

μ WS on AIDA-IP++ Si-Calo's

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in behalf of



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Goal of meeting

information

- on situation +
- AIDA-IP++

Collect ideas on Eol's

Decide on the expressions for next week (WP14 meeting) and Eol (end June).

Working hypotheses

① CMS-HGCAL building by 2026

① The ILC is decided this year

- We still have ~~3/4~~ 5–6 years of R&D before launching the production

+2y ?

ILD assembly timeline for Hybrid option (CMS style assembly)

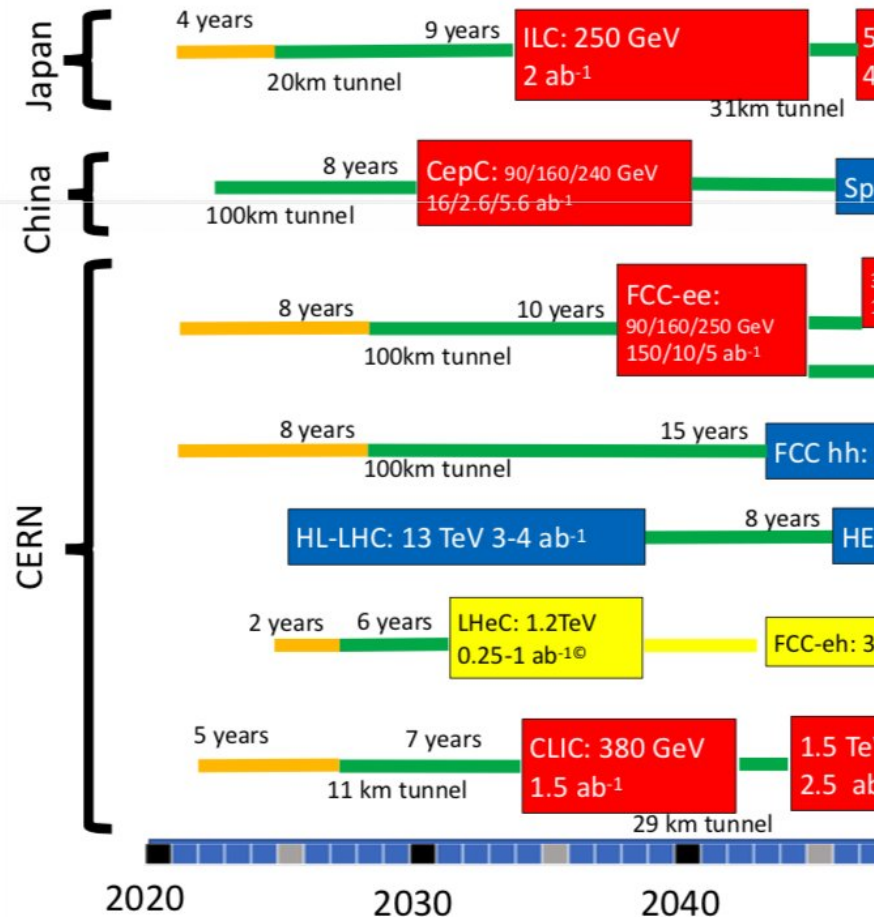
2017	2019	2020	2021	2022	2023	2024	2025	2026	2027
Sub-detector	Y-3	Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6
ECAL (Barrel)	R&D		TDR						
ECAL (End cap)	R&D		TDR						
HCAL (Barrel)	R&D		TDR						
HCAL (End cap)	R&D		TDR						

Construction off site: 2022-2025
Ass. On site: 2026
Install: 2027

adapted from 2014 ressource survey

- The organisation
 - should switch from “loose R&D” to **project mode**,
 - “ILD-like” steps-up in 2020 as main organisation (view of IN2P3)
 - CALICE to publish legacy papers for references
- Decision on staging scheme $\leq$ end 2020 ?
- Decision on 1 vs 2 experiments $\leq$ end 2020 ?
 - if 2) conservative: decide on SiW-ECAL parameters
 - if 1) merge SiD & ILD concepts:
 - highly political $\rightarrow$ 1(2) year delay ?

Possible scenarios of future colliders



① The ILC is decided this year

To be consolidated

Module-0 = pre-production goal (4+2 years)

- 1 “Module-0” : demonstrator or module #1 ?
 - **CRFP+W Structure** of 26(?) layers × 5 alveola
 - 2–3×13(?) Long Slabs
 - with “final” cooling + DAQ HW

Technological (τ) Long Slabs (~3+1 years)

- 3–5 Barrel Slabs pre-module-0 production
 - “SK3” chip (corrected auto-trigger, full 0 suppr.)
 - Wafer thickness,
 - PCB technology × design (couple options)
- ≥ 2 –3 End-cap slabs

R&D for τ –Long Slabs (2 years)

- CFRP+W H
- Production with full DQ tracking of elements
 - Upgrade of test benches → semi-automatisation
- Tests of SK3

Prototypes (1 year)

- **e-Long Slab**: signal & power scheme for **FEV14**,
 - 725 μ m – 8” wafers ?
- **m-Long Slab**: connections + termination + cooling
- **τ –prototypes**: tests in beam of FEV12–CoB, FEV13, FEV11, new SK2a-packaging ?
- **Compact DAQ prototype**
- (Existing) **CRFP+W structures** full characterisation

H2020 Innovation Pilot on Detector Technologies at Accelerators

Il s'appellera ~~INFRA-INNOV~~ (ex AIDA++) et visera plus particulièrement la **liaison détecteur avec l'industrie & continuation infra AIDA-2020**

Les détails sont présentés **ici** pour les calos (WP leaders: Frank + Roman) et pour l'ensemble **(Felix)**

La deadline soumission = mars-2020, ce sera pour un démarrage début 2021 (!).

Cela suppose un processus de collecte des Eol (Expression of Interest) et la mise en place sous forme de work package (WP),
qui prend un bon moment.

L'appel pour les Eol est imminent (mai) avec avec une limite de soumission = fin Juin 2019.

Meeting AIDA-2020 WP14 14/06/2019

Ces projets supposent chacun un partenaire industriel qui puisse prendre des commandes, il faut donc avoir taté le terrain avec eux auparavant.

F. Sefkow, SG Meeting 7/3/19, slide not declared as confidential

- INFRA-INNOV-04-2020: Innovation pilots
 - Innovation in light source technologies
 - **Innovation in detector technologies** ← Target is Advanced Communities who have a potential To cooperate with industry
 - Innovation in accelerator technologies
- Detector technologies at accelerators →
- Budget 30M, max **10M** per proposal
- **Deadline March 17, 2020**
- **Open community meeting early September:**
 - Possibly second end Oct, early Nov.
- Eols before summer: sub-community discussions,...
- **Call for Eols in May, deadline end of June**
- Alignment with European Strategy Process will be challenging anyhow
- **News: CERN will be leading institute, Felix invited to lead the proposal**
- Need industrial partners as beneficiaries not just as suppliers, start to think about it now!
- No Transnational access!!!
- Need to define a roadmap into what these developments should yield, what are realistic targets in terms of HEP projects?



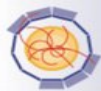
AIDA²⁰²⁰

Innovation Pilots

- Objective:
- Support RI* networks developing and implementing a **common strategy/roadmap including** technological development required for improving their services through **partnership with industry**;
- Support **incremental innovation** and cooperation with **industry and academia** in areas such as scientific instrumentation
- Target:
- **Advanced Integrated Activities****, which have reached a high level of integration and can **focus on joint** research developments

• * RI – Research Infrastructure

• ** e.g. AIDA-2020



AIDA²⁰²⁰

Scope, Guidance, Tools

- Development of **roadmap/strategic agenda** for the construction and upgrade of RI
- Development of **technologies & techniques underpinning** the use of the RI
- **Prototyping** corresponding methodologies & instrumentation
- Early stage involvement of **industry as beneficiary** and supplier
- **Sustainability** plan requested (co-funding of roadmap)
- **Complementarities** between the two innovation actions required
- **Tools:** JRA, NA type of activities -but **no TA**
- Proof of Concept (competitive allocation after start of project) possible, e.g. for low TRL, higher risk projects (“blue sky”)
 - ** **TRL** - Technological readiness level

AIDA-2020++

- Advanced community
- Collaborative, compete globally
- Interdependent work packages
- Aligned with European Strategy and corresponding roadmaps
- Evolutionary development
- Innovation mainly via pre-procurement R&D for HEP
- Leverage on national funding
- Integrating



AIDA²⁰²⁰

Collaboration agreements

- Emphasis is on keeping each other informed
 - **Avoid duplication and double-funding**
 - Information exchange, mutual invitations
 - Dividing line for double funding should be drawn
- Provide access to results for other projects
 - if needed; the giving side decides

⇒ continuation of AIDA-2020 benches

Liste des bancs / elements pour Slab ILD [TDD]

- Common: HW element DB + marking + Analysis
 - Procédure d'assortiment des éléments [lots homogène de matrices (Vbreak), d'ASIC (bandgap)]
- Wafer Test Set-up (~16 needed if ALL matrices are tested): ↔ sampling to check requir't from producer ?
- Asic Test Set-up (common to HGCal): test of configuration + mesures (ADC, TDC, Trigger, bandgaps)
- PCB Metrology set-up (PMS): 3D measurements ? or Optical ? or by Sieving ?
- ASU Electrical Test Set-Up: Marking + noise meas't + source/cosmic ?
- Wafer Gluing Setup (~4 setup) : Fully automatised + Ovens for faster polymerisation ? + C(V) curves ?
- Assemblage des ASUs: ASU signal test set-up: C(V) + Signal measurement (source? Laser ? cosmics ?) needs controlled envir.
- Slab Assembly Set-up: fully automatised & made by industry.
- Slab Testing Setup: Signal and noise measurement → Cosmic / Source (very strong or many...) / Beams
- Metrology of SL-Board: dimensions, ⊃ sensing elements (temperature sensor)

List de bancs pour les structure & Services

Structure:

- Metrology of W plates : dimensions, density (ultrasound / radiation), marking + appariment / matching *if needed*
- Metrology of Cradle: optinca / palpation ? industry
- Metrology of alveoli
- Qualification of Structure (deformation under load under various orientations): FGB ? Optical, etc.

Qualification benches:

- Aging of elements under controlled enviro conditions: Temp, Humidity, B field
 - Connecteurs(pulsé dans 4T), Capacités, ASICs, DAQ, Câbles, Convertisseurs (DC/DC, LV/HV)

Open questions

Very large number of tests

- 1 Eol per bench ? → need global view
 - Draft of Si-Calo
- 1 Eol = 3 deliverables:
 - Description of the requirements for the Qualification & Measurement benches
 - Building of the base infrastructure (Marking, Acquisition & Component DB)
 - Prototypes of Q&M Benches in complete (in-lab) or light (in-company) versions