CPAD RDC9 R&D plans

Introductory remarks by

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Towards a plan for 2025

- Discussion session to review original goals, and develop an action plan for next year:
  - Organize working groups around key themes
  - Identify liaisons to other RDCs to develop synergistic activities
- Resume monthly meeting in January 2025 to start planning generic R&D proposal

From the BRN

Priority Research Direction (PRD)	Technical Requirement (TR)
PRD 1: Enhance calorimetry energy resolution for precision electroweak mass and missing-energy measurements	TR 1.3, TR 1.4, TR 5.5, TR 5.10, TR 5.12, TR 5.15
PRD 2: Advance calorimetry with spatial and timing resolution and radiation hardness to master high-rate environments	TR 1.4, TR 5.1, TR 5.10
PRD 3: Develop ultrafast media to improve background rejection in calorimeters and improve particle identification	TR 1.3, TR 1.4, TR 5.7

Areas of interest

1. New materials for calorimetry, and how they can be tailored to a specific application (including prospects from nanotechnology)
2. Front-end electronics needs for high energy resolution
3. Front-end electronics needs for picosecond timing calorimetry
4. System aspects (mechanical): low mass support & cooling
5. System aspects (electronics): powering scheme & interconnections
6. System aspects (data processing): “intelligent calorimeter”
7. Concepts from the above lines of investigation that can be adapted to hadron identification (time-of-flight, RICH…)

Big ideas as of November 2023

- New materials optimized for different applications (high occupancy, precision time stamp, scalability (cost effectiveness, large masses), optimum resolution, high radiation.
- Sensor technologies:
  - Scintillators
  - Maps – use of CMOS technology for large scale structures
  - Ultrafast silicon (diamond, SiC..)
  - Metamaterial for tunable optical properties
- Optical coupling/light extraction
- Photon detection (interface with photon detector rdc)
- ASIC needs (energy & time measurement, waveform sampling, feature extraction, preservation of signal integrity in high occupancy events, interface with ASIC rdc, picosecond timing RDC)
- Large scale system (electronics/mechanics)

The End