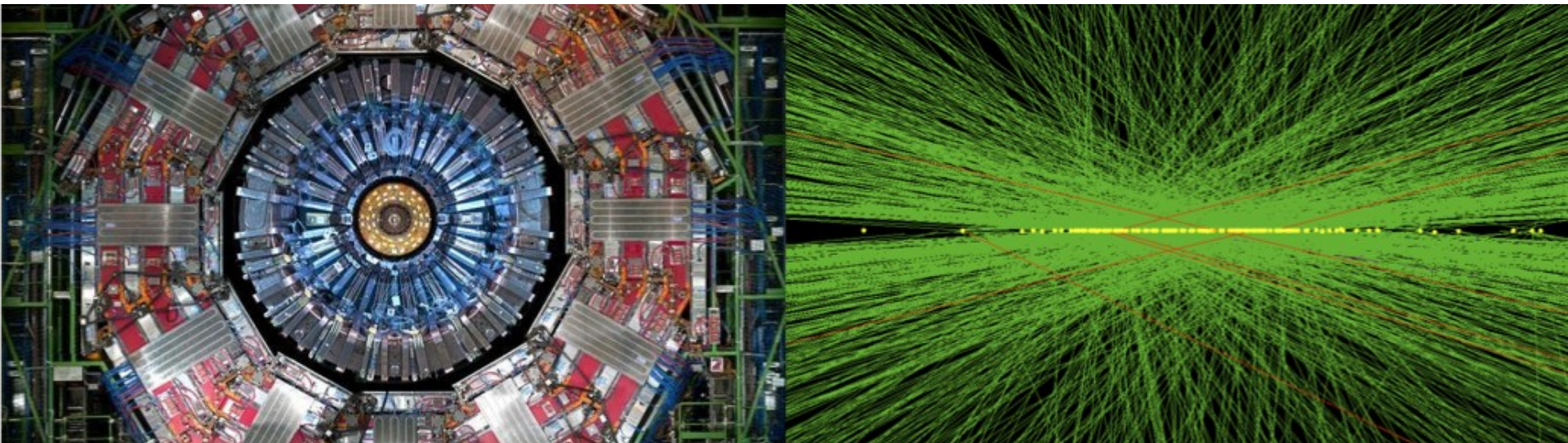




# US-MTD: FNAL Group Meeting

Frank Chlebana

Apr 7, 2021





# FNAL Workplan

We have planned the work assuming we will use specific FNAL / SMU resources in order to estimate the budget and schedule

Need to remain flexible and have the ability to react to a rapidly changing environment

*COVID impact on availability of SMU interns*

*Availability of FNAL ASIC resources due to delays for other projects*

In order to mitigate these risks we will outsource some work that was originally planned for FNAL to one of our partners

Will use the P6 schedule to monitor progress during monthly statusing

Work make be completed by different resources that was used to estimate the budget

We expect that the schedule (and milestones) will remain the same

Cost estimate should also be accurate

*Moving work using higher costed resources may require additional lower costed resources*



# FNAL SOW

The updated schedule based on BCR103 has not yet been approved...  
This will happen following a project cost and schedule review (Apr 29)

In order to get the money flowing... we can use the schedule to get a cost estimate for the FNAL SOW and have a second SOW / Change Order for the remaining funds once the schedule has been approved...



# BCR Implementation

Bill has implemented the ETL BCR

We provided feedback (Ted and Frank) on the ETROC (looks ok...)

Frank Golf and Artur are reviewing the ETL-Assembly section

*Expect to provide feedback this week...*

Using Oct 1, 2020 as the change date

*Activities prior to Oct 1, 2020 are not included*

*Applying changes to the “stated” schedule some activities are shifted*

The CD-2 plan does have work prior to Oct 1, 2020 that was not in the CD-1 plan

Most changes occur after 16-Mar-20 “ETL – T5 -Start post TDR design”

*ETROC1 testing, COVID related costs, and emulator development*

Can add a supplemental cost activity on Oct 1, 2020 to capture additional cost prior to Oct 1, 2020...

Could also treat as a cost variance and reset costs once we baseline...



# Cost and Schedule Workshop

We are planning to have a "schedule workshop" on Apr 29 from 8-11am FNAL time with a slot for spillover discussions from 2:30 - 3:30 if needed

The goal of the workshop is to review the BTL and ETL schedules together with the project office and verify that it is ready for the director's review

We will also be asked to look for ways to reduce costs

In preparation for the workshop we will need to review the updated schedule that has the changes from BCR-102/103 and work with Bill to reconcile any problems.

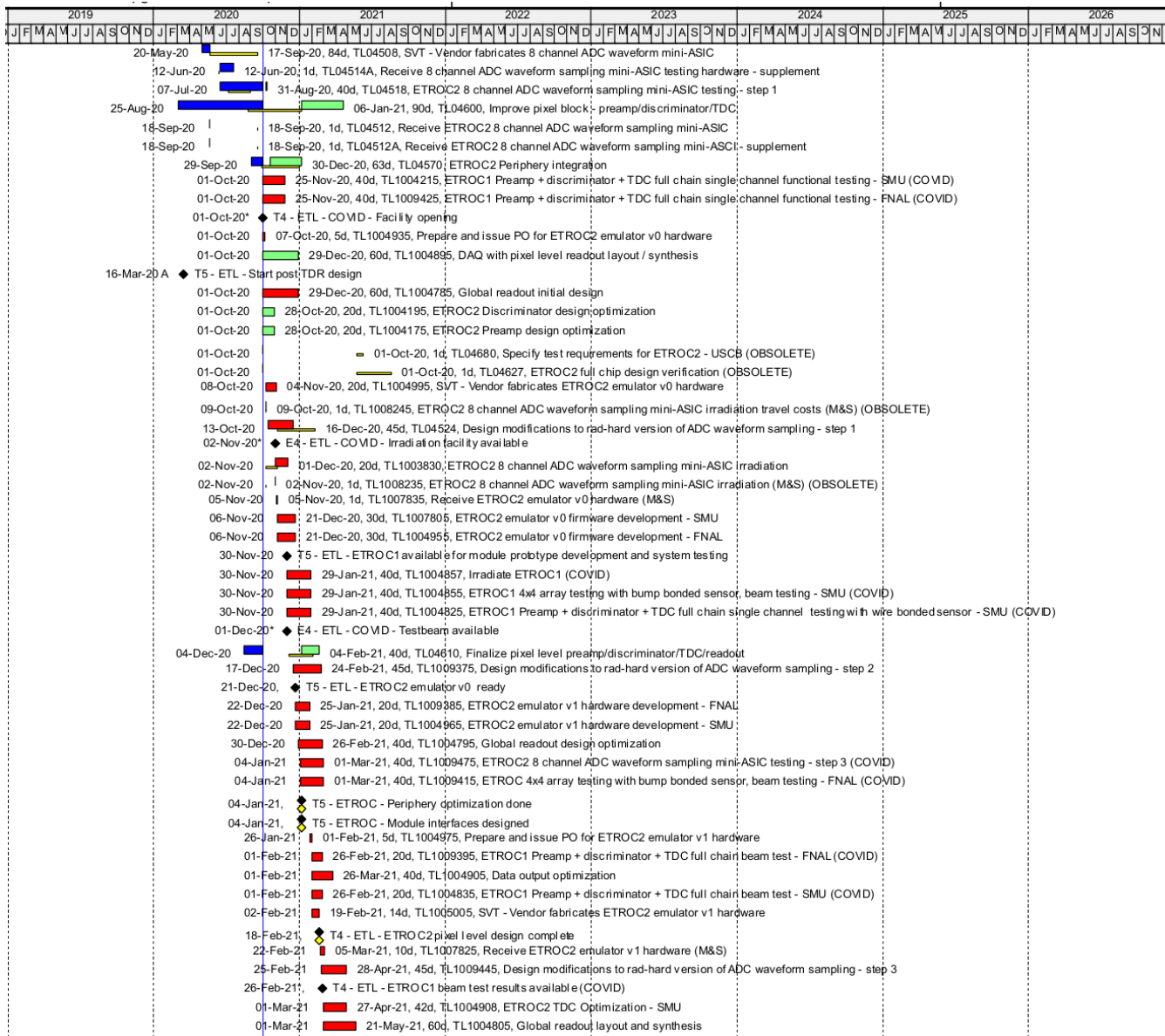
- schedule technical details (hot spots, pred/succ, code assignments...)
- resource allocation (no overloading, uncosted labor)

CAMs will be asked to walk through the schedule and discuss the plan and cost estimate

- general work plan and activity logic
- cost rollup
- critical path evaluation
- determination of float to CMS need by dates
- connections to external constraints and across WBS areas
- milestone alignment with international CMS

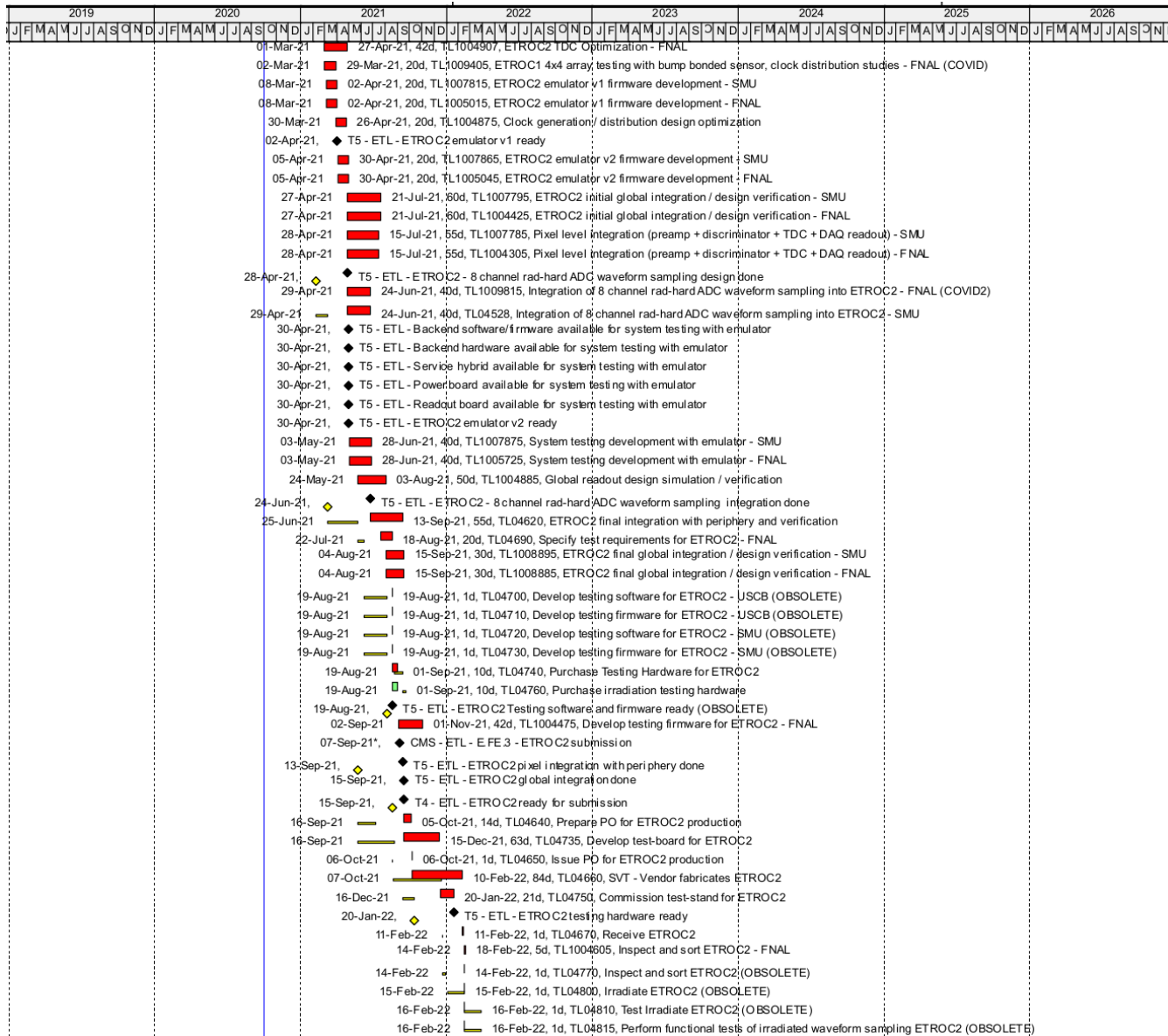


# Gantt Chart (2020 - 2021)





# Gantt Chart (2020 - 2021)





# Budget from P6

Activity ID	FY2020, FQ4	FY2021, FQ1	FY2021, FQ2	FY2021, FQ3	FY2021, FQ4	FY2022, FQ1
<b>WBS: 402W-DEV-6.8.4.2.1 ETL - Frontend ASICs General</b>		\$7,742.66	\$1,054.54			\$7,897.49
Responsible Institution: <u>FN</u> Fermi National Accelerator Laboratory		\$7,742.66	\$1,054.54			\$7,897.49
Resource ID: <u>FN_MS_PASS_FY19</u>		\$2,218.16	\$1,054.54			\$2,262.49
Resource ID: <u>FN_MS_STND_FY19</u>		\$5,524.50				\$5,635.00
<b>WBS: 402W-DEV-6.8.4.2.3 ETL - Frontend ASICs v2 development</b>	\$93,712.99	\$414,780.37	\$385,235.79	\$598,030.96	\$440,467.80	\$87,934.60
Responsible Institution: <u>FN</u> Fermi National Accelerator Laboratory	\$76,831.06	\$357,582.63	\$328,720.74	\$539,370.79	\$419,494.42	\$87,934.60
Resource ID: <u>c_FN_MS_STND_FY19</u>						
Resource ID: <u>c_FNd_ASIC_DESIGN_EN</u>						
Resource ID: <u>c_FNd_ELTN_DESIGN_EN</u>						
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_GRAD_STUD</u>			\$2,375.06			
Resource ID: <u>FN_MS_STND_FY19</u>	\$23,900.40	\$3,314.70	\$2,209.80		\$45,300.90	
Resource ID: <u>FN_MS_TRVL_FY19</u>		\$5,966.46				
Resource ID: <u>FN_U_PT_EXP_PHYST</u>						
Resource ID: <u>FN_U_PT_EXP_RA</u>						
Resource ID: <u>FNd_ASIC_DESIGN_EN</u>	\$52,930.66	\$312,869.28	\$157,773.33	\$444,884.96	\$341,604.52	\$1,978.39
Resource ID: <u>FNd_ELTN_DESIGN_EN</u>		\$35,432.19	\$166,362.55	\$94,485.83	\$32,588.99	\$85,956.21
Resource ID: <u>FNn_ENGNRING_PHYST</u>						
Responsible Institution: <u>SM</u> Southern Methodist University	\$16,881.93	\$57,197.74	\$56,515.05	\$58,660.16	\$20,973.38	
Resource ID: <u>CMS-HL_FN_SM_P_ENG_GRAD_STUD</u>	\$16,881.93	\$34,669.78	\$33,148.90	\$13,036.09		
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_ASIC_DES</u>		\$5,546.31	\$16,597.24	\$45,624.08	\$20,973.38	
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_GRAD_STUD</u>		\$16,981.65	\$6,768.91			
Responsible Institution: <u>UCSB</u> University of California - Santa Barbara						
Resource ID: <u>CMS-HL_AVE_U_SCIENTIST</u>						
Labor		\$405,499.21	\$383,025.99	\$598,030.96	\$395,166.89	\$87,934.60
M&S		\$17,023.82	\$3,264.34	\$0.00	\$45,300.90	\$7,897.49
Total Labor		\$405,499.21	\$1,464,158.44			
Total M&S		\$17,023.82	\$56,462.73			





# Activities from P6

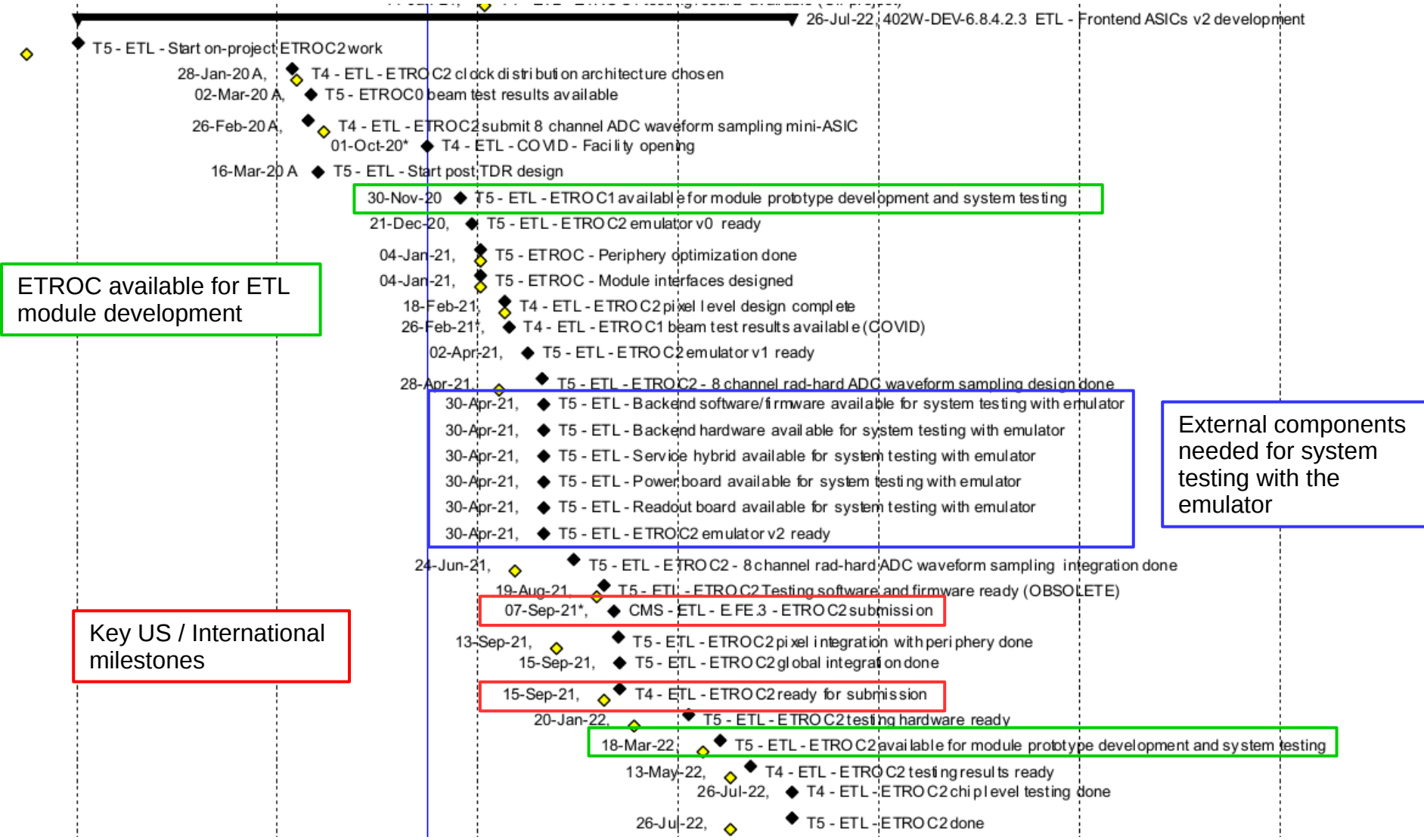
Activity ID	Activity Name	FY2020, FQ3	FY2020, FQ4	FY2021, FQ1	FY2021, FQ2	FY2021, FQ3	FY2021, FQ4	FY2022, FQ1
Responsible Institution: SM Southern Methodist University		\$41,326.40	\$16,881.93	\$57,197.74	\$56,515.05	\$58,660.16	\$20,973.38	
Resource ID: CMS-HL_FN_SM_P_ENG_GRAD_STUD		\$32,459.30	\$16,881.93	\$34,669.78	\$33,148.90	\$13,036.09		
TL04502	ETROC2 8 channel ADC waveform sampling design							
TL04513	ETROC2 8 channel ADC waveform sampling testing specification							
TL04522	ETROC2 8 channel ADC waveform sampling rad-hard version design	\$13,911.13						
TL04504	ETROC2 8 channel ADC waveform sampling improvements							
TL04506	Submit ETROC2 8 channel ADC waveform sampling <u>mini-ASIC</u>							
TL04515	ETROC2 8 channel ADC waveform sampling testing platform development	\$18,548.17						
TL04627	ETROC2 full chip design verification (OBSOLETE)							
TL04518	ETROC2 8 channel ADC waveform sampling <u>mini-ASIC</u> testing - step 1		\$16,881.93					
TL1003830	ETROC2 8 channel ADC waveform sampling <u>mini-ASIC</u> irradiation			\$4,966.13				
TL04524	Design modifications to rad-hard version of ADC waveform sampling - step 1			\$26,227.36				
TL1009375	Design modifications to rad-hard version of ADC waveform sampling - step 2			\$3,476.29	\$16,077.84			
TL1009475	ETROC2 8 channel ADC waveform sampling <u>mini-ASIC</u> testing - step 3 (COVID)				\$6,207.66			
TL1009445	Design modifications to rad-hard version of ADC waveform sampling - step 3				\$10,863.41	\$8,690.72		
TL04528	Integration of 8 channel rad-hard ADC waveform sampling into ETROC2 - <u>SMU</u>					\$4,345.36		
TL04815	Perform functional tests of irradiated waveform sampling ETROC2 (OBSOLETE)							
TL04785	Perform initial functionality test of ETROC2 waveform sampling - <u>SMU</u>							
Resource ID: CMS-HL_FN_SM_P_PHYS_ASIC_DES				\$5,546.31	\$16,597.24	\$45,624.08	\$20,973.38	
TL1004935	Prepare and issue PO for ETROC2 emulator v0 hardware			\$1,167.64				
TL1007805	ETROC2 emulator v0 firmware development - <u>SMU</u>			\$2,919.11				
TL1004965	ETROC2 emulator v1 hardware development - <u>SMU</u>			\$1,459.56	\$4,378.67			
TL1007815	ETROC2 emulator v1 firmware development - <u>SMU</u>				\$2,627.20	\$291.91		
TL1004908	ETROC2 <u>TDC</u> Optimization - <u>SMU</u>				\$9,591.37	\$7,923.30		
TL1007865	ETROC2 emulator v2 firmware development - <u>SMU</u>					\$2,919.11		
TL1007875	System testing development with emulator - <u>SMU</u>					\$5,838.22		
TL1007785	Pixel level integration ( <u>preamp</u> + discriminator + <u>TDC</u> + <u>DAQ</u> readout) - <u>SMU</u>					\$10,747.64	\$2,388.36	
TL1007795	ETROC2 initial global integration / design verification - <u>SMU</u>					\$17,903.89	\$5,449.01	
TL1008895	ETROC2 final global integration / design verification - <u>SMU</u>						\$13,136.00	
Resource ID: CMS-HL_FN_SM_P_PHYS_GRAD_STUD		\$8,867.10		\$16,981.65	\$6,768.91			
TL04585	Develop <u>ASIC</u> periphery common design blocks - <u>SMU</u>	\$8,867.10						
TL1004215	ETROC1 <u>Preamp</u> + discriminator + <u>TDC</u> full chain single channel functional testing - <u>SMU</u> (COVID)			\$4,750.11				
TL04590	Pixel level readout							
TL1007805	ETROC2 emulator v0 firmware development - <u>SMU</u>			\$4,750.11				
TL1004857	Irradiate ETROC1 (COVID)			\$2,493.81	\$2,256.30			
TL1004855	ETROC1 4x4 array testing with bump bonded sensor, beam testing - <u>SMU</u> (COVID)			\$2,493.81	\$2,256.30			
TL1004825	ETROC1 <u>Preamp</u> + discriminator + <u>TDC</u> full chain single channel testing with wire bonded sensor - <u>SMU</u>			\$2,493.81	\$2,256.30			
TL1007815	ETROC2 emulator v1 firmware development - <u>SMU</u>							
TL1007865	ETROC2 emulator v2 firmware development - <u>SMU</u>							
TL1007795	ETROC2 initial global integration / design verification - <u>SMU</u>							
TL04720	Develop testing software for ETROC2 - <u>SMU</u> (OBSOLETE)							
TL04730	Develop testing firmware for ETROC2 - <u>SMU</u> (OBSOLETE)							
TL1008895	ETROC2 final global integration / design verification - <u>SMU</u>							
TL04770	Inspect and sort ETROC2 (OBSOLETE)							
TL04800	Irradiate ETROC2 (OBSOLETE)							
TL04810	Test Irradiate ETROC2 (OBSOLETE)							
TL04820	Evaluate results of irradiated ETROC2 (OBSOLETE)							
TL04780	Perform initial functionality test of ETROC2 - <u>SMU</u>							
TL1008915	ETROC2 initial <u>SEU</u> testing (irradiation) - <u>SMU</u>							
TL1008905	ETROC2 initial <u>TID</u> testing (irradiation) - <u>SMU</u>							
TL1009345	Perform final functionality test of ETROC2 - <u>SMU</u>							
TL1009025	ETROC2 initial system testing - <u>SMU</u>							
TL1008935	ETROC2 final system testing - <u>SMU</u>							
TL1009255	ETROC2 final <u>SEU</u> testing (irradiation) - <u>SMU</u>							
TL1009235	ETROC2 final <u>TID</u> testing (irradiation) - <u>SMU</u>							

Delayed activities got shifted into CY21

Work reassigned to FNAL



# Milestones (ETROC2)





# Milestones (ETROC3)

