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UNIVERSITÄT
BERN

AEC
ALBERT EINSTEIN CENTER
FOR FUNDAMENTAL PHYSICS



Opportunities in the ArgonCube program

A. Ereditato – University of Bern

From ArgonTube to ArgonCube



Letter of Intent

ArgonCube: a Modular Approach for Liquid Argon TPC Neutrino Detectors for Near Detector Environments

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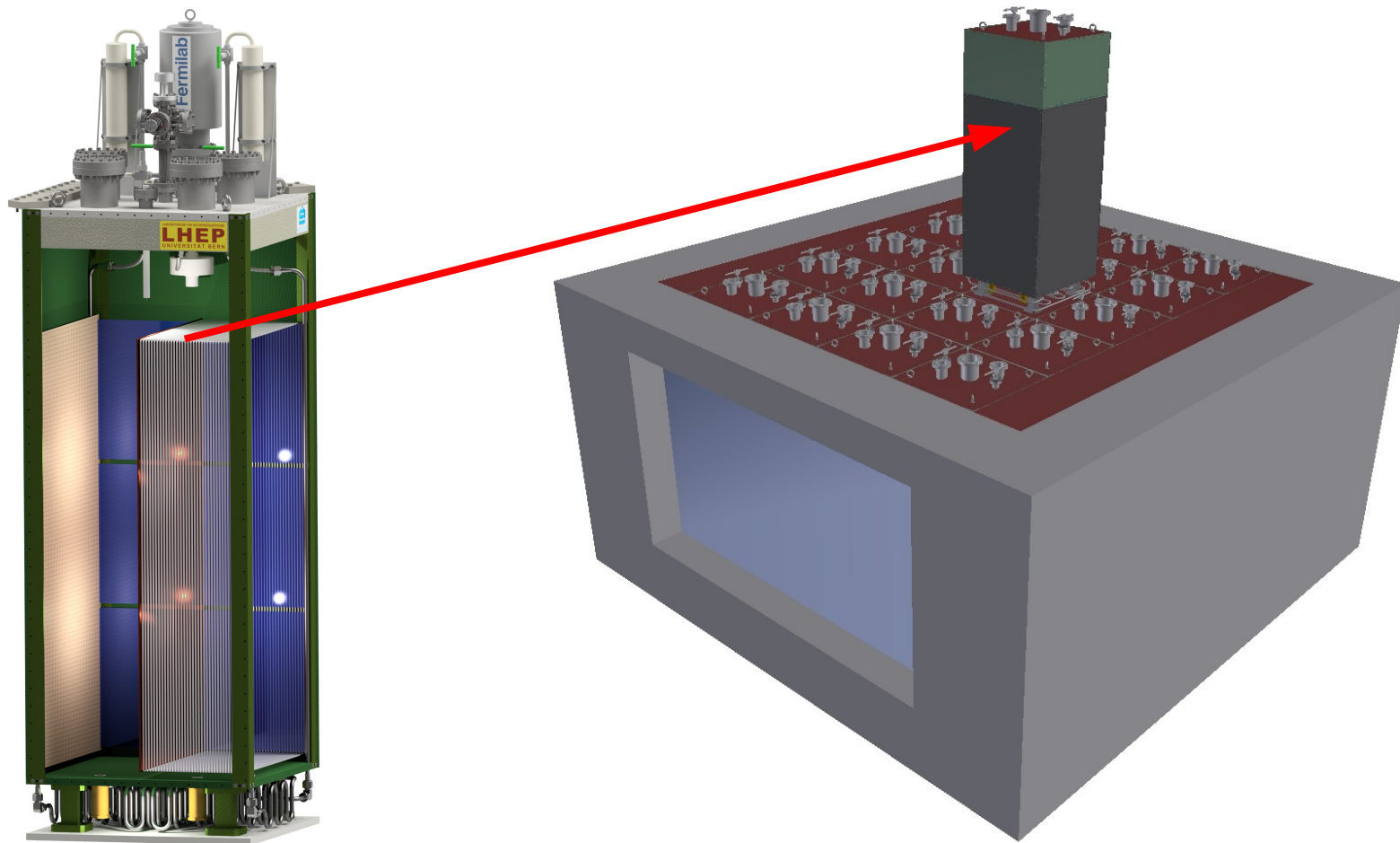
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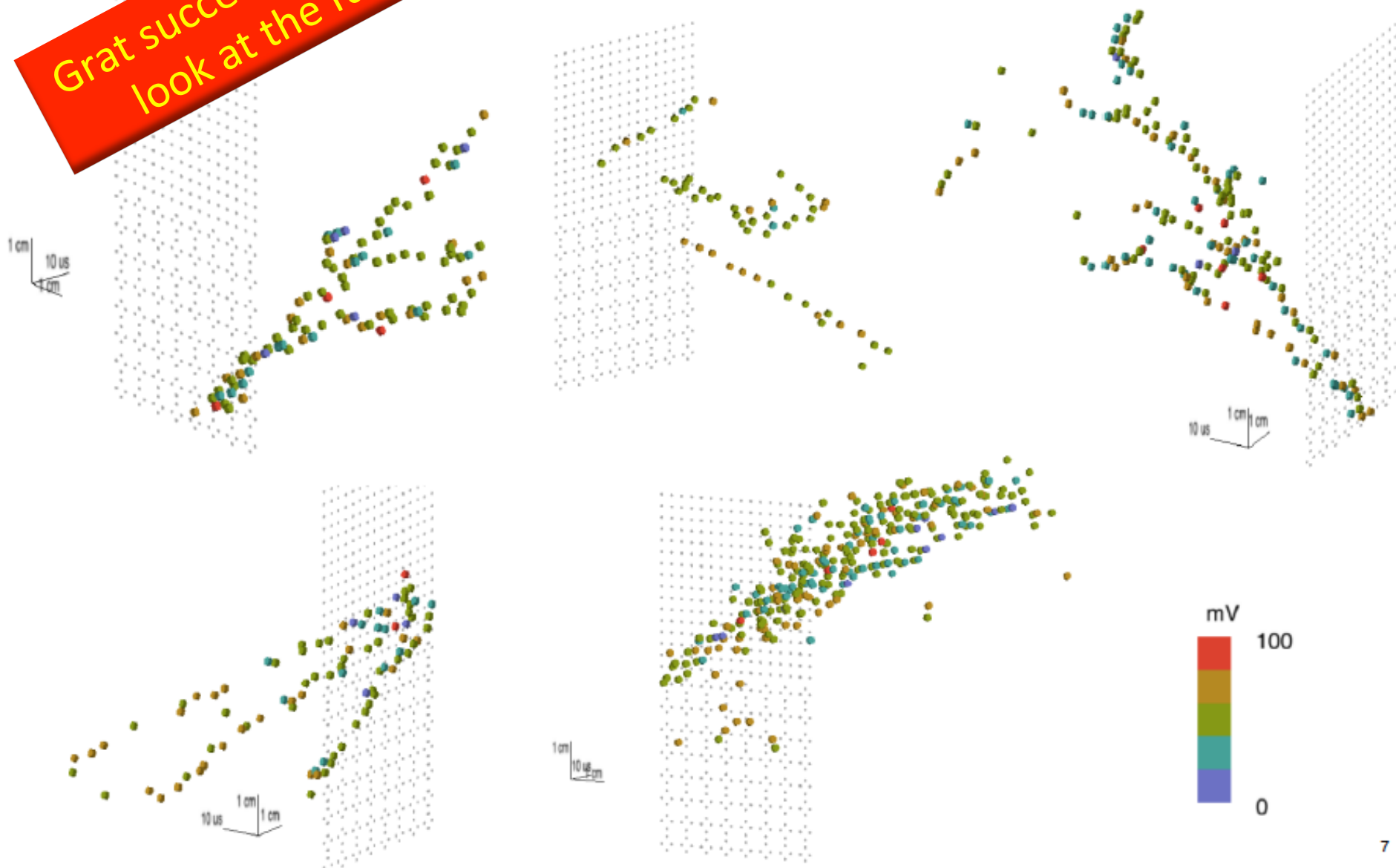


- **LAr Detector**

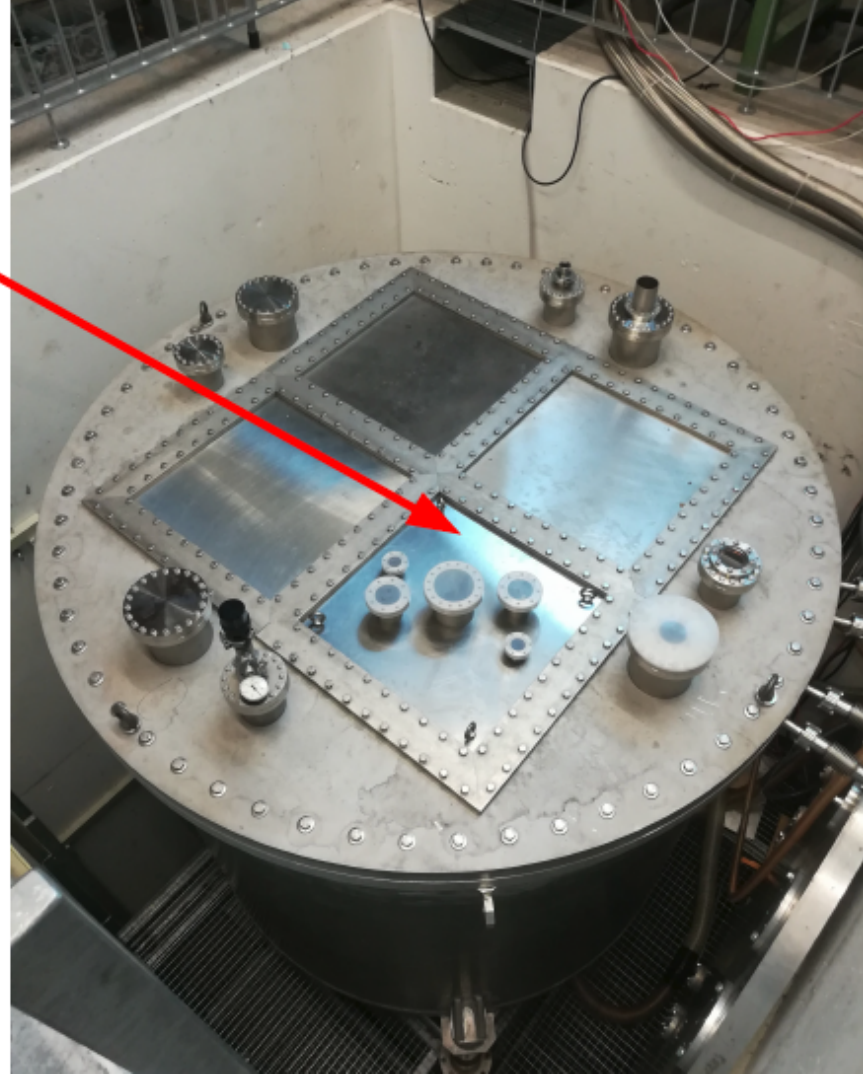
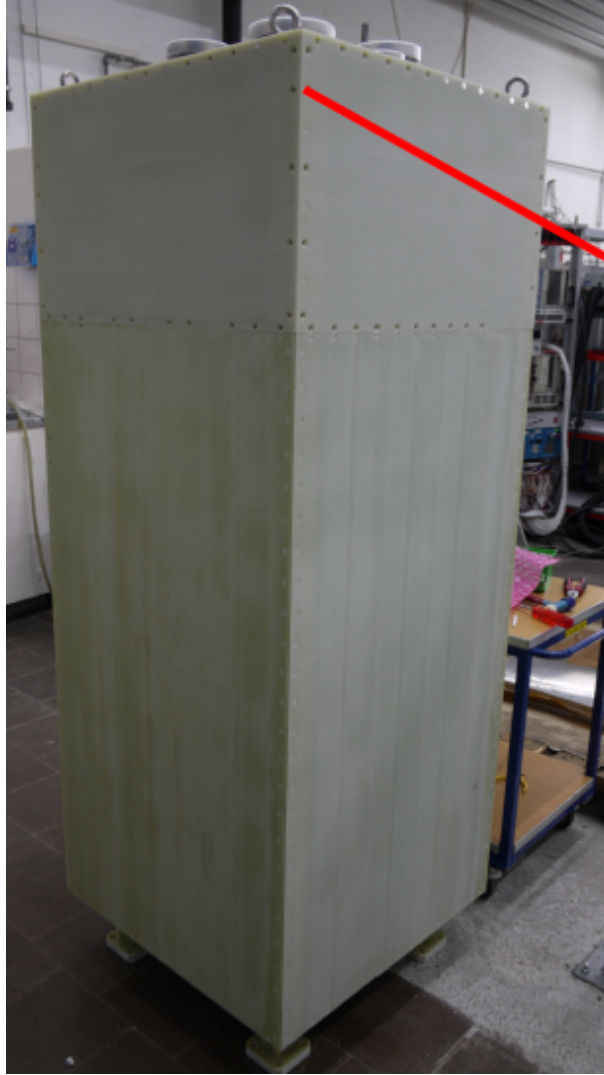
- "The ND CD group recommends that DUNE should have a LArTPC that is optically segmented, with a short drift and 2D pixelized readout, like the concept under study by the ArgonCube collaboration."



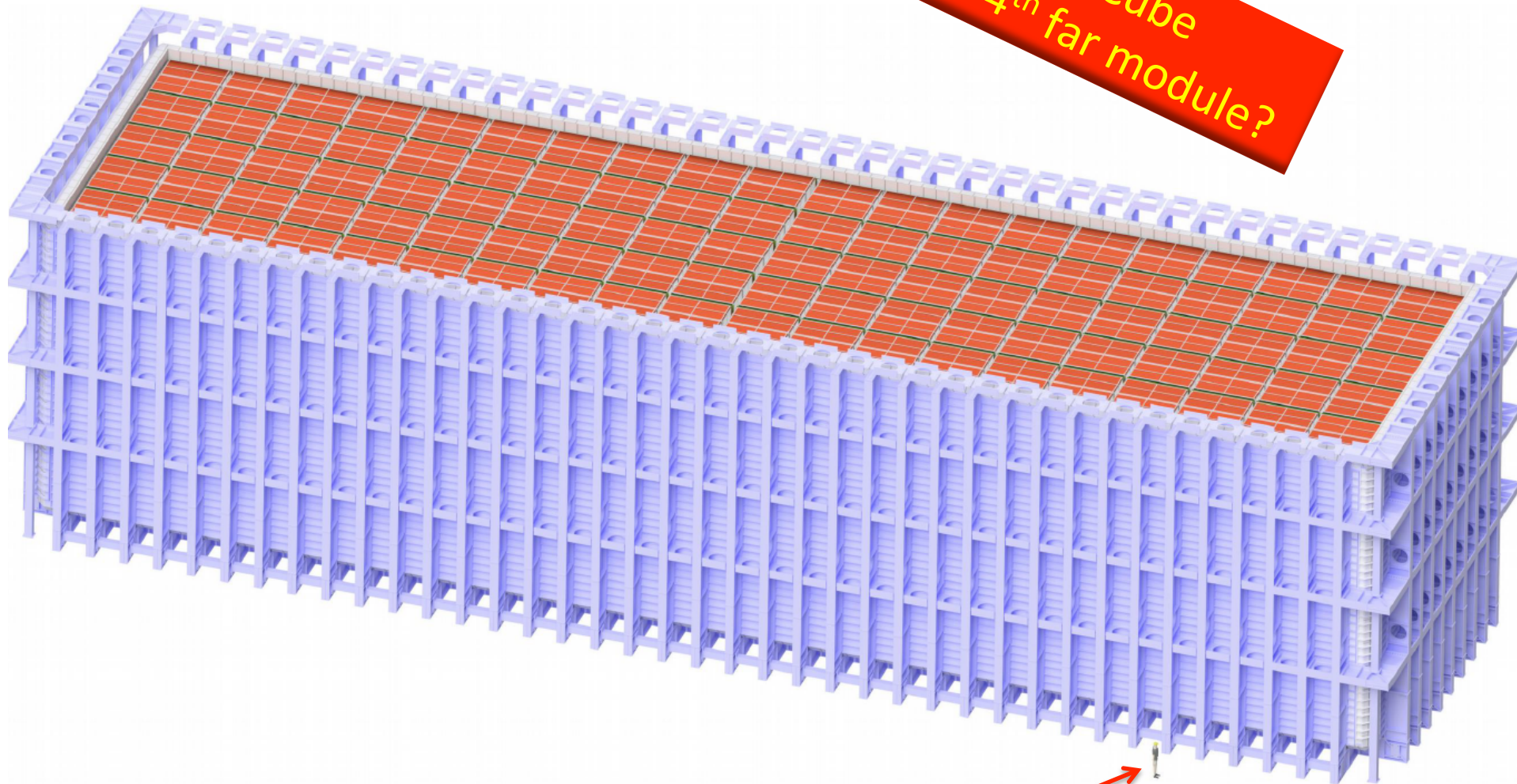
Grat success of the R&D
look at the future



2x2 @ FNAL:
The next challenge



ArgonCube
as the 4th far module?



Martin Auger

A Concept for the Fourth DUNE Far Detector Module

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Abstract

Of the four proposed 10 kt liquid argon (LAr) Far Detector (FD) modules envisaged for the Deep Underground Neutrino Experiment (DUNE) neutrino-oscillation experiment, three have been assigned to single- or dual-phase Time Projection Chambers (TPCs), but the design of the TPC for the fourth module has yet to be decided. Here we propose a novel approach for the TPC design of the fourth module. The core of this proposal is a charge-readout system free from reconstruction ambiguities, and a robust TPC design that reduces high-voltage risks while increasing the coverage of the light collection system. For the charge-readout system, we propose using the charge-collection pixels and associated application-specific integrated circuits currently being developed for the LAr component of the DUNE Near Detector design, ArgonCube. In addition, we propose dividing the TPC into a number of shorter drift volumes, reducing the total voltage used to drift the ionisation electrons, and minimising the stored energy. Segmenting the TPC also allows for the localisation of scintillation light and a more expansive light-readout system. Furthermore, the design opens the possibility of replacing or upgrading components. These augmentations could substantially improve reliability and sensitivity in comparison to a traditional single-phase LArTPC.

DocDB 10419

(Public version
pending)

From this meeting to the future...

- Several interesting developments: physics requirements, detector technology, R&D needs.
- Need a coordinated platform for R&D and further studies.
- ArgonCube collaboration to extend its interest:

Curiosity driven R&D → DUNE ND LAr → explore options for 4th DUNE FD?

(e.g. 2x2 program?, dedicated efforts? Local activities?...)

- Next week: collect expression of interest and work out a tentative organization/responsibility scheme for 2x2 activities
- Proper interplay with DUNE Collaboration will be required

You are all invited to a
early Spring 2019
ArgonCube 3 day meeting
in Bern

Soon a proposal

