



PLENARY / **DETECTOR TECHNOLOGIES**

## Discussion Session

The PPG Instrumentation Group

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23-27 JUNE 2025 Lido di Venezia

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## Questions Overview

1. AI/ML Technologies for Detectors
2. Chip Design Challenge
3. Sustainability
4. Disruptive Breakthroughs and Blue-sky R&D
5. Status of Detector Roadmap Implementation and DRD Collaborations

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## Topic 1: AI/ML Technologies

- AI is transformative for everyone. Are we investing sufficient resources into applying AI in instrumentation development?
- What are the AI challenges that are specific to future detectors in particle physics?
- Does the increased use of AI also introduce new challenges?  
*For example: will implementing AI at the front-end lead to significantly higher power consumption?*



## Topic 2: The Chip Design Challenge

HEP needs lots of ASICs and is lagging behind industry

- How can we narrow the gap between HEP and industry in ASIC development?
- To which extent should we **streamline** the many development paths?
- Can **industry partnerships** be better leveraged?
- Which role can **CERN** and **national labs** play?





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## **Topic 3: Sustainability**

- How can **sustainability** be embedded into the development of future detector technologies — both in terms of environmental impact and long-term operational efficiency?
- How can we solve the challenge of finding **gases with low Global Warming Potential (GWP)** for our detectors?

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## Topic 4: Disruptive Breakthroughs and Blue-sky R&D

- Will the **evolution** of current technologies be **sufficient** for future projects?
- Which **fraction** of detector R&D should be devoted to **blue-sky** developments?
  - What is the impact on career paths particularly for early-career researchers?
- How can our community profit from **breakthroughs in other fields**?





## Topic 5: Roadmap & DRD Collaborations

- **DRD Collaborations**
  - Are technologies **missing**? Which technologies are on a **critical path**?
  - How do we spark **cross-DRD innovation**?
  - How can **more resources** be attracted?
- On what timeline should the ECFA Detector Roadmap be revised?

