Welcome to Santa Fe!

Goals of the Workfest

- MAPS detector group
  - Make significant progress on MAPS MIE proposal
  - Update the cost and schedule to be ready for discussion with DOE in Feb budget meeting
  - Develop additional physics cases for MAPS detector beyond sPHENIX scientific proposal

- HF-jet topical group
  - Produce near final *b*-jet tagging performance plot for MAPS proposal and QM2017 conference
  - Advance the tracking detector simulation towards new baseline simulation configuration
  - Develop B-meson simulations

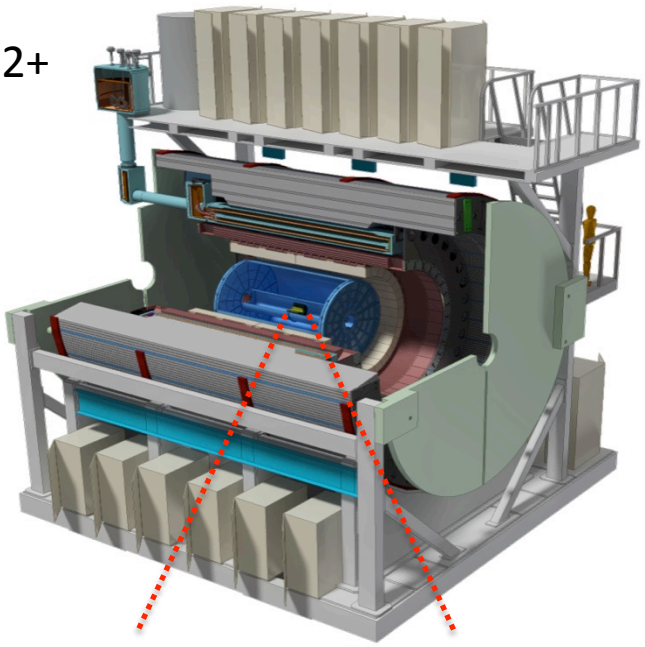
Plan

- Day -1
  - Brief summary of status
  - Working sessions: simulations and MIE discussion
- Day-2: parallel work sessions
  - Simulations
  - MIE writing
  - End of the day summary
- Day-3: parallel work sessions
  - Simulations
  - MIE writing
  - End of the day summary

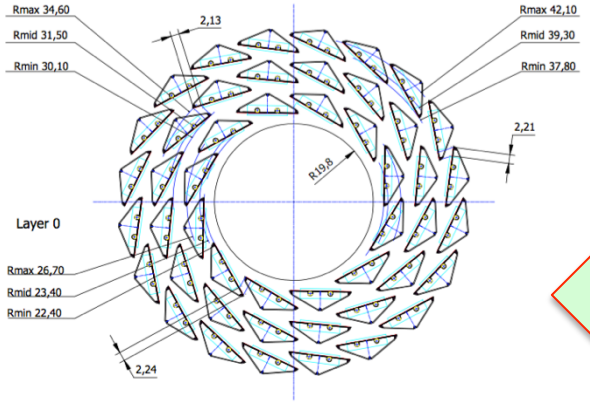
Group Lunch Today: 12:30 – 14:00

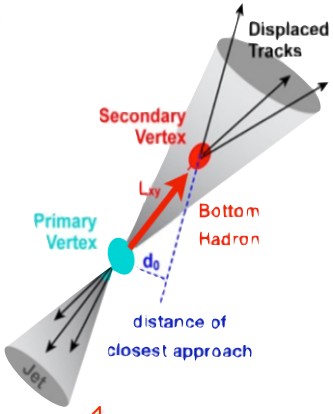
sPHENIX MAPS Inner Tracker

2022+



sPHENIX Inner Tracking

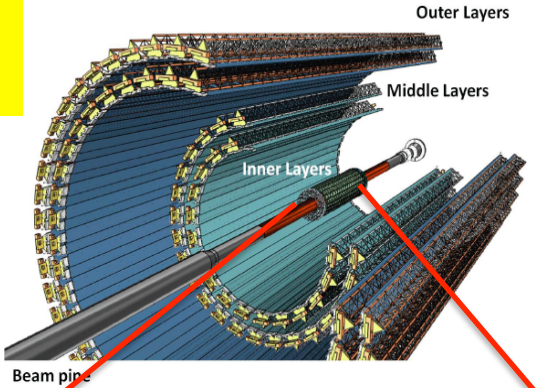


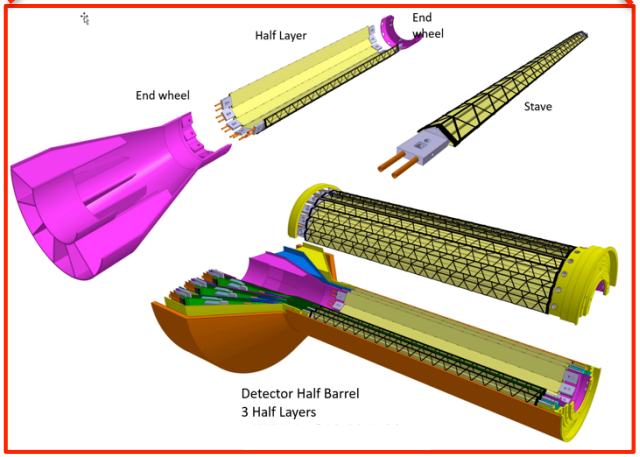


Key integration issues:
- Readout
- Mechanics

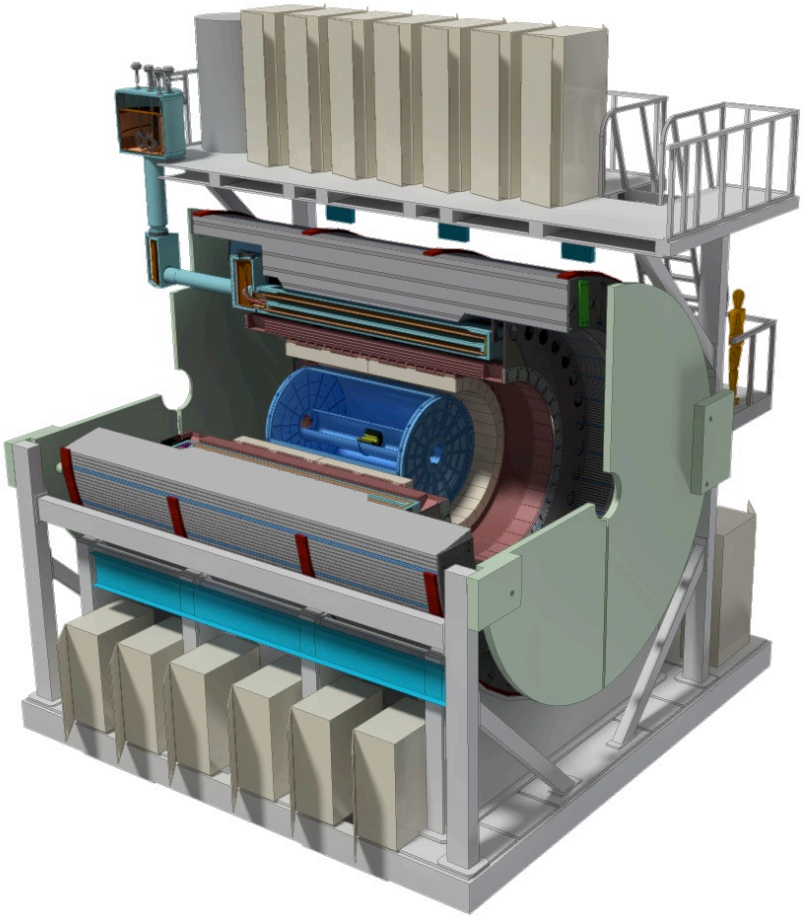
"Adopt" ALICE/ITS
Mini. risk,
Max. physics

ALICE ITS Upgrade (2021+);
Inner Tracker System





WBS of the Latest sPHENIX MIE



WBS	sPHENIX MIE Project Elements
1.1	Project Management
1.2	Time Projection Chamber
1.3	MAPS Telescope
1.4	Electromagnetic Calorimeter
1.5	Hadron Calorimeter
1.6	Calorimeter Electronics
1.7	DAQ-Trigger
1.8	Minimum Bias Trigger Detector

WBS	Infrastructure & Facility Upgrade
1.9	SC-Magnet
1.10	Infrastructure
1.11	Installation-Integration

WBS	Parallel Activities
1.12	Intermediate Silicon Strip Tracker
1.13	Monolithic Active Pixel Sensors

From Ed O'Brien

A new MIE to build the full MAPS detector

Toward the full MAPS MIE

- Early communication with DOE
  - MIE pre-proposal, ~20 pages
  - Science, resources and cost & schedule
  - First full doc by the end of Jan 2017, for DOE Feb. budget meeting, LANL & LBNL
- Possible timeline of MAPS MIE
  - Submitted and reviewed in FY17, establish DOE "mission need"
  - Federal budget request by DOE, Feb 2018
  - Fund available FY20 for construction ("normal route")

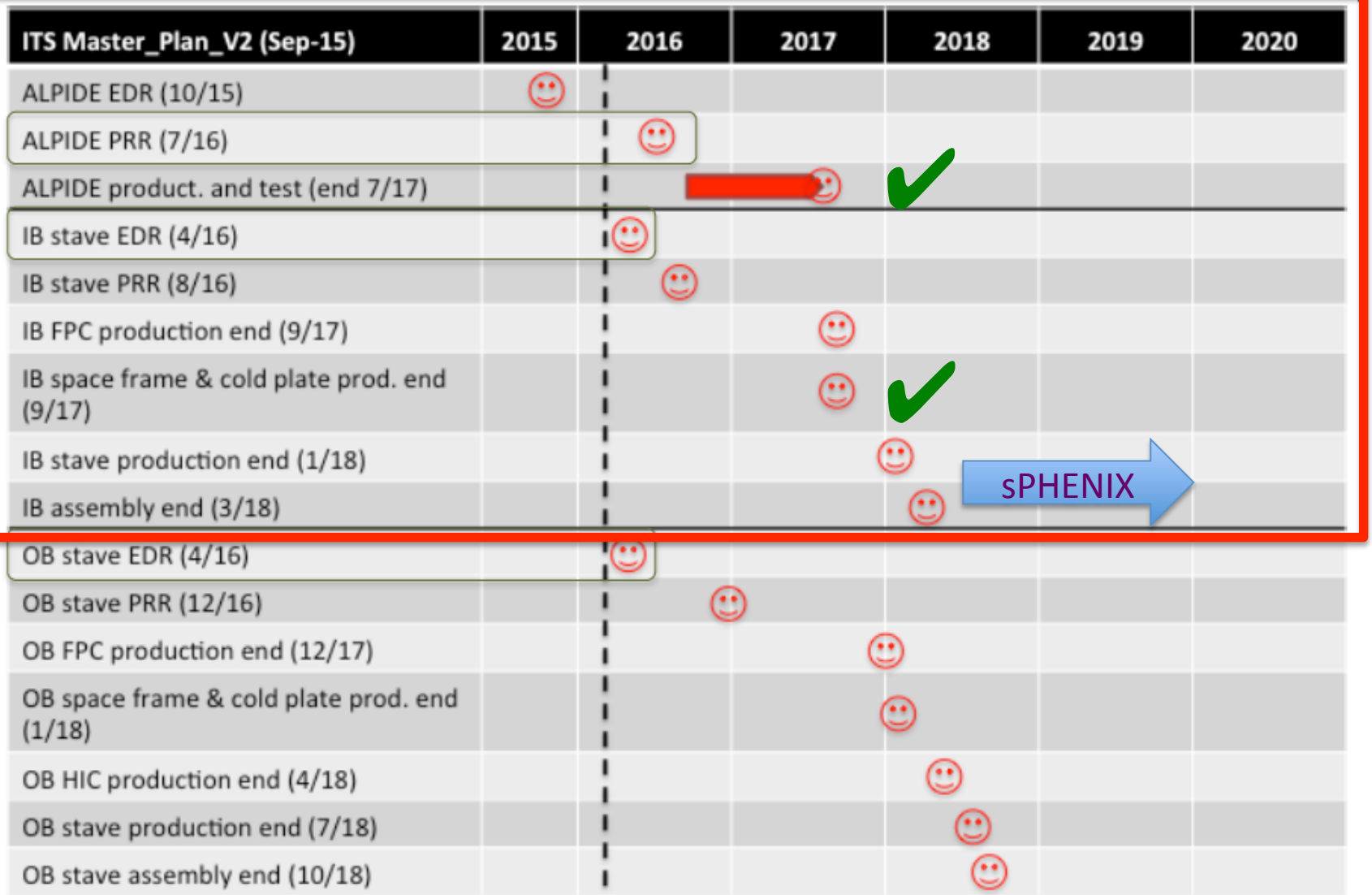
Highly desired:

- Advanced funding by mid 2018 to produce full staves following the completion of ALICE/ITS/IB production at CERN
- Or high level "agreement" to secure CERN facility for sPHENIX

Milestones – ALPIDE, IB & OB Staves

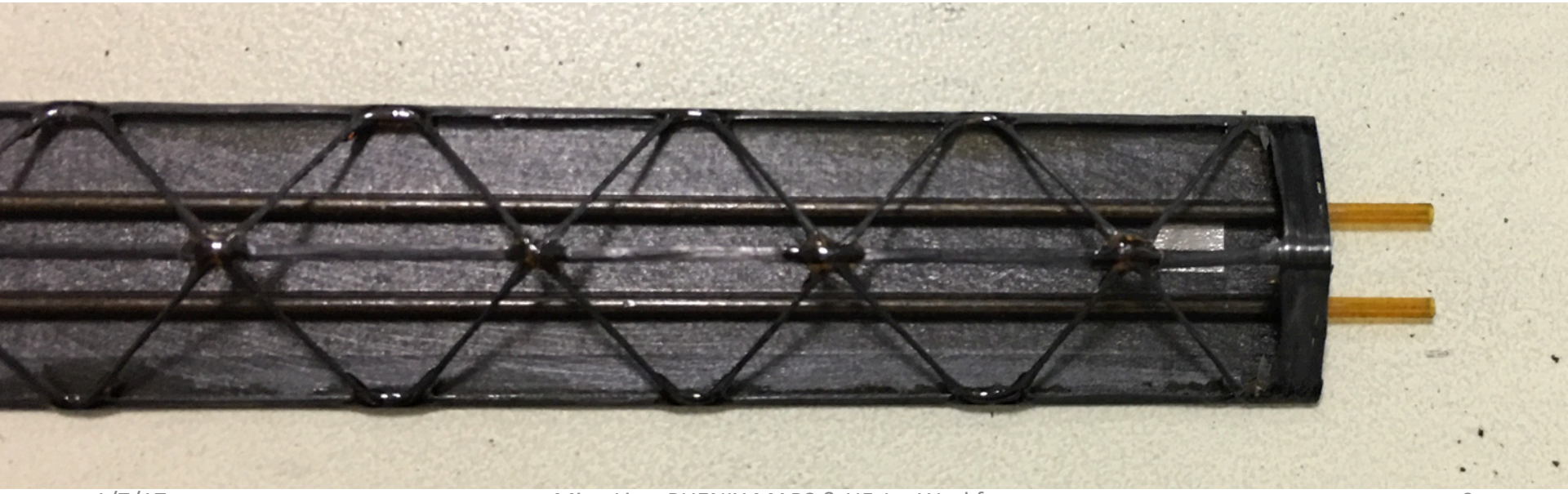
A Large Ion Collider Experiment

ALICE



Stave Frame Production

Very good progress, ahead of schedule



Scope of the Project

- MAPS & Electronics
  - MAPS Detectors
    - MoU to build 68 ITS MAPS staves
    - No modification
  - Readout Electronics
    - Use ALICE/ITS, RDO + CRU
    - Modify/reprogram CRU for sPHENIX
      - Plan-B: build a custom board to convert ALICE/ITS into sPHENIX DAQ format
    - R&D by LANL LDRD
  - Production
    - Extend ALICE/ITS MAPS stave production
    - Train sPHENIX personnel for assembly and testing staves at CERN
    - Reproduce additional ALICE RDO+CRU for sPHENIX
  - Ancillary systems
    - LV, cables, crates, racks etc.
    - Slow control, safety and monitoring
- Mechanics & Cooling
  - No/(some) changes to ALICE/ITS inner tracker mechanical structures
    - End Wheels
    - Cylindrical structure shells
    - Detector half barrels
    - Service half barrels
    - Detector and Service half barrels
    - Half support structures
  - Mechanics Integration
    - Conceptual design by LANL LDRD
    - Prototype by sPHENIX R&D
    - Design integration frames
    - Cage etc.
    - Installation tooling etc.
  - Copy ALICE cooling plant design
    - Minor modification to fit sPHENIX
    - Smaller heat load than ALICE ITS
  - Metrology and Survey

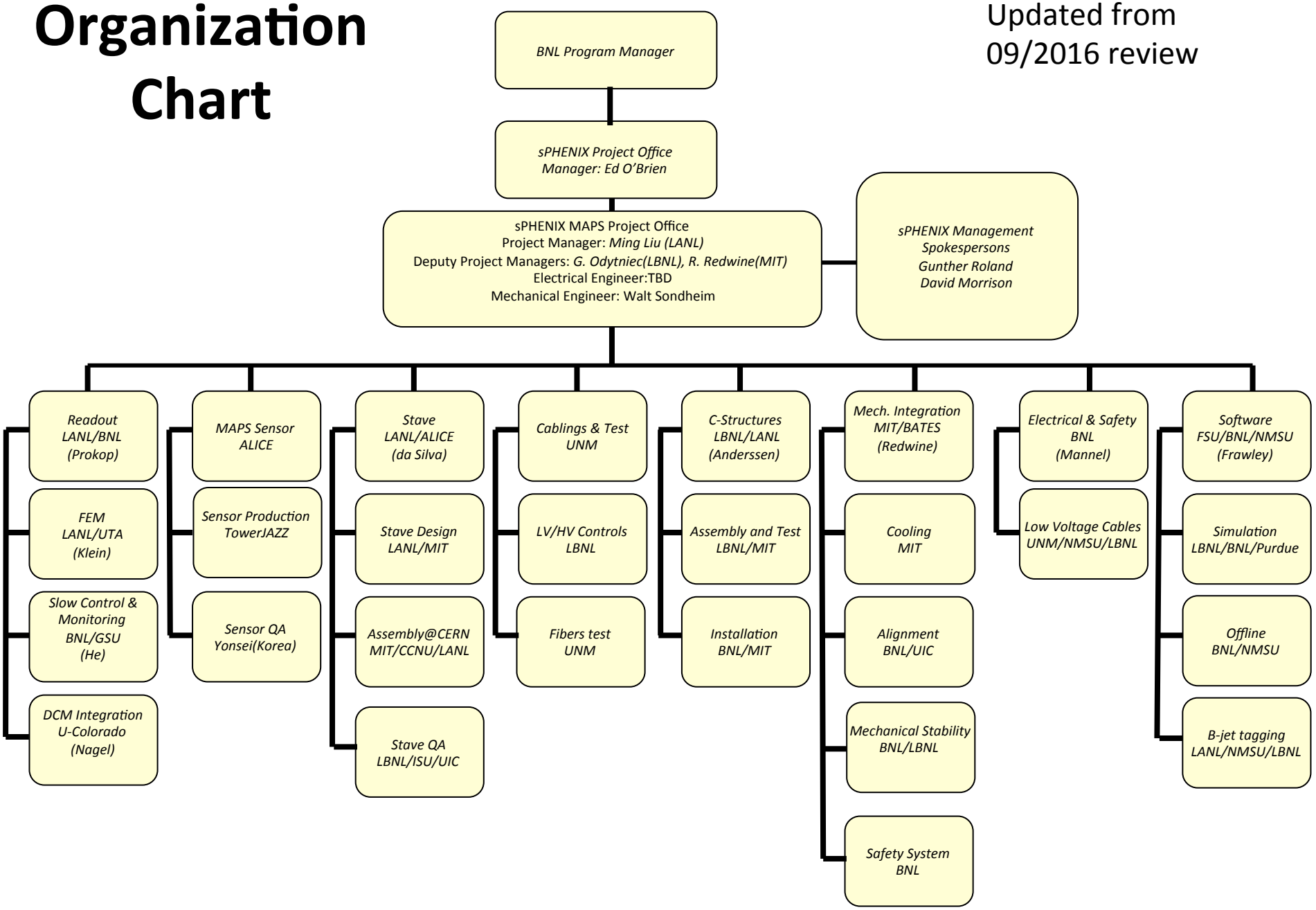
Participating and Interested Institutions

- LANL - Readout & FEMs, mechanical design
- MIT – Mechanical integration, cooling system, stave assembly and testing at CERN and BNL,
- LBNL – Carbon structure design and production, LV/HV PS and controls, system assembly and test
- BNL – Integration and services, safety and monitoring, readout
- UT-Austin – MAPS readout electronics and testing
- Univ. of Colorado – sPHENIX DAQ/DCM-II integration
- Univ. of New Mexico – LV cabling & connectors
- New Mexico State University – Offline tracking and simulations
- Iowa State University – Assembly and testing, simulations
- Georgia State University - Slow control and monitoring, safety system
- Florida State University - Offline and simulations
- Univ. of California, Los Angeles – Assembly and testing, simulations
- Univ. of California, Riverside – Assembly and testing, simulations
- RIKEN/RBRC, Japan – Assembly and testing, integration
- Yonsei, Korea – MAPS QA, simulations
- CCNU – ALICE/ITS upgrade, 5th layer experience, assembly and testing
- Univ. of IL of Chicago – Stave assembly and testing, simulation and offline analysis
- Czech Group – Stave assembly and electronics testing at CERN
- Purdue Univ. – Simulations and analysis

Potential collaboration

Organization Chart

Updated from 09/2016 review



MAPS MIE Proposal Writing

Overleaf | PROJECT | HISTORY & REVISIONS | SHARE | PDF | JOURNALS & SERVICES | SIGN UP | SIGN IN

Source | Rich Text | Edit | Find

```
\documentclass{DOEproposal}
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% NSF proposal generation template style file.
% based on latex stylefiles  written by Stefan Llewellyn Smith and
% Sarah Gille, with contributions from other collaborators.
%
% Additions by Ronni Grapenthin, New Mexico Tech.
%
% Obviously it is your responsibility to make sure that everything
% is, in fact, in agreement with the most current NSF Grant
% Proposal Guide and the respective Program's solicitation!
% This is all provided `as-is' and no blame or responsibility
% for anything that went wrong will be taken.
%
% Good luck!
%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

\usepackage{amsmath, amsthm, amssymb}
\usepackage{latexsym}
\usepackage{epsfig}
\usepackage{epstopdf}
\usepackage{graphicx}
\usepackage[footnotesize,bf]{caption}
\usepackage[final]{pdfpages}
\usepackage{hyperref}
\hypersetup{
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    linkcolor=blue,         % color of internal links
    citecolor=black,        % color of links to bibliography
    filecolor=magenta,      % color of file links
```

Preview | Manual | Auto | warning

Monolithic-Active-Pixel-Sensors (MAPS) MIE proposal for sPHENIX Experiment at RHIC

A proposal submitted to the DOE Office of Science
November 18, 2016

Invited Proposal:
DOE Office of Science Program Manager:

Proposing Organization: Los Alamos National Laboratory

Collaborating Institutions: MIT, LBNL, BNL, Univ. of Texas -Austin, UCLA, UCR, NMSU, UNM, UC, UIC, ISU, GSU, FSU, Yonsei, RIKEN/RBRC

Principal Investigator: Ming X. Liu

Phone: 505-412-7396
Email: mliu@lanl.gov

Requested Funding: $2.0M/year for three years
Total Request: $6.0M

Budget Summary:

Institution	Year 1	Year 2	Year 3
LANL	$500K	$500K	$500K

Major Tasks and Lead Institutions for sPHENIX MAPS Project (MIE Writing)

- MAPS chips/stave production
  - LANL/ALICE (Ming Liu)
- Readout integration and testing
  - LANL, BNL, UT-Austin, U-Colorado (Mike McCumber)
- Mechanical carbon structures
  - LBNL (Grazyna Odyneic/Eric)
- Mechanical integration
  - MIT, LBNL (Bob Redwine)
- LV/HV PS and controls
  - LBNL (Grazyna Odyneic/Leo)
- MAPS stave assembly and testing at CERN
  - MIT, LANL, CCNU and others (Gunther Roland)
- Full module assembly and test in US
  - LBNL, MIT and others (Grazyna Odyneic)
- Online software and Trigger
  - BNL, GSU, LBNL (He)
- Offline software - detector simulation, geometry, offline tracking
  - NMSU, FSU, LANL (Tony Frawley)
- Physics simulations - to make “Money Plots”
  - LBNL, LANL, U-Colorado and all (Xin Dong)
- Cost and Schedule and Resources (Dave Lee)
- Collaboration and Org (Cesar)

Editing/Proofreading – Dennis, Darren, Hubert et al

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7. Cesar, Gunther et al
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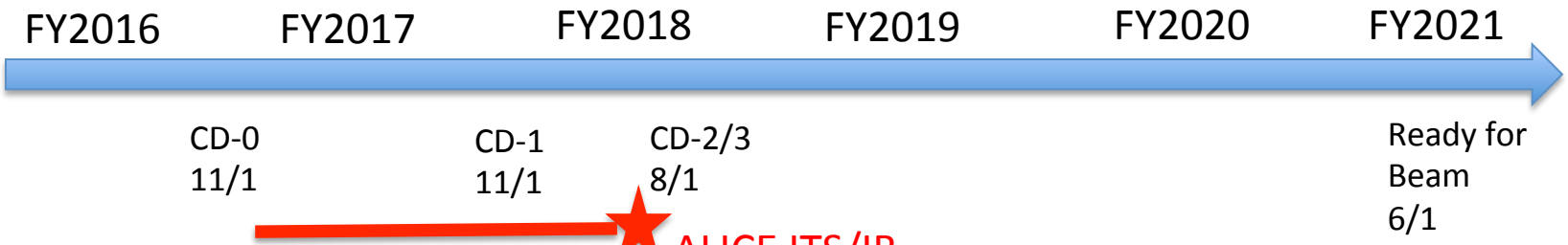
From 09/2016 review

Project Tasks and Timeline



Key R&D

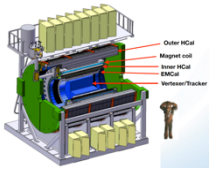
Readout R&D Mech. design @LANL/ALICE

Mech. Integr. & Prototype @MIT/LBNL

A schedule driven project!

Production

MAPS Prod. & QA @ALICE → Stave prod.&Test @CERN; RUs Prod. @US → Detector. Assembly & Test @BNL → Det. Install. @BNL



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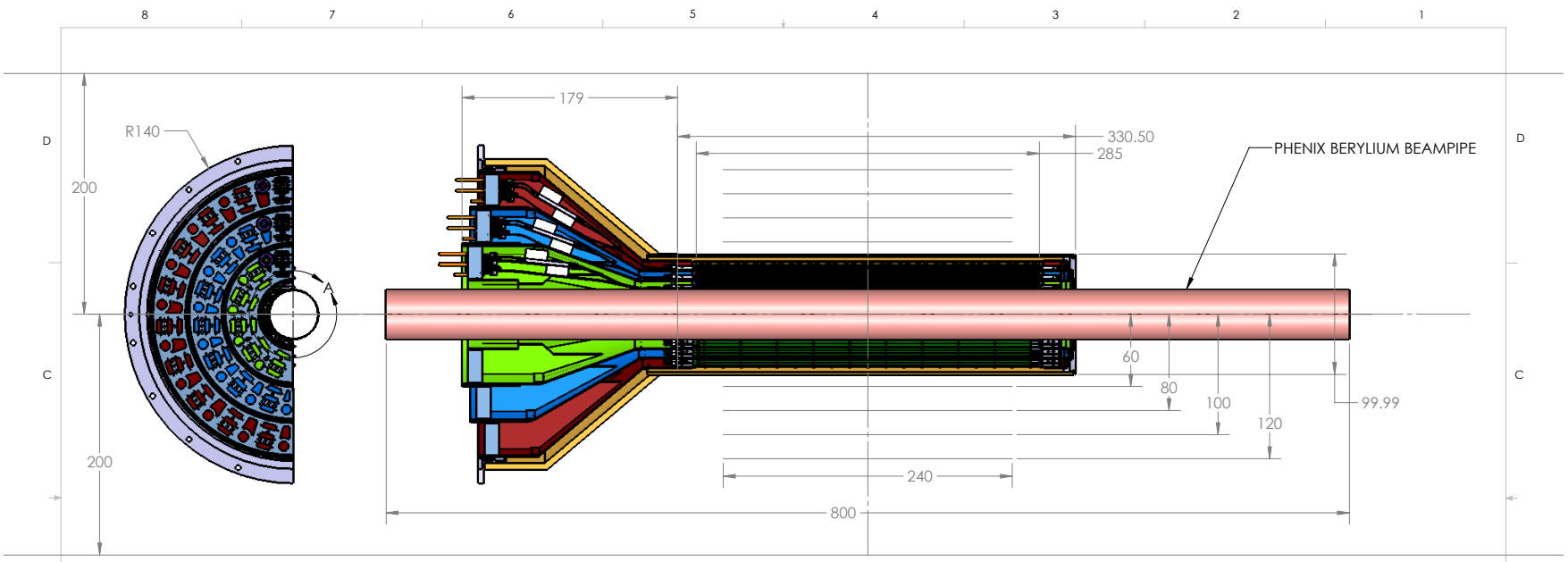
"MoU" w/ ALICE/ITS: 11/2016

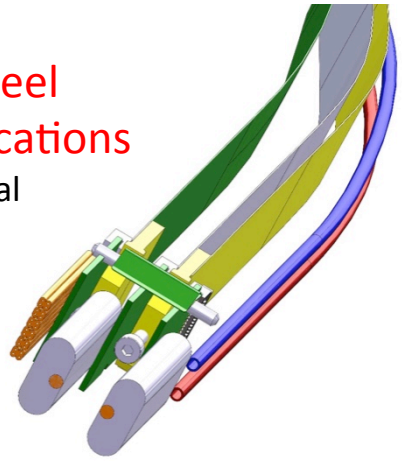
- Produce MAPS chips and stave frames for sPHENIX as part of ALICE production!
- Full staves, space frames and RUs production cost & schedule → **MAPS MIE**

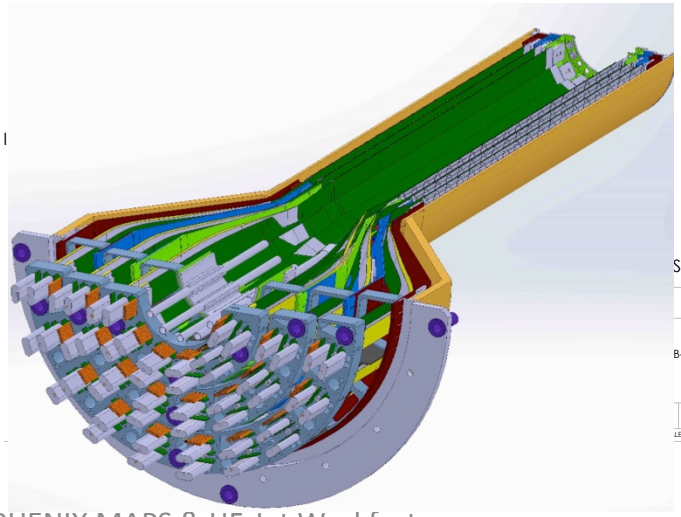
MAPS-sPHENIX Mechanical Integration



Service End Wheel
Possible modifications

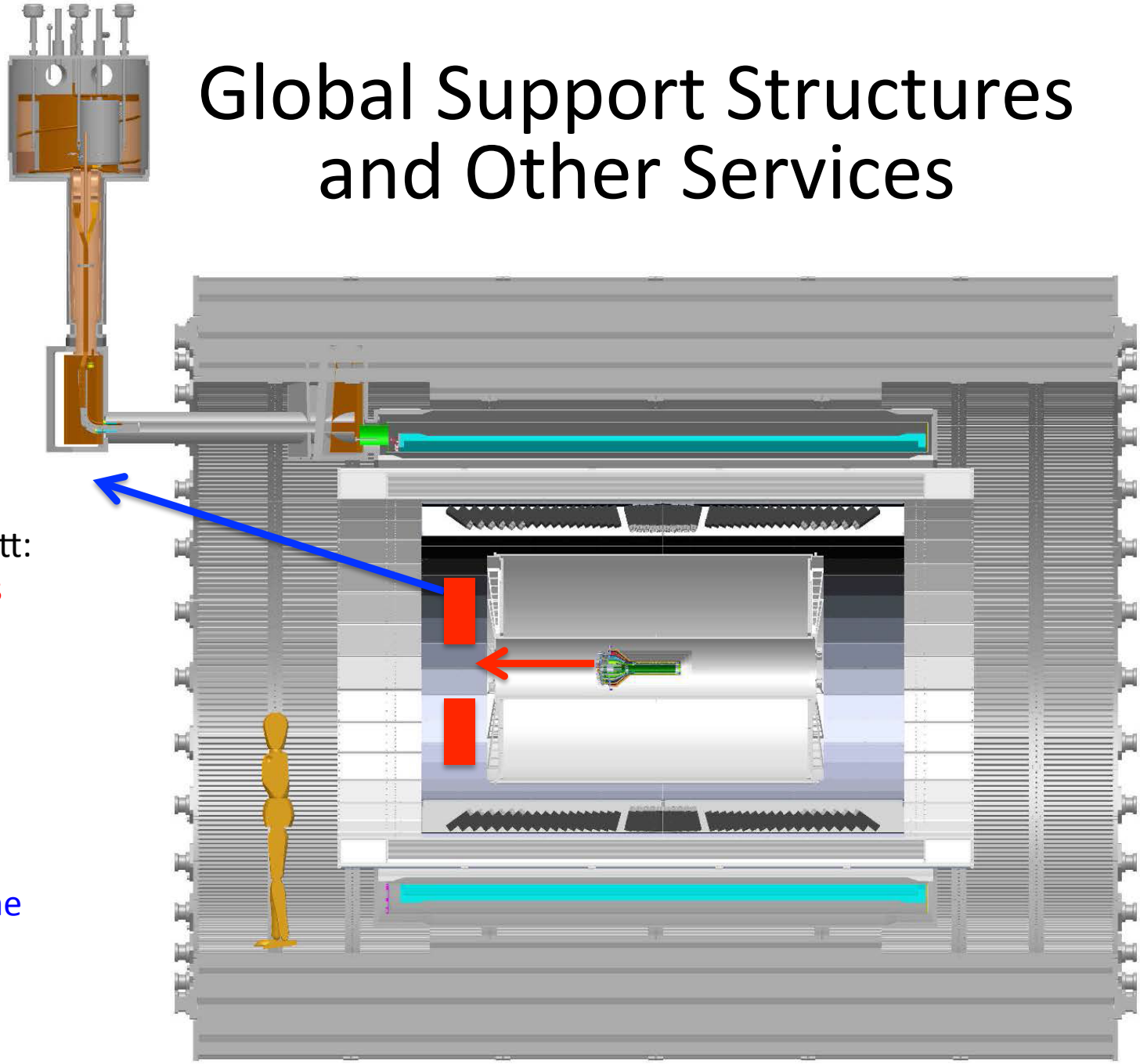
- High speed signal
- Analogy power
- Digital power
- Cooling





Staves

Global Support Structures and Other Services



MAPS->ReadoutUnitt:
- “5m” copper wires
- 6U VME modules
- 48 modules

RU->CRU@CH:
30+m fibers

Global support frame