

F51-141 N46

INSTITUTE OF THEORETICAL PHYSICS
KYOTO IMPERIAL UNIVERSITY.

No. 1

Fifth Lectureship, Physics Department
Key Personnel (names, positions, qualifications,
special interests)

Prof. Hideki Yukawa, Theoretical Physics,
especially Quantum Mechanics and Theory
of Elementary Particles.

Assis. Prof. Matsuhei Tamura, Theoretical
Physics, especially Theory of Relativity.

Activity or Work Program of Target

1. Current Activity (what is being done now,
who is in charge, what results have been
obtained, what publications and reports pre-
pared?)

Main research items are the theory of the mesotron
and the general theory of elementary particles,
which are central problems of contemporary physics.
Prof. Yukawa succeeded in 1935 to establish
a new theory of nuclear forces, predicting at
the same time the existence of the charge particle,
which had the mass about 200 times as large as
that of the electron and which changed spontaneously
into an electron in a very short time. In 1937
the particles with such properties were found
in cosmic rays by American physicists. This
particle is now called "mesotron". The theory
of the mesotron was developed by Yukawa and
Prof. Sakata of Nagoya Imperial University and

could, at least qualitatively, account for the nuclear forces, β -decay and the various phenomena concerning the hard component of the cosmic ray in a unified way. Although this theory is not yet complete and has several defects, it ~~made~~ contributed considerably to the progress in the whole branch of nuclear physics.

^{list} ~~Some~~ of the more important papers are as follows:
(publish before 1940)

1. Yukawa, On the Interaction of Elementary Particles I. (Proc. Phys.-Math. Soc. Japan)
2. Yukawa and Sakata, On the Interaction of Elementary Particles II. (ibid.)
3. Yukawa, Sakata and Taketani, On the Interaction of Elementary Particles III. (ibid.)
4. Yukawa, Sakata, Kobayashi and Taketani, On the Interaction of Elementary Particles IV (ibid.)
5. Yukawa and Sakata, On the β -Disintegration and the Allied Phenomenon (Theory of

Yukawa and Sakata also predicted the phenomenon of the absorption of ^{the} orbital electron by nuclear transformation, which was verified subsequently by ^{the} experiment of American physicists and was called K-electron capture.



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2. Future Activity (Work program for next 6 months - new projects, plans for expansion, reorganization or other changes etc.)

Prof. Yukawa and his collaborators want to continue the investigation into the theory of the mesotron above mentioned and to revise the original theory so as to reach the quantitative agreement with the whole experimental facts in the field of nuclear physics and including cosmic rays. In order to accomplish carry out this program, we see the establishment of the general theory of elementary particles devoid of divergence difficulties is needed at the same time.

3. Past Activity (Brief description of work, research, men in charge and publications during 1940-1946)