### Fermilab **ENERGY** Office of Science



# **Executive Session Kickoff**

Joe Lykken, Mike Lindgren CMS HL-LHC CD-1 Readiness Directors' Review March 19<sup>th</sup>, 2019

#### **Executive Session Kickoff of the CMS HL-LHC CD-1 Readiness Directors Review**

08:00 - 09:00 Executive Session

Zoom information:

Join Zoom Meeting https://fnal.zoom.us/j/348461954

One tap mobile +16465588656,,348461954# US (New York) +16699006833,,348461954# US (San Jose)

Dial by your location +1 646 558 8656 US (New York) +1 669 900 6833 US (San Jose) Meeting ID: 348 461 954 Find your local number: https://zoom.us/u/abaRB468V9

Convener: Michael Lindgren (Fermilab) Location: Fermilab (Comitium (WH2SE))



**Recommendation 10:** Complete the LHC phase-1 upgrades and continue the strong collaboration in the LHC with the phase-2 (HL-LHC) upgrades of the accelerator and both general-purpose experiments (ATLAS and CMS). **The LHC upgrades constitute our highest-priority near-term large project.** 

- Fermilab is committed to the success of the P5 plan
- Fermilab is committed to the integrity of the P5 priorities
- In particular, Fermilab is committed to, and takes responsibility for, the success of the U.S. CMS HL-LHC Upgrades, both as a DOE project and as an essential contribution to an international scientific endeavor



# Schedule context from the charge

A shutdown of the LHC accelerator complex is planned to begin in 2024, which will result in the LHC delivering much higher luminosities than the current running conditions in the period from 2026-2035. The new operating conditions require upgrades to the aging CMS tracker system, the barrel and the end-cap calorimeters and associated readout electronics, the muon system readout electronics and the trigger and data acquisition system, as well as the installation of a new timing detector.



### **Previous review context from the charge**

The U.S. CMS HL-LHC upgrade comprises both NSF and DOE projects. The NSF project is reviewed separately. The DOE project was comprehensively reviewed in June 2018, and the Tracker, Endcap Calorimeter and Trigger/DAQ subsystems were deemed to be at a CD-1 level of maturity. However, the MIP Timing Detector was considered not mature enough to proceed to CD-1. The DOE review committee further pointed out some of the project documentation needed to be updated, especially in the ESH and QA areas.



#### **Review Team**

#### **Project Management** Giorgio Apollinari, FNAL\* apollina@fnal.gov 630-840-4641 Janet Bishop, FNAL janet@fnal.gov 630-840-8567 Brenna Flaugher, FNAL brenna@fnal.gov 630-840-2934 David Lissauer, BNL david.Lissauer@science.doe.gov 631-294-5089 Cost/Schedule jeff.deal@pnnl.gov Jeff Deal, PNNL 509-375-6745 brackett@slac.stanford.edu 650-926-8581 Craig Brackett, SLAC ES&H Angela Aparicio, FNAL asands@fnal.gov 630-840-3701 Amy Pavnica, FNAL\* pavnica@fnal.gov 630-840-8493 **Outer Tracker** Marco Verzocchi, FNAL\* mverzocc@fnal.gov 630-840-3289 Charlie Young, SLAC young@slac.stanford.edu 650-929-2669 **End Cap Calorimetry** Paul Derwent, FNAL\* derwent@fnal.gov 630-840-8520 Ping Gui, SMU pgui@lyle.smu.edu 214-768-1733 Dave Christian, FNAL dcc@fnal.gov 630-840-4001 **Trigger-DAQ** Kurt Biery, FNAL\* biery@fnal.gov 630-840-6663 Bill Badgett, FNAL badgett@fnal.gov 630-840-6674 MTD Maurice Garcia-Sciveres, LBNL mgarcia-sciveres@lbl.gov 510-486-7354 Stefano Miscetti, INFN\* stefano.miscetti@lnf.infn.it para@fnal.gov Adam Para, FNAL 630-840-2132 grakness@fnal.gov Greg Rakness, FNAL 630-840-3671

\*Subcommittee chair

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### **DOE Critical Decision 1**

	TOTAL PROJECT COST (TPC)	\$750M or more	Less than \$750M to \$400M	Less than \$400M to \$100M	Less than \$100M to \$50M*	Less than \$50M* to \$20M	Less than \$20M to \$10M**
DECISION / REQUIREMENTS <sup>1</sup> / APPROVAL <sup>2</sup>							Delegation Allowed
CD-1-APPROVE ALTERNATIVE SELECTION AND COST RANGE		S-4	SC-1	SC-1	SC-AD	SC-AD	SC-AD
PRIOR TO CD-1-CONCEPTUAL DESIGN	Approve Acquisition Strategy	Reviewed by SC-28 Approved by SC-1	Reviewed by SC-28 Approved by SC-1	Reviewed by SC-28 Approved by SC-2	Reviewed by SC-28 Approved by SC-AD	Reviewed by SC-28 Approved by SC-AD	Reviewed by SC-28 Approved by SC-AD
	Approve Preliminary Project Execution Plan (PEP)	S-4	Reviewed by SC-28 Approved by SC-1	Reviewed by SC-28 Approved by SC-2	Reviewed by SC-28 Approved by SC-AD	Reviewed by SC-28 Approved by SC-AD	Reviewed by SC-28 Approved by SC-AD
	Appointment of the Federal Project Director (FPD)	S-4	SC-1	SC-1	SC-AD	SC-AD	SC-AD
	Approve Integrated Project Team (IPT)	S-4	SC-1	SC-2	SC-AD	SC-AD	SC-AD
	Develop a Risk Management Plan	Project	Project	Project	Project	Project	Project
	Comply with the One-for-One Building Space Replacement	Project	Project	Project	Project	Project	Project
	Complete a Conceptual Design	Project	Project	Project	Project	Project	Project
	Document High Perf. & Sustainable Bldg. & Sustainable Env. Stewardship considerations	Project	Project	Project	Project	Project	Project
	Conduct a Conceptual Design Review	Team external to project					
	Complete a Conceptual Design Report	Project	Project	Project	Project	Project	Project
	Prepare a Preliminary Hazard Analysis Report	Site Office or Lab					
	Develop and Implement an Integrated Safety Management Plan	Site Office or Lab					
	Establish Preliminary Quality Assurance Program (QAP)	Site Office or Lab					
ΓO C	Identify general Safeguards and Security requirements for the recommended alternative	Site Office or Lab					
PRIOR .	Complete National Environmental Policy Act (NEPA)Strategy by issuing a determination (i.e., EIS, EA)	Site Office or Lab					
	Conduct Independent Project Review or External Independent Review	ICE or ICR by PM & SC-28	ICE or ICR by PM & SC-28	ICE or ICR by APM with SC-28	SC-28	SC-28 Tailored	SC-28 Tailored
	Update PDS, or other funding documents for MIE and OE projects, and OMB 300s, if applicable.	SC-AD	SC-AD	SC-AD	SC-AD	SC-AD	SC-AD
	Hazard Cat. 1,2,3 Nuclear FacilityUpdate Safety Design Strategy (SDS)	SBAA & FPD, w/ CNS or CDNS concurrence, as appropriate	SBAA & FPD, w/ CNS or CDNS concurrence, as appropriate	SBAA & FPD, w/ CNS or CDNS concurrence, as appropriate	SBAA & FPD, w/ CNS or CDNS concurrence, as appropriate	SBAA & FPD, w/ CNS or CDNS concurrence, as appropriate	SBAA & FPD, w/ CNS or CDNS concurrence, as appropriate
	Hazard Category 1, 2, and 3 nuclear facilities, conduct an Independent Project Review (IPR)	PSO	PSO	PSO	PSO	PSO	PSO
	Hazard Cat. 1,2,3 Nuclear FacilityPrepare a Conceptual Safety Design Report (CSDR)	SBAA via the CSVR					
	Hazard Cat. 1,2,3 Nuclear FacilityPrepare Conceptual Safety Validation Report (CSVR)	SBAA	SBAA	SBAA	SBAA	SBAA	SBAA
	Hazard Cat. 1,2,3 Nuclear FacilityInitiate a Code of Record	Project	Project	Project	Project	Project	Project
POST CD-1	Submit approved CD or equivalent documents to APM	SC-28	SC-28	SC-28	SC-28	SC-28	SC-28
	Allow expenditure of PED, MIE OR OE funds for project design.	Project	Project	Project	Project	Project	Project
	Submit budget request for the remainder of TPC if CD-2 is approved w/i 1 year of OMB submission	SC-AD	SC-AD	SC-AD	SC-AD	SC-AD	SC-AD
	Update PARS II with monthly status	Prog. Mgr. & FPD No Earned Value (EV)					
	Continue with Monthly or Quarterly Project Reporting/Meeting	SC-AD Invite SC-1 and SC-28	SC-AD Invite SC-1 and SC-28	SC-AD Invite SC-2 and SC-28	SC-AD to invite SC-28	SC-AD to invite SC-28	SC-AD to invite SC-28
	Develop an Acquisition Plan if applicable						
	Hazard Cat. 1,2,3 Nuclear FacilityDevelop a Checkout, Festing & Commissioning Plan	Project	Project	Project	Project	Project	Project



This Director's Review will assess the project's readiness to proceed to CD-1 and address the following specific questions for CD-1:

1. Does the acquisition strategy document a carefully considered analysis of alternatives that support the preferred alternative?

2. Does the conceptual design satisfy the performance requirements?

3. Does the conceptual design report and supporting documentation adequately justify the stated cost range and project duration?

4. Do the project's plans to execute the work make the most efficient use of the financial, human, and technical resources available to them at the participating national labs and universities when they are the most efficient choice?



This Director's Review will assess the project's readiness to proceed to CD-1 and address the following specific questions for CD-1:

5. Does the proposed project team have adequate management experience, design skills, and laboratory support to produce a credible technical, cost, and schedule baseline?

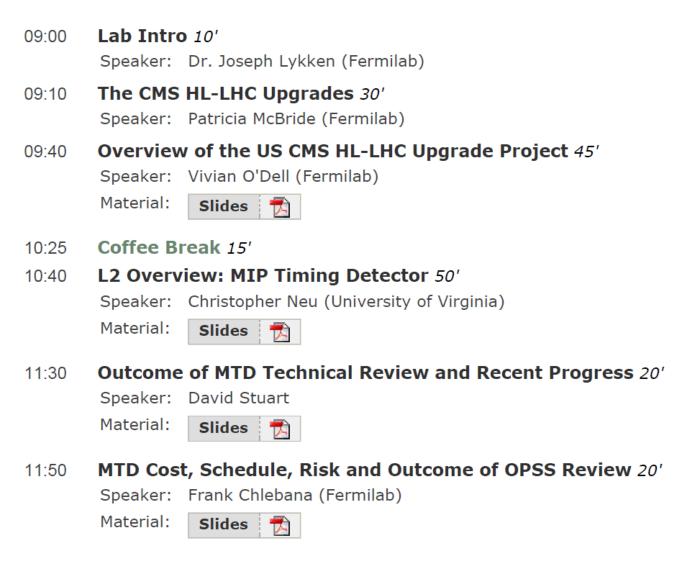
6. Are the ESH&Q aspects of the project being properly addressed and is the ESH&Q planning currently sufficient for this stage of the project?

7. Is the documentation required by DOE O413.b for CD-1 approval complete and in good order?

8. Has the project satisfactorily responded to the recommendations from previous reviews?



#### Agenda, Tuesday morning plenary



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#### Agenda, Tuesday afternoon plenary

13:05 - 16:15 Plenary Session

First Day - Plenary overview of L2 areas

Location: Fermilab (One West)

#### 13:15 L2 Overview: Outer Tracker 45'

Speaker: Steve Nahn (Fermilab)

Material:



## 14:00 L2 Overview: Endcap Calorimeter 45' Speakers: Jeremiah Mans, Jeremiah Mans (University of Minnesota) Material: Slides T 14:45 L2 Overview: Trigger/DAQ 45' Speaker: Jeffrey Berryhill (Fermilab) Material: Slides T 15:30 Project Overall Cost/Schedule/Risk Evaluation 45' Speakers: Dr. Lucas Taylor (Fermilab), Lucas Taylor

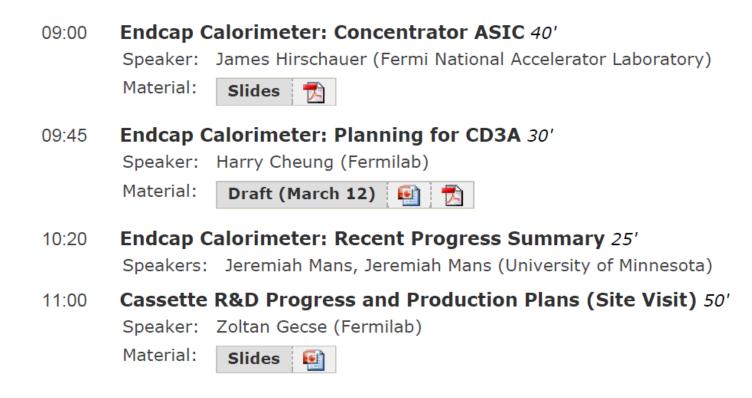
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Material:

Slides 📑

16:15 - 18:00 Executive Session

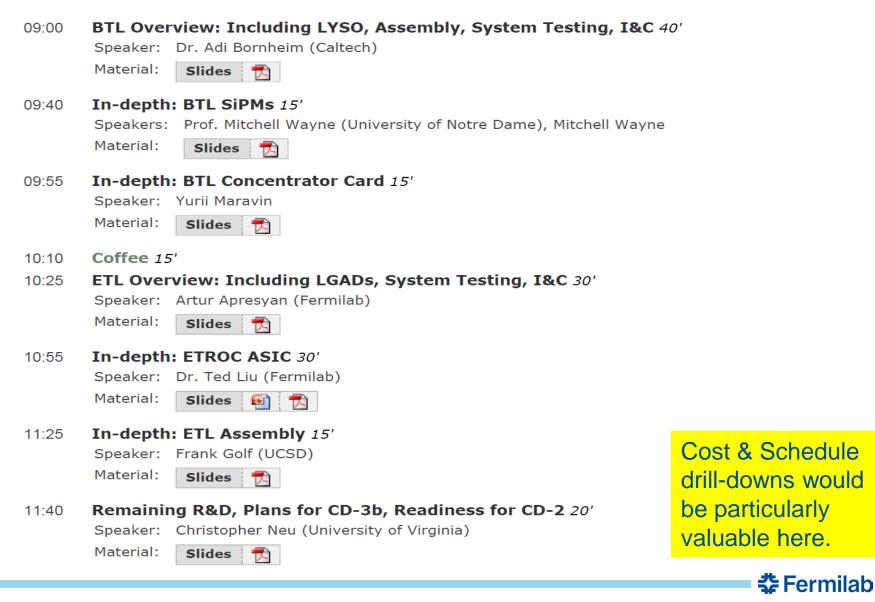
#### Endcap Breakout, Wednesday morning



Cost & Schedule drill-downs would be particularly valuable here.

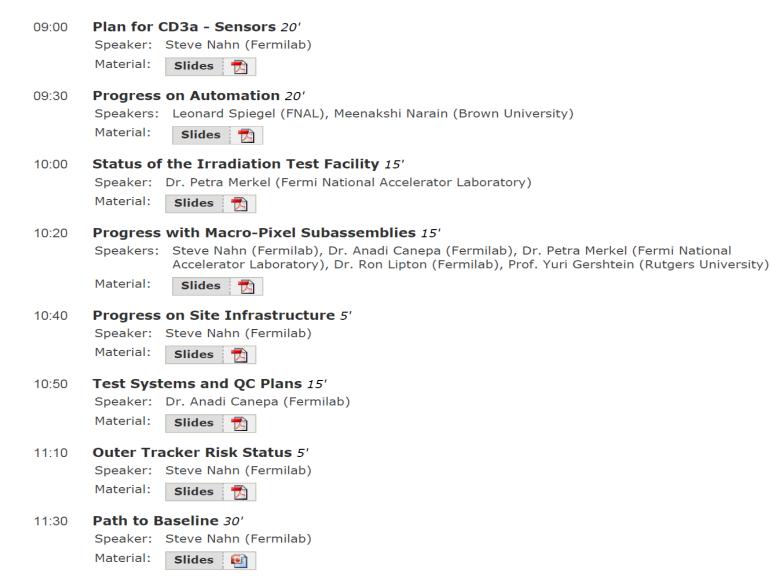


#### **MIP Timing Detector Breakout, Wednesday morning**



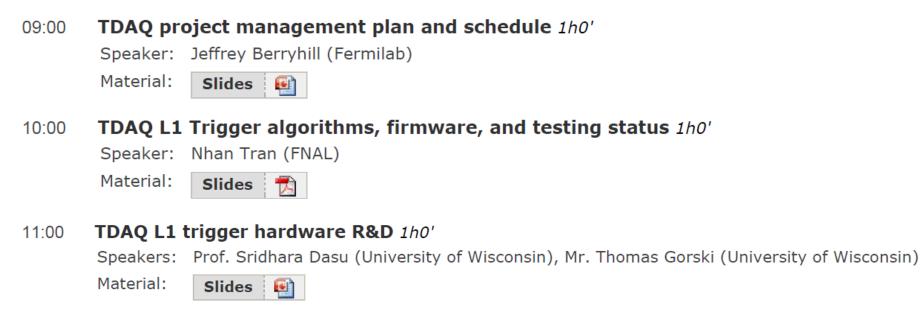
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#### **Outer Tracker Breakout, Wednesday morning**



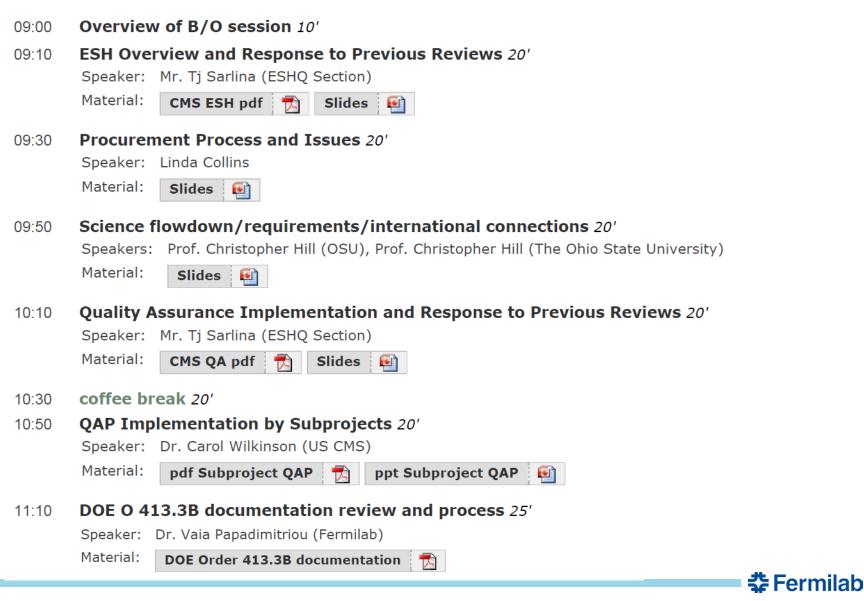
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### **TDAQ Breakout, Wednesday morning**





#### **Management Breakout, Wednesday morning**



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#### **Executive Sessions, Google Doc Reporting**

#### Wednesday:

13:00 - 16:30 Executive Session: Executive Session / impromptu questions to project

#### **Thursday:**

08:00 - 11:00 Executive Session: Executive session / writing / closeout dry run

# We will develop the report as a Google Document, and will speak to the final draft document at the closeout.

#### **Closeout: Thursday 11:00**



# **DOE Perspective**

HEP general remarks

FSO general remarks



### **Discussion**



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