

sTGC- Status @ BNL

Prashanth for the BNL group

Text color scheme in the slides:

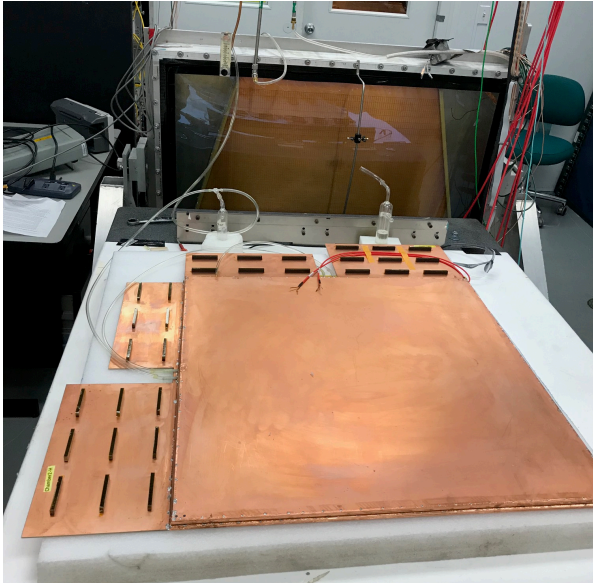
- Done
- Need to be done in next two months
- After that

Cost

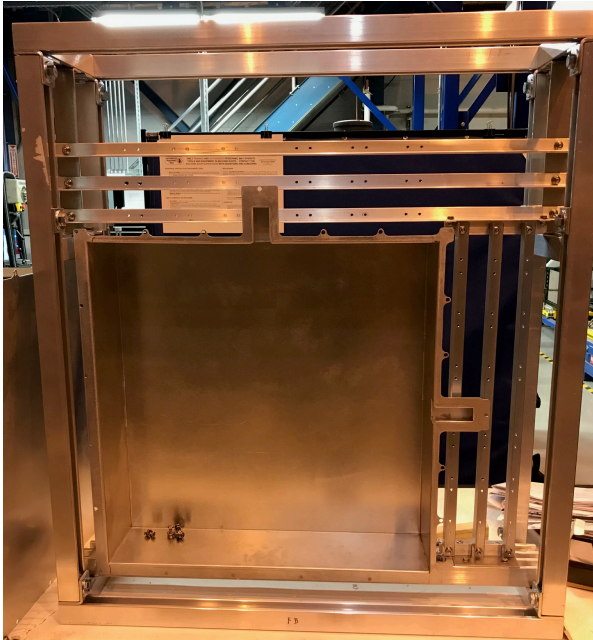
A new cost associated with the item

Status of 60 x 60 cm² Prototype

Prototype



Mounting frame with gas enclosure



- Prototype arrived to BNL on June 6th, now purged with N₂ in clean room at STAR
- Shock sensors were red, but no leak detected in the chambers
 - pressurized the chambers to 4 mbar above atm and hold it for 30 min
 - Like to ramp to 1000 V with N₂
- Mounting frame is mostly ready
 - Bill is working on mounting the prototype to frame
 - Heat detector & two pentane sniffers need to be mounted
- Need to connect RDOs and FEEs and start testing for noise and integration
- Start cosmics when the gas system is ready
 - The old pentane mixing system is rusted, I will try to restore it if time permits, so we can use with the old system earlier

Status of Gas Mixing system

- Please see Rahul's talk for full details
- Bob is working on the gas cabinet
 - Various controllers and safety equipment are being tested and provided to Bob for assembly
- Heat tape:
 - Working on approvals to get power outlet for the heat tape controller
 - Need to test the heat tape controller
 - CAD techs for mounting heat tape
- Supply and return flow meters for each sTGC chambers are need to be chosen and purchased
 - Since there is no safety gas envelop to catch any leak, accurate flow meters are need to chosen and purchased.
- Need to design on how to monitor possible gas leak in the final 4-sTGC planes using a single pentane sniffer
 - Need to have gas sampling mechanism

Cost ??

Cost ??

Status of Safety and Interlock System

- ESRC approved the interlock design
- Most of the PLC hardware are in hand or on track to receive by end of this month
- Wiring schematic is under review \Leftrightarrow under development
 - All the wiring parts need to be purchased, max lead time is 2 weeks
 - Final cost will be available after review (current estimate is \$16 k, likely to go down)
- Start building after electrical review
- David is working on programing the PLC on a test setup Mike made
- Tying to STAR Global Interlock
 - Any hazard activity in west pole tip need to be tied to sTGC interlock

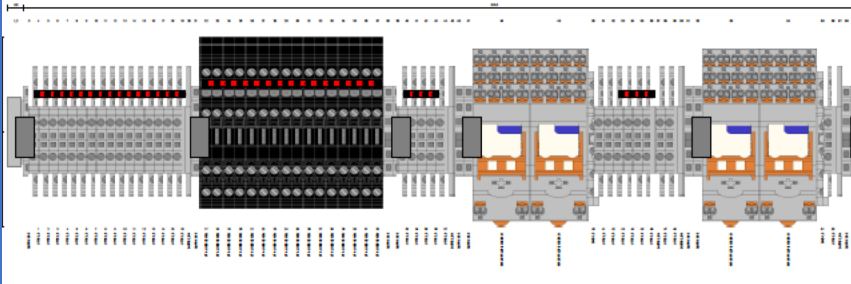
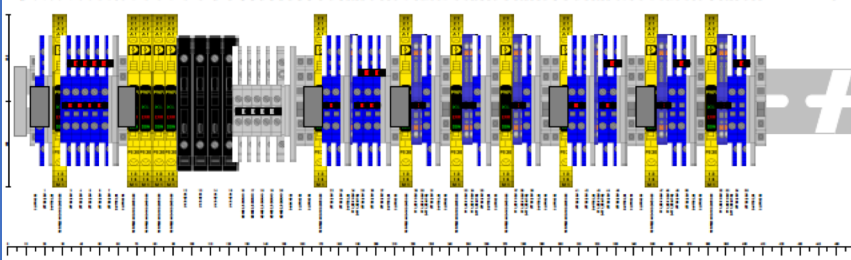
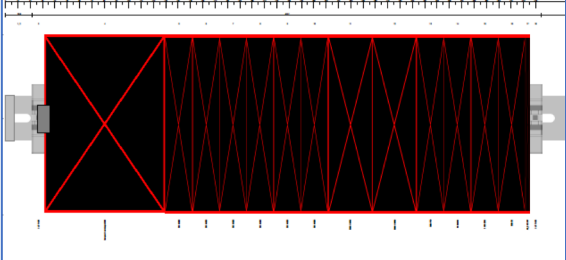
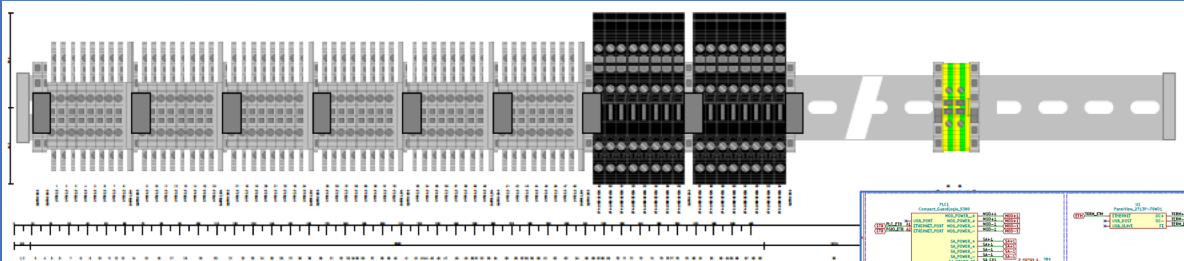
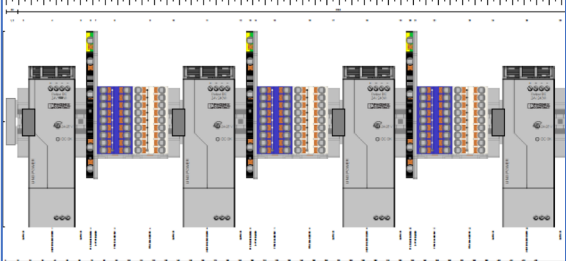
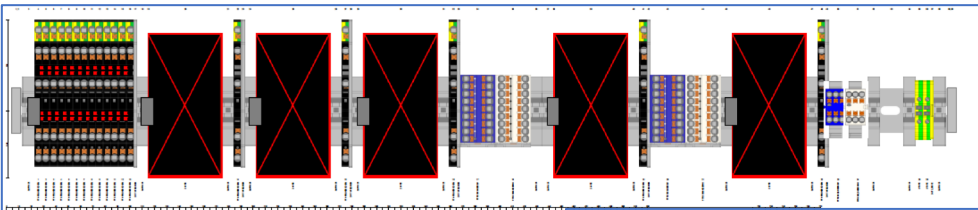


Cost ??

Status of Safety and Interlock System

Some Pictures

Final versions will available after review



PLC & modules

Relays & connectors

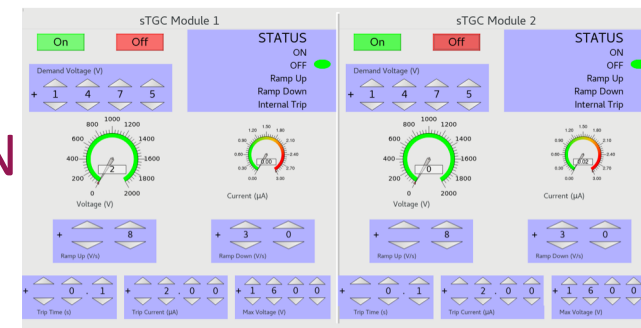
By: Michael Capotosto

Status of HV distribution and Controls

- Chi reported that
 - sTGC can stand at 15 kHz/cm²
 - 8pC@2900V for each event with Co-60 source
 - So the max current needed 300 uA
- From the calculations by Yuri et.al. estimated current from charged particles with K.E. > 100 keV near 1st plane of sTGC
 - For AuAu 200 GeV 264 uA
 - For pp 500 GeV 624 uA
 - In this calculations electrons with K.E> 100 keV included. But, real contribution comes with K.E > 1 MeV, so only part of the electrons contribute and this is over estimate
- Proposing power supply:
 - Max HV = 3500 V
 - Current limit = 350 mA / 0.35 mA (dual range)
 - 9 W
- 32 (+2 spare) HV cables need to be purchased
- Controls: A two channel version of HV controls available for MTD CAEN module. Need to work on this for new module and calibrate.

Full details of above studies are here:

<https://drupal.star.bnl.gov/STAR/event/2020/05/20/star-forward-stgc-meeting/power-supply-selection>



Status of HV distribution and Controls

Cost: ~ \$20 K

AG7435

12/24 Channel 3.5 kV, 3.5/0,35 mA (9W) Common Ground Dual Range Boards

Request a quote

Manual Downloads

Features

- 12/24/32 independently controllable High Voltage channels
- 3.5 kV output voltage (9 W)
- Dual range current:
 - High Power: 3.5 mA (10 nA Current monitor resolution)
 - High resolution: 350 μ A (1 nA Current monitor resolution)
- Available with either positive, negative or mixed polarity (only with SHV connectors)
- Radiall 52 pin or SHV coaxial connectors
- Low ripple
- Under/over-voltage alert, overcurrent and max. voltage protection



x 3 + 1 spare

SY5527

Universal Multichannel Power Supply System

Request a quote

Manuals Downloads

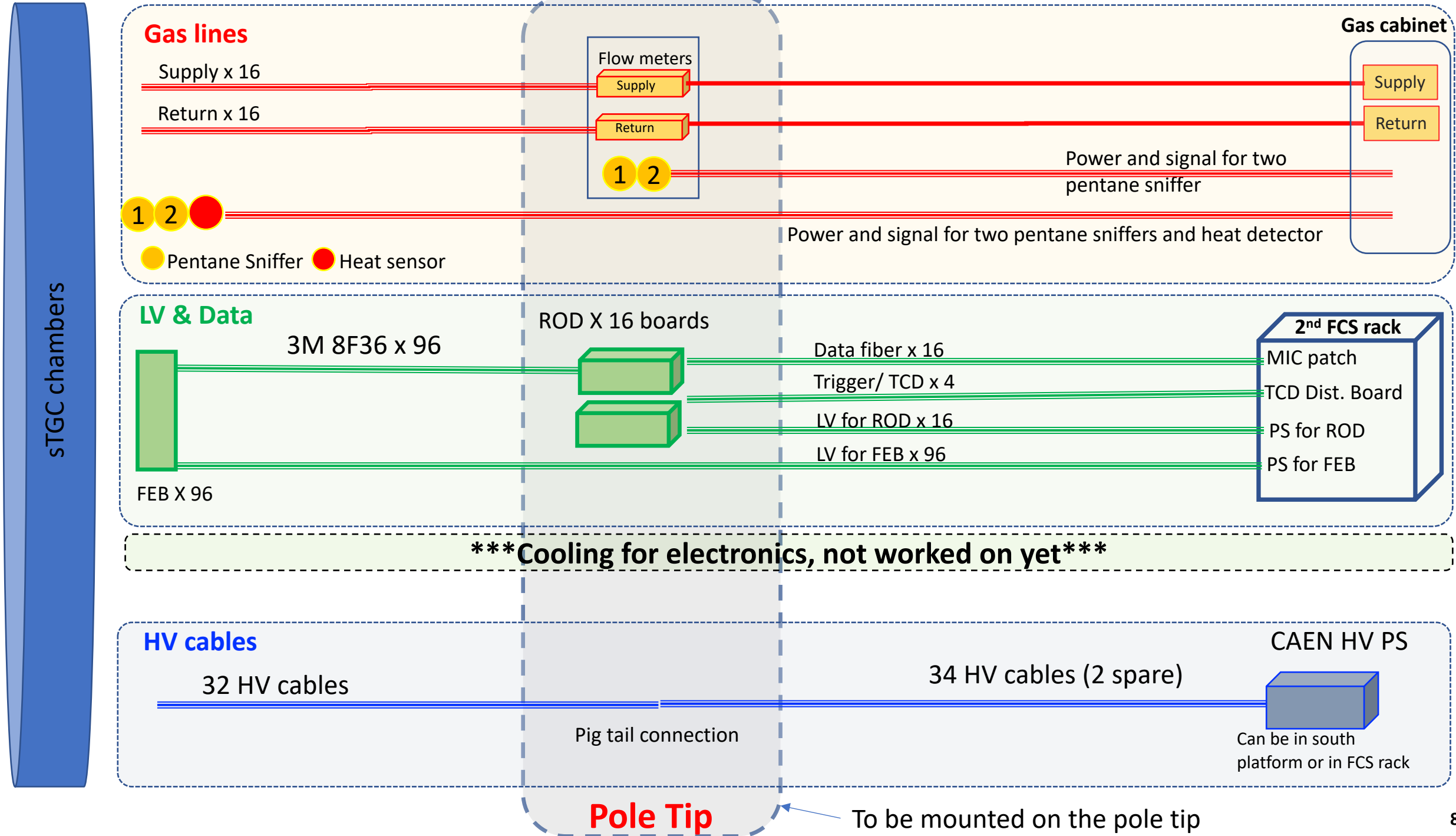
Features

- Available in a fully equipped option: [SY5527 Premium Version](#)
- Communications via Gigabit Ethernet
- Communications via Wi-Fi (optional)
- OPC Server to ease integration in DCS
- Fast, accurate setting and monitoring of channel parameters
- 5.7" colour touchscreen LCD (optional)
- Live insertion of boards
- Advanced Trip handling
- Hardware current protection
- Modular and expandable power supply

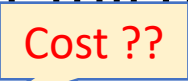
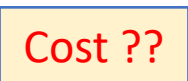
Model	Image	No. of Channels	Max Output V	Max Output I	Vset/Vmon Resolution	Iset/Imon Resolution	Max. Ramp Up/Down Rate	Ripple Typ.	Connectors	Max Power per Channel	Grounding	Polarity
AG7435		12 / 24	3500 V	3.5 / 0.35 mA selectable	5 mV	10 / 1 nA	500 V/s	< 15 mVpp	SHV /Radiall 52	9 W	Common Ground	Neg / Pos



Last decision was to wait till the 60x60 prototype results
 Since, prototype studies delayed for next year, I am proposing to buy mainframe and one module for next run.



Status of LV

- Please see Tim's talk for full details
- ROB crate and cables 
- Cooling for electronics 
- LV controls (FEB and ROB) software

Conditions Monitoring and Archiving

- David (and his group) will provide a monitoring GUI and help to archive conditions parameters
- Archived to online DB
 - nPentane flow
 - Co2 flow
 - HV of 32 chambers
 - Temperature from heat tape
 - Gas mixture supply and return pressure
 - Ambient temperature of sTGC chambers

Data QA Monitoring

- JEVN plots for shift crew
- Offline monitoring plots (run-by-run QA)
- Need volunteers

Remaining Cost - Summary

	Item	Cost \$
1	Supply and return flow meters	TBD
2	Gas sampling system for pentane sniffing	TBD
3	Controls wiring	TBD
4	HV power supply	20,000
5	HV cables	TBD
6	ROD crates	TBD
7	LV cables	TBD
8	Cooling for electronics	TBD
9	UPS for gas & control cabinet	TBD

Jobs and Resources

The items listed here are for until end of Run 21

Job	Main Responsible Person
1 Gas mixing system	
Assembly of gas cabinet and supply	Bob
Component testing and calibration	Prashanth & Alexei
Heat tape testing	Mike and Prashanth
Heat tape installation	CAD
Supply and return flow meters	Prashanth
Pentane sniffer attachment to final sTGC plane	Prashanth
Final testing	
Documenting operation procedures	Prashanth
Safety approvals	Rahul
2 Safety and Interlock	
Component testing	Prashanth
Wiring	Mike
Programing	David
Testing	
Documenting operation procedures	Prashanth
Safety approvals	Rahul
Tying to STAR Global Interlock	2021 summer
3 HV	
Procurement power supply	Prashanth
Power supply (calibration) testing	
Procurement HV cables	Mike
Routing HV cables	Mike
Slow controls	David
4 LV	
ROD Crates	Tim
Cables and wires procurement	Tim
Routing LV and control cables	
5 60 by 60 Prototype	
Mounting to frame	Bill
FEEs and DAQ testing	Bob Scheetz ? And Tonko
Gas connection	
Cosmic test stand	
Integrate to STAR	
6 conditions parameters monitoring and archive	David
7 Data QA and monitoring	
JEVP plots	
Offline run-by-run QA	

Summary and Conclusions

- We are progressing, but need to accelerate!