RDC9 Calorimetry @ CPAD

Community townhall @ CPAD workshop UPENN 2025

From Jinlong & Jonathan plenary talk

Looking Forward to 2026

- RDC 2024 process for HEP University Comparative Review for FY2025
  - Multi-institutional (consortium) proposals were encouraged, two awarded
- RDC 2025 process for HEP University Comparative Review for FY 2026
  - FY26 pre-proposals by July 31, 2025
  - FY26 proposals to be considered in the Comparative Review by September 4, 2025
    - Multi-institutional team proposals discouraged
- (RDC 2026 process TBD for) HEP University Comparative Review for FY 2027 (FY26 SC Open Call DE-FOA-0003600)
  - FY27 pre-proposals by July 30, 2026
  - FY27 proposals to be considered in the Comparative Review by September 3, 2026
    - Multi-institutional team proposals discouraged

Another avenue for action

Targeted Review: Multi-institutional Team Applications for HEP Detector R&D

- A merit-review panel in June 2026 for multi-institutional team applications submitted to the topic, proposing high-risk, high-reward blue-sky research that address significant challenges beyond the scope of typical single-investigator awards.
- In the FY26 SC Open Call DE-FOA-0003600
  - Pre-proposals by February 27, 2026 (mandatory)
  - Encouragement / discouragement decisions by March 27, 2026
  - Encouraged proposals by May 1, 2026
- Additional details in the NOFO and the forthcoming Lab Call
  - The award ceiling is $500,000 per year in total across all institutions for a three-year award.
  - HEP expects to make at most three awards.

Tasks for WP1 – Broad R&D on new materials

1. **New materials for calorimetry**, and how they can be tailored to a specific application (including prospects from nanotechnology); develop industrial partners
   a. Scale-up material (liquid scintillators)
   b. Inorganic scintillators
      - ❑ Bright, fast, rad hard
      - ❑ Ultrafast inorganic (quantum dots may help to break the ps timing barrier) [also medical industry]LuO:Yb can be o
      - ❑ Dense-UV transparent, cost-effective heavy inorganic scintillator [water-based liquid scintillator] (HHCAL)
   c. Maps for cost-effective large scale structures
2. **Wavelength shifters** to match scintillator (quantum dots, pTP, flavenols)
3. **Photon detectors:** SiPM

Tasks for WP2- Calorimetry with ps timing

- ❑Ultrafast inorganic scintillators
- ❑Ultrafast-Si-based calorimetry with fast TDCs/waveform sampling

Tasks for WP3-large scale system challenge

- Integration of high-granularity large system (eg. Digital calorimeters) - electronics and mechanics infrastructure
- Calorimeters with embedded electronics
- 5D-Calorimeter Design with Online and Offline AI/ML: integration of ML techniques in the design of the detector structure and integration with the tracking system, as well as development of optimized strategies for reconstruction and calibrations

Tasks for WP4: Scalable calorimeters for large volumes and low cost

- Modular design constructed with building block
- Low mass-low cost signal transmission/ mechanical and electrical infrastructure
- Optimization of the appropriate cooling system

Synergies with other RDCs

RDC#	TOPIC	COORDINATORS	MAILING LIST
1	Noble Element Detectors	Jonathan Asaadi, Carmen Carmona	cpad_rdc1@fnal.gov
2	Photodetectors	Shiva Abbaszadeh, Flavio Cavanna	cpad_rdc2@fnal.gov
3	Solid State Tracking	Anthony Affolder, Sally Seidel	cpad_rdc3@fnal.gov
4	Readout and ASICs	Angelo Dragone, Mitch Newcomer	cpad_rdc4@fnal.gov
5	Trigger and DAQ	Zeynep Demiragli, Jinlong Zhang	cpad_rdc5@fnal.gov
6	Gaseous Detectors	Prakhar Garg, Sven Vahsen	cpad_rdc6@fnal.gov
7	Low-Background Detectors	Daniel Baxter, Guillermo Fernandez-Moroni, Noah Kurinsky	cpad_rdc7@fnal.gov
8	Quantum and Superconducting Sensors	Rakshya Khatiwada, Aritoki Suzuki	cpad_rdc8@fnal.gov
9	Calorimetry	Marina Artuso, Minfang Yeh	cpad_rdc9@fnal.gov
10	Detector Mechanics	Eric Anderssen, Andreas Jung	cpad_rdc10@fnal.gov
11	Fast Timing	Gabriele Giacomini, Matt Wetstein	cpad_rdc11@fnal.gov