History of Physics Department

Early History (1911-1948)

The first appointments of academic staff at The University of Queensland were made in 1910. At the commencement of teaching in 1911 a Lecturer in Physics, Thomas Parnell, M.A. (Cantab) was appointed within a combined department of Mathematics and Physics, and in 1912 an Assistant Lecturer, S. Gordon Lusby followed. In 1919 Parnell was promoted to a Chair and Physics became a separate department. About that time Parnell set up a workshop using Navy surplus tools. The department's first research publication, on AC measurements, had appeared in 1917 while Parnell was at the War, but with a small staff and heavy teaching loads research does not seem to have enjoyed a high priority in those times, much to Lusby's disappointment.

In 1937 Hugh Webster, who had done a PhD with Chadwick in the Cavendish Laboratory and almost discovered the neutron, was appointed as Lecturer in Hospital Physics with costs shared by the Qld Cancer Trust and the Brisbane and South Coast Hospitals Board. He set up a radon preparation plant and began to establish strong links with the Faculty of Medicine. A textbook written by Webster and Donald Robertson served first year medical and other biological science students for many years.

At the beginning of WWII the department had five academic staff including a Demonstrator but there were no fourth level or other honours lectures given and there were only ever a few students at third level. From 1940 Webster and Arnold Reimann were seconded to the Radiophysics Division of CSIR to work on radar, returning in 1945. Meanwhile the department had become involved in ionospheric studies funded by the

Radio Research Board. This activity soon grew and a Radio Mechanic was appointed, marking the beginning of a separate Electronic Workshop.

Growth and Stability (1948-1974)

After the death of Parnell in 1948 and appointment of Webster to the Chair in 1949, a period of growth ensued. The University moved from the city to the new St. Lucia campus in 1955 and Webster decided to concentrate research on ionospheric physics and radiation biophysics, both of which had guaranteed funding sources. Reimann's pioneering work on solid state electronics was not supported. Throughout the 50's student numbers grew steadily, and the demand for service subjects necessitated further staff appointments and a new building. In 1950 the department had 1 Professor, 1 Reader, 2 Senior Lecturers, 6 Lecturers and 4-1/2 Demonstrators. In 1960 the corresponding numbers were 1, 3, 5, 10 and 10.

In 1958 Donald Mugglestone was appointed Senior Lecturer in Theoretical Physics, introducing theoretical astrophysics to the department, and in 1959 Ralph Parsons was appointed Reader. He brought a laboratory component to the department's research interests with his microwave spectroscopy work. Meanwhile the ionospheric work expanded with a field station being set up at Moggill. The department continued to expand until around 1970 with many of the present staff being appointed in that period. From 1965 separate Honours level subjects were offered at first, second and third levels in the BSc course, thus providing better preparation for the students proceeding to the postgraduate Honours (fourth level) studies.

Mugglestone and Parsons were offered Chairs in Theoretical and Experimental Physics respectively and Frank Stacey, who established research in geophysics, was

appointed. He quickly developed a strong research group that focussed on an earlier suggestion of the intrinsic predictability of earthquakes. He became Professor of Applied Physics in 1971. Thus, there were three established chairs, in Experimental, Theoretical and Applied Physics. The theoretical group had been expanded with the appointment of Jim O'Mara in 1967 and Gerard Finn in 1968. Following the resignation of Finn, John Ross was appointed in 1973. In 1970 there were 3 Professors, 5 Readers, 9 Senior Lecturers, 9 Lecturers, 8 Senior Demonstrators and 15 full-time Demonstrators, and in addition to staff of the two workshops and office there was a storeman, two lecture attendants, a purchasing officer, and equipment officer, a Professional Officer (graduate engineer) and two analysts.

Professor Parsons replaced Professor Webster as Head in 1970. At this stage, the research activities of the department were ionospheric physics, magnetospheric physics, radiation biophysics, theoretical astrophysics, microwave spectroscopy, quantum optics, solid state physics, atomic physics, and geophysics. In 1974 Neville Milford introduced Environmental Physics research based on modelling of the Brisbane River system and Moreton Bay and was joined in that work by John Steele. In 1975, following the death of Robert McNicol, John Mainstone moved from magnetospheric research to physical oceanography. Under the leadership of David Whitehead (personal chair 1975) members of the ionospheric group had moved their work to a field station at Bribie Island where a large array antenna was being developed. The appointment of Brian Lucas in 1969 introduced experimental solid state physics research and Bryan Dalton in 1970 started research in theoretical quantum optics. Lynn Hastie joined the geophysics group in 1972. Professor Stacey became Head of Department in 1979 and Professor Whitehead in 1982.

Experimental atomic physics and laboratory astrophysics research was carried out during the 1970's after the appointments of Ron Gardiner in 1968, John Ross in 1973, and Ray Liu in 1974. By 1981 two other areas of geophysics had achieved prominence: thermodynamics of the earth's core and Newton's law of gravity. The latter work generated significant worldwide interest for the following decade. Following a suggestion by Stacey in 1978 that an improved value of the Newtonian gravitational constant, G, relative to the laboratory result, was possible from measurements in the deep ocean, experiments commenced in mines, a hydroelectric lake and the laboratory. Initial results indicated a breakdown of Newton's law of gravity at geophysics scales and this work stimulated world-wide interest in over 40 laboratories which continued until the early nineties when the question was answered in the negative. However, today improved laboratory values of G are possible following the novel experimental techniques developed over the decade.

A Changing World (1974-1985)

In 1974 the University changed from a three term calendar to a semester timetable with a formalized system of credit points and prerequisites intended to foster more broadly based study. This spelled the end of the dominance of the traditional physics/ chemistry/mathematics base in the first level of Science, Engineering, Medicine, Veterinary Science, Dentistry etc. although it took some years for the full effects to bite.

In 1977 the Chair of Theoretical Physics, vacant following the death of Mugglestone, was advertised. The short listed applicants were Dan Walls (now FRS) and Frank Goodman, the latter being appointed. Goodman returned to his former position

in Canada about a year later, accentuating divisions within the department over his appointment.

Before 1983 the University had been organised with maintenance and equipment funding being determined by central committees for various areas, and the Heads of Departments in those areas splitting the funds, often using historical precedent. The staff numbers in each department were determined by the Standing Committee of the Academic Board for academic staff, and the Deputy Vice-Chancellor (Fabric and Finance) for general staff. A major change was introduced in 1983 with the University being divided into five "Groups" each headed by a Pro-Vice-Chancellor responsible for funding arrangements within his group. The five groups did not correspond to the thirteen faculties which decided academic matters. The Physics Department (along with Mathematics, Chemistry and Geology) was included in a Physical Sciences and Engineering Group, whose PVC, Professor Nicklin, adopted the principle of a one-line budget with a formula, regarded by some as arbitrary and biassed, based on teaching and research indicators, to determine how income was split. Physics rapidly found itself in financial difficulties that were exacerbated as other faculties decided that their students did not require as much Physics in their first year as previously.

The Previous Review and Subsequent Developments

In 1985 the department was the first to undergo a decennial Review. At that time the academic staff consisted of 3 Professors, 5 Readers, 13 Senior Lecturers, one Lecturer, 3 Senior Tutors, and one full time Tutor. In its submission, the department advocated changes to the funding scheme, including a change to Faculty based resource

management, the rationalization of service subjects, and proposed that geophysics and material science offerings be increased.

The Review Committee (external members were Professor T.F. Smith, Monash; Professor J. Cooper, JILA; Professor B. McKellar, Melbourne) recommended (see attached summary) withdrawal of departmental funding from the ionospheric field work and encouragement of experimental laser research like that begun by Norman Heckenberg in 1980. Importantly, the committee recommended that the Chair of Theoretical Physics (then vacant for 7 years) should be filled in the "broad area of the interaction of radiation with matter", as advocated by a group within the department, and effectively set a direction for future development.

The Chair was advertised in 1988; as a result two appointments were made – Peter Drummond as Professor and Gerard Milburn as Reader. Both were already well known for their work in quantum optics. In 1989 Carl-Otto Weiss was appointed Senior Lecturer and started up programs in laser chaos and pattern formation with Heckenberg before returning to his previous institute in Germany a year later. About this time Halina Rubinsztein-Dunlop joined the department, introducing research on laser based diagnostics of flows in conjunction with the Mechanical Engineering department as well as introducing, in collaboration with Heckenberg, laser trapping experiments.

As these developments were enhancing the laser/quantum optics areas, further loss of funding and retirements were reducing activities in most other areas except for astronomy where there was still strong demand for postgraduate projects. In 1987, Keith Jones moved from ionospheric physics to radioastronomy, using the Australia Telescope Compact Array at Narrabri for research on radio stars and galactic structure. In 1989

Associate Professor Mainstone became Head. He worked hard to encourage cooperation and strategic planning and to maintain service courses. In 1993 Associate Professor Mike Gladwin left to join CSIRO Exploration and Mining, but he has continued to offer PhD and Honours projects in instrumentation and geophysics as an Honorary Reader. In 1994 the department's long role as a service subject provider to the Faculty of Medicine finally came to a complete end with introduction from 1995 of a graduate-entry medical course requiring only high school level Physics for entry. Undergraduate enrolments in Physics were moderately stable but were continuing to drop as a proportion of Group or University enrolments as the government expanded tertiary student numbers, so the department's financial situation continued to deteriorate, with virtually all income being committed to salaries. On the other hand, the ISI was able to award its highest accolade to the department in 1996 for the worldwide impact of its research over the preceding five-year period. In the same year, the Mt Kent Observatory (a joint venture with The University of Southern Queensland) was officially opened, and also a very significant financial agreement with Telstra for use of the former antenna-array site at Bribie Island was signed. In 1995 on the initiative of the Physics Department (Rubinsztein-Dunlop and Amberyn Thomas), the Faculty of Science and the Faculty of Engineering, a program called "Science in Action" was started with the aim of promoting and popularising Physical Sciences. The program is directed toward school pupils and their teachers as well as to the general public and has been very successfull.

The Restructure (1996)

Financial problems came to a head in 1996 with the accession of a new Vice-Chancellor, John Hay, and the announcement by the Australian Government of cuts to

tertiary education funding, and that the forthcoming salary increases would be unfunded. The term of the Head of Department, Associate Professor Mainstone was also about to expire. Pro-Vice-Chancellor Paul Greenfield called for staff reductions through voluntary separations and part-time appointments .Three members of the academic staff sought and were offered half-time appointments which they accepted. Voluntary redundancies taken by 4 workshop staff together with the 3 academic staff agreeing to take half-time positions were deemed insufficient to deal with the financial deficit looming in the departmental budget. Though it was later revealed that the University had a multimillion dollar surplus in its T&R account, the management used the financial "crisis" as a major factor to justify a "restructure" of the Physics Department, as outlined in the paper "Focussing Physics" (attached) circulated by PVC, Professor Greenfield. Calls to hold the now overdue Review before any restructuring were not heeded. The purpose of the restructure process was to allow tenured academic staff to be terminated without violating the Universities and Post Compulsory Academic Conditions Award 1995. According to that award tenured academic staff positions could now be terminated on the basis of financial exigency within an individual unit or cost centre rather than in the institution as a whole as applied prior to the award. Clause 21(m) however provided that a review committee could be set up to consider whether fair and objective criteria were used to select staff to be identified as excess (ie redundant) staff members. Presumably an appointment process to what was notionally a new department would not have required such matters to be considered. The restructure of the Physics Department served as a learning experience for management and the staff union. Professor Greenfield is now Deputy Vice-Chancellor (Research).

After an initial declaration of Redundancy for the entire academic staff of the department as from 2 December, five tenured staff already working in laser physics/quantum optics were transferred to a "Centre for Laser Science" to be directed by Professor Milburn, and continued their appointments within the Physics Department while the other 11 tenured staff, including those who had already accepted half-time appointments, were invited to apply for a total of six equivalent full-time positions, consisting of two positions in astronomy/astrophysics, two positions in geophysics, one in solid state physics, and one other teaching and research position in experimental physics. Part-time appointments were allowed. Although the advertised positions were specified in some detail there were some surprises when the appointments were announced. Excess staff had full access to the provisions of the Universities and Post Compulsory Academic Conditions Award 1995 in terms of redundancy payments. Overall three previously tenured academics lost their positions and two others were asked to accept half-time appointments.

Professor Milburn was also appointed Head of Department, the Vice-Chancellor not consulting the staff as had occurred on previous occasions following the 1970 Senate Rules. The "restructuring" process resulted in a certain amount of negative publicity, with some press reports declaring that the department had been closed. This may have had some adverse effects on enrolments. One proven effect of the "restructure", which was finalised as classes began in 1997, was a 30% increase in teaching loads with no chance to make adjustments to subject offerings. The death of Lynn Hastie exacerbated these problems. Fortunately, the appointment of a Lecturer was approved in 1998. Another result of the restructure was the provision of funding to allow for much needed

refurbishment of student and staff facilities as well as special funding for research in the Centre in the period 1997-99.

Recent Developments

In 1997 the Vice-Chancellor restructured the management of the University, dissolving the faculties and groups and setting up a new structure with faculties run by Executive Deans responsible for both academic and resource matters. In order to keep the number of faculties small and of uniform size, the Science Faculty was split, with Physics, along with Mathematics, Computer Science, and Earth Sciences, going to the Faculty of Engineering, Physical Sciences and Architecture, and Chemistry going into a Faculty of Chemical and Biological Sciences. At this stage, a single BSc degree is still being awarded. However, remnants of the old structure may well be swept away in the upcoming reorganisation of the teaching activities of the University. The old credit point system is being replaced by a new more efficient system with fewer larger units and no complex prerequisites policed by the central enrolments administration. Whether this will lead to a return to the relatively inflexible course structures of the pre-semester system remains to be seen.

Finally, a quantitative picture of the development of the department since the last review is presented in the accompanying table which compares staffing in 1985 and 1998. It shows a substantial contraction in academic and support staff partially offset by the presence of a considerable number of research staff on externally funded fixed term appointments. Apart from their major contribution to the research work of the department, many of them contribute to teaching undergraduates and in postgraduate

supervision. The larger number of postgraduate students in 1998 reflects a marked growth in the Physics postgraduate enrolments in the first half of the present decade.

Many postgraduates are also making a larger contribution to the teaching and other activities of the department than formerly was the case.

Norman Heckenberg
1998

Departmental Staffing

	1985	1998
Professor/Level E	3	2
Reader/Assoc.Prof/ Level D	5	3
Senior Lecturer/Level C	13	3 + 3*0.5
Lecturer/Level B	1	1 (to be appointed)
Senior Tutor/Level A	3	1
Tutor	1	0
Professional. Officer	1	0
Total Academic Staff	**27**	**11.5**
ARC Fellows	0	6
Postdoctoral Fellows	0	5
Total Research Staff	**0**	**11**
Mech Workshop	9	4
Elec Workshop	9	3
Store	1	0
Computer Officer	1	1
Admin Officer	1	2
Equipment Officer	1	0
Lecture Room Asst	1	0
Data Analyst	1	0
Office staff	4	2
Total Support Staff	**28**	**12**
Postgrad students	19	33
Honorary	0	5