US Detector R&D organization …waiting for P5

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CALICE Collaboration Meeting, September 2023

Snowmass – Energy Frontier Long term perspective. Input to P5

The US EF community has also expressed renewed interest and ambition to bring back energy-frontier collider physics to the US soil while maintaining its international collaborative partnerships and obligations.

The Energy Frontier community proposes several parallel investigations over the 2025-2035 period for pursuing its most prominent scientific goals, namely 1) completing the HL-LHC physics program, 2) proceeding with a Higgs boson factory and 3) planning for multi-TeV colliders at the energy frontier.

The proposed plans in five year periods starting 2025 are given below.

For the five year period starting in 2025:

1. Prioritize the HL-LHC physics program, including auxiliary experiments,
2. Establish a targeted e^+e^- Higgs Factory detector R&D program,
3. Develop an initial design for a first stage TeV-scale Muon Collider in the US,
4. Support critical detector R&D towards EF multi-TeV colliders.

For the five year period starting in 2030:

1. Continue strong support for the HL-LHC physics program,
2. Support construction of a e^+e^- Higgs Factory,
3. Demonstrate principal risk mitigation for a first stage TeV-scale Muon Collider.

Plan after 2035:

1. Continuing support of the HL-LHC physics program to the conclusion of archival measurements,
2. Begin and support the physics program of the Higgs Factory,
3. Demonstrate readiness to construct a first-stage TeV-scale Muon Collider,
4. Ramp up funding support for detector R&D for energy frontier multi-TeV colliders.

U.S. Linear and Circular Colliders Detector R&D Coordination Group

4.0 FY24 Calorimetry

4.1 CMOS MAPS Development for Calorimetry

4.2 Noble Liquid Calorimetry

4.3 Optical Calorimeters: Hybrid Dual-Readout Calorimetry

4.4 Optical Calorimeters: Scintillator tiles with SiPM Readout

4.5 RPC-based Digital Calorimetry

Hucheng Chen, Andy White

SiD Hadron Calorimeter – FY24 needs

Andy White

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Travel support

CALICE/DRD6 – testbeams, working meetings

SLAC – interactions w/engineer

SiD AHCAL Design (0.1 FTE Engineer)

Preliminary barrel design

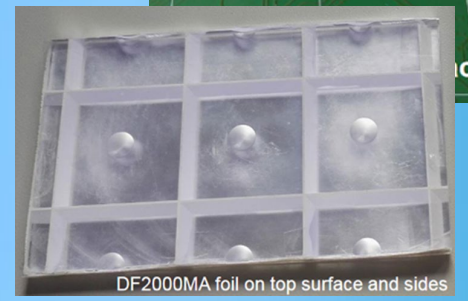
Need to start endcap design + Support /integration

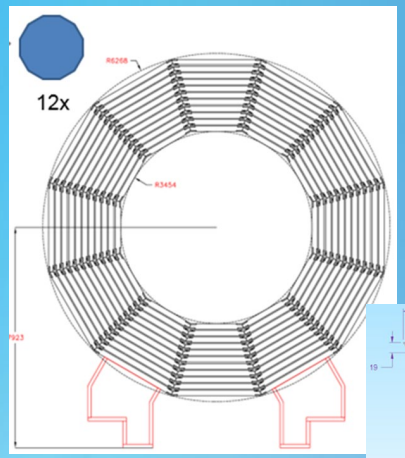
Software support (0.2 FTE Undergraduate student)

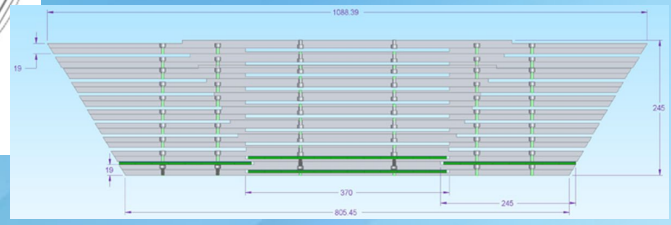
Extend single particle/jet response studies

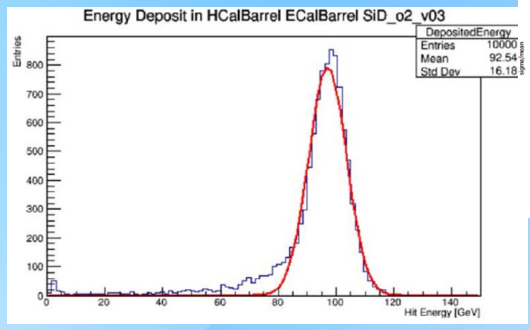
Develop detailed endcap AHCAL simulation

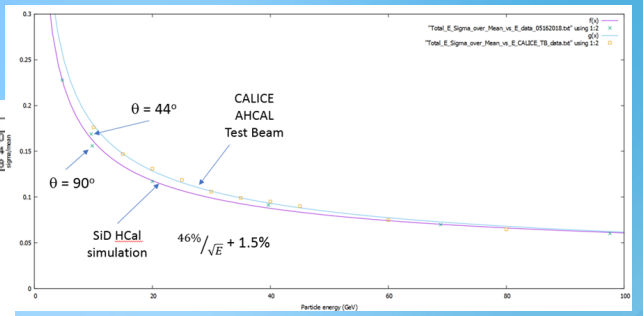
Detailed megatile design and simulation studies











CPAD ABOUT CPAD COMMUNICATIONS COMMITTEES US R&D COLLABORATIONS WORKSHOPS PRIZES & AWARDS RESOURCES REPORTS CPAD AND DPF

CPAD, the Coordinating Panel for Advanced Detectors, seeks to promote, coordinate and assist in the research and development of instrumentation and detectors for high energy physics experiments.

FIND OUT MORE

CPAD Workshop 2023

Nov 7 – 10, 2023
SLAC

Enter your search term

The Coordinating Panel for Advanced Detectors (CPAD), seeks to promote, coordinate and assist in the research and development of instrumentation and detectors for high energy physics experiments. CPAD's representatives come from the national high-energy physics

CPAD – Coordinating Panel for Advanced Detectors

US R&D Collaborations

RDC's

In a culmination of a decade of discussions within the US Detector Instrumentation community facilitated by CPAD, it has been decided at the last CPAD annual workshop to create a network of US Detector R&D Collaborations.

These Collaborations will be created covering major technology areas in line with the 2019 BRN. The goal is to bring together the community in a more persistent way than the annual CPAD workshops alone, to coordinate R&D efforts and to forge collaboration.

To this end, we have created the following mailing lists. Please sign up to your area of interest. Once we have the mailing lists filled, we will send around surveys to each to gauge everyone's specific interests with the goal to organize dedicated workshops and create work packages along the PRDs that were identified in the BRN.

(RDC1) Noble Element Detectors: **cpad_rdc1@fnal.gov**

(RDC2) Photodetectors: **cpad_rdc2@fnal.gov**

(RDC3) Solid State Tracking and Picosecond Timing: **cpad_rdc3@fnal.gov**

(RDC4) Readout and ASICs: **cpad_rdc4@fnal.gov**

(RDC5) Trigger and DAQ: **cpad_rdc5@fnal.gov**

(RDC6) Gaseous Detectors: **cpad_rdc6@fnal.gov**

(RDC7) Low-Background Detectors: **cpad_rdc7@fnal.gov**

(RDC8) Quantum and Superconducting Sensors: **cpad_rdc8@fnal.gov**

(RDC9) Calorimetry: **cpad_rdc9@fnal.gov**

U.S. Department of Energy - Detector R&D

- Use guidance from 2019 Detector Basic Research Needs (BRN) report
- Welcome initiatives by interested labs to lay out the directed R&D needed for their favorite project.
- Welcome the initiative by CPAD to help organize broad, generic R&D efforts along the technology priorities identified in the HEP BRN.
- An appropriate balance and funding mechanisms need to be found for both types of effort.
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- Both types of effort need to proceed in close coordination/collaboration with each other and with the European DRDs so as to realize synergies while avoiding duplication of effort.

Extra

P5

Particle Physics Project Prioritization Panel

Panel Members

- Shoji Asai (University of Tokyo)
- Amalia Ballarino (CERN)
- Tulika Bose (Wisconsin)
- Kyle Cranmer (Wisconsin)
- Francis-Yan Cyr-Racine (New Mexico)
- Sarah Demers (Yale)
- Cameron Geddes (LBNL)
- Yuri Gershtein (Rutgers)
- Karsten Heeger (Yale), Deputy Chair
- Beate Heinemann (DESY)
- JoAnne Hewett (SLAC) HEPAP chair, ex officio
- Patrick Huber (Virginia Tech)
- Kendall Mahn (Michigan State)
- Rachel Mandelbaum (Carnegie Mellon)
- Jelena Maricic (Hawaii)
- Petra Merkel (Fermilab)
- Christopher Monahan (William & Mary)
- Hitoshi Murayama (Berkeley), Chair
- Peter Onyisi (Texas Austin)
- Mark Palmer (Brookhaven)
- Tor Raubenheimer (SLAC)
- Mayly Sanchez (Florida State)
- Richard Schnee (South Dakota School of Mines and Technology)
- Seon-Hee (Sunny) Seo (IBS Center for Underground Physics)
- Jesse Thaler (MIT)
- Christos Touramanis (Liverpool)
- Abigail Vieregg (Chicago)
- Amanda Weinstein (Iowa State)
- Lindley Winslow (MIT)
- Tien-Tien Yu (Oregon)
- Bob Zwaska (Fermilab)

Snowmass – Energy Frontier Report

The intermediate-future Energy Frontier collider

The e^+e^- colliders are the vehicle that will enable a high-precision physics program in the EW sector by increasing the precision of SM measurements. The physics case for an e^+e^- Higgs factory is compelling and the program is possible essentially with current technology. The various proposed facilities have a strong core of common physics goals that underscores the importance of realizing at least one such collider somewhere in the world. A timely implementation of a Higgs factory is important, as there is considerable US support for initiatives that can be achieved on a time scale relevant for early career physicists.

…and why not in the U.S. ?

The Energy Frontier also supports the possibility of a Higgs factory in the US. Given global uncertainties, consideration should also be given to the timely realization of a possible domestic Higgs factory, in case none of the currently proposed global options are realized.