

Contributions au mid-term review report (quels articles en préparation, quels résultats)

Couplage Triple Higgs ($H\lambda$)

- En retard pour le papier
- Presentation de L. Portales au FCC WS à Londres

Estimation des Flux attendus dans les calorimètres (VB + LP)

pour $\neq$ configurations (E_{CMS} , $\mathcal{L}$, bdf machine) simulations détaillées de $\neq$ processus

→ Distributions d'énergie, et temps

→ avec hypothèses ad-hoc (electronique, seuils, bruit)

- Cartes de
 - Nombre de hits, rates, occupancy ($\leftrightarrow$ threshold, cells size)
 - Consommation d'énergie ($\leftrightarrow$ electronics)
 - Flux de donnée ($\leftrightarrow$ electronics, topology)

Sujet de stage programme international IPP :
- 22/05 – 07/08 (2,5 m)
- Khalid Hassouna (M2, U. Hawaii)

SiW-ECAL Prototyping

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

(FEV2.1 + 500 μm Sensors)

PCB prod (ongoing),
ASICs tests (ongoing)

Stage Juillet
bachelor (L3)

- **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
- **Far Side** : new prototype → pilote module (1Mch)

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

- **2023:** Prepare specifications for low occupancy, continuous operations ASICs
 - power, rates, etc. Test of various ASICs hypothesis, Check for active cooling needs in ECAL
 - Specify requirement on precision on timing in PFA/PID
 - Dedicated layers (LGADs) vs Bulk Timing
- **2024:** Prepare design
 - Electronics, DAQ
 - Integrated cooling, *if needed*
 - Optimisation of the ECAL (granul, resolutions E, t)
 - Mechanics & monitoring
- **2025:** Blueprint (EDR) of pilote module for Higgs factory

Target:

- EIC, FCC, ILC, CEPC...
- embedded electronics and detector/electronics coexistence + joint optimization

Start from HGCROC / HKROC : Si and SiPM

- power reduction ~ 15 mW/ch $\rightarrow$ 'few' mW/ch
- Allows better granularity
- Extend to LAr (cryogenic operation) and MCPs (PID)
- Remove HL-LHC-specific digital part and provide flexible auto-triggered data payload

Collaboration:

- Ω MEGA : VFE and backend
- AGH: ADC
- CEA-Saclay: TDC

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»

Ressources & Participations

2023 :

- MC prods : Higgs samples + Sample for Detector studies
 - 10% L. Portales (PD) + 10% V.B.
- Higgs λ studies $\rightarrow$ publication / MTR
 - 10% L. Portales (PD) + 10% R.S.
- CALICE prototype
 - 30% J. Nanni (IR elec) + 20 % V.B.
- PFA + Timing:
 - 20% H. Videau + 20% V.B.
- ECFA, WS, DRD + Admin:
 - 20% JC. Brient + 30% V.B. + 5 % R.S. + 5% L.P.

2024:

- Δ / 2023:
 - J. Nanni $\rightarrow$ 50% ? (tests)
 - +30–40% IR meca (cooling, structure)
 - R.S. $\rightarrow$ CMS Phys. Coord. @ CERN

