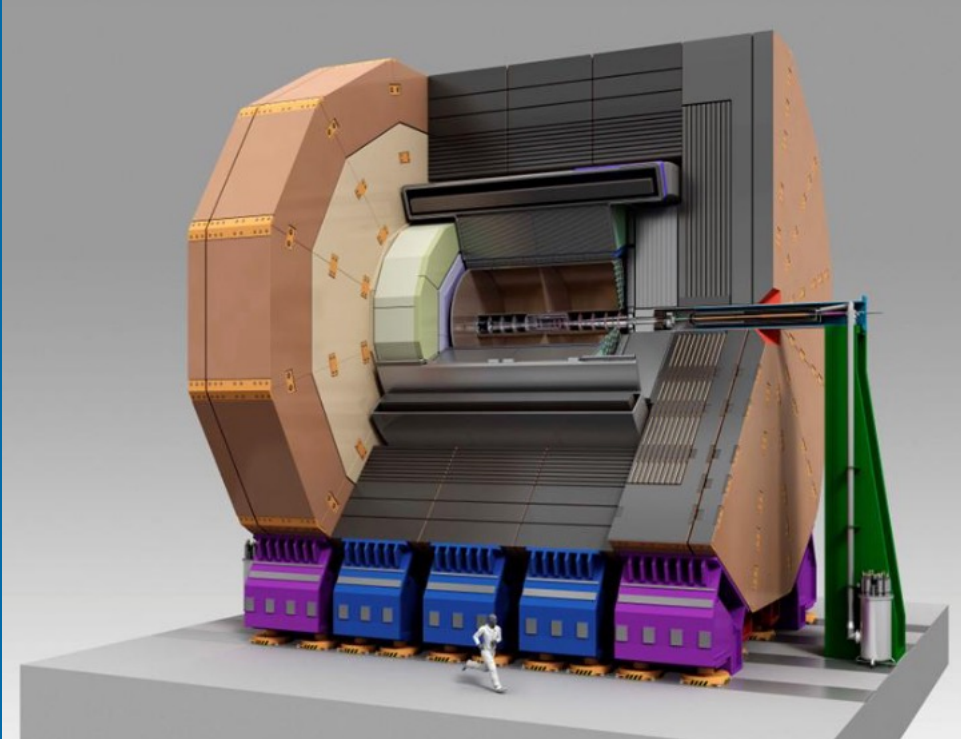




# Summary

**M.C Fouz**  
**CIEMAT**

*A detector for the next CERN flagship project: ILD  
CERN, Geneve Sep 2026*

Grant PID2024-158190NB-C22 funded by



GOBIERNO  
DE ESPAÑA

MINISTERIO  
DE CIENCIA, INNOVACIÓN  
Y UNIVERSIDADES



AGENCIA  
ESTATAL DE  
INVESTIGACIÓN

**Ciemat**  
Centro de Investigaciones  
Energéticas, Medioambientales  
y Tecnológicas



# So... Where Are We Now?

After several days of discussions, where do we stand — and what comes next?

PEOPLE  
IDEAS  
DETECTORS  
A BRIGHTER TOMORROW



What did we  
learn?



What remains  
open?



What comes  
next?



LAKE GENEVA  
(LAC LÉMAN)

FCC-ee

CLEANER HIGGS  
BRIGHTER ANSWERS

*Same questions.  
New horizons.*

## 3 DAYS · 35 TALKS · 3 MAIN AREAS

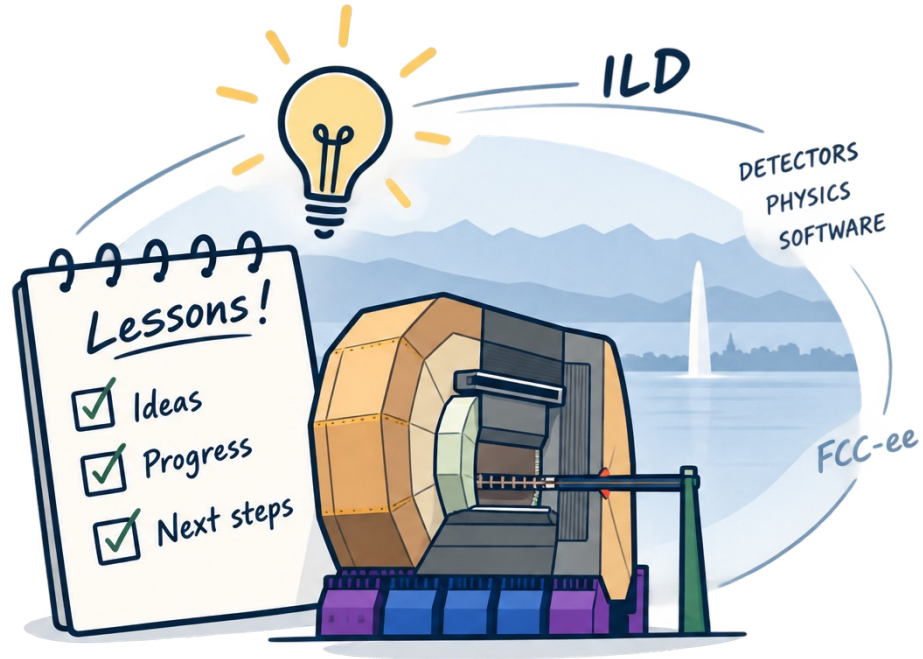
We presented and discussed ILD's current activities and plans in all three areas, looking at where we are today and where we want to go next.

We combined the ILD perspective with contributions from FCC-ee coordinators and experts, providing an overview of ongoing activities, the evolving FCC-ee study structure, and plans for the coming years

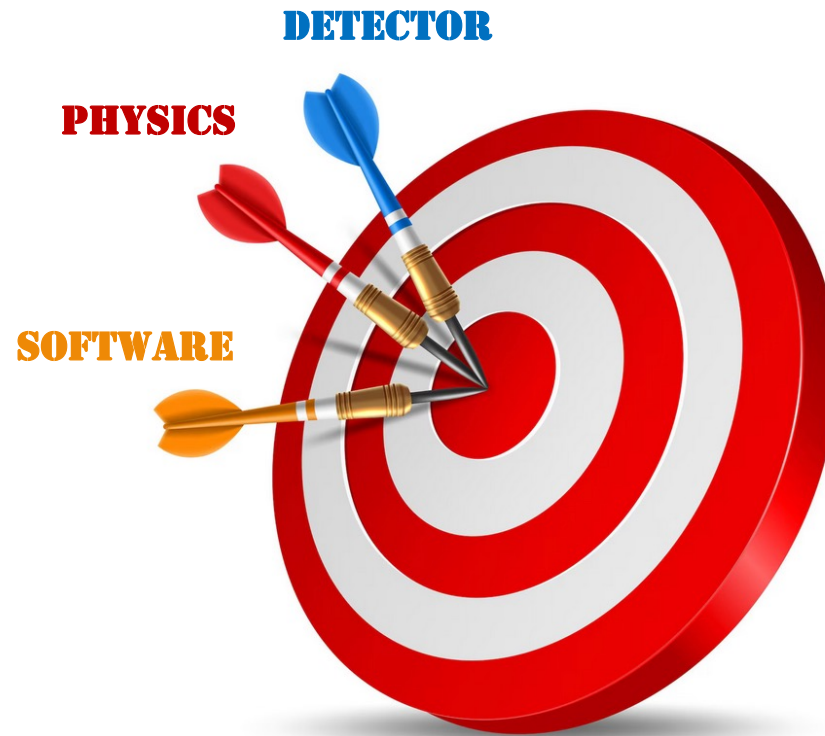
FCC-ee must be the main focus of our activities in the coming period, and ILD should become increasingly integrated into its detector, physics and software studies.

At the same time, until the future collider landscape is definitively settled, ILD should remain connected to alternative linear-collider scenarios. A dedicated session therefore discussed LCF380 and HALHF, their current status and future perspectives.

*A clear focus on FCC-ee — while keeping alternative collider scenarios in view.*



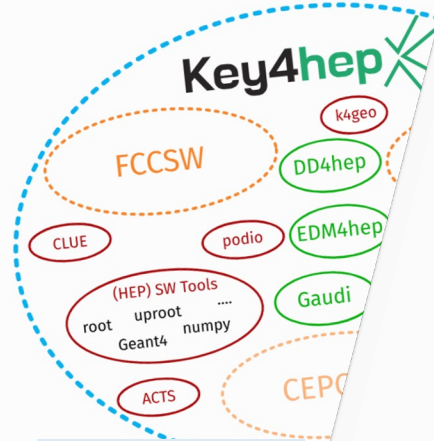
# WHAT HAVE WE LEARNT?



**BACK TO OUR THREE KEY AREAS...**

## High level view of the current software status

- Key4hep is production ready and in use
  - ILD full reconstruction available via *Marlin Wrapper*
  - (Can still use Marlin and all the tools we developed)
  - Ongoing migration of processors
  - New developments should use Gaudi and EDM4hep!
- Many developments in FCCee context
  - See other talks in this session



**Thomas' talk**

## Conclusions

- *High-level reco*: current algorithms could use an update, many common developments
  - need to figure out common approaches for vertexing and flavour tagging
- *Calorimetry*: Pandora calibration for ILD@FCC; implement MLPF in ILD
- *Tracking*: finish track merging between Si and TPC; ACTS?
- *Si & Calo digi*: should become more realistic, application of new developments to ILD
- *TPC digi*: major work to make more realistic and apply FCC conditions, overlap with AGORA
- *In-depth discussions* (focus: Vtx, FT, PFlow) at the [FCC Reco WS](#) in Oct!

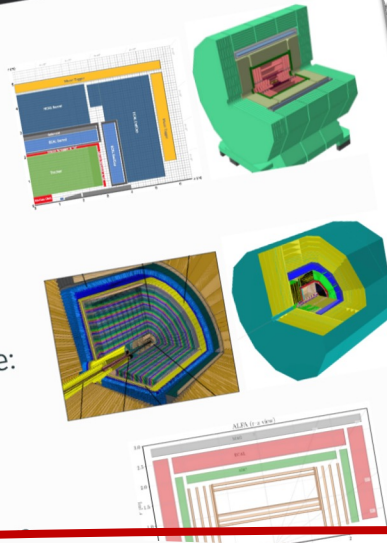
**Uli's talk**

Thank you!



## ILD in the context of FCC-ee

- Other FCC-ee detector concepts deliberately no proto-collaborations yet
  - Many centralized efforts
- ILD with well established structure and processes
- For FCC-ee studies we **should align processes as much as possible with other concepts**
  - Do we need to change our by laws for this (e.g. re: sample sharing)?
  - Clearly visible sign of good will from our side
  - Reduces required efforts on our side
- Technical details can be sorted out after decision
- VO membership, storage locations, etc.



*In the process of moving to Key4hep*

*New ILD simulations should be developed within this framework*

*New policies for sharing our data samples need to be established*

- Aligning as far as possible with FCC-ee processes should be the goal

# Bringing Machine Learning into ILD

## Taikan's talk

### Jet flavor tagging with Particle Transformer (and PFA) for ILD

Taikan Suehara / 末原 大幹  
(ICEPP, The University of Tokyo)

T. Kawahara, R. Tagami, T. Murata (UTokyo)  
C. Trinh, A. Schaeffer, R. Marchenko (our internships)  
T. Tanabe (MI-6., Ltd.)

Taikan Suehara et al. ILD workshop 2026 at CERN 14 Sep 2026 page 1

## Bohdan's talk

### Summary

- 1) Including the ILD@FCC for the MLPF studies would be great.  
Let us know, which ILD@FCC detector model we should consider the "default" and when.
- 2) We are starting an attempt to standardize the input/metrics for the MLPF studies.  
Idea is to simplify the comparison process of the results between different MLPF groups.  
Any feedback will be very welcome.
- 3) From the current studies, the MLPF performance looks already usable.  
We are constantly working on improving it.  
Checking the impact on the physics studies will become possible very soon.  
Let us know if you are interested, so we try to make certain inferences available quicker!
- 4) MC production is coming.  
Request ILD datasets of interest. (at least a copy of all major processes CLD has)  
Contribute with the expertise in the production tools.

### Different Groups, Different Ideas, Different Approaches

|                      | Pipeline                 | Architectures        | Detectors                        |
|----------------------|--------------------------|----------------------|----------------------------------|
| Dolores Garcia et al | hits+tracks → PFOs       | GATr                 | CLD, <b>ILD</b>                  |
| Jan Kiesler et al    | hits+tracks → PFOs       | GravNet, local GATr  | CMS HGCAL, DICE, CLD, <b>ILD</b> |
| Farouk Mokhtar et al | clusters + tracks → PFOs | GNN, Transformer     | CMS, CLICdet, CLD                |
| Max Hart et al       | hits+tracks → PFOs       | MaskFormers          | CLD                              |
| Taikan Suehara et al | hits+tracks → PFOs       | GravNet, Transformer | ILD                              |

1. Between the FCC-ee detectors, CLD is used the most.  
Up until now, the only detector with a reliably working full reco chain.
2. Some work on ILD has commenced (ILD@ILC so far)  
Having a stable "default" ILD@FCC detector model would be great for MLPF cross-detector studies while ALLEGRO, IDEA, ALFA are still finalising.  
Would also make ILD more present.

## The FCC-ee TDAQ Challenge

| FCC-ee parameters       |                                                   | Z       | W <sup>+</sup> W <sup>-</sup> | ZH  | ttbar   |
|-------------------------|---------------------------------------------------|---------|-------------------------------|-----|---------|
| √s                      | GeV                                               | 91.2    | 160                           | 240 | 350-365 |
| Luminosity / IP         | 10 <sup>34</sup> cm <sup>-2</sup> s <sup>-1</sup> | 140     | 20                            | 7.5 | 1.5     |
| Bunch spacing           | ns                                                | 25      | 160                           | 680 | 5000    |
| "Physics" cross section | pb                                                | 35,000  | 10                            | 0.2 | 0.5     |
| Total cross section     | pb                                                | 70,000  | 30                            | 10  | 8       |
| Event rate              | Hz                                                | 100,000 | 6                             | 0.5 | 0.1     |
| "Pile up" parameter [μ] | 10 <sup>-6</sup>                                  | 2,500   | 1                             | 1   | 1       |

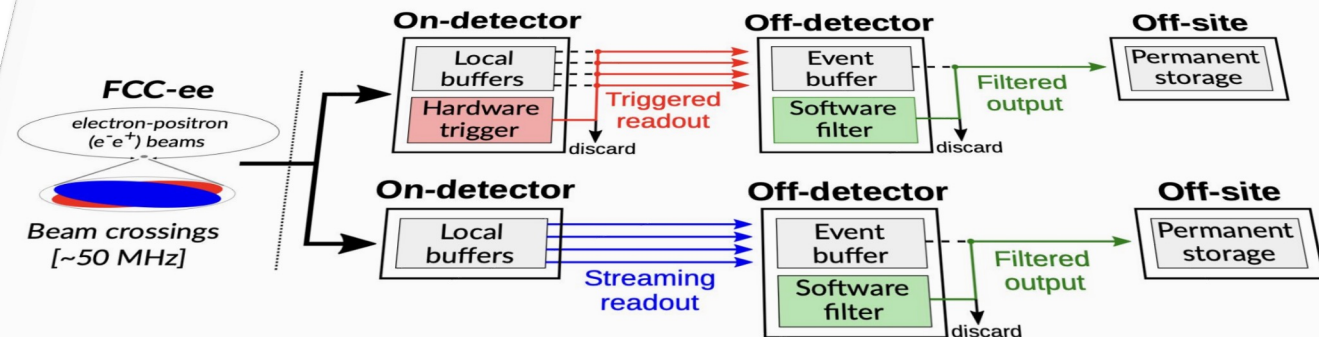
- precision EW programme demands:
- trigger efficiency uncertainty negligible vs luminosity:  $\delta R/R \approx 2 \times 10^{-5}$
  - same dead time for all event types → EW precision relies on ratio of events
  - Trigger bias control to 1 part in 10<sup>6</sup>

Zeynep's talk

## Trigger or Streaming Readout?

Steven Schramm, FCC Week

Three options: triggerless/streaming, minimal trigger, classical triggered



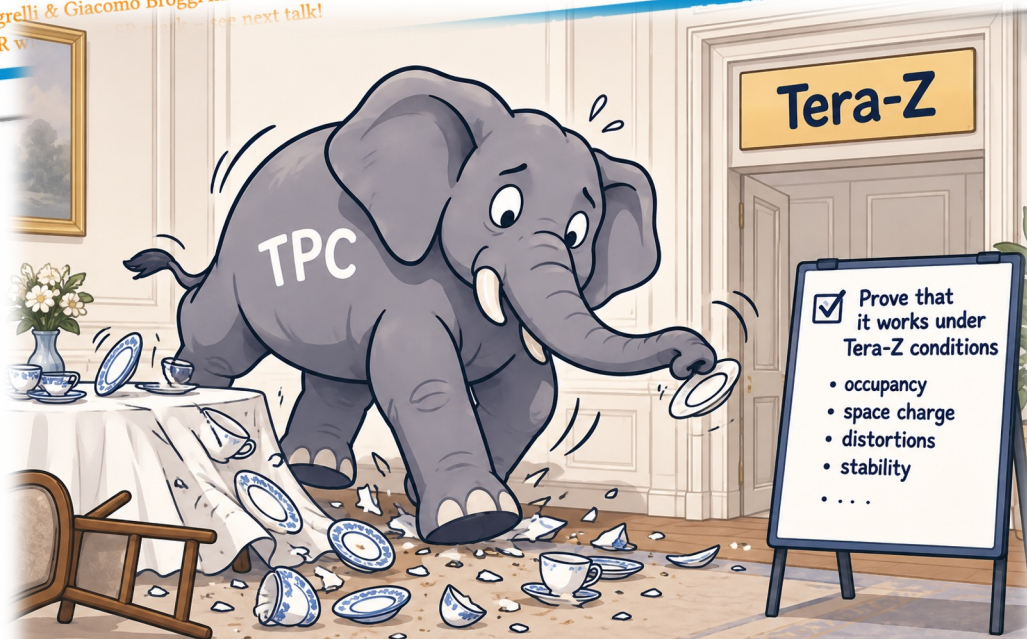
First question: Can we do it?

Recap of Detector backgrounds in Central Tracking Detectors talk at FCC Week 2026  
<https://indico.cern.ch/event/1552126/contributions/7128849/>

- several contrasting central tracker technologies considered for FCCee
- new central tracker background estimates for FCCee-91 (preliminary) using recent beam parameters & MDI description
- **Synchrotron Radiation dominates**  
 ~100 keV SR photons scatter off central beampipe into tracker
- current background estimates are **extremely challenging** → **impossible** for current technologies  
 must **strongly reduce SR contribution...**  
 tighter upstream collimation? beampipe design/coating?  
 ... else suitable tracking technology options will be **severely constrained**
- should also look at WW, ZH, tt runs with latest parameters & designs, & effects of backgrounds on track reconstruction

→ following FCC Week, the FCC-ee MDI group has set up a Task force on SR mitigation in the MDI

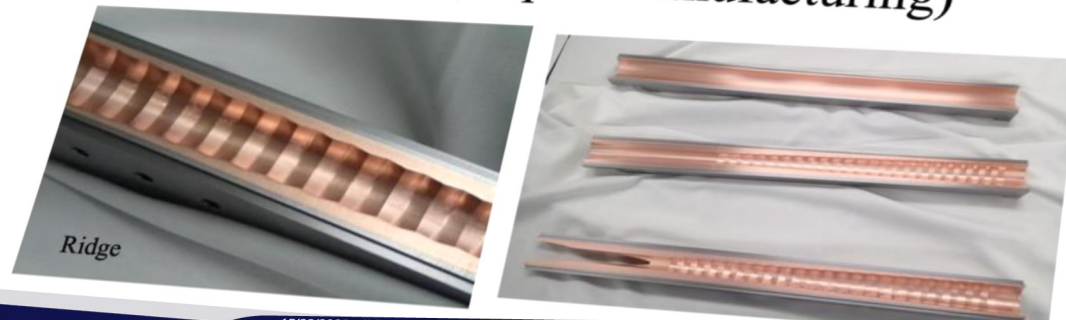
→ Giulia Nigrelli & Giacomo Broggi have newer studies, reportedly showing a big reduction of core SR w



## Corrugated beam pipe

- Undergoing studies within the vacuum group on efficiency of a **corrugated beam pipe à la SuperKEKB**
  - **Could help with the reflected component of the SR**
- The additional mask could also be integrated in the corrugated design.
- Synrad+ better suited for this study

## IP chamber (Ta part manufacturing)



15/09/2026 ILD meeting at CERN

15/09/2026 ILD meeting at CERN

Giulia Nigrelli

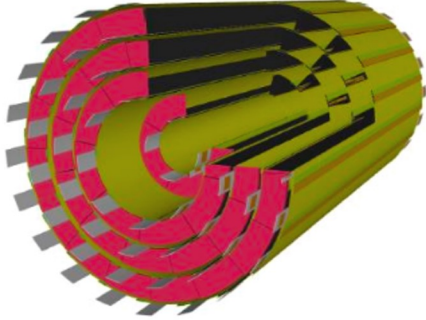
## Conclusions

- Identified Geant4's SR angular sampling as source of discrepancies
  - **BDSIM SR loss maps now agree with FLUKA and SYNRAD**
- **Beam halo at the FFQs confirmed as the dominant source of SR background at the IP**
  - Halo SR at IP ~2 orders of magnitude above core contribution
- Possible mitigation strategies:
  - **Alternative Final Doublet** (increased QF1-QD0 separation): **factor 10 reduction of SR from halo for direct hits in the central chamber**, with no effect on SR from the core
  - **Additional masking near the IP**: SR at IP mostly intercepted; **halo contribution reduced by at least a factor 100**
- **SR background at the IP can be significantly reduced with the proposed mitigations**
  - **Very promising results for the vertex detectors!**

Monitor de Actividad

## FCC-SEED

(soon available to any det. concept)



- Curved, 1D-stitched MAPS
- Five layers,  $\approx 0.1\% X_0$  per layer
- Overlapping curved sensors to avoid gaps
- Powering and readout via long flex cables

## Vertex and silicon tracking detectors

### Time to Embrace New Technologies

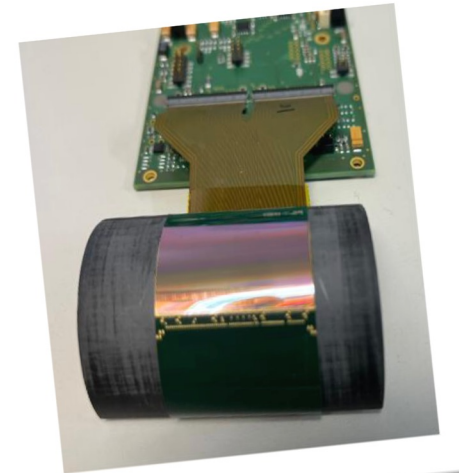
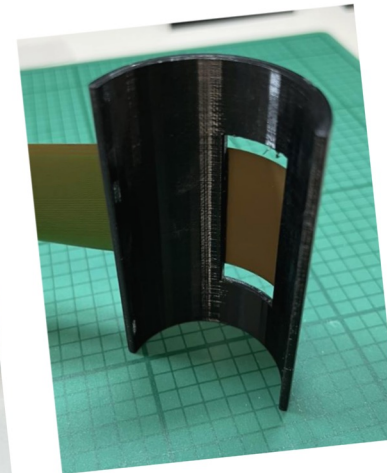
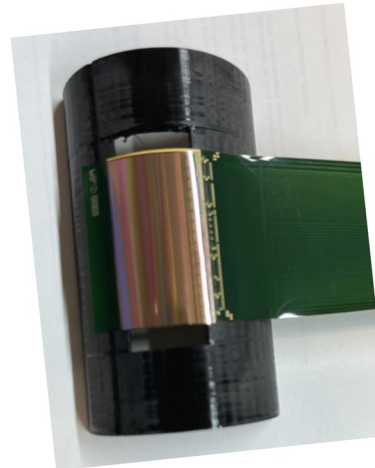
[Jeremy's talk](#)



## Test beam preparation



- A different version of half-shelf developed for test beam.
- Removable part.
  - allowing for a safe bending,
  - opening for the passage of the beam.
- Glue positioned only on the contact surfaces.



## Muon system requirements

### Basic Assumption

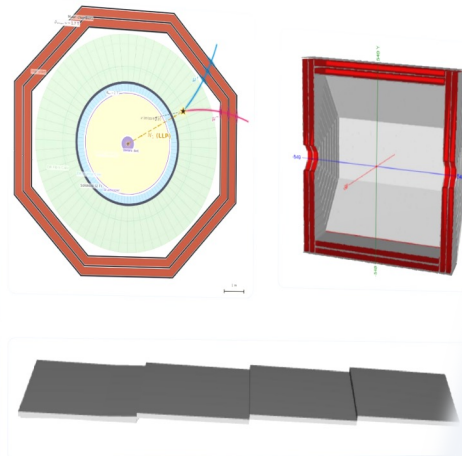
- Triggerless / software-based event selection
- Z peak: 40 MHz bunch crossing,  $\sim 100$  kHz interaction rate
- Expected rate in the barrel  $\ll 1$  kHz/cm<sup>2</sup>
- Expected rate in the endcap  $< 10$  kHz/cm<sup>2</sup>

### Complementary System Role

**Complements the tracker and calorimeters** by providing robust muon identification, background suppression, sensitivity to long-lived particles (LLP), and calorimeter leakage recovery.

### Primary Muon System Tasks

- High-efficiency **muon ID** at large radius with low fake rate
- Rejection of hadron **punch-through** from the calorimeter
- Calorimeter leakage recovery support (**tail catcher** role)
- Sensitivity to long-lived particle decays outside the central tracker
- **High-precision tracking capability** for long-lived particle signatures



Riccardo's talk

## Conclusion

### FCC-ee community

**Six detector concepts:** Scint. bars and RPC are mentioned in 5/6 concepts for calorimeter or muon systems

**Similar R6D:** are ongoing to optimize these technologies for the muon system application

### Technologies

**RPC:** a spatial resolution of 1-10 mm and a time resolution of 0.1-1 ns are suitable

**Scintillating strip:** performance better than 2 mm and 0.5 ns with length up to 5 m

**Challenges:** GHG emission has to be reduced to zero with sealed RPC and recirculating and recuperating systems; eco-gas reduces the impact on the environment if it is not possible to recycle 100% of the gas due to needs for fresh gas

September 14th, 2026 - Muon systems in FCC-ee detector concepts

FCC

FCC

FCC

# How to adapt calorimeters to FCC-ee conditions

## CALICE calorimeters:

- Embedded readout: compact design & DAQ
- Minimal consumption by power pulsing
  - 1–2ms readout, 198–199 ms off.
  - Passive cooling → no dead materials

Vincent's talk

## 1) Rates and cross-sections

- Z-peak out-of-scale wrt all the other configurations
  - One detector fits all? “optimal” granularity?
- DAQ Scheme? Continuous readout?

## 2) Continuous running

- Electronics base consumption × 100–200 wrt ILC

## 3) New opportunities: timing in calorimeters

- Adds consumption
- Large potential but at what cost? What precision?

# Towards a Compact cooling system

## ‘Boosted Standard Slab’

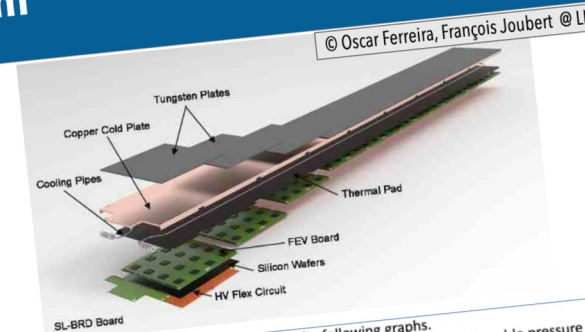
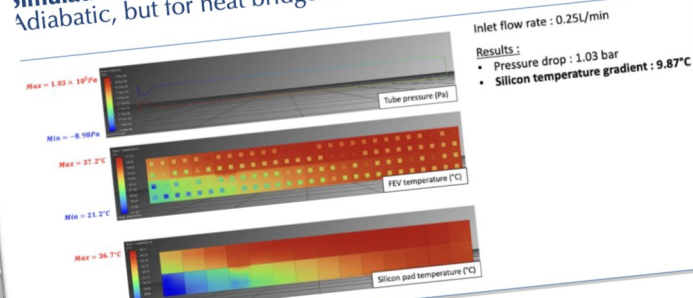
- → 210W (30W/ASU): ASICs + Concentrators + PS...
- (ILC like in CC ~ 130W)

## Active cooling:

- 4 mm Cu plate with 1/8" Stainless Steel Tubing
- 0.2 ℓ/min of water @ 15°C

## Simulations

Adiabatic, but for heat bridge at the end,  $t = \infty$



- Preliminary results resumed in the following graphs.
- Operating point between 0.25 L/min and 0.45 L/min for allowable pressure drops

Technologies are more or less mature  
But with the “old electronics”. New developments ongoing including precise timing measurements

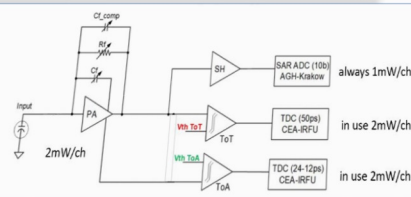
## CALOROC 1C (ℓ Ar / Si)

### CALOROC1C Requirements and Test Setup

| Function           | LAr (FCC)                      | Si           |
|--------------------|--------------------------------|--------------|
| Charge Measurement | 2.25fC (750keV)                | 4fC          |
| Dynamic Range      | 0.2fC - 4.5pC (70keV - 1.5GeV) | 0.4fC - 10pC |
| Temperature        | 87K                            | Ambient T    |
| Cdet               | 50 - 220pF                     | 20 - 50pF    |
| Crosstalk          | <1%                            | <1%          |

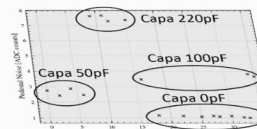
### Low Power: solutions:

- Remove PLL and reduce ADC frequency
- Increase shaping time and lower the current
- Reduce the number of bits of the ADC/TDC
- Turn off the ADC when not in use
- Turn off TDC

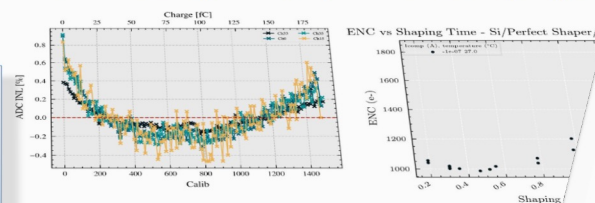


### Noise for various Cdet

The expected range of detector capacitances is tested.



### Non linearity < 1% ; ENC vs shaping time



## KlauS7: Slow + Fast Command/Readout Interface

### Same A2D block as Klausv6

### Moving forward to IpGBT eLink

- Reduce the number of IO pads.
- Lower design complexity of redundant bus interfaces.
- Standardize interface with IpGBT.

### I<sup>2</sup>C interface:

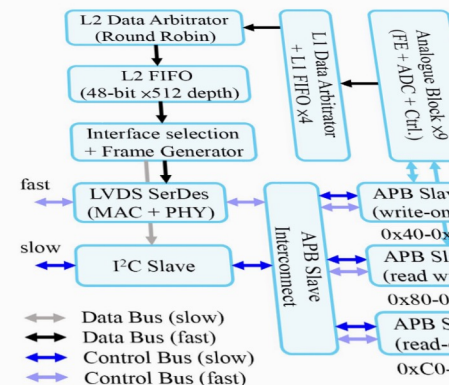
- Slow data readout, read-write status/control registers
- 1Mbit/s data rate (limited by PCB routing)

### LVDS interface:

- 8B10B decoded/encoded (160Mbit/s, 320Mbit/s) for high data rate applications (Frame-based link)

### On-chip interconnect specification:

- I<sup>2</sup>C-to-APB bridge + LVDS-to-APB bridge
- Status/control registers refer to byte addressing



KlauS7 Digital Interface Architecture

Considering large extruded hole with 4 or 7 YS4 fibers to increase fast capture acceptance. (Need to understand issues with air gaps ...) Also likely 2 layers. How about 2 large extruded holes with 2 SiPMs per bar?

# Detector requirements for luminosity measurements

## Lumical requirements for small-angle Bhabha

- Precise control of acceptance, radial alignment, and angular scale
- Asymmetric acceptance method reduces sensitivity to radial misalignment
- Electron-photon separation: requires tracking in front of lumical?
- Dealing with abundant beam backgrounds (SR, IPC) in the MDI/forward region
- Observation: can lumical acceptance be relaxed if statistical precision remains far below theory/systematics?

## ECAL requirements for wide-angle di-photon

- Excellent angular resolution over entire ECAL acceptance
- Electron/photon separation crucial to suppress fakes from  $Z \rightarrow ee$  or Bhabha
- Alignment of the ECAL and other sub detectors up to the desired precision ( $10^{-5}$ ) (see next slide)

## Common detector/systematic strategy

- Each channel is also a background to the other  $\rightarrow$  strong need for electron/photon separation
- Treat Bhabha and di-photon channels in a combined fit
- Correlate common systematics: acceptance, alignment, material, reconstruction
- Synergy with the on-peak  $\alpha_{QED}(m_Z)$  measurement

## Readout / trigger

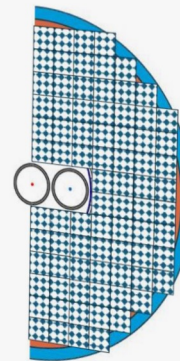
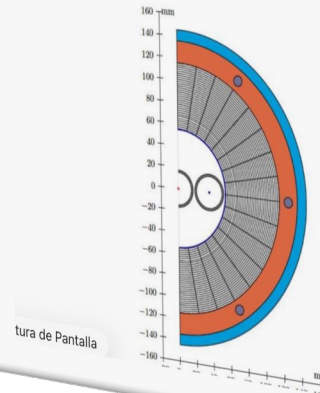
- BX spacing  $\approx 25$  ns
- Luminosity events must be collected unbiased
- If a trigger is used, trigger efficiency and prescales must be controlled at the target precision

## The Luminometer: The Challenge of $10^{-5}$ Luminosity Precision

[Yan's presentation](#)

### Basic idea:

Replace Si strips with MAPS positioned as close as possible around the beam pipe(s)



## CDR LumiCal Design

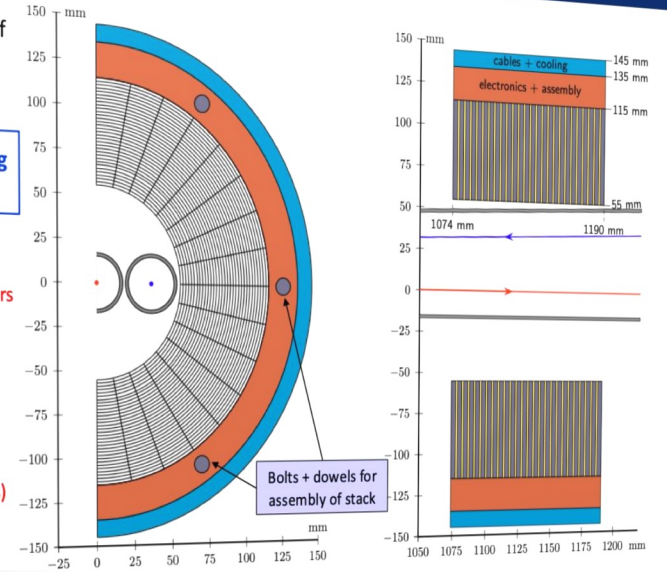
Design considerations:

- ◆ Need to control geometry to precision of  $O(1 \mu m)$

- Keep geometry as simple as possible

Multilayer barrel with all layers having identical circular geometry

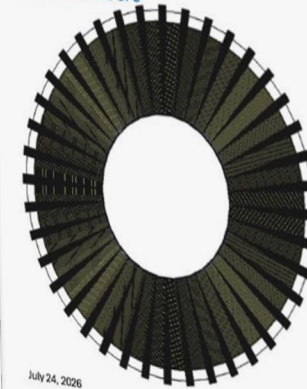
- ◆ 25 layer SiW sandwich
  - 3.5 mm W ( $1 X_0$ ) + 1.0 mm gap for Si sensors
- ◆ Physical dimensions
  - Sensitive region:  $r = 55-115$  mm
  - Region for "services": 115-145 mm
  - Calorimeter front face at  $z = 1074$  mm
- ◆ Proposed segmentation
  - 32x32 pads/layer ( $1.875 \times 10^{-22}$  mm<sup>2</sup> pads)
  - 25,600 channels per LumiCal
- ◆ Weight
  - About 65 kg per LumiCal



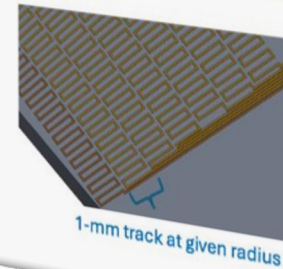
## SNSPD Lumical detector concept

We consider same geometric volume as Si/W LumiCal  
Each detector layer fabricated on a single 12-inch (30.48cm) silicon wafer cut to  $d=23$ cm  
Sensor wires arranged in Tracks and sectors

40 phi sectors of  $9^\circ$



- 20 X 12" single wafers, 1 wafer per layer
- 200nm-wide wires arranged per sector as 60 X 1mm wide tracks at a given radius from 54 mm to 114 mm
- Radial readout corridors between sectors, 1mm wide
- Readout region active as superconductive pattern on ring
  - Sensor geometry: 50 % Fill Factor
- One alignment track at the outer edge,  $R = 115$  mm



- Each wire extends from perimeter to a given radius, meanders across  $9^\circ$  sector, then returns to perimeter
- 1mm track from 54-115mm
- Wire readout on 2 sides at outer radius for position resolution

July 24, 2026

B. Kilminster, SNSPDs for HEP

# Feasibility Study → Reference Design Phase

- **Feasibility Study completed (started in 2020)**
  - [FCC Feasibility Study Report Vol. 1, Physics, Experiments, Detectors \(290 pages, April 2025\)](#)
  - Physics Programme: physics case of the integrated programme
  - Physics Performance: case studies → detector requirements, simulation and reconstruction tools, MC production, analysis tools
  - seven documents submitted to the 2026 European Strategy update (links on the right)
- **ESPPU recommendation**
  - A. FCC-ee is the preferred option for the next flagship collider at CERN
  - B. a descoped FCC-ee is the preferred alternative
- **Reference Design Phase, 2026–2028**
  - goal: **answer the possible questions of the CERN Council** before the approval (around 2028)
- **Many aspects go beyond the two years of the RDP**
  - detector optimisation, algorithm design, exploration of the broader physics case, theory calculations, control of the systematics: **this takes more than 2 years**
  - these are complex topics, the goal is to **do things properly** and not in a rush



## FCC Physics Studies

Status of the activities and how to contribute

[Michele's talk](#)

Analysis and visualization  
J. Smiesko, TBD

MC generators  
S. Batthacharya, S. Plaetzer, L. Portales, A. Price, A. Siódmok

High-level reconstruction  
D. Garcia, L. Herrmann, A. Zaborowska

Physics Studies

P. Azzi  
J. de Blas  
D. d'Enterria  
M. McCullough  
M. Selvaggi

Physics groups

BSM  
J. Davighi, R. Gonzalez-Suarez, G. Polesello, S. Renner

EW  
J. Bendavid, M. Defranchis, J. Eysermans,  
M. Riembaud, A. Vicini

FCC-hh  
S. Banerjee, B. Stapf, A. Taliercio, S. Williams, T. You

Flavour  
G. Isidori, J.F. Kamenik, Z. Ligeti, A. Lusiani, S. Montell

Charm  
M. Bertemes, G. Heller, N. Jurik, J. Kamenik, D. Mitzel

CCP  
C. Agapopoulos, A. Juttner, M. Prim, D. Robinson, R. van Tonder, X. Zuo

CPV  
A. Bragagnolo, L. Dufour, M. Kenzie, S. Schacht, M. Veronesi, J. Zupan

Rare  
W. Altmannshofer, M. Bordone, T. Humair, R. Quagliani, N. Rost, E. Smith

TauEW  
M. Cepeda, R. Nader, A. Mariani, E. Passeras, O. Sumensari, TBD

Global fits & EFT  
L. Brenner, A. Gilbert, L. Mantani, V. Miralles

Higgs  
G. Cacciapaglia, M. Delmastro, R. Gröber, A. Li, A. Mehta

Precision calculation  
J. Glusza, M. Zaro

QCD and  $\gamma\gamma$   
A. Badea, S. Kluth, R. Poncelet, G. Stagnitto

Top  
G. Durieux, J. Reuter, C. Schwanenberger, X. Zuo

### Summary

- **Higgs and top programme demonstrated**
  - physics and requirements are to first approximation **similar to the ILC ones**, and have been **extensively** used to benchmark the detector and reconstruction performance, and should be used to improve both
- **Z pole and WW threshold**
  - this physics is useful to benchmark the detector and reconstruction performance, and have been **extensively** used to benchmark the detector and reconstruction performance, and should be used to improve both
  - integral part of the FCC-ee physics programme, with unprecedented statistics for electroweak physics, flavour, QCD and searches for feebly interacting particles, **there is a lot to contribute there to make sure that the detectors can deliver**
  - the Z pole operation is the most challenging: ILD is a mature detector concept, it needs to be adapted to the Z pole conditions
- **Reconstruction**
  - the ILD reconstruction (e.g. PFA) is **the most mature among the concepts**: it can be used **right away** to develop the complex analyses that require detailed simulation
  - synergy between the physics groups, High-Level Reconstruction and the detector design is essential, in order to iterate
- **This community is welcome to contribute with its expertise and experience**
  - contact: FCC-PED-Physics-admin@cern.ch, or the conveners of the groups
  - [List of the proposed contributions for all groups: PED in-kind contributions document](#)

## Mandate of the Physics Studies work package

- **Physics Programme and Physics Performance merged in one work package**
  - theorists and experimentalists in the same groups, with common deliverables
- **Main tasks**
  - articulate the physics case, feasibility and schedule implications of the different stages, not only the ones currently proposed
  - involve the theory community on the theoretical challenges, and on the tools needed to interpret the measurements
  - **match the experimental and theoretical uncertainties** to the projected statistical precision
- **Provides the physics requirements to the other work packages**
  - Detector Concepts, Software & Computing, MDI, EPOL
- **Deliverables in this phase**
  - list of key physics topics per group, each with a contact person
  - typically one workshop per group per year, with dedicated schools

## Conclusions



Many diverse topics studied within ILD, many interesting results...

We made significant contribution to ECFA study report  
and also other submissions to the ESPPU'2026 (LCVision, Briefing Book,...)

## Objectives for ILD physics studies

- Physics studies for FCC-ee
  - Need to think of relation with FCC-ee physics studies
- Physics studies for linear colliders
  - High energy studies: e.g. ZHH/nnHH, BSM studies
  - Advanced concepts: e.g. HALHF, ERL, photon collider, muC?
- Detector optimization/validation
  - Focus on key physics topics suitable...
    - To demonstrate advantages of ILD
    - To optimize design of ILD (by comparing performance with different config)

## Z-pole studies for ILD?

Brief tour of the most critical physics aspects (EW focus)

### Graham's talk

Graham Wilson

University of Kansas

September 15, 2026

- Overview with emphasis on electroweak physics. See LEP1/SLC Phys. Rep. 427 (2006) 257 for details.
- No full simulation studies to date for ILD@ILC at the Z nor for ILD@FCC-ee. Do both and compare performance!
- We really need to demonstrate amazingly good performance for multihadron acceptance including at forward angles to take advantage of FCC-ee statistics.

### Z lineshape

At some level, the be all and end all case for extensive running at the Z.

### Asymmetries

Measurements of experimental asymmetries such as  $A_{FB}$ ,  $A_{LR}$ ,  $A_{LRFB}$  (last two require longitudinally polarized beam). Sensitive to the fermion-specific asymmetry parameters (related to L/R (V/A) couplings and the weak mixing angle).

### Z branching fractions / branching ratios

### Tau polarization in $Z \rightarrow \tau^+ \tau^-$

Taus have a special role. Measure tau polarization vs  $\cos \theta_\tau$  and extract  $A_e$  and  $A_{\tau\text{au}}$  using all possible decay modes.

### $Z \rightarrow \nu \bar{\nu}$



## Higgs hadronic branching ratio studies for LC and FCCee (incl. PFA performance with ILD-FCC)

Ryu Sawada, ICEPP, University of Tokyo presenting for

Takumi Seino (UTokyo) : Higgs couplings measurement at ILC  
Kanako Watanabe (Iwate U) :  $H \rightarrow bs$  search at ILC

Nagomi Dogishi (UTokyo) :  $H \rightarrow ss$  at FCC-ee

## HH Analysis.

Status

Mikael Berggren (DESY), Bryan Bliewert (DESY/UHH), Jenny List (DESY), Dimitris Ntounis (SLAC), Taikan Suehara (U Tokyo), Junping Tian (U Tokyo), Julie Munch Torndal (DESY/UHH), Caterina Vernieri (SLAC)  
ILD meeeting @ CERN  
September 15, 2026



HELMHOLTZ



University of Glasgow

Jenny List<sup>1</sup>, Nana Ozaki<sup>2</sup>, Aidan Robson<sup>3</sup>, Junping Tian<sup>4</sup>, Yuyang Zhang<sup>1,3</sup>

<sup>1</sup>DESY Hamburg, <sup>2</sup>Mount Holyoke College, <sup>3</sup>University of Glasgow, <sup>4</sup>Univeristy of Tokyo

ILD workshop at CERN

## Preliminary results on Higgs CPV analysis in tth coupling at $\sqrt{s} = 550 \text{ GeV}$ LCF



September 15, 2026

## Summary of exotic scalar searches



Many interesting studies presented  
See the [analysis session](#)

## $Z \rightarrow \tau\tau$ . Reconstruction and preliminary tau polarization studies at FCCee. ILD vs CLD

ILD meeting at CERN 15-09-2026

Olmo Arquer Peinazo (CIEMAT)  
Jorge Berenguer (University of Cordoba)  
Maria Cepeda (CIEMAT)  
Mary Cruz Fouz (CIEMAT)  
Juan Alcaraz (CIEMAT)



40 CIEMAT

GOBIERNO DE ESPAÑA

MINISTERIO DE CIENCIA, INNOVACION Y UNIVERSIDADES

## Event Reconstruction and Higgs-to-Invisible Analysis with ILD Detector Models for FCC-ee

ILD@CERN Meeting

Victor Schwan

15th September 2026

UHH

Universitäts Hamburg

HELMHOLTZ

Visor de Tiques

CLUSTER OF EXCELLENCE

PIER

EJADE

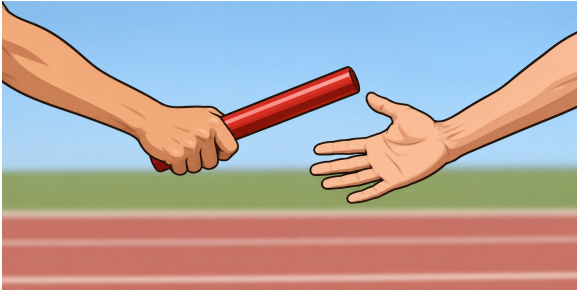
## Many challenges ahead — with limited manpower and financial resources

- Identify the most critical areas where action is most urgently needed.
- Optimize the use of the available manpower, while exploring opportunities to attract new contributors and, where possible, strengthen the effort within our groups
- .
- Align our action plan closely with the FCC roadmap, so that ILD can actively contribute to the studies leading up to the final decision on the construction of FCC.
- Build on the plans already outlined by the new coordinators, following initial discussions over the summer and further exchanges during this workshop — and now complete, prioritize and turn them into a well-defined plan of action.

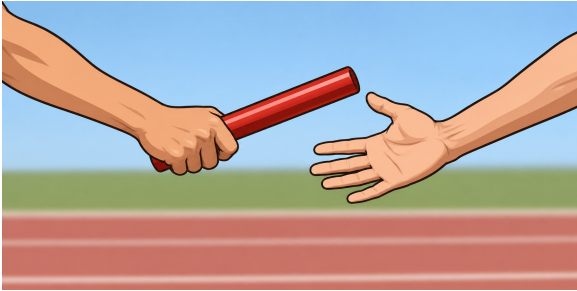
**Establish a dedicated working group** bringing together the **ILD coordinators and additional experts (volunteers)** to **be identified**, with the goal of preparing a **clear work plan before Christmas**. Define and **prioritize the essential objectives** that ILD needs to address.

- **Identify the activities and expertise required** to achieve each objective.
- **Set up dedicated working groups where needed**, either within individual coordination areas or **across them for transversal activities** . **Cluster the expertise and manpower around this** , making the most efficient use of our limited resources.
- **Identify gaps and opportunities to bring in additional contributors** where necessary.

***Goal: a clear, prioritized and realistic work plan before Christmas.***



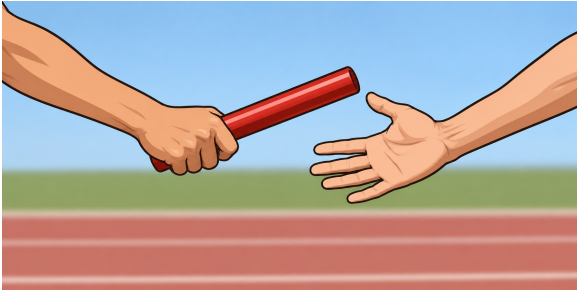
Now it is our responsibility to keep that momentum going



Now it is our responsibility to keep that momentum going

*But don't worry, Ties, the previous spokesperson, has provided the new spokesperson with all the tools she needs!*





Now it is our responsibility to keep that momentum going

But don't worry, Ties, the previous spokesperson, has provided the new spokesperson with all the tools she needs!

*With just one caveat...*

**The crystal ball doesn't seem to work.**  
Whether this is a technical problem or simply a lack of the necessary skills on Ties' side remains unclear...



*But don't worry — Ties, the previous spokesperson, has provided the new spokesperson with all the tools she needs!*

*With just one caveat...*

**The crystal ball doesn't seem to work.**  
Whether this is a technical problem or simply a lack of the necessary skills on Ties' side remains unclear...



Before thanking you all for your participation and wishing you a safe trip home...

There is still one thing left to do:  
our final discussion!