

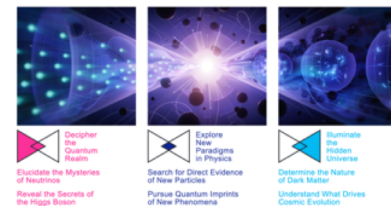
# R&D Collaboration 10

aka RDC10:

## Status & plans

Eric Anderssen & Andy Jung

# P5 outcome



**Current priorities:** HL-LHC, the first phase of DUNE and PIP-II, the Rubin Observatory to carry out the Legacy Survey of Space and Time (LSST)

## **Future priorities on experiments**

- CMB-S4, which looks back at the earliest moments of the universe,
- Re-envisioned second phase of DUNE with an early implementation of an enhanced
- Offshore Higgs factory, realized in collaboration with international partners, ...
- Ultimate Generation 3 (G3) dark matter direct detection experiment...
- IceCube-Gen2 for the study of neutrino properties ...

... **This includes an aggressive R&D program that**, while technologically challenging, could yield revolutionary accelerator designs that chart a realistic path to a 10 TeV parton center-of-momentum (pCM) collider. In particular, the muon collider option builds on Fermilab strengths ...

- Colliders are long term project that need strong investment into R&D now, which was recognized
- Smaller scale experiments provide opportunities for “Mechanics R&D”

# CPAD & RDC's - What is it & How to engage

- Coordinated Panel for Advanced Detectors / CPAD
  - Structure to form community on “Blue Sky” high risk R&D
  - Funded by DOE, some “bias” to High Energy Physics (Strong desire to enhance)
  - CPAD web page: [https://cpad-dpf.org/?page\\_id=1549](https://cpad-dpf.org/?page_id=1549)
- RDC10 webpage in development
  - Volunteers needed
  - [https://cpad-dpf.org/?page\\_id=1727](https://cpad-dpf.org/?page_id=1727)
- How to subscribe to any RDC10:
  - To SUBSCRIBE to a mailing list called MYLIST:
  - Send an e-mail message to [listserv@fnal.gov](mailto:listserv@fnal.gov)
  - Leave the subject line blank
  - Type “SUBSCRIBE MYLIST FIRSTNAME LASTNAME” (without the quotation marks, and using the string before the @ in the mailing list’s name as MYLIST- as well as your own name) in the body of the e-mail message

For example “SUBSCRIBE CPAD\_RDC1 ALICE SMITH”

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

# RDC10 - Mechanics

- Next Action Items:
  - Mirror Survey of CERN DRD for future DRD on Mechanics, very close discussion within international mechanics community – drafted and about to be released these days
    - Focus on interest not so much on specific FTE & funding existing
    - Identify also capabilities and infrastructure, e.g. cooling plants, process equipment, etc.
  - Contacted any and all mechanics institutes in the US to join the RDC10: Washington, Cornell, Purdue, LBNL, LANL, Fermilab, Amherst, Yale, and many more already
    - Distributed also to nuclear/EIC community: **To all, Spread the word...**
    - Clear desire to broaden further: what about mechanics in neutrino, CMB, space ?
  - Next RDC10 meeting likely timescale of Fall 2024
    - Intend to have bi-annual meetings
      - One in overlap to Forum, one ahead of CPAD community meeting
    - Once established, we can discuss in our community on what the plans & goals can (?) or could (?) be.

Module/Sensor Mechanical performance is more aligned with other RDC, RDC10 is more directed at 'detector supports' and integration/assembly

# RDC10 - Community Survey

This is an expression of interest not a proposal so FTE/Funding is not requested--will send a standard email request shortly with this basic information requested (suggestions for further information welcome!)

- Who you are--describe your group/institute
  - Add relevant personnel to RDC10 and perhaps indicate a POC if desired
- What are your/group's interests, e.g. current and future
  - Open format--can be R&D proposals, current/future detector projects,
  - Other RDC's that you or your group are interested/involved with
- R&D Proposals
  - Both what you think is important for the field and also ones you are interested in (Blue Sky!)
- DRD (CERN/ECFA) Collaboration
  - Do you have plans to collaborate with any CERN DRD programs and which ones
- Capabilities or Expertise
  - Open format, e.g. Partnerships with other departments or institutes or industry, access to various test or process equipment etc.
  - If desired summary of expertise, e.g. Composite Design/Fab, Machine shop, 3D Printing, UHV, Cryogenics, RF, FEA

This info will not become public. Can discuss at CPAD or RDC10 level if/how to share 'useful' information within the community e.g. who has what equipment/capability to enhance collaboration

# RDC10 - Community

- Mechanics is a very broad subject with differing requirements and impacts in several of the other RDC subjects
- Tracking Detectors represent the current cohort--the intention is to expand to include other technologies which may include Cryogenic, UHV, and of course Services (which are often overlooked)
- The Forum on Tracking Detector Mechanics is a recent good example of the goal here, which is to get experts and interested parties with similar or adjacent interests and challenges to communicate better and eventually coordinate and share R&D results
- A Survey will be circulated and can be filled out by individuals, groups, or organizations within institutions; ideally some coordination within an institution would be useful but not required

# RDC10 - Community Expansion

- CPAD is mostly aligned with HEP Detectors which is already a broad field with varied technologies
- Adjacent Fields (and funding sources) will be encouraged to join, e.g. Nuclear Science, BES (Light Source), NSF colleagues
- Several current and future projects in these other fields/FA share technology (and likely personnel already)
- We are each funded uniquely, but we are not a funding source
- Space or Industry may be outside our wheelhouse, but will not be discouraged if interested in the future
- SC Magnets are a DRD in the CERN/ECFA planning--some ties between RDC10 and US MDP (Magnet Development Program) may prove beneficial (shared personnel may be sufficient)

# RDC10 - Community Goals

- Establish a collaborative community in which R&D can be leveraged and enhanced (HEP, nuclear, satellite, materials, etc.)
- Identify duplicate efforts and encourage collaboration both within the US and internationally by increasing community awareness of others work (potential to share resources/equipment)
- Encourage and increase publication of results of mechanics R&D in journals which has been historically poor
- Help to identify relevant journals to publish papers in detector mechanics
- Develop a resource to collect resources and information for early career researchers



# Recent CPAD Meeting (May 3rd)

- **We open submission for 2-3 page “white papers” from the community to ensure we gather input from any interested parties**
  - Many of the RDC’s have already started this process, we just need to collect this information in a “standard template” ([see example here](#))
  - Your ideas should be communicated through the RDC coordinators
  - These “white papers” will be posted to CPAD RDC webpage
  - Period of submission is two months (May and June 2024)
  - We anticipate RDC coordinators are holding meetings between May and June to both advertise this process and work with proponents articulate their research
- **Early July 2024 we will hold a meeting and invite a large number (all?) of the white paper submitters to present their idea to the community and RDC coordinators will collect feedback and synthesize the proposals**
- **Late July 2024 the RDC coordinators and the CPAD Executive Committee will convene to encourage a few of these proposals**
  - Eric Andersson & Andy Tung These results are then posted on the CPAD website and we will work with proponents for proposal preparation to the comparative review RDC 10 collaboration

# May - June 2024

Slide credit: J. Asaadi & J.Zhang  
(CPAD coordinators)

- **Period of submission is two months (May and June 2024)**
  - We anticipate RDC coordinators are holding meetings during this period to both advertise this process and work with proponents articulate their research
  - We will collect the various whitepapers onto the CPAD webpage as they are submitted
- **RDC coordinators should be working with members of the community to “manage their expectations” and help identify links between the RDC’s which will enhance various proposals**
  - The RDCs should be working with proponents to form long-term collaborations as well as identifying possible proposals for 2024

# Outlook

- Community building to fully establish a R&D collaboration for Mechanics, Services and Cooling
  - Join the CPAD RDC10 email lists! See earlier slides
  - Realistically: bi-annual meetings
    - One in overlap or simply the Forum itself
    - One more in Fall but ahead of the yearly CPAD community meeting (November-ish)
  - Community (US centric) survey in preparation of the RDC10 Fall meeting
- CPAD white paper process in anticipation of next DOE BlueSky FOA
  - P5 plan implementation has a promise to increase R&D funds in coming years
- P5 has released the priorities early December and a town hall at Fermilab on 11th December
  - <https://indico.fnal.gov/event/61641/>
  - Link to Report: <https://www.usparticlephysics.org/2023-p5-report/>



# Backup

## CPAD R&D Collaboration White Paper Template 2024

### **Title:**

(Put your title here)

### **Institutions:**

PI # 1 Name, Institution

PI # 2 Name, Institution

PI # 3 Name, Institution

...

### **Abstract:**

(Explain what your R&D is and what are the outcomes if successful.... 2-3 paragraphs)

### **Collaboration:**

(Outline the teams (who and where)

the collaboration structure (which institution is responsible for what),

and the links to the relevant CPAD RDC's (list the relevant RDC's and the match to their areas of research priorities))

### **Timelines:**

(Give a rough outline of the timeline for the R&D with any known milestones or deliverables during the proposed 3(4) year funding period 2025 - 2028(9) )

# Links on the CPAD Website

## 2024 RDC Collaborative Proposals

For the 2024 Comparative Review, CPAD and the RDC's aim to put forward a small number of university lead, multi-institutional proposals focused on generic "blue-sky" R&D

To this end, we are open to submission of community lead "White Papers" which outline proposals for such consortia. These white papers will be used to help CPAD coordinate and promote groups intending to submit to the DOE Comparative Review in September 2024

### Relevant Links:

- **Comparative Review FOA:**

<https://science.osti.gov/hep/-/media/grants/pdf/foas/2023/DE-FOA-0003177-000001.pdf>

- **2024 RDC White Paper Google Drive**

[https://drive.google.com/drive/folders/1b7HJZcH2vpf9Di\\_HSyruxDAP-zgzDo8o?usp=sharing](https://drive.google.com/drive/folders/1b7HJZcH2vpf9Di_HSyruxDAP-zgzDo8o?usp=sharing)

- **2024 RDC White Paper Template**

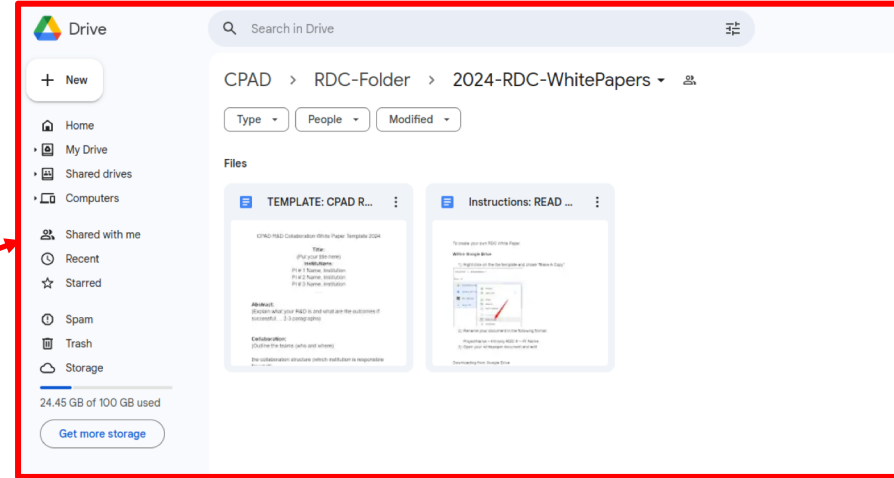
<https://docs.google.com/document/d/1cU7nccoCaFCvFRBffVfNVDLOSciNHgz0VR1ppNZmiRw/edit?usp=sharing>

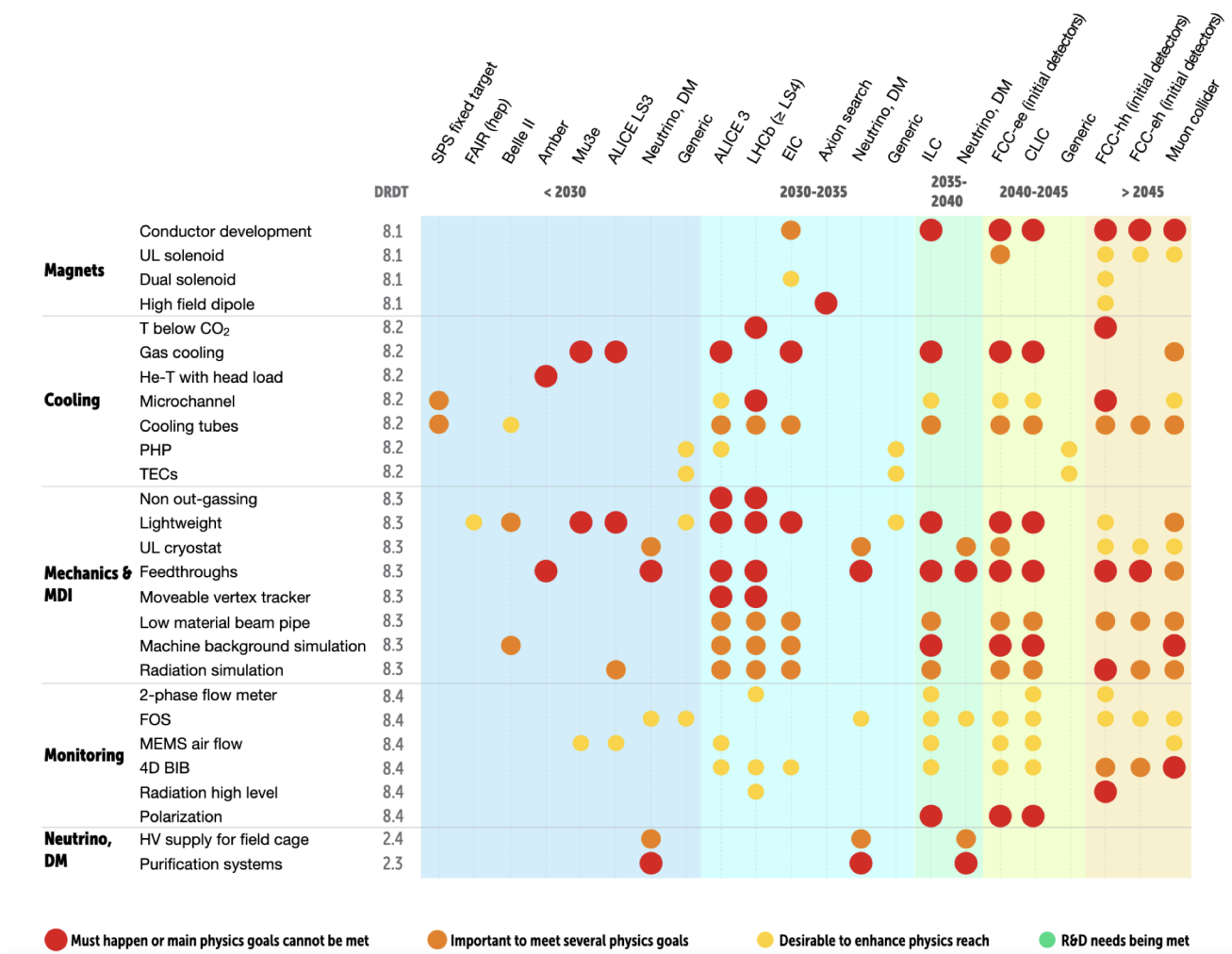
## Link to CPAD RDC General Meetings

May 2024 RDC Community Meeting: [Indico Link](#)

July 2023 RDC Kickoff Meeting: [Indico Link](#)

[https://cpad-dpf.org/?page\\_id=1549](https://cpad-dpf.org/?page_id=1549)





# Summary of international developments

- ECFA (European Committee for Future Accelerators) matrix of “experiment/detector” mapped to technologies / R&D (DRD)

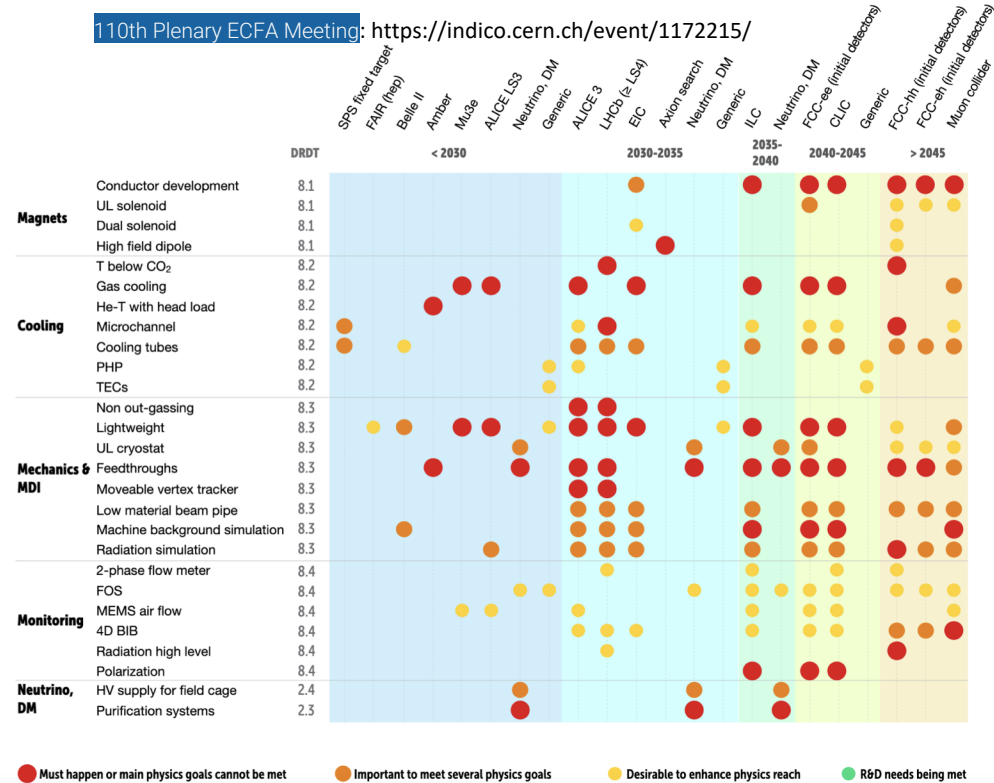
- ECFA Detector R&D roadmap: <https://cds.cern.ch/record/2784893>

- European Developments:

- Interest to form European Detector R&D on Mechanics, Integration, and Cooling

- Topics: Gas & single and 2-phase cooling, humidity+temp+thermal, TIM, pipe materials, materials, 3D printing, Radiation, FEA’s, Structural design, ML for support designs
    - Community Meeting for R&D collaboration on Tracking Detector Mechanics, Dec 6th [indico](https://indico.cern.ch/event/1344395/):
    - <https://indico.cern.ch/event/1344395/>

110th Plenary ECFA Meeting: <https://indico.cern.ch/event/1172215/>



● Must happen or main physics goals cannot be met
 ● Important to meet several physics goals
 ● Desirable to enhance physics reach
 ● R&D needs being met