Science & Technology Cluster University of Groningen

Materials Science Centre (MSC)
Stratingh Institute for Chemistry and Chemical Engineering (Stratingh)
Kernfysisch Versneller Instituut (KVI)
Centre for Isotope Research (CIO)
Centre for Theoretical Physics (CTN

ASSESSMENT OF RESEARCH QUALITY

1996-2004

RuG

Rijksuniversiteit Groningen

Assessment of Research Quality

Science & Technology Cluster University of Groningen

Materials Science Centre (MSC)

Stratingh Institute for Chemistry and Chemical Engineering (Stratingh)

Kernfysisch Versneller Instituut (KVI)

Centre for Isotope Research (CIO)

Centre for Theoretical Physics (CTN)

1996-2004

University of Groningen

RuG

University of Groningen
P.O. Box 72
9700 AB Groningen
The Netherlands

Department of Academic Affairs and International Relations
Phone: +31 50 363 5370
Email: G.B.de.Vries@rug.nl
Website: http://www.rug.nl/corporate/onderzoek/kwaliteitszorg/onderzoeksbeoordelingen

Kernfysisch Versneller Instituut
Zernikelaan 25
9747 AA Groningen
The Netherlands
Phone: +31 50 363 3600
Email: info@kvi.nl
Website: http://www.kvi.nl/

Faculty Mathematics and Natural Sciences
Nijenborgh 4
9747 AG Groningen
The Netherlands

Materials Science Centre (MSC)
Phone: +31 50 363 4843
Email: J.Knoester@rug.nl
Website: www.rug.nl/msc/

Stratingh Institute for Chemistry and Chemical Engineering (Stratingh)
Phone: +31 50 363 4278
Email: B.L.Feringa@rug.nl
Website: www.rug.nl/stratingh

Centre for Isotope Research (CIO)
Phone: +31 50 363 4943
Email: H.A.J.Meijer@rug.nl
Website: http://www.rug.nl/ees/onderzoek/CIO/index?lang=en

Centre for Theoretical Physics (CTN)
Phone: +31 50 363 4950
Email: secrctn@fmns.rug.nl
Website: http://www.rug.nl/natuurkunde/onderzoek/instituten/ctn/index

To be cited as: Assessment of Research Quality, Science & Technology RUG/FMNS/KVI 1996-2004, University of Groningen, December 2005.

Design Dorèl en anderen, Groningen, NL

Photographs Elmer Spaargaren, Groningen, NL

Printing PlantijnCasparie, Groningen, NL

Date December 2005

Assessment of Research Quality

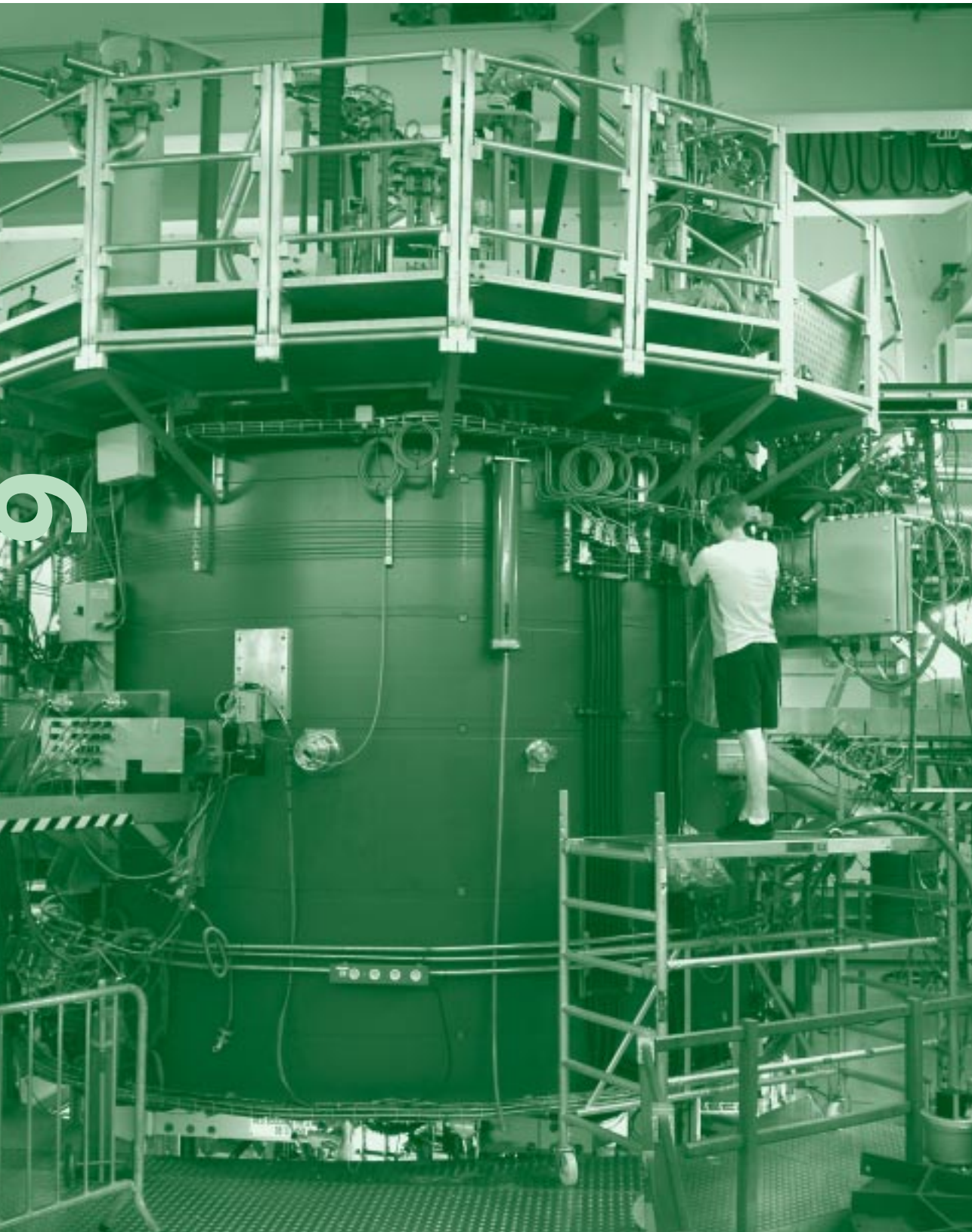
Science & Technology Cluster
University of Groningen

Materials Science Centre (MSC)
Stratingh Institute for Chemistry and Chemical Engineering (Stratingh)
Kernfysisch Versneller Instituut (KVI)
Centre for Isotope Research (CIO)
Centre for Theoretical Physics (CTN)

1996-2004

University of Groningen

Contents



1 General Information

1 1 Introduction

1 1 1 National system for assessing the quality of research

In 2003, the Dutch system for assessing the quality of research underwent a major change. The system of national, external assessments of individual disciplines, coordinated by the office of the Association of Dutch Universities (VSNU), was discontinued. In its place, the Executive Boards of the universities now determine the design and organization of the research quality evaluations. They are bound by the "Standard Evaluation Protocol 2003-2009" (SEP)[1], which is approved not only by VSNU but also by the Netherlands Organization for Scientific Research (NWO), the Royal Netherlands Academy of Arts and Sciences (KNAW) and the Dutch ministry of education and science.

The three main aims of the Standard Evaluation Protocol are improving the quality of research, improving research management and direction and improving accountability, both internal (by the unit to its immediate superiors within the university) and external (by the university to government and society). The SEP is based on two fundaments:

- an external assessment once every six years (by a peer review committee conducting a site visit)
- a self-evaluation once every three years (one in preparation for the external assessment and one intermediate evaluation three years later, the 'mid-term review').

The SEP requires the committee members to evaluate the research institute or school as a whole and the relevant parts of the institute (research programs) individually, on four main criteria, namely:

- Quality (international recognition and innovative potential)
- Productivity (scientific output)
- Relevance (scientific and socio-economic impact)
- Vitality and feasibility (flexibility, management, and leadership)

The most important conclusions of the external assessment committee, the reaction to these by the assessed unit and the final conclusions with regard to the future applied to them by the Executive Board will all be published.
An independent meta committee, set up by the KNAW, NWO and VSNU, will check the design and implementation of the new system by the various institutions and publishes its findings annually.

[1] This can be downloaded from: *http://www.qanu.nl/comasy/uploadedfiles/sep2003-2009.pdf*.

112 Outline of the RUG Protocol

The SEP provides a framework to guarantee -as far as possible- comparable procedures and criteria. Within this, it provides room for specific input by the universities. Subsequently, the University of Groningen (RUG) developed the so-called "Protocol for Quality Assurance at the University of Groningen".

The following principles underlie the RUG protocol[2]:

a *There is a close connection with the RUG quality policy*
b *There is a clear division of tasks and responsibilities*
c *The external assessment is transparent, authoritative and is relevant for both internal policy and external accounting*
d *The aim is professionalization and minimal workload for researchers.*

Re a) RUG quality policy with regard to research

The RUG regards quality improvement as the dominant principle in its research policy. A crucial part is played by the peer reviews, external assessments by independent, objective researchers with expertise in the disciplines of the unit to be assessed. The peer reviewers should preferably be recognized international authorities and base their assessment not only on the self-evaluation of the unit but also on actual knowledge of the most important output, where possible supplemented by quantitative and qualitative indicators.

Further, external research assessments should concentrate on:

- providing direct feedback from the peer reviewers on the position of the research, measured against national and international standards for quality, productivity, relevance and vitality;
- assessing both past performance and future expectations, the ambitions and the scientific and social impact of the research;
- evaluating the management and the academic leadership of the unit in relation to the mission and ambitions;
- the context of the research unit, for example how the unit is embedded in the faculty and/or the university as a whole, its national and international context, as well as its disciplinary and interdisciplinary contacts.

Before formal acceptance of the findings of the peer review committee as laid down in the assessment report, the Executive Board of the university will apply the principle of hearing both sides of the case.

Re c) Usefulness

The results of an assessment must be sufficiently informative to serve as the basis for policy decisions. Therefore, the possibility of adding a lower aggregation level -compared to the aggregation level referred to in the SEP- exists. In practice, the aggregation levels of research programs may vary strongly. However, if a research program is believed to be too large to

[2] The full text in Dutch and an English summary can be downloaded from: *http://www.rug.nl/Corporate/onderzoek/kwaliteitszorg/index*

receive an adequate judgment on all research covered by this program, the Executive Board of the university may request for a supplementary evaluation at a lower aggregation level. The external assessment at this lowest level can, if desired, remain confidential. The SEP provides for this eventuality in the management letter: 'Matters of personnel policy and sensitive decisions are generally treated in the confidential management letter to the Board and do not form part of the public report.'

Re d) Minimal assessment

Institutes at the RUG are organized on a disciplinary and local level. Within the previous national system, an institute was assessed simultaneously with comparable research groups at other Dutch universities. In the current system national, disciplinary visitation is no longer compulsory but still an option, provided that the relevant Executive Boards approve. The RUG is determined to keep the option for national co-operation open, particularly because of the increased comparability of the assessments and the more efficient use of peer reviewers. An alternative for national co-operation would be to allow a single Peer Review Committee (PRC) to assess several Groningen institutes. This option is offered to faculties aiming to cluster their multidisciplinary research institutes.


BRAUN
MB

Review of the Science & Technology Cluster

2

2 1 The review committee

The peer review committee members for the research assessment of the Science & Technology cluster were appointed by the Executive Board of the University of Groningen, after a thorough selection procedure assuring an authoritative, critical and independent assessment of the research institutes.
The committee consisted of:
Prof.dr. J.F. van der Veen (Chair), *Experimental Physics, Switzerland*
Prof. dr. ir. S. Bruin, *Chemical Reactor Engineering, The Netherlands*
Prof. dr. A.J. Kirby, *Biological Chemistry, UK*
Prof. dr. W. Kutschera, *Nuclear Physics, Austria*
Prof. dr. H. von Löhneysen, *Solid-state Physics, Germany*
Prof. dr. H. Nicolai, *Mathematical physics, Germany*
Prof. dr. C. Taliani, *Advanced Materials Science, Italy*
Prof. dr. B. Tamain, *Nuclear Physics, France*
Prof. dr. H.P. Trommsdorff, *Condensed Phase Physics, France*

Dr. J.M. van Rooij, Department of Academic Affairs, University of Groningen, was appointed secretary to the review committee.

All members of the Committee signed a declaration and disclosure form (see: Appendix A) to safeguard that:

- the panel members judge without bias, personal preference or personal interest, and
- the judgment is made without undue influence from the institute, the program or other stakeholders.

Additional information on the committee members and their curricula vitae can be found in appendix B.

2 2 Scope of the assessment, assignment to the committee

The assessment comprised the following research units (further referred to as institutes) of the Science & Technology cluster of the Faculty of Mathematics & Natural Sciences (FMNS):

- Materials Science Centre (MSC)
- Stratingh Institute for Chemistry and Chemical Engineering (Stratingh)
- Kernfysisch Versneller Instituut (KVI, Nuclear-Physics Accelerator Institute)
- Centre for Isotope Research (CIO)

- Centre for Theoretical Physics (CTN)
  In addition, two biophysics groups of the
- Centre for Behaviour and Neurosciences (CBN),
  belonging to both the Science & Technology and the Life Sciences cluster of FMNS, were included in the present assessment.

The review committee was asked to evaluate the institutes separately as well as the research programs within each institute. For the institutes, emphasis was on strategy and organizational aspects, while the program assessments focused on results, quality and future perspectives of the scientific research. The PRC had to take into account the general rules laid down in the SEP and RUG Protocol. In addition, the following specific instructions were given by the Executive Board:

Numerical scores for Q, P, R, V&F

The SEP is somewhat ambiguous about the use of the five point scale. Following the SEP guidelines for the evaluation report (§3.6, p.16), the PRC was asked to provide numerical scores at the level of the research programs only. At the institute level, verbal judgments would suffice.

Publication numerical program scores

The SEP prescribes that the final evaluation report will be made public. However, sensitive parts may be left out and can be addressed instead in a confidential management letter to the Executive Board and the Board of the Faculty of Mathematics & Natural Sciences.
Given the low level of aggregation of the Science & Technology programs, the PRC was asked to restrict the individual program scores to a confidential management letter and to provide anonymous frequency tables of the numerical scores in the public evaluation report.

Citation analysis

An advanced bibliometric analysis was performed by the independent Centre for Science and Technology Studies (CWTS; http://www.cwts.nl/), covering the scientific output over the period 1994-2004. It provided a sophisticated view of (trends in) relative citation impact of the Science & Technology cluster and programs (compared to the world averages in relevant subfields and journal sets), thus yielding some sort of an international benchmark. The PRC was requested to take these into consideration before drawing its final conclusions, as considered appropriate.

The committee based its assessments on the self-evaluation reports of the institutes, additional documentation provided (see § **2** 3) and on discussions with the program leaders, institute Directors and members of the Faculty Board.

A total of 32 research programs were presented to the PRC for evaluation, 13 for MSC, 8 for Stratingh, 7 for KVI, 1 for CIO, 1 for CTN and 2 for CBN (see Contents for overview).

2 3 Input for the research assessment

Prior to the site visit the committee received the following documentation:

- a summary of the SEP and RUG protocol
- the self-evaluation reports of MSC, Stratingh, KVI, CIO, CTN and CBN (cf. SEP format, including a SWOT analysis, tables with input and output at institute and program levels, key and full publication lists)
- the results at FMNS and institute level of the bibliometric analysis mentioned above.

Upon arrival the committee received the following additional information:

- the results at the program level of the bibliometric study mentioned above
- an overview of the relative productivity (output : input ratios) of the institutes and programs.

The self-evaluation reports covered the 9-year period 1996 – 2004[3], were written in accordance with the directives of the SEP and comprised information at three levels of aggregation:

- FMNS (organization; management; publication strategy; human resource policy)
- institute (leadership; mission, strategy & policy; research staff & input; resources, funding & facilities; collaboration; reputation; internal evaluation; external validation; results; SWOT analysis)
- research program (leadership; mission, strategy & policy; collaboration; reputation; external evaluation; research staff & input; resources, funding & facilities; results; SWOT analysis)

[3] This extended period was chosen to fully cover the period since the last national Physics assessment (1990-1995). However, main focus was on the last six years (1999-2004).

2 4 Working procedure of the Committee

Given the extensive documentation and the large number of programs to be evaluated, a division of labor between committee members was followed.
In preparation of the evaluation, all members were asked to read Part A (description at FMNS and institute level) of all institutes. First responsibility for studying the documentation on the research programs in Part B was allocated as follows:

PRC-member	Special focus on program numbers (see table below for program titles and leaders)	
Van der Veen	MSC:	nrs. 1, 2, 3, 5, 8, 11
	KVI:	nrs. 1, 3
	CBN:	nrs. 1
Von Löhneysen	MSC:	nrs. 1, 2, 3, 4, 6, 9, 10, 12, 13
Taliani	MSC:	nrs. 6, 7, 9, 10, 11, 12, 13
Kirby	MSC:	nrs. 5, 8
	Stratingh:	nrs. 1, 2, 4, 5, 6, 7, 8
Bruin	Stratingh:	nrs. 1, 2, 3, 4, 5, 6, 7, 8
Tamain	KVI:	nrs. 2, 4, 5, 6, 7
	CTN:	nrs. 1
Kutschera	KVI:	nrs. 1, 2, 3, 4, 7
	CBN:	nrs. 1
	CIO:	nrs. 1
Nicolai	KVI:	nrs. 2, 4, 5, 6, 7
	CTN:	nrs. 1
Trommsdorff	MSC:	nrs. 4, 7, 10, 13
	KVI:	nrs. 1, 6
	Stratingh:	nrs. 3
	CIO:	nrs. 1

To keep an overview and to guard uniformity, the chair studied all documentation.

All PRC members sent their individual qualitative pre-assessment of each institute and of the allocated programs to the secretary prior to the site-visit. These were compiled and used as input for the closed 'kick-off' meeting.

To allow for separate interviews with all program leaders, these were scheduled in two to four 'parallel sessions'. The PRC was split up accordingly, such that at least two of the members that

had read the program's self-evaluation attended the interview. The chair and secretary took notes of all interviews they attended, while dr. N.J.I. Mars and dr. M. Koopmans, coordinators from the MSC/Stratingh and KVI offices, provided support and took minutes of the remaining interviews. Notes were exchanged and discussed in plenary sessions several times during the site visit.

Regarding the writing of the report, one PRC member was appointed for each institute and program as first reporter. However, all drafts were first exchanged among the attendants of the interview and finally edited by the chair. The committee wishes to stress that all subsequent versions of the compiled report were fully supported by all PRC members.

The first draft of the compiled report was circulated among the program leaders and the managers of the institutes for verification of the facts and for comments on the findings of the PRC. The comments were taken into consideration and led occasionally to corrections in the final text and/or scores.

2 5 The site visit

The committee members were welcomed in Groningen on Sunday evening, March 20th by representatives of the university 's Executive Board (Prof. dr. M. Kooyman), the Faculty Board (Prof. dr. D.A. Wiersma) and the management of the institutes.

The actual site visit started Monday morning March 21st and ended March 23rd in the afternoon. The program comprised:

- plenary sessions:
  - closed meetings of the PRC:
    - kick off meeting (March 21st 8:30-9:45): comparison of preliminary assessments; formulation of major topics for discussion with the University and Faculty Boards, institute directors, and program leaders; requests for additional information; adjustment of program
    - 'calibration' meetings: exchange of preliminary impressions and scores between subcommittees (during lunch, coffee and tea breaks on Monday and Tuesday; 45 minute 'lobby-meeting' preceding dinner on Monday; March 23rd 13:10-15:00)
  - meetings with:
    - the University and Faculty Boards and the institute directors: initial discussion (March 21st 9:45-10:40) and concluding session with presentation preliminary findings PRC (March 23rd, 15:00-15:50)
    - all institute directors simultaneously (March 21st, 11:10-12:45)
    - the directors of MSC, Stratingh and KVI separately (30-45 minutes each on March 23rd between 10:30 and 12:45)
- parallel 'subcommittee' meetings:
  - 1 hour interview with each program leader (including tour of facilities)
- plenary tours of the facilities
  - one tour for the entire committee to the KVI facilities

2 6 Assessment criteria and Ratings

The SEP calls for an assessment based on four main criteria: Quality, Productivity, Relevance and the dual criterion Vitality & Feasibility. The questions to be answered with the assessment concern both the institute and the research programs. These questions are:

For past performance:

- What are the quality and relevance of the institute?
- What is the quality of the leadership, management, strategy and research programs of the institute, its (human) resources, organization and infrastructure and how can they be improved?
- To what extent has the institute/research program achieved its mission and goals formulated for the period under review?

For future plans:

- Is the mission of the institute well chosen and phrased in view of the actual developments in the relevant research field(s)?
- How do you assess the institute's research plans and is there sufficient coherence in the research portfolio of the institute?
- What is the quality of the leadership, management and strategy of the institute, its (human) resources, organization and infrastructure and how can they be improved?
- Which of these aspects has room for improvement and how could that be accomplished?

Assessment criteria according to the SEP and interpretation by the PRC

Quality is to be seen as a measure of excellence and excitement. It refers to the eminence of a group's research activities, its abilities to perform at the highest level and its achievements in the international scientific community. It rests on the proficiency and rigor of research concepts and conduct; it shows in the success of the group at the forefront of scientific development. The members of the committee judged quality largely based on the discussions with the program leaders and the information in the self-evaluation reports, relying on their own knowledge and expertise. Relative citation impact as emerging from the bibliometric analysis by CWTS was helpful for the evaluation of the institutes, but played a minor role in assessing the quality of the research programs.

Productivity refers to the total output of the group; that is, the varied ways in which results of research and knowledge development are publicized. Usually, quantitative indicators measure this. The output needs to be reviewed in relation to the input in terms of human resources. The committee used the productivity analysis provided by the management only in the final stage of the assessment, mainly for 'calibration' of program scores within each institute. The subcommittees first based the program's productivity on the information in the self-evaluation report, not only on numbers but also on the nature of publications. Both academic publications and dissertations were taken into account. Output numbers were primarily related to the research input of the tenured plus non-tenured staff, but the input of PhD students was not neglected totally.

Relevance is a criterion that covers both the scientific and the technical and socio-economic impact of the work. Here in particular research choices are assessed in relation to developments in the international scientific community or, in the case of technical and socio-economic impact, in relation to important developments or questions in society at large.

Vitality & Feasibility refer to the internal and external dynamics of the group in relation to the choices made and the success rate of projects. On the one hand, this criterion measures the flexibility of a group, which appears in its ability to close research lines that have no future and to initiate new venture projects. On the other hand, it measures the capacity of the management to run projects in a professional way. Assessment of policy decisions is at stake, as well as assessment of project management, including cost-benefit analysis.

Ratings

The SEP provides a five-point scale to allow for the attribution of a numerical score on each of the four criteria. The scores used in this assessment are excellent (5), very good (4), good (3), satisfactory (2), and unsatisfactory (1). It should be stressed that these scores can not replace the verbal judgments that supply more relevant information.

A more extended description of this scale is as follows:

Excellent: work that is at the forefront internationally, and which most likely will have an important and substantial impact in the field. Institute is considered an international leader.

Very good: work that is internationally competitive and is expected to make a significant contribution; nationally speaking at the forefront in the field. Institute is considered international player, national leader.

Good: work that is competitive at the national level and will probably make a valuable contribution in the international field. Institute is considered internationally visible and a national player.

Satisfactory: work that is solid but not exciting, will add to our understanding and is in principle worthy of support. It is considered of less priority than work in the above categories. Institute is nationally visible.

Unsatisfactory: work that is neither solid nor exciting, flawed in the scientific and or technical approach, repetitions of other work, etc. Work not worthy of pursuing.

As pointed out above, the committee was instructed to provide scores at the program level only. Furthermore, as recognized by the SEP, it is not always feasible or satisfactory to measure on a five-point scale. To allow for more 'fine-tuning', the committee therefore extended the scale to include intermediate scores (e.g. 3-4).

In order to keep the program scores in this public report anonymous, as instructed, frequency

tables are provided for MSC and Stratingh separately and for KVI, CIO and CTN combined, listing the number of programs with a specific rating for each of the four criteria. Furthermore, graphs are provided of the mean program scores (unweighted average of the scores on the four criteria) plotted against the score on Quality.

Finally, it should be noted that previous external assessments used a different scale, prescribed by the former 'VSNU Protocol 1998' that was used in the national quality assessments until 2003. The table below provides an overview of the differences that should be taken into account carefully when comparing present and past scores.

VSNU 1992-2002 (previous reports)	**SEP 2003-2009** (this report)
5 Excellent	5 Excellent
	4 Very good
4 Good	3 Good
3 Satisfactory	2 Satisfactory
2 Unsatisfactory	1 Unsatisfactory
1 Poor	

Assessment of the Science & Technology institutes

3

3.1 General remarks

The evaluation of the research program of a large science cluster is a difficult task, especially if the cluster covers a wide spectrum of disciplines. The Peer Review Committee (PRC) was asked by the Executive Board of the University of Groningen to evaluate the Science & Technology Cluster of the Faculty of Mathematics & Natural Sciences, which comprises research in materials science, nuclear physics, isotope research, chemistry and chemical engineering, and neurobiophysics. The PRC, consisting of nine members, could cover each discipline with two to three expert members, except for the biophysics programs, for which specific expertise was insufficient.

Prior to the site visit from 21 to 23 March 2005, the PRC members received the self-evaluations of the different programs as well as a bibliometric analysis of the Cluster's activities, performed by CWTS. These were useful documents, without which an evaluation would be very difficult. But the committee members found the site visits by far the most helpful, and it was clear that this part of the evaluation procedure was also valued most by the program leaders. The panel would like to thank the Faculty and the program leaders for elucidating their tasks. Dr. J.M. van Rooij has provided much assistance to the PRC during all stages of the evaluation.

The self-evaluations were well-written and contained a wealth of data on the ongoing research as well as on the plans. The site visits were very well prepared by the program leaders, without exception. Each visit started with a brief presentation, after which a discussion started, typically around the following questions:

1 Which are the most prominent results of your research during the past three years?
2 How do you view your position in the national and international competition?
3 Which future developments do you propose for your research?
4 Where are possible problems or threats?
5 With which groups do you collaborate?
6 Do you receive adequate funding?
7 What is done to promote young scientists?

At the end of the visit, the PRC members usually received hand-outs of the presentation sheets. These were particularly helpful, because the research descriptions on the handouts were much more concise than in the self-evaluations and often just as informative. Therefore, the PRC suggests that in the future the descriptions of the research in the self-evaluations be shortened. In this way, the burden on the staff will be less. Some committee members noticed a certain degree of tiredness vis-à-vis evaluations in general. Indeed, there are too many evaluations, and the Executive Board of the University should make an effort to reduce the burden.

The PRC had to determine evaluation scores for each of the different programs. A complication is that the institutes are working on totally different research topics, and we all know that the 'publication culture' varies considerably among disciplines. Hence, calibrating the scores among institutes is an almost impossible task. For example, the engineering disciplines tend to publish more often in (badly cited) conference proceedings or, in some cases, not at all (the equipment or the product is proof of the work done).

In what follows below, the reader should keep the above caveats with scoring in mind. The PRC finds that most research programs within the Cluster are on a very high scientific level. Indeed, there is a large incidence of score 4. The Material Science Centre scores very well. Stratingh is also excellent, but the quality is a bit more diverse, with some groups scoring on Quality and Productivity somewhat below 4 and two groups scoring flat 5's. Most of the KVI groups also score quite well. Real jewels are CIO and CTN. The PRC found it difficult to evaluate the neurobiophysics and biomedical engineering programs of CBN, which therefore did not receive numerical scores. In short, the committee congratulates the Faculty with having so many high-quality programs in its research portfolio.

The PRC noticed also some problems and bottlenecks:

KVI

- The new funding policy by FOM works out extremely negatively for KVI. The University Board should put more pressure on FOM to change its policy. The life time of an accelerator facility is normally 20 years or longer. The PRC cannot imagine that research and education in nuclear physics would stop altogether in The Netherlands.
- TRIμP is a great program, but does not fully exploit AGOR. Projects for industry will be insufficient for maintaining the scientific position and status. One should find a (EU) source for a new nuclear physics program, in parallel with projects for industry, in order to maintain a positive scientific life around the facilities of KVI.
- The lower citation impact is partly explained by a high percentage of self-citations due to the small sized international community and the necessity to publish many co-authored papers (large-scale collaborations to exploit expensive facilities).
- The feasibility of EARTH is questionable. One should first prove that the detector concept works. The plans for EARTH should be subjected to a close scrutiny by an expert committee on neutrino detection and geophysics before KVI and RUG embarks in any way on a venture of this dimension.

Stratingh

- Chemical Engineering has generally a lower impact, but publications are in excellent journals.
- The planned move of Chemical Engineering to ITEM is a bold step. It will create opportunities, but a warning is in place: do not break links with the rest of Stratingh and MSC^{plus}.

CBN

- One of the two groups (Biomedical Engineering) appears to be sub-critical. There is a heavy teaching load on its leader. He also feels that the group is somewhat isolated within the FMNS.

General

- There is a too low proportion of female staff.
- Technical staff is badly needed for maintenance of equipment, for example the UHV surface science equipment at MSC. The present level seems minimal.
- Too much publication pressure on staff may have the unwanted effect that young investigators are less willing to invest time in innovative instrumentation projects. Internal citation analyses may have such a negative effect.

Assessment Materials Science Centre (MSC)

4

4 1 The Institute

DIRECTORS

'03-present:	J. Knoester
'01-'03:	L. Niesen
'98-'00:	G. Hadziioannou
'96-'98:	G. Sawatzky

RESEARCH INPUT 2004 (FTE)

Tenured staff:	9.3
Non-tenured staff:	30.4
PhD students:	55.1
Total:	94.8

The mission of the Materials Science Centre (MSC) is to design and to scientifically study materials for functionality. The center was founded in 1970 and currently encompasses 14 groups, working in the areas of solid-state and materials physics, chemical physics and polymer chemistry. Since 1999, the MSC has the status of a National Research Center (NRC), and its status was renewed in 2004. Together with parts of the Groningen Biomolecular Science and Biotechnology Institute (GBB) and the Stratingh Institute for Chemistry and Chemical Engineering, the MSC forms MSC^{plus}. The committee was asked to evaluate the activities within MSC.

During the site visit, the committee has experienced that the MSC is much more than just the sum of its parts. The groups within MSC cross boundaries between physics and chemistry by forming multidisciplinary teams. At the same time, focus is maintained within well-defined thrust areas. MSC covers the complete spectrum from materials design and fabrication, through determination of their functional properties to theoretical modeling. The sharing of common resources, in particular expensive laboratory equipment, makes the research at MSC truly cost-effective. The scientific output of MSC on the whole is impressive, given a comparatively modest budget of 12 M€ per year.

The center is led by a dynamic management team having a well-defined strategy. Basically, its strategy is to create a stimulating research environment for young talented scientists. An important instrument here is the American style tenure track system, introduced a few years ago by the faculty board. There is a quality control mechanism in place, which includes an international advisory panel convening once per year, internal competition for funds and citation analysis. This results in most cases in highly motivated staff and very occasionally in

too much pressure on individuals, as was evident during the visits to the individual groups. Overemphasis of publication rates may cause some unwanted side effects. One such effect may be that too little effort is invested in developing novel instrumentation, which in the short term is less rewarding as regards publication output but in the long term is leading to competitive advantages and scientific breakthroughs (an example is the work by Sawatzky et al.).

The position of MSC within The Netherlands is unique. Nowhere else within The Netherlands does one find a center where the entire spectrum of molecular scale materials properties to the functioning of integrated systems is investigated on a *fundamental* level with such a drive and intensity. During the past few years, research into microscopic materials properties (electronic and structural) has been under-funded in The Netherlands in comparison to other disciplines. In addition, the current policy of FOM to stimulate industrial partnerships and application-oriented research at the cost of more fundamental research, will probably lead to a decrease of basic materials science activities on a national scale. It is the understanding of the committee that MSC wants to challenge the national science policy fashions of the day, and to continue its mission as formulated in the self-evaluation and the presentation by the management. The committee fully supports this strategy. MSC receives funding as a NRC and as participant in NanoNed and two Large Technological Institutes (NIMR and DPI). In addition, NWO provides funding for Veni-Vidi-Vici fellowships (currently, 8 fellowships are funded at MSC) and there are plans to increase funding by EU-programs. Therefore, MSC will be able to fulfill its mission also in the coming years, despite occasional strong headwind.

In the past few years, MSC has seen the departure of some internationally reputed scientists (e.g., Sawatzky, van der Marel, Hadziioannou). The vacancies could be filled with talented, highly motivated young scientists, thanks to the above-mentioned tenure track system. Though it is still too early to assess the productivity of these starters, the committee notes that their research programs are well on track and very promising. The international position of MSC as a whole is internationally competitive and the scientific quality of some of its programs are internationally at the forefront. The future of MSC looks bright.

Overview program scores MSC

Score	Number of programs with score on			
	Q	P	R	V&F
2		1		
2.5				
3	1		1	
3.5	1	1		
4	3	4	6	5
4.5	5	4	4	5
5	3	2	2	2
n.a.		1		1
Total:	13	13	13	13

Mean score vs. Quality MSC programs

Mean program scores (unweighted average of the scores on all four criteria) plotted against the programs scores on Quality.

4 2 Research programs

4 2 1 Computational Physics (MSC1)

PROGRAM LEADERS

'96-present:	H. De Raedt

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.4
Total:	3.6

The group works in the field of computational physics and focuses on the development of new algorithms for physics and engineering. The group has developed an algorithm that can simulate quantum phenomena with a deterministic computer, based on an event-by-event simulation, e.g., of particles passing through a double slit. In this approach to simulating quantum phenomena the group plays a leading role. This is not reflected in the bibliometric data because not many groups are working in this field. The priority of research is seen rather in the simulation and/or solution of quantum problems than in materials-related issues, although the group does provide input towards problems such as electron emission from carbon nanotube based cold cathodes. The overall quality of the research is ranked very high.

The productivity, based on the number of papers in ISI-refereed journals, 9 papers in 2002, 11 in 2003, and 3 in 2004, is quite high. General problems hampering productivity as seen by the group are a decline of academic standards and a proliferation of evaluations and rankings.

Simulation of quantum computing with "classical" computers not only is of high relevance for quantum information technologies, but may also shed new light on the understanding of the laws of quantum mechanics.

The group is very active in securing funding of its research, and strictly limits the duration of a PhD student to four years. The group is visible also on an international level. Collaboration within the RUG is mostly with the groups of J. Th. M. De Hosson (MSC) on electron holography and geometric image analysis and of D. Stavenga (CBN) on light scattering off butterflies.

4.2.2 Applied Physics - Materials Science (MSC2)

PROGRAM LEADERS

'96-present:	J. Th. M. De Hosson

RESEARCH INPUT 2004 (FTE)

Tenured staff:	1.2
Total:	13.0

The research centers on the characterization of line defects (dislocations and disclinations) of homo- and heterophase materials with the aim to contribute to the understanding of structure-property relationships and bridging the atomic and engineering scales. Special attention is given to interfaces and dynamical properties using a variety of electron-microscopy techniques and other structural probes. The group leader is involved in mathematical modeling of the morphology and defect structure of materials, together with the group of H. De Raedt. In electron microscopy, the group plays a leading role in The Netherlands and is internationally visible. Highlights include the MRS Trophy Award in 2004 for work on nanocomposites and the FEMS European Materials Gold Medal in 2005.

The output of the group is very high and appears to be very well organized, with about 30 publications per year.

The investigation of multiphase materials is of great technological importance. This is also borne out by the numerous projects performed in collaboration with or at the demand of industrial partners.

The group has a very good record of PhD theses and collaborates with a number of groups in the MSC, notably with that of E. van der Giessen, e.g., on metallic foams. Funding is secured by a number of grants from different sources. However, the problem of strongly increasing cost of high-end electron microscopes was raised by J. Th. M. De Hosson.

4.2.3 Micromechanics of Materials (MSC3)

PROGRAM LEADERS

'96-present:	E. van der Giessen

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.8
Total:	7.2

Due to the absence of E. van der Giessen and other senior group members, a site visit was not possible. The evaluation is therefore based on the written documents presented to the PRC and a 30-minute telephone discussion between E. van der Giessen and a member of the PRC (HvL).

The group applies computational tools and models in order to understand the micromechanics of materials, e.g., plastic flow and fracture. One of the research highlights is the calculation of size-dependent strain relief in films via dislocations taking into account the long-range nature of interactions between the latter. This research is internationally recognized as can be seen from invitations to conferences.

Given that the group has been installed in 2001 only, the productivity is viewed as being very high, with about 10 publications per year in ISI-refereed journals.

The research is of interest for the materials-science and mechanical-properties communities, but also plays a role for the understanding of mechanics of metallic interconnects in microelectronic circuits. A possible extension of the work towards electro-migration effects might even enhance the relevance of the research.

The strong interaction with the group of J. Th. M. De Hosson is worth mentioning, as is the prospect of studying biological materials such as the cytoskeleton. This may establish new links between physics/mechanics and biochemistry. The group has received further impetus by the appointment of P. R. Onck in 2003.

4.2.4 Optical Solid-State Physics (MSC4)

PROGRAM LEADERS

'03-present:	P. van Loosdrecht
'96-'03:	D. van der Marel

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.4
Total:	4.4

The group focuses on optical properties of solids with strong electron correlations. With the group leader D. van der Marel, the group has been one of the world-leading groups focusing on transition-metal oxides. After the departure in 2003 of D. van der Marel to Geneva, the group is in a transitory state with great potential for the future.

The group aims at investigating timely problems of condensed matter physics. The prospect of using time-resolved Raman scattering as a probe for structural phase transitions is particularly interesting and challenging. The search for Bose-Einstein condensation of excitons in Cu_2O has a long history, but the approach proposed by the present group leader is certainly of interest.

The group, together with T. T. M. Palstra and Y. M. Mostovoy, will form a "cluster" within the MSC focusing on strongly correlated materials. The collaboration with C. van der Wal on optical properties of laterally confined quantum Hall liquids in the extreme quantum limit appears very promising.

4.2.5 Physical Chemistry of Polymers (MSC5)

PROGRAM LEADERS

'96-present:	G. ten Brinke

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.4
Total:	5.6

The research in this group is devoted to nanostructure formation in copolymer systems, in particular to ordering phenomena at different length scales and self-assembly. Emphasis is on the use of advanced structural characterization methods and structural modeling, including theoretical analysis and computer simulations. There are strong collaborations with external groups (Helsinki).

Functional polymers are a well-recognized target, and controlled self-assembly is becoming increasingly widely accepted as a logical and practical way to produce new materials. A broad range of practical techniques and approaches is used, and we commend the strong emphasis on education in polymer science, in which ten Brinke leads by example.

The productivity of this group, which is of comparatively small size, is excellent by all usual criteria. The group has a strong international reputation.

4.2.6 Physics of Nanodevices (MSC6)

PROGRAM LEADERS

'00-present:	B. J. van Wees
'96-'99:	T.M. Klapwijk

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.8
Total:	9.1

The group conducts cutting-edge research on electron spin transport and electron spin dynamics in nanoscale systems. The work on spin accumulation and injection as well as on spin precession in magnetic fields in metallic nanostructures is internationally well recognized. The future impact will be even enhanced by the research program defined by C. van der Wal who will investigate optics with spin-polarized quantum Hall liquids.

The publication record shows some fluctuations (for instance, no papers were published in 2004). However, given the very high quality of the research, this should not be taken too seriously. Problems seen by the group lie in the constant pressure towards application-oriented research, as well as in the ongoing trend towards organization of research.

The group's vision of studying basic properties of electron spin dynamics in nanosystems is challenging from a fundamental point of view and at the same time apt for possible applications. For instance, the group proposes to use the electron spin as a probe for an electron's dwell time on a molecule in a single-molecule device.

The group is active in securing funding, e.g., through the prestigious Pioneer Award to B. van Wees, and other sources. The bottleneck is seen in finding high-level students and postdocs rather than finances. B. van Wees has already led a number of students to their PhD. Collaboration within the RUG are with B.L. Feringa (Stratingh) on switching of organic molecules and J. C. Hummelen (Stratingh) on spintronics with organic materials. C. van der Wal who joined the group in 2003 will collaborate with P. van Loosdrecht on optical control and readout of electron spins in nanostructures.

427 Physics of Organic Semiconductors (MSC7)

PROGRAM LEADERS

'00-present:	P.W.M. Blom

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.8
Total:	7.5

The group has been established in 2000. Despite its young age, the group has already acquired a strong worldwide reputation in the scientific community of organic semiconductors. The contribution of this group to the understanding of organic semiconductor device physics is in fact widely recognized internationally, in particular the unified view of the transport properties in devices with different transport regimes.

We recognize that productivity must be estimated with a particular attention to the nature of this very young group. Given the experimental nature of the activity and the need to build up the experimental infrastructure from scratch, we think that it has already achieved a substantial level of productivity. The number of papers in the recent years has rapidly increased and the quality of the papers is particularly high.

The field of organic semiconductors and their application in optoelectronic and electronic devices is booming. The need to establish firmly the foundations of the electronic and transport properties is widely recognized and this group is particularly active and influential in this area. This research activity is expected to have a large socioeconomic impact. Here we note also the impressive amount of external funding that the group obtained.

The group is well balanced between staff and PhDs, with an important contribution of synthetic organic chemistry. The activity towards raising funds is effective. The record of the achievements made up to now is a good indication that in the future we may expect a great expansion. Particularly relevant is the attitude to integrate with activities of other groups in related areas.

4.2.8 Polymer Thin Film & Surface Science (MSC8)

PROGRAM LEADERS

'97-present:	A.J. Schouten

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.8
Total:	4.5

This is a small group in transition. The move in the direction of biomedical materials is well-judged and positive: this is an intensely interdisciplinary area and needs flexible inter-group organization, as well as good working relationships between individuals, if it is to work well.

The program on enzyme-catalyzed polymerization (K.U. Loos) is a potential trail blazer.

The productivity in terms of publications has been low. Some publications are in preparation.

4.2.9 Polymers at Surfaces and Interfaces (MSC9)

PROGRAM LEADERS

'99-'04:	U. Steiner

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.4
Total:	4.0

The program leader, Prof. U. Steiner, has left RUG in 2004. It is the understanding of the committee, that one soon starts to search for a successor. Whether or not the research line is to be continued, has not been discussed within the committee, since no interview and site visit to the laboratory have taken place. In general, the functionality and structural properties of thin polymer films form an important and timely research subject, and synergies with the activities in the group of Prof. ten Brinke could be exploited. From this point of view, a continuation of the research line would be a logical step. On the other hand, much depends on the preferences and the expertise of the new chair holder.

4 2 10 Solid-State Chemistry (MSC10)

PROGRAM LEADERS

'96-present:	T.T.M. Palstra

RESEARCH INPUT 2004 (FTE)

Tenured staff:	1.7
Total:	8.7

This excellent group, established in 1996, is focusing on the electronic properties and charge transport properties of a wide range of materials ranging from transition metal oxides (TMO) to organic conductors with the view that these systems have common characteristics, in particular strong electron correlations. The group is internationally well recognized and is among the most active groups studying highly correlated systems. Particularly remarkable is the combination of chemistry and physics skills.

The productivity is large and the quality of the papers is remarkably good with peaks of excellence.

Transition metal oxides and molecular organic conductors are at the center of attention within condensed matter physics. The controlling of electronic materials properties by design is an important goal.

The composition of the group (PhDs and staff) is well balanced. In 2004 a Rosalind Franklin Fellow (B. Noheda) started in the group. We note the numerous contacts and collaborations with other groups.

4 2 11 Surfaces and Thin Films (MSC11)

PROGRAM LEADERS

'03-present:	P. Rudolf

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.4
Total:	5.3

Since the group became active only in 2003, we do not attempt to judge the productivity based on the present activity. However, the past research record of Professor Petra Rudolf is excellent. We observe a rising productivity in the past two years and a number of papers are in preparation.

The group's activities focus on the electronic, vibrational and structural properties of adsorbed molecules and of thin organic films. This is an area with great potential. In particular the studies of molecular motors and photo-magnetically switchable materials are highly relevant.

The legacy of George Sawatzky in the field of electron spectroscopy sets high expectations. The newly established group is well positioned and there is a substantial potential for achieving excellence. The group is successful in acquiring funding from the EU as well as from other national and international sources.
We note that the large number of UHV facilities, also shared with other groups, requires adequate technical support.

4 2 12 Theoretical Chemistry (MSC12)

PROGRAM LEADERS

'03-'05:	R. Broer
'97-'03:	J.G. Snijders
'96-'97:	R. Broer

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.4
Total:	8.1

The group is active on different aspects of quantum-chemistry calculations based on density functional theory, including materials with strong electron correlations and organic molecules that are also investigated experimentally.

The productivity was maintained at its high level, despite the sudden loss of the group leader in 2003. A new professor will be appointed, and Prof. Filatov, appointed in 2005, has reactivated some sub-fields previously covered by Prof. Snijders.

The improvement of DFT in the description of time-dependent phenomena such as dynamic polarizabilities and optical spectra is a promising avenue. Collaboration with experimental groups in the MSC will further enhance the international visibility of this group.

4 2 13 Theory of Condensed Matter (MSC13)

PROGRAM LEADERS

'96-present:	J. Knoester

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.6
Total:	4.5

This is an excellent, strong group, which has recently been significantly strengthened with the arrival of M.V. Mostovoy as of 1/1/05. The research interests of this group cover electronic excitations in low-dimensional molecular systems, including the influence of static and dynamic disorder, and wave propagation in disordered media, where the emphasis is shifted to photonic materials. The research orientations are well focused and thought through.

Interrelations between the phenomena studied as well as the relation to experimental observations are emphasized.

The group leader is internationally recognized as top player in his field. The work is first rate and is published in the highest rated journals. What characterizes the work of this group is the close connection with experiment, and this theory group is therefore ideally positioned in MSC, with numerous collaborations and providing a competent interacting discussion partner. The extension to electronic conduction processes in molecular materials might be fruitful and worthwhile to consider, in view of the strength of MSC in this field.

In addition to the strong research activities, the remarkable and intense engagement of the group leader regarding education and popularization of science in general must be underlined.

Assessment Stratingh Institute for Chemistry & Chemical Engineering (Stratingh)

5

5 1 The Institute

DIRECTORS

'03-present:	B.L. Feringa
'01-'02:	J.H. Teuben
'97-'00:	R.M. Kellogg

RESEARCH INPUT 2004 (FTE)

Tenured staff:	5.5
Non-tenured staff:	18.5
PhD students:	35.9
Total:	59.9

The Stratingh Institute is a well-organized and – led institution with a strong international presence in most of its main areas of research. The organizational structure is simple and the unit size manageable. Now the organization structure will be changed – the Chemical Engineering cluster moving to Industrial Technology & Management Institute.

The research leadership/management appears to be receptive and forward-thinking: We approve particularly of the policy of dedicated PhD positions for collaborative research efforts of young faculty. Its record of international collaborations is a key indicator of a unit's vitality, and the development of (especially interdisciplinary) collaborations at home is an excellent psychological starting point.

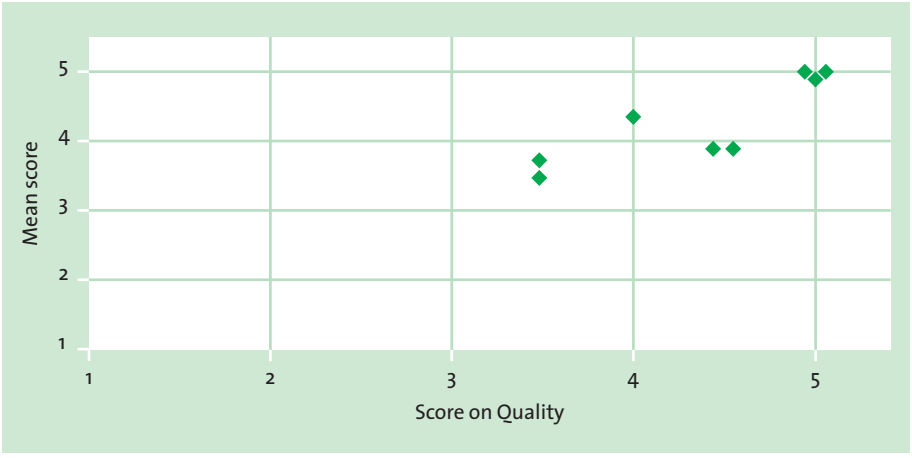
The documentation provided gives no picture of the teaching load of the various research groups. A high teaching load (PhD's excluded) means that less time is available for staff to do/coach research. (Concise) information on the teaching duties of the various groups would have been useful.

The productivity of the Institute, as measured by its output of PhDs and publications, is excellent, as generally is the quality and international visibility of the work, and the PhDs produced.

Overview program scores Stratingh

Score	Number of programs with score on			
	Q	P	R	V&F
2				
2.5				
3		1		
3.5	2	2		4
4	1		4	
4.5	2		2	1
5	3	3	2	2
n.a.		2		1
Total:	8	8	8	8

Mean score vs. Quality Stratingh programs



Mean program scores (unweighted average of the scores on all four criteria) plotted against the programs scores on Quality.

5.2 Research programs

5.2.1 Chemistry of (Bio) Molecular Materials and Devices (Stratingh1)

PROGRAM LEADERS

'00-present:	J.C. Hummelen
'96-'00:	part of group Kellogg (Bio-organic Chemistry)

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.4
Total:	3.4

This is by any criterion a highly successful research group, as shown by its rapid growth and exceptionally high productivity. It is well-equipped and funded, has good local and national collaborations and a strong international profile. The enthusiasm and drive from the top is impressive and the group leader's outreach activities highly commendable and, we do not doubt, effective.

If photovoltaics becomes a major contributor to green energy one generation from now, the current research in the fullerenes area is highly significant.

The new -logic line of research breaks new ground, and fits in well with the MSC^{plus} philosophy of encouraging curiosity driven research.

5.2.2 Chemical Reaction Engineering (Stratingh2)

PROGRAM LEADERS

'03-present:	H.J. Heeres
'96-'01:	A.A.C.M. Beenackers (Reactor and Process Technology)

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.6
Total:	7.2

Now the third largest group in the Stratingh Institute, was forced to reinvent itself between 2001-3 due to the unexpected passing away of Prof. Beenackers. The effects are still evident: recovery in terms of personnel seems to be under way, but publication rate is still suffering. Normally reliable indicators such as the level of international collaborations are more difficult to interpret in this situation, but the move into green chemistry seems to be proving very positive in this regard.

This is definitely not the ideal time to assess this group.

5 2 3 Combustion science and Engineering (Stratingh3)

PROGRAM LEADERS

'96-present:	H.B. Levinsky

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.5
Total:	3.7

This is a small group with the special situation of being created and funded in collaboration with the Netherlands 'Gasunie'. The original goals were to do long-term basic research in relation to gas industry, addressing in particular the issue of the production and control of pollutants (NO_x) and the issue of the addition of hydrogen. The manpower of this group has gradually increased since 1998 and seems to have attained sufficient critical mass with the arrival of 2 PhD students in 2002.

Overall combustion is a vast field and the elementary processes and reaction intermediates involved are numerous, making a detailed characterization and modeling difficult. Only few groups worldwide perform such detailed studies, and the group of Levinsky seems to be well situated in this regard in doing careful measurements using laser spectroscopic techniques under well defined conditions appropriate for modeling. Recently his interests have shifted from aspects related only to application to more fundamental issues in more general high temperature combustion processes.

What is not so clear is the situation of the group within the institute and RUG, where the group is scientifically isolated, other groups being interested in condensed phases. This isolation is compensated by numerous collaborations within The Netherlands and internationally (USA). The group leader is well aware of this situation, and for the new Stratingh Institute it will be a political decision to develop or reorient these activities in the longer term, but as long as the funding situation is sound via the Gasunie and the science produced is of high quality, there is no immediate need to act. One problem resulting from this local isolation that is of concern for the group leader is the access to well trained PhD students.

The productivity of the group is biased by the fact that apparently in this field of combustion there is a tradition to predominantly publish in conference proceedings, which, however, are severely refereed.

5.2.4 Molecular Inorganic Chemistry (Stratingh4)

PROGRAM LEADERS

'04-present:	B. Hessen
'96-'04:	J.H. Teuben

RESEARCH INPUT 2004 (FTE)

Tenured staff:	1.1
Total:	11.5

Numerically the second largest group in the Stratingh Institute, this group's productivity has also been affected by the change of research group leader during the assessment period. The research focus on polymerization catalysts has paid off both directly and in terms of advances in fundamental organometallic chemistry, and the proposed movement towards materials-related systems makes good sense.

External collaborations look very healthy and the group's international visibility and reputation are evidently high. We note that, though the publications list per capita looks thin, the group publishes as a matter of course in the highest impact journals.

N. B. We specifically took no account of any input from the recently arrived Dr. van Koningsbruggen.

5.2.5 Physical Organic Chemistry (Stratingh5)

PROGRAM LEADERS

'96-present:	J.B.F.N. Engberts

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.8
Total:	4.0

Physical organic chemistry is a relatively small discipline, but its influence on chemistry has proved to be of great significance historically. The Engberts group is recognized within the discipline as a world leader in research on reaction mechanisms in solution, and in particular on the properties of water as a reaction medium. It has attracted and educated excellent students over the years - several hold staff positions in UK as well as Dutch universities - and it has been admirably productive in terms of publications in high impact journals.

It is to be hoped that the group, and its interests at the growing bio-end of physical organic chemistry, will survive the retirement of its leader, and that a worthy successor will be found. The good news is that Prof. Engberts remains available to carry on with specialized teaching and supporting his remaining researchers.

5.2.6 Product Engineering (Stratingh6)

PROGRAM LEADERS

'03-present:	A.A. Broekhuis

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.8
Total:	1.7

Too early to judge. Made a very good start with introducing product engineering into the chemical engineering group of Stratingh.

5.2.7 Synthetic Organic Chemistry (Stratingh7)

PROGRAM LEADERS

'96-present:	B.L. Feringa

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.6
Total:	25.4

The Feringa group is by far the biggest in the Stratingh Institute. The Group Leader (also Director of the Stratingh Institute) is in apparently unlimited demand internationally as speaker, collaborator and scientific editor, and this demand arises squarely from the high excellence of the research done in the group.

The work done to raise the public profile of the group is also exceptional.

5.2.8 Transport Phenomena (Stratingh8)

PROGRAM LEADERS

'96-present:	L.P.B.M. Janssen

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.5
Total:	2.8

A small, specialized and moderately productive group. The "rather unique" laboratory facilities can support and attract external collaborations.

This is not high impact work, and reactive extrusion not a high profile technique despite its big practical importance. But the work with supercritical solvents is forward-looking and potentially of general interest.

The shift in emphasis from process related to product design related transport phenomena seems a good initiative. The emphasis on 'green raw materials' is good, but could limit the group's inputs into high added value product design problem areas.

Assessment
Kernfysisch Versneller Instituut (KVI)

6

6 1 The Institute

DIRECTORS

'96-present:	M.N. Harakeh

RESEARCH INPUT 2004 (FTE)

Tenured staff:	7.8
Non-tenured staff:	3.4
PhD students:	17.5
Total:	28.7

KVI is a well-functioning institute in which many groups have an internationally recognized level. AGOR is a European facility producing precise and new results mostly in the nuclear physics area. Besides the AGOR physics programs, the institute has developed other research programs on an international level, for instance in atomic physics and in theory.

Continuation of the operation of AGOR is very important. The facility will be used extensively for the TRIμP program, which is a beautiful opening to studies of fundamental interactions and which is based on the competences of the institute in theory, atomic and nuclear physics and accelerator technologies. The committee strongly supports this large and interesting program.

A major problem is the decision of the FOM to decrease the KVI funding significantly. Therefore, it is necessary to find new sources of funding, for example from electronic industry or European agencies (ESA) for which AGOR is an irradiation facility. The institute is encouraged to go in this direction. However, such funding will probably be insufficient to cover the entire running budget. On the other hand, a decrease of the beam time delivered by AGOR does not result in correspondingly large cost savings, given the sizeable fraction of fixed costs. A reduction of beam time may also discourage new international collaborations.

Therefore, the director and the funding authorities are strongly encouraged to foster a positive scientific life around the facility also in the future. It appears to the committee that the first step should be to define, besides the TRIμP program, another nuclear physics project which could become a program if sufficient financial support is obtained. This nuclear physics project has of course to be defined within a European context, taking advantage of the specificities of the AGOR facility.

The committee expresses its confidence in the future of this excellent institute. But at the same time it is clearly worried that the budgetary situation may jeopardize research and education of nuclear physics in the Netherlands altogether, a development quite unimaginable for such a highly developed country.

Overview (sub)program scores KVI, CIO and CTN

Score	Number of programs with score on			
	Q	P	R	V&F
2				1
2.5				
3	1	2	2	
3.5				
4	4	6	4	3
4.5	2		2	2
5	3	2	2	4
n.a.	1	1	1	1
Total:	11	11	11	11

Mean score vs. Quality KVI, CIO and CTN (sub)programs

Mean program scores (unweighted average of the scores on all four criteria) plotted against the programs scores on Quality.

6 2 Research programs

6 2 1 Atomic-Physics Group (KVI-1)

PROGRAM LEADERS

'96-present:	R.W.H. Morgenstern

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.9
Total:	5.3

The main research theme is the interaction of highly charged ions with matter. The group uses a ECR ion source, and technically it operates independently from AGOR. Scientifically, however, there are important synergies in particular with the TRIμP project.

The scientific scope of the group ranges from the determination of cross sections of charge transfer reactions relevant for astrophysics and nuclear fusion research, through probing of surface magnetism with 'hollow atoms' and investigations of radiation damage in biomolecules, to trace element analysis in atom traps. In all these areas there are notable successes, as is evident from publications in high-profile journals. The group is dynamic and enterprising, starting fascinating projects in the areas of ultra-sensitive isotope detection using atom traps and studies of the fragmentation of biomolecules.

Because of the group's endeavors in new research directions, there was a dip in the publication output, but the productivity is up again.

6 2 2 Interacting Hadrons (KVI-2)

PROGRAM LEADERS

'96-present:	H. Löhner

RESEARCH INPUT 2004 (FTE)

Tenured staff:	2.0
Total:	6.7

The interacting hadron group performs primarily research on nucleon-nucleon interactions in few-body systems. The particular achievements of this research lie in high-precision experiments with polarized proton and deuteron beams at AGOR to study effects of three-body forces. In addition, bremsstrahlung is used in an international collaboration with sophisticated detector systems (the electromagnetic spectrometer TAPS), and with the full set of unique detector systems at AGOR (Plastic Ball, SALAD, BINA, BBS). These measurements supplement the detailed investigations of the few body systems. International competitors are the RCNP Osaka in Japan and Jülich in Germany, but the KVI has more accurate results due to superior beam quality and coverage of the full phase space.

The current program on studying few-nucleon systems was proposed seven years ago and will be achieved before the end of 2006. Plans for a new program as successor of the Interacting Hadrons program exist (collaboration with the new GSI facility). However, due to the funding situation the nuclear physics research in this group has probably to stop, and the focus would then be directed to other fields. These might be high-energy cosmic-ray and astrophysics. KVI is new in these fields, but it could make significant contributions through special expertise (e.g. recovering data from nanosecond particle pulses). The group has also considerable expertise in simulation calculations, which could also be useful in astrophysics experiments.

In general, the review committee feels that the beams delivered by AGOR should still be used to continue nuclear physics programs. KVI is the only nuclear-physics institute in the Netherlands and some of the beams are unique in Europe. In addition, it is useful to keep a good education in subatomic physics in the country, including nuclear physics. The KVI physicists are involved in the ASAP (Atomic and Sub-Atomic Physics) top master training program together with TSL Uppsala and in the FANTOM school, together with partners from Gent, Leuven, Orsay and Muenster. These education programs have to be preserved.

In some way, the committee sees a forced stop of the nuclear physics program also as an opportunity to change fields. On the other hand there is clear concern that a part-time use of AGOR may be a serious threat for keeping the level of excellence of this unique accelerator facility. Therefore, it is recommended to think about new fundamental physics programs with AGOR and find "inventive" ways to finance it. It may not be unreasonable that the two KVI nuclear-physics group join for this effort.

6.2.3 Nuclear Geophysics Division (KVI-3)

PROGRAM LEADERS

'96-present:	R.J. de Meijer

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.7
Total:	4.3

The primary research area of this group, which exists since 1980, is the application of nuclear-physics-based techniques. The considerable experience with radiation detectors for natural radioactivity has led to applications of direct industrial use, such as the measurement of the asphalt layer thickness in road construction. A long-standing effort in modeling radon transport in porous media has reached a level of sophistication, where it might be possible to evaluate the condition of concrete constructions by measuring the exhalation of radon.

While this kind of research looks promising and feasible, a number of future projects were presented that either did not fully convince the committee (use of neutrons for landmine and other explosives detection), or were considered by the committee to be unrealistic in their implementation (EARTH). The latter project proposes to measure the distribution of

radioactivity in the whole earth by antineutrino detection to learn more about the internal heat distribution What is clearly needed here is a step-by-step approach to develop a detector system for antineutrino detection with the necessary angular resolution. Although Monte Carlo simulations for possible detector systems have been performed, the design, construction and testing of a prototype detector should indeed be a first step. This may be within reach of the wider expertise of KVI, whereas the full-blown EARTH project (probably in the hundred million EURO range) clearly needs support from an international community interested in such a project.

It is difficult to see how this group will continue, with the group leader (R.J. de Meijer) retiring in 2005, and no successor being searched for at this time. In addition, all projects of the group depend almost entirely (80-90%) on external funding.

In conclusion, some of the work mentioned above looks feasible and promising, and should continue at the current level, but the large future project EARTH should first be subjected to a close scrutiny by an expert committee on neutrino detection and geophysics before KVI and RUG embark on a venture of this dimension.

6 2 4 Nuclear Structure and its Applications for Astrophysics (KVI-4)

PROGRAM LEADERS

'96-present:	M.N. Harakeh

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.9
Total:	3.3

The Nuclear Structure group has realized high-quality nuclear physics experiments in which KVI is one of the leading laboratories in the world. There are two reasons for this: the availability of polarized proton and deuteron beams and the BBS experimental set-up, which is a large-acceptance spectrometer enabling complete kinematical studies of three-body reactions including polarization measurement. This has led to large data sets, obtained generally within the framework of international collaborations.

The experiments have addressed spin-isospin excitations and collective compression or oscillation modes. The KVI group has obtained conclusive evidence for the isoscalar giant dipole resonance in several nuclei. Some results are of interest for astrophysics. For example, the group provided evidence for a collective excitation, interpreted as the $4\hbar\omega$ compression mode – the overtone of the isoscalar giant quadrupole resonance, which is relevant for determining the nuclear matter compressibility controlling the stellar equation of state. Other collective low lying resonances have been carefully characterized and studied. All these studies, which were very well done, advance our knowledge of nuclear structure and astrophysical models of stellar objects.

The group is well known in the international community and it publishes its results in the best international reviews. The publication rate is good. When looking at the bibliographic analysis, one has to take into account the fact that this research is done by a very small number of large international teams. The international visibility of the group leader is high; he is president of NuPECC, the Nuclear Physics European Collaboration Committee, and he has been very strongly involved in the international school FANTOM.

The future of the group has to be seen in the following context:

- the starting of the TRIμP program
- the high quality equipment around the facility
- the fact that the group is quite small
- the possible link with neutrino physics.

The two nuclear physics groups of the institute could be merged with the aim to develop another nuclear physics program besides the TRIμP project. For example, a study of reactions like (d,^{2}He) and (^{3}He,t) establishes a link with neutrino physics; the corresponding nuclear matrix elements are input for double beta decay studies. Such an opening to neutrino physics would suit KVI since it makes use of the AGOR facility.

6.2.5 Theory Group (KVI-5)

PROGRAM LEADERS

'03-present:	R.G.E. Timmermans
'99-'02:	J.A. Tjon
'96-'99:	R.A.R.L. Malfliet

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.9
Total:	3.4

The KVI theory group (R. Timmermans, O. Scholten) is an important player in theoretical nuclear physics at the international level, at a time when nuclear physics is in decline in The Netherlands. Their results on the application of effective field theory to nuclear physics and their work on photonuclear physics deserve special mention. Besides being active in more traditional areas of theoretical nuclear physics, the group is also actively involved in up-to-date topics in physics beyond the standard model of particle physics. The latter research is concerned with possible violations of discrete symmetries in the fundamental interactions and other signatures of new physics beyond the standard model, such as electric dipole moments and neutrino-less double beta decay. Overall, the group makes a very dynamic impression, with an optimistic outlook in spite of a difficult funding situation.

The group fits well within KVI, with excellent connections to the experimentalists at the KVI, although, due to its smallness, it cannot possibly assist all the experimental groups and activities. KVI theorists have thus found a good balance between their own theoretical interests and the 'service' to the experimental groups. In particular, they are well positioned to provide

crucial theoretical support to the upcoming TRIμP experiment. Further collaboration between theory and the experimental groups at KVI would be helped by the appointment of `dedicated' PhD students. The recent appointment of E. Pallante in THEF is welcomed as an opportunity for the KVI Theory group also, in view of common interests in the application of QCD to nuclear physics and possible future activities in astroparticle physics.

The fact that one position (formerly Dieperink) remains frozen is viewed as a major problem. The group would like to see this position filled within the field of fundamental interactions in nuclei or in the field of astroparticle physics (provided the latter gets funded in The Netherlands). Such an appointment would not only further strengthen the existing links with THEF and CTN, but also improve prospects for future FOM (and perhaps EU) funding.

6.2.6 Trapped Radioactive Isotopes: Ìicrolaboratories for fundamental Physics (TRIμP) (KVI-6)

PROGRAM LEADERS

'01-present:	K. Jungmann

RESEARCH INPUT 2004 (FTE)

Tenured staff:	2.4
Total:	6.7

The TRIμP group is addressing a large and exciting program devoted to fundamental interaction physics. The program deals with phenomena beyond the Standard Model of particle interactions: extension beyond the V-A description of weak interaction (^{21}Na beta decay study) and possible violations of parity or time reversal deduced from EDM measurements (Ra and deuteron studies). There is significant potential for discovering "new physics" and the program is ambitious, involving long and difficult measurements.

This new program requires many competences which exist on the KVI site: high-quality heavy ion beams, nuclear physics, atomic physics (trapping and polarization), particle physics and theory. The committee noticed that all partners involved (accelerator team, nuclear physics, atomic physics, theory groups) are strongly motivated.

The TRIμP group is very visible internationally. This is evident from the large number of invited presentations to conferences and lectures. In addition, the team is coordinator of the European network NIPNET. The group members are active in various committees and experiments. Their competitors are the Berkeley group for ^{21}Na beta decay study and the Argonne group for Ra EDM. There is no competitor for possible deuteron EDM. The TRIμP program is complementary to the high-energy particle program which will start at LHC.

The construction of the facility is making progress. The separator has been installed and it is even used for preliminary experiments. The cooler has been built, a versatile optical laboratory has been set up and the traps are similar to those already developed and controlled for atomic

physics research and applications. The group recognizes the importance of a careful assessment of the sensitivity of their experimental results to all parameters in their setups. For all the planned experiments dedicated activities were started to arrive at a reliable control over these parameters. This work is in progress. The needed precision is indeed crucial. For example, the precision should be of the order of 10^{-4} for the *D* factor measurement in weak interaction decay. The committee is confident that the group is able to control these aspects, since its members have dealt with the same problems in other international collaborations. Part of the program needs a significant increase of the beam intensity of AGOR. The accelerator team has already shown in part the feasibility of such an increase, which implies ECR source developments and a very good extraction efficiency of the beam.

This project is quite positive for KVI and AGOR. The construction of the experiment is well done and all the needed competences are present at KVI. The group has now to perform detailed simulations to ensure a complete control of all the parameters affecting high-precision measurements.

6.2.7 Accelerator Group (KVI-7)

PROGRAM LEADERS

'99-present:	S. Brandenburg
'96-'98:	H.W. Schreuder

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.8
Total:	0.8

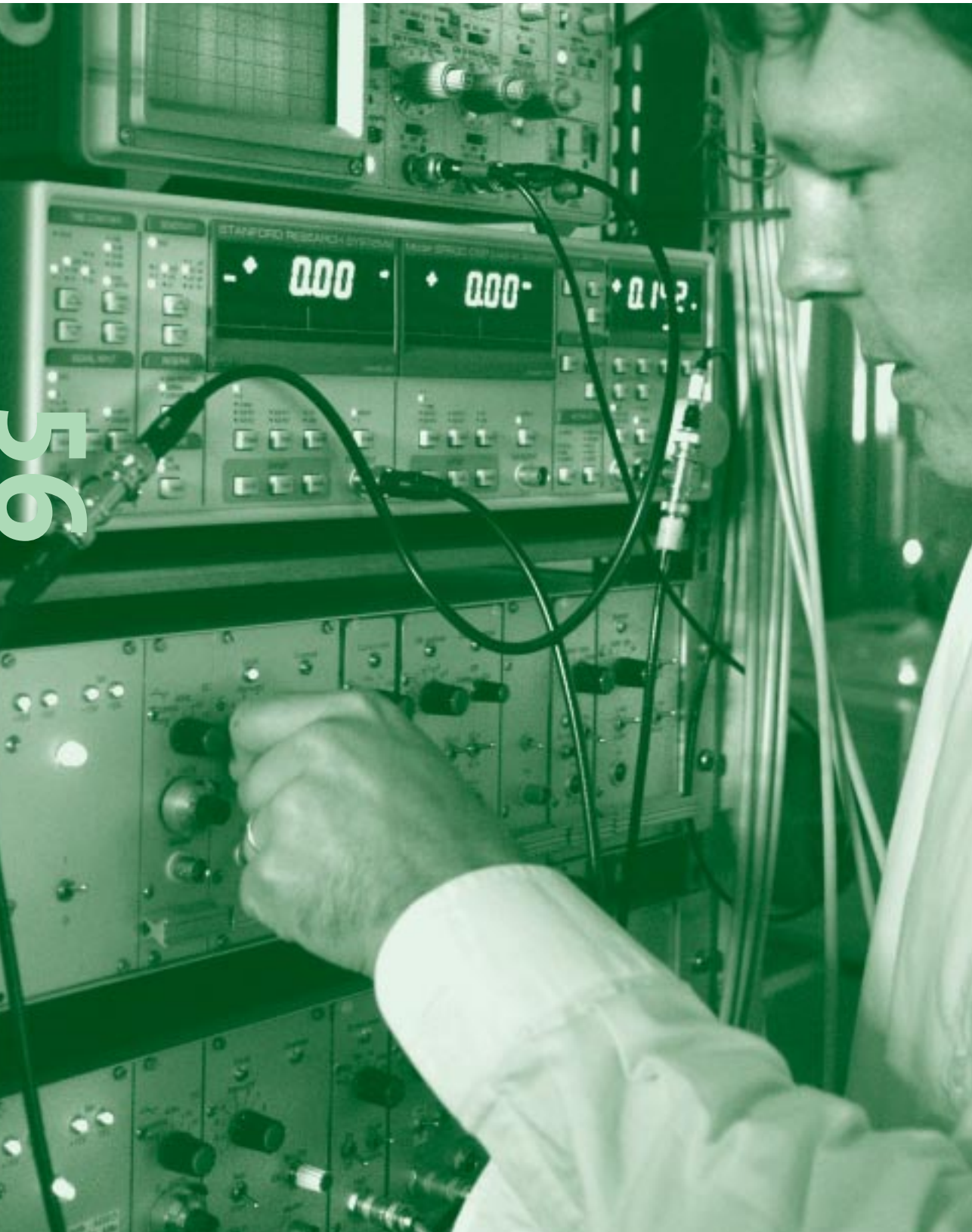
The first mission of the accelerator group is to deliver a high-quality beam over extended periods of time. This is the case: 3000 hours of beam time are delivered annually on target for experiments. The small emittance of the beam and the absence of a halo have resulted in high-quality measurements very close to zero degree.

AGOR is capable of accelerating ions from protons to uranium. Up to now AGOR has mainly delivered polarized proton and deuteron beams in the range of 50 to 200 MeV. These polarized beams are unique in Europe and clearly justify AGOR's status of being a European facility. In the future (TRIμP program) heavy ions will be also needed in order to produce ^{21}Na and Ra ions and atoms.

Because of the TRIμP program, it will be necessary to increase the beam intensity. A factor of 500 for Pb beams is needed in order to reach an intensity of 5.10^{12} ions per second. This implies developments at the ECR source and the beam extraction. The power of the corresponding beam (1 kW) is large and will require a perfect control of the extraction step. The accelerator team is competent and should be capable of dealing with these challenges. Another interesting improvement of the machine should be the production of heavy ion beams with spot sizes in the range of a few μm. If the accelerator team is successful with this project, it

will open the possibility for biological applications in which the irradiation of single cells are possible.

The committee has been impressed by the presentation of the group activities and by what is possible with this machine.


STANFORD RESEARCH SYSTEMS
0.00
0.00

Assessment Centre for Isotope Research (CIO)

7

7 1 Institute and Research program

(numerical scores included in table and figure in § 6 1)

PROGRAM LEADERS

'96-present:	H.A.J. Meijer

RESEARCH INPUT 2004 (FTE)

Tenured staff:	1.2
Total:	5.2

The CIO represents an excellent example of a truly interdisciplinary research center, with a well-balanced program of service and research in isotope analysis. The center has a high international visibility, and belongs to the top laboratories in the world in this field, particularly concerning ^{14}C measurements.

The CIO operates and develops an impressive suite of high-tech instruments for isotope research: a ^{14}C beta counting facility, a ^{14}C accelerator mass spectrometer, 6 stable isotope mass spectrometers, an innovative laser spectrometry set-up, and a number of peripheral instruments for sample preparation. The high fraction of technical staff (65% of the personnel) reflects the intensive use of these instruments and results in both a broad research program and a considerable income from service work (e.g. ~20,000 stable isotope and ~3000 ^{14}C measurements per year).

The five scientific staff members pursue first-rate lines of research, expressed in a high output of publications. This includes collaborations with research groups in many different fields in a large number of countries. Particular points of excellence are the ^{14}C calibration program, new aspects in ice core research, the use of stable isotopes to study evolutionary/behaviour aspects of animals, and the instrumental development of the laser isotope facility. Joint professorships of some of the scientific staff in other fields round up the interdisciplinary character of this research center. The initiative to bring in more students by actively participating in a new master program emphasizing the interdisciplinary research aspect looks promising.

Due to the interdisciplinary character, the work performed at the CIO has a high societal impact. Here, the new air monitoring station at Lutjewad with its research program on the carbon balance in the atmosphere is a good example. A closer collaboration with scientists working on modeling of natural systems would be beneficial for this and other programs at CIO and is therefore recommended for the future.

The funding situation looks reasonably stable, with a slight upward trend due to a high fraction of external funds (25%) and income from analytic services (40%).

Overall, the CIO is rated as one of the best laboratories of its kind in the world.

Assessment Centre for Theoretical Physics (CTN)

8

8 1 Institute

(numerical scores included in table and figure in § 6 1)

DIRECTORS

'96-present:	E.A. Bergshoeff

RESEARCH INPUT 2004 (FTE)

Tenured staff:	1.4
Non-tenured staff:	0.9
PhD students:	4.5
Total:	6.8

The Centre for Theoretical Physics has seen quite a few personnel changes during the past few years. New staff has recently joined (Mostovoy and Pallante) and a new strategy is being sought, directed at achieving more cohesion. The CTN indeed covers a wide range of subjects, and the research groups working on condensed matter subjects are, in fact, fully embedded within the MSC. As is stated in the self-evaluation of the CTN, this can be seen as a strength (diversity) and a weakness (perceived lack of cohesion) at the same time. But the latter seems to be not much of a problem because the individual scientists are internationally well-connected.

The committee has evaluated the research within the individual sub-programs of CTN (THEF) in string theory, particle physics and statistical physics separately. The activities within CTN (MSC) have been evaluated as part of MSC.

8 2 Research programs

8 2 1 Theoretical High Energy Physics (CTN1)

PROGRAM LEADERS

'00-present:	E.A. Bergshoeff
'96-'00:	D. Atkinson

RESEARCH INPUT 2004 (FTE)

Tenured staff:	1.4
Total:	6.8

Sub-programs: String theory Particle physics Statistical physics

The THEF group is a small, but very distinguished and highly visible group, and one of RUG's `jewels'. In its main area of expertise, supergravity and superstring theory, it plays a leading role

in Europe and the world (the two other leading groups in the Netherlands, Utrecht and Amsterdam, are much bigger). E. Bergshoeff and M. de Roo both have an outstanding research record with many important contributions and a high level of productivity, which they have been able to sustain over many years. Among their most recent results, their work on supersymmetry in singular spaces and on T duality deserves special mention. The international standing of the group is reflected in high citation scores and numerous invitations to international conferences (its director, E. Bergshoeff is the second most highly cited string theorist in the Netherlands).

The THEF group is very well connected both nationally and internationally. At the national level, it participates in different research schools (DRSTP, etc.). At the international level, it enjoys numerous collaborations with leading groups in Europe and the USA (here, its important role in past and present EU networks should be specially mentioned). In particular, E. Bergshoeff has been mentioned as one of the "best connected" scientists internationally. The group has a very good record in securing third party funds (FOM, EU, etc.). On the other hand, their funding situation within the University, with the dependency on different money sources, could still be improved.

With the recent appointment of E. Pallante the group has enlarged its expertise by branching out into new subjects (lattice field theory, with applications to QCD and weak interactions physics, which may be relevant in connection with upcoming LHC experiments at CERN). The new Blue Gene/L supercomputer facility presents new opportunities. This development as well as new activities that are foreseen in astro-particle physics and cosmological applications of string theory should be encouraged, also in view of strengthening links with the KVI theory group.

The only member of the group working in statistical physics (Van Enter) is well recognized in the mathematical physics community. However, the embedding of statistical physics into THEF does not appear optimal. Perhaps these activities might be better placed in a condensed matter or mathematical physics context. If such a re-organization is envisaged, it should not deprive the THEF group of existing resources.

With regard to teaching and training students, THEF maintains an excellent record: 57% of students go into theory, with good prospects of finding jobs afterwards (not only in academia). The group emphasizes the continuing need to attract young people and their importance in ensuring its continued vitality. Last but not least, its efforts to reach out to the public deserve to be mentioned.


PHILIPS

Assessment part of Centre for Behaviour and Neurosciences (CBN)

9

9 1 Research programs

The committee was asked to evaluate the physics aspects of two programs within CBN, 'Neurobiophysics' and Biomedical Engineering'. These programs are also evaluated within the Life Sciences Cluster. The committee has no experts in the areas covered by these groups, and it was difficult to pass a judgment. Hence, no numerical scores were assigned and what is said about the research in these groups must be seen against this background.

Before 1999, the two programs were part of the biophysics group at the physics department. Although this perhaps did little justice to the interdisciplinarity of the research in these groups, there was at least clarity about the organizational structure. Now the activities are part of CBN, are split in two programs, of which one program (neurobiophysics) is split in three sub-programs. The biomedical engineering program appears to be sub-critical. The committee recommends adherence to a simple organizational structure and a realistic number of fte's to be spent on each research topic.

9 11 Biomedical Engineering (CBN1)

PROGRAM LEADERS

'96-present:	H. Duifhuis

RESEARCH INPUT 2004 (FTE)

Tenured staff:	0.8
Total:	3.9

The group mainly focuses on sensory processing of sound, as seen in functional MRI, and on noise problems of MRI hardware. A spin-off is the development of applied signal analysis software (with a company). The laboratory was moved to the Antonius Deusinglaan in 2003, where use can be made of the 3T fMRI-setup.

The output of the group is relatively modest. As was also indicated in the self-evaluation, this may be related to the heavy teaching load on the program leader, who also complains about his many organizational duties. The group appears to be too small in size for making a real impact. Prof. Kok has retired in 2004 and Wiersinga-Post only works part-time on the research projects (N.B.: the position is only partly financed by FMNS). In addition, the program leader feels that the group is somewhat isolated within the FMNS. In his view, there is more interest for the group's program from the medical side and from psychology; the biologists are more interested in PET.

The question arises how interdisciplinary research of this kind can best be organized. Viability in the longer term is only possible if critical mass is generated.

9.1.2 Neurobiophysics (CBN2)

PROGRAM LEADERS

'96-present:	D.G. Stavenga, J.H. van Hateren, S.M. van Netten

RESEARCH INPUT 2004 (FTE)

Tenured staff:	1.2
Total:	5.9

The activities of this group are spread over three sub-programs: (1) photoreceptors and colour processing (Stavenga), (2) visual information processing (van Hateren) and (3) mechano-electrical signal transduction (van Netten). The persons responsible for the sub-programs all belong to the tenured staff , so there is no problem of sub-criticality as in the biomedical engineering group.

For experiments some unique optical instruments are around. The group's publications appear in good journals and the good academic reputation of its members is evident from invited lectureships, reviews and memberships of various committees.

Stavenga retires in two years and one is not sure how the faculty will decide. Clearly, the faculty should soon decide on a well-defined strategy for all its biophysics activities.

Appendix A

Quality assurance at the University of Groningen[4]

Selection Criteria and Guarantee of Independence for Peer Review Committees

Peer review and quality assurance committees are expected to produce authoritative, critical and independent assessments of the quality of the research schools, institutes or programs they have been asked to examine. This means that the members must meet high standards with regard to quality.
The authority of the assessment in terms of quality, objectivity and influence stands or falls with the independence of the assessing peers. It is in everyone's interests that such peer review committees be carefully selected in order to guarantee their independence. This appendix lists selection criteria for members of peer review committees as well as instruments to guarantee the independence of these committees.

Contents

1 Guidelines for selecting a Peer Review Committee

When choosing an external peer review committee (PRC) which conforms with the criteria of independence, expertise and academic quality, the following points must be taken into consideration when selecting potential candidates:

- Authoritative scientific expertise in at least one discipline or subdiscipline of the department to be assessed
- National or international authority in the field
- Independence with regard to the department to be assessed and to the researchers within the department
- Insight into, and if possible some expertise in, related disciplines and subdisciplines
- Insight into and an overview of national developments in the field

[4] Based on the format of the national organisation "Quality Assurance Netherlands Universities" (QANU) d.d. Dec. 2003

- Insight into and an overview of international developments in the field
- Insight into relevant interdisciplinary developments
- Some familiarity with how research is organized in the Netherlands.

In order to determine the independence of the potential chairperson and members of the visitation committee, the following issues at least must be considered:
Excluded from a PRC are:
(former) employees or PhD students of the Institute to be assessed,
(former) members of an advisory body for the Institute to be assessed (or the associated Research School),
co-authors of scientific publications from employees or PhD students of the Institute to be assessed.
Has the potential candidate ever worked intensively with members of the department to be assessed, for example, long-term participation in alliances, regular participation in PhD assessments?
Has the potential candidate close links with one or more members of the department to be assessed, for example as the PhD supervisor of a member, or as a member of the same research group, joint editorships?
If one or more of these questions must be answered with yes, then this must be clearly stated by the Institute when proposing the candidate in question. It should also be made clear why the board is of the opinion that the independence of the proposed candidate can be sufficiently guaranteed.

When potential candidates are approached with the request to participate in a PRC, they will be asked to sign a standard declaration of independence, including a brief *code of behaviour* (see below), before accepting. During the final meeting, the members of the committee will be asked to confirm or expand the declaration they signed earlier, and to state that they have actually fulfillled their commitments.

2 Reporting obligation

The list with potential peer review committee members must be presented to the heads of the programs, research schools and institutes to be assessed before it is sent to the Executive Board. The former are obliged to report any potential conflicts of interest, prejudice or influence on the part of the proposed peer review committee members and must be able to report and substantiate their objections in writing to the Faculty Board.

3 Code of behaviour + declaration of independence for peer review committees

The following will be sent together with the invitation to participate to the individual members of the peer review committee and must be signed and returned before the site visit takes place.

Competence and independence of peer review committee members

1 Members of the peer review committee must base their assessment primarily on:
- the Standard Evaluation Protocol 2003-2009 for Public Research Organizations[5]
- the 'specific peer review protocol' adopted by the Executive Board of the University[6]

2 When judging the quality of research, members of the peer review committee must base their assessment on the following information:
- the self-evaluation report and accompanying documentation
- possible additional information provided at the request of the peer review committee
- interviews, lectures and talks conducted within the framework of the assessment

3 Members of the peer review committee must meet the generally accepted quality demands within scientific research, including:
- competence and professionalism
- independence and objectivity
- care and consistency
- transparency and impartiality

4 Members of the peer review committee may not have any personal, scientific, financial or any other potential conflicts of interest when participating in the research assessment of the Science & Technology Cluster of the Faculty of Mathematics & Natural Sciences, and are therefore both qualified and competent to carry out their task as independent assessors.

5 Members of the peer review committee must report any potential conflicts of interest in the assessment procedure to the chairman of the review committee.

I declare that I have read the above-mentioned and that I will follow these to the best of my ability.

Place and date: .....

Signature: .....

Name: .....

.....

5 This national protocol can be downloaded from: *http://www.qanu.nl/?contentid=144*

6 The RUG protocol and other relevant documents are available at: *http://www.rug.nl/kwaliteitszorg*

Appendix B

Brief curricula vitae PRC members

Prof. dr. J.F. van der Veen, Department of Physics, ETH-Zürich and Research Department of Synchrotron Radiation and Nanotechnology, Paul Scherrer Institut, Villigen, Switzerland.
Friso van der Veen (1949) studied physics in Utrecht (Netherlands) where he earned his doctorate in 1978 on a surface science topic. After a one year postdoc at IBM Yorktown Heights (USA) he joined the staff of the FOM-Institute for Atomic and Molecular Physics in Amsterdam. In 1987 he became head of the Surface Physics department at this institute and in 1997 he was appointed professor of Experimental Physics at the Van der Waals-Zeeman Institute of the University of Amsterdam. In 2000 he moved to Switzerland where he is full professor of Experimental Physics at ETH Zürich and head of research at the Swiss Light Source at PSI, Villigen. His current research interests lie in the application of synchrotron x-ray scattering techniques for studies of the structural properties of solid-liquid interfaces and of confined fluid films. Earlier work included the use of medium-energy ion scattering and of synchrotron radiation-based XUV electron spectroscopy and X-ray diffraction for studies of the geometric and electronic structure of single-crystal surfaces. In 1998 Prof. van der Veen was awarded the IUVSTA Prize by the International Union for Vacuum Science, Techniques and Applications for the above-mentioned research, in particular for his studies of surface melting. He is a corresponding member of the Royal Academy of Sciences of The Netherlands.
Further information: *http://www.ethz.ch/people/whoiswho/index_EN*

Prof. dr. ir. S. Bruin, Chemical Reactor Engineering, Eindhoven University of Technology, The Netherlands.
Solke Bruin (1940) graduated from Wageningen Agricultural University (Netherlands) where he completed his PhD in 1969. After postdocs at Eindhoven University of Technology and the USDA's Western Regional Research Center in Berkeley (CA, USA), he joined the Royal Shell Research Laboratories in Amsterdam in the Equipment Engineering. In 1974 he was appointed full-professor in Process Engineering at Wageningen Agricultural University. Research activities included drying of food materials, adsorption of chemicals from aqueous solutions to active carbon and modeling storage of agricultural products. In 1980 he joined Unilever Research Vlaardingen where he fulfilled various senior positions in research management. In his latest position he was responsible for Exploratory Research in the Foods Processing area in both the Colworth House (UK) and Vlaardingen (NL) Research Laboratories and member of the management committee of Unilever Research Vlaardingen. He retired from Unilever in 2001 and was appointed Hoogewerff-professor at the Eindhoven University of Technology in 2002, to start a new chair "Product-driven Process Technology" in the Faculty of Chemical Engineering and Chemistry.
Further information: *http://yp.chem.tue.nl/showemp.php/1070*

Prof. Dr. A.J. Kirby, University Chemical Laboratory, Cambridge, UK.

Anthony Kirby (1935) obtained his PhD degree in 1962 at the University of Cambridge on a study on Enol Phosphates". After a NATO Postdoctoral Fellowship at Cambridge and Brandeis University (USA), he pursued his academic career at Cambridge, first at Demonstrator, then as Reader and since 1995 as professor of Bioorganic Chemistry. Following his formal retirement in 2002, he has remained active in research through several one-to-one collaborations, as visiting and invited lecturer and as member of several learned societies (e.g. Fellow of the Royal Society), editorial boards and review panels. His research interests relate to all aspects of organic reaction mechanism in solution, in the general context of mechanism and efficiency in enzyme catalysis. His approach aims at a sound understanding based on results from systems simple enough to understand in detail. Anthony Kirby has published over 300 papers and review articles, 5 recent patents and 3 books, and received several prestigious honors and awards.
Further information: *http://www.ch.cam.ac.uk/staff/ajk.html*

Prof. Dr. W. Kutschera, Institut für Isotopenforschung und Kernphysik, Vienna, Austria.

Walter Kutschera (1939) has been professor of Physics at the University of Vienna since 1993, where he is also head of the Institute for Isotope Research and Nuclear Physics, founder and director of the Vienna Environmental Research Accelerator (VERA) and dean of the Faculty of Physics. Following his PhD in Experimental Physics at the University of Graz in 1965, he worked for three years as visiting scientist at the Tandem Accelerator Lab of the Max-Planck-Institute for Nuclear Physics in Heidelberg (Germany). From 1969 to 1978 he was assistant professor in Physics at respectively the University of Heidelberg, the Technical University of Munich and the Tandem Accelerator Laboratory in Garching (Germany). From 1978-1993 Walter Kutschera worked at the Physics Division of the Argonne National Laboratory in Chicago (USA). During this period he was also visiting professor in Munich, Garching, Vienna and at the Hebrew University of Jerusalem (Israel). Since 2002 he has a Guest Senior Scientists appointment at Argonne National Laboratory. His research interests lie in Nuclear Physics (heavy ion reactions; gamma-ray spectroscopy; half-life measurements with recoil-distance, Dopplershift attenuation, specific activity methods; shell model; high-spin states; rare cluster decays; solar neutrino detection, nuclear astrophysics, search for exotic particles) and in Accelerator Mass Spectrometry. Currently, he focuses on the exploration of our world by means of the "isotope language" utilizing both long-lived radioisotopes and stable isotopes. His research extends to all seven domains of our environment: atmosphere, biosphere, hydrosphere, cryosphere, lithosphere, cosmosphere and technosphere.
Further information: *http://homepage.univie.ac.at/Walter.Kutschera/*

Prof. Dr. H. von Löhneysen, Physikalisches Institut, University of Karlsruhe, Germany.

Hilbert von Löhneysen (1946) received his doctor's degree at the University of Köln in 1976 for his study on thermal conductivity of strongly disordered and amorphous solids. After a one- year stay as guest scientist at the Centre de Recherches sur les Très Basses Temperatures (CNRS, Grenoble), he moved to the Aachen University of Technology. In 1986 he was appointed full professor of Experimental Physics at the University of Karlsruhe where in 2000 he additionally became head of the Institute of Solid State Physics at the Research Center Karlsruhe. His international orientation is illustrated by frequent research stays abroad (e.g. at the Centro Atomico Barilocho, Argentina; McGill University, Montreal, Canada; UC San Diego, La Jolla, USA; Institute of Theoretical Physics,

Santa Barbara, USA). Hilbert von Löhneysen has been member of the 'Heidelberger Akademie der Wissenschaften' since 2001. He has produced over 350 academic publications, received several awards and honors and joined many editorial, advisory and evaluation boards. His research interest is in the fields of physics of metallic layered systems and nano structures, properties of strongly correlated electron systems (heavy-fermion systems, rare earth and transition-metal compounds), magnetism and superconductivity, metal-insulator-transitions.
Further information: *http://www-pi.physik.uni-karlsruhe.de/loehneys/loehneys.html.en*

Prof. Dr. H. Nicolai, Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Potsdam, Germany.
Hermann Nicolai (1952) studied Physics at the University of Karslruhe where he also obtained his PhD (1978). After a one-year position at the University of Heidelberg, he became a fellow and staff member of the CERN Theory Division until his appointment in 1986 as professor of Theoretical Physics at the University of Karlsruhe. In 1988 he moved to the University of Hamburg where he occupied the same chair until he became director and scientific member of the Max-Planck-Institut für Gravitationsphysik in 1997. He has published 118 papers in academic journals, received the Otto Klung Prize for Physics (1991) and was member of several learned societies and editorial boards. His work is concerned with various aspects of quantum gravity and unified theories, especially supergravity, superstring and supermembrane theories. His present interests include maximal gauged supergravities, infinite dimensional duality symmetries, as well as canonical quantum gravity.
Further information: *http://www.aei.mpg.de/english/php-Skripte/quMembPage/index.php?personKey=nicolai*

Prof. Dr. C. Taliani, Institute for Nanostructured Materials Studies, ISMN-CNR, Bologna, Italy.
Carlo Taliani (1945) has been head of the Bologna Division of the ISMN-CNR since 2002. The preceding 10 years he was director of the CNR-Institute of Molecular Spectroscopy (Bologna), where he worked as scientist from 1973-1991. He combined the latter with a position (as lecturer, assistant and associate professor) at the Faculty of Chimica Industriale of the University of Bologna, which also granted him his PhD in Chemistry (in 1968). Between 1983 and 1989 he spent a total of 18 months as postdoc, visiting or research scientist at the University of British Columbia (Vancouver, Canada). He has published more than 220 (frequently cited) academic papers in refereed journals and 5 patents, has given over 100 invited talks, edited several books, organized some 24 (international) conferences and workshops and regularly acts as referee for a great number of international journals. His principal interest is in soft matter nanotechnologies for application in information technologies, renewable energy sources and pollution control. Other areas of interest are the design of new multifunctional materials, properties of conjugated organic semiconductors, nanoscience and nanotechnology, and organic spintronics.
Further information: *http://www.ism.bo.cnr.it/curriculum/taliani/taliani.html*

Prof. Dr. B. Tamain, Laboratoire de Physique Corpusculaire, Caen, France.
Bernard Tamain (1946) received his PhD in Nuclear Physics in 1970 and his 'Doctorat d'Etat' in 1974. He obtained a permanent position at the National Center for Scientific Research (CNRS) as early as 1967, leading him to various research positions such as the LPC Clermont Ferrand, Orsay

IPN, University of Caen (University Professor in 1980, First Class Professor in 1988, Outstanding University Professor in 1999). He was also study director of the Engineer School of Caen (1987-1991), director of the Physics Doctoral School SIMEM-Caen (1994-1997), director of the Nuclear Physics Laboratory of Caen (1996-2000) and commissioned at the National University Committee (1992-1999), by IN2P3 (1999-2002, subatomic physics teaching) and at the Research Government (1990-1998 and since 2001). Bernard Tamain was awarded the Knight (1991) and Officer (2000) academic distinctions, the Subatomic Physics Bronze medal of CNRS (1974) and the Joliot Curie Price of the French Physical Society (1992). He published 149 refereed articles, 197 communications, one book in nuclear physics (IOP) and gave 35 invited and 52 other talks. He was / is member of numerous scientific councils, organized several conferences and is referee for a number of academic journals. His research interests are: heavy ion nuclear physics in the Fermi energy domain where the first phase transition of nuclear matter is observed.

Prof. Dr. H.P. Trommsdorff, Laboratoire de Spectrométrie Physique, St. Martin d'Hères, Cedex, France.

Hans Peter Trommsdorff (1940) got his PhD in 1966 and his 'Doctorat d'Etat' in 1972, both at the University of Grenoble. He has been employed by the National Center for Scientific Research (CNRS) since 1969, the last 23 years as 'maître/directeur de recherché II'. Between 1973 and 1996 he spent some 2 years abroad as postdoc (University of Pennsylvania, IBM San Jose) and as invited professor (Universities of Bayreuth and Erlangen). Hans Peter Trommsdorff is associate member of the Institute for Spectroscopy of the Russian Academy of Sciences, fellow of the American Physical Society and Doctor Honoris Causae at the University of Cluj-Napoca. He was / is member of several editorial boards and scientific panels and committees and published 175 academic papers. His research interests are: condensed phase molecular structure and dynamics; quantum motions and tunneling of protons and methyl groups, photochromism and transient, photo-induced structural changes.

Further information: *http://www-lsp.ujf-grenoble.fr/eng/fiches_identites/TFHP.html*

This publication is part of a series on the assessment of research quality at the University of Groningen.

ISBN 90-367-2451-1

Also published in this series:

Northern Centre for Healthcare Research – University of Groningen
Assessment of Research Quality 1997-2002 (March 2005)
ISBN 90-367-2241-1

Centre for Language and Cognition Groningen – University of Groningen
Assessment of Research Quality 1998-2003 (March 2005)
ISBN 90-367-2242-X

BCN-FMS Institutes: Motor Systems and Control (MSCL),
Emotional and Cognitive Disorders (ECS) – University of Groningen
Assessment of Research Quality 1997-2002 (May 2005)
ISBN 90-367-2243-8

Institute for Biomedical engineering,
Materials Science and Application (BMSA)
Assessment of Research Quality 1997-2002 (June 2005)
ISBN 90-367-2265-1

Life Sciences Institutes (CBN, CEES, GBB)
Assessment of Research Quality 1998-2004 (November 2005)
ISBN 90-367-2450-3

Materials Science Centre (MSC)

Kernfysisch Versneller Instituut (KVI)

Stratingh Institute for Chemistry and Chemical Engineering (Stratingh)