

TPOT Status

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for the TPOT team
PMG meeting, May 19, 2022

Introduction

TPOT = TPc Outer Tracker

Mission:

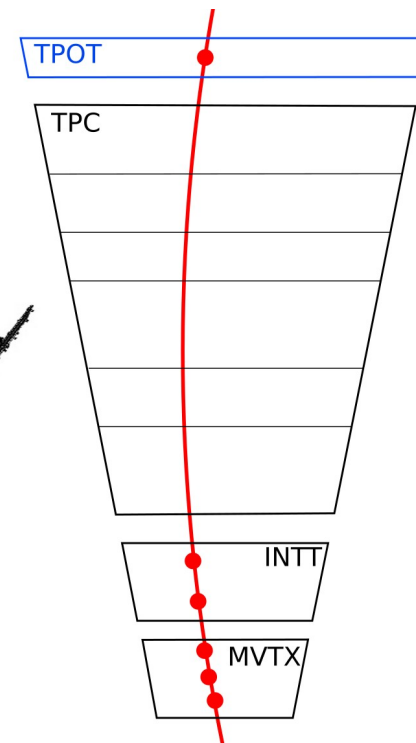
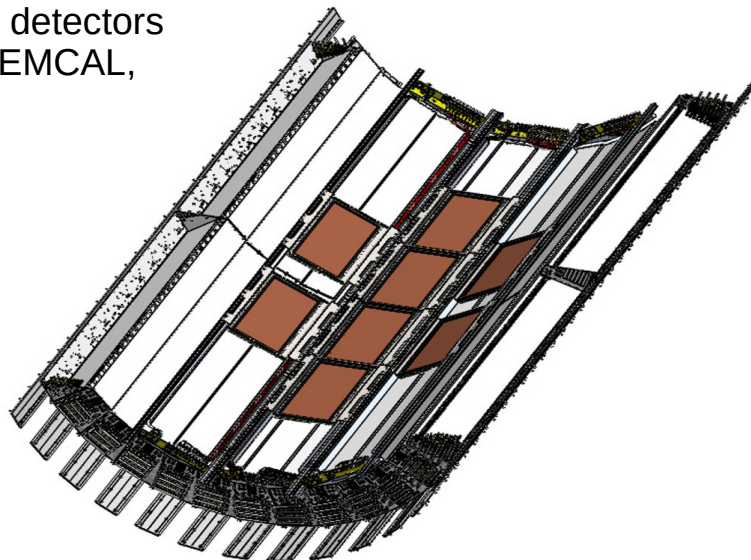
provide an additional space point on the outside of the sPHENIX TPC, in a fraction of the acceptance, to calibrate the TPC (i.e. **beam-induced space charge distortions**)

Concept:

8 identical modules of Micromegas detectors (2x1D detectors each), located at the bottom of the TPC, above the EMCAL, attached to picture frames mounted on the I-HCAL

Outline:

- highlights on mechanical support
- highlights on Micromegas production
- other updates
- assembly schedule
- Milestones and risks



Highlights 1 - FDR on May 18 2022

Link: <https://indico.bnl.gov/event/15381/https://indico.bnl.gov/event/15381/>

The review went well. Overall concept validated for

- TPOT support structure
- interface with TPC and EMCAL
- installation procedure

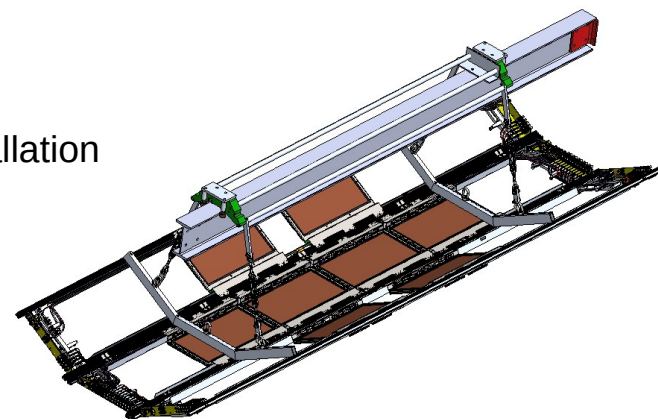
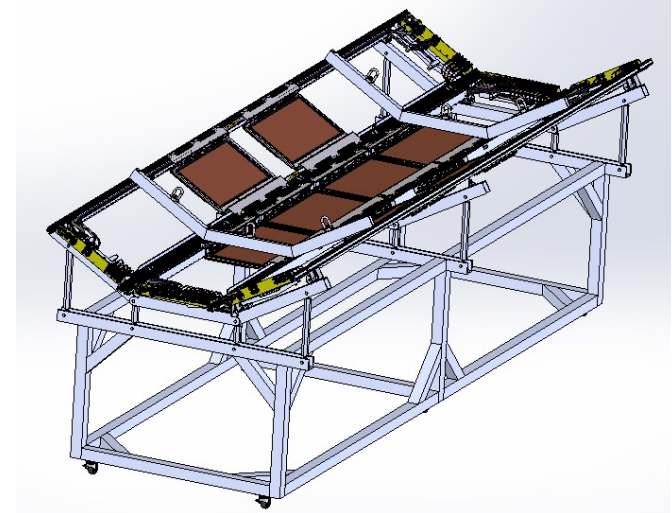
Committee's recommendations include:

- additional FEA analyses (e.g. during lifting; weight on EMCAL at mid-span, ...)
- get official green light from TPC about clearance (exp next week)
- get official green light from EMCAL about mid-span support (exp within 10 days)
- write Interface Control Document together with TPC and EMCAL
- write procedural documentation for installation
- anticipate a removable protection cover over detector during TPOT and TPC installation

No show stopper.

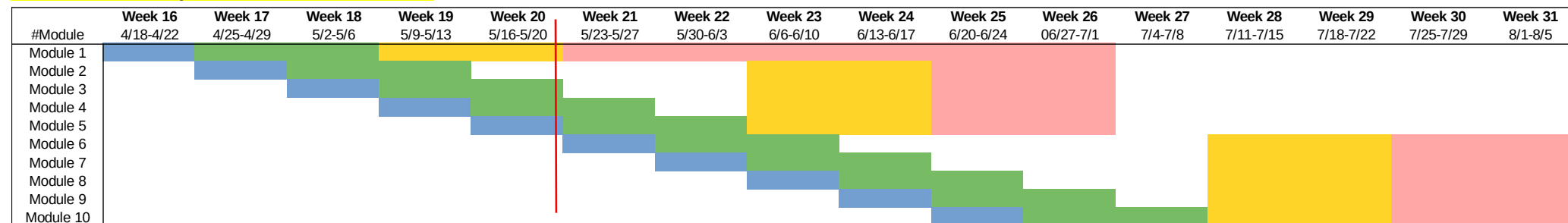
Will move forward with repurposing existing parts to new design

Expect start support assembly by June 16, completion by July 14



Highlight 2 - Micromegas production

Latest TPOT production schedule

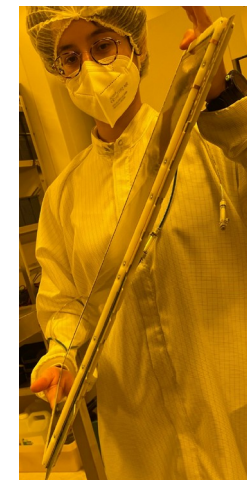


Legend	
	Production
	Testing + metrology at Saclay
	Shipping to BNL
	Testing at BNL/SBU

Number of module produced today 2 (expected 5)

Might have 4 by the end of this week (update today during TPOT engineering meeting)

- Problems in production chain are being investigated, and followed up with team + management at Saclay
- As backup solution, consider subcontracting part of the production to MPGD lab at CERN
- Decision point and impact on schedule still being finalized with management at Saclay (exp 1w)
- First module available at BNL since Monday May 9, for testing with SAMPA electronics (on schedule)



Electronics

- FEE and backend follows TPC schedule. Expect first boards available for TPOT early July.
- Trunk Fibers (patch-panel to DAQ) ordered (in-time), detector-to patch panel fiber routing being finalized. Should place order soon
- Transition board+flat cable (detector to FEE) ordered at SAMTEC expected June 16 (on-time)
- First test Detector+FEE completed. Encouraging results. More tests with first production module to start next week (exp by Jul 1.)
- FEE cooling plates received. FEE cooling test at BNL in progress (in-time). Tube length and routing definition in progress

Other services

- HV power supply and modules received. Will be tested next week, with module 1.
- HV cables (detector-to-patch panel) finalized (come with detector)
- HV cable length and routing definition (patch panel to PS) ongoing
- LV Power Supply is the same as TPC
- all LV cables (detector-to-patch panel and patch panel to PS) ordered. Routing completed (will use same stress relief as TPC)
- gas system: will use pre-mix (Ar/iC4H10 95/5). Will repurpose PHENIX TOF-W gas rack, and RPC gas distribution.
Should not need any flammable gas detection. Plan for ESRC review in June (TBC)

Assembly schedule

Final Design Review	5/18/22 (originally 4/4/2022)
All mechanical parts available for assembly	6/16/22
Support structure assembly begins	6/16/22
End of support structures assembly	7/14/22
First batch of TPOT modules (1-5) available for assembly	7/1/22
First batch of TPOT modules (1-4) installed on support	7/29/22
Second batch of TPOT modules (6-10) available for assembly	8/5/22
Second batch of TPOT modules (6-9) installed on support	9/2/22
End of post-assembly tests	9/30/22
End of TPOT installation in sPHENIX	10/07/22

High level milestones and risk

Milestone	date	Status	risk
Number of TPOT modules produced at Saclay	Today	2, possibly 4 by end of week (expected: 5)	moderate
FEA analysis finished and reviewed	18/05/22	FDR happened. more FEA analyses requested	low
First batch of 5 TPOT Modules assembled & tested (Saclay)	06/03/22	(assembly ends 05/20/22)	moderate
FEE to detector fabricated and tested	06/23/22		low
HV system tested	06/16/22	Test will happen on Week 21 (May 23)	low
LV systems	05/31/22	depends on TPC schedule	low
Slow controls	06/16/22	depends on TPC schedule	low
Characterization of first 5 TPOT modules at SBU	07/01/22		moderate
Second batch of 5 TPOT modules assembled & tested (Saclay)	07/08/22	(assembly ends on 06/24/22)	moderate
Gas system designed, ES&H reviewed and tested	07/07/22		low
TPOT mechanical support assembled	07/14/22		low
TPOT ALD review, decision point	July 15		
Start TPOT installation in the support structures	07/01/22		moderate
installation of modules 5-8	08/12/22		moderate
End of TPOT installation	09/30		moderate
Installation of TPOT in sPHENIX	10/07/22	(also depends on sPHENIX schedule)	moderate