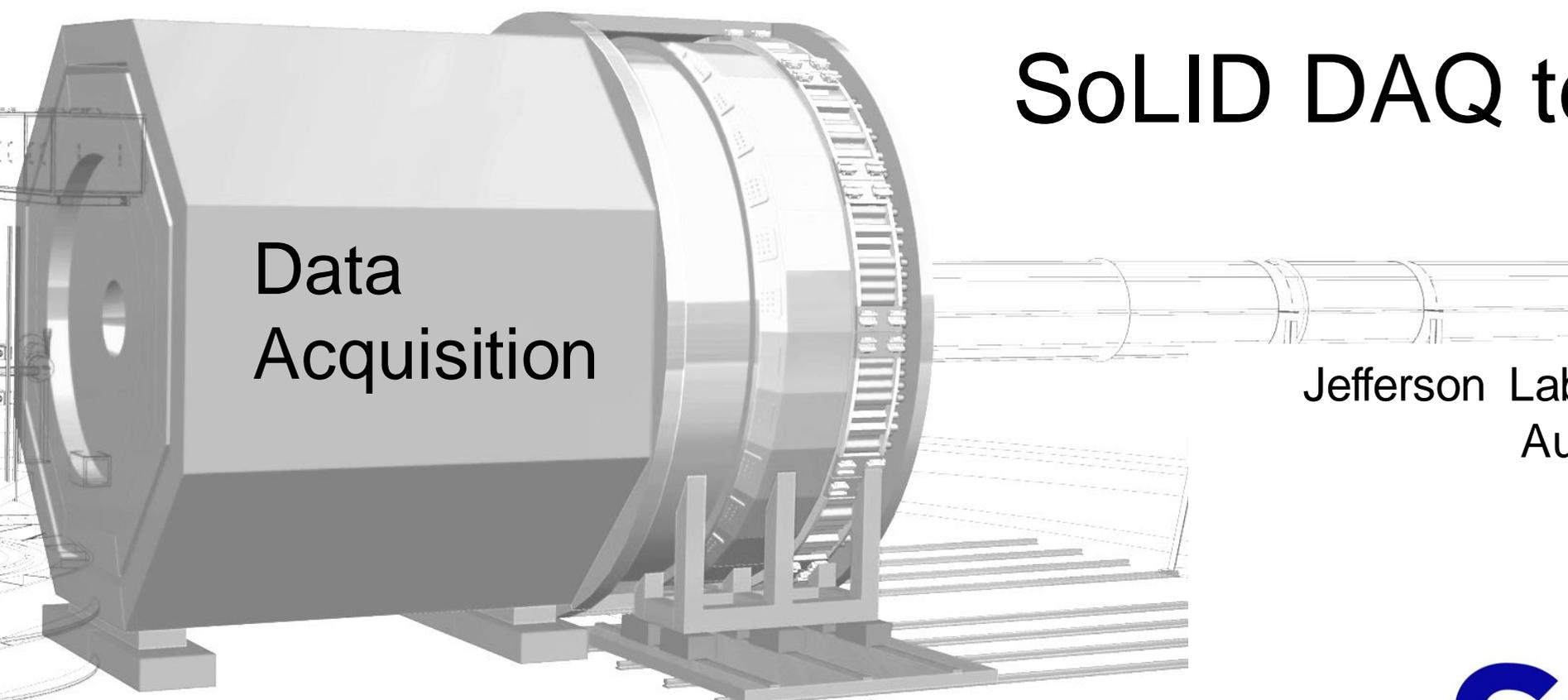


SoLID DAQ test stand status



Data
Acquisition

Jefferson Lab SoLID Pre-R&D Review
August 7th, 2020

Hanjie Liu

Data acquisition working group
University of Massachusetts -
Amherst



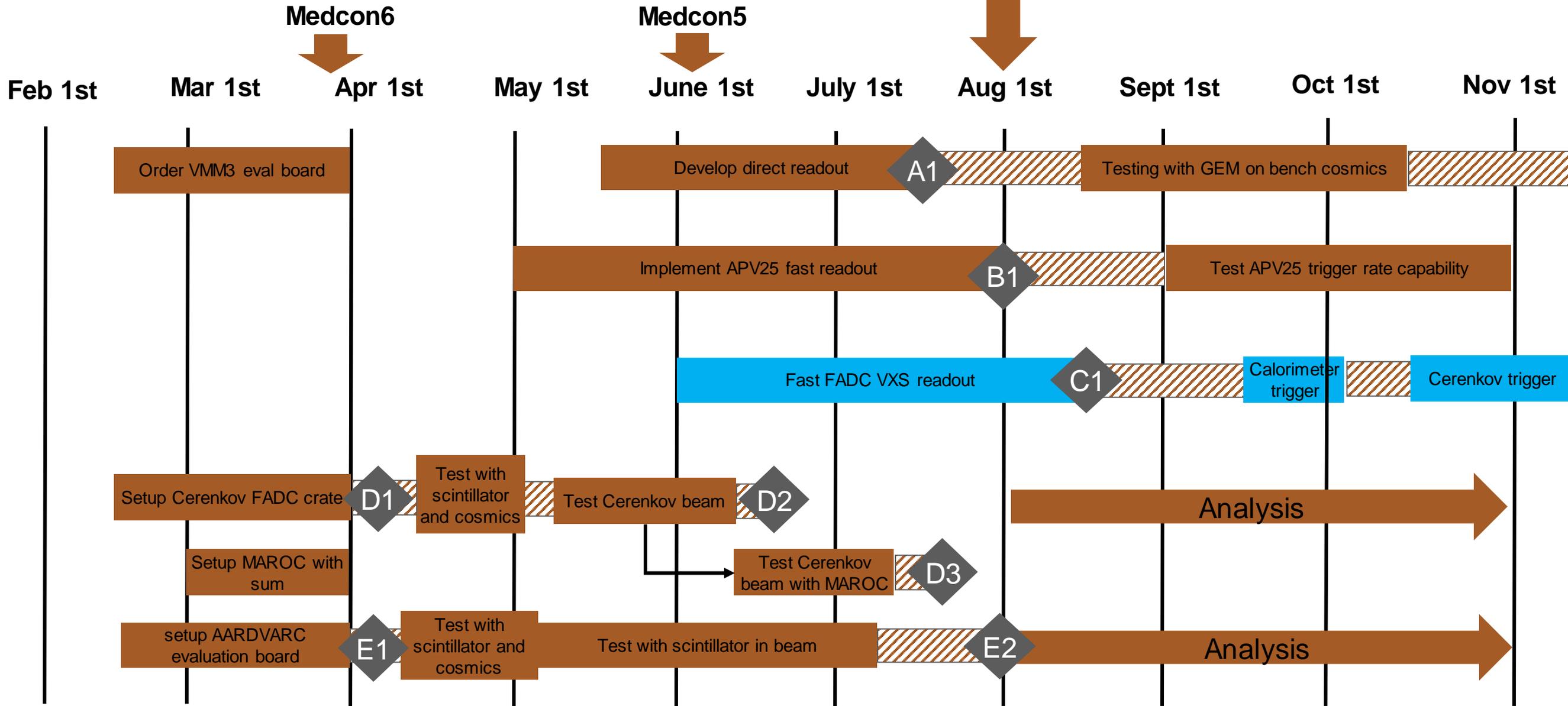
Outline

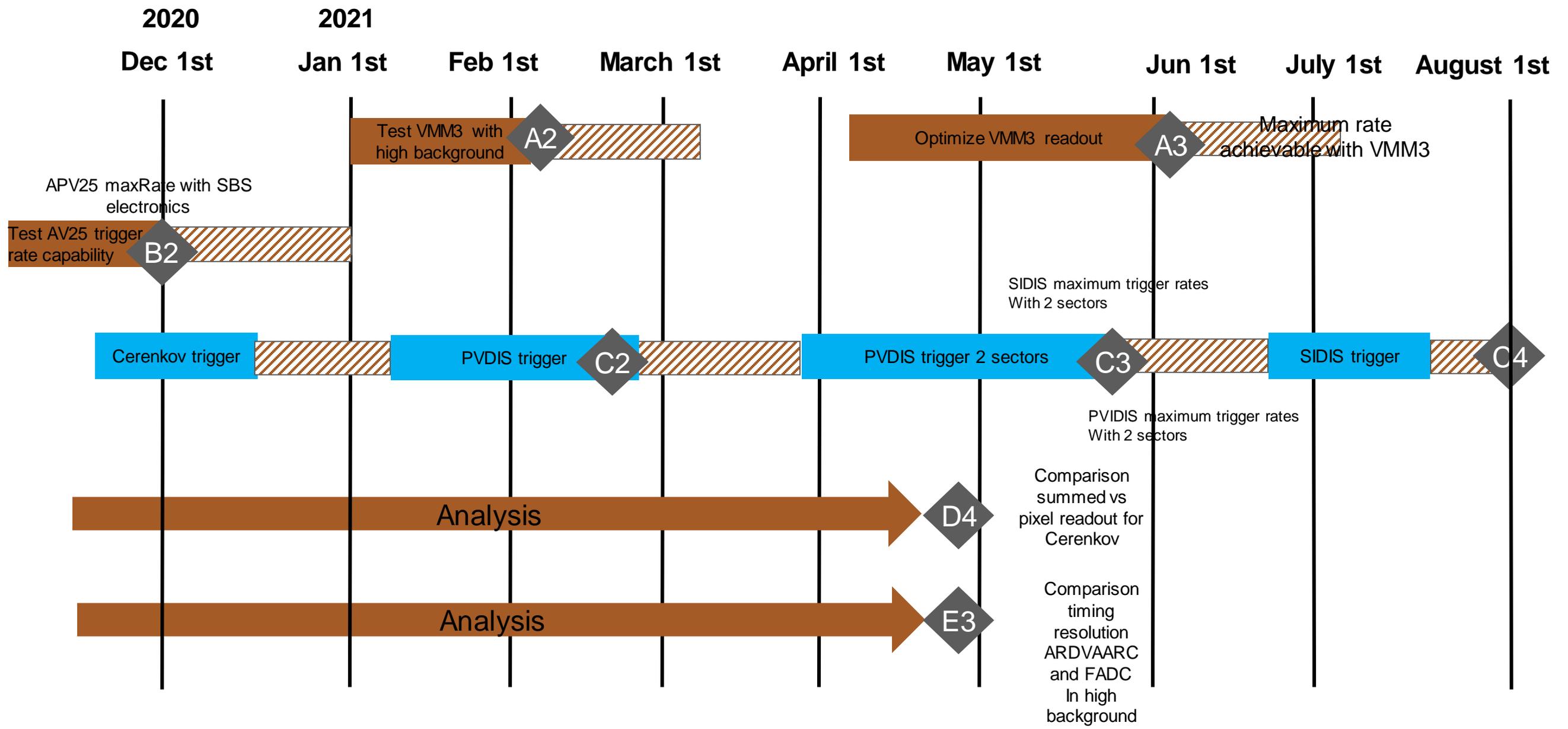
- UMASS test stand and the goals
- Compton setup used during CREX and its performance
- Conclusion

Tasks and milestones

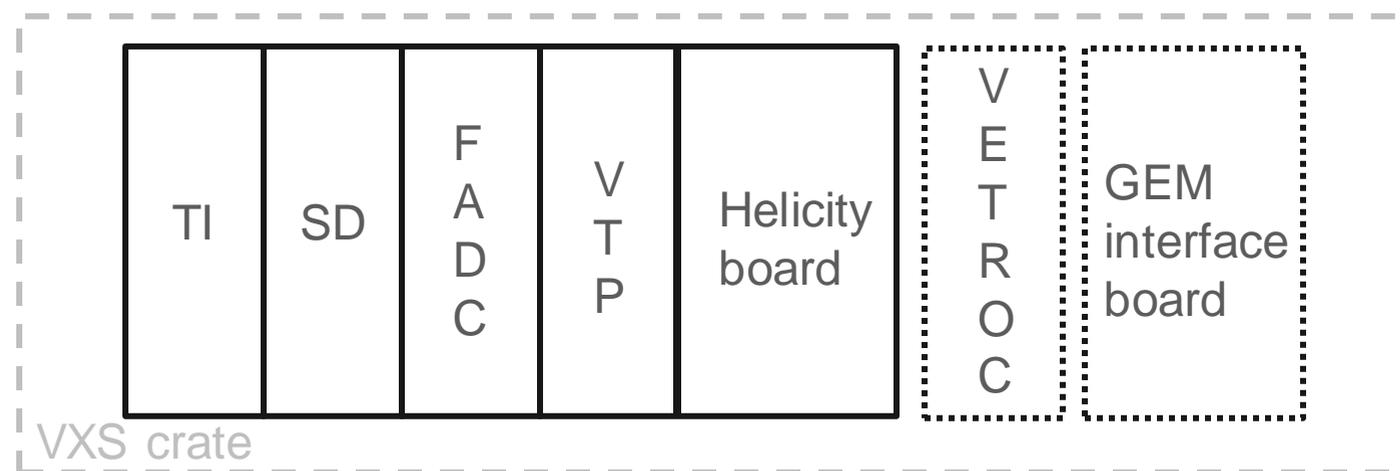
C : FADC development

- C1 : Fast VXS readout August 15th 2020
- C2 : Calorimeter trigger September 15th 2020
- C3 : PVDIS trigger and test February 15th 2021
- C4 : PVDIS trigger and test 2 sectors May 15th 2021
- C5 : SIDIS trigger and test July 15th 2021





UMASS test stand setup



PVDIS: ECal, Cherenkov → FADC

SIDIS: ECal → FADC

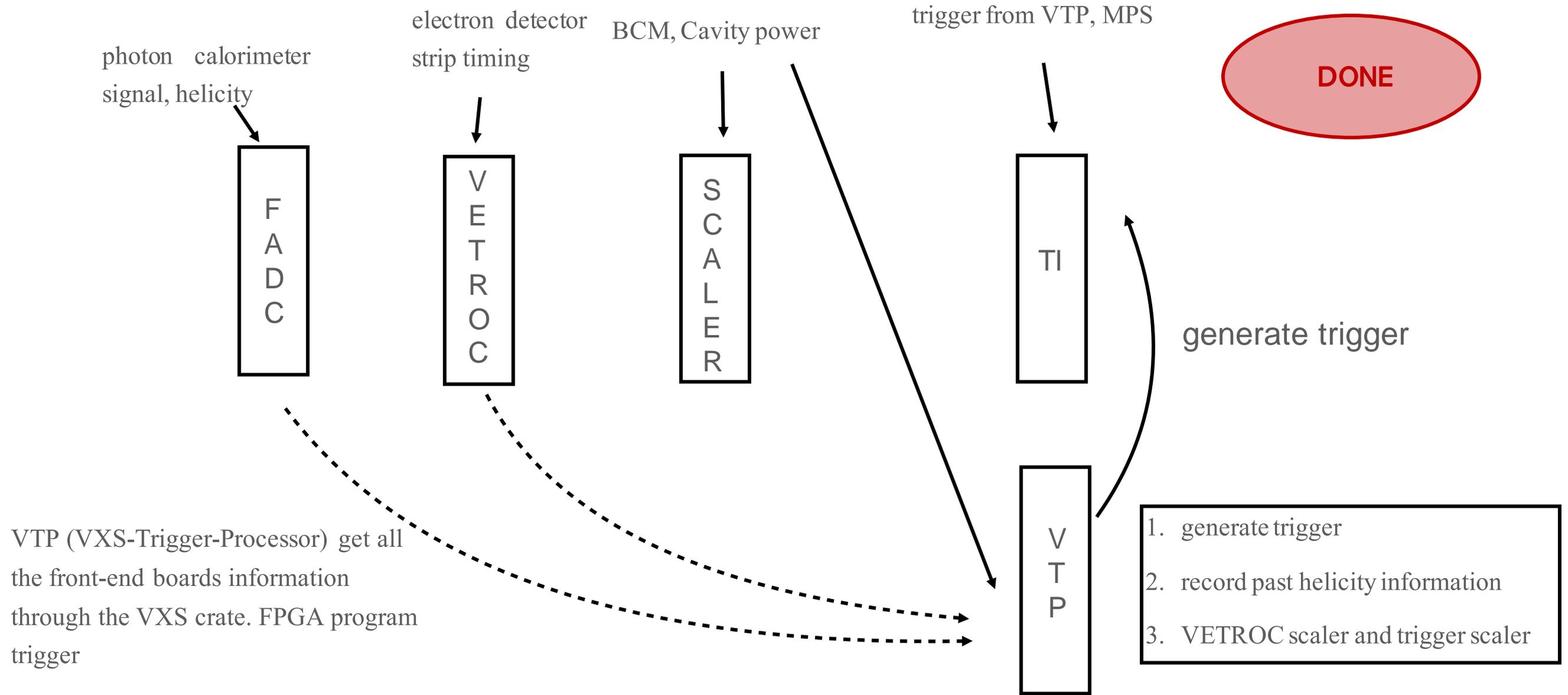
MRPC → VETROC

TO BE DONE

Goal of the test stand

- Test the performance of the FADC fast readout through the VXS backplane in terms of deadtime and rate capabilities
- Develop FADC based calorimeter trigger for PVDIS
- Test the PVDIS trigger consisting of a coincidence between the Cherenkov and Calorimeter trigger
- Study effect of dead time on the measurement of full system FADC + GEM
- Check pedestal width and ability to measure asymmetries at the ppm level required for PVDIS

Compton DAQ setup during CREX



Test during CREX in Compton test stand

- VTP collect signals from FPGA based boards (FADC, TI, VETROC) and program triggers
- CODA 3 is used and software for decoding multi-block data is prepared
- Implemented delayed helicity recording and decoding
- Developed basic software for analysis of asymmetries and dead time
- Starting observing Compton asymmetries



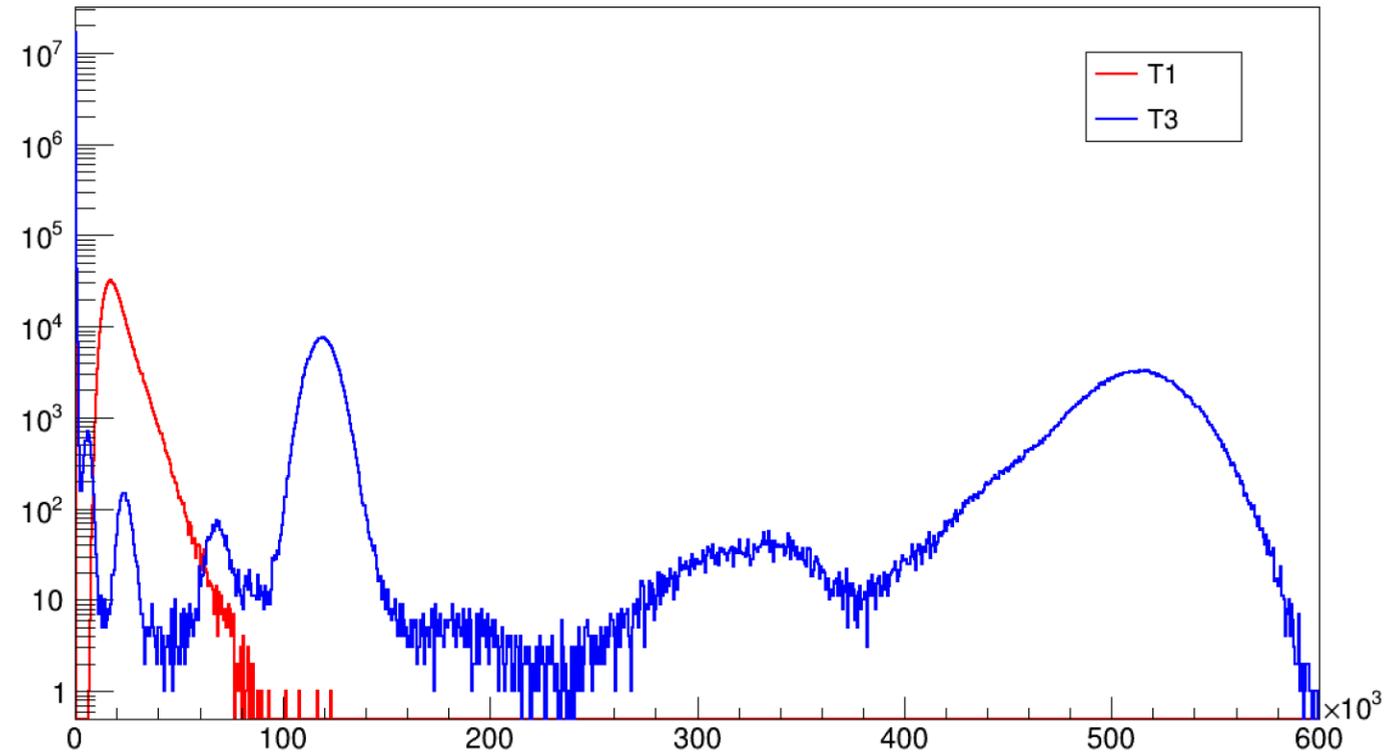
DONE

Deadtime

T1: at least two electron planes

T3: photon (prescale =1000)

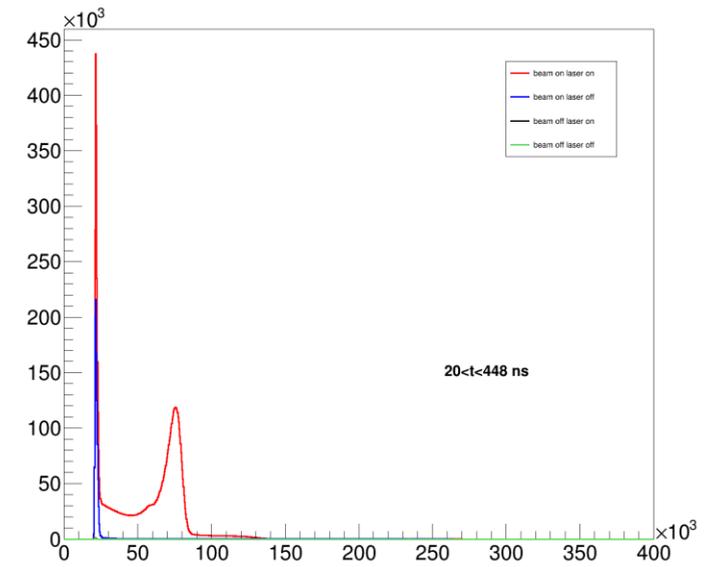
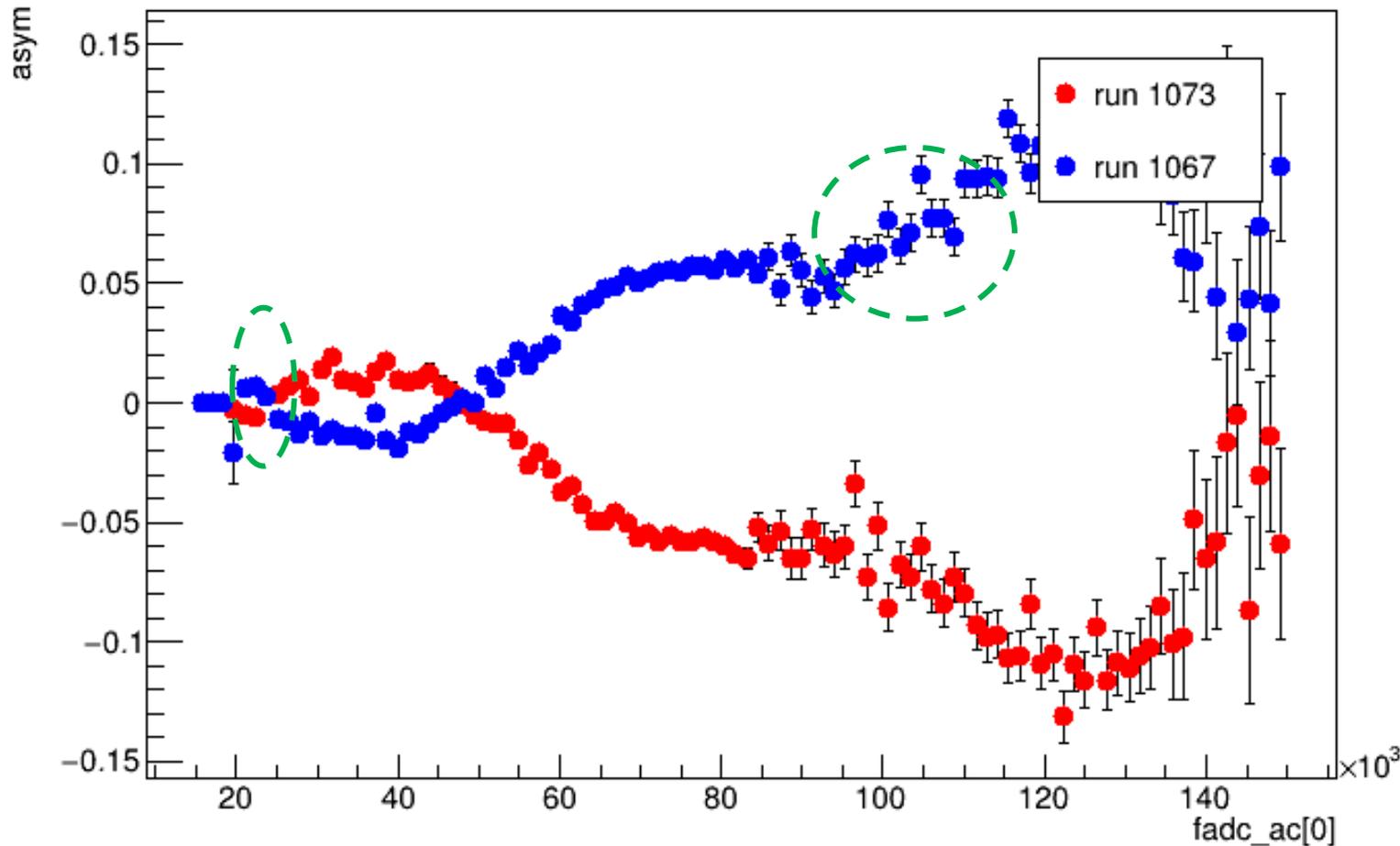
block level=20



	T1 dead time	error	T3 dead time	error
laser on, beam>130 uA	9.49%	0.004%	38.2%	0.07%
laser off, beam>130 uA	9.06%	0.005%	35.1%	0.2%
beam off	8.77%	0.008%	17.2%	3.6%

Preliminary results

beam on laser on



- Compton asymmetry measured (expected asymmetry around 6% at maximum)
- Asymmetry changes sign as half wave plate flipped
- Some features still need to be understood (under study), which may come from electronics

Conclusion

- UMass DAQ test stand is being built
- Compton electron DAQ setup runs successfully and is able to measure the asymmetry
- Already have VTP firmware and basic data analysis tools that have been used in Compton setup
- Next step is to test the FADC performance at high event rate (for PVDIS)