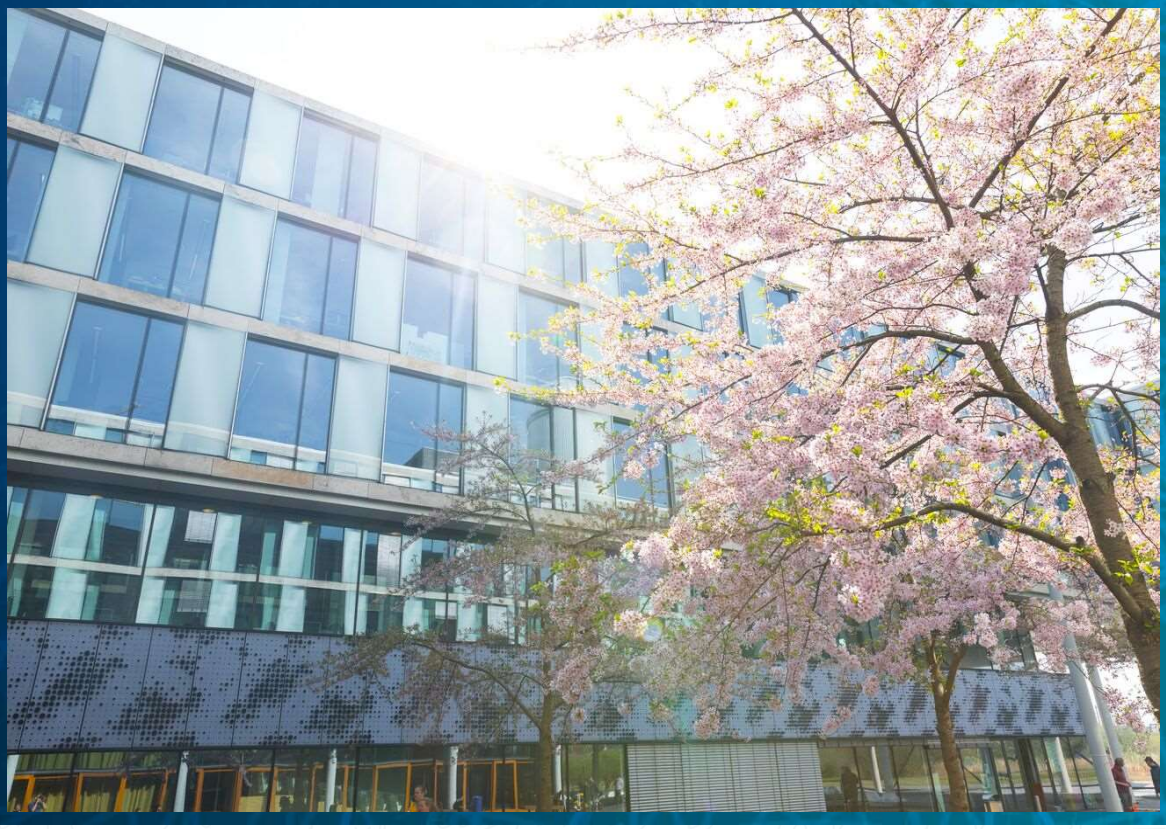
ASSESSMENT REPORT 2017 - 2023

Institute of Physics

University of Amsterdam



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Institute of Physics

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Preface

In front of you is the report presenting the research assessment of the Institute of Physics at the University of Amsterdam (IoP). The assessment is based on the self-evaluation report written by the IoP staff and a site visit by an international committee in March 2024. During the site visit the committee interviewed staff members, students and stakeholders.

I am very pleased to inform both the dean of the Faculty of Science and the governing board of the university about our main conclusion: that the physics research at the University of Amsterdam is of an excellent quality. This excellence is widely recognized, and moreover the institute is well-embedded in local, national and international networks. Over the past years, it has been able to attract a significant number of new highly talented and enthusiastic staff members. As a research institute, the IoP is contributing substantially to our understanding of a range of fundamental physics questions, and has great potential to further this knowledge. It can lay the groundwork for technological advancement and contribute to the development of a more sustainable society.

In this report we have collected our conclusions and recommendations on each of the topics required by the Strategy Evaluation Protocol (SEP) that was used as a framework for this research assessment. We hope that our conclusions and recommendations will help the institute to further sharpen its vision and strategy for the future and thus be able to continiue its success.

On behalf of the assessment committee, I would like to thank the board of the University of Amsterdam for hosting us, and for entrusting us with the important task to evaluate the IoP. We appreciate the keen organization and smooth interaction with the institute before and during the site visit. The committee was provided with an extensive and clearly written self-evaluation report. All additional information that we requested was promptly provided. Both senior and junior researchers not only showed pride in their work and in the institute, but were also open about their concerns. As a committee, we highly profited from this cooperative atmosphere.

I extend my sincere thanks to my fellow committee members. With our complementary expertise we managed to sketch an overall picture of where the institute now stands and where its opportunities and challenges lie. Finally, I would like to add words of gratitude to the scientific secretary of the committee, Mariette Huisjes, who provided very professional support through the entire evaluation process.

Gerard van der Steenhoven,
Chair of the assessment committee

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Executive summary

IoP as a whole

The committee was impressed by the Institute of Physics at the University of Amsterdam, both by the quantity and quality of its research and by the way it operates. The institute is financially strong and has grown substantialliy over the past six years, attracting talented researchers from all over the world. The IoP has managed to foster an inclusive and supportive atmosphere, and is well embedded in local, national and international networks. The committee's main recommendation is that the IoP should develop a clear and explicit strategy to navigate potential funding challenges in the (nearby) future and to further align its research portfolio with societal demands.

Institute for High-Energy Physics

The reseach within the Institue of High-Energy Physics (IHEF) is of high quality, with significant contributions to international collaborations and a healthy, diversified portfolio. By embedding its research programme in that of the nearby National Institute for Subatomic Physics, Nikhef, its impact goes well beyond that of a typical university group. IHEF is active in education and public outreach, in an effort to bridge the gap between academia and society, and thus increase its societal relevance. As far as the viability is concerned, the committee recommends that IHEF strengthens its lobbying efforts for future accelerator facilities at CERN and - at the same time - for a more diversified programme at CERN. Furthermore, IHEF should stay alert for opportunities that emerge from its own technological developments in detector research that may have more industrial or societal applications than presently observed.

Institute for Theoretical Physics

The Institute for Theoretical Physics (ITFA) excels in theoretical physics research, fostering laudable connections across specializations and with experimental groups. Worldwide it is rarely encountered that both theoretical high-energy physics and theoretical quantum matter and soft matter are hosted by one group. This is a strong aspect of ITFA. The division has enhanced its societal relevance through participation in national quantum information initiatives and industrial collaborations. ITFA has so far operated successfully with an informal strategy, but potential future funding risks necessitate the development of a clearer scientific profile and a more explicit strategic approach. Such a strategic plan or roadmap will create clarity for the ITFA staff, and will provide an actionable plan for research directions and future hirings.

Van der Waals Zeeman Institute

The Van der Waals Zeeman Institute (WZI) conducts excellent research in soft matter, quantum gases, quantum information, and quantum materials. The committee was particularly impressed by the extensive, modern laboratory facilities, which clearly add to the excellence of the research. Moreover, WZI has a strong track record in selecting impactful research areas, producing break-through science results as well as spin-off companies, and (partly new) collaborations with industry.

1. Introduction

1.1. Context and aims of the assessment

The board of the University of Amsterdam (UvA) asked a committee of peers to perform a research assessment of its Institute of Physics over the period 2017 - 2023. The institute comprises three divisions: the Institute for High-Energy Physics, the Institute for Theoretical Physics Amsterdam, and the Van der Waals-Zeeman Institute. Each of these divisions was subject of this assessment, as was the Institute of Pysics as a whole. The basis of the assessment are the terms of reference (see appendix 7.1). The assessment helps to monitor and improve the quality of the research conducted by the institute with the aim of contributing to the viability of the institute. Additionally, the assessments of the research quality and societal relevance of the research contribute to fulfil the duty of accountability towards government and society. The board of the institute may use the outcomes of the research evaluation for quality assurance purposes and institutional strategy development.

Specifically, the committee was requested to address the following three assessment criteria:
1. research quality
2. societal relevance
3. viability.

During the evaluation process, the assessment committee was asked to also consider four additional aspects. These aspects are included as they are becoming increasingly important in the current scientific and societal context and are of relevance for the future successful development of a research unit.

They are:
1. open science
2. PhD policy and training
3. academic culture
4. human resources policy.

The committee was asked to provide a written assessment on each of the criteria in accordance with the guidelines of the Strategy Evaluation Protocol, used by most research organizations in the Netherlands for their research evaluations. The committee was also asked to provide recommendations for improvement.

1.2. Composition of the assessment committee

The assessment committee consisted of:

- Gerard van der Steenhoven (chair)
- Thierry Giamarchi
- Liesbeth Janssen

- Jorge Kurchan
- Steven Lowette
- Fernando Quevedo
- Kate Schollberg
- Kirsten Kanneworff (PhD)

Brief descriptions of affiliations and curriculum of the committee members can be found in appendix 7.5.

The committee was supported by Mariette Huisjes, who acted as committee secretary.

1.3. The assessment process

The committee first met online on 21 February 2024 to be introduced to each other, the assessment process, and the Institute of Physics. Prior to the site visit, all committee members read the self-evaluation report provided by the institute and formulated first impressions and questions to be asked during the site visit. These were discussed within the committee on the evening before the actual site visit, on 26 March. The interviews and lab excursions took place on 27 and 28 March. For a full programme, see appendix 7.2. At the end of the site visit, the chair of the assessment committee presented some first impressions and conclusions to the institute.

This assessment report is based on both the documentation provided by the Institute of Physics and the information gathered from the interviews and lab excursions during the site visit. The committee members each contributed to the writing of the assessment report. The first draft of the report was compiled and edited by the secretary. The committee members then offered feedback, which was processed by the chair and secretary. The secretary sent a draft report to the institute. The institute then checked the report on factual mistakes. In close consultation with the chair, the secretary used these comments to create the final report.

1.4. Quality of the information

Before and during the site visit, the committee received the following documents:

- terms of reference
- strategy evaluation protocol
- self-assessment report 2017-2023
- introductory powerpoint presentations
- the previous assessment report
- interactive bibliometric analysis
- international bibliometric benchmark
- equity and inclusion survey

2. Mission, structure, resources and strategy

2.1. Mission and structure

The Institute of Physics (IoP) is one of eight institutes in the Faculty of Science of the University of Amsterdam (UvA). Here, about 250 colleagues carry out research in three divisions, each of roughly equal size in terms of permanent scientific staff: the Institute for High-Energy Physics, the Institute for Theoretical Physics Amsterdam, and the Van der Waals-Zeeman Institute. For an overview of staff, see appendix 7.3.

The IoP's mission is to carry out excellent research across a broad range of fields in both experimental and theoretical physics, spanning from fundamental to more applied; to provide inspiring education within the physics and adjacent curricula; and to transfer knowledge and enthusiasm to society, both by collaborating with industrial partners and by boosting interest in physics in general.

The IoP is led by a management team consisting of the IoP director, the heads of the three divisions, and the institute manager.

2.2. Funding

The UvA uses a full-cost accounting system, in which all costs of the university's supporting infrastructure such as housing, financial services, personnel management, IT services, and library are attributed to the institute. The institute is compensated for these costs through the university's and faculty's internal budget allocation. This direct budget is characterized by the following components:
1. a mostly fixed amount of base funding, including capacity budgets for specific infrastructure such as lab space and workshop access;
2. a parametrized component that is primarily determined by performance indicators such as the numbers of PhD degrees and undergraduate diplomas conferred, and the annual turnover of externally funded projects;
3. fixed (often temporary) budgets earmarked for specific strategic goals, such as investments in research priority areas.

Besides this direct university funding, external funding is obtained from the national research funding organization NWO, from international sources (mostly the European Union and the European Research Council), and from private partners such as companies or foundations. For an overview of funding, see appendix 7.4.

2.3. Strategy

Past strategy, funding developments

A major funding development during the evaluation period with large positive impact on the IoP has been the launch of the Sector Plan 'Bèta-Techniek' in 2018. This initiative was aimed at strengthening Physics, Chemistry, Mathematics and Computer Science departments at general universities as well as Applied Sciences departments at universities of technology in view of increasing student numbers. The IoP was deeply involved in developing the plans for UvA's Faculty of Science, called 'Connecting Science'. For the IoP specifically, this plan led to the creation of 9 (7.5 fte) new staff positions.

Apart from the Sector Plan, in general, funding for the institute has been steadily growing over the years. As a result of this and the proper management of financial resources, the IoP has consistently produced a modest to sizeable annual budget surplus for almost a decade. In view of the substantial growth of the institute in terms of permanent staff, the institute decided not to spend the surplus exclusively on new staff positions, but rather on internally funded PhD and postdoc positions. Staff can apply for this funding. This internal funding scheme is quite unique, both within the UvA and within the Netherlands.

Past strategy, embedding in the Amsterdam context

During the evaluation period, the IoP has made a concerted effort to strengthen the collaboration with its immediate academic neighbours, both with the other disciplines within the Faculty of Science and with the NWO institutes on campus such as Nikhef (for high-energy physics), AMOLF (physics of functional complex matter) and ARCNL (for nanolithography). As a consequence of this strategy, several of the new Sector Plan positions were strategically designed to be shared positions with other institutes, either between two IoP divisions (IHEF+ITFA) or between an IoP division and another research institute within the Faculty of Science, notably the, the Informatics Institute, the Korteweg-de Vries Institute for Mathematics and the Van 't Hoff Institute for Molecular Sciences.

New interdisciplinary initiatives such as the Dutch Institute for Emergent Phenomena DIEP and 'AI for Sustainable Molecules and Materials' have been actively embraced by IoP staff. Equally, the IoP is well embedded in the quantum hub created at the UvA from the budget received through an approved National Growth Fund programme.

Partly, these developments compensated for the failed efforts in 2017 to merge the science faculties of the University of Amsterdam and the 'Vrije Universiteit'. Despite the recommendations of the previous assessment panel and the efforts by the departments involved (in the years prior to the previous assessment), eventually no relocations could be realized between the two campuses, and most of the originally identified research synergies did not materialize.

Future strategy

For the next evaluation period, the IoP aims to consolidate the strong points of the institute, which include the good reputation of its divisions and groups, stability in funding levels, healthy staff size, and well-trained PhD graduates. The institute wants to enhance cohesion within the institute and invest in a more visible institute identity. It also wants to further strengthen collaborations with research institutes and centers such as DIEP, QuSoft and the informatics institute IvI and with industrial and societal partners. The institute aims to capitalize on the fact that it is well positioned to play a central role in the technology ambitions of the Faculty of Science, leveraging its own technological strengths as well as its strategic partnerships with the NWO institutes located nearby: Nikhef, AMOLF and ARCNL. Furthermore, the IoP will keep actively supporting grant applications of its staff and continue its full adherence to the principles of open science in general and the successful initiative SciPost (see paragraph 2.1.) in particular.

3. Findings and recommendations for the Institute of Physics as a whole

3.1. Research quality

The committee was impressed by the outstanding quality and quantity of the research at the IoP. It is beyond doubt that the institute is at the forefront of European research, with some elements truly world class. The successful grant applications, publications and scientific results are indicative of a successful institute, with three divisions that each make a significant contribution to the body of scientific knowledge. The institute's staff is talented, well-cared-for and active in many local, national and international leadership & organizational roles. The average output per year per staff member is also impressive, as is the field-weighted citation index. Overall, the IoP can be considered a very strong, successful and healthy institute. In the chapters on the divisions, the committee will treat the research quality of each of them in more detail.

3.2. Relevance to society

All three divisions of the IoP have been working hard on improving the societal relevance of their work, among others by involving stakeholders more frequently. During the site visit, the committee found that stakeholders much appreciate the value of what IoP is doing. Against this background, it should be noted that the societal relevance of the Van der Waals Zeeman Institute – given its experimental work that is often more closely linked to applications – was convincingly demonstrated, whereas for the other two divisions this is more challenging. Therefore, relevance to society is more accurately discussed at the level of the divisions rather than at the level of the IoP as a whole.

3.3. Viability

Funding and strategy

In the period under review, the IoP has grown substantially, both in terms of internal and external funding and in terms of talented staff. Thanks to its scientific achievements and effective grant acquisitions, the institute now has a strong financial position. The internal funding scheme to which part of these funds are allocated seems to work very well and gives the institute some leeway to carry out strategic plans. The committee therefore recommends sustaining this funding scheme in one form or another, even if there is less financial surplus in the future.

The IoP deserves congratulations with its successes in developing its science program and grant acquisition during the review period. This success is an excellent starting point for a promising future development of the institute. However, conditions may not remain stable. For one, the Ministry of

Economic Affairs recently announced a 'pause' of the National Growth Funds, which may lead to a definite closure of this funding opportunity in the future. Moreover, the announcement of possible budget cuts by the next Dutch Government imply that it is unlikely that the university or external funding will further increase. The opposite trend is more likely to occur. Against this backdrop of possibly stagnant growth or even budget cuts, it is crucial for the IoP's viability in the long run to have a clear strategy. The strategy should take into account key developments in the future that are as yet undecided, such as the decisions on investments in CERN, the building and location of the Einstein Telescope, the growing impact of AI and changing demands of society. These developments require a proactive strategy that is well thought through and shared by all concerned. The committee has the impression that strategic thinking on these and other issues may well be in place, but in an implicit form and as such only shared by a few senior scientists. It recommends making the strategy more explicit and transparent, so that junior staff is involved as well and the IoP strategy does not come as a surprise for any staff member, student or external stakeholder. While doing so, the IoP should be aware that although its primary relevance to society will always be its scientific excellence and the education of students, a growing emphasis on environmental transitions and applied science may necessitate a shift or expansion of its research portfolio in directions that more directly address questions raised in society.

PhD policy and training

PhD candidates at the IoP all have two to four staff members who supervise the research project and carry responsibility for the quality of the thesis research. Besides these formal supervisors, IoP policy prescribes that a PhD mentor from a different research group is assigned to each PhD candidate at the start of the PhD project. This mentor is a contact person for both the PhD candidate and the main supervisors. Involving a mentor is meant to prevent stagnation of the project. For each PhD candidate, a training and supervision plan is drafted early in the PhD trajectory, describing the overall aims of the research project, the schools and courses to be attended, and various aspects of the supervision such as type of supervision and frequency of meetings between PhD candidate and supervisors.

For topical training, the IoP participates in three national research schools: the Dutch Research School for Theoretical Physics, the Research School Subatomic Physics, and the National research school for fluid mechanics J.M. Burgerscentrum. In addition, the Faculty of Science at the UvA offers extensive skills training, with the programme Mastering your PhD as the main compulsory training component, and various presentation/writing/didactical skills trainings as optional elements. A dedicated career coach for PhD candidates is available both for group and individual counseling sessions.

The committee found that the IoP has a well-structured system of PhD supervision and training in place and in general a good record for the number and quality of PhD candidates with a low drop-out rate. The supervision setup with the additional independent supervisor is much appreciated by the PhD candidates. The exact rules and regulations for courses to follow, teaching

load, summer schools, topical lectures and such seem to differ between the three divisions of the IoP and are not fully transparent for all PhD candidates. This is especially true for young PhD candidates at the Institute of High-Energy Physics, who through the close bonds to Nikhef are more in contact with PhD candidates from other universities. As a consequence of this, confusion is more prevalent. The committee therefore proposes that each of the IoP divisions provides clear guidelines for the PhD candidates to know what is expected of them as soon as possible, in order to avoid any confusion at a later time in the PhD trajectory.

The committee notes with pleasure that the IoP as a whole has a unified PhD and postdoc committee. The social and scientific events the PhD and postdoc committee organizes are cherished by all, as the committee heard. Both the IoP and the UvA are proactively preparing the PhD candidates and postdocs for their careers after they finish their research projects, with many courses, workshops and career lunches. Talking to the PhD candidates and postdocs from IoP, the committee got the impression that they are quite happy in general and appreciate all the facilities provided to them.

The committee found that in the period 2018 -2023 the average time required for a PhD trajectory at IoP transgressed the nominal four years. Instead of 48 months, the average duration of a PhD trajectory at ITFA was around 51 months, and at WZI and IHEF around 55 months. The pandemic of 2020 – 2021 may well have influenced these durations. During the lockdowns, the WZI and Nikhef labs were only accessible for a limited number of people, which will have slowed down the experimentalists more than the theorists.

Open science

The IoP has introduced a set of procedures for data management and storage as an integral part of the research process. It also promotes publishing papers as open access. In the reporting period, an average of 95% of IoP articles were published through open access, with an upward trend. A figure head of open science is the scientific publication portal SciPost, which was initiated by one of the IoP researchers in 2016 and offers free open, global and perpetually accessible science. Today, SciPost consists of 14 different journals on physics, astronomy, chemistry and political science.

The committee concludes that the IoP does all that may be expected with regard to the promotion of open science, with SciPost as the pinnacle of its success. In the committee's view, the IoP as the founding institute should take care that SciPost is able to continue its internationally pioneering work in the long run, and does not succumb to its own success. At present the success of SciPost is largely dependent on one staff member, which is a significant vulnerability. In order for it to be more viable, an international business case for SciPost is required. The committee recommends the IoP, the leadership of the UvA Faculty of Sciences and the Dutch funding agency NWO to join forces in this mission. Together, they should convince other parties in Europe - and possibly beyond - to support SciPost, and make a plan that transcends the level of one trailblazing individual.

Academic culture

The IoP puts much thought and effort in creating an open atmosphere in which researchers, support staff and students can work safely and be part of an inclusive research community. The committee found a very good collegiate atmosphere across the IoP, in which both junior and senior staff members seem to feel at home, responsible for the success of the institute and willing to work with and support each other. The committee commends the leadership of the IoP and its divisions for fostering such a culture.

The committee is impressed by the work of the Diversity and Inclusion Council that the IoP installed in 2020. This council advises the management team of the IoP independently and proactively about efforts to enhance diversity and inclusion at the institute. In addition and among many other activities, it organizes a paid annual summer research internship for students from underrepresented groups studying at the UvA, it organizes colloquia on diversity and inclusion, bystander trainings, and a series of events called *Behind the CV*, where faculty members and students share with junior researchers some of the struggles that they experienced during their journey to a career in science. The council was involved in an extensive survey of the entire IoP community to determine to what extent the institute offers an inclusive environment. This survey was triggered by the #MeToo and Black Lives Matter movements in the Netherlands and elsewhere. It was prepared internally but evaluated and analyzed externally by a Dutch expertise centre for diversity policy: ECHO. The survey report led to a two-day think tank programme for IoP members guided by ECHO. The programme led to recommendations for concrete policy changes as well as grass-roots ideas to make diversity and inclusion easier to discuss and address in the daily life within the institute.

While social safety and inclusivity policies are in place, they need further consolidation. There are numerous support channels available, both within and outside the institute, through which researchers can seek help when confronted with problems in the workplace. The committee heard that – even though there is a website listing all these pathways – PhD candidates and postdocs in particular are still confused on where they should go to for which kind of support. Instead, the institute manager seems to be the nexus where many PhD candidates, postdocs and junior staff go with their questions.

To consolidate the diversity and inclusion policies, the committee has four recommendations. First, it recommends that the IoP allocates a fixed budget to the Diversity and Inclusion Council, to underline the importance of its work. Second, the committee recommends that some of the questions of the recent ECHO survey are included in the annual employer satisfaction survey carried out by the faculty, to monitor progress. Third, the committee suggests that the Diversity and Inclusion Council's excellent plan to initiate a postdoc fellowship for researchers from underrepresented groups (notably women, people of colour and queers) deserves to be upgraded towards creating a tenure track position for a representative of such groups, to increase long-term

diversity. Possibly, such a plan could be financed from a fraction of the IoP's internal project funding. Fourth, the committee recommends firmly integrating issues of social safety and diversity in the academic leadership training that tenure trackers receive.

Finally, it is the committee's experience that occasional interpersonal issues can cause problems, such as researchers - especially junior ones - perceiving certain kinds of interactions as bullying or disrespect. Such interactions might be below the threshold for any kind of formal reporting, but nevertheless can degrade the working environment or even drive away talent. Sometimes these kinds of conflicts can be mitigated or resolved satisfactorily via a mediation system with a low threshold for reporting and guaranteed responses. At IoP such a system ('vertrouwenspersonen') is in place, but may require more publicity. The same applies to existing codes of conduct, which have been adopted by the faculty or the institute but sometimes are not known to staff or students. The committee therefore recommends to advertise these measures in such a way that they reach the IoP staff members and student more widely.

Research integrity is the topic of awareness courses that are a mandatory part of the training programme for PhD candidates. Nevertheless, the committee found that there is a lack of awareness and sense of urgency concerning research integrity, especially among PhD candidates and postdocs. The committee recommends making training on research integrity more effective. It will probably help to focus not so much on what is right and what is wrong in science in general, but more on how to act in certain situationsand how to deal with more ambiguous or delicate topics of research integrity (the 'grey area').

Human resources policy

For talent management, the IoP adheres to the 'career principle'. This means that staff members can be promoted through the ranks based solely on their individual performance. This deviates from the more hierarchical system, in which a promotion depended on the availability of a vacancy in the next rank which carried only a fixed number of positions ('formation principle'). The committee found that the career principle works very well. It heard that there is a clear set of criteria and that all tenure trackers are annually assessed. When a tenure-tracker wants to come up for promotion, a thorough procedure is followed involving the department heads of all three divisions within the IoP plus external experts. For new hires as well, there is a careful procedure where a committee of internal and external stakeholders strives for consensus. Such mechanism for deciding hires and promotions, as well as the joint administration of the three divisions and the internal funding scheme, show an institute that stands out as unusually collegial in its HR-policy decisions. Moreover (and possibly as a result of this policy), the IoP has managed to attract and retain very talented and enthusiastic tenure track staff.

In the period under review, the IoP's human resources policy has been directed explicitly to increasing diversity amongst its staff. This effort was particularly successful in increasing the fraction of female assistant professors, which is now at 50 %. This is laudable. For the coming years, the committee

recommends a focus on consolidating (gender) diversity in the hiring policy of new staff, as well as career development and retention of underrepresented groups.

With many new staff coming in from abroad, effective onboarding procedures need to be in place. They are now perceived as insufficient by the IoP itself in its self-evaluation report and by some of the researchers the committee talked to. The Institute for Theoretical Physics seems to have set a good example by providing an onboarding document that is much appreciated. The committee recommends making this an IoP-wide practice.

As the IoP mentions in its self-evaluation report, the mentoring scheme for tenure trackers needs to be strengthened. Talking with the tenure-track staff, the committee heard that the role of the mentor and the rights of the mentee are as yet not well-defined, and that as a consequence the functioning of the mentorship differs widely between individual cases. Another aspect that could be better organized is the division of teaching duties among tenure-trackers. This now seems to be done in a haphazard way. If a teaching duty has to be filled in, or a lecturer has to be replaced, whoever feels called upon the most does the job. The committee recommends a more formalized and equalized allocation system of teaching duties. Introducing such a system may also be a means to gain a more equitable spread of master's students across the divisions: students should get to know a balanced set of lecturers throughout their curriculum.

As the IoP itself notes, it will remain a challenge to retain good researchers and especially female staff in the international competition for talent. However, the IoP is in an excellent starting position due to its good scientific reputation, collegiate atmosphere and the flexible working conditions that it has created. Particularly the career support for partners seems to be a promising instrument. The committee encourages the IoP to continue its efforts. To monitor chances and hazards, it recommends doing exit surveys with all academic staff members who leave, from PhD candidates to tenured staff.

The current organization of the IoP and its divisions with minimal hierarchy is appreciated by the staff, the committee found. However, given that the size of the institute has increased substantially, the committee recommends the leadership to delegate some responsibilities among the faculty. Also, the division should make sure that the informal culture still works as it should. Possibly more formal structures may be needed to ensure that all voices are heard.

4. Findings and Recommendations Institute for High-Energy Physics

4.1. Introduction

The Institute for High-Energy Physics (IHEF) carries out research in particle and astroparticle physics. The goal of the research at IHEF is to unravel outstanding questions about nature, such as: what is the origin of mass for elementary particles; what is the equation of state of neutron stars; are there new symmetries, new physical laws; what explains the patterns we see in the Standard Model of particle physics; what is dark matter? IHEF is an integral part of Nikhef, the Dutch National Institute for Subatomic Physics.

4.2. Research Quality

Overall, the quality of the research performed at IHEF is very high. The division profits from the extensive technical and research resources of Nikhef, as well as coordination and connection with the high energy physics community in the Netherlands and beyond. The Nikhef strategy is effectively both the IHEF strategy and the strategy for high energy physics in the Netherlands.

The field of high energy physics is characterized by very large international collaborations, within which researchers tend to distinguish themselves not so much by individual publications but rather by leadership roles in instrumentation construction, in data analysis, and in scientific management. IHEF and Nikhef have selected several leading experiments in different areas of high energy physics to make contributions to, with a strategy to always complement ongoing experiments with developments towards next-generation projects. These contributions are selected broadly and are well-matched to the expertise of the personnel, available resources and possible opportunities. The quality of the IHEF contributions is attested to by multiple high-profile analysis convenerships and detector hardware responsibilities. One faculty member won the prestigious New Horizons in Physics prize for 2020, which is a tremendous achievement.

Some of the ongoing work includes projects for which there has been long-standing Nikhef participation and impact, such as ATLAS, KM3NeT and XENONnT. Newer efforts closer to the ramping-up phase include DUNE and gravitational waves via LIGO-Virgo-KAGRA and the Einstein Telescope project. The latter offers the exciting possibility of a nearby siting of this next-generation gravitational wave detector. Nikhef also hosts ongoing detector R&D and collaborations with theorists. The committee notes that all of these research directions within high-energy physics have necessarily some long-

term viability risk. For each of them, the corresponding large-scale project has a non-zero probability of not succeeding for one reason or another. However, the committee finds that IHEF has mitigated this risk quite reasonably via judicious diversification of its portfolio.

The committee notes that there are potentially productive cross-pollination opportunities within the IoP between IHEF and the Van der Waals Zeeman Institute, for example in the development of new technologies and/or better instruments. While there is some existing interaction already, the opportunities may as yet be under-exploited. The committee encourages increased attention to potential collaboration between IHEF and the Van der Waals Zeeman Institute, as indeed IHEF strives for.

4.3. Relevance to society

While technological spinoffs do result from research in high-energy physics, these tend to need some time before they result in direct practical applications, sometimes decades or centuries. A stronger factor for societal relevance is therefore the inspirational appeal of the search for a fundamental understanding of nature. Communication with the general public on IHEF research topics can have very positive impact on the scientific enterprise in general. It pleases the committee that IHEF has been very active in education and public outreach, thus bridging the gap between academia and society. IHEF physicists regularly give lectures at schools, they contribute to the development of educational material for particle physics in high-school curricula and offer opportunities for participation in short school projects at Nikhef as well as master classes in particle physics. IHEF physicists have a regular presence in the media and are active on social media. One of the staff members wrote a popular science book and was appointed professor in Science Communication at Leiden University. The committee applauds such activities and the fact that IHEF allows some of its faculty to concentrate more heavily on outreach. The committee supports continued effort in education and outreach. It also encourages IHEF to stay alert for opportunities for technological developments with industrial applications, since society demands them more and more.

4.4. Viability

With its well-diversified portfolio, both in topics and in time-scale, well-suited to the available expertise, IHEF is at present a healthy research community. The committee was pleased to hear that the division – in close collaboration with Nikhef – keeps its eyes firmly set on the future and actively lobbies for new accelerator facilities at CERN. The committee advises IHEF and Nikhef to strengthen this lobby and in doing so to gain support from the Dutch ministry of Education, Culture and Science. A compelling argument can be made for the desirability of Dutch participation in this field of frontier discoveries, in which CERN is world leading and which is a breeding ground for international talent. In the committee's view, the lobby should include advocacy for a diversified programme for CERN, hedging its bets and keeping

options open for alternative functions such as detecting gravitational waves or other subjects in the domain of astroparticle physics – such as dark matter searches. Also, sustainability should set a boundary for future facilities at CERN, since society increasingly demands it.

5. Findings and Recommendations Institute for Theoretical Physics

5.1. Introduction

The Institute for Theoretical Physics Amsterdam (ITFA) performs research in theoretical physics, and teaches and trains students, PhD candidates, and postdocs. Over the evaluation period, its strategic focus was on fostering connections. ITFA actively participates in local initiatives like GRavitational and AstroParticle Physics Amsterdam (GRAPPA) and QuSoft, the Dutch research centre for quantum software and technology. It also participates in national clusters like the Quantum Software Consortium (QSC), the Dutch Institute for Emergent Phenomena (DIEP), and the Delta Institute for Theoretical Physics (Delta-ITP). Additionally, ITFA has a culture of fostering theoretical work that transcends the boundaries between different specializations, producing researchers and collaborations that bridge the gaps between different fields of theoretical physics such as string theory, gravitational wave physics, cosmology, mathematical physics and condensed matter theory.

5.2. Research quality

The research done at ITFA is overall of a truly excellent level. This is obvious based on the international reputation of the individual researchers and the institute, as well as various indicators such as publications, grants, and the ability of the ITFA to attract extremely talented young researchers. The two main directions of ITFA (high-energy physics on the one hand, and quantum and soft matter on the other hand) have managed to live in good harmony and strengthen alliances between themselves and the other divisions, which is far from obvious in other institutions elsewhere. Given the synergy between the two domains, this is commendable.

In addition to its core themes quantum matter theory, soft matter, cosmology, astroparticle physics, particle phenomenology and string theory, ITFA has successfully developed in new directions, largely via the hiring of younger researchers. Such developments have led to an increase of the contacts with other institutes and outreach efforts. In particular, the panel appreciates the creation of the Computational Soft Matter lab, which it recommends to consolidate. The Dutch Institute for Emergent Phenomena DIEP, as well as interactions with QuSoft and the collaboration with experimental groups are great strengths of ITFA.

The growing activities in experimental quantum science and technology have resulted in analytical activities on correlated systems (at ITFA) and novel numerical developments in the field of tensor networks. In the future such contacts with experimental groups should of course be continued. In the committee's view, the connection between black hole physics and quantum information could be made more visible, given the strengths of ITFA in both

domains. The committee also recommends to strengthen – in each domain - the relation with artificial intelligence given the enormous developments in AI worldwide. Finally, the increasing relevance of gravitational waves observations is a golden opportunity for synergies between the astrophysics, cosmology, and string groups.

5.3. Relevance to society

The committee found that in the period under review, ITFA has made strong efforts to enhance its societal relevance. In particular, the engagement with the quantum information initiatives such as QuSoft and Quantum Delta have added important societal links to theoretical physics, with large companies such as Bosch, IBM, and Toyota taking part in industrial collaborations. A first spin-off activity was launched in 2023: Hydra Computing, bringing quantum-inspired computational techniques to solve complex problems in semiconductor industries.

Besides working towards applications, ITFA has organized inspiring and successful outreach activities promoting physics for a general public. For instance, the Dutch Institute for Emergent Phenomena (DIEP) was the source of the award-winning Science and Cocktails initiative held in the Amsterdam pop temple Paradiso. The creation of open access platforms for publication, particularly Scipost which originated in ITFA, deserves compliments as an action benefiting the scientific community as a whole.

In the committee's view, ITFA should remain attentive to fields that could increase its footprint on the societal relevance front, while of course keeping the exceptional level it has shown in the past in its core domains.

5.4. Viability

So far, the institute has worked successfully with a rather informal strategy and more or less opportunistic hirings. Although this has been successful, the panel is concerned that such a method might not be as successful in the future given the potential changes in the funding situation. In a growth scenario letting a thousand flowers bloom may be a fruitful tactic, but if the tide turns stretching the budget over too many topics may jeopardize the international visibility of ITFA in the long term. There is also the risk of instable growth, where large research nuclei crowd out smaller ones without deliberation behind this process. The committee therefore reinforces ITFA's plans to formulate its ambitions for a future scientific profile and derive an actionable plan to achieve it in terms of hiring.

ITFA is not only successful in research, it also attracts by far the most master students of all the IoP divisions. To prevent an overload on some supervisors, a cap of three master students per supervisor over a given period has been proposed. The committee finds it an excellent idea to spread the master students more evenly amongst the staff, which should possibly extend to other IoP divisions as well.

6. Findings and Recommendations Van der Waals Zeeman Institute

6.1. Introduction

The van der Waals-Zeeman Institute for Experimental Physics (WZI) carries out experimental research ranging from atomic, molecular and optical physics to soft condensed matter science. WZI research is powered both by a fundamental, knowledge-based drive, as well as by an ambition to maximize the transfer to and exploitation of results in industry and society in general. The division provides education within the physics and other curricula, transfers knowledge, and generates enthusiasm for experimental physics to society, both in the form of collaboration with industrial partners as well as in terms of boosting interest in physics in general and in its study in particular. Several specially appointed professors at WZI help to connect to industry.

6.2. Research quality

The committee found that WZI's research quality is excellent. The soft matter group is world-class, as demonstrated by an outstanding scientific publication output, an impressive number of grants and awards, and a high field-weighted citation impact. The Quantum Gases & Quantum Information and Quantum Materials groups also have a first-rate level, again as attested by output, grants and awards, citations, and international recognition. Obviously, allowances need to be made for the fact that these groups are of relatively small size compared to some similar groups in Europe and the US. It is commendable that the research fields quantum materials, quantum gases and soft matter are well integrated, which allows for good synergy.

WZI has managed to attract very strong new hires in recent years, mostly at the junior level. These hires have already become successful in highly competitive grant programmes and they enjoy international recognition. This bodes well for the coming years to further uphold the excellent scientific quality of the division. WZI faculty members are well represented in various national and international advisory and programme committees, indicating leadership in their field.

WZI is one of the founders of the new Research Priority Area 'AI for Sustainable Molecules and Materials' which is a timely and relevant topic. The same is true for the Computational Soft Matter lab which was co-founded by WZI. This great initiative will strengthen the ties with ITFA, and the Chemistry and Informatics Institutes of the University of Amsterdam. Both topics can be expected to generate significant scientific impact in the coming years and will presumably also help to attract more master students.

6.3. Relevance to society

WZI has an impressive portfolio of spin-offs and start-ups. It also has an excellent track record in successful collaborations with industry and semi-industry, ranging from tech companies and businesses working on innovations for the energy transition to the medical domain and the world of art and cultural heritage.

Examples of particularly impactful and societally relevant research of the Soft Matter group include work on emergent metamaterials, pioneering research on the transmission of the COVID virus by droplets in air, and a multidisciplinary collaborative project protecting cultural heritage against salt crystallization. The Quantum Materials group is pushing towards applied endeavours such as magnetic materials for technological applications, photovoltaic materials, and 2D materials (of only one or a few atomic layers). The Quantum Gases & Quantum Information group holds promising application potential for such future inventions as commercial atomic clocks, optical circuits, quantum computing, and precision control.

6.4. Viability

The division has three research groups: Quantum Materials, Soft Matter, and Quantum Gases & Quantum Information. The three groups have a high level of collaboration, for instance through joint PhD projects. This is quite remarkable given the disparity of subjects between these groups. At the same time the committee finds this very commendable as collaborations between subfields almost always leads to new insights.

The division fosters a collegial spirit and flat organization, which creates a supportive and stimulating research environment. WZI researchers have access to excellent experimental facilities, and while lab space is limited, the available space and infrastructure is sufficient to continue their high-quality research activities in the coming years.

The research lines of both senior and junior faculty members are well embedded and supported in the Dutch and European quantum and soft matter environments. The institute is also well embedded in the local ecosystem through strong links with institutes such as AMOLF, ARCNL, and QuSoft. The committee recommends further strengthening these ties, to fully exploit the potential for more applied physics projects.

Among the three groups within WZI, the Soft Matter group is currently the largest and has a strong and diverse research portfolio. The Quantum Gases & Quantum Information and Quantum Materials groups are both aware that their relatively small (but certainly viable!) size forces them to choose their research topics and competitive edge wisely. They do so among other strategies by making good synergistic use of the close connectedness with the Theory division within the IoP, and by focusing on the most promising

directions for application of their research. For the Quantum Materials group, 2D materials are an example of such a direction, for the Quantum Gases & Quantum Information group, pioneering a 'machine' for continuous production of strontium cold atoms is another one. These examples illustrate how smart collaborations between groups lead to novel developments, insights and publications. The committee expects that the new Research Priority Area 'AI for Sustainable Molecules and Materials' will also enable exciting and original research in the coming years. In addition it may attract a larger number of master students to WZI, which would be welcomed.

During the site visit, the committee heard that some PhD candidates felt that there was a lack of support staff at WZI, which slowed down the pace of their PhD trajectories. The committee observes that in general the hiring of technical support staff for the more complex and sophisticated setups will help PhD candidates, since they can then spend more time on the physics. Also, permanent technical support staff will bring more continuity of knowledge about complex tabletop experiments, such as atomic clocks. It therefore satisfies the committee that in the past years such support has indeed been recruited. At the time of the site visit, the group Quantum Gases still had a vacancy, but this has since been filled.

The committee found that IoP researchers suffered from a temporary flat boycot on collaboration with fossil-fuel industries that was imposed by the UvA board in 2023, which necessitated the retraction of a large public-private research proposal. Since then a more nuanced protocol has been developed to regulate such collaborations. The committee understands that the university has – apart from scientific or national security considerations – other reasons to impose restrictions for collaborating with partners associated with the fossil fuel industry. It advises the board of the UvA to check with the IoP whether the new protocol works for them, to avoid unnecessary delays or retractions, or unintentional harm to the culture for valorization in the future. Although the committee is aware of the fact that it is not in IoP's power to change these policies easily, it is recommended to discuss this subject with the Governing Board of the University of Amsterdam, also in view of the fact that other universities and research institutes in the Netherlands have arrived at a more nuanced policy for collaborating with industrial partners.

7 Appendices

7.1. Terms of reference

Introduction

The Institute of Physics (IoP) is one of the eight research institutes of the University of Amsterdam (UvA)'s Faculty of Science. The mission of the IoP is to carry out excellent research across a broad range of fields in both experimental and theoretical physics – spanning from fundamental to more applied; to provide inspiring education within the physics and adjacent curricula; and to transfer our knowledge and enthusiasm into society, both in the form of collaboration with industrial partners as well as in terms of boosting interest in physics in general. In 2022, IoP had grown to over 60 fte scientific staff members (assistant, associate and full professor; some of whom jointly appointed at other institutes within the Faculty), more than 40 postdocs, over 125 PhD candidates and about 12 fte support staff.

In the Netherlands, the governing boards of the universities, the Royal Netherlands Academy of Arts and Sciences (KNAW) and the Dutch Research Council (NWO), are responsible for the quality of research done at their scientific institutes. As part of their quality assurance cycle, all academic research in the Netherlands is evaluated every six years. The executive board of the relevant university and the board of NWO or KNAW commissions the research assessment and determines which research units are to be evaluated each year. For the coordination of the assessment, all research organizations associated with the Universities of the Netherlands (UNL), KNAW and NWO use the Strategy Evaluation Protocol (SEP).

The main goal of a SEP evaluation is to evaluate a research unit in light of its own aims and strategy. In the self-evaluation, the unit reflects on its ambitions and strategy during the previous six years as well as for the future in a coherent, narrative argument, supported wherever possible with factual evidence. This fact means that there should be a direct relationship between the arguments with regard to the aims and strategy on the one hand and the type of robust data underpinning the self- evaluation on the other. The SEP assessments help to monitor and improve the quality of the research conducted by the research unit. Additionally, the assessments of the research quality and societal relevance of research contribute to fulfil the duty of accountability towards government and society. The boards of the institutes may use the outcomes of the research evaluations for quality assurance purposes and institutional strategy development.

Assessment

The board of the University of Amsterdam (UvA) hereby issues the Terms of Reference to the evaluation committee assessing the Institute of Physics (IoP). The committee will be chaired by prof. dr. Gerard van der Steenhoven. The committee is requested to carry out the assessment according to the guidelines specified in the Strategy Evaluation Protocol. The evaluation includes a retrospective and a prospective component. Specifically, the committee is asked to judge the performance of the unit on the main assessment criteria and offer its written conclusions as well as recommendations based on considerations and arguments.

You are being asked to assess the quality, viability and societal relevance of the research conducted by IoP. The time window of the research field comprises the research input and output of the 2017 – 2023 period. You are asked to assess the strategic targets of the research unit and the extent to which they are equipped to achieve them. You should do so by judging the research unit's performance on the three assessment criteria of the SEP:

1. research quality;
2. societal relevance;
3. viability of the unit.

During the evaluation of these criteria, the assessment committee is asked to incorporate four specific aspects. These aspects are included as they are becoming increasingly important in the current scientific context and help to shape the quality of the research unit.

These aspects are as follows:

1. Open Science: availability of research output, reuse of data, involvement of societal stakeholders;
2. PhD Policy and Training: supervision and instruction of PhD candidates;
3. Academic Culture: openness, (social) safety and inclusivity; and research integrity;
4. Human Resources Policy: diversity and talent management.

The main assessment criteria and the four specific aspects are described in detail within the Strategy Evaluation Protocol. Please take into account current international trends and developments in science and society in your analysis. Please provide a written assessment on each of the three criteria in accordance with SEP guidelines. Please also provide recommendations for improvement.

Besides the indicators specified by the SEP protocol, indicators of research quality explicitly include the outputs developed by the research unit. As indicators of relevance to society, sources of funding (e.g., public-private partnerships, EU funding) and other valorization activities such as *spin-off companies* can be considered. With respect to PhD education, you are asked to assess the relevance and quality of the PhD programs in the institute.

Statement of impartiality

The members of the committee are requested to sign a statement of impartiality before they conduct their assessment work. In this statement, the members declare that they have no direct relationship or connection with IoP.

Schedule of the assessment and reporting

The site visit at the IoP will take place from Tuesday 26 March 2024 (evening arrival and first gathering) until Thursday 28 March 2024 (afternoon departure). The contact person will contact you about logistical matters and other relevant issues related to the research assessment prior to the site visit. The committee is requested to report its findings in an assessment report drawn up in accordance with the SEP guidelines and format. The committee is asked to send the draft report to IoP no more than eight working weeks after the site visit. IoP will check the report for factual inaccuracies; if such inaccuracies are detected, the committee will ensure that they are corrected. The committee will then send the final version of the assessment report to the board. The board publishes the final version of the assessment report.

Documentation

The necessary documentation will be available on a secure website no later than four weeks prior to the site visit. The documents will include at least the following:

- Self-evaluation of the research unit, including participation in local or national research schools
- The Strategy Evaluation Protocol (version 2021 – 2027)
- These terms of reference for the assessment
- Short biosketches of the committee members and the secretary.

7.2. Programme for the site visit

Start	End	Program item
Tuesday, 26 March		
17:00	19:00	Internal meeting committee: preliminary findings and preparation interviews
19:00	21:00	Dinner with Dean and IoP directorate
Wednesday, 27 March		
08:45	09:00	Arrival at Amsterdam Science Park
09:00	10:00	Interview with Dean and IoP directorate
10:00	11:00	Interview with WZI division staff
11:00	11:15	Short break
11:15	11:45	Recap WZI (closed)
11:45	12:45	Lab tour WZI
12:45	13:15	Lunch (closed)
13:15	14:15	Interview with ITFA division staff
14:15	14:45	Recap ITFA (closed)
14:45	15:15	Transfer to Nikhef
15:15	16:15	Interview with IHEF division staff
16:15	16:45	Recap IHEF (closed)
16:45	17:45	Lab tour Nikhef
17:45	18:15	Consultation with IoP directorate (optional)
18:15	19:00	Transfer to restaurant (bicycle)
19:00	21:30	Committee dinner
Thursday, 28 March		
08:45	09:00	Arrival at Amsterdam Science Park
09:00	09:45	Interview with junior staff / staff on tenure track
09:45	10:15	Recap previous session (closed)
10:15	11:00	Interview with PhD candidates and postdocs
11:00	11:30	Recap previous session (closed)
11:30	12:15	Interview with Diversity & Inclusion council
12:15	12:45	Recap previous session (closed)
12:45	13:30	Lunch meeting with external stakeholders IoP
13:30	14:00	Recap previous session (closed)
14:00	14:30	Consultation with IoP directorate (optional)
14:30	15:45	Closed session committee
15:45	16:00	Transfer to Nikhef
16:00	16:30	Presentation of first impressions
16:30	17:30	Informal drinks, joint with Faculty of Science Spring Drinks

7.3. Composition of IoP staff

	2017		2018		2019		2020		2021		2022		2023	
IoP	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**
Scientific staff														
Assistant professor	11	11,0	10	10,0	11	11,0	16	16,0	19	19,0	22	22,0	21	21,0
Associate professor	17	17,0	20	20,0	22	22,0	20	20,0	21	21,0	20	19,6	23	22,1
Full professor	24	20,7	21	17,9	18	17,8	20	19,8	18	17,8	19	18,8	20	18,6
Postdocs	36	35,0	40	39,4	48	47,4	53	52,3	61	59,7	39	37,4	50	48,3
PhD candidates	61	61,0	70	69,6	72	71,6	86	85,3	108	107,1	115	114,6	118	117,8
Total research staff	**149**	**144,7**	**161**	**156,9**	**171**	**169,8**	**195**	**193,4**	**227**	**224,6**	**215**	**212,4**	**232**	**227,8**
Support staff	16	10,8	14	9,2	11	7,7	14	10,1	14	10,0	16	12,5	21	14,7
TOTAL STAFF	**165**	**155,5**	**175**	**166,1**	**182**	**177,5**	**209**	**203,5**	**241**	**234,6**	**231**	**224,9**	**253**	**242,5**

	2017		2018		2019		2020		2021		2022		2023	
Division: IHEF (cont.)	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**
Postdocs			3	3,0	5	5,0	6	5,4	7	7,0	3	3,0	5	5,0
PhD candidates	1	1,0	2	2,0	7	7,0	8	8,0	19	19,0	21	21,0	21	21,0
TOTAL STAFF IHEF	**11**	**10,8**	**16**	**15,8**	**22**	**21,8**	**27**	**26,2**	**39**	**38,8**	**38**	**37,8**	**40**	**39,8**

	2017		2018		2019		2020		2021		2022		2023	
Division: ITFA	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**
Assistant professor	4	4,0	3	3,0	2	2,0	4	4,0	6	6,0	8	8,0	9	9,0
Associate professor	10	10,0	12	12,0	13	13,0	13	13,0	12	12,0	11	11,0	12	11,3
Full professor	8	8,0	6	6,0	7	7,0	7	7,0	7	7,0	7	7,0	7	6,3
Postdocs	23	22,5	27	26,4	32	31,4	29	28,9	30	29,7	21	20,6	23	22,5
PhD candidates	32	32,0	39	38,8	32	31,8	36	35,6	41	40,5	40	40,0	44	44,0
TOTAL STAFF ITFA	**77**	**76,5**	**87**	**86,2**	**86**	**85,2**	**89**	**88,5**	**96**	**95,2**	**87**	**86,6**	**95**	**93,1**

	2017		2018		2019		2020		2021		2022		2023	
Division: WZI	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**	**#**	**FTE**
Assistant professor	5	5,0	4	4,0	6	6,0	6	6,0	7	7,0	7	7,0	5	5,0
Associate professor	4	4,0	5	5,0	6	6,0	5	5,0	6	6,0	7	6,8	9	9,0
Full professor	11	7,9	10	7,1	7	7,0	8	8,0	7	7,0	7	6,8	8	7,3
Postdocs	13	12,5	10	10,0	11	11,0	18	18,0	24	23,0	15	13,8	22	20,8
PhD candidates	28	28,0	29	28,8	33	32,8	42	41,6	48	47,6	54	53,6	53	52,8
TOTAL STAFF WZI	**61**	**57,4**	**58**	**54,9**	**63**	**62,8**	**79**	**78,6**	**92**	**90,6**	**90**	**88,0**	**97**	**94,9**

7.4. IoP budget

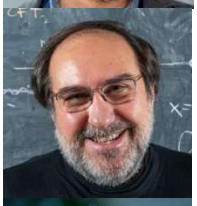
	2017		2018		2019		2020		2021		2022		2023	
IoP	**FTE**	**%**	**FTE**	**%**	**FTE**	**%**	**FTE**	**%**	**FTE**	**%**	**FTE**	**%**	**FTE**	**%**
Funding														
Direct funding	58,0	40,1	61,9	39,4	72,9	42,9	78,6	40,6	96,8	43,1	99,6	46,9	107,6	47,2
Research grants	50,4	34,8	56,6	36,1	54,7	32,2	63,0	32,6	81,0	36,0	69,5	32,7	70,8	31,1
Contract research	36,3	25,1	38,4	24,5	42,2	24,9	51,8	26,8	46,8	20,9	43,3	20,4	49,5	21,7
Other	-	-	-	-	-	-	-	-		-	-	-	-	-
TOTAL FUNDING	**144,7**	**100**	**156,9**	**100**	**169,8**	**100**	**193,4**	**100**	**224,6**	**100**	**212,4**	**100**	**227,9**	**100**

Expenditure														
Personnel costs	k€ 9.507		k€ 9.674		k€ 11.283		k€ 13.467		k€ 15.583		k€ 15.730		k€ 16.732	
Material costs	k€ 1.947		k€ 1.768		k€ 2.809		k€ 2.778		k€ 1.455		k€ 3.897		k€ 3.206	
Other costs	k€ 5.129		k€ 6.041		k€ 6.852		k€ 6.483		k€ 6.707		k€ 7.387		k€ 9.009	
TOTAL EXPENDITURE	**k€ 16.584**		**k€ 17.483**		**k€ 20.944**		**k€ 22.729**		**k€ 23.744**		**k€ 27.014**		**k€ 28.947**	

7.5. Overview of the committee

Gerard van der Steenhoven (Chair)
Advisor to the Dutch Ministry of the Interior and Kingdom Relations and professor at the University of Twente. Former Director General of the Royal Netherlands' Meteorological Institute (KNMI, until 2023). Previously staff member at Nikhef (until 2008).

Fernando Quevedo
Professor at the University of Cambridge (UK). His work focuses on string theory and its potential phenomenological and cosmological implications.



Thierry Giamarchi
Professor at the University of Geneva (Switzerland). His field of research focuses on low-dimensional quantum systems and on disorder in classical and quantum systems.

Liesbeth Janssen
Professor at Eindhoven University of Technology, The Netherlands. She studies materials that are far from thermodynamic equilibrium.

Kirsten Kanneworff
PhD candidate in the Solid State and High Dimensional Quantum Optics group at Leiden University, The Netherlands.

Jorge Kurchan
CNRS research director at the École Normale Supérieure, Paris (France). His main interests are out-of-equilibrium thermodynamics, glassy physics and the stochastic treatment of near-integrable dynamical systems.

Steven Lowette
Professor at the Vrije Universiteit Brussels in Belgium. His field of research is experimental high-energy physics (CMS collaboration at CERN).

Kate Scholberg
Professor at Duke University in Durham, USA. Her research interests include experimental elementary particle physics, astrophysics and cosmology.