



# GDR DUPh - Deep Underground Physics - Review 2021-2025 - Prospects for 2026-2030

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## 1 Introduction

The GDR Deep Underground Physics (DUPhy) brings together the French scientific community engaged in the study of rare-event physics in deep underground laboratories. Its primary focus is the detection of extremely rare phenomena, such as dark matter interactions and neutrinoless double-beta decay within ultra-low background environments.

The GDR is coordinated by a scientific committee comprising the leadership team, Work Package (WP) conveners, and several active external members<sup>1</sup>. It operates through a structured WP framework designed to foster interdisciplinary collaboration among researchers and laboratories. Regular meetings and thematic sessions are held to review progress, explore emerging theories, and present future experimental efforts.

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Section 2 presents a detailed overview of the activities carried out by the GDR as of June 2025, declined by its five WPs. It reflects DUPhy’s integrated approach, which combines theoretical insight, experimental diversity, and technological innovation to advance the frontiers of rare-event physics.

Section 3, which can be read independently, offers a concise summary of the first mandate of GDR DUPhy and adds perspectives to shape a second term.

## 2 Review 2021-2025

The GDR DUPhy was established to unite the French scientific community working on rare-event physics in underground environments characterized by extremely low levels of background radiation. During its first term (2021–2025), DUPhy successfully brought together a diverse group of researchers by organizing plenary meetings, fostering technical and theoretical exchanges, and collaborating with both national and international thematic networks.

The GDR was organized into five thematic Work Packages, each led by dedicated conveners and overseen by a governing council designed to ensure scientific and geographical representativity. DUPhy maintained close interactions with other collaborative structures, such as the IRN Neutrinos and IRN Terascale, thereby contributing to a broader, interdisciplinary research framework. The DUPhy mission and its organization are visible as well through a dedicated website: <https://gdrduphy.in2p3.fr>.

Over the five-year period, DUPhy held six plenary meetings, in Paris, Nantes, Aussois, and twice in Lyon (2024 and 2025), as well as one virtual meeting in 2021 (due to the pandemic). These gatherings featured round tables, joint sessions, and technical discussions, serving as key opportunities to review progress, discuss strategic directions, and engage early-career scientists in the community. Statistics related to the talks are presented in Appendix A, and the detailed timetables for the six plenary meetings are provided at the end of this document.<sup>2</sup>

Two joint meetings were organized with the IRNs *Neutrino* and *Terascale* to foster coordination and alignment of research efforts in France and at the European level.

1. **IRN Neutrino (November 2021, Paris):** A joint session was held focusing on shared themes, including neutrinoless double beta decay ( $0\nu\beta\beta$ ), general neutrino physics, including e.g. “*The magnetic moment anomaly of the neutrino*”, alongside discussions on prospects for future experimental collaborations.
2. **IRN Terascale (October 2022, Nantes):** A joint session addressed common interests in dark matter research, both experimental and theoretical, including direct and indirect detection, as well as its implications for cosmic inflation. The day opened with cross-presentations from GDR DUPhy and IRN Terascale, followed by talks focused on each network’s specific expertise, such as the indirect detection of dark matter and its production mechanisms at the LHC.

The rest of this section details the activities of the GDR by Work Package.

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<sup>2</sup>All presentations are available at: <https://indico.in2p3.fr/category/987/>.

## 2.1 WP1: Rare-event physics (Conveners: Luca Scotto Lavina, LPNHE; Christine Marquet, LP2i; Mariangela Settimo, Subatech)

### Objectives

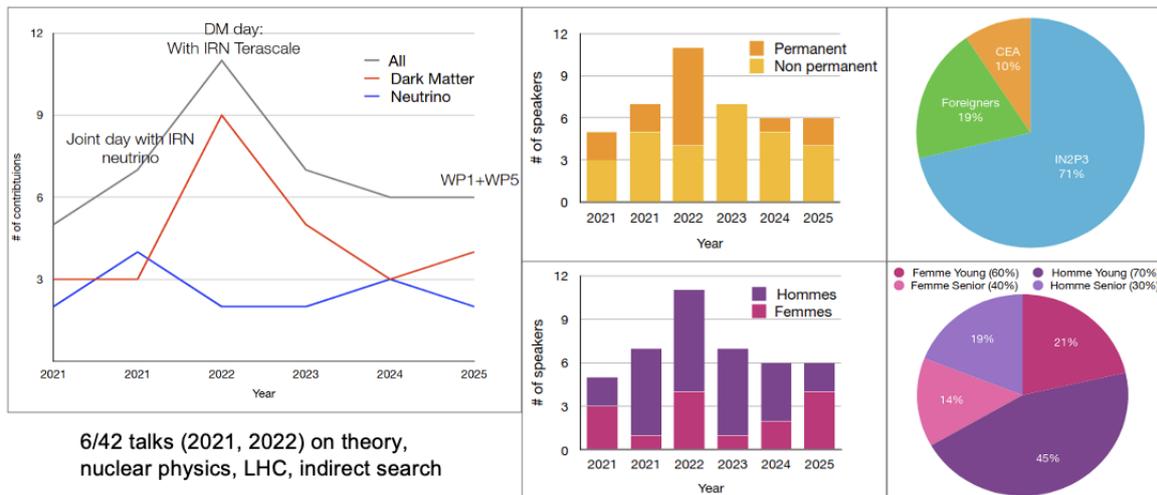
Deep underground physics plays a vital role in the search for physics Beyond the Standard Model (BSM). It enables direct investigations into dark matter (DM), the study of proton decay, and the exploration of neutrino properties, particularly through the search for neutrinoless double-beta decay  $0\nu\beta\beta$ . Work Package 1 (WP1) was established with the following primary objectives:

1. to assess the current status of rare-event BSM physics from both theoretical and experimental perspectives, with a particular focus on French contributions (notably from IN2P3, but also including collaborators from other institutions), while staying informed of international progress;
2. to foster communication between theorists and experimentalists working on rare-event BSM topics, as well as between the various WPs within the GDR;
3. to identify and promote new synergies among experiments and strengthen collaboration with the theory community;
4. to engage and encourage young researchers to participate in GDR activities and contribute to ongoing deliverables.

### Actions

During the five years of the first GDR DUPhy mandate, one of the main missions of WP1 was to communicate the latest results in underground physics at general meetings, addressing both IN2P3 activities and significant international developments (Goal 1). The topics covered ranged from fundamental physics to geophysics as well as other disciplines that share tools and methodologies with our community (e.g., biology, environmental sciences, forensic science). A notable deliverable of this activity is an open-source tool developed for plotting current dark matter results. This tool offers customizable plotting options and includes integrated bibliographic references. It is publicly available online at <https://github.com/odadoun/DarkPlotter>, and can be downloaded for offline use or run interactively as a notebook via the Binder service.

In addition to specialized presentations, typically delivered by early-career researchers, WP1 also organized overview talks aimed at providing broader context and fostering discussion between theorists and experimentalists. These talks supported Goals 2-4 by encouraging reflection on the current theoretical landscape, experimental status, and future directions. Notable outcomes include collaborative events with other international networks, such as a joint discussion day with the IRN Neutrino in 2021 and with the IRN Terascale on dark matter in 2022. Exchanges with other WPs were also actively promoted through close coordination to ensure that general meeting presentations were complemented by detailed insights into technologies, analysis methods, and planned upgrades. Over the 2021–2025 period, WP1 hosted 42 presentations, delivered by both permanent and non-permanent staff, including senior and junior scientists, as well as a balanced representation of women and men (see Fig. 2.1). WP1 played a central role in facilitating discussions on the current status and future of rare-event physics in underground laboratories.



**Figure 1.** Statistical overview of WP1 presentations (including WP5 in 2025). Credits: Luca Scotto Lavina (LPNHE), Christine Marquet (LP2i), Mariangela Settimo (Subatech).

Through its members, WP1 has also been actively involved in national discussions on the strategic direction of rare-event physics, particularly dark matter and neutrinoless double-beta decay, in the context of defining the French roadmap for the 2025-2030 period.

## 2.2 WP2: Low Radioactivity Techniques (Conveners: Jose Busto, CPPM; Maryvonne De Jesus, IP2I; Silvia Scorza, LPSC)

### Objectives

Current and next-generation experiments in dark matter detection, neutrinoless double-beta decay, and low-energy neutrino physics demand increasingly stringent background reduction strategies to reach their scientific objectives. These experiments are typically conducted in deep underground laboratories to mitigate external backgrounds, particularly those induced by cosmic rays. As experimental sensitivity continues to improve, whether in terms of probing lower dark matter interaction cross-sections, longer half-lives for neutrinoless double-beta decay, or enhanced rate and spectral-shape resolution for low-energy neutrinos, detector volumes are increasing, and the requirements for ultra-low background levels are becoming ever more critical.

Background reduction efforts generally fall into two broad categories: (1) innovative experimental design to minimize background impact, and (2) direct control of background source terms. A review of recent published results across these fields reveals that, for nearly all experiments, the dominant limiting background arises from radioactive contaminants internal to the construction materials. These internal backgrounds are primarily caused by naturally occurring primordial radionuclides—most notably those from the uranium and thorium decay chains, as well as potassium-40. Thus, direct management of source terms involves selecting and qualifying materials with extremely low levels of these isotopes, using precise radioassay techniques throughout the construction phases of large-scale detectors to ensure background targets are met. This approach is commonly referred to as *low-background materials and assay*, which forms the central focus of Work Package 2 (WP2) within the GDR DUPhy.

## Actions

The choice of material assay technique depends on several factors: the specific isotope or impurity to be measured, the type of material under investigation, and the sensitivity required by the experiment. As a result, a broad range of complementary methods and specialized facilities is needed, tailored to the requirements of each experimental program. Over the past five years, WP2 has organized dedicated round tables, seminars, and surveys focused on the most widely used techniques for screening materials for radioactive impurities. These include radiometric methods, which detect radiation emitted directly from the material, and mass spectrometry techniques, which enable the precise quantification of radionuclide concentrations—particularly for long-lived isotopes.

In particular, WP2 activities have addressed the capabilities, limitations, and development needs of several key techniques: Neutron Activation Analysis (NAA), Inductively Coupled Plasma Mass Spectrometry (ICPMS) with Laser Ablation (LA-ICPMS), and High-Purity Germanium (HPGe) gamma-ray spectroscopy. These methods have been examined in depth to assess their suitability for future experiments, through both targeted round table discussions (see Appendix B) and dedicated seminars held during GDR plenary meetings.

The LA-ICPMS technique using femtosecond lasers has been developed by the IPREM laboratory for a range of applications. The technique can be adapted to measure both surface and bulk contaminations of materials at the sub-ppt level. A promising quantitative method has been demonstrated on acrylic, achieving sensitivities down to a few  $10^{-13}$  g/g for uranium and thorium impurities. In addition to bulk sensitivity, this technique is particularly powerful for evaluating surface contamination and optimizing cleaning procedures for experimental components. Continued efforts are needed to expand the method to other materials critical to low-background physics. Strengthening the interdisciplinary collaboration between physics and chemistry communities is essential, particularly in the context of ICP-MS technologies.

High-Purity Germanium (HPGe) gamma-ray spectroscopy is a mature and widely adopted technique and remains the primary tool for radiometric material assay in screening and selection programs. Within the GDR DUPhy community, a clear need has been identified for next-generation HPGe detectors featuring improved shielding, ultra-low background crystals, and enhanced sensitivity. To address these issues, a dedicated round table on HPGe activities in underground laboratories was held in September 2024. The meeting included strong international participation, with contributions from LNGS, LSC, and Boulby laboratories. Notably, LNGS and LSC presented their existing HPGe screening infrastructures and discussed future developments. One key outcome of the round table was the recognition that underground laboratories should take a leading role in coordinating HPGe-based material screening programs. Concrete proposals included the definition of shared protocols and the scheduling of cross-calibrations between germanium detectors across different sites, to ensure consistency and improve the reliability of assay data.

Regarding Neutron Activation Analysis (NAA), the French community currently relies on NAA facilities available elsewhere in Europe, with no immediate plans to develop dedicated infrastructure or in-depth expertise within France. However, the upcoming Jules-Horowitz research reactor at Cadarache may offer opportunities worth exploring in the future.

Another important topic addressed by WP2 is radon radioactivity and its contribution to the background in rare-event experiments. In response to growing interest, WP2 organized a series of seminars and a dedicated round table, culminating in an interdisciplinary workshop held in May

2025 in France<sup>3</sup>. This event brought together researchers from various scientific domains to discuss the challenges and opportunities associated with radon mitigation. In this context, the IRENE project (*Innovative mateRials for Extreme radon capturE*), a collaboration between CPPM and four laboratories specializing in chemistry and materials science, has been launched to investigate new high-performance adsorbents for radon capture over the next four years. Additionally, WP2 has identified the study of radon emanation in key detection media, such as water, liquid scintillator, argon, and xenon, as a topic of significant impact. Despite its importance, data in this area remain scarce. WP2 aims to promote and develop research on radon behavior in these media, as it is crucial for improving the background models of next-generation rare-event experiments.

To support those efforts, additional resources, especially the establishment of a shared postdoctoral position on radon or on ICP-MS, are highly recommended.

### **2.3 WP3: Detection of rare-events (Conveners: Claudio Giganti, LPNHE; Romain Gaïor, LPNHE; Stefanos Marnieros, IJCLab)**

#### **Objectives**

The objectives of WP3 were to stimulate and advance discussions on the following topics related to Dark Matter (DM) and neutrinoless double beta decay ( $0\nu\beta\beta$ ) experiments:

1. **Signal characterization** – A detailed understanding of the detector response is essential for accurately extracting the physical signal and plays a crucial role in background suppression.
2. **Calibration efforts** – Extending the experimental sensitivity requires corresponding calibration strategies. A typical example is the measurement of the quenching factor for nuclear recoil detection across different target nuclei.
3. **Experimental design** – Proper design is necessary to ensure minimal levels of radioactive background in the detector environment.

The common goal across these topics was to foster the exchange of expertise in key areas such as signal and background modeling, calibration techniques, and the selection of technologies and detector components, essential aspects for all experiments in the field.

#### **Actions**

The main action undertaken by WP3 was the organization of dedicated sessions during the GDR plenary meetings. Given that the field consists of multiple small to medium-sized experiments (at the IN2P3 scale), the initial task was to present and reference these experiments through dedicated talks. A particular effort was made to encourage the participation of students and postdoctoral researchers in the plenary sessions.

Out of the 20 talks presented across six meetings, most focused on the experimental setups, calibration procedures, and their current status. Some talks addressed specific technologies shared by several experiments (e.g., “*Crystals for heat-scintillation cryogenic bolometers used in rare event searches*,” by Matias Velazquez), while others proposed novel technologies for potential future developments (e.g., “*Polarized bolometer, a new tool essential to neutrino physics?*” by Maurice Chapellier).

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<sup>3</sup>Rencontre scientifique interdisciplinaire sur le Radon, 14-16 May 2025 <https://indico.in2p3.fr/event/34193>

## **2.4 WP4: Simulation & Analysis (Conveners: Davide Franco, APC; Jacob Lamblin, LPSC)**

### **Objectives**

One of the main challenges in rare-event physics is the extraction and identification of signal events, which are typically buried in background noise. This task requires dedicated and sophisticated analysis methods. In addition, simulation tools are essential for predicting the residual background after event selection and for validating these predictions. Finally, well-established and robust statistical methods are necessary to draw reliable conclusions from the data, whether in the form of a discovery or an upper limit. The objective of WP4 is to review the various methods used for both simulation and data analysis, to compare their performance, promote knowledge exchange, and identify synergies between different experiments.

### **Actions**

WP4 proposed the following actions:

1. Compilation, review and comparison of Monte Carlo event generators;
2. Identification of the most suitable Monte Carlo tools and configurations for each experimental case addressed within the GDR DUPhy;
3. Promotion and dissemination of machine learning techniques;
4. Review of frequentist and Bayesian statistical approaches for extracting rare-event signals and for setting limits or defining discovery contours.

Regarding item (1), a significant portion of the meeting discussions focused on neutron simulations, specifically,  $(\alpha, n)$  reactions and gamma cascades induced by neutron captures on gadolinium. Neutrons are among the most problematic backgrounds in direct dark matter searches, double beta decay experiments, and neutrino detection via coherent nuclear scattering. In relation to item (2), various simulation techniques were discussed, particularly those aimed at optimizing light and phonon propagation processes that are typically computationally intensive, as well as background generation methods. Concerning item (3), two talks were dedicated to machine learning, a technique that, while not yet widespread in this field, is gaining interest due to its promising potential. As for item (4), we have engaged with experts in Bayesian statistics who have expressed interest in contributing to future meetings. However, this topic remains largely unexplored at present. In addition to the planned topics, two talks addressed subjects outside the proposed objectives: one on distributed computing, and another on a web-based tool for comparing dark matter exclusion limits.

## **2.5 WP5: Future experiments (Conveners: Andrea Giuliani IJCLab; Björn Herrmann, LAPTh; Dominique Thers, replaced by Julien Masbou, Subatech)**

### **Objectives**

The aim of WP5 was to develop a scientific roadmap for the French community, in collaboration with international partners, by fostering connections among theoretical physicists, particle physicists, nuclear physicists, astrophysicists, and cosmologists. WP5 also maintained a scientific and technological watch on physics topics, detector development, experimental efforts, and the activities of underground laboratories.

## Actions

The group followed and reported on several key experiments in neutrinoless double beta decay ( $0\nu\beta\beta$ ) and direct dark matter detection at various meetings: CUPID ( $\beta\beta0\nu$ ), DarkSide-20k (DM), LZ\* (DM &  $\beta\beta0\nu$ ), nEXO ( $\beta\beta0\nu$ ), NEWS-G\* (DM), Oscura (DM), PandaX-III\* ( $\beta\beta0\nu$ ), R2D2\* ( $\beta\beta0\nu$ ), SuperNEMO\* ( $\beta\beta0\nu$ ), Tesseract (DM), XENONnT\* (DM &  $\beta\beta0\nu$ ), XLZD (DM &  $\beta\beta0\nu$ ). Experiments marked with an asterisk (\*) are currently taking data and are now primarily followed by WP1.

A key activity of WP5 was the organization of a round table in 2022 at Subatech (Nantes), dedicated to the Laboratoire Souterrain de Modane (LSM), with participation from the laboratory's Scientific and Technical Directors. The event included updates on ongoing experiments hosted at LSM, proposals for future projects, and a constructive discussion on the laboratory's short-term capabilities and requirements. A long-term vision for LSM was also outlined. This round table laid the groundwork for the status and planning report subsequently presented to IN2P3 by LSM leadership. As a follow-up, a group visit to LSM was organized during the Aussois meeting in June 2023, allowing participants to become familiar with the site. The visit highlighted LSM's already operational infrastructure and its readiness to host current and future low-background experiments.

This WP5 was naturally an opportunity to present the forthcoming international projects, which are structuring the community, to the French partners.

## 3 Prospects for 2026-2030

The GDR DUPhy successfully fulfilled its mission during its first term by bringing together the French scientific community working on deep underground physics. Through numerous technical and theoretical exchanges, the development of themes of national and international relevance, and interactions with other GDRs and IRNs, DUPhy has provided IN2P3 community with a clearer overview of the field and highlighted the technical and scientific expertise present in France.

There is strong consensus among participants to renew DUPhy for a second term. The community is cohesive, with strong participation from both domestic and international early-career researchers. The initiative has helped clarify the connections between dark matter and  $0\nu\beta\beta$  physics, and has structured the French community around shared experimental and theoretical challenges.

During the last two plenary meetings of the GDR, the community extensively discussed the shape of the second mandate. The GDR council synthesized these discussions to produce the present document. The following sections provide brief summaries of the WP reports prepared by the conveners and discussed in October 2024 with Vincent Poireau and Nicolas Leroy, DAS for *Astroparticules et Cosmologie*, and Marcella Grasso, DAS for *Nucléaire et Hadronique*, followed by an organizational proposal.

### 3.1 Summary of the Work Packages Reports

#### WP1 – Physics of Rare Events

WP1 focused on experimental and theoretical efforts related to dark matter and neutrinoless double beta decay ( $0\nu\beta\beta$ ), the two main pillars of rare-event physics in underground laboratories. The group reported substantial activity over the course of the mandate, with most of the initially defined

deliverables completed. WP1 fostered a clearer understanding of the national research landscape and strengthened connections with international projects. Notably, networking was significantly enhanced, both within France and with IRNs abroad.

For the second mandate, the conveners proposed restructuring WP1 with two major changes to more clearly separate theoretical and experimental efforts, and to better align with long-term experimental planning. The first action is merging it with WP5. The second is to reinforce the efforts in data interpretation and theoretical models with a dedicated WP that will focus on theory, phenomenology and the interactions with other GDR/IRN. This reshaped WP1 will continue to support links between ongoing research activities and the key features of underground physics laboratories. Several upgraded detectors are currently under construction, with significant results expected in the coming years. Communicating these findings and discussing their implications for data interpretation will remain central to engaging the scientific community and guiding future collaborations, as well as technological and theoretical developments. Future directions may also involve deeper integration of insights from astrophysics, cosmology, nuclear and high-energy physics.

### **WP2 – Low Radioactivity Techniques**

WP2 aimed to foster the exchange of expertise in background reduction, instrumentation, and calibration techniques essential for ultra-sensitive underground experiments. The group organized focused round-table discussions, primarily in virtual formats, to share knowledge and best practices. Its recommendations highlighted the need to appoint a low-radioactivity liaison within each major French experiment and emphasized the importance of mentoring early-career researchers in this domain. Senior scientists were also encouraged to actively promote WP2 activities within their collaborations. While topics such as material radiopurity and background mitigation are essential, they are often perceived as overly technical, resulting in limited involvement from collaborators. Participation in WP2-organized meetings and round tables has remained low, with audiences largely composed of the same core group of individuals, and with minimal transfer of knowledge to younger researchers. Its recommendations highlighted the need to appoint a low-radioactivity liaison within each major French experiment. Current and future experimental programs require material purities at the microbecquerel level, or even below, corresponding to fewer than one radioactive atom per cubic meter or per kilogram. In this context, radon mitigation remains a particularly pressing issue. Although the IN2P3-funded MicroRadon master project concluded in 2023, there is strong community support for establishing a permanent platform dedicated to radon characterization and control.

A likely extension of the GDR DUPhy will be necessary to sustain and expand the initiatives launched by WP2. In particular, training a new generation of experts in low-background techniques is essential for the long-term success of underground physics in France. WP2 supports the organization of dedicated schools and training sessions focused on radiopurity and background reduction methods. Strengthening human resources in this domain will be critical to creating the critical mass and interdisciplinary synergy needed to elevate the visibility and perceived importance of low-radioactivity research. As a concrete example, the request for a shared postdoctoral position between LP2i Bordeaux and IPREM is expected to significantly enhance the community's capacity and engagement in WP2 activities.

### **WP3 – Detection of Rare Events**

WP3 focused on detection technologies, hosting 19 presentations across five plenary meetings.

These covered a broad range of experimental efforts in dark matter and double-beta decay detection, including contributions to crystal fabrication and innovative R&D on polarized bolometers. The conveners noted that, while many valuable contributions were made, identifying common ground remained challenging due to the highly specific nature of each experiment.

WP3 will continue along the same trajectory, aiming to bring together experimentalists from the low-background community to exchange expertise. Particular attention will be given to emerging techniques, with WP3 serving as a natural forum for discussions on new technological directions to be pursued within the French research landscape, in collaboration with the GDR DI2I. The group plans to organize focused half-day round tables on specific topics such as quantum sensors and the unexplained low-energy event excesses.

#### **WP4 – Simulation & Data Analysis**

WP4 reviewed computational tools, simulations, and analysis methodologies used across DUPhy-related experiments. Over the five-year term, 14 presentations were given, covering major projects such as XENONnT, SuperNEMO, nEXO, and GERDA/LEGEND, as well as specialized tools like the *Dark Matter Plotter*. Key topics included particle tracking software (e.g., GEANT4, FLUKA), detector response modeling, and statistical approaches—including Bayesian versus frequentist methods, profile likelihoods, and machine learning techniques. WP4 identified a clear need for improved coordination of software tools and proposed the creation of a centralized summary page on the DUPhy website to consolidate available codes and configurations. The conveners also noted a lack of interaction with experts in Bayesian statistics, although some have expressed interest in future participation.

For a second mandate, WP4 will continue to promote the comparison and benchmarking of simulation tools and will broaden its efforts in facilitating knowledge exchange on statistical methods and machine learning.

#### **WP5 – Future experiments**

WP5 primary goal was to present the upcoming international projects to French researchers. This was also an opportunity to better showcase the LSM to the French community (group visit to LSM during the Aussois meeting). A dedicated session presenting current and medium-term projects in this laboratory was also organized (Nantes plenary meeting) with the participation of the LSM's scientific and technical management.

The conveners emphasized the importance of DUPhy acting not only as a technical and scientific network, but also as a strategic player within the broader European underground science community. In the second GDR term, the scope of WP5 will be integrated into WP1. The newly formed WP1 will be responsible for strengthening ties with the IRNs Neutrino and Terascale and with the GDRs RESANET and DI2I, with the aim of contributing more effectively to structuring reports commissioned by the European Commission. DUPhy members, motivated by physics and skilled in the detection techniques required for low-background experiments, are well-positioned to play a key role in these efforts. Connections with major European underground laboratories, such as Canfranc (Spain), Gran Sasso (Italy), and Boulby (UK), will also be reinforced.

### 3.2 General thoughts for a second mandate

The previous section presented the outcomes and perspectives of each Work Package. In addition to the merger of WP1 and WP5 (now unified under the name WP1 to better align scientific goals of present and future rare-event experiments), two new Work Packages are proposed:

- **WP5 – Phenomenology and Theory:** Initially part of WP1, this thematic area now becomes a dedicated Work Package. The community identified a clear need for a focused effort to strengthen the interface between theoretical work and experimental activities, and to better integrate phenomenological insights across DUPhy-related topics. On top of that, this work package would promote the interface with already existing GDR/IRN (such as IRN Neutrino, IRN Terascale and GDR RESANET).
- **WP6 – Outreach and Open Science:** These two areas have become essential pillars of modern scientific research, and a dedicated Work Package is considered necessary. During the first mandate, it became clear that many groups had developed excellent outreach materials that effectively communicated the value of physics in general, and underground physics in particular, to the public. Improved coordination and sharing of resources would help promote the visibility of our community. A dedicated focus on Open Science would support the dissemination and sharing of research results, as well as enhance internal collaboration. Both outreach and Open Science are key to fostering knowledge exchange within the community, contributing to the dialogue between science and society, and attracting young people to careers in science.

Other non-structural developments planned for the second term of the GDR include:

- Maintaining one regular plenary meeting per year, scheduled at a consistent time, ideally in June, to facilitate the participation of young researchers, including M2 internship students.
- Continuing to explore broader societal responsibilities, particularly in relation to inclusivity and sustainability.
- Building on the first mandate's emphasis on providing early-career researchers with opportunities to present their work and exchange ideas within the GDR's open and constructive environment. To further support this objective, each Working Group will include an additional early-career convener. We are aware of the turnover that this would imply for those positions.

Over the past years, the GDR has significantly strengthened its links with international underground laboratories. Discussions have emerged regarding a potential transition of DUPhy from a GDR to an IRN structure. While such a transition would broaden its international scope, it may also risk weakening internal community cohesion. Further reflection is required, but the second mandate could serve as a springboard for establishing an IRN, provided that the current momentum and collaborative environment continue to evolve positively.

From a management perspective, our proposal includes the following elements:

- Each Work Package will be coordinated by two or three conveners, in addition to one early-career convener.

- The GDR leadership will adopt a co-directorship, consisting of two co-directors, with the goal of better representing both dark matter and neutrinoless double beta decay physics cases.
- Communication and invitation to contribute to the GDR will be conducted via the DUPhy mailing list (hosted on `listserv.in2p3.fr`).
- The contributions will be selected with attention to gender balance, career stage diversity, representation across laboratories, and a well-balanced range of topics.
- The GDR council will be composed of the direction, one representative convener per WP, and one early-career researcher representative.

### 3.3 Proposed management structure

By wrapping up all the elements discussed above, we propose the following management structure for a second mandate.

- Direction : 2 co-directors
- Six Work Packages:
  - WP1 : Physics of Rare Events
  - WP2 : Low Radioactivity Techniques
  - WP3 : Detection of Rare Events
  - WP4 : Simulation & Data Analysis
  - WP5 : Phenomenology and Theory
  - WP6 : Outreach and Open Science
- Each Work Package has two or three senior conveners (with a balance between Dark Matter and Neutrino physics) plus one early-career convener
- Council (9 people) : the two co-directors, one senior convener per WP, one early-career representative
- Frequency of plenary meetings : once per year (the site rotating around the involved unities)
- Date : in June (maximization presence of students), with exceptions if coordination with other GDR/IRN

## 4 Conclusion

GDR DUPhy's first term has been marked by strong scientific engagement, community-building, and cross-disciplinary collaboration. With thoughtful restructuring and strategic ambition, DUPhy is well-positioned to continue as a leading network for French and international underground physics in its second term 2026-2030.

## **A Appendix: GDR statistics**

### **2021- May, kickoff meeting, visio**

- 10 women, 20 men, 4 presentations by researchers from foreign laboratories,
- 5 general introductions on WP,
- 6 DBD, 9 DM, 3 reviews (1 DBD and 2 DM), 2 talks on underground science,
- 5 talks on WP2 thematics,
- 1 general discussion on the GDR.

### **2021 – Dec., LPNHE, Joint session with IRN Neutrino**

- 7 women, 15 men, 1 presentation by researcher from foreign laboratory,
- 7 DBD, 7 DM, 2 neutrino reviews, 1 talk on solar axions,
- 4 talks on WP2 thematics,
- 2 round tables (WP2 and WP4).

### **2022, Subatech, Joint session with IRN Terascale**

- 9 women, 21 men, 2 presentations by researchers from foreign laboratories,
- 10 DBD, 16 DM, 1 DM review,
- 3 talks on WP2 thematics,
- 1 LSM dedicated session.

### **2023, Aussois**

- 5 women, 15 men, 5 presentations by researchers from foreign laboratories,
- 3 DBD, 13 DM, 1 talk on PAUL underground lab,
- 2 round tables and 1 review on WP2 thematics,
- 1 LSM visit.

### **2024, IP2I**

- 5 women, 13 men, 6 presentations by researchers from foreign laboratories,
- 6 DBD, 7 DM, 1 talk on PAUL underground lab,
- 2 talks and 1 review on WP2 thematics,
- 1 LSM status,

- 5 WP status,
- 1 general discussion on DUPhy's future

### **2025, IP2I**

- 6 women, 10 men, 3 presentations by researchers from foreign laboratories,
- 2 DBD, 7 DM, 1 DBD discussion,
- 4 talks on WP2 thematics,
- 1 LSM status,
- 1 discussion of DUPhy's future (with Arnaud Lucotte).

## **B Appendix: WP2 round tables**

### **NAA:**

- Monica Sisti (INFN, Milano-Bicocca) (Invited Talk at Kick-off meeting, May 2021  
Talk: Neutron Activation Analysis for low background experiments.
- Olivier Meplan (LPSC Grenoble), LBA@LPSC, November 24, 2021
- Ulli Coster (ILL Grenoble), January 10, 2022  
Seminar: Opportunities for neutron activations at ILL Grenoble
- Ali Dastgheibi-Fard (LPSC Grenoble, LSM), November 24, 2021

### **LA-ICPMS (invited convener: Frédéric Perrot):**

- Frédéric Perrot (LP2i Bordeaux), Invited Talk at Kick-off meeting, May 2021
- Christophe Pécheyran (IPREM, Université de Pau et des Pays de l'Adour), Invited Talk at General Meeting, November 2021.
- Frédéric Perrot (LP2i Bordeaux), Seminar, General Meeting, October 2022.

### **Radon (invited convener: Luca Terray)**

- Hardy Simgen (Max Planck Institute Heidelberg)  
Seminar: Radon background in astroparticle physics experiments - Past achievements and future challenges.
- Guillaume Bertrand (CEA Saclay)  
Seminar: Metal Organic Framework for radioactive gas detection.
- Luca Terray (LP Clermont)  
Seminar: The radon in Earth and Environment Sciences in France.
- Jose Busto (CPPM Marseille)  
Seminar: Radon capture on Microporous Materials.

### **HPGe spectrometer**

- Silvia Scorza (SNOLAB), March 17, 2022  
Seminar: Material screening and assay program for underground science @SNOLAB
- WP2 Community Survey for Screening - Round Table at 2023 General Meeting
- Carlos Peña Garay (LSC), "HPGe at LSC", round table on HPGe activities at underground laboratories, September 2024
- Mathias Laubenstein, LNGS, "The ultra-low background laboratory STELLA (SubTERRanean Low Level Assay) in the Laboratori Nazionali del Gran Sasso (Italy) underground laboratories", round table on HPGe activities at underground laboratories, September 2024

## 31 May – 2 June 2021: GDR DUPhy Kick-off meeting (distanciel)

<b>1</b>	<b>lun. 31 mai</b>	
	Welcome (Corinne Augier)	1
	WP1 session - Rare event physics: WP1 (1) - Chair: Ch. Marquet	1
	Break	1
	WP1 session - Rare event physics: WP1 (2) - Chair: M. Settimo	1
	WP3 session - Detection of rare events: WP3 (1) - Chair: R. Gaior	1
	Break	1
	WP3 session - Detection of rare events: WP3 (2) - Chair: R. Gaior	2
<b>3</b>	<b>mar. 1 juin</b>	
	WP2 session - Low radioactivity techniques: WP2 (1) - Chair: M. De Jesus	3
	Break	3
	WP2 session - Low radioactivity techniques: WP2 (2) - Chair: M. De Jesus	3
	WP2 session - Low radioactivity techniques: Discussion - Chair: J. Busto	3
	Break	3
	WP4 session - Simulation & Analysis: WP4 - Chair: J. Lamblin	3
<b>5</b>	<b>mer. 2 juin</b>	
	Underground Science and DULs: Chair: C.Augier	5
	WP5 session - Future experiments: WP5 (1) - Chair: D. Thers	5
	Break	5
	WP5 session - Future experiments: WP5 (2) - Chair: A. Giuliani	5
	Break	6
	General discussion: All	6

### WP1 session - Rare event physics: WP1 (1) - Chair: Ch. Marquet

Session

13:30 - 13:40 **WP1 Introduction**

Orateur

Luca Scotto Lavina

13:40 - 14:20 **Dark matter review (Geneviève Bélanger)**

Orateur

Genevieve Belanger

14:20 - 15:00 **Double beta decay review (Julia Harz)**

Orateur

Julia Harz

15:00 - 15:20 **CUPID-Mo results (Dounia Helis)**

Orateur

Dounia Helis

## WP1 session - Rare event physics: WP1 (2) - Chair: M. Settimo

Session

15:35 - 15:55 Dark matter sub-GeV (Jean-Philippe Zopounidis)

Orateur

Dr Jean-Philippe Zopounidis

15:55 - 16:15 Sub-GeV dark matter searches with the EDELWEISS experiment (Hugues Lattaud)

Orateur

Hugues Lattaud

## WP3 session - Detection of rare events: WP3 (1) - Chair: R. Gaior

Session

16:15 - 16:35 WP3 Introduction

Orateur

Claudio Giganti

16:50 - 17:10 Calibration of the XENON experiments (with Kr83m) (Maxime Pierre)

Orateur

Maxime PIERRE

17:10 - 17:30 BINGO (Hawraa Khalife)

Orateur

Hawraa Khalife

17:30 - 17:50

Directionality and 3D tracks in the (sub)keV range with the MIMAC detector (Cyprien Beaufort)

Orateur

Cyprien Beaufort

17:50 - 18:10

CROSS experiment: surface background rejection in bolometric  $0\nu 2\nu$  searches (Anastasiia Zolotarova)

Orateur

Anastasiia Zolotarova

18:10 - 18:30 Towards the DAMIC-M experiment (Georgios Papadopoulos)

Orateur

Georgios PAPAPOPOULOS

## WP2 session - Low radioactivity techniques: WP2 (1) - Chair: M. De Jesus

Session

13:30 - 13:35 WP2 Introduction (Maryvonne De Jesus)

Orateur

maryvonne de jesus

13:35 - 14:05 Screening activities with HPGe detectors (Pia Loaiza)

Orateur

Pia Loaiza

## WP2 session - Low radioactivity techniques: WP2 (1) - Chair: M. De Jesus

Session

14:05 - 14:35 Neutron Activation Analysis for low background experiments (Monica Sisti)

Orateur  
monica sisti

14:35 - 15:00 LA-ICPMS (Frédéric Perrot)

Orateur  
Frédéric PERROT

15:15 - 15:40 BiPo: a dedicated radiopurity detector for planar samples (Hector Gomez-Maluenda)

Orateur  
Hector Gomez

15:40 - 16:05 Radon (Jose Busto)

Orateur  
Jose Busto

## WP2 session - Low radioactivity techniques: Discussion - Chair: J. Busto

Session

## WP4 session - Simulation & Analysis: WP4 - Chair: J. Lamblin

Session

17:00 - 17:10 WP4 Introduction (Davide Franco)

Orateur  
Davide Franco

17:10 - 17:50 The simulation of neutrinoless double beta decay experiments (Luigi Pertoldi)

Orateur  
Luigi Pertoldi

17:50 - 18:30 Machine learning for LXe TPC analysis (Sid El Moctar Ahmed Maouloud)

Orateur  
Sid El Moctar AHMED MAOULOUD

## Underground Science and DULs: Chair: C.Augier

Session

13:30 - 14:00 Les ultra-basses radioactivités, une nouvelle frontière pour la biologie (Vincent Breton)

Orateur  
Vincent BRETON

14:00 - 14:30 Discussion about underground science and DULs (All)

Orateur  
Corinne AUGIER

## WP5 session - Future experiments: WP5 (1) - Chair: D. Thers

Session

14:30 - 14:40 **WP5 Introduction**

Orateur  
Björn Herrmann

14:40 - 15:10 **Dark matter outlook (Andreas Goudelis)**

Orateur  
Andreas Goudelis

## WP5 session - Future experiments: WP5 (2) - Chair: A. Giuliani

Session

15:25 - 15:45 **SuperNEMO (Malak Hoballah)**

Orateur  
Malak HOBALLAH

15:45 - 16:05

**CUPID : searching for neutrinoless double beta decay with Li<sub>2</sub>MoO<sub>4</sub> scintillating bolometers (Antoine Armatol)**

Orateur  
Antoine Armatol

16:05 - 16:25 **Towards an Era of Discovery: Status of the XENONnT Experiment (Erwann Masson)**

Orateur  
Dr Erwann Masson

16:25 - 16:45 **Direct dark matter searches with the LZ experiment (Quentin Riffard)**

Orateur  
Quentin Riffard

16:45 - 17:05 **Status and future of the NEWS-G collaboration (Paco Vazquez Da Sola)**

Orateur  
Francisco Vasquez de Sola

## General discussion: All

Session

## 29 Nov. – 1 Dec. 2021: GDR DUPhy plenary meeting (LPNHE Paris)

### 1 lun. 29 nov.

GDR DuPhy: GDR Council - closed session - Chair: C. Augier	1
Welcome coffee	1
GDR DuPhy: Part 1 - Chair: A. Giuliani	1
Coffee break	1
GDR DuPhy: Part 2 - Chair: J.Busto	1

### 3 mar. 30 nov.

GDR DuPhy: Two different roundtables for discussions - Chair: M. De Jésus (WP2) and J. Lamblin (WP4)	3
Free lunch - Not organized by the GDR	3
Common session GDR DUPhy - IRN Neutrino: Part 1 - Chair: M. Settimo	3
Coffee break	3
Common session GDR DUPhy - IRN Neutrino: Part 2 - Chair: D. Franco	3

### 5 mer. 1 déc.

Common session GDR DUPhy - IRN Neutrino: Part 3 - Chair: C. Giganti	5
Coffee break	5
Common session GDR DUPhy - IRN Neutrino: Part 4 - Chair: R. Gaïor	5
Common lunch organized by the IRN Neutrino (thanks!)	5

IRN Neutrino: See <https://indico.in2p3.fr/event/25014/timetable/#20211201> - Also zoom connexion: <https://cern.zoom.us/j/67325665376?pwd=THJHbnI5d3NtZUtkemozOVA5SVFjUT09>

### GDR DuPhy: Part 1 - Chair: A. Giuliani

Session

14:00 - 14:30 **New EDELWEISS-SubGeV results**

Orateur

Hugues Lattaud

14:30 - 15:00

**Results on Low-Mass Weakly Interacting Massive Particles from a 11 kg d Target Exposure of DAMIC at SNOLAB**

Orateur

Michelangelo Traina

15:00 - 15:30 **Search for light Dark Matter with DAMIC-M**

Orateur

Claudia De Dominicis

15:30 - 16:00 **DarkSide-20k : Status and french contributions**

Orateur

Pascal PRALAVORIO

## GDR DuPhy: Part 2 - Chair: J.Busto

Session

16:30 - 17:00

**Low level measurements of environmental samples with HPGe detectors at Laboratoire Souterrain de Modane**

**Orateur**

Dr Anne De Vismes Ott

17:00 - 17:30

**Direct ultratrace and isotopic analysis in solids by femtosecond LA-ICPMS**

**Orateur**

Dr Christophe Pecheyran

17:30 - 18:00

**Low-activity measurement of radon and radon daughters in air for volcanology**

**Orateur**

Dr Luca Terray

18:00 - 18:30

**Search of solar axions with BabyIAXO**

**Orateur**

Esther Ferrer Ribas

## GDR DuPhy: Two different roundtables for discussions - Chair: M. De Jésus (WP2) and J. Lamblin (WP4)

Session

10:00 - 12:00

**WP2 discussions: Low radioactivity techniques**

10:00 - 12:00

**WP 4 discussions: Simulation & Analysis**

## Common session GDR DUPhy - IRN Neutrino: Part 1 - Chair: M. Settimo

Session |

Site: AMPHI CHARPAK - Jussieu Same zoom link (Monday afternoon, Tuesday afternoon, Wednesday morning): <https://cern.zoom.us/j/67920336017?pwd=K1N3cGx3NU9HUksvQVRFZEFyTkdzdz09>

14:00 - 14:45

**Correlating Muon  $g-2$  Anomaly with Neutrino Magnetic Moments**

**Orateur**

Sudip Jana

14:45 - 15:30

**Towards reliable nuclear matrix elements for neutrinoless double beta decay**

**Orateur**

Frederic NOWACKI

15:30 - 16:00

**New CUPID-Mo limit**

**Orateur**

Toby Dixon

## Common session GDR DUPhy - IRN Neutrino: Part 2 - Chair: D. Franco

Session |

Site: AMPHI CHARPAK - Jussieu Same zoom link (Monday afternoon, Tuesday afternoon, Wednesday morning): <https://cern.zoom.us/j/67920336017?pwd=K1N3cGx3NU9HUksvQVRFZEFyTkdzdz09>

16:30 - 17:00 **Neutron background simulations for the SuperNEMO experiment**

Orateur

Veronika Palusova

17:00 - 17:30 **Simulation of gamma-ray shower after neutron capture**

Orateur

Gabrielle Soum

17:30 - 18:00 **Primary electron identification in NEWS-G's S140 SPC**

Orateur

Dr Francisco Vazquez de Sola

18:00 - 18:30 **Radon deposition: limit of Geant 4**

Orateur

Guillaume Warot

## Common session GDR DUPhy - IRN Neutrino: Part 3 - Chair: C. Giganti

Session |

Site: AMPHI CHARPAK - Jussieu Same zoom link (Monday afternoon, Tuesday afternoon, Wednesday morning): <https://cern.zoom.us/j/67920336017?pwd=K1N3cGx3NU9HUksvQVRFZEFyTkdzdz09>

09:30 - 10:00 **DarkSide-50: characterisation of the LAr ionization response in the keV regime**

Orateur

Julie Rode

10:00 - 10:30 **The R2D2 project: an SPC R&D for the neutrinoless double beta decay search**

Orateur

Vincent Cecchini

## Common session GDR DUPhy - IRN Neutrino: Part 4 - Chair: R. Gaïor

Session |

Site: AMPHI CHARPAK - Jussieu Same zoom link (Monday afternoon, Tuesday afternoon, Wednesday morning): <https://cern.zoom.us/j/67920336017?pwd=K1N3cGx3NU9HUksvQVRFZEFyTkdzdz09>

11:00 - 11:30 **Neutrinoless double-beta decay searches with Xe136-based PandaX-III experiment**

Orateur

Andrii Lobasenko

11:30 - 12:00 **Crystals for heat-scintillation cryogenic bolometers used in the rare event searches**

Orateur

Matias Velazquez

12:00 - 12:15 **Polarized bolometer, a new tool essential to neutrino physics?**

Orateur

Maurice CHAPPELLIER

## 19 – 21 Oct. 2022: GDR DUPhy plenary meeting (Subatech Nantes)

### 1 mer. 19 oct.

Common session with IRN Terascale	1
Coffee break	1
Common session with IRN Terascale	1
Lunch	2
Common session with IRN Terascale	2
Coffee break	2
Common session with IRN Terascale	2
Social Diner	2

### 3 jeu. 20 oct.

GDR DUPhy - WP3	3
Coffee break	3
GDR DUPhy - WP1 & WP5	3
Lunch	3
GDR DUPhy - WP5 - LSM discussion	4
Coffee break	4
GDR DUPhy - WP5 - LSM discussion	4

### 6 ven. 21 oct.

GDR DUPhy - WP4	6
Coffee break	6
GDR DUPhy - WP2	6
Lunch	6

#### Common session with IRN Terascale

Session |

Site: SUBATECH, Charpak amphitheater, IMT Atlantique Campus de Nantes 4, rue Alfred Kastler - La Chantrerie CS 20722 44307 Nantes cedex 3

09:15 - 09:20 **Welcome**

09:20 - 09:30 **Welcome**

Orateur

Dr Gines MARTINEZ

09:30 - 09:35 **IRN Terascale presentation**

Orateurs

Ana M. Teixeira, Marie-Helene Genest

09:35 - 09:40 **GDR DUPhy presentation**

Orateur

maryvonne de jesus

## Common session with IRN Terascale

Session |

Site: SUBATECH, Charpak amphitheater, IMT Atlantique Campus de Nantes 4, rue Alfred Kastler - La Chantrerie CS 20722 44307  
Nantes cedex 3

09:40 - 10:10 **Dark matter indirect detection limits from complete annihilation patterns**

Orateur

Céline ARMAND

10:10 - 10:50

**DM searches @ the LHC and some discussion on complementarity with direct and indirect detection**

Orateur

Marie-Helene Genest

11:30 - 12:00 **Cosattering in micrOMEGAs: a case study for the singlet-triplet dark matter model**

Orateur

Gaël Alguero

12:00 - 12:30 **Probing extended Starobinsky-inflation with future cosmic data**

Orateur

Benedikt Schosser

12:30 - 13:00 **Searching for New Physics in the First XENONnT Data**

Orateur

Dr Erwann Masson

14:30 - 15:00 **DarkSide 50 S2-only results and future DarkSide 20k**

Orateur

Dr Davide Franco

15:00 - 15:30 **First Results of the Low Background Chamber and the DAMIC-M Experiment**

Orateur

Dr Jean-Philippe Zopounidis

15:30 - 16:00 **Low mass Dark Matter searches with NEWS-G: Results with a methane target**

Orateur

Francisco Andres Vazquez de Sola Fernandez

16:30 - 16:50 **DARWIN and the XLZD Consortium**

Orateur

Luca Scotto Lavina

16:50 - 17:10 **The Dark Matter Plotter**

Orateur

olivier dadoun

17:10 - 17:40 **Discussion**

## GDR DUPhy - WP3

Session |

Site: SUBATECH, Charpak amphitheater, IMT Atlantique Campus de Nantes 4, rue Alfred Kastler - La Chantrerie CS 20722 44307  
Nantes cedex 3

09:30 - 10:00 **Calib DarkSide-20K**

Orateur

Marie van Uffelen

10:00 - 10:30 **XeLab**

Orateurs

NABIL GARROUM, Yajing Xing

10:30 - 11:00 **Rare events searches with LiquidO technology**

Orateur

Diana Navas Nicolás

## GDR DUPhy - WP1 & WP5

Session |

Site: SUBATECH, Charpak amphitheater, IMT Atlantique Campus de Nantes 4, rue Alfred Kastler - La Chantrerie CS 20722 44307  
Nantes cedex 3

11:30 - 12:00 **Neutrino searches at the XENON Dark Matter experiment**

Orateur

Yajing Xing

12:00 - 12:30 **nEXO**

Orateur

Dr Julien Masbou

12:30 - 13:00 **CUPID**

Orateur

Antoine ArmatoI

13:00 - 13:15 **Discussion**

## GDR DUPhy - WP5 - LSM discussion

Session |

Site: SUBATECH, Charpak amphitheater, IMT Atlantique Campus de Nantes 4, rue Alfred Kastler - La Chantrerie CS 20722 44307  
Nantes cedex 3

### Description

Special open session on future ideas for astroparticle physics experiments at LSM, in order to better prepare its medium and long-term science program. Introduction by the LSM scientific director (including not astroparticle program), followed by presentations of current and future experiments, then a discussion on the best way to produce a final proposition for the LSM strategic council.

14:45 - 15:10 **LSM Strategy**

Orateur

Jules Gascon

15:10 - 15:35 **Super NEMO**

Orateur

christine marquet

## GDR DUPhy - WP5 - LSM discussion

Session |

Site: SUBATECH, Charpak amphitheater, IMT Atlantique Campus de Nantes 4, rue Alfred Kastler - La Chantrerie CS 20722 44307  
Nantes cedex 3

15:35 - 16:00 **Light Dark Matter searches with TESSERACT**

Orateur  
Julien Billard

16:00 - 16:25 **Status and plans for DAMIC-M at the LSM and Oscura**

Orateur  
Paolo Privitera

16:55 - 17:15 **BINGO**

Orateur  
Hawraa Khalife

17:15 - 17:35 **Directional Dark Matter Detection with MIMAC et non-directionnal with Sedine**

Orateur  
Daniel Santos

17:35 - 17:55 **R2D2 status & projects @ LSM**

Orateur  
Pascal Lautridou

17:55 - 18:15 **CUPID-1T**

Orateur  
Pia Loaiza

18:15 - 19:00 **Discussion**

## GDR DUPhy - WP4

Session |

Site: SUBATECH, Charpak amphitheater, IMT Atlantique Campus de Nantes 4, rue Alfred Kastler - La Chantrerie CS 20722 44307  
Nantes cedex 3

09:00 - 09:30 **Distributed computing resources for XENONnT**

Orateur  
Bernard Andrieu

09:30 - 10:00 **Missing data reconstruction using CNN in the gaseous TPC PandaX-III experiment**

Orateur  
Andrii Lobasenko

10:00 - 10:30 **New simulation codes (alpha, n)**

Orateur  
Emilio MENDOZA

## GDR DUPhy - WP2

Session |

Site: SUBATECH, Charpak amphitheater, IMT Atlantique Campus de Nantes 4, rue Alfred Kastler - La Chantrerie CS 20722 44307  
Nantes cedex 3

11:00 - 11:15 **WP2 Status**

**Orateur**

maryvonne de jesus

11:15 - 11:40 **Laser Ablation ICPMS technique and potentialities- Status of the round table**

**Orateur**

M. Frédéric PERROT

11:40 - 12:05 **The MicroRadon Project**

**Orateur**

Prof. Jose Busto

12:05 - 12:15 **Discussion**

## 21 – 23 Jun. 2023: GDR DUPhy plenary meeting (Caes CNRS, Aussois)

### 1 mer. 21 juin

Lunch	1
Session: WP1	1
Coffee break	1
Session: WP4	1
Session: WP1 & WP5	1
Apéritif & diner	2

### 3 jeu. 22 juin

Session: WP2	3
Coffee break	3
Session: WP2	3
Lunch	3
Session: WP1	3
LSM visit	3
Apéritif & diner	3

### 4 ven. 23 juin

Session: WP3 & WP4	4
Coffee break	4
Session: WP3 & WP4	4
Lunch	4

#### Session: WP1

Session | Site: CAES CNRS AUSSOIS | Responsable de session: christine marquet

13:55 – 14:00 **Welcome**

**Orateur**

Prof. Corinne AUGIER

14:00 – 14:30 **Status and first results of the DAMIC-M experiment**

**Orateur**

Dr Jean-Philippe Zopounidis

14:30 – 15:00 **First WIMP search results from the XENONnT experiment**

**Orateur**

M. Maxime PIERRE

15:00 – 15:30 **CUPID-Mo Results**

**Orateur**

Toby Dixon

15:30 – 16:00 **The DAMIC-M experiment: Background budget and Compton measurement**

**Orateur**

Claudia De Dominicis

## Session: WP4

Session | Site: CAES CNRS AUSSOIS | Responsable de session: Silvia Scorza

16:30 - 17:00 **Detailed GEANT4 Simulation of S2 Photons in XENONnT**

Orateur

Bernard Andrieu

17:00 - 17:30 **G4CMP: Condensed Matter Simulations with GEANT4**

Orateur

Ben LOER

## Session: WP1 & WP5

Session | Site: CAES CNRS AUSSOIS | Responsable de session: Dr Julien Masbou

17:30 - 18:00 **Confirmation of the spectral excess in DAMIC at SNOLAB with skipper CCDs**

Orateur

Michelangelo Traina

18:00 - 18:30 **OSCURA**

Orateur

Paolo Privitera

18:30 - 19:00 **TESSERACT**

Orateur

Julien Billard

## Session: WP2

Session | Site: CAES CNRS AUSSOIS | Responsable de session: Prof. Jose Busto

09:00 - 09:50 **Radon background in astroparticle physics experiments**

Orateur

Hardy SIMGEN

09:50 - 10:30 **Table ronde : Radon**

## Session: WP2

Session | Site: CAES CNRS AUSSOIS | Responsable de session: Silvia Scorza

11:00 - 12:00 **Table ronde : screening**

## Session: WP1

Session | Site: CAES CNRS AUSSOIS | Responsable de session: Luca Scotto Lavina

13:30 – 14:00 **Low-mass dark matter search with DarkSide-50**

Orateur

Timothée Hessel

14:00 – 14:30 **Supernova neutrinos in XENONnT**

Orateur

Daniel LAYOS

## LSM visit

Session | Site: Laboratoire Souterrain de Modane - Modane Underground Laboratory

## Session: WP3 & WP4

Session | Site: CAES CNRS AUSSOIS | Responsable de session: Romain Gaior

09:00 – 09:30

**Ionization Quenching Factor Measurements of H in CH<sub>4</sub> for News-G and Directional detection of proton recoils in the keV region with MIMAC**

Orateur

Daniel Santos

09:30 – 10:00 **LiquidO: detecting light in an opaque medium**

Orateur

Raphael Gazzini

10:00 – 10:30 **Cryosel SSED**

Orateur

Elsa Guy

## Session: WP3 & WP4

Session | Site: CAES CNRS AUSSOIS | Responsable de session: Jules Gascon

11:00 – 11:30 **Xenon Offline Monitoring**

Orateur

Quentin Pellegrini

11:30 – 12:00 **Updates on XeLab Project: a R&D platform of LXe double phase TPC**

Orateur

Yongyu PAN

12:00 – 12:30 **Paarl Africa Underground Laboratory : PAUL**

Orateur

Dr Fairouz MALEK

## 9 – 11 Oct. 2024: GDR DUPhy plenary meeting (IP2I, Lyon)

### 1 mer. 9 oct.

Presentations	1
Coffee break	1
Presentations	1
Diner du GDR	2

### 3 jeu. 10 oct.

Presentations	3
Coffee break	3
Presentations	3
Lunch	3
Visite Cryostat MANOIR	3
Report on WP activities + discussion about GDR DUPhy	3
Coffee break	4
Report on WP activities + discussion about GDR DUPhy	4

### 5 ven. 11 oct.

Presentations	5
Coffee break	5
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## Presentations

Session | Site: IP2I, Amphi Dirac, 4 rue Enrico Fermi - Campus de la Doua - 69100 VILLEURBANNE

14:00 - 14:05 **Welcome**

**Orateur**

Prof. Corinne AUGIER

14:05 - 14:35 **Study and development of new radon adsorbents - The IRENE project**

**Orateur**

Prof. Jose Busto

14:35 - 15:05 **Radon implantation simulation through nuclear recoil**

**Orateur**

guillaume warot

15:05 - 15:35 **Status of WP2 round tables**

**Orateurs**

Prof. Jose Busto, Silvia Scorza, maryvonne de jesus

15:35 - 16:05 **Update from LSM**

**Orateur**

Silvia Scorza

## Presentations

Session | Site: IP21, Amphi Dirac, 4 rue Enrico Fermi - Campus de la Doua - 69100 VILLEURBANNE

16:35 - 17:05 **CUPID: status and prospects**

**Orateur**

Andrea Giuliani

17:05 - 17:35 **Light DM search with TESSERACT**

**Orateur**

Paul Vittaz

17:35 - 18:05 **Search for Double Beta Plus Decays with NuDoubt++**

**Orateur**

Chloé Girard-Carillo

18:05 - 18:35 **DarkSide-20k sensitivity to light dark matter particles**

**Orateur**

Fabrice Hubaut

18:35 - 18:55 **Update on PAUL project**

**Orateur**

Dr Fairouz MALEK

## Presentations

Session | Site: IP21, Amphi Dirac, 4 rue Enrico Fermi - Campus de la Doua - 69100 VILLEURBANNE

09:30 - 10:00 **Impact of Nickel Cryostats in the nEXO Detector**

**Orateur**

Antoine AMY

10:00 - 10:30 **Search for Beyond Standard Model physics with the SuperNEMO Demonstrator**

**Orateur**

Maros Petro

## Presentations

Session | Site: IP21, Amphi Dirac, 4 rue Enrico Fermi - Campus de la Doua - 69100 VILLEURBANNE

11:00 - 11:30 **DAMIC-M electronics: Status and results**

**Orateur**

Lounes IDDIR

11:30 - 12:00 **XeLab - Construction and Commissioning**

**Orateur**

Frédéric Girard

12:00 - 12:30 **The SABRE South experiment at the Stawell underground physics laboratory**

**Orateur**

Owen Stanley

## Visite Cryostat MANOIR

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## Report on WP activities + discussion about GDR DUPhy

Session | Site: IP2I, Amphi Dirac, 4 rue Enrico Fermi - Campus de la Doua - 69100 VILLEURBANNE

### 14:30 - 14:50 Bilan WP1

#### Orateurs

Luca Scotto Lavina, Mariangela Settimo, christine marquet

### 14:50 - 15:10 Bilan WP3

#### Orateurs

Claudio Giganti, Romain Gaior, Stefanos MARNIEROS

### 15:10 - 15:30 Bilan WP4

#### Orateurs

Davide FRANCO, Jacob Lamblin

### 15:30 - 15:50 Bilan WP5

#### Orateurs

Andrea Giuliani, Björn Herrmann, Dominique Thers, Dr Julien MASBOU

### 15:50 - 16:00 Example of outreach in schools

#### Orateur

christine marquet

## Report on WP activities + discussion about GDR DUPhy

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## Presentations

Session | Site: IP2I, Amphi Dirac, 4 rue Enrico Fermi - Campus de la Doua - 69100 VILLEURBANNE

### 09:30 - 10:00 Latest results from the XENONnT experiment

#### Orateur

Dr Maxime PIERRE

### 10:00 - 10:30 Status and results of the DAMIC-M experiment

#### Orateur

Claudia DE DOMINICIS

### 11:00 - 11:30 The effect of neutron and gamma backgrounds in the SuperNEMO experiment

#### Orateur

Sam Pratt

### 11:30 - 12:00 First axion and dark photon dark matter searches with MADMAX

#### Orateur

Pascal PRALAVORIO

## 11 – 12 Jun. 2025: GDR DUPhy plenary meeting (IP2I, Lyon)

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Introduction to the GDRDUPhy Meeting	1
Update on LSM	1
WP1	1
Coffee break	1
WP5	1
Lunch	1
WP3	1
WP2	2
Coffee break	2
WP2	2
Social Dinner	2

### 3 jeu. 12 juin

WP4	3
Coffee break	3
Discussion	3

#### Update on LSM

Contribution | Orateur: Silvia Scorza

#### WP1

Session

09:35 - 10:00 **Probing Benchmark Models of Hidden-Sector Dark Matter with DAMIC-M**

Orateur

Claudia DE DOMINICIS

10:00 - 10:25 **Latest XENONnT Results**

Orateur

Federica POMPA

10:25 - 10:50 **SuperNEMO**

Orateur

christine marquet

## WP5

### Session

11:20 - 11:45

**Impact of extreme ultraviolet radiation on the scintillation of pure and xenon-doped liquid argon**

**Orateur**

Timothée HESSEL

11:45 - 12:10

**The TESSERACT direct dark matter experiment at LSM**

**Orateur**

Julliette BLÉ

12:10 - 12:35

**Feedback on 3rd Summit of Neutrinoless Double Beta Decay**

**Orateur**

Julien MASBOU

## WP3

### Session

14:00 - 14:25

**Updates on XeLAB Project @LPNHE**

**Orateur**

Yajing XING

14:25 - 14:50

**FIXED: Field array emitter in Xe Detector**

**Orateur**

Romain GAIOR

14:50 - 15:15

**Gas recirculation and purification system for Argon**

**Orateur**

Ali DASTGHEIBI FARD

## WP2

### Session

15:15 - 15:40

**Xenon Purification**

**Orateur**

Lutz Althüser

15:40 - 16:05

**Summary of the conference "rencontre Radon" in Marseille (May 2025)**

**Orateurs**

José BUSTO, Luca TERRAY

16:35 - 17:00

**Status and activities of IRENE ANR**

**Orateur**

Hichem TEDJDITI

17:00 - 17:25

**Informing dust backgrounds on low-background detector materials using ICP-MS**

**Orateur**

Maria Laura DI VACRI

## WP4

Session

09:30 – 09:55 **How We Hunt for Rare Processes: Overview of the XENONnT Analysis Workflow**

Orateur

Maxime PIERRE

09:55 – 10:20 **remage: Modern Geant4 simulation package for HPGe detectors**

Orateur

Toby Dixon

## Discussion

Session