

## THE AUSTRALIAN NATIONAL UNIVERSITY

School of General Studies

DEPARTMENT OF THEORETICAL PHYSICSANNUAL REPORT - 1963

The Department came into being at the beginning of the year. As regards its teaching activities, regular courses at third and fourth year levels got under way, but there were as yet no post-graduate students.

Academic Staff.

Professor H. A. Buchdahl, Dr. L. J. Tassie.

Teaching.

Student enrolments and examinations are set out in the following table:-

	<u>Enrolled</u>	<u>Examined</u>	<u>Passed</u>
Theor. Phys. III	3	2	2 (1D, 1C)
Theor. Phys. IV	2	2	*

\* Results not yet available.

Research.

Some original work was done in connection with the preparation of the manuscript (completed) of a book entitled "The Concepts of Classical Thermodynamics", an elementary work written from an advanced standpoint. (Buchdahl)

The Bohm-Aharonov effect, that is, the influence on the motion of charged particles by magnetic fields in regions inaccessible to the particles, was further investigated, in particular for a magnetic field within an impenetrable torus. A paper covering the results obtained has been published. (Tassie)

An elementary method was devised for obtaining the usual matrix representations of the three-dimensional rotation group without the use of group theory, and a paper embodying this work was published. (Buchdahl)

The usual description of symmetry properties of physical systems is not gauge-invariant. Investigations intended to remedy this defect were undertaken, and two papers prepared. (Tassie; Tassie and Buchdahl)

Questions connected with the canonical quantization of the Schrodinger and Glein-Gordon equations were investigated and a manuscript on this work prepared. (Tassie)

Other Activities.

During the year Dr. Tassie gave a course of lectures on quantum mechanics to Honours students in the Physics Department of the University of Western Australia; and Professor Buchdahl contributed a paper to the May meeting of the Australian Mathematical Society.



Publications - Theoretical Physics.

Buchdahl, H. A. -

"Remark on the eigenvectors of angular momentum operators". Amer. Jour. Phys., 31, 829-34, 1963.

Tassie, L. J. -

"The scattering of electrons by a magnetic field contained in an impenetrable torus". Physics Letters, 5, 43-44, 1963.