



Spokesperson's Welcome

Roman Pöschl



CALICE Collaboration Meeting Göttingen – March 2023



- On behalf of the collaboration I would like to thank the Georg August Universität Göttingen for hosting us for this meeting
 - We are honoured by the welcome of the President Prof. Metin Tolan
 - I would like to thank Stan, Andre and Julian for the local organisation
 - First Meeting in Germany since Mainz 2018
- The group of Göttingen is CALICE member since Autumn 2019
 - Hardware contributions to AHCAL
 - Forward looking topics with machine learning for highly-granular calorimeters
- Thanks to the conveners for having compiled the program
- Thank you very much for coming to this CALICE Meeting of for participation online
 - ... again with participants from three continents on-site

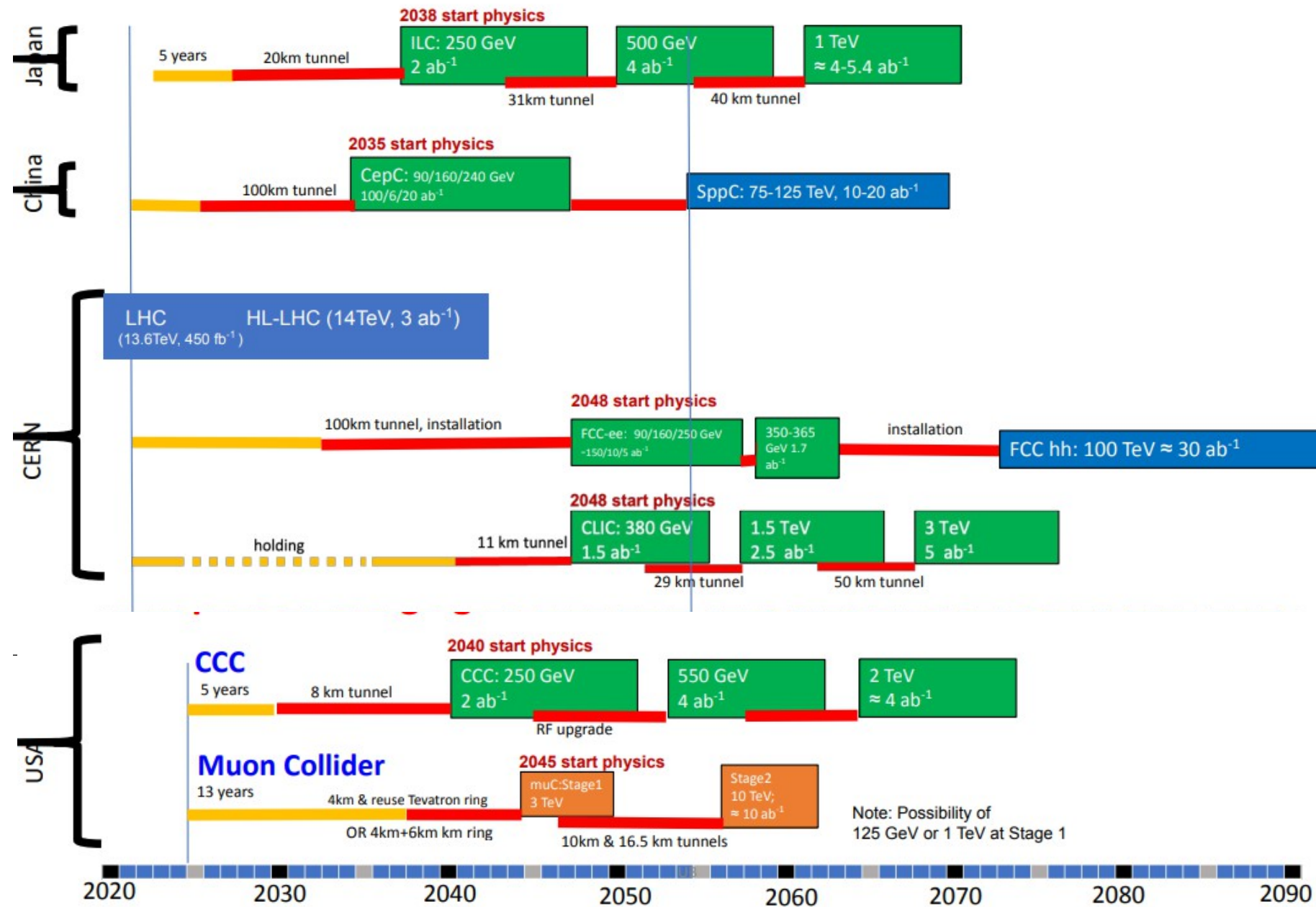
- Unfortunately the situation hasn't got better since our last meeting in April
- Reminder: As of March 17th 2022 Russian Institutes have been excluded from the CALICE Institution Board
- In June 2022 CERN Council expressed it's intention to terminate the International Cooperation Agreement with the Russian Federation and the Republic of Belarus at the end of 2024
- **At this meeting we will adapt our publication strategy**
 - See Frank's talk on Friday
- Personal remark: Despite the rightful sanctions imposed on Russian Institutes it is important to keep open channels for communication and scientific collaboration

- (Finally) CALICE has entirely switched to CERN e-groups
 - Last UK based list retired as of February 1st 2023
 - Thanks for the service over meanwhile 15 years
- Relevant lists
 - calice-general@cern.ch
 - General mailing list
 - Composed of e-groups of CALICE groups, calice-xxxx (e.g. Calice-orsay)
 - It is on the group leaders to keep their lists up to date!
 - calice-group-leaders@cern.ch
 - Group leader list = list used for IB matters
 - Technical Board matters: calice-tb@cern.ch
 - Speakers bureau matters: calice-speakers-bureau@cern.ch

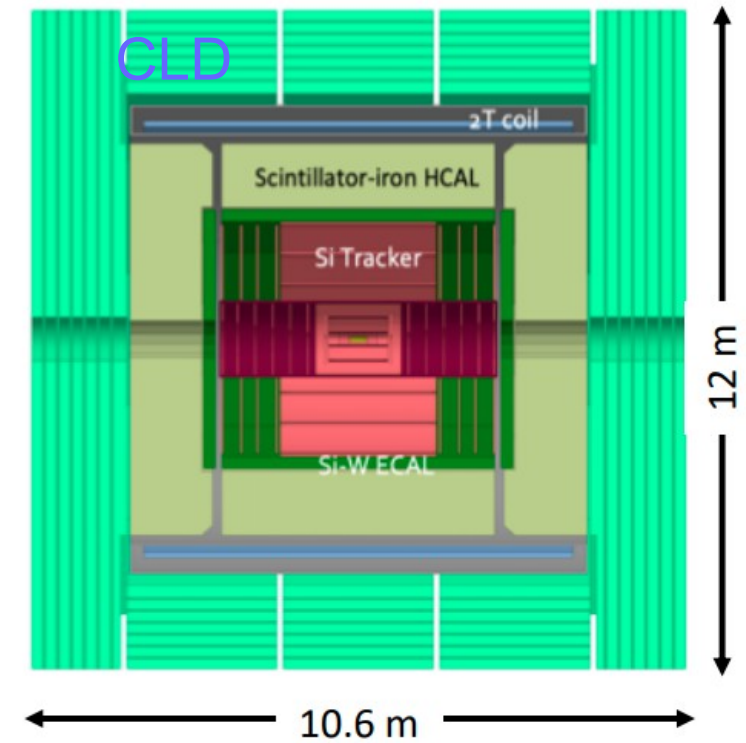
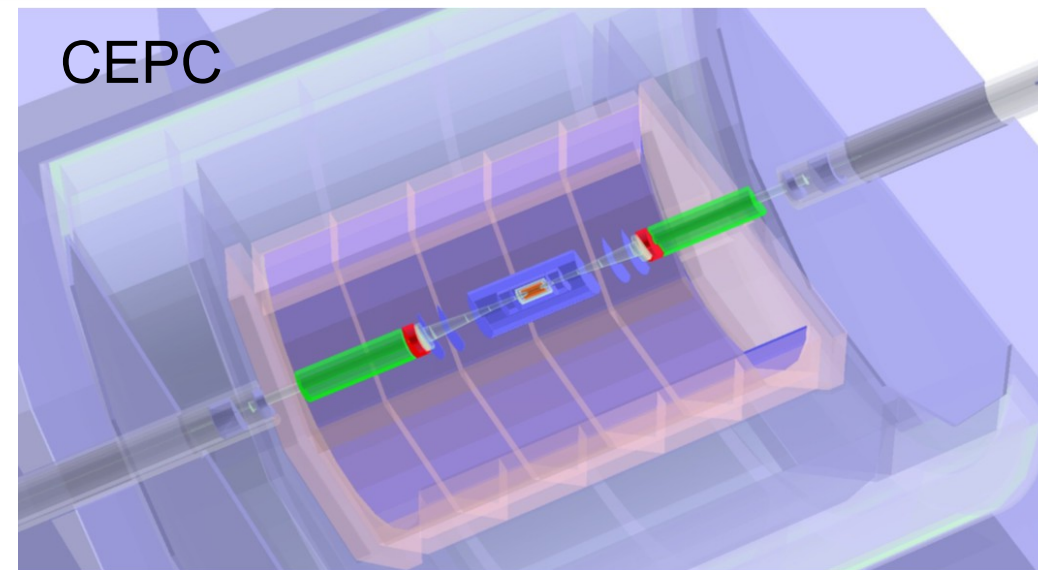
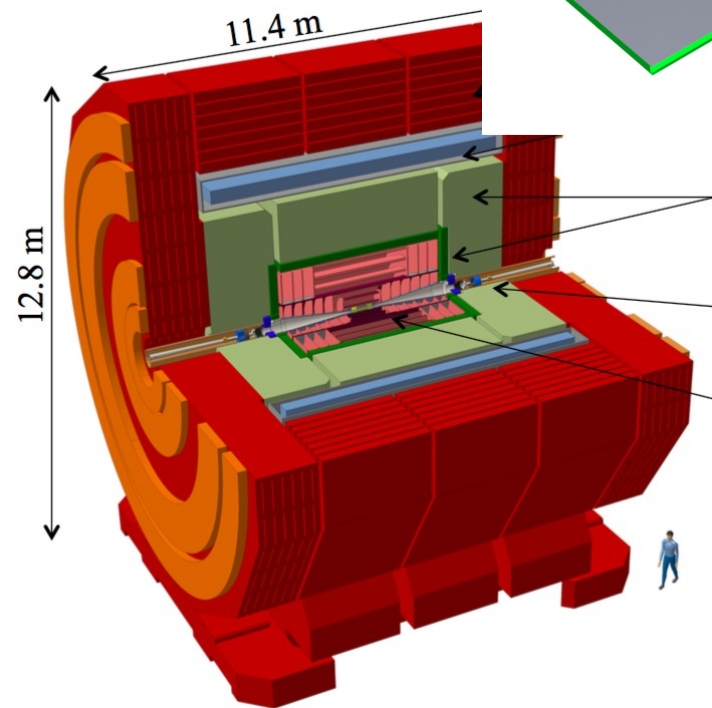
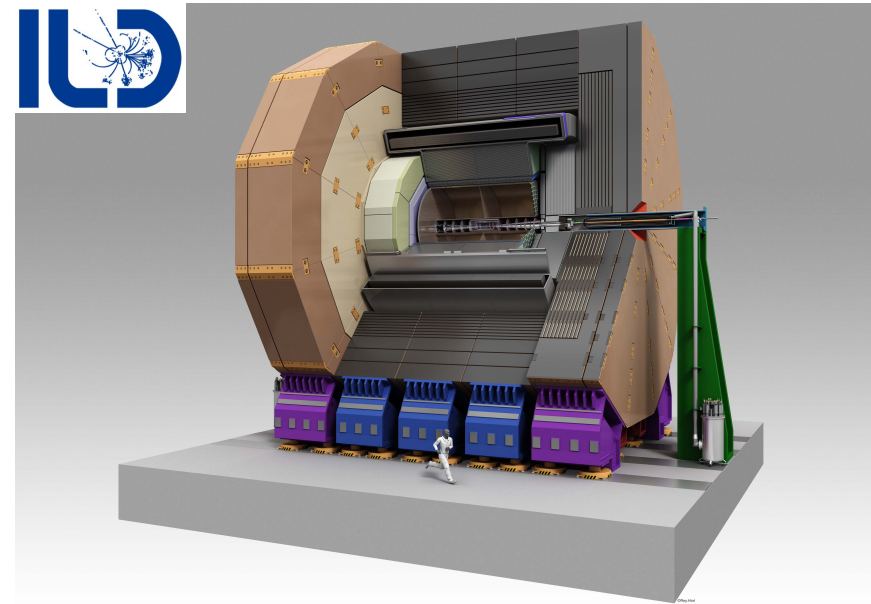
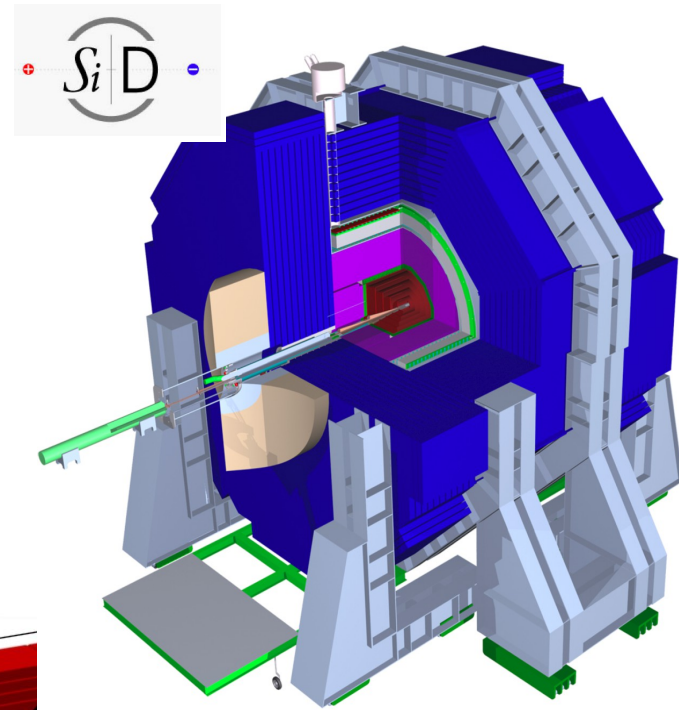
Indicative scenarios of future colliders [considered by ESG]

- Proton collider
- Electron collider
- Muon collider
- Construction/Transformation
- Preparation / R&D

Original from ESG by UB
Updated July 25, 2022 by MN



- The landscape is a plethora of linear and circular machines of various types
- The R&D in CALICE and beyond has to mirror that
- Not easy since partially diametral opposite boundary conditions



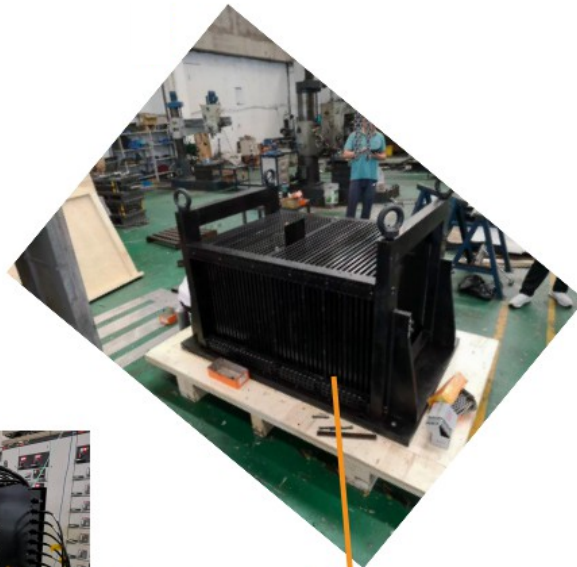
All planned e+e- facilities feature at least one PFA detector with “CALICE Style” calorimeters

- PFA calos are also planned for smaller scale experiments (LUXE, BES, LOHENGRIN)

ScW Ecal + AHCAL
6700 + cells

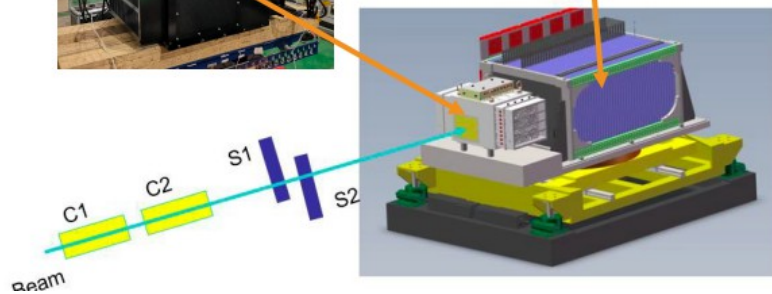


- ScW ECAL and AHCAL (CEPC)
 - Beam time at SPS and PS in April/May 2023
 - This is good!



H8 Beamtime
19/10/22 – 02/11/22

- SDHCAL Beam test had to be cancelled due to funding problems in 2023
 - Plan is to try again in 2024



- **ECFA R&D Roadmap**
 - CERN-ESU-017 <https://cds.cern.ch/record/2784893>
 - 248 pages full text and 8 page synopsis
- Endorsed by ECFA and presented to CERN Council in December 2021
- The Roadmap has identified
 - General Strategic Recommendations (GSR)
 - Detector R&D Themes (DRDT) for each of the taskforce topics
 - Concrete R&D Tasks
- Timescale of projects as approved by European Lab Director Group (LDG)



Guiding principle: Project realisation must not be delayed by detectors



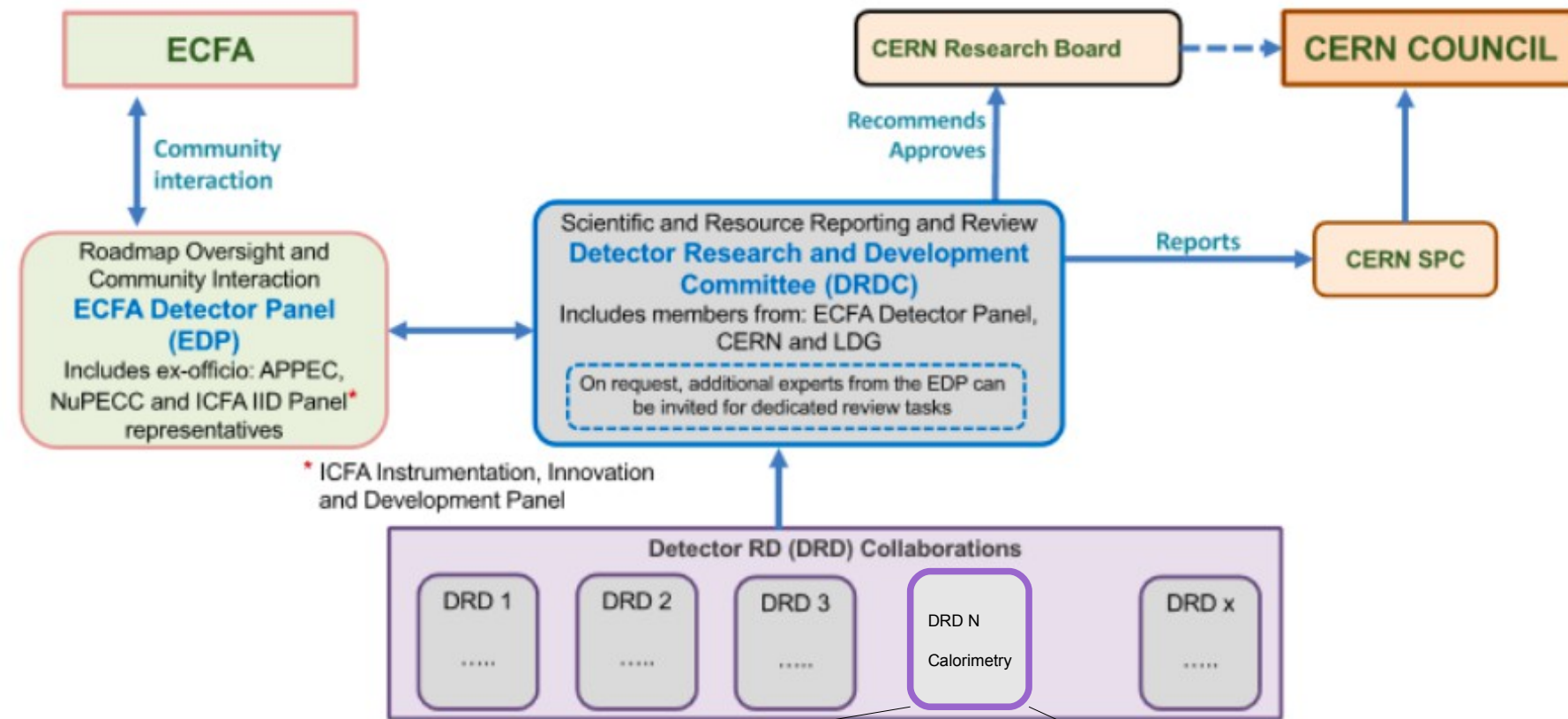
*In December 2021, ECFA was invited by CERN Council to elaborate, in close contact with the SPC, funding agencies and relevant research organisations in Europe and beyond, a **detailed implementation plan***

*Likewise, the European Lab Director Group (LDG) was mandated to work out an implementation plan for the **Accelerator R&D Roadmap***

K. Jakobs, ECFA Meeting, November 2022

- ECFA Roadmap Coordination group has worked out a proposal
 - P. Allport, S. Dalla Torre, J. D'Hondt, K. Jakobs, M. Krammer, S. Kühn, F. Sefkow and I. Shipsey
- Proposal went through discussions with RECFA, National ECFA Contacts, CERN SPS and Council as well as with existing R&D Collaborations
- Document sent to and endorsed by CERN Council in September 2022 (CERN/SPC/1190)
- Main outcomes are the organization of the Detector R&D in form of **Detector R&D (DRD) Collaborations**, the overall Organisation of the detector R&D and an outline of the way towards the formation of the DRD

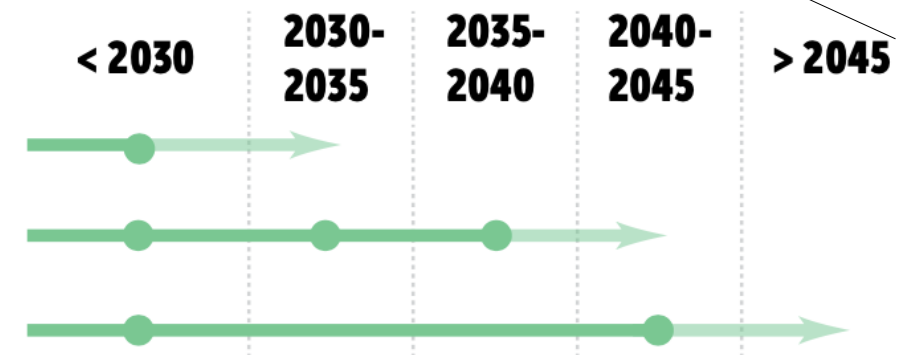
Proposed organisation scheme :



Research themes calorimetry:

Calorimetry

- DRDT 6.1** Develop radiation-hard calorimeters with enhanced electromagnetic energy and timing resolution
- DRDT 6.2** Develop high-granular calorimeters with multi-dimensional readout for optimised use of particle flow methods
- DRDT 6.3** Develop calorimeters for extreme radiation, rate and pile-up environments



Through 2023, mechanisms will need to be agreed with funding agencies in parallel to the process below for country specific DRD collaboration funding requests for Strategic R&D and for developing the associated MoUs.

Q4 2022	Outline structure and review mechanisms agreed by CERN Council. Detector R&D Roadmap Task Forces organise community meetings to establish the scope and scale of community wishing to participate in the corresponding new DRD activity. (Where the broad R&D topic area has one or more DRDTs already covered by existing CERN RDs or other international collaborations these need to be fully involved from the very beginning and may be best placed to help bring the community together around the proposed programmes.)
Q1 2023	DRDC mandate formally defined and agreed with CERN management; Core DRDC membership appointed; and EDP mandate plus membership updated to reflect additional roles.
Q1-Q2 2023	Develop the new DRD proposals based of the detector roadmap and community interest in participation, including light-weight organisational structures and resource-loaded work plan for R&D programme start in 2024 and ramp up to a steady state in 2026.
Q3 2023	Review of proposals by DRDC leading to recommendations for formal establishment of the DRD collaborations.
Q4 2023	DRD Collaborations receive formal approval from CERN Research Board .
Q1 2024	New structures operational for ongoing review of DRDs and R&D programmes underway.

We are here →

Through 2024, collection of MoU signatures

- **Entry point, “DRD Calo indico page”**: <https://indico.cern.ch/category/12772/>
 - Information on important events and access to relevant documents
 - Note also the Q&A Doc
 - 219 people from four regions registered so far
- **1st Community Meeting 12/1/23**
 - <https://indico.cern.ch/event/1212696/>
 - See also next slide
- **Proposal phase until 1st of July 2023**
 - **Input-proposals until latest 1st of April 2023**
 - Proposal team (see later) will get in contact with stakeholders and ask for input-proposals
 - **CALICE Input: See discussion tomorrow**
 - **2nd Community Meeting 20th April at CERN**
 - Presentation of input-proposals (w/o disclosing confidential information)
 - Presentation of a WP Structure of DRD Calorimetry
 - Guidance by existing R&D collaborations such as CALICE
- **Input-proposals will be condensed into a DRD on Calorimetry proposal until (around) 1st of June 2023**
 - Further iteration with stakeholders, community and higher level bodies



ECFA Detector R&D Roadmap Task Force 8: Calorimetry Community Meeting (12 January 2023) - Indico 21/01/2023 13:12

09:00 → 09:30 **Introduction to community meeting** 30m
 This introduction will briefly the roadmap process and will outline the reasoning behind the formation of the DRD. It will be an opportunity to ask questions about the process in general and the formation of the DRD Calorimetry in particular.
 Speakers: Roberto Ferrari (INFN Pisa (IT)), Roberto Ferrari, Roman Poeschl (University Paris-Saclay (FR))
 talk120123-v5.pdf

09:45 → 10:50 **Sandwich calorimeters with fully embedded Electronics – Main calorimeters**

09:45 **Electromagnetic section** 25m
 Speaker: Adrian Irlin (CERN)
 TFS_20230112_irlin_

10:20 **Hadronic section** 20m
 Speakers: Katja Kruger (Deutsches Elektronen-Synchrotron (DESY)), Katja Kruger (Deutsches Elektronen-Synchrotron (DESY))
 CalcDRD_hadronic_

10:50 → 11:05 **Coffee Break** 15m

11:05 → 12:00 **Sandwich calorimeters with fully embedded Electronics – Main and forward calorimeters**

11:05 **Calorimeters based on MAPS sensors** 10m
 Speaker: Thomas Peitzmann (National Institute for subatomic physics (NL))
 apical-2-drd-mainfor_

11:20 **Forward Calorimeters** 15m
 Speaker: Yan Benhammou (Tel Aviv University (IL))
 forward.pdf

11:40 **Spillover and discussion** 20m

12:00 → 13:30 **Liquid Noble Gas Calorimeters**

13:30 **Current status of Noble-Liquid Calorimetry R&D** 20m
 Speaker: Brieuc Francois (CERN)
 20230112_Brieuc_

14:00 **Future Plans & Goals for Noble-Liquid Calorimetry for Future Collider Experiments** 20m
 Speaker: Nicolas Morange (University Paris-Saclay (FR))
 NobleLiquidCalorif_

ECFA Detector R&D Roadmap Task Force 8: Calorimetry Community Meeting (12 January 2023) - Indico 21/01/2023 13:12

14:30 → 15:30 **Optical calorimeters: Scintillating based sampling and homogenous calorimeters**
 Speakers: Ettore Del Monte (INFN), Umberto Giordano (INFN Pisa)
 20230112_DRD_Opt_

14:40 **Homogeneous Calorimeters** 15m
 Speaker: Marco Tolman Lucchini (Università & INFN, Milano-Bicocca (IT))
 23_01_12_Homoge_

15:05 **Picosecond Scintillating sampling electromagnetic calorimeters** 15m
 Speaker: Philipp Roloff (CERN)
 p09L_calorimetry_6_

15:30 → 15:50 **Optical calorimeters: Scintillating based sampling and homogenous calorimeters**

15:50 → 17:15 **Tile Calorimeters** 15m
 Speaker: Henric Wilkens (CERN)
 TFS-Tilecal.pdf

16:15 **Dual Readout Fiber Calorimeters** 15m
 Speaker: Romualdo Santoro (Instituto de Física de Caracás (VE))
 santoro_ECFA_Jan_

16:40 **Recent development on scintillators** 15m
 Speaker: Etennette Auffray Hilemanns (CERN)
 EAuffray_SDPADRD_

17:05 **Discussion on Optical Calorimeters** 10m

17:15 → 17:55 **Wrap-up and the way ahead** 40m
 talk120123-wrapup_

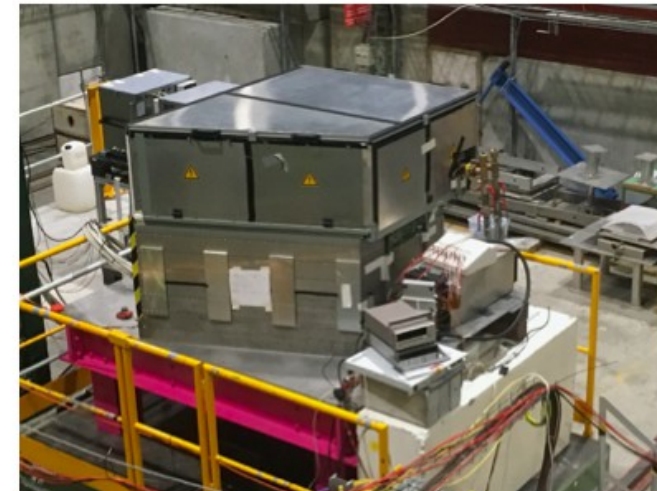
- 137 registrants for Community Meeting
- Three main categories, 14 topical talks in total
- The three categories define “Tracks” for the proposal phase

Beam tests of calorimeter systems

Putting it all together

In order to determine the capabilities of a calorimeter concept, we need to test the complete system of EM section and hadronic section (and tail catcher)

- For the large CALICE prototypes of the concepts for the hadronic section, these tests have just started
 - Very limited data for SiW ECAL together with SDHCAL or AHCAL
 - 2 weeks of data taking in 2022 for Sci ECAL + AHCAL (CEPC prototypes)
 - More beam tests planned in the coming years
 - Data can not only be used to determine calorimeter energy resolution, but also provide important input to other areas
 - Tuning of particle flow algorithms
 - Tuning of hadronic shower models, in Geant4 or with fast generative approaches (ML)
-
- Nice summary by Katja
 - CALICE programme has large potential to animate the launching of the DRD and to make the starting phase a success



Coordinators: Roberto Ferrari (INFN-Pavia), R.P.

Representative from Coordination Team: Felix Sefkow

Track 1: Sandwich calorimeters with fully embedded Electronics – Main and forward calorimeters

Track conveners: Adrian Irlles (IFIC, adrian.irlles@ific.uv.es), Frank Simon (KIT, frank.simon@kit.edu), Jim Brau (University of Oregon, jimbrau@uoregon.edu), Wataru Ootani (University of Tokyo, wataru@icepp.s.u-tokyo.ac.jp)

Track 2: Liquified Noble Gas Calorimeters

Track Conveners: Martin Aleksa (CERN, martin.aleksa@cern.ch), Nicolas Morange (IJCLab, nicolas.morange@ijclab.in2p3.fr), Marc-Andre Pleier (mpleier@bnl.gov)

Track 3: Optical calorimeters: Scintillating based sampling and homogenous calorimeters

Track Conveners: Etienne Auffray (CERN, etiennette.auffray@cern.ch), Gabriella Gaudio (INFN-Pavia, gabriella.gaudio@pv.infn.it), Marco Lucchini (University and INFN Milano-Bicocca, marco.toliman.lucchini@cern.ch), Philipp Roloff (CERN, philipp.roloff@cern.ch), Sarah Eno (University of Maryland, eno@umd.edu), Hwidong Yoo (Yonsei University, hdyoo@cern.ch)

Track 4: Alternatives or transversal proposals.

Watched by entire proposal team

DRD Calo is about to be turned into a real worldwide effort (CALICE Spirit!!!)

- Snowmass frontiers
 - Energy
 - Neutrino
 - Rare & precision
 - Cosmic
 - Theory
 - Accelerator
 - Instrumentation
 - Computational
 - Underground
 - Community
- Diversity
 - Geography
 - R1, R2, RUI



- P5 will propose funding priorities to US funding agencies
- P5 process started end of 2022
- Chair Hitoshi Murayama
 - P5 Committee comprises experts on instrumentation
- More details, see Andy's talk on Thursday

- 64 participants, 26 on site
 - Thanks to the conveners for having compiled the program
 - My apologies for the last minute completion of the program
- Feedback from 2022 beam tests, new beam tests in 2023
 - The core of our activities
- CALICE in the new landscape: Implementation of ECFA Roadmap, toward P5
 - CALICE is one of the central player in these discussions
 - ... but developments will/may have consequences for CALICE itself
 - --> Important discussions at this meeting and in particular in IB tomorrow
 - Overview on input-proposals by CALICE Teams on Thursday
 - CALICE will/can give example on how to include transversal topics into an R&D Collaboration
 - ASIC and DAQ Development
 - See discussion to today
 - Frank is coordination team member of of DRD Elec. And DAQ
 - Software
 - Testbeam organisation and infrastructure
- In all cases CALICE proposes a strong program in a changing environment and will remain an reference

Electronics/DAQ: Christophe de la Taille (taille@omega.in2p3.fr), Taikan Suehara (suehara@phys.kyushu-u.ac.jp),
Jihane Maalmi (jihane.maalmi@ijclab.in2p3.fr)

ECAL: Vincent Boudry (boudry@lir.in2p3.fr), Tohru Takeshita (tohru@shinshu-u.ac.jp),
Jianbei Liu (liujianb@ustc.edu.cn)

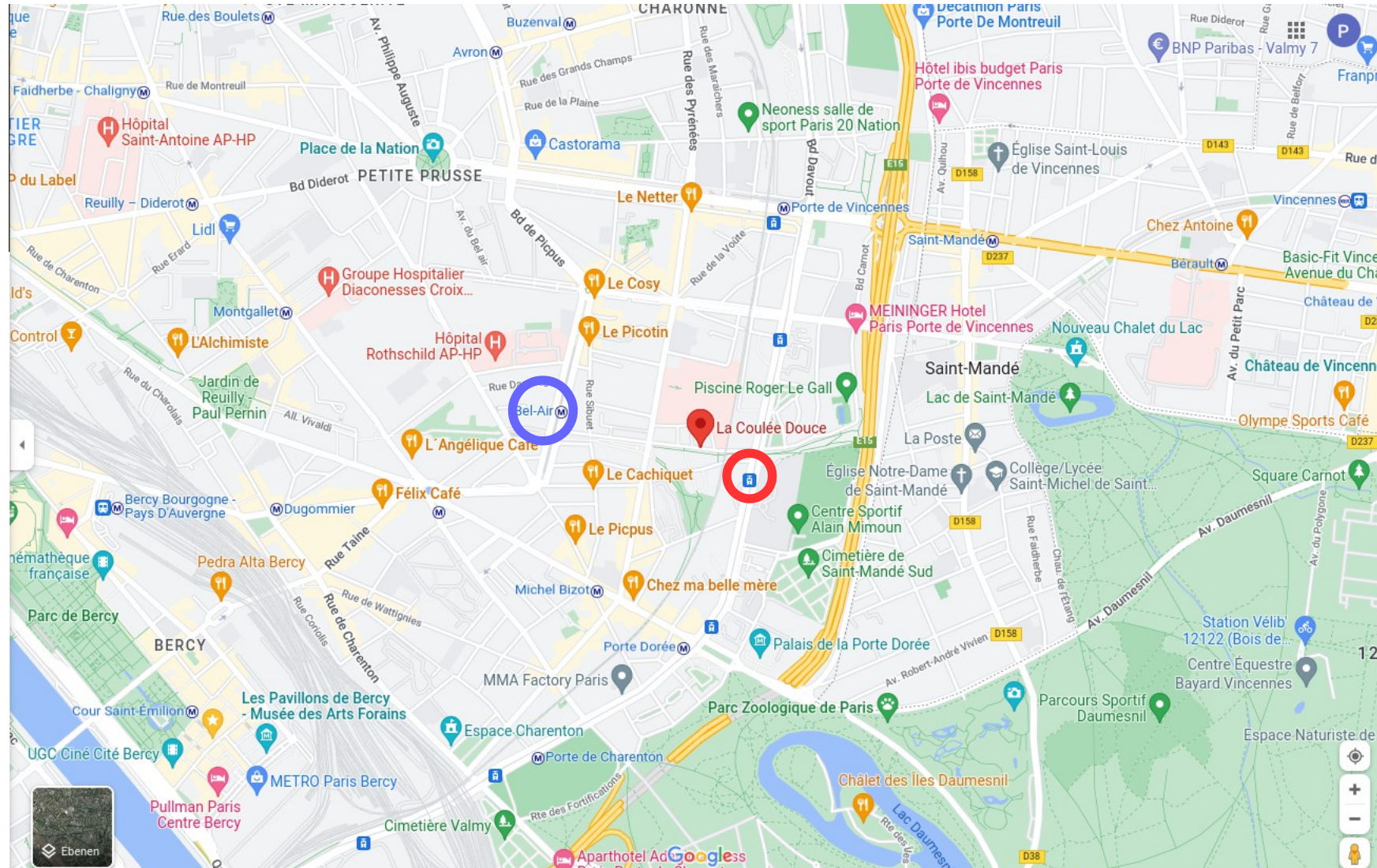
SDHCAL and DHCAL: Imad Laktiner (laktineh@ipnl.in2p3.fr), Burak Bilki (Burak.Bilki@cern.ch)

AHCAL: Katja Krüger (katja.krueger@desy.de), Wataru Ootani (wataru@icepp.s.u-tokyo.ac.jp)

Analysis: François Corriveau (corriveau@physics.mcgill.ca), Adrian Irlles (adrian.irlles@ific.uv.es)

Other Applications: Roman Pöschl (roman.poeschl@ijclab.in2p3.fr), Stan Lai (stan.lai@cern.ch)

La Coulée Douce, 51 rue du Sahel, 75012 Paris, 19.30h



Getting there:

Option 1:

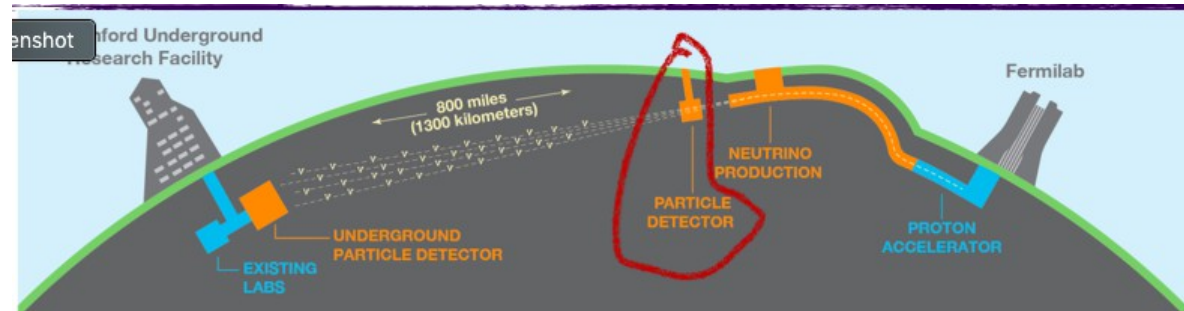
- RER B to Station Cite Universite
- Tram T3a to Station Montempoivre
- 5 min. walk

Option 2:

- RER B to Station Denfert-Rochereau
- Metro 6 to Station Bel Air
- 5-10 min. Walk

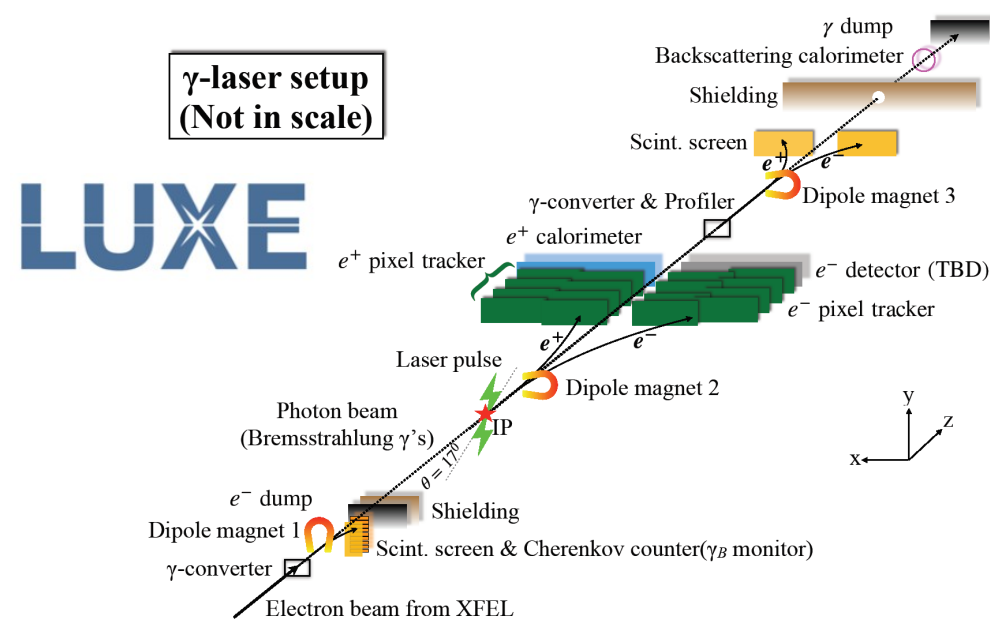
Total trip time from LLR around 60-75 min.

Backup



- DUNE Near Detector
 - Scintillator tiles/srtips

- Smaller experiments on dedicated topics
 - LUXE (Experiment at DESY XFEL to test QED)
 - See W. Lohmanns talk at CALICE Spring 2021 Meeting
 - Beam dump experiments
 - See Taikan's talk at this meeting
 - These need rather the compact elm. prototypes
- Recently the idea was brought up of continuous use of prototypes to test GEANT4 and to constitute platform for machine learning algorithms



- The CNRS/IN2P3 and the German Helmholtz Association are about to found a common research laboratory

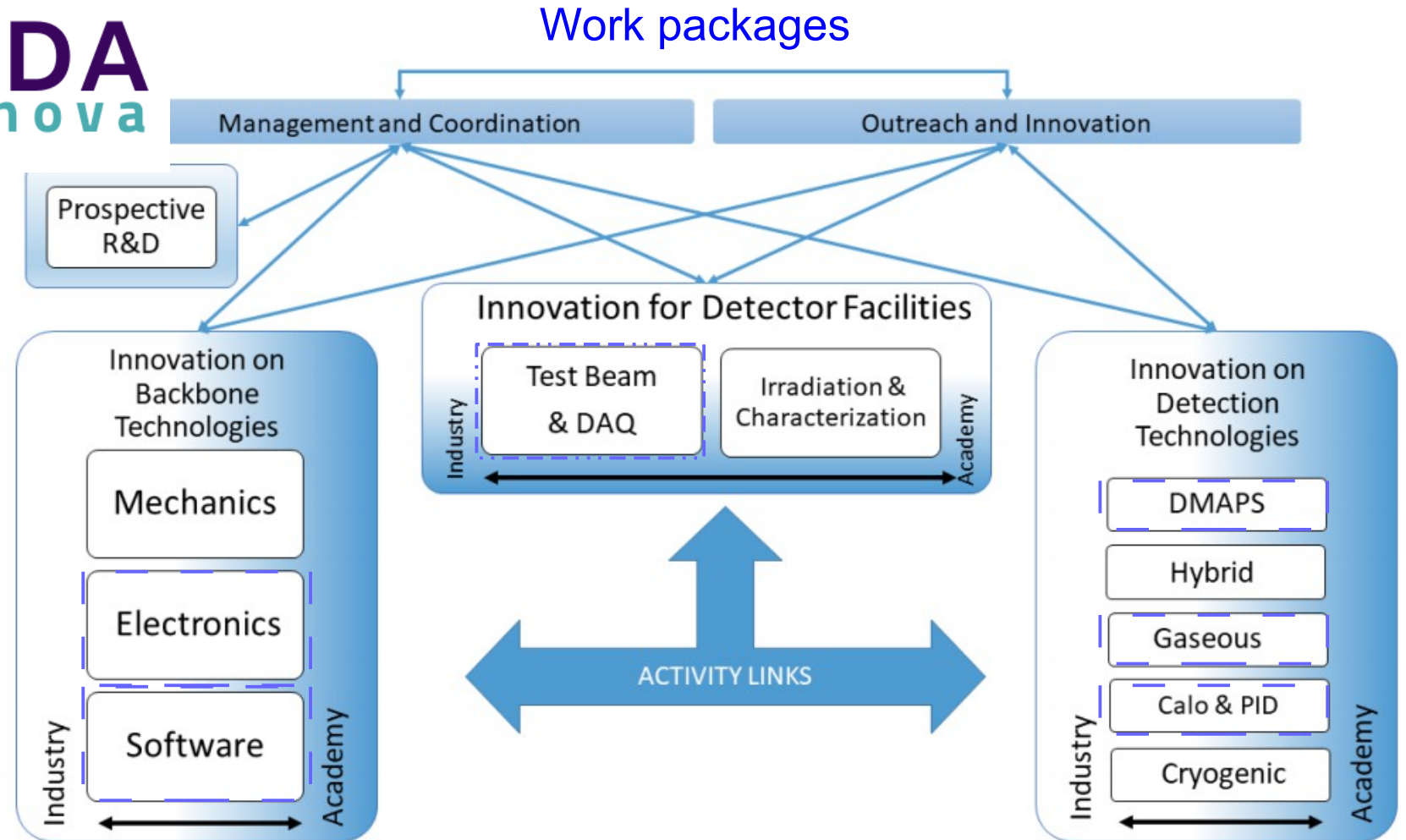


- DMLAB created technically by CNRS
- MOU under negotiation
- Particle Flow Calorimetry among scientific projects within this IRL
 - Topic carried by CALICE Members
- Kick-off planned 2021

Map of participants

45 Partners
 15 Countries
 8 Industrial companies
 3 Research & Technology Org.

Legend:
 ● Academia
 ● Industry
 ● RTOs



- European project for detector development targeting advanced communities
 - To unfold synergies and enhance coherence in European detector R&D
- Project started on April 1st 2021
 - First Annual Meeting 28-31 of March 2022 <https://indico.cern.ch/event/1003419/timetable/#20210413.detailed>
- Close coordination with European Detector R&D Roadmap and developments in other regions
- CALICE activities spread over several workpackages

- On January 24th 2022 CALICE has signed the Diversity Charter formulated by ECFA-NUPECC-APPEC



Diversity Charter Agreement

The CALICE Collaboration agrees to support the Diversity Charter of APPEC, ECFA and NuPECC in all its contents and to provide the monitoring data as indicated in it.

Date and place, Orsay, 24/01/22

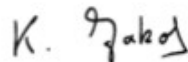


Roman Pöschl, IJCLab
Spokesperson of the CALICE Collaboration

Representative and
Organisation name



Andreas Haungs
Chair of APPEC



Karl Jakobs
Chair of ECFA



Marek Lewitowicz
Chair of NuPECC

- More details on the Charter under
- Version of 23rd June 2021
 - Signed version takes into account concerns formulated by CALICE w.r.t. first version from Summer 2020
- Let me thank the sub-panel for their collaboration on this topic
 - Three meetings since Autumn 2020
 - Lucie Linssen, Jihane Maalmi, Marina Chadeeva, MaryCruz Fouz, Marisol Robles, Lucia Masetti, Erika Garutti, Frank Simon Francois Corriveau, Taikan Suehara
- The signing comes along with obligation for monitoring certain parameters
 - The IB will be in charge of this

IF06: Calorimetry

- C.-H. Yeh, S. V. Chekanov, A. V. Kotwal, J. Proudfoot, S. Sen, N. V. Tran, S.-S. Yu, “Studies of granularity of a hadronic calorimeter for tens-of-TeV jets at a 100 TeV pp collider”, arXiv:1901.11146 [physics.ins-det] (pdf). (also under EF09)
- S. V. Chekanov, A. V. Kotwal, C.-H. Yeh, and S.-S. Yu, “Physics potential of timing layers in future collider detectors”, arXiv:2005.05221 [physics.ins-det] (pdf). (also under EF09)
- I. Pezzotti, Harvey Newman, J. Freeman, J. Hirschauer, et al. “Dual-Readout Calorimetry for Future Experiments Probing Fundamental Physics”, arXiv:2203.04312 [physics.ins-det] (pdf).
- Minfang Yeh, Ren-Yuan Zhu. “Materials for Future Calorimeters“, arXiv:2203.07154 [physics.ins-det] (pdf).
- **S. V. Chekanov, F.Simon, V. Boudry, W. Chung, P. W. Gorham, M. Nguyen, et al.** “Precision timing for collider-experiment-based calorimetry”, arXiv:2203.07286 [physics.ins-det] (pdf).
- Chen Hu, Liyuan Zhang, Ren-Yuan Zhu. “Inorganic Scintillators for Future HEP Experiments“, arXiv:2203.06731 [physics.ins-det] (pdf).
- Chen Hu, Liyuan Zhang, Ren-Yuan Zhu. “Ultrafast Inorganic Crystals with Mass Production Capability for Future High-Rate Experiments”, arXiv:2203.06788 [physics.ins-det] (pdf). (also under EF01, RF05)
- David R Winn. “Novel Low Workfunction Semiconductors for Calorimetry and Detection: High Energy, Dark Matter and Neutrino Phenomena”, arXiv:2203.09939 [physics.ins-det] (pdf).
- David R Winn, Yasar Onel. “Photomultipliers as High Rate Radiation-Resistant In-Situ Sensors in Future Experiments“, arXiv:2203.09941 [physics.ins-det] (pdf).
- T. Anderson, T. Barbera, D. Blend, N. Chigurupati, B. Cox, P. Debbins, et al. “RADICAL: Precision-timing, Ultracompact, Radiation-hard Electromagnetic Calorimetry”, arXiv:2203.12806 [physics.ins-det] (pdf). (also under EF04)
- **Randal Ruchti, Katja Krüger.** “Particle Flow Calorimetry”, arXiv:2203.15138 [physics.ins-det] (pdf). (also under EF0)
- Sergey Pereverzev, Gianpaolo Carosi, Viacheslav Li. “Superconducting Nanowire Single-Photon Detectors and effect of accumulation and unsteady releases of excess energy in materials”, arXiv:2204.01919 [quant-ph] (pdf). (also under NF0, CF0)

- In 2020 CALICE has been invited to contribute to the JENAS Recognition Working Group
 - Participation in two meetings
 - Answers to set of questions on CALICE Wikipage
 - Motivates the creation of the CALICE ECR Forum

Draft of summary report from 18/3/222

Recognition of Individuals in Large Collaborations

Summary Report

18-03-2022

APPEC-ECFA-NuPECC (JENAS) working group

Diamel Boumediene, Emmanuel Gangler, Nasser Kalantar, Karl-Heinz Kampert,
Bogna Kubik, Marcel Merk, Gerda Neyens, Eberhard Widmann

- CALICE Feedback to initial set of questions recognised in report

ECFA collaborations:

ATLAS, AWAKE, CALICE, CAST, CMS, COMPASS, DUNE, LHCb, NA61/SHINE, NA62, SoLid.

- Feedback to draft until April 20th 2022 (today)
 - A little later will hopefully not harm
 - Attached to my talk

When could we have a Higgs Factory?

Today financial and human resources (in Europe) are bound by the HL-LHC and the detector upgrades

- (HL)-LHC schedule
- LHC physics results?
- N.B. (R.P.): [What can we learn from the detector upgrades](#)

Depends on progress on R&D and projects studies:

- FCC: CERN feasibility study
- ILC: political & administrative progress in Japan, is there interest elsewhere?
- CLIC: potential plan B for Europe/CERN?
- CEPC in China?

Depends on roadmaps in various regions:

- P5 in US started with Snowmass
- Next update of the European Strategy (around 2027?)



Developing highly granular calorimetry optimised for particle flow event reconstruction for future energy-frontier electron-positron colliders.

Members of the [CALICE Collaboration](#) are encouraged to update these pages.

CALICE condemns by all means the brutal war unleashed on Ukraine by the Russian Government. We are shocked by the atrocities that we have to learn about every day. We salute those who stand with courage against this war, in Ukraine and in Russia. CALICE will remain a place for peaceful international scientific and cultural exchange.

The following measures have been implemented as a reaction by CALICE to the invasion of Ukraine by Russian Military Forces (Status: 4th of May 2022):

- The membership of Russian Institutes in the CALICE Institution Board has been suspended as of 17/3/22 and until further notice.
- Scientists affiliated to Russian institutes cannot represent CALICE at a Conference.
- For the time being, publications will be submitted to CDS, arXiv and journals given only "The CALICE Collaboration", without authors. The rules for the author lists will be reviewed in the future, with the goal of adding authors prior to the publication in journals following peer review.
- Scientists affiliated to Russian institutes cannot present at formal CALICE collaboration meetings.

For the time being, exceptions can be made if the presentation is given in an individual capacity for the CALICE collaboration, without the use of institute logos, institute email addresses or any other elements referencing Russian institutes in the slides.

- Following a request from the IB the CALICE webpage ...
- ... contains an official statement on CALICE condemnation of the war in Ukraine
- Lists of actions agreed upon in the IB