

MVTX Status and Plan

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For the MVTX Group

05/21/2020

sPHENIX L2 Meeting

Project Status - Mechanics

• Design

- One-piece EndWheel (change from ALICE/ITS):
 - prototype in hand – looks good!
 - now in shop for CMM x-check
- Nose roller-assembly (Jan. review suggestion):
 - designed
 - prototyping (end of May back from shop)
- Left to do (end of May)
 - Finish FEA (next week)– all good so far
 - Finish drawings (end of this week)
 - CF layup (LBL input)

• Vendor selection:

- Ready to contact ~June (P6 was March-April)
- Started preparing the SOW

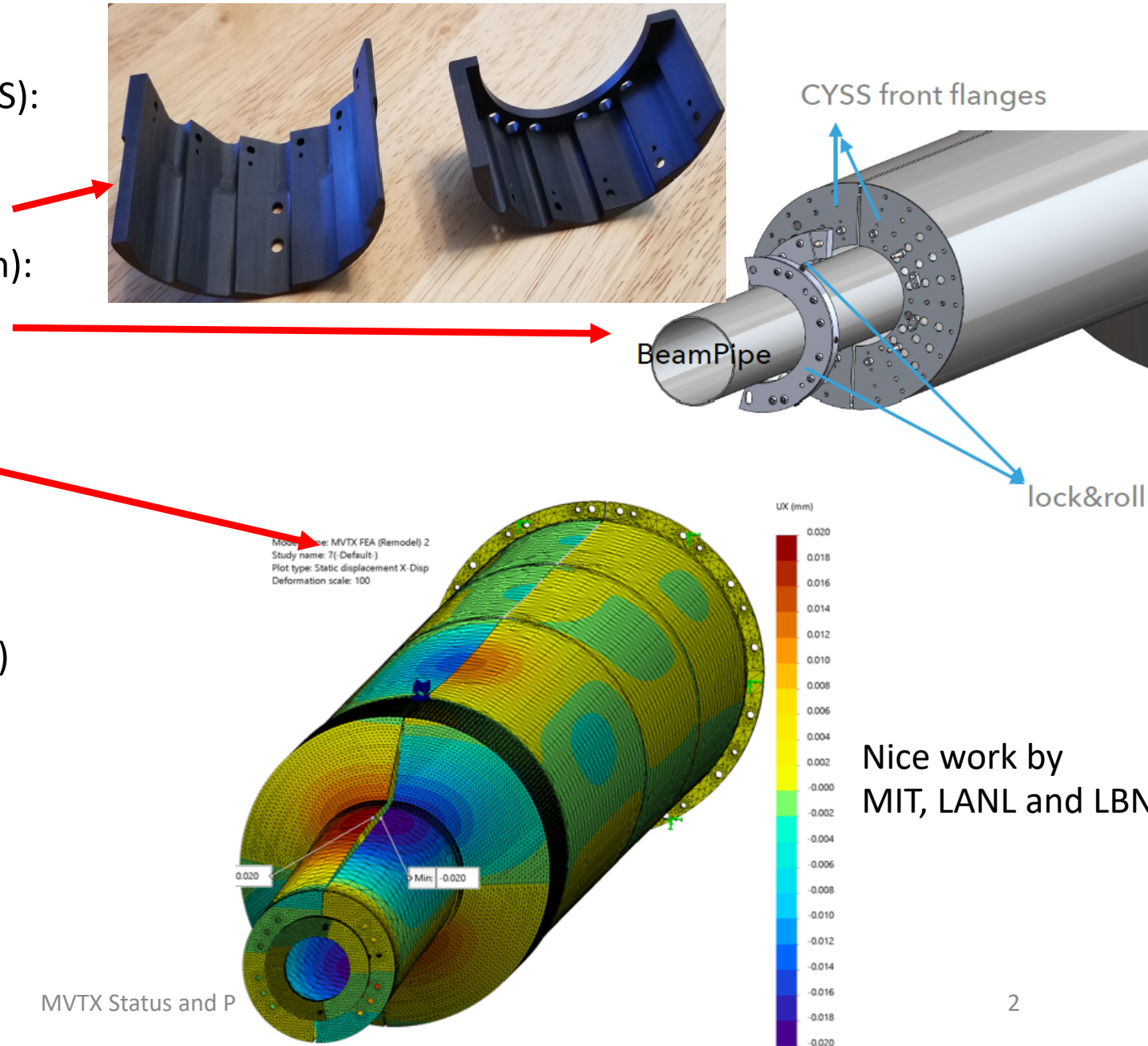
• Final design review ~ Fall 2020

- was planned for 7/2020

• Short term (after finishing design):

- Prototyping & preparing the mega mock-up
- X-wing, design installation tools, cooling, ...

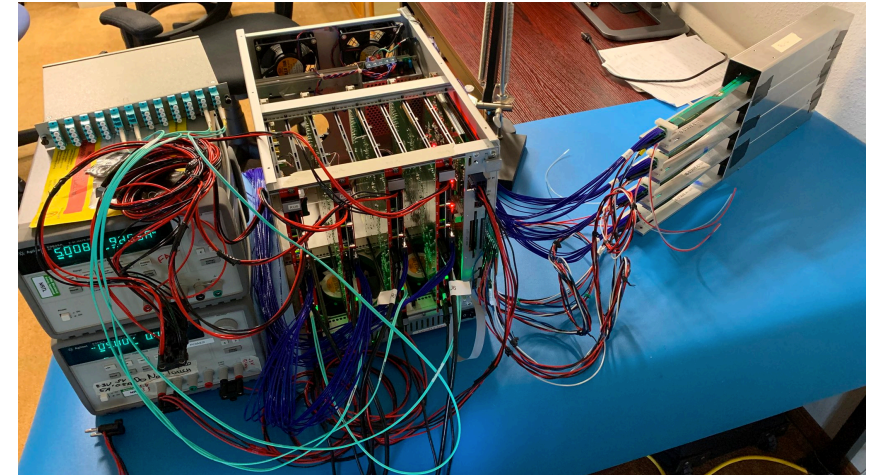
- ▶ the CMM report (from the vendor) shows all Tolerances are within given specs
- ▶ we decided to get a 2nd opinion/CMM → trying to find one in MA



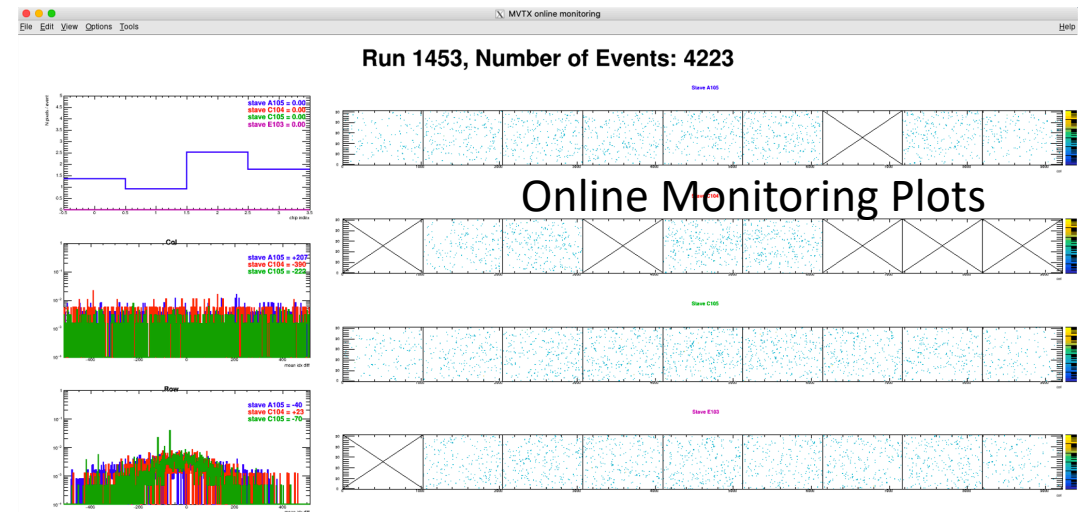
Nice work by
MIT, LANL and LBNL

Project Status: Readout and Electrical System

- Readout system integration
 - RU firmware/software updated (synced to ALICE 3/2020)
 - FELIX firmware/software
 - software/driver update (synced to ATLAS)
 - firmware design in progress for GBT slow control
 - readout firmware work next
 - 8-stave telescope under development
 - Possible test beam later in 2020
 - Online decoder & monitor updated
- Power boards submitted for fabrication
 - Delivery ~ late June 2020
- RU board test
 - 60 RUs waiting to be tested at CERN
 - Re-planning under discussion
 - Cold plates production at UT-A
 - Fund being transferred to UT-A
 - use UT-A machine shop



Cosmic data from a set up of:
4-satve/4-RU + 1-FELIX + 1-PU + 1-FELIX/Server + 1 GTM



Stave Status

Stave production re-start plan discussed with CERN, 5/14/2020

- 3 STAVEs ready for shipment
- 2 STAVEs ready for final tests
- 12 HICs are ready to be glued on STAVEs
- 3 HICs have to be bonded
- **Potentially ~20/84 available soon**

IBSTAVE IDC	HIC assembly	Insp. after glue	Bonding	Insp. after bonding	HIC PWR test	Qualif. test	HIC+SF -> Stave	Stave PWR test	Stave test	Stave test (with long PWR extrn.)	Final test (with PT100 and metrology)
TOTAL	24	23	20	20	20	18	5	5	5	3	3
A201	1	1	1	1	1	1	1	1	1	1	1
A202*	1	Damag. chip									1
A203	1	1	1	1	1	1	1	1	1	1	1
A204	1	1	1	1	1	1	1	1	1	1	1
A205	1	1	1	1	1	1	1	1	1		
A206	1	1	1	1	1	1	1	1	1		
B201	1	1	1	1	1	1					
B202*	1	1	1	1	1	*	Damag. chip				
B203	1	1	1	1	1	1					
B204	1	1	1	1	1	1					
B205	1	1	1	1	1	1					
B206	1	1	1	1	1	1					
F201*	1	1	1	1	1	*	Damag. chip				
F202	1	1	1	1	1	1					
F204	1	1	1	1	1	1					
G202	1	1	1	1	1	1					
G203	1	1	1	1	1	1					
F203	dummy										
H202	1	1	1	1	1	1					
H203	1	1	1	1	1	1					
H204	1	1	1	1	1	1					
H206	1	1	1	1	1	1					
E204	1	1									
E201	1	1									
E202	1	1									

Plan: to produce remaining $84-20=64$ staves

- MVTX: 48 staves for the full detector

- Possible restart date at CERN: June 2

- 29 wks left until the end of 2020;

- 64 golden modules to be produced:

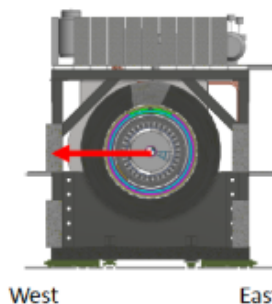
- with 80% yield -> 80 modules

- 2.75 / wk , completed by Jan/Feb 2021 seems within reach!
(Origin plan: complete by the end of 2020)

Preparation for Staves Test and Detector Assembly at LBNL

- Funding received at LBNL
- Stave reception and testing (**currently on schedule**)
 - ½ postdoc (Hanseul) on the project already.
 - Transportation box design started.
 - A default option, 10 staves/trip, is nearly ready.
 - Working on better custom boxes to carry 12~14 staves/trip.
 - **Uncertainty:** when can we fly to CERN in-person?
- Issue with the assembly/metrology space
 - ALICE ITS clean tent @ LBNL will most likely be reclaimed by engineering for other purposes.
 - Will have to rearrange/find new space for stave testing and detector assembly.
 - We have almost a year to prepare. Schedule risk is low but requires extra work.





1.4 m
6.5 m
4.7 m

40U

Power for individual components

CAEN	Comments	# devices	ch/dev	ch total	max pow/ch	service power	chann pow
SY4527	Mainframe (incl A1676 and A2518)	1				200	
	Integrated Mainframe Fans	9				20	180
A1676	branch Controller	1					0
A3486	bulk power	1	2	2	2000		40
EasyCrate	5 dev/crate	2	5	10			40
A3009R	LV: 12W / ch (RU), 5W/ch PU	10	12	120	45	200	816 PU+RU
A2518	LV in Mainframe	2	8	8	45	0	4 BB
						660	820
FAN Trays		3			180		540
						TOTAL	2020
						Cable Loss	300
						TOTAL + LOSS	2320

MVTX Services: Racks and Power

Several meetings with BNL integration team recently,
finalized the preliminary design for MVTX

2E1:~0 kW

Rack 1, 2E1

Patch panel, 2U
VME, 6U
Patch panel, 2U
VME, 6U
Patch panel, 2U
VME, 6U
Patch panel, 2U
VME, 6U
Patch panel, 2U
VME, 6U

Rack 2, 2E3

2E3: 2.32 kW

Easy 3000, 6U
Fan, 1U

Easy 3000, 6U
Fan, 1U

SY5527 main frame, 4U If SY4527, 8U
Bulk supply, A3486, 3U

Ask CAEN to update firmware to the one used in ITS



A3009B
Eur 7750
8V/9A/45W 12-ch
floating
48ch for RU
48ch for PU
Need 8 modules

<https://uk.farnell.com/ebm-papst/ft900sp30-01/fan-tray-9-fans-iec-plug-switch/c>



A2518
Eur 2050
8V/10A 8-ch individual
floating for back bias
Need 2

Power boards & Readout boards

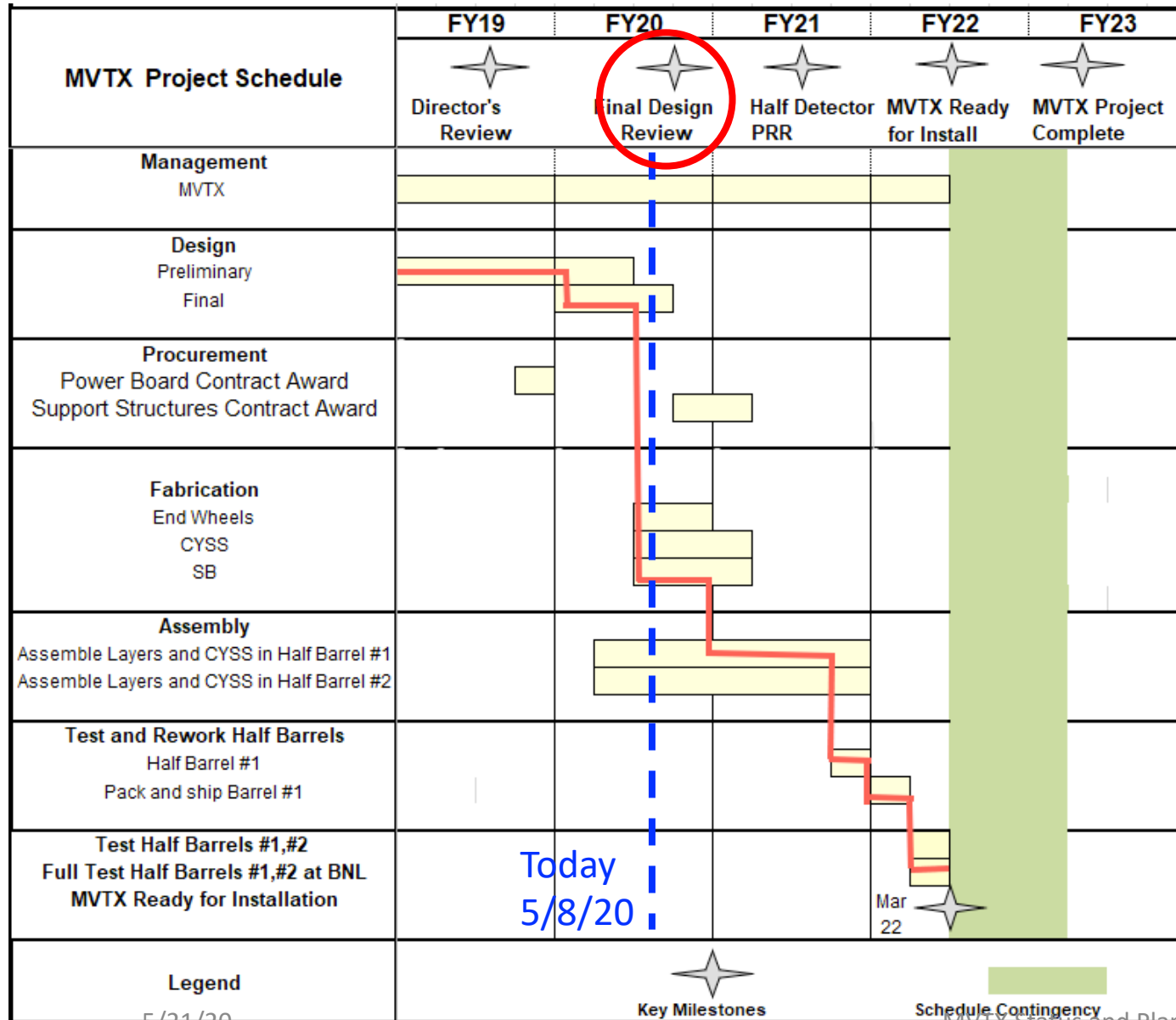
Each VME has 21 slots
<https://www.digikey.com/product-detail/en/vector-electronics/CCA28-84-00/V1178-ND/275023>

48 RU in VME
48 PU (24 power boards) in VME 1U = 1.75", typical rack height = 42U

MVTX Status and Plan

backup

Where do we stand - PMP(12/2019)



Final design review -> late Fall 2020?

Delays in FY-20:

- Mechanical design & prototyping
 - Final design review
- Carbon structure fabrication
 - Most facilities closed due to COVID-19
- Insertion system design, beam pipe
 - Active discussions with BNL CAD and sPHENIX OSI
 - Final beam pipe design completed and reviewed recently
- Power system
 - Power boards fabrication – ordered
 - CAEN power – ready to order
 - Cables – waiting for final layout for length
- Stave production & RU test
 - CERN schedule
 - International shipping

Staves – QA plan inspections/test records

- The MVTX will receive fully tested staves from ALICE.
- The full history including testing results and measurements of all of the parts of the stave are preserved in the ITS databases.
- This data is available for download.
- For simplicity, we will continue using the ALICE database for the testing that happens at LBNL. The software is already set up for this interface.
- After completion of all testing, the full set of data for the MVTX staves could then be pulled from the ALICE server.
- In any case, a full record of building and testing results will be preserved.

Detector Assembly - Procedure

