



NUCLÉAIRE
& PARTICULES

Institut national de physique nucléaire
et de physique des particules
IN2P3

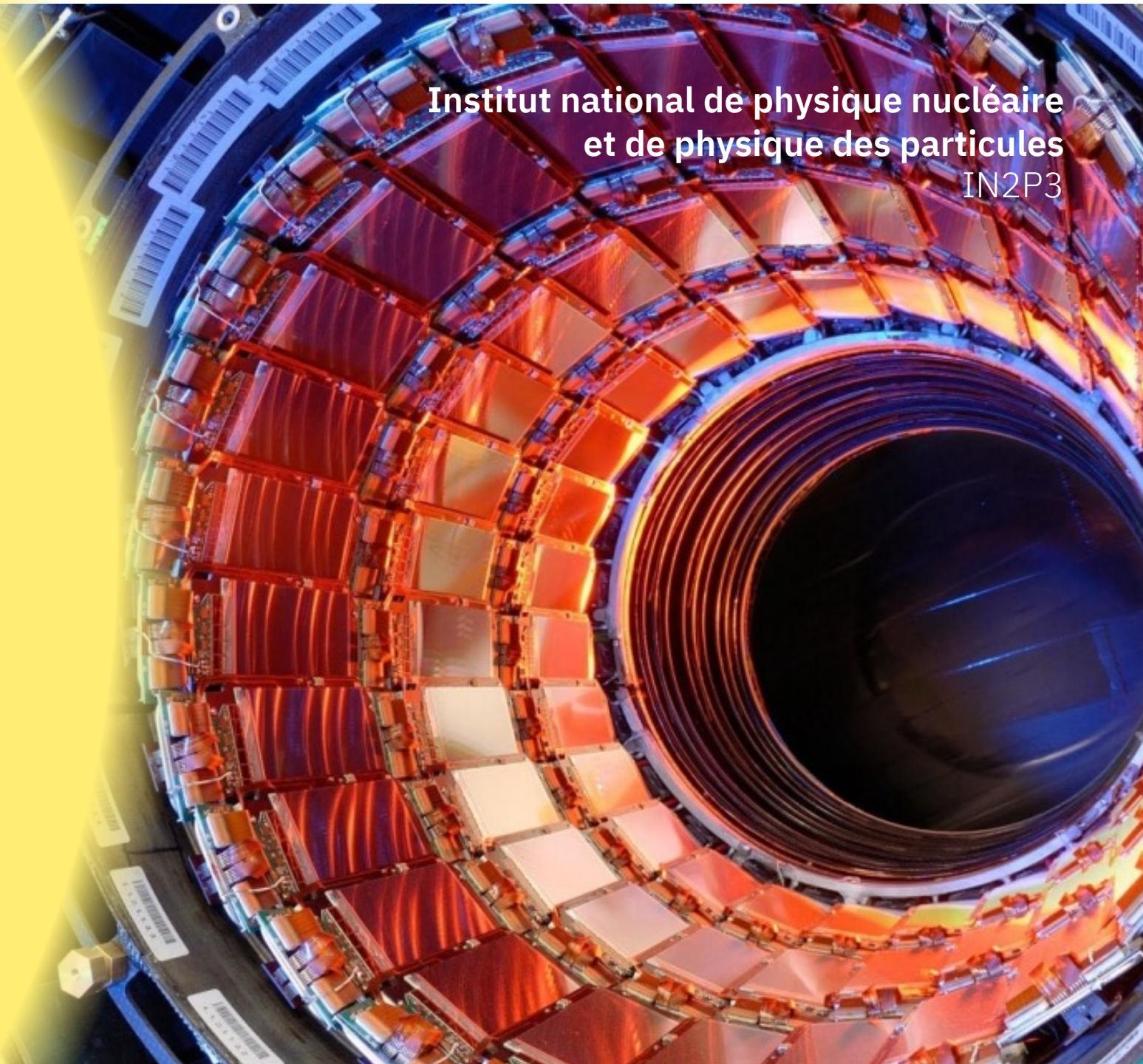
Welcome from IN2P3

FCPPN 2026 Workshop in Lyon

Laurent Vacavant

Scientific Director for Particle Physics

→ 29/06/2026



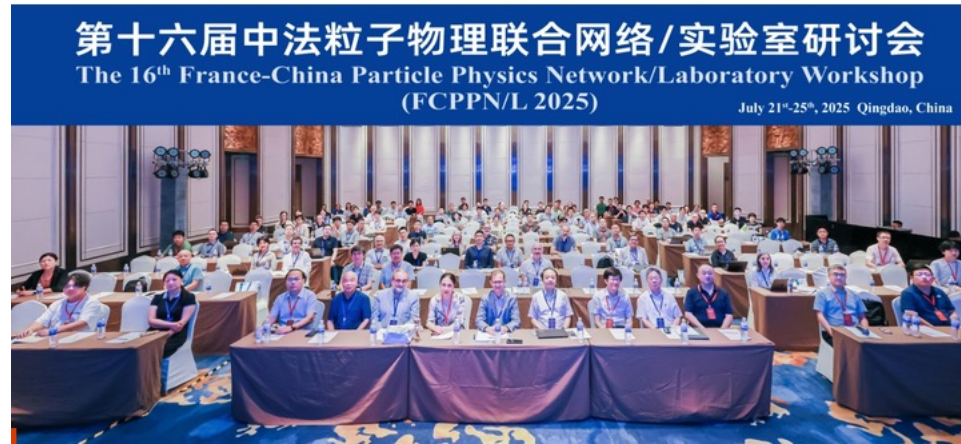
Welcome to the FCPPN 2026 workshop

In Lyon

Building on the success of the previous workshops, e.g. recently:



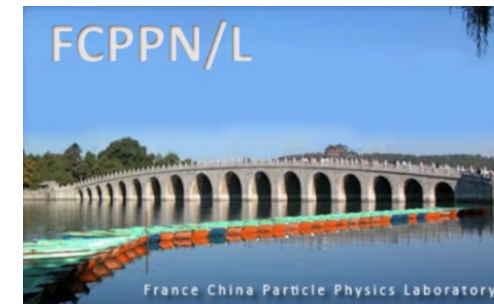
Bordeaux 2024



Qingdao 2025



Looking forward to interesting talks and lively discussions...
Thanks to IP2I for hosting us



FCPPN

International Research Network

FCPPN/L : a success story since 2007

Very fruitful collaborations, seeding larger cross-participations in several projects

Structures adapted in 2023 to follow evolution of CNRS international tools

My slide from last year...

- FCPPL became :
 - a network : FCPPN International Research Network
 - *network with many partners/institutions*
 - *funding of collaborative research projects*

- Under reflection : a lab ?
 - *an actual international lab in China*
 - *in the premises of IHEP Beijing offices*
 - *to host a few IN2P3 physicists*
 - *for long stays (1 year or more)*
 - *neutrinos (JUNO, KM3Net, ...)*
 - *cosmic gamma rays, dark matter*
 - *future colliders & detectors*

A new IRL is born !

Birth certificate dated June 12, 2026



Major achievement and a milestone to deepen our collaborations !!

Followed the LoI signed in Dec 2025 by CAS President & CNRS CEO

FCPPL: the lab

And its relationship with FCPPN

Three main research topics:

- neutrino physics and in particular with JUNO
- high energy astroparticle physics and cosmology
- future of accelerators, detectors and data science for HEP

The lab, with the scientists based there, will develop research programs along those lines of already established collaboration; using its own budget, specific project budget (from MasterProjects at CNRS and from the partner). It can apply as well for ANR, ERC and local grants.

The role of FCPPN in this context:

- pursue its mission : seed money for new projects and new collaborations
- along the lines above (if new and not recurrent projects) but mostly to start new things
- actually time to review the scope of science, funding policy and schedule of calls (cf. Steering C)

CNRS Nucléaire & Particules / IN2P3

One of the 10 Institutes of CNRS, with a specific national mission

Mission : to coordinate research in nuclear physics, particle physics, and astroparticle physics

COORDINATES

national research programs
and French participations in
major infrastructures

OPERATES

research units, mostly in partnership
with universities and/or research
organizations

EXPLORES

the physics of the two infinities :
from elementary particles to
cosmology

Links with society :

DEVELOPS

associated technologies,
applications and interdisciplinary
research

PROVIDES

expertise, teaching, training

Areas of research

@ IN2P3

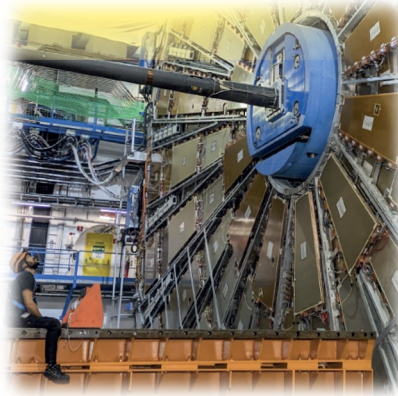
Explore fundamental physics

Lead research on contemporary scientific challenges

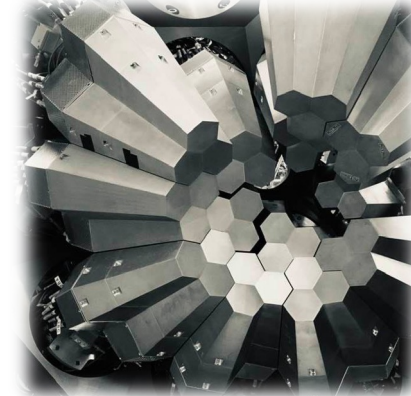
Valorize technology for society & industry

in synergy with other institutes from CNRS and other research organizations in France and worldwide

Particle Physics



Hadronic & Nuclear Physics



Astroparticles & Cosmology



Nuclear sciences for Society



Accelerators & Technologies



Data science & Computing



IN2P3 key figures

15+8

laboratories, jointly operated
with universities

including 8 with foreign universities / institutes

30 + 10

research programs
+ animation
groups (GDR/IRN)

1 000 (600 CNRS)

staff scientists & faculties

10

support units & interdisciplinary
research platforms

50

international
research
agreements

1 500

engineers, techs and admins

300

post-docs

90 M€

annual budget
(w/o salaries)

20 M€

yearly for very large
research infrastructures

450

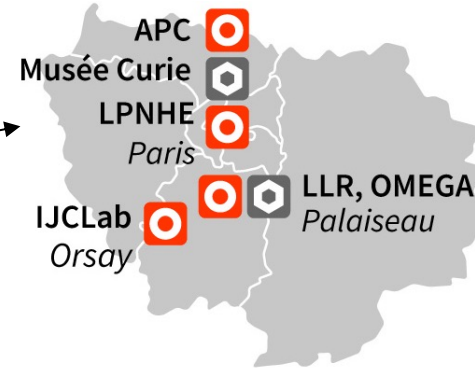
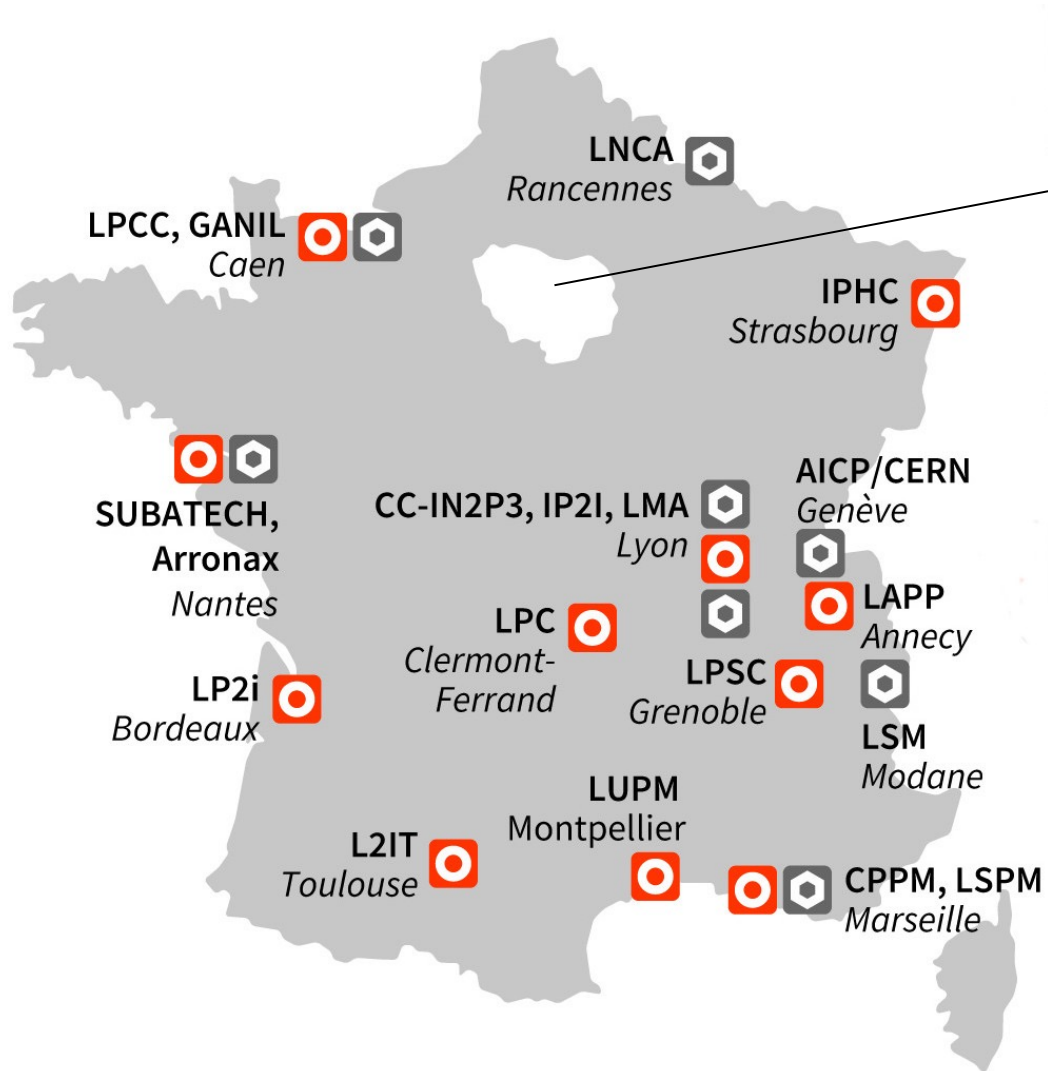
PhD students



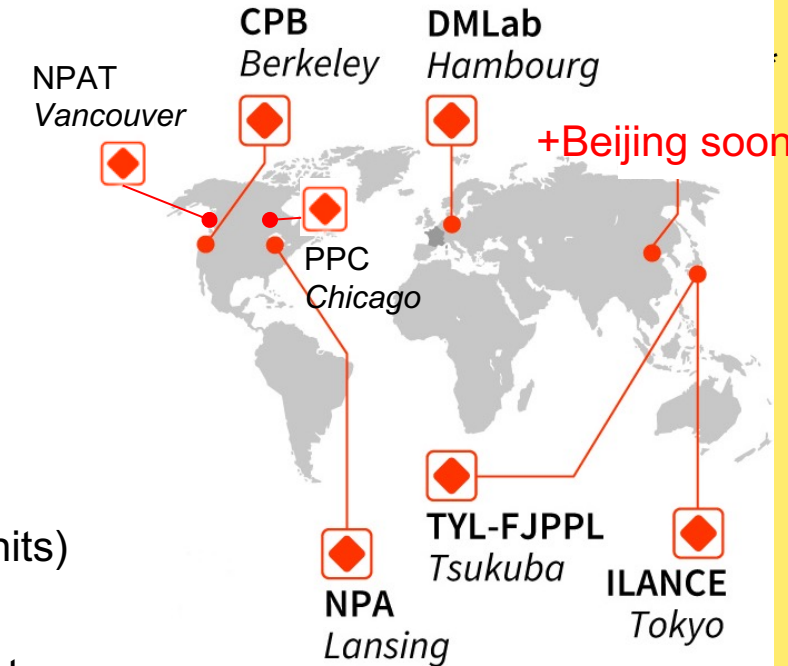
© CERN

IN2P3: a distributed lab

Across France... and also abroad

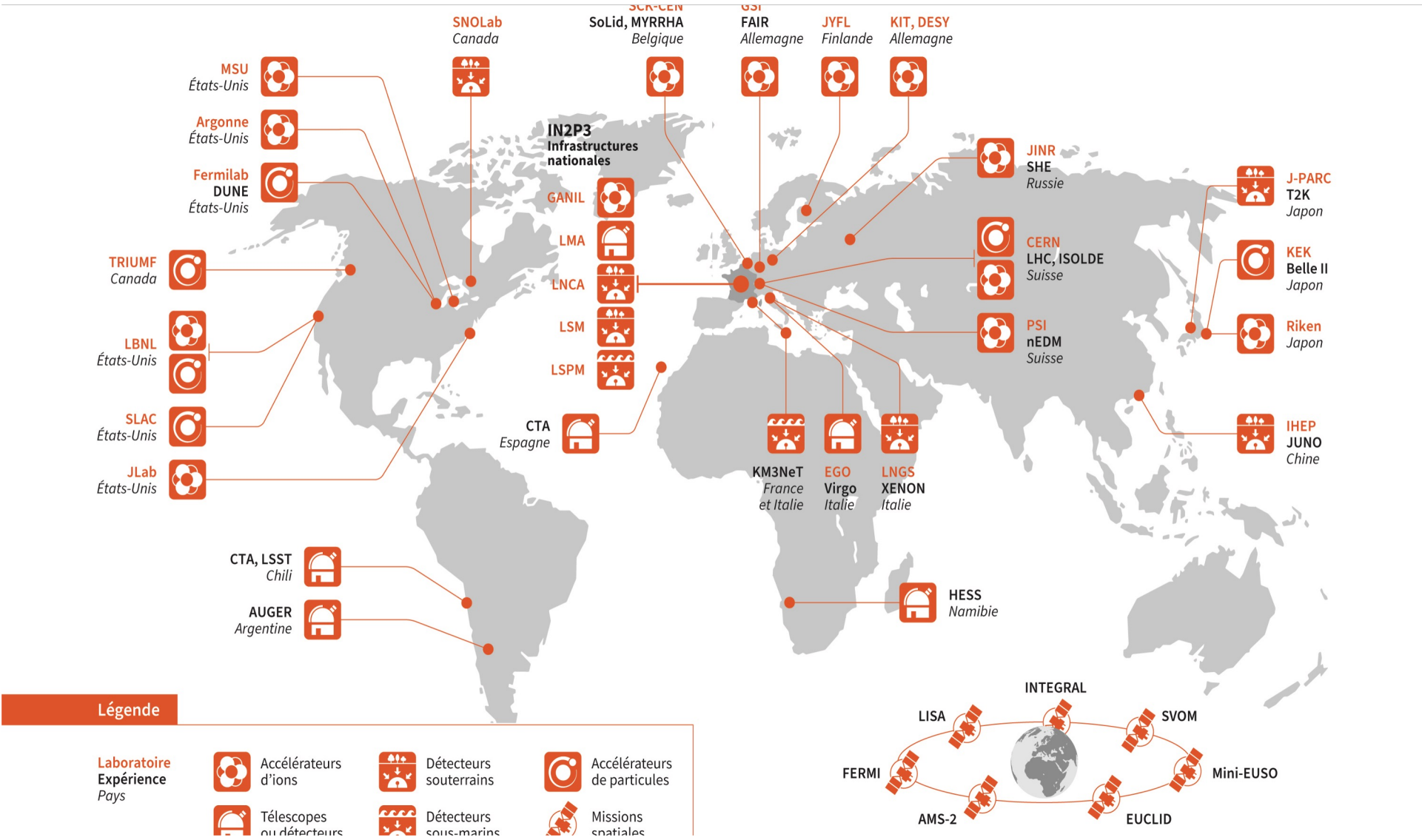
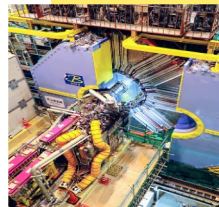
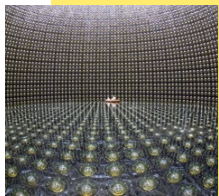
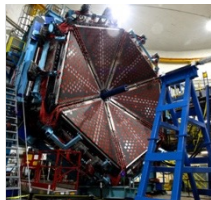
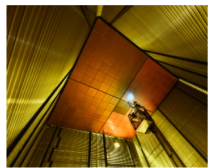


- 15 labs (joint research units) w/ major FR universities
- 10 infrastructure / support units
- 7 labs abroad w/ foreign universities: UC Berkeley, U Chicago, U Tokyo, MSU, Helmholtz, KEK, TRIUMF



Worldwide (+) research infrastructures

With IN2P3 involvements



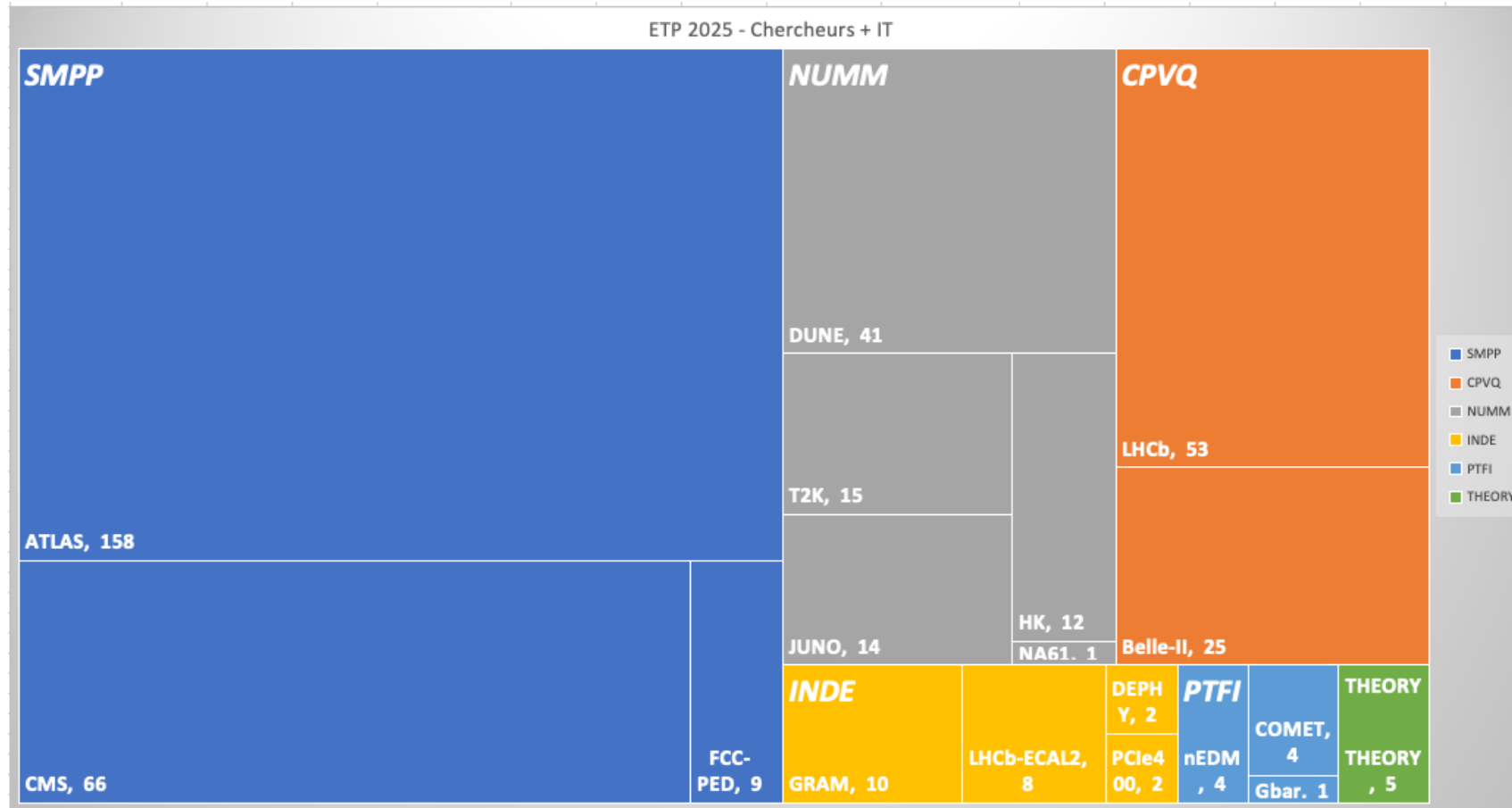
Particle Physics Portfolio

@ IN2P3

- 300 permanent physicists: 230 CNRS, 70 faculties
- 200 on contract: 70 postdocs, 130 PhD students
- 300 engineers & technicians working on PP projects

- 5 scientific programs, 32 master-projects
- 50 research teams in 15+3 labs

ETP 2025 - Chercheurs + IT



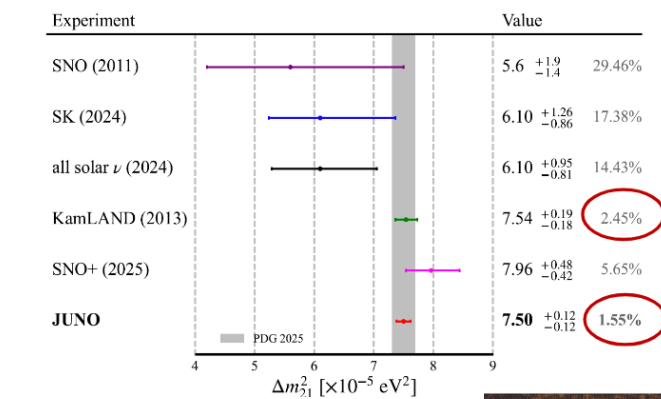
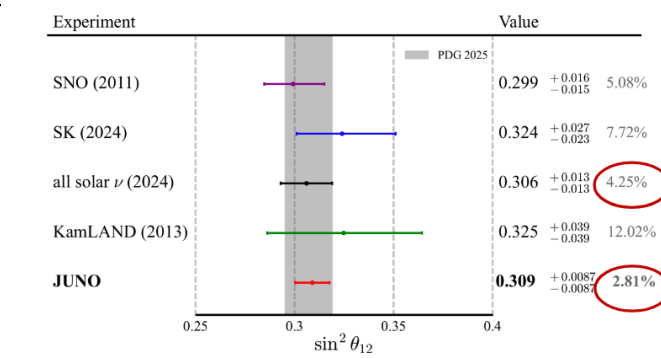
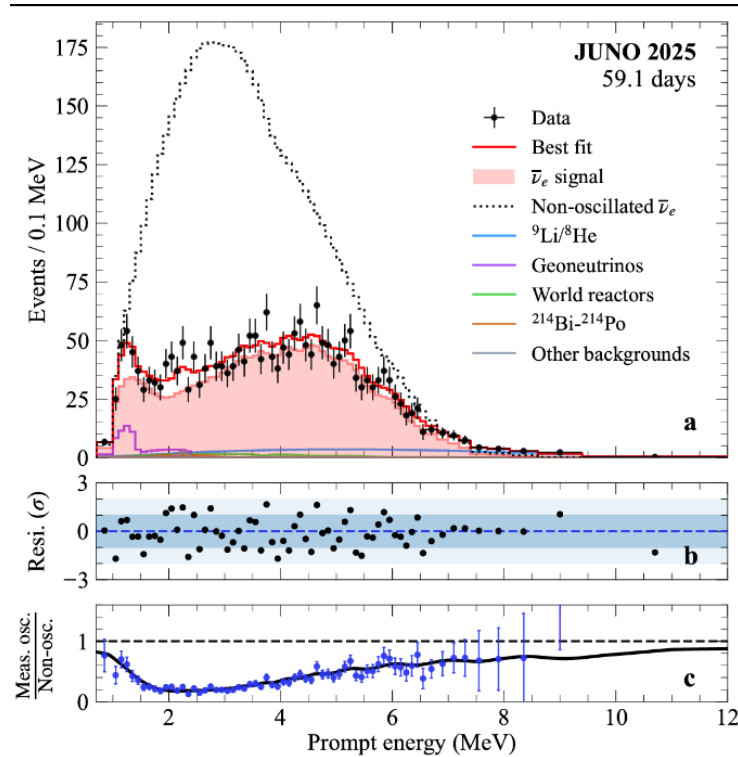
The Highlight of the Year :

The Highlight of the Year :

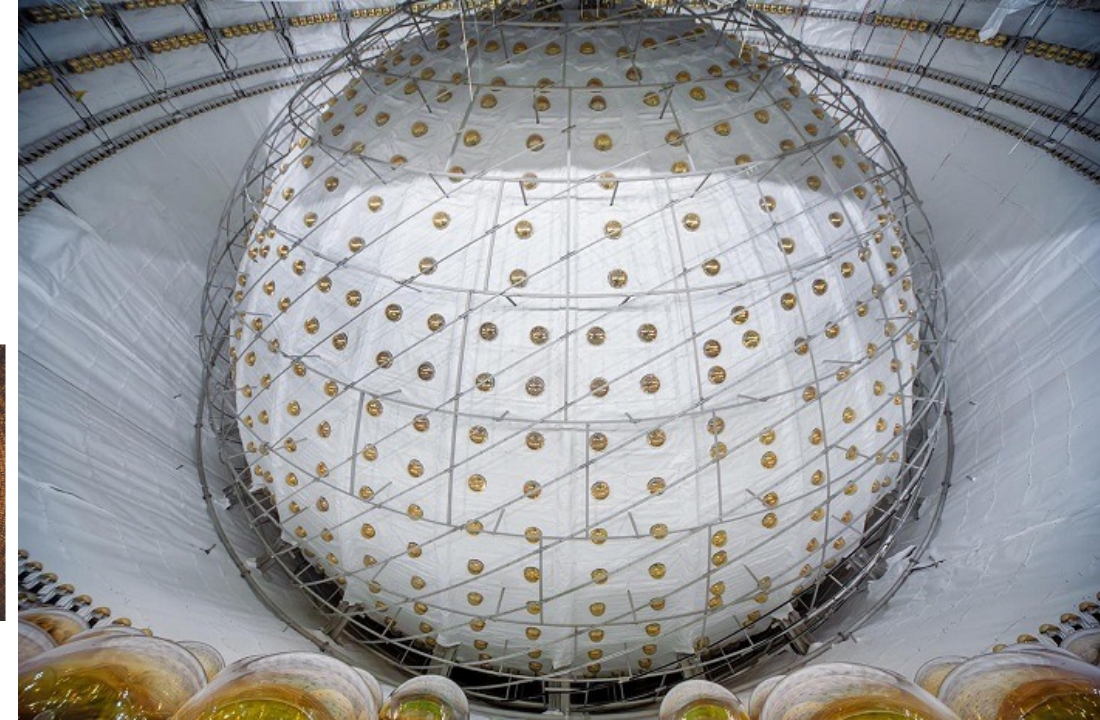
JUNO

Start of JUNO experiment

... and first major results 59 days after !!!



- best world measurements of $\sin^2 \theta_{12}$ and Δm^2_{21}
- several contributions from IN2P3 to the experiment



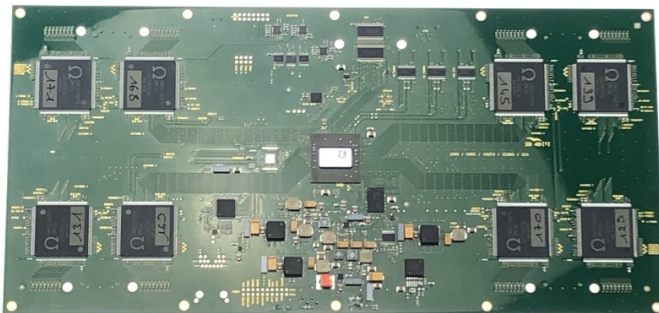
JUNO: IN2P3 contributions to SPMTs

Very exciting first results, SPMTs starting to be used to constrain non-linearity

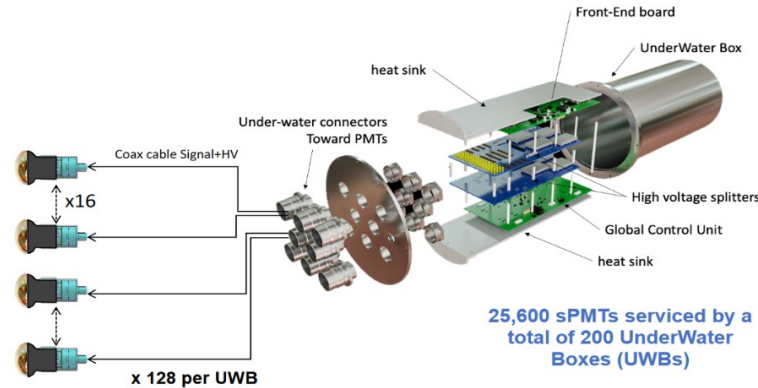
25600 SPMTs (3 inches) in between of the 17612 Large PMTs (20 inches)



ABC Front-End cards with OMEGA CATIROC



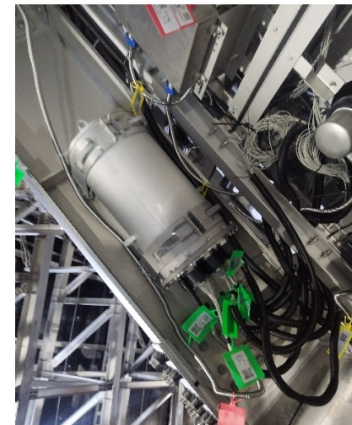
25600 SPMTs serviced by a total of 200 UnderWater Boxes



Connectors from Axon company



UnderWater box installation on site



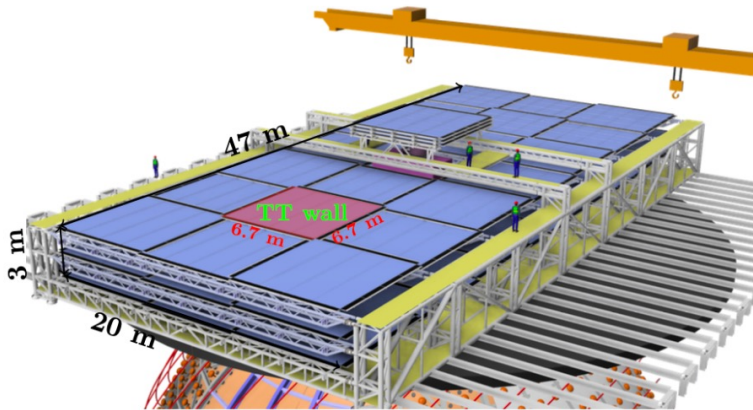
- CATIROC chip design, manufacturing and testing.
- Design of the Asics Battery Card : front-end board
 - Optimisation of the Printed Circuit Board
 - Mechanical and thermal measurements of the ABC card.
- Mass testing of the ABC cards :
 - Acceptance, calibration, packaging
- Joint developpement of the SPMT cables with AXON.
- ABC firmware and synchronisation

(slide: C. Jollet)

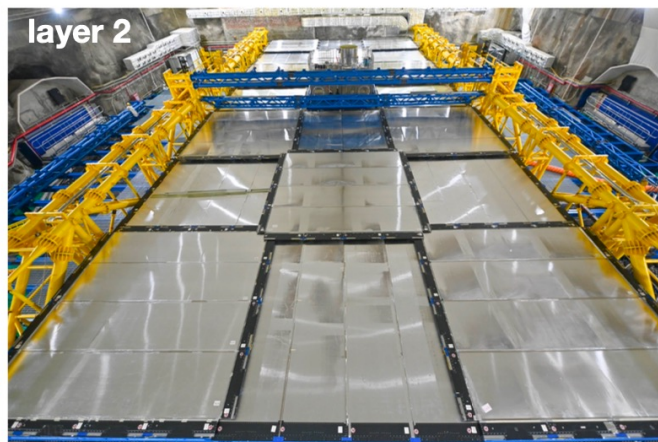
JUNO: IN2P3 contributions to TopTracker

Very exciting first results, working on improving physics reach with TT soon

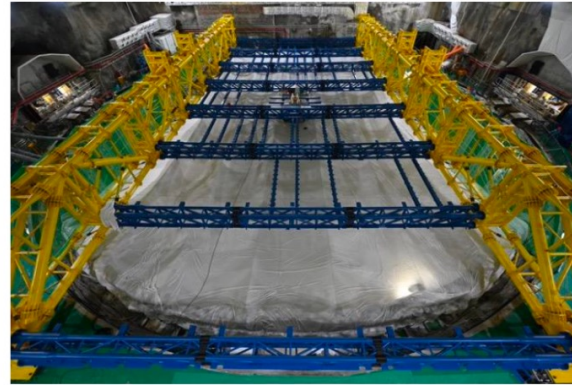
Tracker on the top of the Central Detector to improve the muon track reconstruction.



3 layers of TT. Each layer is made of 20 walls. Each wall is made of 4 vertical and 4 horizontal modules. Each module is made of 64 scintillator strips.



Solid Bridge on top of JUNO to install TT



Electronic card of 1 TT module



- TT module constructed in IPHC for the OPERA
- Electronic block diagram:
 - Front-End Board (MAROC from OMEGA)
 - Read-Out Board
 - Concentrator Board (tested at IPHC)
 - Global Trigger Board
- Test of the whole electronic chain (IPHC)
- Firmware
- Tests and installation on site.

(slide: C. Jollet)

JUNO results @ Neutrino26

... even more impressive with 207 days !

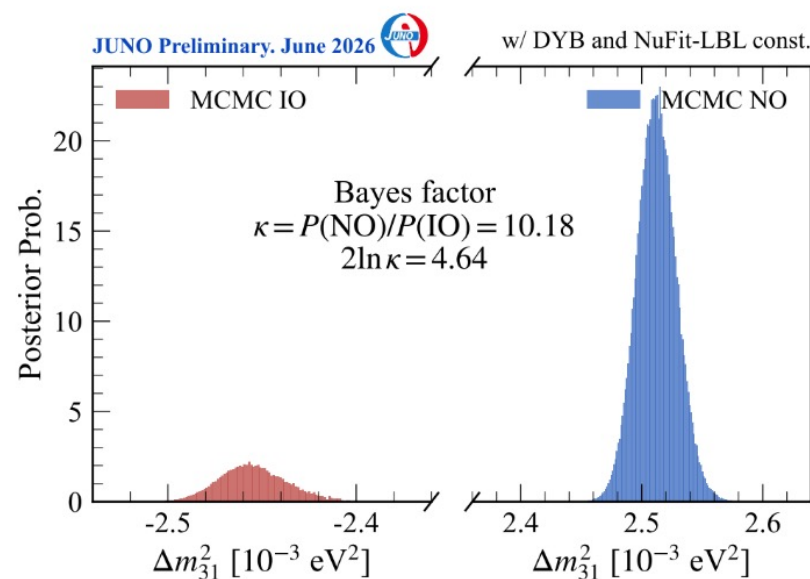
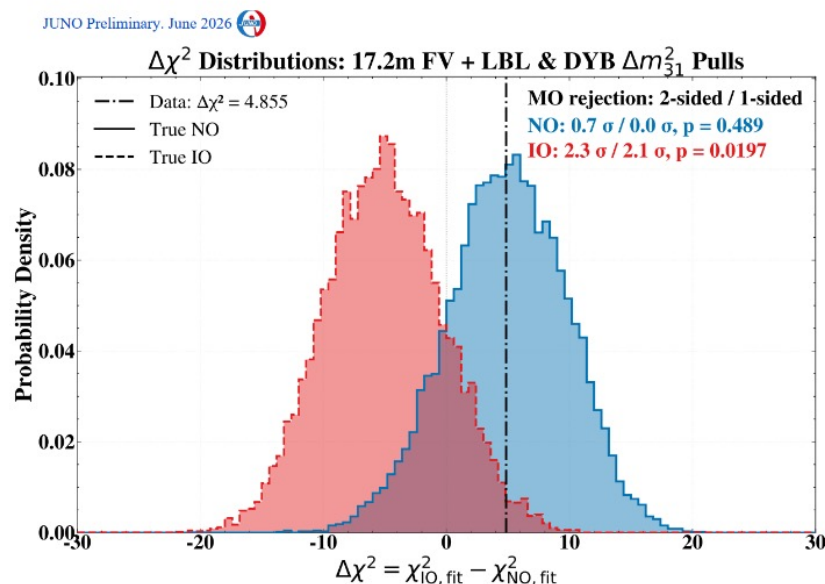
- further improved accuracy (+30-50%) on solar oscillation parameters $\sin^2\theta_{12}$ and Δm^2_{21}
- measurement of Δm^2_{13} at 1% uncertainty
- → first hints about neutrino mass hierarchy !!!

Neutrino Mass Ordering Significance

Posters: 252, 205



- Frequentist approach using pseudo exp. to convert $\Delta\chi^2$ to significance
- Influence of δ_{CP} considered (scanned)
- Normal Ordering is favored at **2.3 σ**
- Bayesian approach using Markov Chain Monte Carlo(MCMC) method
- Normal Ordering is favored with a Bayes factor of **10.18** → $2\ln \kappa = 4.64$
- ⇒ Consistent with the frequentist $\Delta\chi^2$

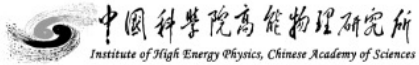


Slide from Yifang
at Neutrino2026

Much more
discussed this week
on Friday !

31

Let's enjoy this 17th workshop & our collaboration !



National Astronomical Observatories
Chinese Academy of Sciences

