SiW-ECAL Contributions to DRD6

CERN, IFIC, IJClab, KEK, Kyushu, LLR, LPNHE, Omega

SiW-ECAL Prototyping

- **2023**: Build a prototype with uniform layers

  (FEV2.1 + 500 µm Sensors)

  All material avail.

  analysis of existing data
  (prepare G4 sample ?)

- **2024**: Test in beam (standalone, w AHCAL)
  Prepare setup with 2 towers
  - 7–12 layers, same ASUs + 40 Wafers (*if funding*)
  - ➡ Dark γ, QED exp:
    LUXE@XFEL, EBES@KEK, Lohengrin@ELSA
- **2025**: Test a 2 tower design : BT, Experiments
  - If funding (ANR?) prepare for 3 towers for LUXE
- **2026+:**
  Far Side : new prototype ➡ pilote module (1M ch)

SiW-ECAL Design for Detectors (↔ ECFA WG3 & CLD/ILD)

- **2023**: Prepare specifications for low occupancy, continous operations ASICs
  - power, rates, etc. Test of various ASICs hypothesis, Check for active cooling needs in ECAL
  - Specifiy requirement on precision on timing in PFA/PID

    Dedicated layers (LGADs) vs Bulk Timing
- **2024**: Prepare design
  - Optimisation of the ECAL (granul, resolutions *E, t*)
  - Link to other DRDs ?
    - Electronics, DAQ ➡ *DRD7.1, 7.2 ?*
    - Integrated cooling, *if needed* ➡ *TF8.2 ?*
    - Mechanics & monitoring ➡ *TF 8.3, 8.4 ?*

  Time scales ?
- **2025**: Blueprint (EDR) of pilote module for Higgs factory

T-SDHCAL

IP2I, OMEGA, CIEMAT, Cordoba Univ., VUB, Yonsei, GNWN, SJTU, Tunis

Objectives:

- **Simulations**
  1) study of hadronic showers with time information
  2) study of cooling system required for the T-SDHCAL unit based on the present knowledge of the Liroc ASIC power consumption as well as the other components to be used.
  3) Comparisons data–simulation

- **Prototyping:**
  1) Mechanical structure with the cooling system
  2) Conception and production of fast-time electronics (PETIROC/Liroc+TDC)
  3) Conception of a thin and large ASU hosting the readout electronics to be associated to the MRPC in a cassette.
  4) DAQ system for a few T-SDHCAL units.
  5) Construction of a few T-SDHCAL units. Brussels, Lyon, Shanghai, GWNU
  6) Construction of cooling units for the T-SDHCAL units.
  7) Validation of the new T-SDHCAL units in beam tests
     - first in independent way and
     - then with the other SDHCAL units.

From Imad @ CALICE

DRD6 proposal

Omega

CEA, CERN, Krakow, Omega

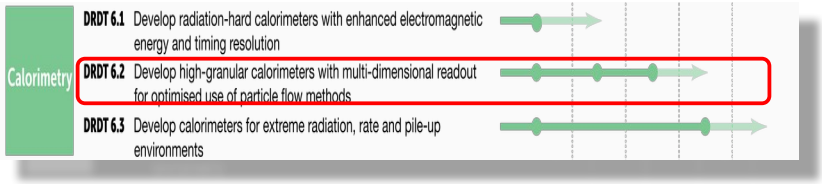
- Collaboration OMEGA + AGH Krakow + CEA Saclay
  - OMEGA : VFE and backend
  - AGH : ADC
  - CEA : TDC

- Start from HGCROC / HKROC : Si and SiPM
  - Reduce power from 15 mW/ch to few mW/ch
  - Allows better granularity or LAr operation
  - Extend to LAr (cryogenic operation) and MCPs (PID)
  - Remove HL-LHC-specific digital part and provide flexible auto-triggered data payload
  - Several improvements foreseen in the VFE and digitization parts

- Prepare MPWs and/or engineering runs to get enough chips for calos
  - Already ~300 k€ for an engineering run in 130 nm
  - First run early 2024 with EICROCs and « DRD6 ROCs »

- Submit to DRD6 to have close interaction with physics performance
  - Embedded electronics and joint FE/detector optimization

Links to other DRDs/TFs



All :

- DRD7.2: ASICs, power management
- DRD7.5: DAQ, clock distrib, data
- DRD8.2: Cooling (Mostly ECAL)
- DRD8.3 & 8.4: Mechanics & Envir Monitoring, integration

Si-ECAL, dECAL:

- DRD3.1: R&D on MAPs, SMADs
- DRD3.2: LGADs (timing layer)

T-SDHCAL:

- DRD1.1: Space & Timing resolution…