

# Review of research in Physics in Norway

## Mandate for the evaluation committee

### I INTRODUCTION

The Board of the Division for Science, The Research Council of Norway, has decided that an evaluation of research activities in Physics in Norwegian universities and relevant contract research institutes should be conducted. The report of the evaluation committee will become a part of the basis for the future strategy of the Research Council.

#### **The objective of the evaluation**

The objective is to review the overall state of basic research in Physics in Norwegian universities and relevant contract research institutes.

More specifically, the evaluation process should:

- Provide a critical review of the strengths and weaknesses of basic research in Physics in Norway, both nationally and at the level of individual research groups and academic departments. The scientific quality shall be reviewed in an international context and related to internationally accepted benchmarks.
- Identify research groups that have achieved a high international quality level or have the potential to reach such a level.
- Identify areas of research that need to be strengthened in order to establish the necessary competences in strategic areas of importance for the nation. An assessment of the impending situation regarding recruitment in important fields of Physics should be included.

#### **The long-term purpose of the review**

The evaluation should provide the involved institutions with the knowledge, advice and recommendations they need to enhance their own research standards.

The evaluation should improve the knowledge base for strategic decision-making by the Research Council, constitute a platform for future work on developing the basic research in Physics, and represent a basis for determining future priorities, including funding priorities, within and between individual areas of research.

The evaluation should improve the knowledge base needed for the Research Council's advice on research policies to the Norwegian Government and ministries.

## Methods

An international Evaluation Committee will be appointed. The Evaluation Committee should base its assessments on self-evaluations provided by the departments/research groups, as well as on meetings with the involved departments/research groups giving oral presentations. The Evaluation Committee will also perform selected site visits to the institutions. Facts on the organisation and resources will be included in the self-evaluations, as well as future plans, CVs, and publication lists of the scientific staff. The Committee should address both the scientific quality of the research and quantitative aspects based on bibliometric analyses of the scientific publications. The Committee is requested to write a report with a set of specific recommendations. A preliminary report will be sent to the departments to check the factual information. The Committee's final report will be submitted to the Board of the Division for Science.

## II MANDATE

Based on the self-evaluations provided by the institutions and site visits, the Evaluation Committee is requested to present the evaluation in a written report. This report should include a set of specific recommendations for the future development of the field, as well as suggestions of means for improvement when required. The Committee is requested to evaluate scientific activities with respect to their quality, relevance and international and national collaboration. The Committee is also requested to evaluate the way in which Physics research is organised and managed.

The conclusions of the committee's report should lead to a set of recommendations and possible scenarios concerning the future development and prioritization of Physics research in Norwegian universities and relevant contract research institutes, including challenges related to recruitment and possible reductions in the number of permanent scientific positions.

Specific aspects to be considered:

### 1. General aspects

- Which fields of research in Physics have a strong scientific position in Norway and which have a weak position? Is Norwegian research in Physics being carried out in fields that are regarded as important and relevant by the international research community? Is Norwegian research in Physics leading the scientific developments internationally within specific areas?
- Is there a reasonable balance between the various fields of Physics research in Norway, or is research absent or underrepresented in any particular field? Are any fields overrepresented, in view of the scientific quality or relevance of the research being carried out?
- Is there a reasonable degree of co-operation and division of research activities at the national level, or should these aspects be improved?

- Is the Physics research of today in Norway relevant to the needs of industry and society? Do research groups maintain sufficient contact with industry and/or the public sector?

## **2. Academic departments**

- Are the academic departments adequately organised?
- Is scientific leadership being exercised in an appropriate way?
- Do individual departments carry out their research as part of an overall research strategy?
- Are there satisfactory policies in place guiding the recruitment and handling of employees, including gender balance in academic positions?
- How has the previous evaluation of research in Physics (1999/2000) and the associated national strategic plan been used by the departments in their own strategic planning?

## **3. Research groups**

### *3.1. Strategy, organization and research leadership*

- Have research groups developed satisfactory strategies for their research, and are these implemented?
- Is the size and organisation of the research groups reasonable?
- Is research leadership being performed in an appropriate way (e.g. in execution of project management), and is there in place an effective distribution of tasks and responsibilities within the research group?

### *3.2. Research activities, staff and scientific production*

- Do the research groups represent a high scientific quality judged by the significance of contributions to their field, prominence of the leader and team members, and scientific impact of their research?
- Is the scientific production, e.g. the number of scientific publications and Ph. D. theses awarded, reasonable in terms of the resources available?
- How is the long term viability of the staff and facilities evaluated in view of future plans and ideas, staff age, facilities, research profile, and new impulses through recruitment of researchers?
- Do they play an active role in dissemination of their own research and new international developments in their field to industry and/or public sector?

### *3.3. Research collaboration (national, international, industry)*

- Is there sufficient contact and co-operation among research groups nationally, in particular, how do they cooperate with colleagues in the contract research institutes?
- Do the research groups have contracts and joint projects with external partners at a satisfactory level?

- Do the research groups take part in interdisciplinary/multidisciplinary research activities at a satisfactory level?
- Do they play a satisfactory role in creating and establishing new industrial activity?
- What roles do Norwegian research groups play in international co-operation in individual subfields of Physics?
- Is the international network satisfactory, e.g. in terms of contact with leading international research groups, number of guest researchers, and number of joint publications with foreign colleagues?
- Do research groups take satisfactorily part in international programmes or use facilities abroad, or should utilisation be improved by introducing special measures?
- Is their participation in international professional committees, peer review, work on standardization, and other professional activities satisfactory?
- Are there any significant differences between Norwegian research in Physics and research carried out in other countries?

#### **4. Research infrastructure (RI), incl. scientific equipment**

- How is the current situation and the future needs with regard to laboratories and access to modern RI?
- Is there sufficient national and international co-operation related to the use of expensive equipment?
- Is there sufficient awareness of new RI opportunities in Europe and globally, and are there plans for active participation in such RI projects?

#### **5. Training and mobility**

- Does the scientific staff play an active role in stimulating the interest for their field of research among young people?
- Is recruitment to doctoral training programmes satisfactory, or should greater emphasis be put on recruitment in the future, including strategies aimed at improving the gender balance?
- Are there sufficient educational and training opportunities for PhD students?
- Is there an adequate degree of national and international mobility?

The Committee's written report is expected to be based on the elements and questions above. The assessments and recommendations should be at research group, departmental, institutional and national level.

Please feel free to address any other aspects of Norwegian research in Physics you mean deserve attention and consideration.