

# Enigmass Status

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2<sup>nd</sup> Enigmass2 ISC meeting

October 14, 2022



# Formal and Financial Matters

- ❑ Issues pending last year have been clarified
- ❑ Enigmass2 – 2020-2024
  - Budget: 2.8 M€ (-6% admin fee)
  - Budget path: ANR → UGA (Idex) → CNRS
  - Idex confirmed in summer 2021, supervision of all local Labex transferred from ANR to Idex
  - Enigmass2 budget secured, amendment to UGA-CNRS convention formalized in March 2022
- ❑ Spending deadline confirmed to be 31/12/2024
  - Exception: PhDs and postdocs can extend till 2025
  - Constrained number of calls for HR and R&D
- ❑ Significant increase of HR cost, overall > +4%
  - Constrains available funds for final two years
    - Commitments so far ~90% of budget, HR ~70% of budget

# PhD and postdoc fellowships

- ❑ 14 2-year junior postdocs + 4 PhDs
  - Pressure typically higher for postdocs than for PhDs
- ❑ Calls for projects: 2020, 2021, 2022
  - Organized in fall of previous year
  - Projects assessed by 2 external experts
  - Selection done by management board
    - Scientific quality, strategic position, impact, feasibility & timing
  - Fellow selection managed by PIs following European HRS4R hiring procedure
    - PIs advised to self-train on diversity/bias using ERC video and to include member external to team in selection board

# R&D projects

- ❑ Budget: 340 k€
- ❑ 2 calls: 2022 and 2023
  - Organized in summer of previous year
  - Projects assessed by  $\geq 2$  external experts
  - Selection done by management board
    - Scientific quality, strategic position, impact, feasibility & timing
- ❑ Medium scale projects ( $\leq 140$  k€ to be spent over 2 years)
  - Only in 2022 call
  - 2 identified priorities: future CMB and GW detectors
- ❑ Small scale projects, aka R&D boosters (10-20 k€ to be spent over 1 year)
  - In 2022 and 2023 calls
    - 2023 call adjusted to include computing (with theory in mind)
- ❑ 2022 call: 2 medium-scale + 2 small-scale projects received, all funded
- ❑ 2023 call: 7 medium-scale projects received (pressure  $\sim 2$ )
  - Currently being reviewed, selection in a few days

# Current summary of postdoc/PhD/R&D allocations

## □ WP1

- Effective Field Theories (N. Berger) postdoc 2020
- Photons in Auger (C. Berat) PhD 2020
- Quark-Gluon Plasma with ALICE (G. Conesa Balbastre) PhD 2021
- Large-scale Liquid Argon detector prototype for DUNE (D. Duchesneau) postdoc 2021
- Detector operation and data analysis for LHCb (JF Marchand) postdoc 2021
- Dark QCD with ATLAS (MH Genest) postdoc 2021
- DUNE vertical drift TPC module 0 (J. Collot) PhD 2022
- New phenomena in the dilepton final state at the LHC (T. Berger-Hryn'Ova) postdoc 2022
- Light new physics at the atomic frontier (C. Delaunay) postdoc 2022

## □ WP2

- Lorentz Invariance with CTA (S. Caroff) PhD 2022
- Cosmic-ray and new physics signatures in the very high-energy sky (F. Calore) postdoc 2022
- Extraction of error signals for gravitational wave detector control (L. Rolland) postdoc 2022

## □ WP3

- Etude des amas de galaxies avec LSST (C. Combet) postdoc 2020
- Cluster cosmology with the NIKA2 camera (F. Mayet) postdoc 2020
- Gravitational probes of dark matter (P. Serpico) postdoc 2020
- Axions at the crossroads (C. Smith) postdoc 2021
- Cosmological constraints from galaxy clusters with Rubin (T. Guillemin) postdoc 2022
- Towards high resolution cosmology: the CMB-HRO project (J. Macias Perez) postdoc 2022

## □ WP1

- ALICE FOCAL (R. Guernane)
- MC202 , Micro-channel CO<sub>2</sub> cooling for FCC (R. Kossakowski)

## □ WP2

- Building an in-vacuum seismically isolated optical bench at LAPP for R&D towards future gravitational wave detectors (L. Rolland)

## □ WP3

- New generation lenses for next decade millimeter cosmology experiments (A. Catalano)

# Schools – Internships – Visits – Outreach

- ❑ Schools
  - Support recurrent Enigmass-driven schools
    - Instrumentation winter school: ESIPAP 2020 in person, 2021 & 2022 remote, 2023 in person
    - Summer school for 3rd and 4th year physics students: GRASPA 2020 cancelled, 2021 & 2022 in person
  - Also support external schools like *Physics at TeV Colliders @ Les Houches* (2021 cancelled, 2023) or *IN2P3 School of Statistics (SoS 2022)*
- ❑ Master internships
  - 2020 budget came too late to support any
  - 2021-2024: funding ~12 4-month internships/year (12 in 2021, 16 in 2022)
- ❑ Visiting scientists
  - None in 2020 or 2021, due to late budget and/or pandemic
  - Two visits in 2022
- ❑ Outreach
  - 2021: Video with stand-up artist (> 200k views)
  - 2021: Mallette Cosmix: portable cosmic ray detection device
    - Easy to bring to classrooms or science festivals

Deal with requests as they arise

- No fixed-timeline call for maximum flexibility

Not exhausting planned budget (40 k€ + 40 k€)

- Probably a relief in light of the HR cost “crisis”

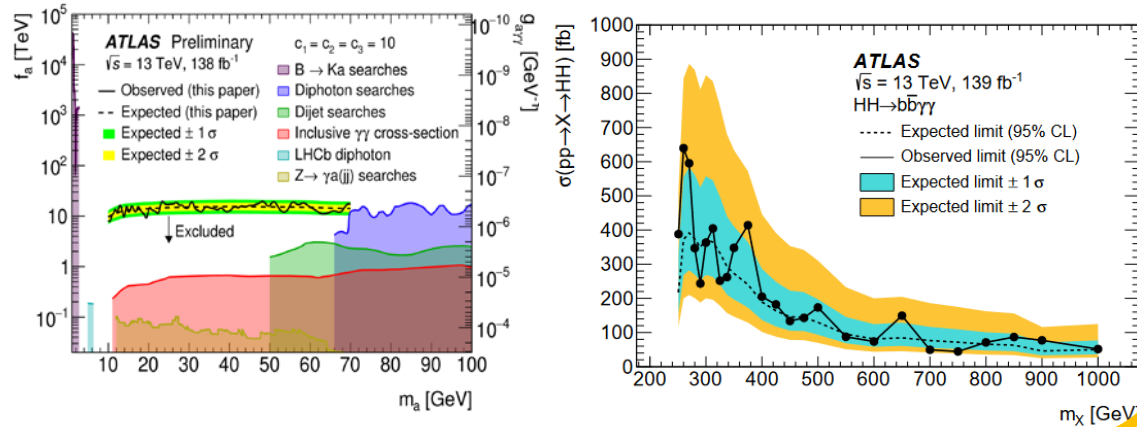
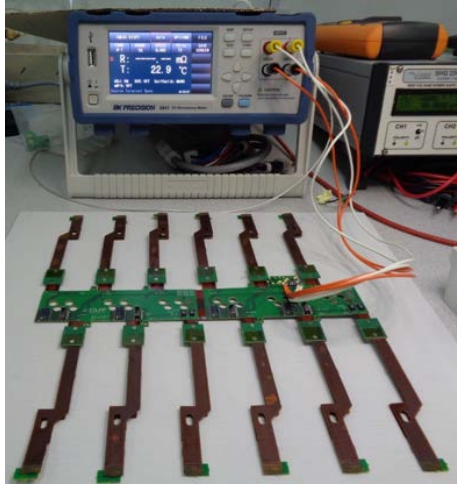
# Recent highlights

- ❑ Some recent results or milestones highlighted in the next few slides – far from exhaustive!
- ❑ For a glimpse of the specific work of some Enigmass2 fellows, please see talks at plenary meetings
  - 2021: <https://indico.in2p3.fr/event/24170/>
  - 2022: <https://indico.in2p3.fr/event/27684/>

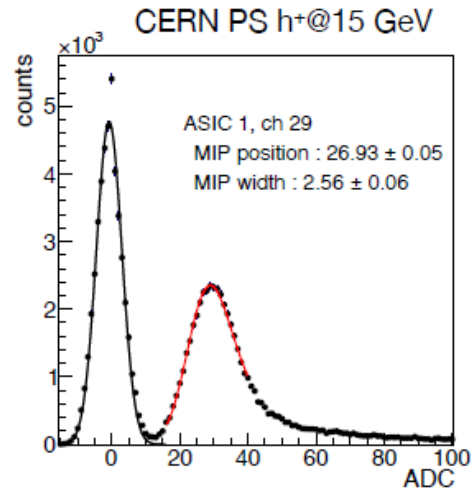
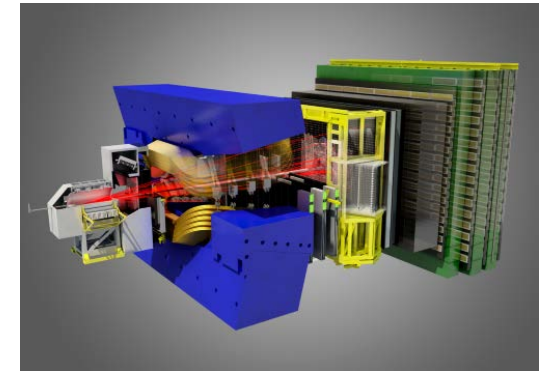
# Recent highlights: WP1

Médaille de cristal du  
CNRS  
**2022**

Many new physics results  
Preparing ATLAS Upgrade Phase II

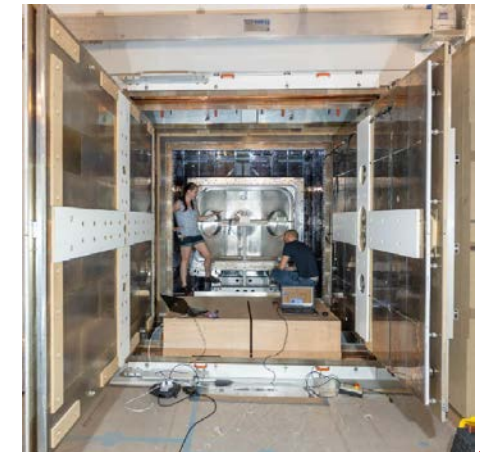


LHCb Run 3  
ECAL commissioning and calibration  
Early measurements publications



ALICE: FoCal R&D for  
high-granularity  
forward calorimeter

nEDM  
Crucial  
chamber  
magnetic  
field mapping  
in progress



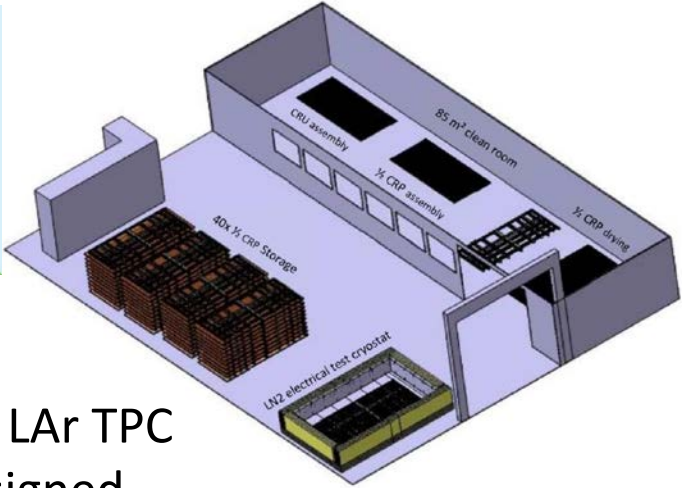
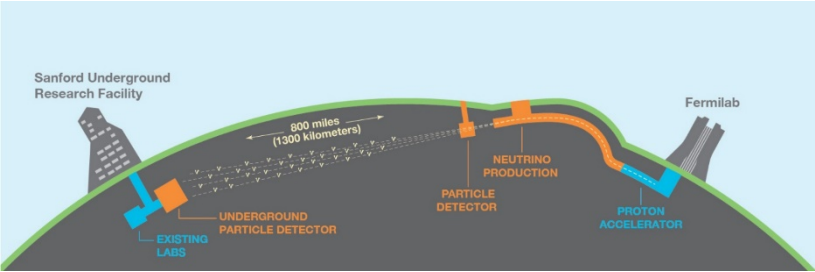


# Recent highlights: WP1 (cont.)

On the effective lifetime of  $B_s \rightarrow \mu\mu\gamma$

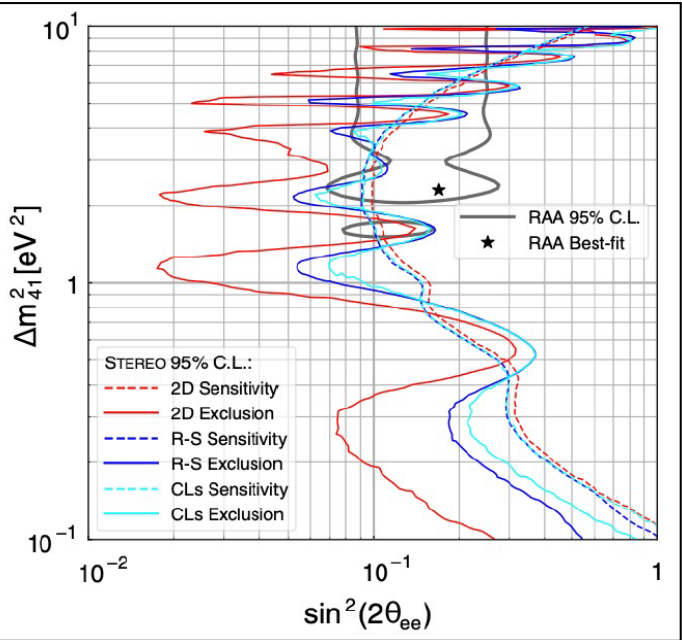
Alexandre Carvunis, Francesco Dettori, Shireen Gangal, Diego Guadagnoli & Camille Normand

*Journal of High Energy Physics* 2021, Article number: 78 (2021) | [Cite this article](#)



DUNE: development of vertical-drift LAr TPC  
Charge-readout plane prototype designed,  
produced and tested

STEREO: No sterile neutrinos!



Version 2  
released



A tool for interpreting simplified-model results from the LHC

# Recent highlights: WP2

H.E.S.S. detection of nova RS Ophiuchi

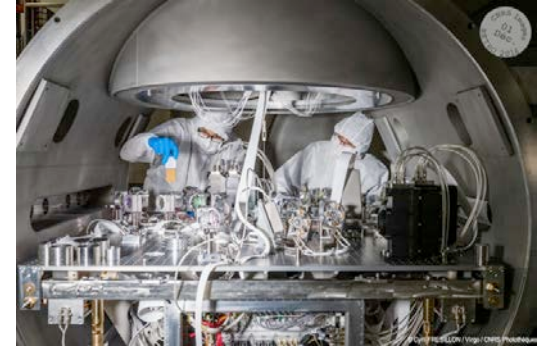
First observations with CTA LST-1



GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run

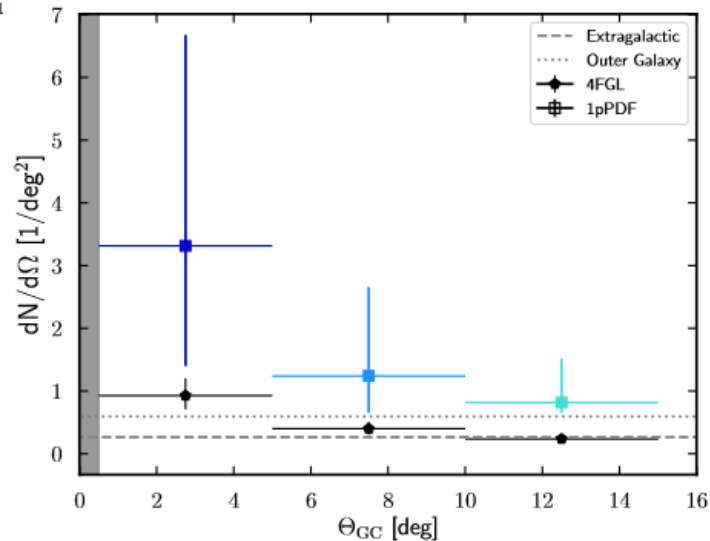
O3 observing run catalog and publications

AdV+ phase I upgrade completed

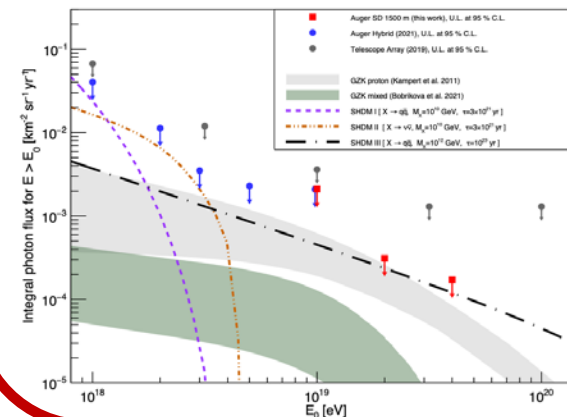


Dissecting the Inner Galaxy with  $\gamma$ -Ray Pixel Count Statistics

F. Calore, F. Donato, and S. Manconi  
Phys. Rev. Lett. **127**, 161102 – Published 13 October 2021



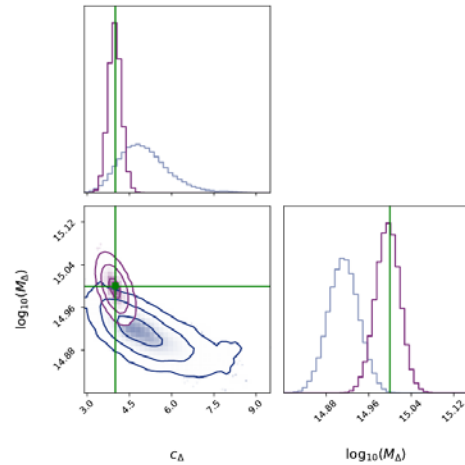
AugerPrime upgrade nearing completion  
Targeting UHE photons



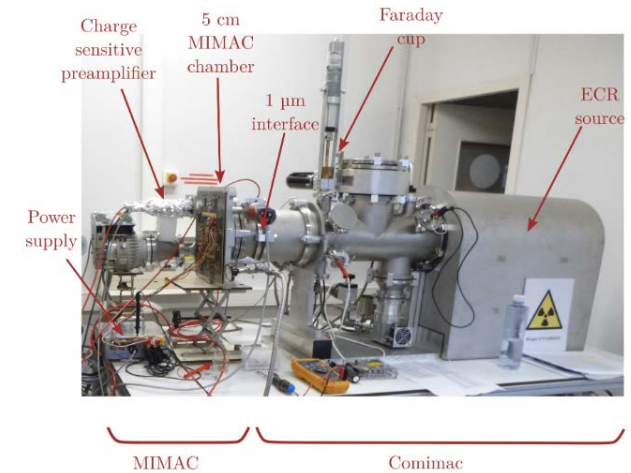
Médaille de bronze du CNRS  
**2021**

# Recent highlights: WP3

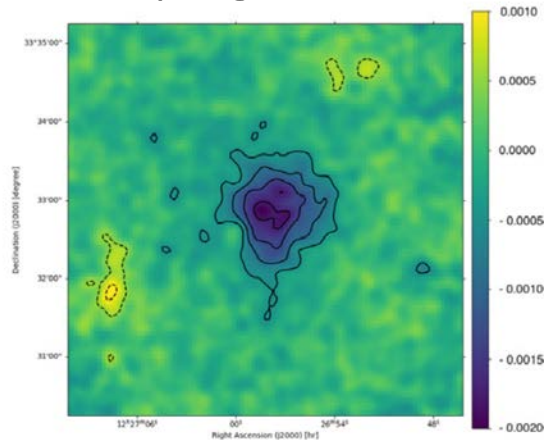
Rubin/LSST filter automated carousel delivered  
Preparing science with galaxy clusters



Directionality and head-tail recognition in the keV-range with the MIMAC detector by deconvolution of the ionic signal



NIKA2 SZ program 80% complete



# Response to ISC 2021 recommendations (I)

- *Consider measures to further increase the synergies and to foster the collaboration between laboratories*
  - Reviving strong scientific dialog has been a struggle in the post-pandemic era
    - 2021: Launched invitations to all Enigmass members to join a few broad-interest LPSC and LAPP seminars on Zoom – not a huge success
    - Zoom fatigue + reluctance to travel + tight timelines in big projects = not much energy to widen perspectives
  - *Specific funds could be established for projects that involve different sites*
    - We chose not to prioritize multi-site projects explicitly, but some emerged naturally
    - Among 2022 PhD/postdoc selected projects:
      - Design, optimization, construction and test of the DUNE vertical drift TPC module 0 (PhD, J. Collot @LPSC & D. Duchesneau @LAPP)
      - Cosmological constraints from galaxy clusters with the first Rubin data (postdoc @LAPP), follows fellowship allocated on similar topic @LPSC in 2020 (both proposals jointly supported by both groups)
        - » Collaboration with LPSC has helped enormously to build new LSST group at LAPP, Enigmass contributes to this process

# Response to ISC 2021 recommendations (II)

- ❑ *Establish more concrete criteria for measuring success and, in particular, the added value of the network*
  - Qualitative impact
    - Join forces to maximize impact in big projects, e.g. ATLAS (Itk tracker upgrade), neutrinos (DUNE), cosmology (LSST)
    - Increase visibility in big projects science results production
    - Invest in R&D allowing teams to weigh in the game for future detectors, e.g. CMB, GW
  - Opening possibilities
    - Explore new theoretical ideas
    - Start projects that can then attract further funding, e.g. recently:
      - 4 ANR grants in ATLAS (*Photon Portal*, PI M. Delmastro ; *Diboson Z-gamma*, PI N. Lorenzo-Martinez; *ML-Tracking*, PI J. Leveque ; *EFT@LHC*, PI N. Berger) + 1 in Virgo (*MILDOG*, PI L. Rolland)
      - T. Hryn'ova pre-selected for ERC Consolidator Grant 2022 🙌
      - Micro-channel cooling R&D further funded by CNRS MITI (cross-disciplinary projects), now applying for multi-lab IN2P3 funding

# Response to ISC 2021 recommendations (III)

- *Continue to foster the career of young scientists*
  - *A transparent process of distributing resources with well established criteria and time lines (dates for calls for proposals + spending profile)*
  - *Transparency*
    - Calls for proposals held with regular calendar (fall for PhD/postdocs, summer for R&D), announced during plenary meetings and on web site
      - e.g. 2022 R&D call mentioned plans for 2023 R&D call
    - Criteria spelled out in calls (quality, feasibility, impact, strategic position)
    - Selection outcome shared via email with all Enigmass members and on the web site, (anonymous) expert reviews shared with project PIs
  - *Supporting young scientists*
    - Application burden kept minimal (3-page document for PhD/postdoc, 5 to 12 pages for R&D projects)
    - Explicit focus on younger colleagues in R&D calls: junior staff PIs welcome, postdoc PIs allowed for small-scale projects, connection to PhD welcome
      - 2022: Both PIs for medium-scale projects + one PI for small-scale project were (then) junior scientists
      - PIs for 2023 submitted projects: 3 juniors, including 1 recently hired assistant professor, 3 seniors, 1 engineer
    - Outcome of 2022 PhD/postdoc call: 6/8 fellowships allocated to junior PIs, including 1 recently hired CNRS researcher and 1 colleague who recently transitioned from HEP (ATLAS) to cosmology (LSST)
    - Enigmass fellows successful at pursuing in academia, in France or abroad

# Response to ISC 2021 recommendations (IV)

- *Think about activities to further increase the visibility of the network and the participating institutions*
  - During the 2021 plenary meeting, we announced Enigmass would be willing to devote 10 k€ to a locally-organized international workshop on an Enigmass-related topic
    - No volunteers seized the opportunity
  - Creation of the federation + IPAG joining forces definitely good progress to boost the regional visibility of our teams

# Response to ISC 2021 recommendations (V)

- *Continue to work on the sustainability of the network in order to secure the outstanding scientific activities in the long term*
  - A lot of time and energy invested in the past year, opening fresh prospects
  - See next presentation

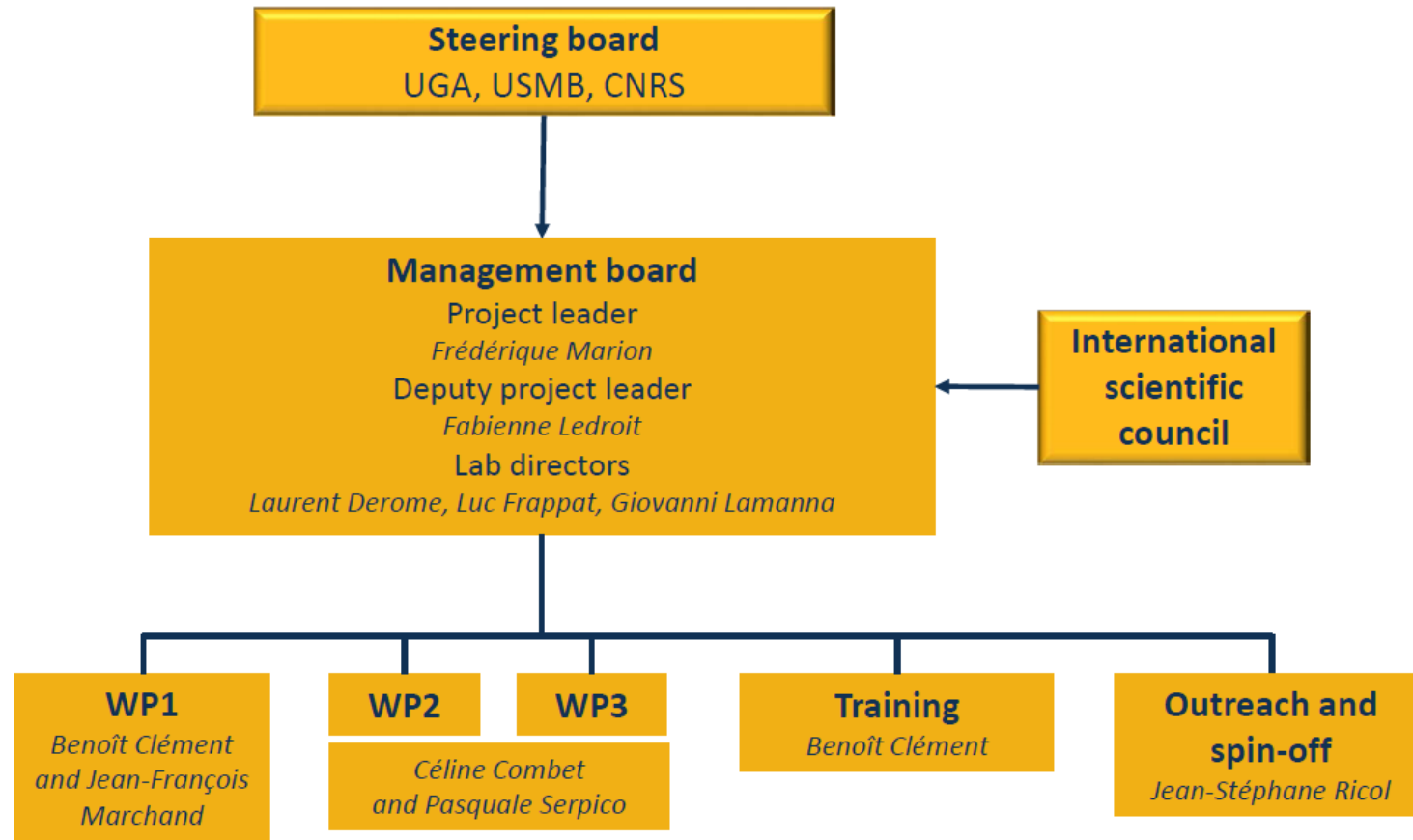


# Questions to the ISC

- ❑ Is there any feedback that the ISC would like to give the management team regarding recent actions?
- ❑ What is the ISC assessment of the (very) preliminary proposal for a future extension, in terms of science and organization? Is there any advice or recommendation that the ISC would like to give the management team in order to maximize chances of success?
- ❑ Is there any other advice or recommendation that the ISC would like to give the management team?

# **EXTRA SLIDES**

# Enigmass2 Organization



- ❑ WP1: Origin of mass and search for new physics
- ❑ WP2: Gravitational waves and multi-messenger science
- ❑ WP3: Dark matter and dark energy in the Universe or the standard model of cosmology

# Enigmass2 Actions

- ❑ Support research project
  - Postdocs, R&D funds, visiting scientists
- ❑ Support training
  - PhD fellowships, master internships, schools
- ❑ Support outreach
- ❑ Target budget allocation outlined in extension application
  - Some freedom to adjust it
- ❑ Guidelines and constraints
  - Strike a reasonable balance
    - Support a very broad science project
    - Provide substantial boosts to have real impact
    - Ensure fair share (on average) across topics and sites
  - Stay true to spirit of « excellence »
    - Organize « competitive » calls for projects
    - Internationalize recruitment of fellows
  - Operate on tighter budget than Enigmass1
    - Lower funding, higher costs for overhead, PhD fellowships, etc.

From extension application

Category	Cost (k€)	% of Total
Research project	1334	51,61%
Postdoc fellowships	994	
Equipment for R&D	300	
Visiting scientists	40	
Educational project	1202	46,50%
PhD fellowships	802	
M2 scholarships	100	
Schools	300	
Valorization	45	1,74%
Governance	4	0,15%
Total	2585	
Administration	207	8,00%
Grand Total	2792	