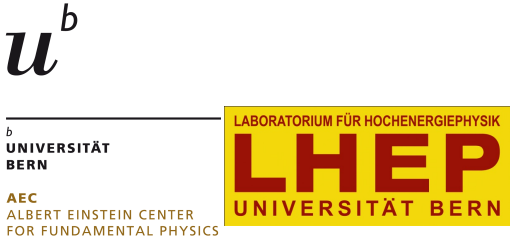

Status of the ArgonCube R&D project

A. Ereditato – University of Bern

ArgonCube

Letter of Intent

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

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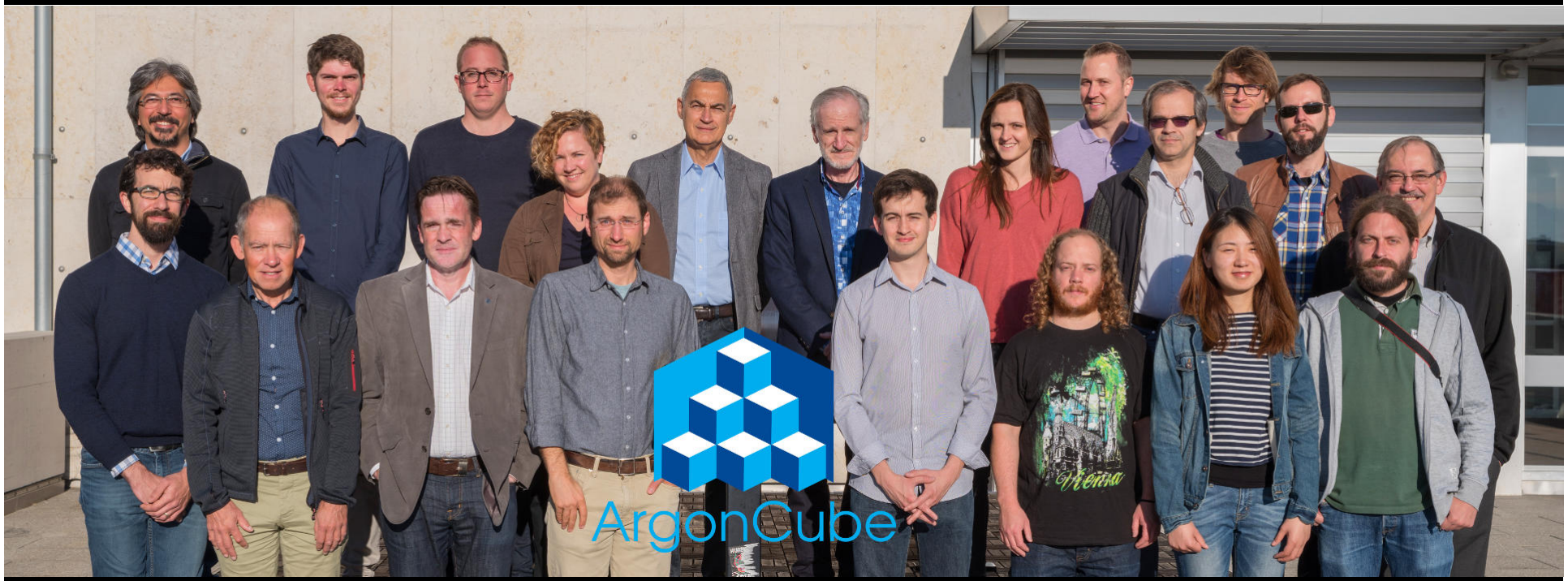
CERN-SPSC-2017-025 / SPSC-I-246
13/06/2017

ArgonCube

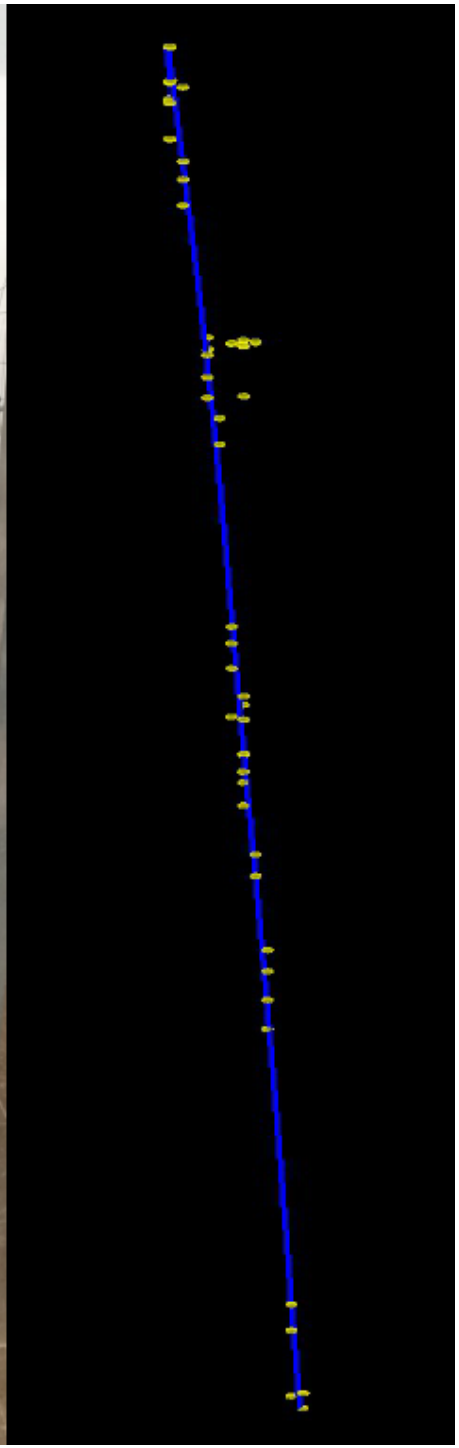


Bern, 16-17 October 2017

ArgonCube

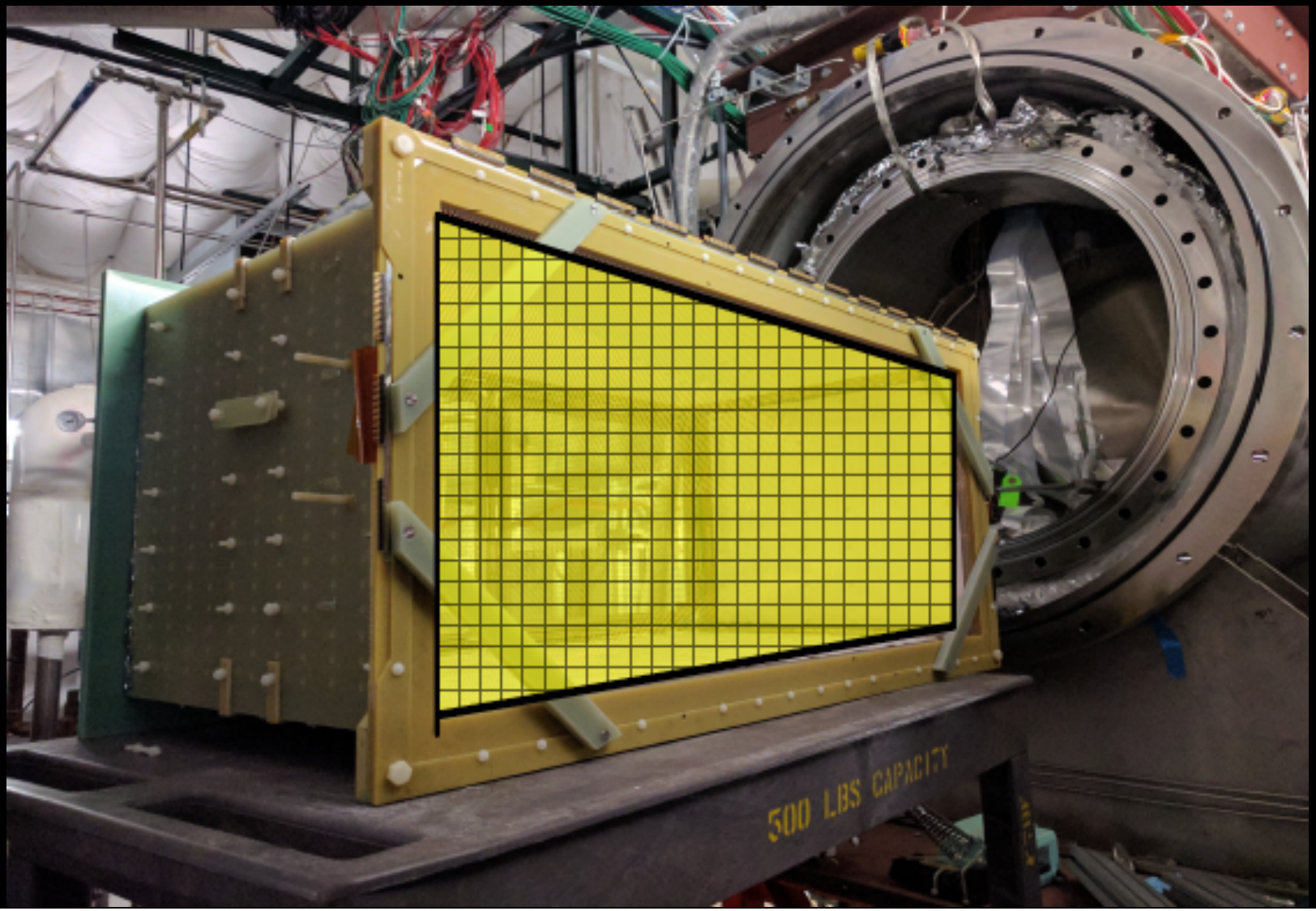
Prototype: proof of principle of pixel readout

(Swiss funded R&D program)



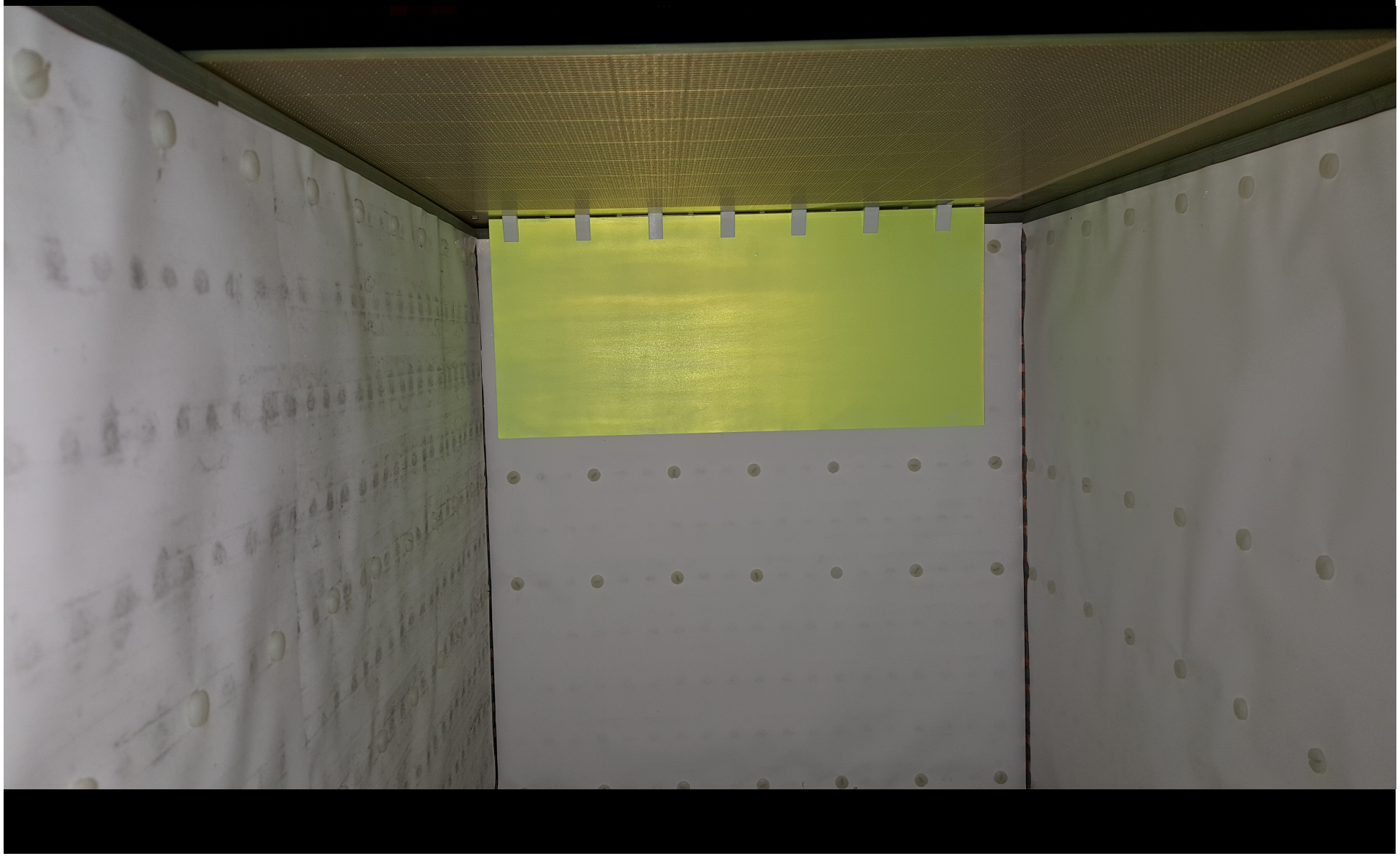
ArgonCube

PixLAr (LArIAT) @ FNAL:
first beam test of the pixel readout technique



ArgonCube

Pixel R/O plane just installed in the LArIAT chamber

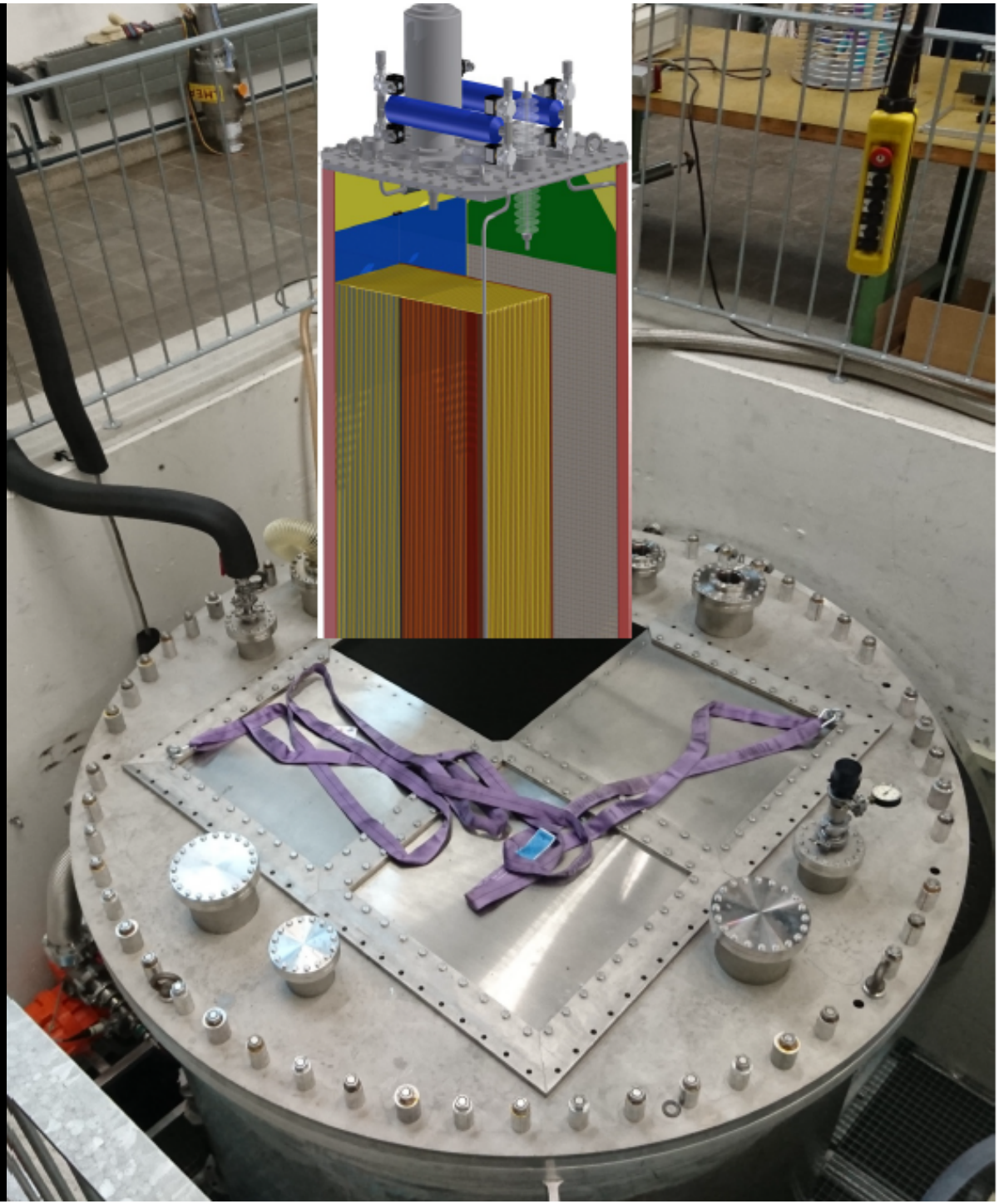


ArgonCube

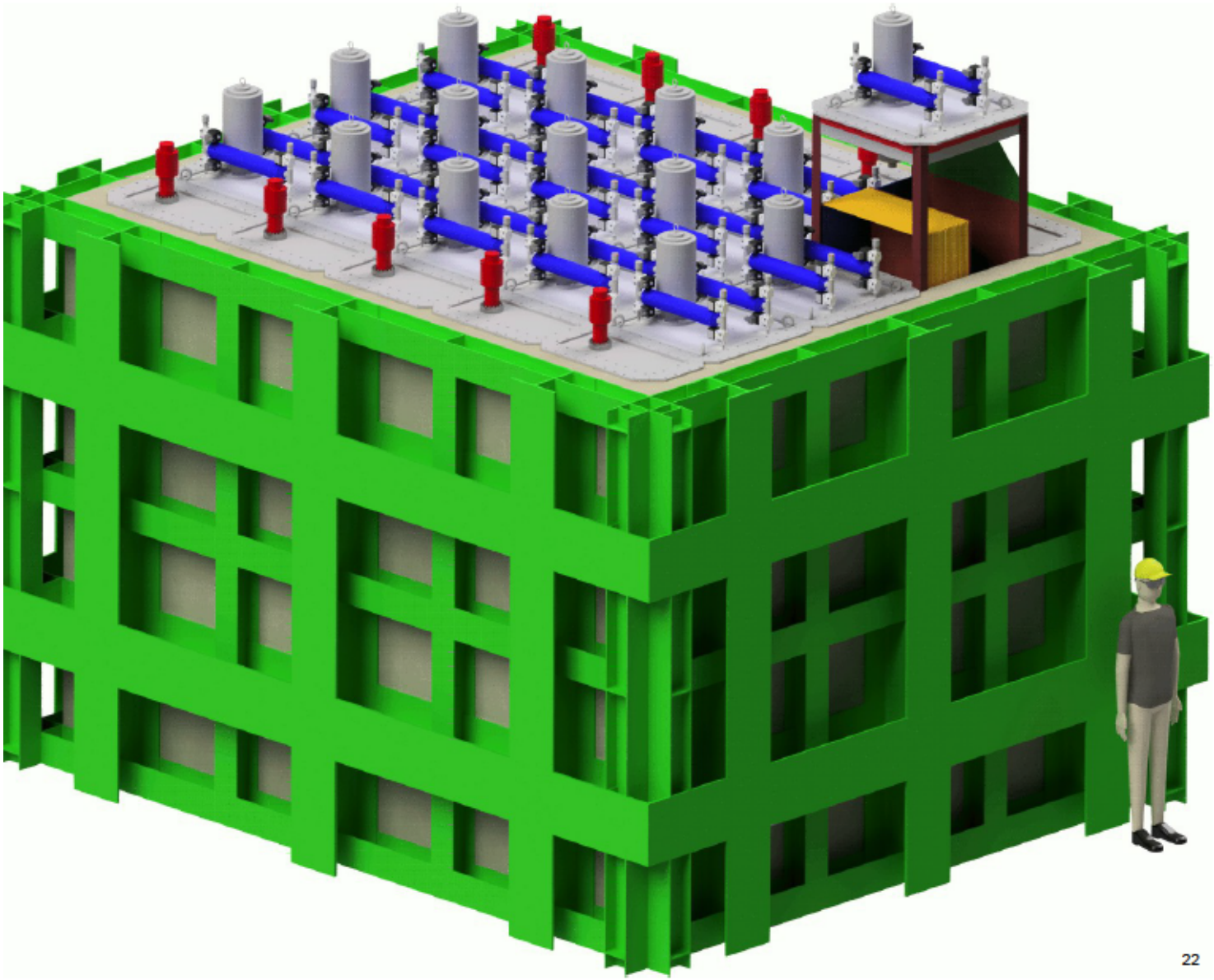
The 2x2 detector @Bern

CERN neutrino platform

FNAL neutrino beam



The final goal: ArgonCube @ DUNE ND



ArgonCube groups' resources & interest

Institute	Resources
Arlington	Management of PixLAr, and in-house cryogenic facilities
Aveiro	Computing farm and technical support
Bern	Local infrastructure for 2x2 prototype, and engineering support
BNL	Readout electronics and analysis/simulation support
CERN	Mechanical engineering expertise (CENF)
Colorado state	Mechanical and cryogenic engineering support
Dubna	Technical support
Fermilab	Support for local test beam studies
Harvard	Computing support
Iowa	Scintillator production facilities and engineering support
LBNL	Engineering support and funding for ASIC development
PNNL	DAQ expertise
Sheffield	Engineering and technical support
SLAC	Engineering support for ASIC, LZ cryogenics, DAQ and reconstruction
South Carolina	Computational support
Stony Brook	Computing support
Syracuse	
Yale	

ArgonCube groups' resources & interest

Institute	Current interests
Arlington	Prototype testing
Aveiro	
Bern	2x2 development
BNL	
CERN	Engineering support
Colorado state	Calibration simulation
Dubna	Light readout prototype studies
Fermilab	PixLAr support and cryogenic engineering advice
Harvard	
Iowa	Wavelength shifter R&D
LBNL	ASIC design and production, detector simulations
PNNL	DAQ advice
Sheffield	Wire TPC construction and PixLAr operation support
SLAC	Guidance on reconstruction
South Carolina	Sensitivity simulations and analysis
Stony Brook	Geometry development
Syracuse	
Yale	

ArgonCube groups' resources & interest

Institute	Planned activities
Arlington	Module construction
Aveiro	Light collection
Bern	2x2 deployment at CERN/FNAL test beam
BNL	ASIC demonstration in wire module, simulation/analysis of 2x2
CERN	Logistics for potential beam test at CENF
Colorado state	2x2 module construction
Dubna	Light readout production
Fermilab	Host 2x2 prototype
Harvard	Test beam pixel studies support and analysis
Iowa	Light readout production and characterization
LBNL	Full production and characterization
PNNL	DAQ development support for 2x2
Sheffield	Local module tests
SLAC	2x2 readout plane/module prod., DEEP learning, R/O ASICS and DAQ
South Carolina	Combined 2x2 and proto-FGD beam studies
Stony Brook	Operational support of 2x2 beam studies
Syracuse	Data analysis of PixLAr and 2x2
Yale	HV feedthrough production, Wright Lab test facility for R&D

ArgonCube

Forthcoming actions

- Complete the full ArgonCube R&D program
- Work within the ND WG to fully characterize the DUNE ND detector and answer to the still open questions in view of the collaboration milestones
- Exploit potential synergies with technologies for the magnetized detector
- Try to motivate new interested groups: the planned R&D program include several novel applications and could lead to very interesting detector technology and physics results
- All this work represents a big investment if ArgonCube will be eventually chosen as the DUNE ND LAr TPC