



NUI MAYNOOTH
Ollscoil na hÉireann Má Nuad

DEPARTMENT OF EXPERIMENTAL PHYSICS

QUALITY REVIEW 1997

PEER REVIEW REPORT 1997

INTRODUCTION

The assessors visited National University of Ireland, Maynooth during June 3rd - 5th 1997 to assess the quality of the work of the Department of Experimental Physics. During the course of this visit they inspected the accommodation and facilities in the Department and held meetings with the Head of Department; Academic, Technical and Administrative staff, all Postgraduate Research Students and some students reading for the Higher Diploma course in Applied Physics (ATS). The teaching and research activities of the Department were discussed in detail as well as the problems and challenges facing a small Physics Department in a University. The assessors concluded that the self-assessment report and their discussions confirmed the excellence of the educational provision in tuition, skills training and research in the Department. A verbal report of their findings and recommendations was made to the President and Registrar of the University.

SCOPE OF A PHYSICS DEPARTMENT

The goal of a Department of Experimental Physics in a University such as National University of Ireland, Maynooth is to provide an all round balanced education in the discipline to a wide cohort of students of mixed ability and varying degrees of previous knowledge of the subject. Those students who qualify with a specialist degree in the honours or double honours programme require a comprehensive programme of lectures in a wide variety of topics ranging from fundamental principles of mechanics, electromagnetism and thermodynamics to advanced studies such as, for instance, Quantum Mechanics and Relativity. In addition instruction is required in more specialised subjects such as, for example, Solid State Theory, Astrophysics and Particle Physics. In parallel with these studies students must acquire experimental skills, experience with both modern and classical experimental equipment and analytical techniques for data reduction and analysis. Opinions differ internationally as to the minimum 'critical size' to enable a department to provide the above services.

A welcome feature of the modern employment market is the fact that it is now increasingly realised that the education of a physicist leads to the acquirement of problem solving skills applicable to a variety of occupations within and without the scientific/technical area.

MEETINGS WITH DEPARTMENTAL GROUPS

1. ACADEMIC STAFF

The assessors had two opportunities to meet with the seven academic staff. In touring the facilities they met each academic in his/her research environment. Subsequently, the assessors chaired a discussion on problems in the Department over lunch.

The Departmental staff are led with vigour and vision by Professor Slevin. He is internationally celebrated for his researches in atomic and molecular physics. His impact on the Department has been exciting and uplifting. He has great ability to motivate and inspire his small band of scholars. The University may be complimented for the wisdom in this appointment. In turn Professor Slevin has been able to repay the investment in human and other resources by appointment of a number of excellent young researchers, whose interests complement those of the established staff.

Professor McKenna-Lawlor is a star in the international astronomical firmament. Her prodigious work *rate* brings her an admirable reputation which reflects well on the Department and College. She has been an inspired entrepreneur, bringing to the campus Space Technology Ireland, which provides high technology products to many parts of the world. This independent company adds greatly to the profile of the department. In our view, the department would benefit greatly from Professor McKenna-Lawlor contributing more widely to the administration and management of the department.

Dr. F J Mulligan has a burgeoning international reputation in atmospheric physics and also, as Dean of the Faculty of Science, contributes significantly to the life and management of the University. Drs. Van der Burgt and O'Neill are excellent co-workers for Professor Slevin in the areas of electron-photon coincidence spectroscopy and laser photo ionisation spectroscopy of hydrogen. Both are publishing regularly and beginning to build up important international contacts and regular presentations at conferences. Dr. J A Murphy is very active in sub-millimetre-wave astronomy using large, specialised telescopes in Hawaii, which involves him in major international programmes. Finally, the astronomical researches are completed through the work of Dr. M F Cawley on x-ray induced showers of high energy particles incident upon the upper atmosphere. This work is carried out in collaboration with the Whipple Observatory in Arizona. The Departmental research is at a high level, sustained by considerable ingenuity in the design of appropriate equipment, which present resources do not permit them to purchase at high cost from

external suppliers. The effort is naturally complemented by the advanced skills of a dedicated technical workforce.

Dedication to quality research does not deflect the academic staff from their primary goal; the training and education of young people to take their place in a rapidly changing world. Here, these staff again show dedication and high skills in presenting a broad programme of physics courses of interest and relevance for students and would-be employers. The standards set by staff, of themselves and of the students, are challenging and up-to-date. A slight concern is the absence of a condensed-matter physicist from the staff, given that this area of physics underpins the semiconductor and information technology industry, so vital to Ireland's expanding industrial base. This, however, may be rectified by future staff recruitment in the context either of expansion or normal replacement.

As our report mentions elsewhere, the work of staff at all levels has been constrained by spatial deprivations. We have been astonished how the Department has deployed every square meter of space, including cupboards and corridors, to further their academic mission.

Individually and collectively the academic staff have impressed: they have an impressive array of products of which the University may justly be proud. The product list includes five discrete B.Sc. programmes (single, double and general honours, and advanced diploma level). This is an ambitious and extensive task which will be made somewhat easier in 1998 when the new building comes on stream. However, even this exciting development will not reduce to manageable the level the workload expected of the staff. Some more radical suggestions are made elsewhere in this report. The assessors noted the recommendation of the Institute of Physics Accreditation Panel that two additional academic staff be appointed (the University has already made one such appointment).

Finally, the assessors wish to comment that the programme of physics-research and teaching is a team effort, involving academic, technical and administrative players. This team plays in the First Division and the University may be proud of their accomplishments.

2. TECHNICAL STAFF

The technical staff are few in number, but they are highly skilled and devoted to the work of the Department and the reputation of the University. This valuable resource would be the envy of many, much larger Departments. They are valued by students and academic colleagues, but they are seriously overstretched by the flexible roster of duties placed upon them and by a particularly onerous work load. It is the case that over the years since 1986, and despite much increased cohorts of academic staff and of students at all levels, and the very considerable increase in the amount and complexity of equipment and computer facilities, there have been no increased human resources in the technical area.

The assessors have been able to examine closely the quality of their work, and are greatly impressed. The technical staff contribute to the entire range of teaching and research activities and from time to time they manufacture mechanical and electronic components for other Departments. Their devotion to the Department is graphically illustrated by their willingness to engage, in their own time, in additional skills training for more advanced qualifications. They also contribute to administration and to courses of instruction. At the same time there are tasks required of them which are rather routine for such highly skilled staff. Some alleviation of their work load and/or range of duties is an urgent requirement. This need not be too costly, since the recruitment of one, possibly two, junior or trainee technicians to assist in the non-project teaching laboratories, would enable senior staff to concentrate their efforts in areas more demanding of their advanced skills.

The critical comments made by technical staff were not regarded by the assessors as a lack of commitment to the mission of the Department, but an advance warning of serious overload in terms of the breadth of duties expected of technical staff and of total output which seems only to escalate. It is a problem that needs to be addressed soon, so that the skill levels required of a technical force in a modern science department may be better deployed. Certainly, in a larger University with a unionised technical staff there would be serious disruption on both fronts referred to above.

This type of unrealistic expectation of what can be done in a working day seems to be spreading into the work of the administrative assistant. She also is greatly respected by the student body for the quality of her work and for the caring attitude she displays to student needs. However, as the Department has expanded their work on communication skills so has she had to assume an increasing burden of responsibilities. In the past two years this has included skills training classes for the ATS programme, which would not

normally be expected of staff at her level. She enjoys this type of interaction, but is conscious that each new responsibility takes her away from other duties. (Clare Ludden will be leaving at least for twelve months in July: it is imperative that she be replaced effectively in the short, and perhaps, long-term).

The technical/administrative staff are aggrieved at the role they play, or rather do not play, in the wider University context. They have skills and interests that could be more widely deployed in the University. They hope, and the assessors would support them in this, that in the new managerial scheme of things, they will find representative opportunities on senior University committees. This is now general practice elsewhere. They also need to be part of the information circle for important planning documentation- (five year plans, budgetary strategies etc.). Finally, a strong desire was expressed for a more inclusive approach to the social life of the University.

3. STUDENTS

The assessors were able to meet only the ATS Advanced Diploma Class and the M.Sc./Ph.D. cohort. These were quizzed about not only their present programme, but also about their undergraduate programme. In general, these two groups of students are strongly supportive of the work of the Department and have been very happy in their work within it. They are fulsome in their praise of the educational experience in Experimental Physics and their interaction with staff at all levels. They are content with the qualifications earned and would recommend friends and acquaintances to follow these same programmes. The students in general viewed Experimental Physics in a rather favourable light in comparison with their experiences elsewhere.

All of these students work through the medium of project-based education, about which they enthuse eloquently. They have been enriched by the experience and believe that they have earned a worthwhile qualification relevant to present and future needs of the country. In the two separate groups, the students appeared to have become aware of the research in the Department in different stages. This is not to be seen as a criticism, because all realised that when they wanted to know, they were immediately given full and authoritative briefings on this important element of the Departmental activity.

CONSTRAINTS RELATING TO THIS DEPARTMENT

In practical terms, a department such as the Department of Experimental Physics in Maynooth must operate under constraints which are summarised here under three headings:

(i) Staff

(ii) Space

(iii) Funding

(i) In the view of the assessors, the number of Academic and Technical personnel in the department is close to the minimum for viability. The addition of an academic staff member and of one or two junior technical staff would fulfil the most urgent need, but would not of course solve all problems consequent to small staff resources.

The possibility of major rationalisation must be explored by considering the overlap of courses between the Departments of Experimental Physics and Mathematical Physics. Such overlaps occur between Experimental Physics, Chemistry, Computer Science and Mathematical Physics but are most evident in the case of the last mentioned.

The planning and operation of possible common courses would certainly require considerable adjustment by both Departments in the initial phase. It is realised that there are differences in philosophy and approach to the subject matter, and that the size of the student cohort, particularly at first year level, differs greatly between the two departments. At the same time, the assessors are confident that a gradual increase in collaboration would bring considerable academic benefit at all levels up to and including postgraduate research.

It is the experience of one of the assessors that such rationalisation can be brought about successfully but may require an initial top-down stimulus to create the necessary environment for constructive dialogue on both syllabus and educational philosophy.

(ii) We welcome the prospect of a new building which will solve the problem which has had a severe impact on working conditions up to the present time. The assessors note that special provision has been made in respect of space technology. Mindful of anticipated

changes in staff we strongly recommend that in developing this accommodation consideration be given to flexible arrangements which might be changed at some future date at minimum cost. Such future re-deployment should be related to teaching and research activities in Physics.

(iii) The assessors realise that it is unrealistic to suggest significant increases in funding beyond present constraints. They note that prudent management of resources has enabled the Department to function at an acceptable level, and feel that the relatively modest cost of the recommended staff recruitment would be money well spent. This, in combination with the much more efficient working conditions provided in the new building, should provide good value for money to the University.

CONCLUSIONS

The assessors recommend: the following:

- i. That consideration be given to the rationalisation of overlapping teaching programmes with other Departments of cognate interests;
- ii. Accommodation allocated to Space Technology in the new building be configured and fitted out as flexibly as possible to facilitate future needs in Physics;
- iii. That consideration be given to increasing the support staff complement at trainee level;
and
- iv. That consideration be given, in the context of either expansion or natural replacement to creating a balanced teaching and research infrastructure within the Department.

Professor Brian Henderson

Professor Alex Montwill

June 6, 1997.