CNID Status Report

XXVI CPAN days, UCM, Madrid.

I. Vila, Instituto de Física de Cantabria (CSIC-UC)

CPAN NETWORK
ON INSTRUMENTATION
AND DETECTORS

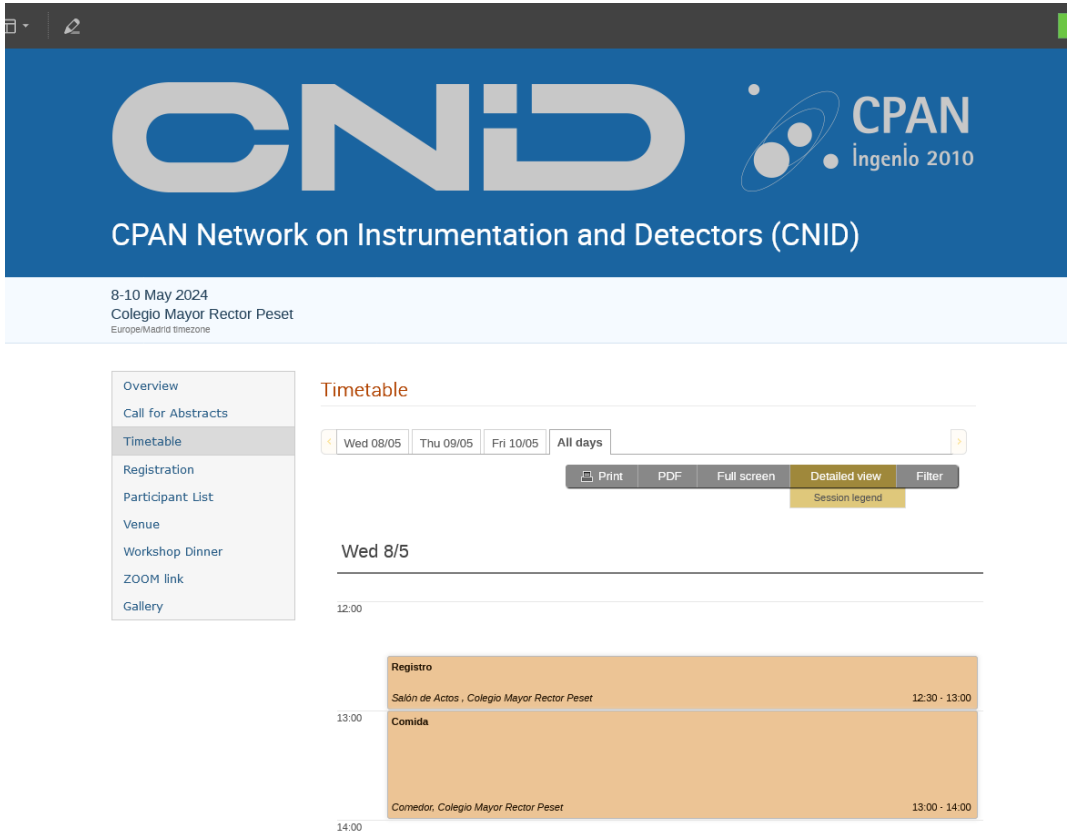
Outline

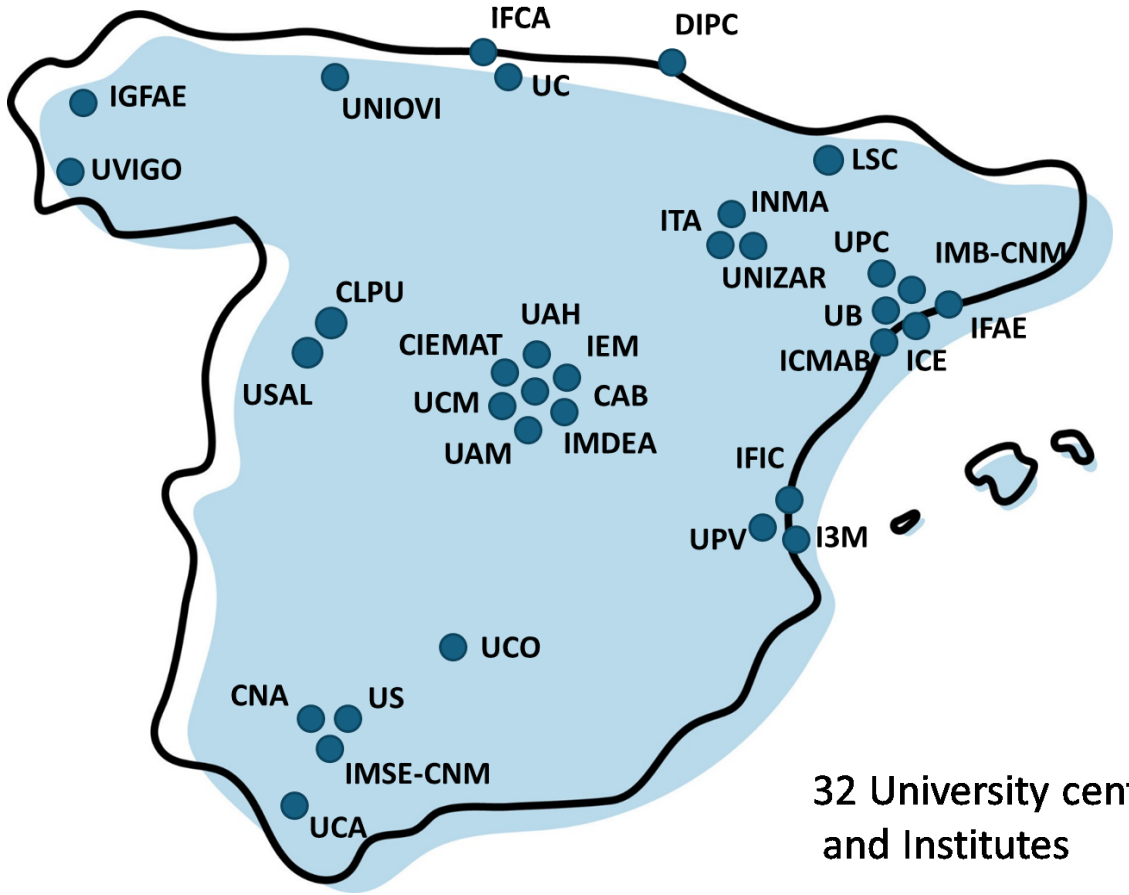
- A at short recapitulation of the network origin and motivation.
- Network structuring:
  - Governance: Steering Group and Collaboration Board composition.
  - Application to the *Redes de Investigación 2024*
- Initial action items:
  - Preparation of the “Strategic analysis and resource optimization”.
  - Instrumentation School.
  - Input to the ESPPU and Dectector R&D collaborations.
- Summary

CNID creation - short recapitualition

- Workshop Instrumentation for the future of particle, nuclear and astroparticle physics and medical applications in Spain, March 2023, Barcelona.
  - https://indico.cern.ch/event/1220045/
- Initial proposal for a network on Instrumentation and Detectors, XV CPAN Days, October 2023, Santander.
  - https://indico.cern.ch/event/1283224/contributions/5612901/
- Motivations:
  - **Building a Community** of Experts in Instrumentation and Detectors.
  - **Platform** for sharing and exchanging knowledge, technologies, practices, and research findings in instrumentation across different fields and disciplines.
  - **Promoting collaboration** among groups that may lead to joint research projects.
  - **Representing the community** to influence and advise scientific leadership (as in case of the DRD collaborations or the coming update of European Strategy for Particle Physics).
  - **Capacity development:** training activities

Kick-off meeting in Valencia (May 2024)





32 University centers and Institutes

80 participants
67 contributions

Structure: Institutional Board

IEM - CSIC	Olof Tengblad
Centro de Astropartículas y Física de Altas Energías (CAPA)-UZ	Gloria Luzón
Centro de Láseres Pulsados (CLPU)	José Manuel Álvarez
Centro Nacional de Aceleradores (US, CSIC, Junta de Andalucía)	Carmen Jiménez Ramos
Centro Nacional de Microelectrónica (IMB-CNM-CSIC)	Pablo Fernandez
CIEMAT	M.Isabel Josa Mutuberría
IGFAE-USC (Instituto Galego de Física de Altas Enerxías)	Abraham Antonio Gallas Torreira
Institut de Física d'Altes Energies (IFAE)	Stefano Terzo
Instituto de Física Corpuscular (CSIC-UV)	Carlos Lacasta
Instituto de Física de Cantabria (CSIC-UC)	Iván Vila Álvarez
Instituto de Instrumentación para la Imagen Molecular (i3M)	Laura Moliner
Instituto Tecnológico de Aragón (ITA)	Fernando Arteche
Universidad de Alcalá	Luis del Peral
Universidad de Cádiz	Inmaculada Ramos Lerate
Universidad de Córdoba	Jorge Berenguer Antequera
Universidad de Oviedo - ICTEA	Santiago Folgueras
Universidad de Salamanca	Begoña Quintana Arnés
Universidade de Vigo	Enrique Casarejos
Universitat Politècnica de València	Miguel Ardid
Instituto de Nanociencia y Materiales de Aragón (CSIC-UZ)	Agustín Camón
DICOM (UC)	Luisa Mª de la Fuente
CAB (INTA-CSIC)	Alicia Gómez
IPARCOS (UCM)	Juan Abel Barrio
Universidad de Barcelona - ICCUB	David Gascón
Universidad Autonoma de Madrid	Luis Labarga
Universidad de Sevilla	Rogelio Pinto
Donostia International Physics Center	Ander simon
IMDEA Nanocienica	Daniel Granados
Universidad Politécnica de Cataluña	Sergio Gómez
Instituto de Ciencas del Espacio (ICE)	aldos@ice.csic.es

- Government body
- One member with vote for each institute or university center.

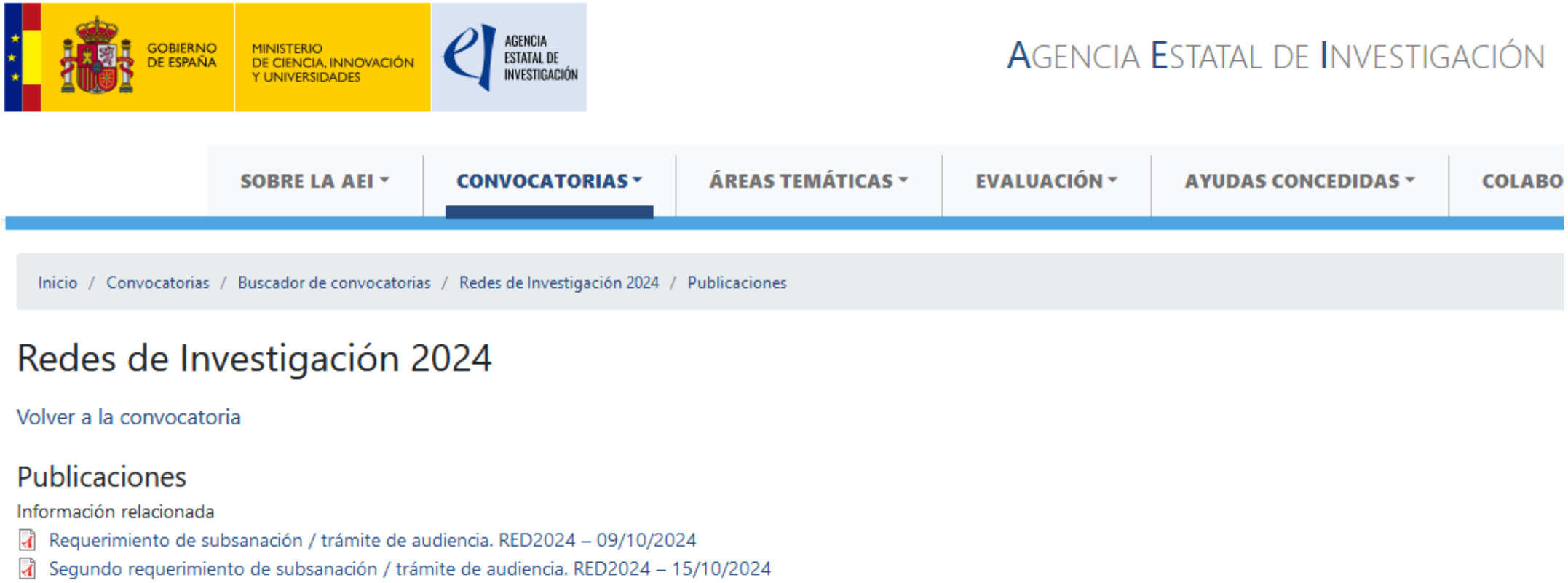
Structuring CNID: Steering group

- **Coordinator:** Iván Vila (IFCA); **Deputies Coordinators:** Cesar Domingo (IFIC) + Inés Gil (Ciemat)
- **WG1 Gaseous detectors:** Yassid Ayyad (IGFAE) + Cristina Fernández (Ciemat)
- **WG2 Liquid detectors:** Clara Cuesta (Ciemat) + Justo Martín (IFIC)
- **WG3 Solid state:** Stefano Terzo(IFAE) + Carlos Mariñas (IFIC) + Teresa Kurtukian (IEM)
- **WG4 Calorimetry:** Mary-Cruz Fouz (Ciemat) + Héctor Alvarez-Pol (IGFAE)
- **WG5 Quantum sensing:** Gemma Rius (IMB-CNM) + Igor García Irastorza UNIZAR)
- **WG6 Electronics:** Santiago Folgeras (UNIOVI) + Fernando Arteche (ITA) + Diego Real (IFIC)
- **WG7 Mechanics & Integration:** Cristobal Padilla (IFAE) + Enrique Casarejos (UV)
- **WG8 Applications:** Carlos Guerrero (US) + Gabriela Llosá (IFIC)
- **WG9 Scintillators and photodetectors:** Luis Mario Fraile (UCM) + David Gascon (UB)
- **WG10 Characterization Techniques:** Carmen Jiménez (CNA) + Jordi Duarte Campderrós (IFCA)
- **WG11 Training:** from the institution leading the school organization + management team.
- **WG12 Low-Background experiments:** Susana Cebrián (UNIZAR) + Francesc Monrabal (DIPC) + Roberto Santorelli (CIEMAT)

- **Executive body:**
  - Management team: network coordinator and two deputies (from the three CPAN fields).
  - Two or three conveners for each WG.

Structuring CNID: *Redes de Investigación 2024*

- **Unexpected entropy introduced during the network's creation process, but it was nevertheless welcome**
- **Still under evaluation**



Application to the “Redes de Investigación 2024”

- The management team served as the preparatory team for the proposal.
- Due to administrative constraints of the call, not all CNID members were able to participate in the 'Redes de Investigación' application.
- It is essential to ensure that these groups also benefit from the 'Red' if the proposal is approved (keep this in mind)

“Redes de Investigación 2024”: Objectives

- **General Objective:**
  - Optimize research resources and foster complementary detection technology development across particle, astroparticle, and nuclear physics at a national level.

- **Specific Objectives:**
  - **Foster Synergies:** Promote collaboration among groups in particle, astroparticle, and nuclear disciplines, encouraging new partnerships.
  - **Coordinate Research:** Enhance detector development, innovation, and societal applications of Spanish research groups.
  - **Train Young Researchers:** Establish schools and workshops to develop technological skills.
  - **Define National Strategy:** Develop a medium- to long-term national plan for instrumentation aligned with European and international initiatives.

“Redes de Investigación 2024”: Coordination

- **Task 1.1: Governance Structure**
  - Establish governance framework, roles, responsibilities, and decision-making processes.
  - Deliverable: Network Framework Agreement for governance and decision-making.
- **Task 1.2: Internal Communication**
  - Promote collaboration via tools like intranet, videoconferencing, agenda management, and messaging systems.
  - Deliverable: Setup of communication tools for network activities.
- **Task 1.3: Annual Workshop**
  - Facilitate knowledge exchange, collaboration, and strategic planning through yearly workshops.
  - Deliverable: Organize one workshop annually.
- **Task 1.4: Thematic Mini-Workshops**
  - Focused events on R&D topics with review talks, discussions, and training.
  - Deliverable: One or two mini-workshops per year.
- **Task 1.5: Strategic Analysis and Resource Optimization**
  - Analyze R&D capabilities, infrastructure, and collaboration opportunities for strategic alignment.
  - Deliverable: Reports on R&D priorities, methodologies, and challenges.

“Redes de Investigación 2024”: Training, Diffusion & Outreach

- Training
  - Task 2.1 School Organization:
    - Organize a two-week annual school for early-career researchers in detector and instrumentation.
    - Provide structured education and hands-on training to stay updated on advancements in the field.
    - Deliverable: Two-week school annually.

- Diffusion and Outreach
  - Task 3.1 Diffusion:
    - Disseminate research outcomes through websites, publications, seminars, and social media.
    - Target stakeholders like industry partners, and policymakers.
    - Deliverable: Website and social network presence.
  - Task 3.2 Outreach:
    - Engage the community through educational events, workshops, and public seminars.
    - Promote awareness of instrumentation's importance in science and society.
    - Deliverable: University-level seminars on frontier physics technologies.

“Redes de Investigación 2024”: Industry Partnership & Community Representation

- Partnership with Industry
  - Task 4.1: Public-private connections
    - Facilitate collaborations with industries (especially SMEs) to address societal challenges using detector technologies. Promote advancements in science and industrial applications. Assist industries in accessing scientific experiments and infrastructure.
    - Deliverable: Annual joint meetings with INEUSTAR (Spanish Science Industry Association)..
- Community Representation
  - Task 5.1: Engage with Spanish social agents and administration (Coordinated with CPAN)
    - Foster collaboration with policymakers (e.g., Ministries of Science & Industry, CDTI).
    - Support policy initiatives, funding opportunities, and regulatory matters in detector R&D.
    - Deliverable: Joint meetings with CDTI and relevant stakeholders.
  - Task 5.2: Interface with international R&D collaborations
    - Maintain active communication with CERN DRDs, NUPECC, APPEC, etc.
    - Enhance the network’s visibility and contributions in global R&D communities.
    - Deliverable: Reports on international collaborations during the annual network workshop.

Initial activities: Coordination

- Addressing activities that do not require additional funds.
- Task 1.1: Governance Structure
  - Establish governance framework, roles, responsibilities, and decision-making processes.
- Task 1.2: Internal Communication
  - Provide collaboration: dedicated servers for web, indico, and Mattermost.
- Task 1.3: Annual Workshop
  - Facilitate knowledge exchange, collaboration, and strategic planning through yearly workshops.
- TASK 1.5: Strategic analysis and resource optimization (next slides)

Strategic analysis: Implementation

- WG conveners should carry out a comprehensive analysis within their group of R&D activities in Spain related to instrumentation for particle, astroparticle, and nuclear physics.
  - Assess the expertise available across institutions.
  - Identify existing infrastructures and their capabilities
  - Opportunities of improvement with impact.
  - Evaluate current technological capabilities.
  - Map out potential areas for collaboration (possible focused joint projects) and resource optimization.
  - Perform a SWOT analysis at both the WG level and the entire network.

Strategic analysis (2): Expected Outcome

- Use insights from this analysis to inform strategic planning, ensuring alignment with both national and international research priorities.
- A detailed report including:
  - Outline key R&D priorities.
  - Propose/identify new methodologies or technologies.
  - Highlight challenges faced by the WG.
  - Recommend strategies for addressing challenges and advancing technological development
- Prepare an executive version of the report as a tool for supporting the requests of **dedicated funds** for instrumentation R&D
- Requesting funds **complementary** to the current Spanish R&D program:
  - Some type of funding mechanism as the "*Plan Complementario*"

Strategic analysis (3): Tentative Timeline

- **January 27:** Conveners complete the process of gathering information from the groups, including dedicated meetings with the relevant parties.
- **February 24:** Conveners release the initial draft of the strategic analysis for each WG.
- **March 17:** The management team finalizes and releases the complete draft, incorporating input from the WGs and including an executive summary, for review by the steering group
- **March 31:** Final draft incorporating feedback from the steering group, for the full network review.
- **April 12:** Strategic analysis Report endorsed by the governing board.

Initial activities: Training - Instrumentation School

- **Funding Requirement**: These activities cannot be conducted without financial support; funding is essential.
- **Interest from Groups:** Several groups have already expressed interest: CIEMAT, IFCA, IFIC (several groups), IMB-CNM, ITA and UCCUB
- **Planning Meeting:** Schedule an open meeting within the next 2–3 weeks to decide on the venue, followed by selecting a suitable date.
- **Local Leadership:** A local representative from the selected venue, working closely with the CNID management team, should lead the organization of the school.

Other Initial activities: Detector R&D collaborations @ CERN

- Presentation during this CPAN days of **M.C. Fouz** (Spanish contact for ECFA detector R&D roadmap) on the current process of formal approval of the new Detector R&D collaborations anchored at CERN.
- In 2021, the European Committee for Future Accelerators (released an extensive report (ECFA Detector R&D roadmap):
  - Comprehensive overview of prospective facilities (EIC, ILC, CLIC, FCC-ee/hh, Muon collider) and major upgrades (ALICE, Belle-II, LHC-b, etc.), along with their projected timelines
  - Identification of the most pressing detector R&D priorities for nine technological domains.
- The implementation of the Roadmap resulted into the creation of the **Detector R&D collaborations**
- CNID facilitated discussions among the affected groups and the HEP plan manager to provide a common feedback from all Spanish groups to the DRD management, DRDC committee, and CERN management regarding the formal approval of the DRDs

Other Initial activities: Input to the ESPPU

- **Full Implementation of ECFA Detector R&D Roadmap:**
  - Prioritize formalizing DRD collaborations through MoU signatures and address GSR6 by establishing sustainable funding programs to support extended R&D timelines and reduce reliance on short-term funding cycles.
- **Collider Experiments Prioritized by the ESPP Update:**
  - Promote the Establishment detector-concept collaborations to optimize designs, conduct benchmarking analyses, and ensure system integration aligned with DRD objectives, providing guidance for R&D efforts.
- **Support for Broader Scientific Goals:**
  - Continue targeted R&D for neutrino physics, dark matter searches, and other experiments. Strengthen the CERN Neutrino Platform and leverage synergies with existing DRD activities for next-generation detectors.

Summary

- The CNID network just launched across the different areas of the CPAN, still under shaping.
- Excellent response of the community, many groups interested and contributing, not just the core CPAN “physicist” but many “engineer” groups.
- Initial activities:
  - Structuring the governance and implementing coordination tools
  - Strategic Analysis study.
  - Instrumentation School.
  - Discussion forum for the approval of the Detector R&D collaborations (DRDs) and input to the ESPPU.


THANK YOU!
CNID