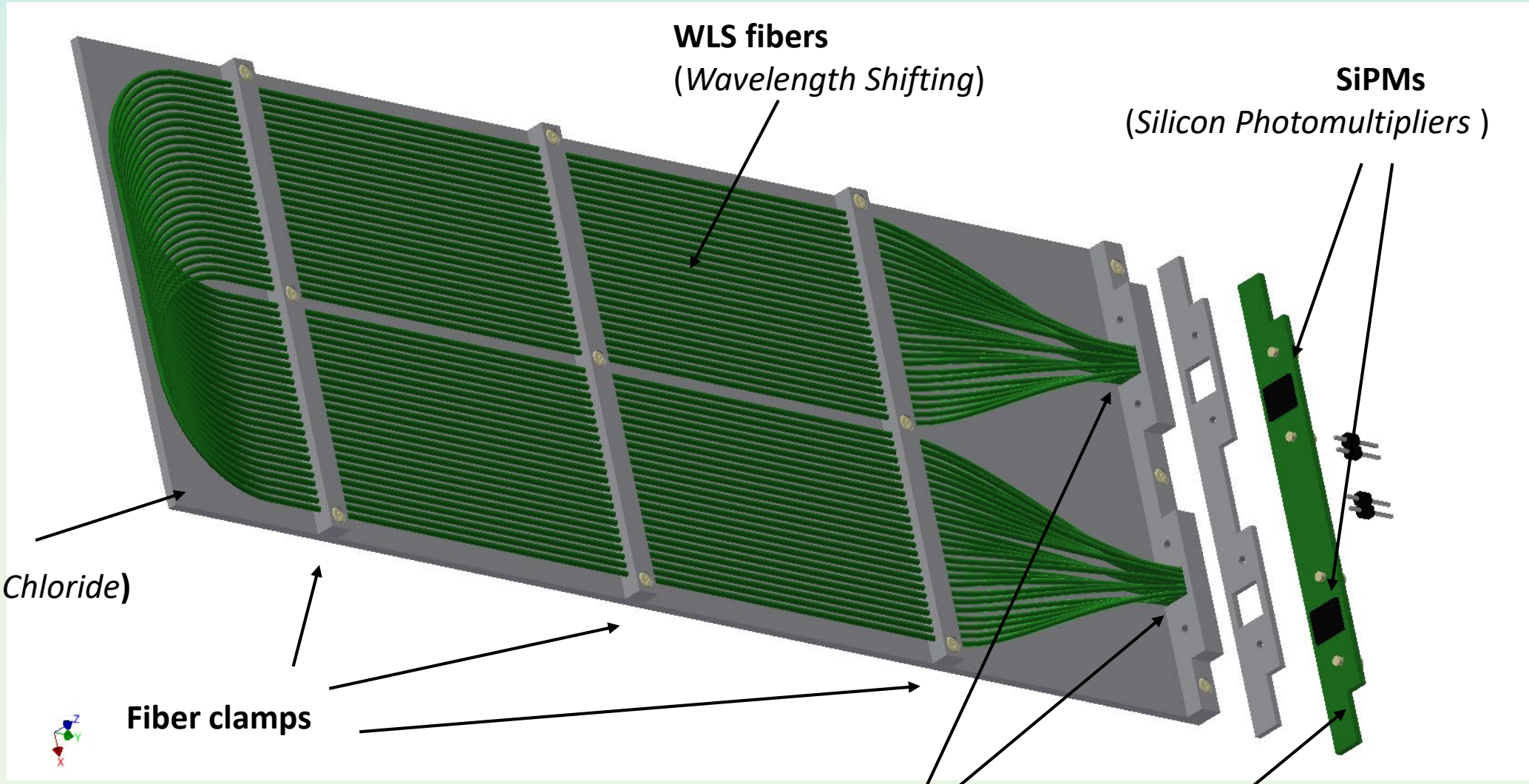
Illustration of the ArgonCube 2x2 Demonstrator module. The four modules are visible, with one of them is partly extracted, on the right.

ArgonCube module



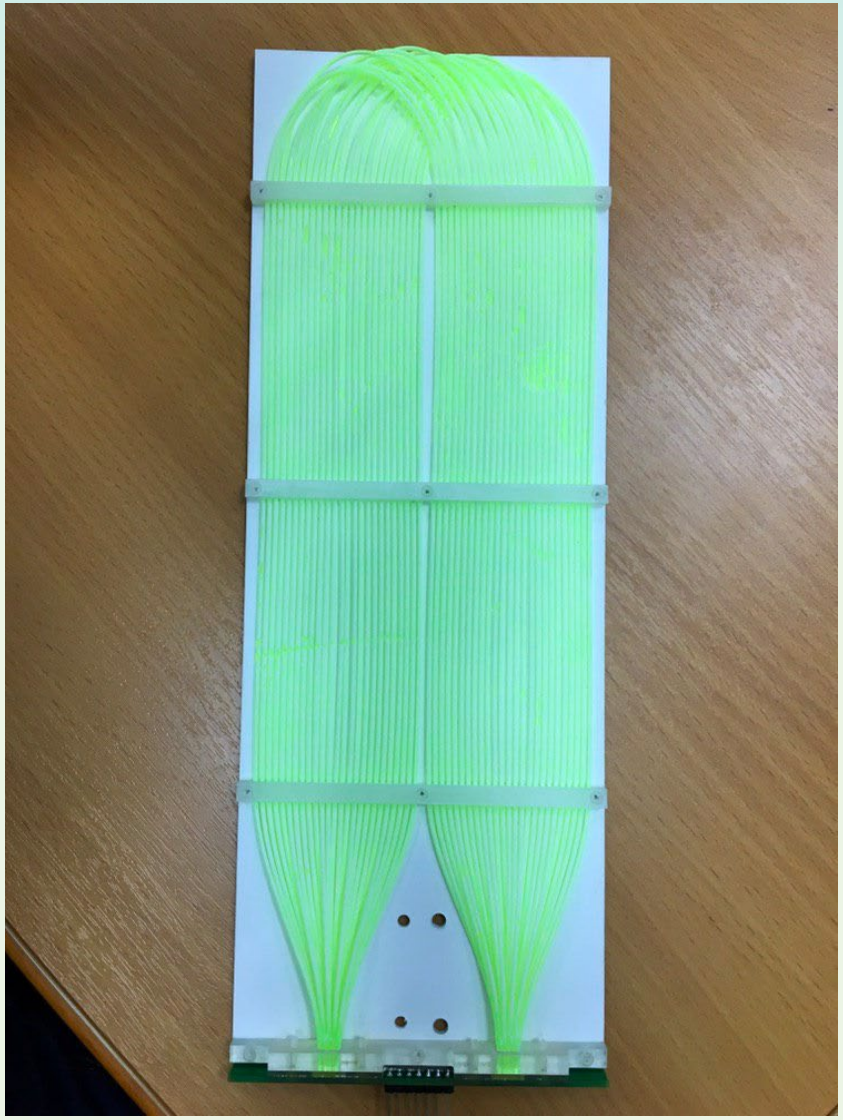
Cutaway drawing of a ArgonCube module for the 2x2 Demonstrator module.

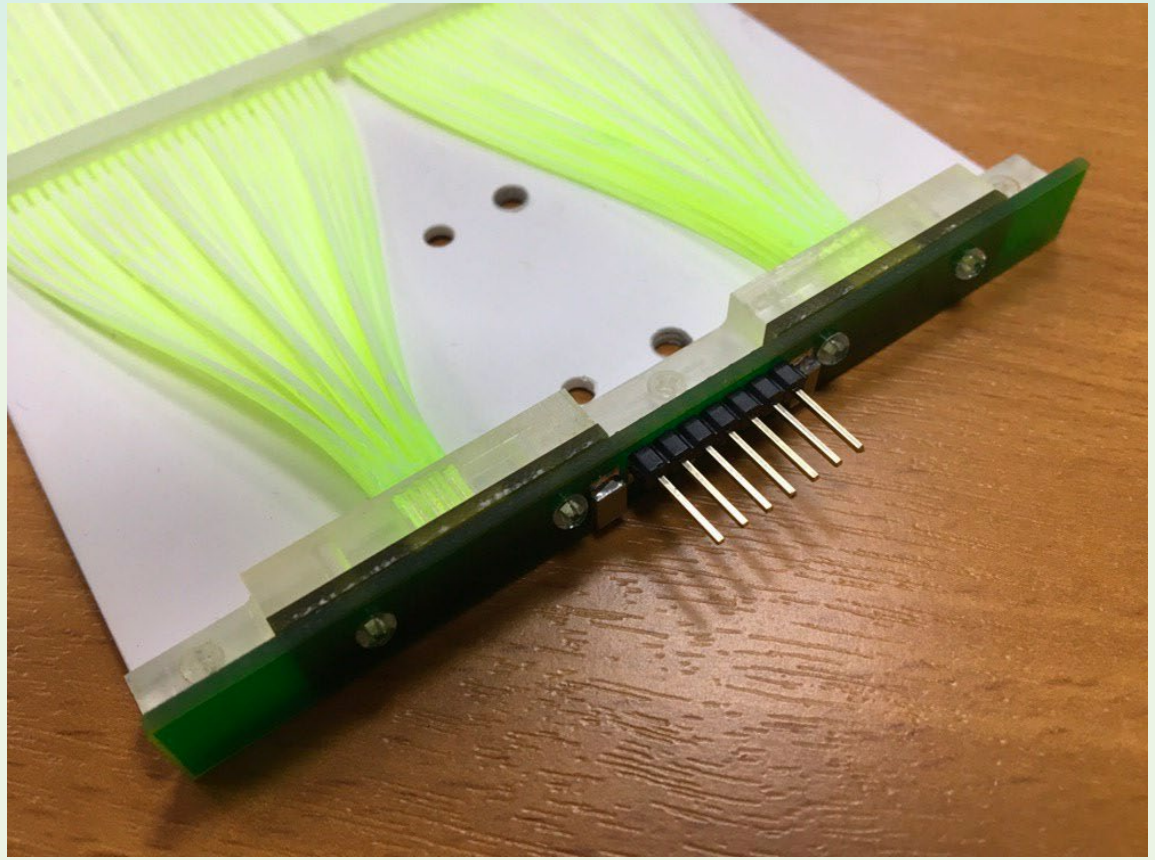
LCM Design



Current LCM's dimensions 100x300x10 mm

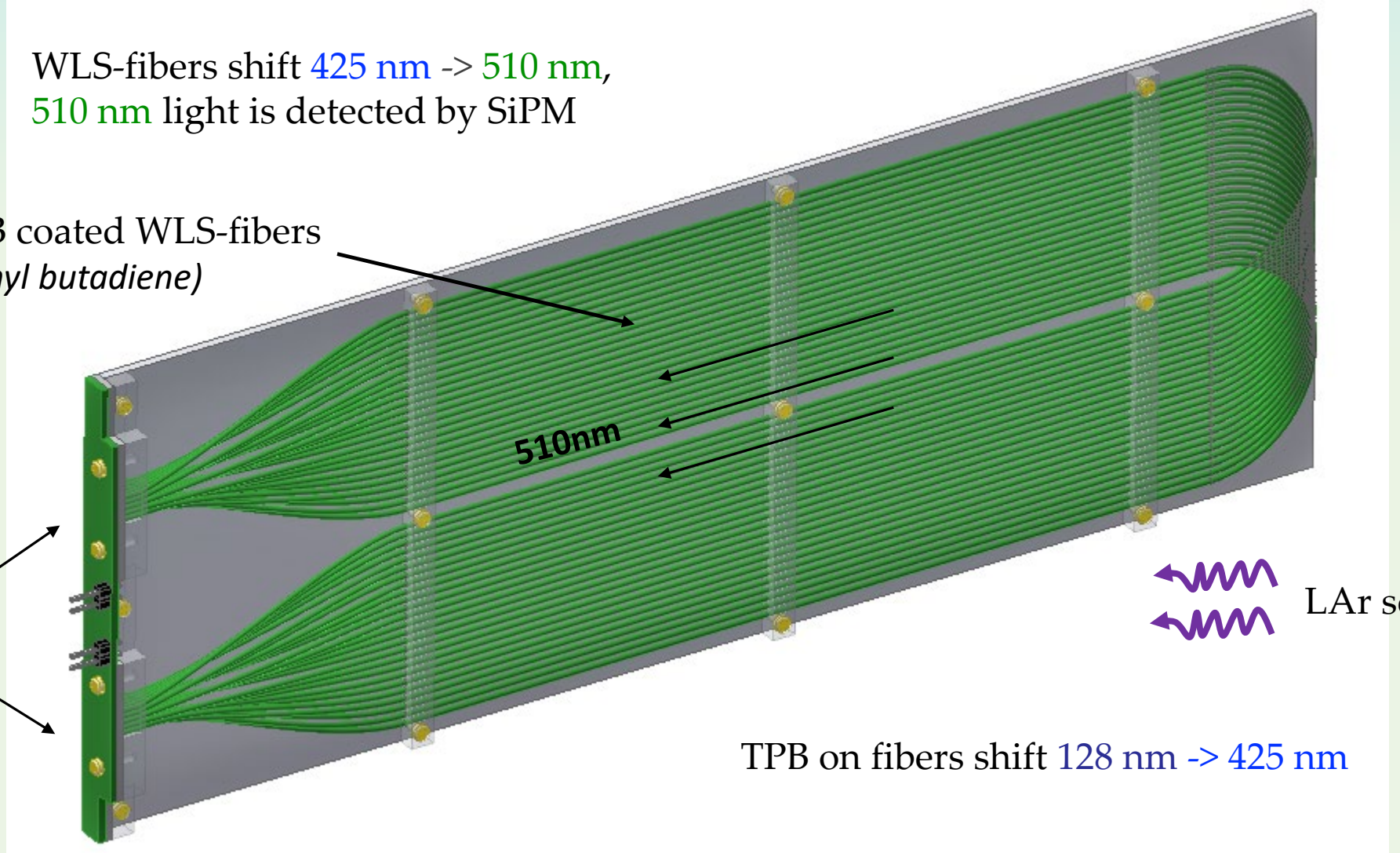
LCM



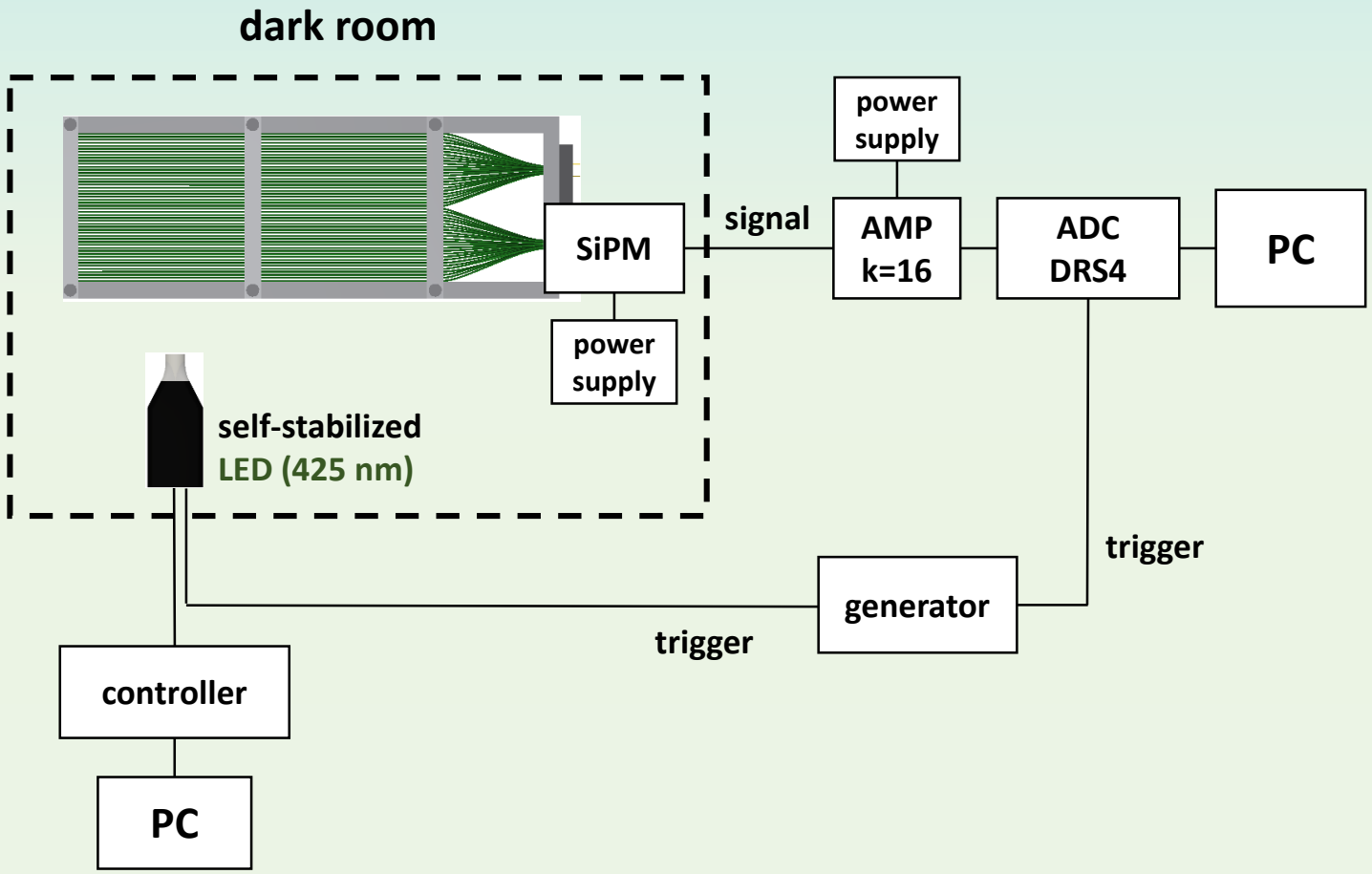


Current LCM’s dimensions 100x300x10 mm

The mechanism of light collection

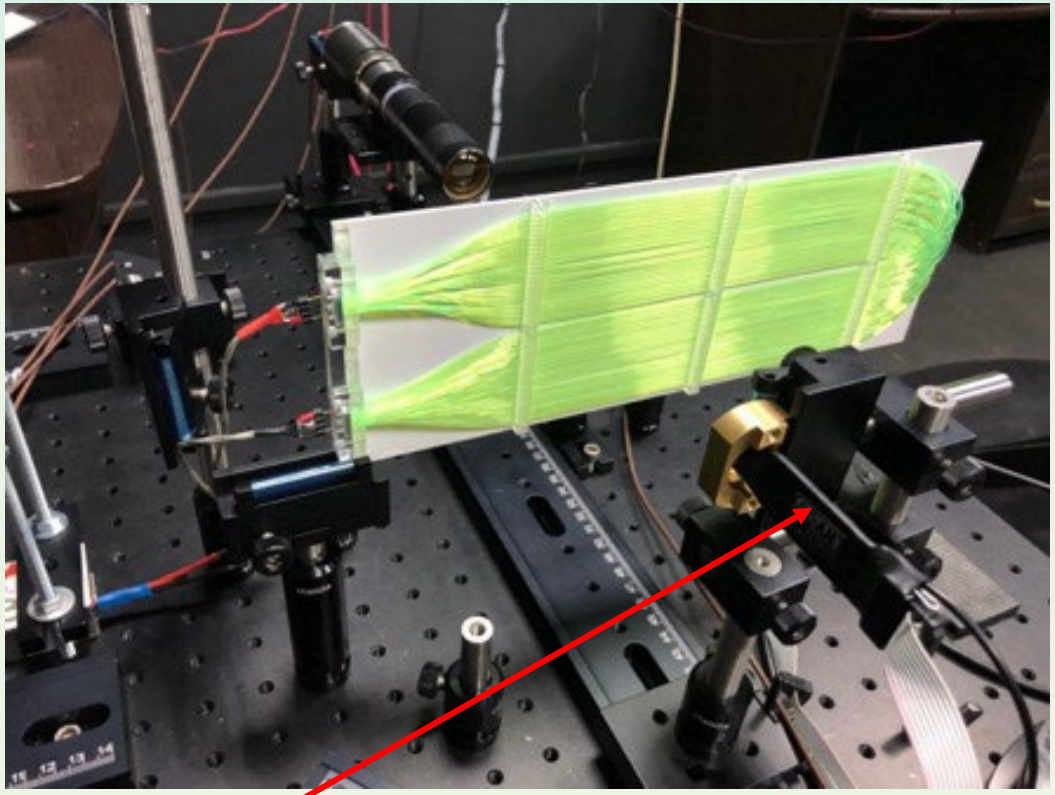


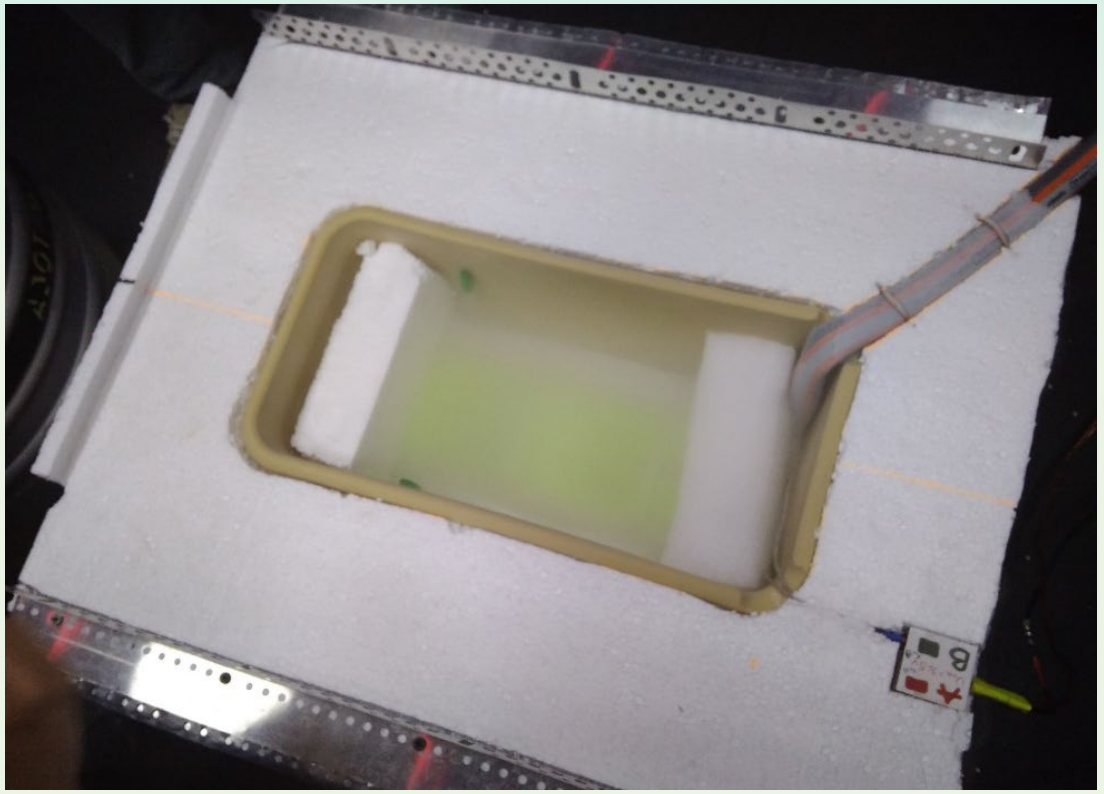
LCMs tests with LED



(LED) light-emitting diode

LCMs tests with LED



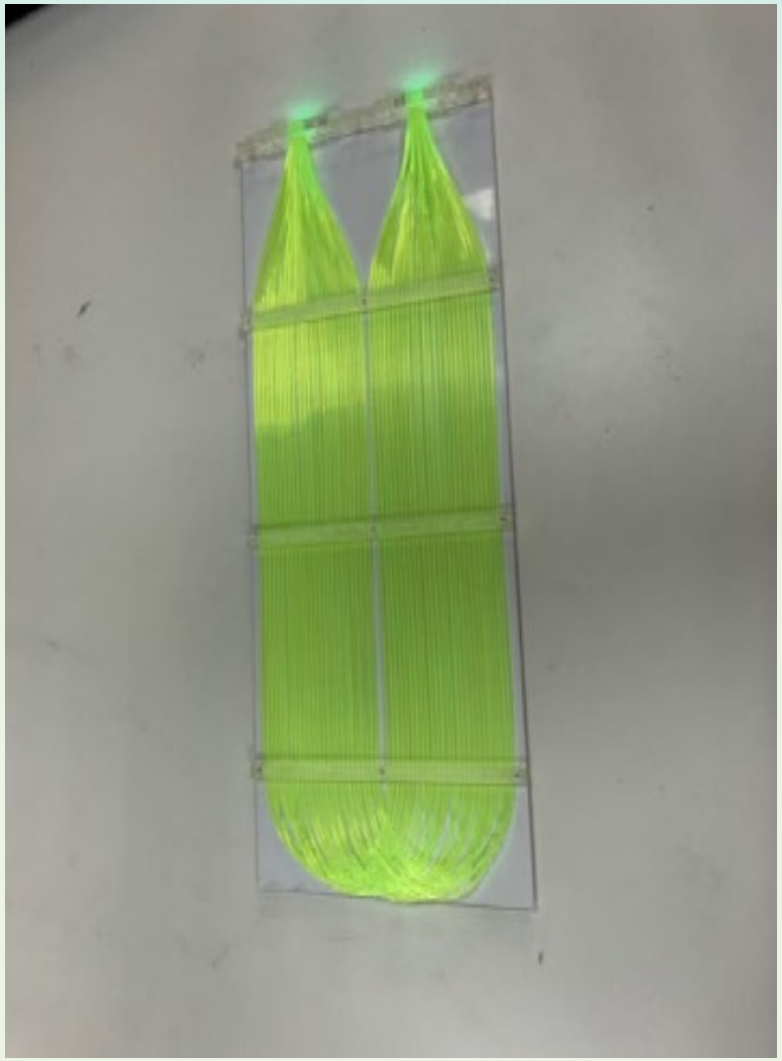


LED

We were convinced of the module operation in these tests and evaluated the photon detection efficiency (PDE) about 2 %.

LCM tests in LAr

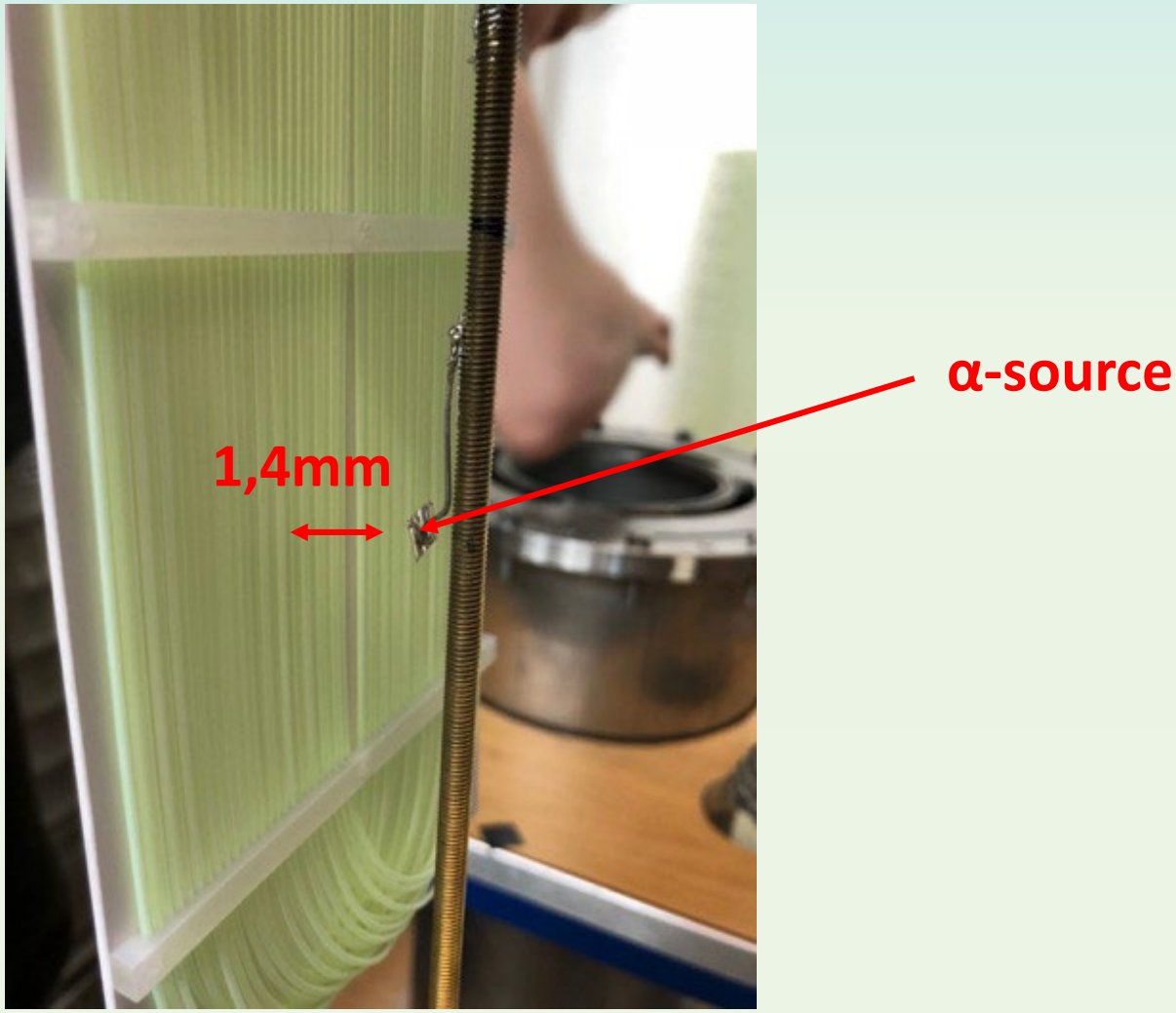
LCM was painted with TPB @ UniBe by means of airbrush



Before

After

Studies of LCM with α-Am241

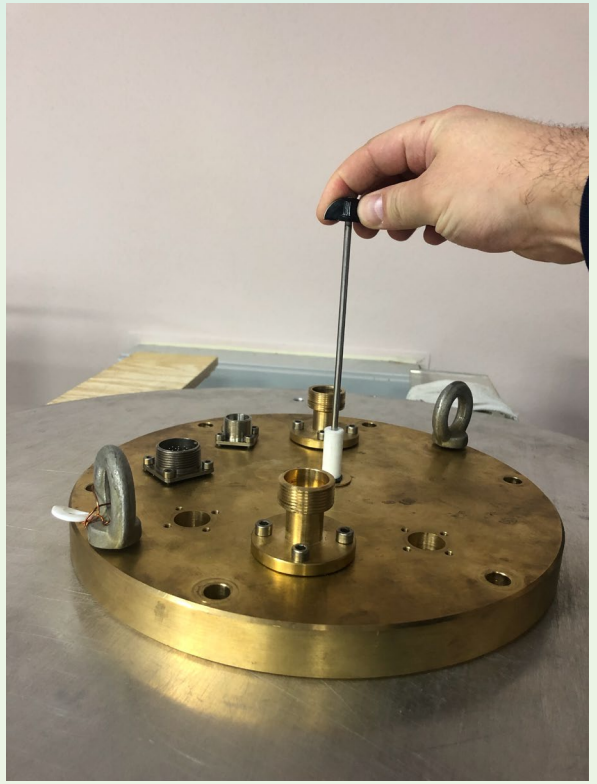


α-source - rhodium film with Am241

LCM tests in LAr

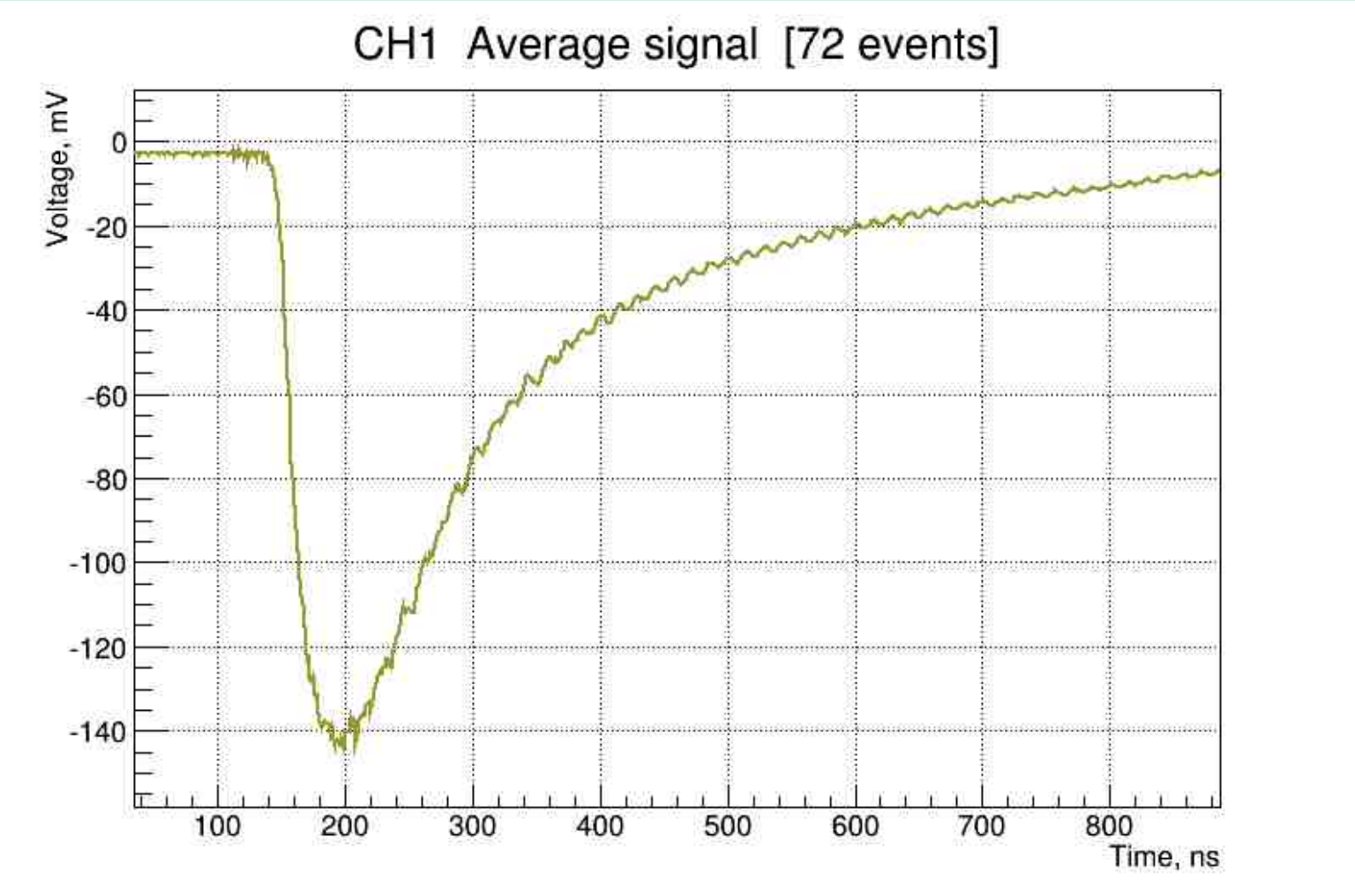
The LCM photon detection efficiency was estimated around 1% preliminary.

Cryogenic stand at JINR



We use open Am241 α-source

Signal



We can see signals from background muons and the alpha source.

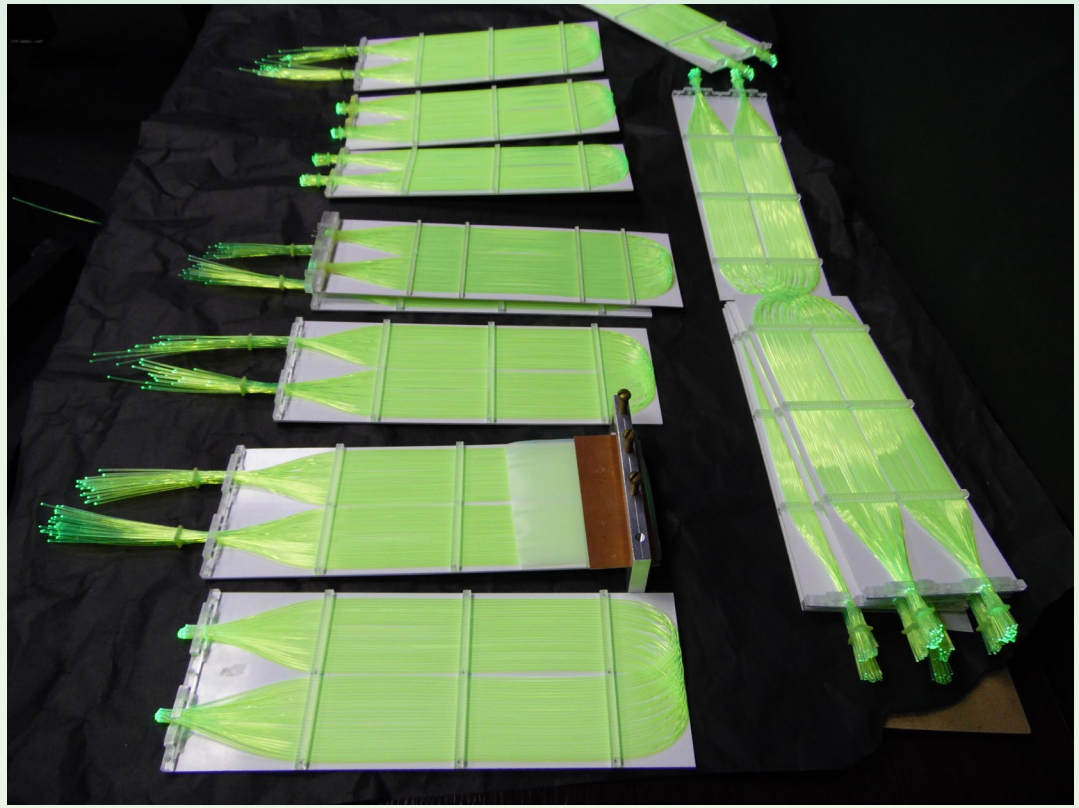
Plans:

The tests of module Argon Cube are to be carried out in Bern in autumn.

- We are to make twenty four LCMs by autumn and one hundred and twenty five by year end.

- The modules production has already been started.

- We are also planning to produce power suppliers, FEE to read out SiPMs and develop DAQ software.



Thank you for attention!

Questions?