Annual Report to the President of the INFN

Il Comitato di Valutazione Internazionale (CVI)

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Introduction

The 2025 annual CVI meeting was held at the Tecnopolo DAMA in Bologna from October 13th to October 15th. The visit organized to the computing facilities at Tecnopolo has been fascinating and a demonstration of the strong position of INFN in this field. We sincerely thank the INFN management for the outstanding hospitality. Our charge was to evaluate the performance and quality of INFN's programs and management. In the sequence of biennial reviews of the four INFN national laboratories, this year's reviews focused on LNF and LNGS.

Executive Summary

Perspective and Strategy – INFN's vision is bold – as it should be – reflecting the scale and importance of the scientific challenges it is committed to addressing. INFN stands stronger than ever on the global stage of particle, astroparticle, and nuclear physics, which is its main mission. This enables INFN to continue taking a leading role in shaping the global research field in the ongoing processes of updating the European strategies for particle and astroparticle physics. Remarkable progress has been achieved in recent years, from a more professional and efficient administration to the enhancement of support for researchers, and the strategic development of research infrastructures. The initial strategic decision to prioritize the installation and upgrading of research infrastructures through PNRR funding has proven to be both timely and highly effective. We recognize the INFN management's efforts to solidify the administrative leadership and praise the efficient and timely execution of PNRR procurements. While we acknowledge the progress by some CSNs to improve on the gender balance, we recommend implementing impactful gender balance actions across all CSNs. We encourage the INFN leadership to build on its strong relationship with the Ministry to actively inform policymakers about the strategic value and potential impact of adapting Italian legislation to facilitate greater mobility between research institutions and universities.

Central Administration – INFN has continued its efforts to modernize and strengthen the efficiency of its Central Administration (CA). The transition to an accrual-based accounting model, mandated by law, together with the management of PNRR projects—which has fostered closer cooperation between administrative and research components—has been a powerful driver of change. Progress toward the new managerial model slowed last year due to turnover in senior management, and meeting the January 2027 deadline for full implementation of the new accounting system remains a challenge. Nevertheless, INFN has reaffirmed its commitment to developing a data-driven management approach to better support strategic decision-making. The steering committee established to guide this process is expected to play a key role in defining and implementing the new model, which will equip INFN's leadership with a comprehensive set of monitoring and analytical tools to strengthen governance and institutional effectiveness.

PNRR – The management by INFN of the massive increase of resources and projects funded by PNRR has been a success. Transition to a new, post PNRR, phase can sustain a higher level of investment in infrastructure if INFN is able to operate as effectively in securing funds in a competitive environment as it has done in executing PNRR programs on time and on budget. To this effect engaging in a constructive dialogue with the Ministry on funding options for important infrastructure expansions and establishing new management processes to attract private-sector funding for computing infrastructure is required.

Directorate of Research Services – DRS provides support to INFN researchers in several activities; the support in securing competitive funding for research is especially relevant in the post-PNRR, more competitive environment. With the support of DRS, INFN researchers already perform very well in that respect, compared to other national and European institutions. DRS should continue to find new ways to monitor the appreciation received by its support and its effect on competitive performance, while INFN leadership may consider making a broader use of DRS capacity of providing well-structured information on competitive programs also to shape its own funding strategy.

Commissione Scientifica Nazionale 1 (CSN1, Fisica delle Particelle) – The committee commends CSN1 for follow-up on 2024 recommendations, effective monitoring of ATLAS and CMS upgrades, and exploration of INFN's potential role in SHiP. It praises the excellent performance of INFN-involved experiments, especially the LHC experiments. It is important to prepare contingency plans for potential HL-LHC upgrade delays or cost overruns. Balancing near-term commitments such as the HL-LHC with long-term ambitions like the FCC is recognized as a major challenge, though current R&D is viewed as a solid foundation for future detector development. The committee welcomes the progress of SND@LHC, including its HL-LHC upgrade TDR, and supports INFN's efforts to strengthen synergies across neutrino, astroparticle, nuclear, and cosmological research.

Commissione Scientifica Nazionale 2 (CSN2, Fisica delle Astroparticelle) – CSN2 continues to grow in researcher participation, and the gender balance continues to improve under proactive management. Many experiments have far more participating researchers than available FTEs, reflecting a broad distribution of individual commitments. A matrix mapping researcher distribution across experiments can inform the creation of policies to avoid excessive dilution of effort. Given that most CSN2 experiments are long-term international efforts amid a shifting global funding landscape, the committee stresses the importance of regularly reassessing INFN's strategic alignment with its partners. Setting clear objectives to strengthen INFN's role in multi-messenger astronomy could become a major asset for INFN.

Commissione Scientifica Nazionale 3 (CSN3, Fisica Nucleare) – The INFN program of nuclear physics keeps its vibrant drive, being one of the most successful in Europe, wide in activities and laboratories. CSN3 has made progress in proactively targeting and reducing the gender balance gap. The INFN nuclear astrophysics program is increasingly interesting. The Bellotti Facility at LNGS constitutes a unique underground laboratory, with a cosmic radiation flux reduced by a million with respect to surface laboratories. The CVI recommends INFN management to set as a strong priority the running of the Bellotti facility and exploration of Carbon burning --crucial to the understanding of stellar evolution, to avoid the risk of being overtaken by international competition. The Alice3 option should be analyzed carefully by INFN. Among the recent news, SPES_MED is now launched, the DM experiment at Jefferson Lab has been approved, and the ePIC detector at EIC is progressing.

Commissione Scientifica Nazionale 4 (CSN4, Fisica Teorica) – The INFN program of theoretical physics is broad, diversified, and it keeps exhibiting strong international leadership. Machine learning techniques and quantum computing are also taking momentum with dedicated IS. The overall growth in terms of people and of FTE keeps a healthy and smooth upwards rise, but for a downwards evolution on phenomenology of particle physics: It is crucial to support the CSN4 efforts on this line, so that it does not compromise its established strong capacity to lead physics discoveries. The CSN4 gender balance situation remains stalled and significantly worse than that of any other CSN. The theory community should set their own quantitative benchmarks on gender balance, and adopt a proactive hiring-search campaign at all levels, extended to the international arena. Furthermore, INFN should maintain (at least) the postdoctoral program of ~15 theoretical positions/year.

Commissione Scientifica Nazionale 5 (CSN5, Ricerca Tecnologica) – CSN5 provides valuable seed funds for new ideas emanating from senior scientists through early career researchers. A broad diversity of projects is funded, and several have gone on to being fully funded by other CSN programs.

The gravitational-wave program – The bold INFN effort on gravitational waves has the potential of having major world impact and leadership, with two principal observational legs: Virgo/EGO and the Einstein Telescope (ET) project. The CVI encourages the INFN efforts to lead a first-class facility such as the ET, which has groundbreaking discovery potential, aiming to ensure that the European GW community aligns behind a configuration and site(s) and continuing its strong efforts in preparing the Sardinia bid. The Virgo/EGO TDR has been delivered and discussed, and most Virgo groups have agreed to join VirgoLab. The foreseen upgrade of Virgo includes significant risks, though. The CVI recommends to carefully map out all these risks, and on the basis of this analysis to make a firm decision with its international partners.

The DarkSide experiment under construction at LNGS – The Darkside-20k experiment located at Laboratori Nazionali del Gran Sasso will search for WIMP dark matter with unprecedented sensitivity in the high mass region. This major project is making progress in all areas, but schedule and budget contingency have now been all used and there is still significant concern on the primary critical path item, the Time projection Chamber. Sourcing of the pure Argon-40 continues to be a concern, but good progress has been made. The Forti committee continues to provide valuable advice steering the project.

Laboratori Nazionali di Frascati (LNF) – LNF remains a leader in accelerator and detector technology, with EuPRAXIA@SPARC_LAB as its central future ambition. Recent successes include surpassing expectations in high-power RF tests of the first X-band structure and achieving beam bending with a plasma device. With the EuPRAXIA TDR expected by end-2025, the committee recommends continuing preparations to achieve the world's first FEL driven by a plasma accelerator, but stresses the need to ensure FEL operation both with and without the plasma module. It also praises LNF's strong industry partnerships, growing user-community engagement, and its vision to continue to be a full research laboratory maintaining LNF's role as a key driver of enabling technologies for particle-physics experiments.

Laboratori Nazionali del Gran Sasso (LNGS) – Gran Sasso is the world leading underground science laboratory. It has a broad science and engineering program that supports experiments in physics, molecular biology, gravity, and earth sciences. It has a suite of world leading experiments that search for dark matter and neutrinoless double beta decay. The next generation experiments in these areas are slotted to be located here. Present challenges are primarily around funding uncertainties from international partners and schedule and funding challenges with Darkside-20k and the delivery of the Time Projection Chamber inner detector from Canada. INFN is encouraged to advance the CUPID schedule by supporting crystal procurement.

High-temperature superconducting magnets – High Temperature Superconductors (HTS) have the potential for big impact on science, society, including fusion research, hadron therapy, energy savings and the environment. The committee congratulates INFN for pursuing a dual approach where HTS impacts both science and society. The IRIS project is an INFN research initiative focused on developing innovative applied superconductivity technologies and has 6 poles across Italy with revamped infrastructure funded by PNRR. There is an expansion of facilities under construction and there are multiple ambitious HTS projects underway with potential for major impact on future accelerators like CERN's FCC-ee that could produce large power and cost savings.

Computing Services and the National Centre CNAF – INFN along with partners has assembled a world leading High Performance Computing (HPC) center at the Tecnopolo in Bologna. The new center allows massive computing resources in one location. The INFN strategy of assembling in Tecnopolo in Bologna a computer center that combines the compute abilities of HPC, quantum computing, and large data storage to exploit the potential of AI, positions INFN and Italy well with the most advanced technology and at the forefront of European efforts.

Technology Transfer – Technology Transfer represents an activity of growing importance and profile within INFN, expanding its traditional focus from production of IP and collaboration with specialized companies to high profile industrial collaborations with large counterparts and the increasing focus to create industrial spin offs. To support this expansion, an increase in external communication activity, a stronger cooperation between central and lab-based TT and a tight project management focus on the new INFN Open projects are required.

Health, Safety and Environment (HSE) – Environment – INFN has published its 2024 Environmental Report, outlining actions to reduce its environmental impact. The Institute is also engaging in international collaborations to strengthen its sustainability practices and learn from other research institutions. The environmental report correctly identifies the areas for improvement, particularly regarding the reduction of SF_6 emissions. It also highlights projects aimed at expanding the use of solar energy and reducing water losses that have led to increased consumption.

Health, Safety and Environment (HSE) – Health and Safety – INFN has established an integrated system to safeguard health and safety across all its activities. Local structures ensure the direct management of prevention, protection, and medical surveillance, while central bodies define strategic guidelines, coordinate implementation, and monitor compliance with regulations. INFN provide training, health promotion, and risk-prevention measures. Overall, accident and radiation exposure data indicate a solid and reassuring safety record throughout INFN.

Work-life aspects – INFN has developed a comprehensive strategy to promote equal opportunities, inclusion, and employee well-being. These objectives are embedded across its main strategic plans and coordinated through dedicated governance bodies. The Institute fosters flexible work arrangements, parental and disability support, welfare initiatives, and training programmes that contribute to a more inclusive and supportive environment. Particular attention and targeted actions are devoted to strengthening the career pipeline for women. Nevertheless, challenges persist in the recruitment and career progression of women – particularly in theoretical physics.

Long report

Perspectives and Strategy

We commend the INFN management for its responsiveness to our 2024 recommendations. In particular, we appreciated the implementation of SWOT analyses by the CSNs to inform our review. The committee praises the INFN management for solidifying the leadership of the administration and for timely realize the PNRR procurements and notes with satisfaction the intention of the INFN management to cap the fraction of the budget spend on personnel at 50%. From 2023 to 2024, INFN management enabled a large number of promotions for both researchers and technologists to ensure that their salaries are competitive with those at universities. Although it is faster to get a permanent position at INFN compared to universities, this matching of salaries is an essential element to foster talents at INFN.

The CVI applauds the introduction of structured pre-tenure tracks and improved postdoctoral contracts. These developments offer a more solid employment basis for early-career researchers while maintaining the flexibility needed by research institutions.

INFN's broad strategic vision for computing is yielding impressive results, positioning Italy as a global leader in high-performance computing (HPC) and AI infrastructures. Through coherent and sustained national investments, Italy – driven in part by INFN – has built a strong foundation to lead future developments in AI and to support advanced scientific and industrial applications. To ensure the long-term operation and the cutting-edge performance of these infrastructures, it is essential to establish adequate revenue streams for their operation and maintenance. Encouraging broader industrial use of HPC resources will require a dedicated commitment to technology transfer and innovation-driven collaboration with companies. INFN is well positioned to serve as a leading national partner in fostering and coordinating initiatives that engage industry in the use of high-performance computing (HPC) infrastructures.

The CVI commends INFN's ambition and ongoing efforts to enhance researcher mobility between INFN and Italian universities. These initiatives represent an important step forward, though their full implementation may require further dialogue with the Ministry, given current legal constraints.

With PNRR resources having been successfully invested in research infrastructures, ensuring their long-term operation will be essential. This presents a valuable argument to retain up to 50% of the personnel hired under temporary PNRR contracts in permanent positions at INFN.

The committee congratulates the INFN management for aligning the Italian research community behind the FCC-ee program of CERN and for its strong support for the development of HTS HF magnets.

Recommendations

GEN-1 *– With the upcoming updates of the European strategies for astroparticle and particle physics INFN is encouraged to take a leading role in shaping the global research field.*

GEN-2 *– We encourage the INFN leadership to build on its strong relationship with the Ministry to actively inform policymakers about the strategic value and potential impact of adapting Italian legislation to facilitate greater mobility between research institutions and universities.*

GEN-3 *– We recommend implementing gender balance actions across all CSNs.*

Recommendations for the CVI meeting in 2026

- *At its next meeting, the committee looks forward to receiving a comprehensive presentation on the INFN Quantum Strategy.*

Central Administration

INFN is pursuing a long-term strategy to develop a data-driven management approach aimed at supporting decision-making and improving the organization's overall performance. This process, already underway, has been catalysed by the transition to an accrual-based accounting system — in line with Directive 85/2011/EU and PNRR Line 1.15 — and by the experience gained through the implementation of PNRR projects.

During the reporting period, the overall strategy remained unchanged. However, the transition to the new managerial model was hindered by turnover in the top positions of the central administration, which necessitated interim arrangements before permanent directors could be appointed. Limited knowledge transfer from consultants caused further delays in obtaining guidance for transitioning to the accrual methodology.

Once the new administrative structure was finalized, collaboration with the CINECA partner — which provides technical assistance in developing the new accounting system — intensified, although the implementation deadline (January 2027) for the new accounting system remains quite challenging.

The goal is not just to replace the old framework but to enhance management capabilities through business intelligence tools, dashboards, and reports. A steering committee has been created in September to coordinate this large-scale transformation and ensure collaboration between scientific and administrative staff. It is expected to capitalize on the experience by disseminating the management tools and methodologies matured and developed in the PNRR to the entire organization. The committee will oversee implementation, coordinate efforts, and foster effective communication among all stakeholders – from scientific teams to administrative personnel – to ensure consistent and integrated deployment of new systems across the institution.
INFN is complementing its transition to the new managerial model with training initiatives to improve the managerial culture of the INFN.

Recommendations:

CA-1 *– INFN is encouraged to expedite the migration to the new accounting system to ensure compliance with the established January 2027 deadline.*

CA-2 *– INFN should fully utilize the steering committee to define and oversee the development of an integrated information system that supports top management's decision-making and ensures alignment between scientific and administrative functions. Concrete progress in the development of management dashboards and a structured set of performance indicators to regularly monitor results and assess progress over time is expected already next year, demonstrating visible advancement toward a more performance-oriented management.*

CA-3 *– INFN could also consider monitoring its scientific output, for example through bibliometric indicators, in order to track developments over time and compare its performance with that of other institutions.*

PNRR

Implementation of PNRR projects has been very successful both on the technical side, with ambitious projects implemented on time and budget, and the administrative side, with a very substantial increase in procurement volume and new reporting requirements managed in line with expectations.

From the technical side, 57% of funds have been already reported as spent as of September 2025, suggesting physical completion is well above that percentage level. Administration procedures for procurement have been executed successfully, with approximately 1200 procedures that have been completed, covering an expenditure of € 236 million, approximately 97% of the program's budget. PNRR expenditure has more than doubled the effort required by INFN's scientists, technical and administrative personnel in managing procurement, relative to the average level of purchases in typical, non PNRR, year.

The success in completing the infrastructure buildout within the program's timeframe is also related to the appropriate choice made by INFN's leadership to use funds for completing research infrastructures that were all already designed and, in most cases, had already started construction.

The focus on infrastructure, rather than financing of research programs, has also reduced the need for future expenditure to keep the activity going after the program expiry. Still, continuing the operation of infrastructures that have been built requires some dedicated resources.

Human resources for that end have been secured. In that respect INFN is discussing with MUR a contribution sustaining part of the expenditure. Overall, INFN is planning to open permanent positions for more than half of PNRR-related personnel (217 people, 126 positions to be opened). INFN leadership is also striving to achieve additional, post-PNRR resources to continue the deployment of infrastructures that PNRR has only partially funded. The progress in the design of Einstein Telescope, expansion of KM3net, continuation of IRIS project in LASA and additional investments in the computing infrastructure have been selected for application to the National Program for Research, Innovation and Competitiveness for Green and Digital Transition. INFN has applied for a total funding of 71 million, which represent a very significant share of the 179 million available for the entire program.

The new, post-PNRR phase that is opening next year presents new challenges from the management point of view: focus on large infrastructure projects with extraordinary funding continues, but securing the funding is to be achieved in a more competitive environment.

While funds for operations are secured, the computing infrastructure needs to secure funding also for technology renewal. INFN expects to sell some capacity to external users and has already registered early interest on the market. A sustained and adequate level of funding, however, is still to be secured.

Recommendations:

PNNR-1 *– INFN leadership should engage the Ministry in a discussion on the funding of the completion of research infrastructures; in that respect leveraging the 3-year plan to be released in Feb 2026 (and presumably approved by Ministry) can also be a forcing device to set priorities among projects.*

PNNR-2 *– INFN should establish proper management processes, including a full-fledged commercial plan for the sale of computing infrastructure capacity to private sector users, to ensure that external funding for infrastructure renewal in computing is adequate.*

Directorate of Research Services

The Directorate for Research Services provides support to the scientific community of researchers within INFN along the entire life of all research projects, form the acquisition of funds, to the management of project execution and deadlines, to the establishment and leverage of intellectual property resulting from research in the Technology Transfer (TT) activity.

While TT will be dealt with in a specific section of this report, this section will be focused on the support provided in the securing of funding, which has been particularly successful, and will become even more critical in the future, given the expected shift of funding towards competitive mechanisms, after the expiration of PNRR.

In a short timeframe from its establishment DSR has been able to provide tools, training and transparency on funding opportunities to the vast community of researchers within INFN to improve their chances in securing resources in competitive contexts. Feedback from the researchers that was received by DSR management on usefulness of tools has been largely positive.

Following CVI's recommendations INFN has made benchmarks of grants won which show that INFN is well ahead of other Italian institutions, positioning it at a higher level than some of the best European peers (DESY). On a per capita basis grants secured by INFN in the prestigious categories of Horizon Europe, Marie Sklodowska-Curie Actions, and European Research Grants exceed those achieved by the other institutions included in the comparison (INAF, INGV, DESY), with only one category (ERC) showing a de facto parity with DESY.

Against this very encouraging background, a recommendation made by CVI last year remains still in progress. INFN leadership has not yet defined or at least formalized the desired balance of project-specific vs unrestricted, recurrent funds. We consider this objective setting also to be important to make full use of DSR capabilities.

Some of the tools required to decide on this balance are still not available, like a "project/source of funds matrix" to make sure that all priority projects have a robust funding plan.

This evolution may be part of a broader expansion of the mission of DSR. Initially DSR defined its mission of support in line with the traditional way of operating of INFN, which has always been largely led by bottom-up ideas from the communities. A more top-down approach (still originated by the communities but eventually finalized by the leadership) that was started with PNRR requires the development of new tools and analyses, in which the support of DSR to INFN leadership may prove very valuable.

Recommendations

DSR-1 *– DSR should keep track of levels of engagement/use and satisfaction of researchers of tools provided, monitoring also the improvement of success rates in applications in the population involved with training programs.*

DSR-2 *– INFN leadership should consider to task DSR to collect and systematize information on all external funding opportunities, in coordination with Brussels office, to provide support also for strategic decisions on fund allocations and project priorities and ensure DSR has the resources to do so.*

CSN1

We thank the leadership of CSN1 for their thorough follow-up on the recommendations provided in the 2024 report, including the close monitoring of upgrade costs and schedules for the ATLAS and CMS experiments, as well as the establishment of a dedicated task force to explore INFN's potential engagement in the SHiP project.

We applaud the strong performance of the experiments in which INFN is involved, with particular recognition of the exceptional data-taking efficiency of the LHC experiments at CERN. The excellent performance of the ATLAS, CMS, and LHCb detectors during Run-3, with record integrated luminosities, high uptime, and strong physics output, confirms the central role of the HL-LHC as a top priority for INFN and CSN1 in the coming decade. In parallel, INFN maintains a strong and coherent R&D program for future colliders, most notably FCC and the Muon Collider, leveraging HL-LHC detector and accelerator developments as a strategic bridge toward the post-HL-LHC era.

In the area of heavy-flavour physics, while SuperKEKB has not yet reached its design peak and integrated luminosities, the performance of LHCb is excellent. Discussions are currently underway within INFN regarding its future participation in the LHCb upgrade programme.

The committee acknowledges the significant challenge of balancing INFN's near-term commitments, such as the High-Luminosity LHC (HL-LHC), with its long-term strategic ambitions, including engagement in the FCC programme. The committee appreciates that INFN's current prioritisation of the full exploitation of the HL-LHC programme is well aligned with the European Strategy for Particle Physics. Several current R&D efforts, for example, those related to the HL-LHC detectors and MEG II, are being effectively leveraged as stepping stones toward future detector development for FCC experiments.

Building on the notable success of the SND@LHC experiment, the committee is pleased to note that a Technical Design Report for its upgrade in the HL-LHC phase has been completed, incorporating silicon vertex detectors from CMS. INFN's ambition to participate in this effort is strongly welcomed. The committee understands that the performance of SuperKEKB is being carefully considered as INFN defines its level of involvement in the upcoming LHCb upgrade.

The committee also supports INFN's ambition to maximise synergies across its research areas; for example, neutrino particle physics with astroparticle physics, nuclear physics, and cosmology.

Recommendations

CSN1-1 *– In addition to monitoring the costs and timelines of the HL-LHC detector upgrade projects, the committee recommends that INFN proactively prepares contingency measures to mitigate potential time delays and cost overruns.*

CSN1-2 *– The committee also recommends INFN to define clear, concrete objectives to support its strategic ambition of leveraging synergies in neutrino particle physics with astroparticle physics, nuclear physics, and cosmology.*

CSN2

The number of researchers involved in CSN2 continues to grow, even following the transfer of some accelerator-based experiments to CSN1. The recent KM3NeT deployment campaign was highly successful, and the installation of the ORCA detector remains on schedule, positioning the collaboration well for the upcoming competition to determine the neutrino mass hierarchy.

It is noted that, for many experiments, the total number of participating researchers significantly exceeds the number of full-time equivalent (FTE) positions, highlighting the strong spread of the individual researchers over experiments. This is a well-known issue, and CSN2 has already started to implement measures aimed at increasing the ratio.

The committee is pleased to note that gender balance within CSN2 continues to improve steadily with a pro-active management.

Nearly all CSN2 experiments are conducted within international collaborations and involve long lead times for implementation. Moreover, many research facilities are undergoing continuous upgrades. In light of the rapidly evolving global funding environment, it remains crucial to regularly assess whether INFN's strategic investments remain well aligned with the ambitions and capacities of its international partners.

Recommendations

CSN2-1 *– While transversal actions across the CSNs are underway in the field of multi-messenger astronomy, the committee recommends that INFN establish clear and concrete objectives to advance its role in this area of research.*

CSN2-2 *– The committee further advises the development of a comprehensive matrix mapping of the distribution of researchers across multiple experiments to monitor the effectiveness of the corrective actions, accompanied, if the problem persists, by the formulation of more stringent policies to prevent excessive dilution of individual researchers' commitments.*

CSN3

The INFN program of nuclear physics keeps its vibrant drive, being one of the most successful in Europe, with a very broad and diversified portfolio on a wide range of activities and laboratories.

Its nuclear astrophysics program is growing and increasingly interesting, with INFN pioneering important experimental low-background projects. In particular, the Bellotti Facility at LNGS constitutes a unique underground laboratory, enabling ion beam experiments with a cosmic radiation flux reduced by a million with respect to surface laboratories. The Carbon cycle and Carbon-alpha measurements ahead are unique and crucial to the understanding of stellar evolution.

Among the highlights in heavy ion physics, NA60+ - an INFN initiative – has been recommended for submission to the CERN Research Board, while the Alice3 upgrade is undergoing an INFN internal review. The DM experiment at Jefferson Lab has also been approved. It is also to be noted that the ePIC detector at EIC is advancing.

The SPES_MED at LNL has started to work, with the potential to optimize radionuclide production for medical purposes.

The CVI praises the uniqueness of the Bellotti facility, while being aware that it may risk strong international competition.

The CVI commends the progress of NA60+, which can probe quark-gluon plasma physics at CERN fixed-target program and is now to be considered by the CERN Research Board.

The CVI congratulates CSN3 on the successful launching of SPES_MED.

While the potential of Alice3 upgrade should be evaluated based on its nuclear physics reach, it is worth to mention that it also has the potential for interesting results outside the usual realms of nuclear physics. One example is the expected reach on the low-mass ALP (axion-like particle) parameter space (thanks to their low momentum identification capacities). On the same line, it is interesting that the Alice3 detector itself would constitute a first step towards the performance parameters of FCC-ee detectors.

The CVI notes the impressive capacity of attracting external funds by the INFN nuclear physics community: 3.65 MEuros last year versus 10 MEuros from INFN.

Recommendations

CSN3-1 *– The CVI recommends INFN management to set as a strong priority the running of the Bellotti facility and exploration of Carbon burning (12C+12C by LUNA@IBFLNGS), so as to avoid the risk of being overtaken by international competition.*

CSN3-2 *– The Alice3 option should be analyzed carefully by INFN.*

CSN3-3 *– The CVI encourages CSN3 to keep monitoring and upgrading its successful efforts aiming to close the gender-balance gap.*

CSN4

The INFN program of theoretical physics keeps being one of the most successful in Europe, with strong international impact and a broad and diversified portfolio. Machine Learning (ML) techniques are taking momentum with one IS on HEP and two in complex systems. Likewise, the challenge of quantum computing, as well as of quantum technologies, is being embraced with dedicated IS.

The overall growth in terms of people and of FTE maintains a healthy and smooth upwards rise. By research line though, phenomenology of particle physics shows a negative slope, in contrast with the steady increase on Mathematical methods, and Statistics/ Applied physics (correlated with new developments on ML and quantum technologies). The percentage of females remains unchanged and significantly lower than that of any other National Scientific Commission (CSN). The training activities for the youngsters keep being of high quality and very active.

Concerning the striking situation in gender balance, the CVI questions the intensity of the efforts being taken by CSN4.

The CVI takes note of the effort to compute directly on the lattice the R ratio for e^+e^- collisions, aiming to clarify the discrepancy between lattice predictions and dispersive calculations.

The CVI appreciates the necessity to adapt the ML techniques to the precision level required by HEP in order to enable the evaluation of high-dimensional systems.

The CVI stresses again the huge potential of INFN to bring together and seed interactions among different theory groups and between theorists and experiments.

Recommendations

***CSN4-1** – The CVI stresses the recommendation to the theory community to set their own quantitative benchmark goals on gender balance, and to set in place a proactive hiring-search campaign at all levels, extended to the international arena.*

***CSN4-2** – The theoretical community is encouraged to keep exploring the perturbative and nonperturbative computational efforts required in view of a future accelerator program, e.g. FCC. The same holds for their high-quality efforts on the other lines of CSN4, including theoretical and formal ones, maintaining their international leadership in key directions.*

***CSN4-3** – At the same time, it is crucial to support the CSN4 efforts on phenomenology, so that the observed quantitative downwards evolution in personnel and FTE does not compromise their established strong capacity to lead physics discoveries.*

***CSN4-4** – The CVI recommends that INFN maintains (at least) the postdoctoral program of ~15 theoretical positions/year, given the abundance of very high-level applicants.*

CSN5

Provides R&D support for the areas of accelerators, detectors, and interdisciplinary physics. There are three categories of projects: Standard, Early Career, and High Impact.

The budget has been stable for the last 4 years and typically 30 proposals received per year. Presently there are a dozen accelerator projects, 36 detector and computer projects, and 6 early researchers funded. The diversity of the funded projects is broad and impressive with many that interact with other CSN programs. These small grants seed larger projects that can eventually be funded by the CSNs.

Recommendations

***CSN5-1** – Continue to support the early career researchers.*

***CSN5-2** – Ensure the funded projects are in line with higher level strategic directions of INFN.*

The Gravitational-wave program[1]

The INFN gravitational wave program is a strongly developing endeavour with the potential of having major world impact and leadership, with two principal observational legs: Virgo/EGO and the Einstein Telescope (ET) project. The ET project has the unique specificity of its sensitivity also to low-frequency (3-5 Hz) GWs.

The Virgo/EGO TDR has been delivered and discussed. Also, most of Virgo laboratories and groups have agreed to join VirgoLab.

[1] As director of Nikhef, Jorgen D'Hondt is co-coordinator with Antonio Zoccoli (INFN President) of the Einstein Telescope ESFRI project, and therefore he did observe a passive role during the discussions on the topic of Gravitational Waves.

For the ET, only INFN and Nikhef+BE are clearly committed by now to support ETO. In addition, ET is now in the German roadmap with two options for the site.

The commitment of the Sardinia region as location option has continued to solidify, with strong financial support from the Italian government and the Sardinia region, and a dedicated structure being set up in Sardinia.

The CVI praises the ET consortium on its completion of the study to inform the choice between a triangular or L-shaped design. This choice is still undecided, though, although INFN personnel are inclining towards the latter option.

The steps given by the Sardinian government aiming to build a local underground laboratory (SUNLab) in the Sos-Enattos former mine, aiming to enable construction from 2026, are a very positive move.

The foreseen upgrade of Virgo is a major project for the European gravitational wave community, but includes significant risks related to the required resources and the uncertainty to improve the performance of the interferometer after the upgrade.

Recommendations

GW-1 *– The CVI recommends INFN to carefully map out all the risks related to the upgrade of Virgo, and on the basis of this analysis to make a firm decision with its international partners.*

GW-2 *– The CVI encourages the INFN efforts to enable and lead a first-class facility such as the ET, with potential groundbreaking discoveries.*

GW-3 *– The CVI encourages INFN to continue its strong efforts in preparing the Sardinia bid for the Einstein Telescope and to ensure that the European GW community aligns behind a configuration and site(s).*

DarkSide

The Darkside-20k experiment located at Laboratori Nazionali del Gran Sasso will search for WIMP dark matter with unprecedented sensitivity. Dark matter represents 25% of our universe and is responsible for most of the gravitational dynamics of stars in galaxies and of galaxies in clusters of galaxies. The Darkside uniqueness is in its use of a large volume of purified liquid argon-40 where it uses the argon scintillation photons and ionization electrons to reject backgrounds. Construction and assembly are proceeding on all fronts. The schedule contingency has now been used and thus delays are expected. Several subprojects are on or near the critical path. The budget is tight but manageable. There is significant concern over the delivery of the TPC. The sourcing of radio-pure argon from URANIA in Colorado is about to begin. Transportation to the ARIA facility Sardinia as liquid is defined. The ARIA 350-meter cryogenic distillation column facility is not yet operational for the final step in purification.

The Forti committee continues to play an important role in the steering the project. There is concern by the committee that the delays will start to impact the parameter space available to Darkside-20k. However, the CVI concludes that Darkside-20k will remain competitive in the high mass region and thus the physics potential is still world leading. A multi-institutional MOU between funding agencies is close to being ready for signatures. The project has a Resource Review Board (RRB) to monitor progress and finances.

Recommendations

DS-1 *– Ensure sufficient resources are available to assist in delivery of the on the TPC.*

DS-2 *– Continue focus on schedule, costs, and delivery and installation.*

DS-3 *– Darkside-20k should be evaluated from a long-term perspective, as its reach will ultimately overcome the parameter space for direct DM searches in the high mass region.*

LNF

LNF continues to play a leading role in the development of enabling accelerator and detector technologies critical to the advancement of particle physics. The EuPRAXIA project at the electron accelerator SPARC_LAB represents a key strategic ambition for the future of LNF. Construction of the beam-driven plasma wakefield accelerator for a FEL light source is scheduled to commence in 2026, with operations anticipated in the early 2030s.

Recent achievements at LNF include a high-power RF test of the first X-band accelerating structure prototype for EuPRAXIA@SPARC_LAB, which exceeded expectations, and the successful bending of a particle beam using a plasma-based device.

The COLD laboratory is fully integrated within INFN's overarching Quantum Strategy, while the GravNet project supports a network of cryogenic detectors, funded by an ERC Synergy Grant.

The Technical Design Report (TDR) for EuPRAXIA@SPARC_LAB is scheduled for approval by the end of 2025. In this context, the committee emphasizes the critical importance of ensuring that the facility can operate and deliver FEL beamlines both with and without the plasma module.

The committee applauds LNF management's proactive efforts to establish concrete co-development partnerships with industry, supported by a dedicated professional industry liaison, as well as its commitment to fostering close engagement with the prospective user community of the FEL.

The committee values LNF's vision to evolve beyond being solely a workshop for instrumentation construction, positioning itself as a fully-fledged laboratory for scientific research. The impending retirement of approximately 10 out of ~75 researchers in 2025–2026 underscores the importance of maintaining LNF's attractiveness to current and future scientific talent.

Recommendations

LNF-1 *– The committee recommends that LNF management firmly continues its preparations to achieve the world's first demonstration of a FEL light source enabled by a beam-driven plasma accelerator.*

LNF-2 *– In addition, we encourage LNF to remain a driver for the enabling technologies for particle physics experiments.*

LNGS

Gran Sasso is the world leading underground science laboratory. It has a broad science and engineering program that includes dark matter searches, neutrinoless double beta decay (NDBD), nuclear astrophysics and experiments in molecular biology, gravity, and earth sciences. The main flag ship projects for the future are the NDBD experiments Legend-1000 and CUPID and Darkside-20k that searches for WIMP dark matter. There is also a possible next generation experiment in dark matter, XLZD that may be located at Gran Sasso. Each of these proposals are building off successful experiments at a smaller scale. There has been significant investment in infrastructure through the PNRR program and this has been executed well by the laboratory. Upgrades to cryogenic facilities, radio-pure labs, and electrical power and air handling have been realized. The over-subscribed underground accelerator program, led by the new Bellotti facility is running well and is performing key astrophysics measurements. Following previous CVI recommendations, the committee appreciates that regular meetings are ongoing between the directors of underground labs worldwide with a view to explore synergies and enhance complementarity.

Darkside20K is advancing although some detector delays and complex installation challenges must still be overcome. Uncertainty in funding for CUPID and Legend1000 and decisions by the XLZD collaboration are holding up more definitive plans for the future.

Recommendations

LNGS-1 *– Funding support from INFN for crystal procurement for Phase I CUPID would advance a potentially world leading NDBD experiment and deliver certainty to the lab allowing for better planning of smaller experiments.*

LNGS-2 *– INFN should encourage the Xenon collaborations to consider a phased approach to the Xenon dark matter searches because infrastructure resources exist to handle a 20-ton scale experiment.*

LNGS-3 *– Accommodate the smaller experiments requests for space and R&D facilities and find an efficient way to manage them.*

HTS magnet developments

High Temperature Superconductors (HTS) have the potential for big impact on science, society, including fusion research, hadron therapy, energy savings and the environment. The committee congratulates INFN for pursuing a dual approach where HTS impacts both science and society. The IRIS project is an INFN research initiative focused on developing innovative applied superconductivity technologies (HTS and standard Nb-Ti cable) for numerous applications in science, engineering that have potential for societal impact. IRIS has 6 poles across Italy with revamped infrastructure funded by PNRR and has chosen to use REBCO ribbons and cable, an industry driven forward by fusion research. HTS Cable is produced in industry (2 Japan, 1 China) and kilometer quantities kms of cable are possible now. The prime technical advantage of present technology HTS is to have superconducting magnets that use helium gas at 20K, not liquid. This reduces helium requirements by more than a factor of ten. Presently HTS magnets are not accelerator quality because of poor electromagnetic field uniformity.

Facilities are being expanded. Two new buildings are under construction, a superconducting (SC) magnet building at LASA and a new building in Salerno to test 1 GW superconducting (SC) cable. Two new additive manufacturing machines, one for metals and one for polymers have been procured.

Several ambitious projects are underway or in the design stage. LASA has designed and constructed the world’s first strongly curved “costheta” dipole using standard superconducting cable, Nb-Ti, aimed at hadron-therapy. Next step is to develop an HTS magnet for enabling smaller gantries. Under construction is a possible world first MgB2 SC power transmission line at LNF to feed the PNRR data center. IRIS is involved in the design and construction of an energy saving, fully HTS dipole Magnet for Accelerators (ESMA). The first coil is being wound. There is an ongoing study with CERN of various HTS layouts with the goal of an HTS dipole 10 Tesla (10T) at 20K with a field uniformity goal of acceptable accelerator quality.

For the Future Circular Collider-ee (FCC-ee), CERN's planned next major project, there is a possibility of combining quadrupole and sextupole magnets into one structure providing space and thus enabling lower dipole fields and hence less synchrotron radiation, thus reducing RF power by up to 10%. Furthermore, the IDEA detector is considering a full HTS 3T detector solenoid. HTS has potential to have a big impact on both FCC-ee and critical for the follow-on planned project FCC-hh.

There are also ambitious HTS projects being considered such as for the ENI Inner Solenoid needed to confine the plasma in a future fusion energy Tokamak, referred to as "Project 20T@20K."

Recommendations

HTS-1 *– Focus R&D on constructing the accelerator quality HTS magnet for FCC-ee.*

HTS-2 *– Develop along with industry societal impacts for fusion and hadron-therapy.*

Computing Services and the National Centre CNAF

INFN along with partners has assembled a world leading High Performance Computing (HPC) center at the Tecnopolo in Bologna. The new center allows massive computing resources in one location and. more than 13 MW of power demand (in the medium-long term a total power of 20-30 MW is foreseen). The state-of-the-art supercomputer Leonardo (10 MW) is located at the facility and managed by the CINECA consortium (of which INFN is a member) as well as a quantum computing. There are several hundred petabytes of disk and tape robot storage. Applications include personalized medicine, energy and climate research, and materials design, and Artificial Intelligence (AI).

The new INFN data center is co-located at Tecnopolo too. It is operated by CNAF (National Center of INFN dedicated to Research and Development on Information and Communication Technologies) and provides HTC/HPC resources and storage for scientific collaborations of INFN. Several hundred petabytes of disk and tape robot storage are installed: CNAF currently manages the computing ad storage resources for more than 60 experiments at the facility, including those at the Large Hadron Collider at CERN for which it is the Italian Tier-1 center.

The INFN data center will also accommodate the computing resources needed for the future HL-LHC at CERN (an increase in the required power beyond 3 MW is foreseen). In this respect, a fruitful collaboration is underway with CINECA: its supercomputers (primarily Leonardo) are used by theorists, but also for the computing of experiments running at the INFN Tier-1. CNAF data center hosts also part of resources funded by PNRR initiatives (the tenders are all almost complete).

Another CNAF core activity is the Data Cloud project, which aims to create a data lake for Italian research coping with the complexities arising from security requirements of the diverse communities and the support for the users. The Data Cloud project is being implemented in the framework of the Italian National Research Centre on High-Performance Computing, Big Data, and Quantum Computing (ICSC). ICSC was established in 2022 with funding from the EU PNRR: its partnership includes universities, research institutions and industries. The next addition will be the AI factory which aims for significant industry participation.

Recommendations

***CS-1** – Ensure sufficient human resources to fully exploit the potential of the Tecnopolo investment.*

***CS-2** – Invest the appropriate effort to bring in private sector partners and funding.*

Technology Transfer

The Technology Transfer activity has always been part of the so called "Third Mission" of INFN, so pertaining to the broader objective of making sure that scientific advancements of the institution also produce benefits to the cultural and economic development of the society.

The rapid advancement of private research and technological development in some areas that have a significant overlap with INFN's research fields and infrastructures, such as high-performance computing, AI and quantum technologies, makes the cooperation of INFN researchers with industrial endeavors not only an effective way for INFN to contribute to societal developments, but also an essential mechanism to keep INFN at the forefront of science and technology in these fields, that are increasingly important for research. In that respect, TT plays an increasingly important role within INFN strategy.

Technology Transfer has been traditionally concerned with developing a portfolio of patents and industrial collaborations. Both areas have seen a steady increase in their numbers over the last 4 years. Patents have grown from 146 in 2020 to 233 in 2024, while revenues from collaborations, although more variable from one year to another, have reached an average of more than 4 million per year in 2023-2024.

Recently a new emphasis has been given to another form of technology transfer, typical for research institutions that have reached a greater maturity of that front, which is the creation of research-based companies, typically referred to as "spin-offs". To that objective, new training and communication initiatives have been launched to expand the capacity of TT of INFN, especially to accelerate spin-off growth.

Also, the profile of industrial cooperation is evolving. Traditional industrial collaborations have occurred mostly with specialized, small-scale companies; new contracts have been started with large scale, high-profile counterparts (ENI in High Temperature Superconductors, Thales Alenia in optical retroreflectors).

In general, the HTS initiative represents the most visible initiative of TT within INFN; all opportunities for reciprocal learning between LASA that leads this initiative and other TT teams should be leveraged.

On the other hand, interaction with leading industrial players and VC investors in most promising areas (medical, nuclear waste treatment, quantum computing, space technology) is still in the early stage.

One of the ideas for the outreach to industry is the start of a "technology lab": inviting companies that may be interested in specific technologies; there is a risk, however, that an excessively narrow technology focus (e.g. sensors), as opposed to an application focus or an industry focus (e.g. medical) may limit the capacity of this initiative to attract substantial interest.

From the organizational point of view, the central Technology Transfer team within DSR operates in coordination with local TT activities in the laboratories to ensure transfer of specialized knowledge (especially in IP protection) and best practices. In this way it can at least partially respond to the challenge posed by its limited size (5 people in total) compared to the equivalent structures of other international research institutions.

A new project within the broader platform for information sharing called "INFN Open" aims at creating an integrated process and IT system to manage the IP process from idea generation to IP exploitation; this represents a quite ambitious objective with a very advanced tool compared to those available in other scientific institutions.

This initiative absorbs a significant part of the total budget of TT, having a total cost of more than 2 million. All the appropriate measures should be put in place to make sure it gets the expected results.

Recommendations

***TT-1** – Organize the external communication initiatives on promising technologies also grouping them by industrial sector (e.g. medical, nuclear, aerospace), involving specialized venture capital players as well, to identify broad-based cooperation opportunities.*

***TT-2** – Set specific objectives for the results of the Open INFN IP management project; evaluate opportunities to conduct a pilot phase to make sure that targets can be reached.*

***TT-3** – Involve TT resources in the labs not only in the sharing of best practices, but also in the design and execution of a coherent outreach program, to expand resources available to that effect.*

HSE

Environment

INFN has published its 2024 Environmental Report, detailing efforts to monitor and reduce its environmental impact. Key focus areas include energy consumption, carbon and water footprints, and waste management.

INFN has implemented various energy-saving measures, some of which are funded by the National Recovery and Resilience Plan (PNRR). A major initiative is the installation of a 1.1 MW photovoltaic plant at LNF, expected to become operational by the end of 2025. Additionally, a dedicated working group is assessing high-consumption systems to develop targeted energy-saving strategies.

Significant progress has been made in monitoring and reducing greenhouse gas (GHG) emissions. SF_6 detectors have been installed at LNS, and LNL is actively working to minimize emissions. INFN aims to reduce GHG emissions by 25% by 2026 (compared to the previous three-year average), with further improvements targeted for 2030.

In terms of water consumption, INFN aims to return to 2022 levels by 2027, with a review planned for 2030. LNF is currently addressing a suspected leak that may be contributing to increased usage. INFN has also initiated several external collaborations, aimed on the one hand at learning from the experience of other institutions, and on the other at jointly developing knowledge with partners, in order to enhance the Institute's capacity to reduce the environmental impact of its activities.

Health and Safety

INFN has established a comprehensive framework to ensure the health, safety, and environmental protection of its staff and activities.

At the local level, Directors appoint key figures including:

- the Head of the Prevention and Protection Service (RSPP),
- the Radiation Protection Expert, and
- the Occupational Physician.

At the central level, the Permanent National Commission for Health, Safety and Environment (CNPISA) defines overarching guidelines and objectives, while the Health, Safety and Environment (SSA) Office oversees the implementation of safety directives and ensures compliance with current legislation.

The SSA Office coordinates the activities of RSPPs, Occupational Physicians, and Radiation Protection Experts. It provides technical guidance, supports the National Workers' Safety Representative.

At the local level, Directors and RSPPs work closely with local teams to assess risks associated with experiments and employee activities, including those conducted outside INFN premises. Based on these assessments, INFN provides tailored safety training.

For large-scale experiments involving complex equipment or hazardous materials, additional roles such as GLIMOS (Group Leader in Matters of Safety) are appointed. GLIMOS collaborates with the local RSPPs to evaluate risks and define appropriate prevention and protection measures.

INFN also promotes employee health through:

- Biennial blood tests for early detection of cardiovascular and other diseases,
- Annual flu vaccinations,
- A broad range of safety training activities, including fire prevention, first aid, and the use of personal protective equipment (PPE).

The analysis of occupational accidents presents an overall reassuring picture: both the number and severity of incidents remain low, and most reported cases occurred outside the workplace. Data on workers' radiation exposure also indicate generally contained levels.

Recommendations

HSE-1 *– The committee does not have specific recommendations on the environmental report, which we consider to be quite comprehensive, apart from encouraging INFN to continue monitoring and pursuing the objectives it has already defined.*

HSE-2 *– INFN is encouraged to begin tracking near-miss incidents, as these can provide valuable insights for developing more effective prevention strategies.*

Work-life aspects

INFN has developed an articulated strategy aimed at ensuring equal opportunities, fostering an inclusive work environment, improving workers well-being. The Institute embeds these goals across its strategic plans – the Triennial Plan of Activities (PTA), the Gender Equality Plan (GEP), the Affirmative Action Plans (PTAP), and the Integrated Plan of Activity and Organization (PIAO) – coordinated through governance structures such as the Comitato Unico di Garanzia (CUG) and the

Confidential Counsellor. Together, they show the commitment of INFN to ensure a safe, fair, and inclusive workplace.

INFN promotes flexible working hours, parental support, and disability inclusion. The Parenthood Guide and the forthcoming Distance Work Rulebook aim to enhance flexibility and balance. Welfare measures include social subsidies, educational grants, sustainable mobility incentives, and a collective health plan, financed through a 1% personnel expenditure fund. Training participation is expanding, especially among women and administrative staff, and new programmes focus on digital and leadership skills.

The official INFN documents and the analyses presented in the report demonstrate a strong commitment to gender equality. At the same time, the report highlights significant room for improvement in ensuring equal opportunities in recruitment and career advancement. Over the past decade, the share of women among technologists has increased, while progress among researchers has stalled. Women remain underrepresented in senior and leadership positions – 20–21% in governing boards and 39% in scientific bodies – although incremental progress continues.

INFN is committed to strengthening gender equality and organisational well-being through a broad set of initiatives. Priority is given to reinforcing the pipeline of women in theoretical physics via outreach and mentoring initiative, and to supporting women's career advancement and access to leadership positions through transparent and inclusive selection processes. Mentoring will be extended to technical and administrative staff to foster professional growth and collaboration. Further actions aim to promote work–life balance, encourage shared caring responsibilities, and improve overall well-being through psychological support, reduced administrative burden and measures that promote employment stability for non-permanent staff. INFN also seeks to enhance intergenerational cohesion and a shared sense of belonging, while intensifying training and awareness activities to build a respectful and inclusive organisational culture.

Overall, INFN is making commendable progress towards fostering a more inclusive and supportive working environment. The coming years will be crucial for consolidating these achievements and advancing towards a more aware and inclusive organisation.

Recommendations

WL-1 *– Overall, INFN demonstrates a clear commitment to enhancing its working environment. However, in order to assess the progress achieved, we recommend that INFN provide evidence of employee feedback on its personnel policies – for instance, by presenting the results of work-climate surveys conducted among staff.*

WL-2 *– The committee strongly encourages INFN to make concrete and measurable progress toward achieving gender balance. In particular, INFN should incorporate cohort-based analyses when reporting on gender representation, establish clear quantitative objectives, and systematically monitor progress over time. Particular attention should be devoted to identifying points of attrition in the career pipeline for women and implementing targeted measures to promote equitable participation and advancement at all career stages.*

WL-3 *– Specific attention should be devoted to addressing the underrepresentation of women in theoretical physics. If this underrepresentation primarily results from a limited inflow of female researchers – as appears to be the case – INFN could pursue a twofold strategy: first, by promoting the participation of women in theoretical physics within the Italian university system, as outlined in the report, and by engaging the broader national community of theorists; and second, by encouraging applications from female researchers based at foreign universities in INFN recruitment procedures.*

WL-4 *– We encourage INFN to better define its plans to promote employment stability for non-permanent staff. Data on turnover among non-permanent employees, conversion rates to permanent positions, and initiatives supporting external placement could provide valuable insights into how INFN addresses this important aspect of staff well-being.*