

netic TV-signal recording, speech transmission, printout systems and underwater acoustical devices. Olson continues to be a consultant at RCA.

Theoreticians Name Dyson As Winner of Oppenheimer Prize

Freeman J. Dyson of the Institute for Advanced Study, Princeton, will receive the second annual J. Robert Oppenheimer Memorial Prize, which is presented by the University of Miami Center for Theoretical Studies. Dyson is being honored for his contributions to theoretical physics, particularly to quantum electrodynamics and physical statistics. The award will be presented in Miami this spring.

Robert H. Bell Receives SAS Achievement Medal

The New York Section of the Society for Applied Spectroscopy awarded its medal for outstanding achievement to Robert H. Bell, president of Lucius Pitkin, Inc., N. Y., an independent laboratory. Bell, a former SAS president, helped develop ways to analyze uranium for the Manhattan Project.

Brian D. Josephson Winner of Research Corporation Award

Winner of the 1969 Research Corporation Award is 29-year old Brian D. Josephson. Now assistant director of

research in the physics department, University of Cambridge, Josephson in 1962 correctly predicted the electron-tunneling phenomenon that bears his name. The award, which includes a \$10 000 honorarium, was presented to Josephson 29 Jan. in New York. The University of Cambridge will also receive a \$10 000 award for its contribution to Josephson's work. Fifteen of the 38 scientists who received the award subsequently won Nobel prizes; last year, for example, Murray Gell-Mann was named winner.

NASA Awards Achievement Medal to George F. Pieper

The National Aeronautics and Space Administration has awarded George F. Pieper, director of space sciences at the Goddard Space Flight Center, Greenbelt Md., its Medal for Exceptional Scientific Achievement. Pieper, who has held his present post since 1965, was given the medal last fall.

Coblentz Society Awards Prize to James R. Durig

James R. Durig has been named to receive the 1970 Coblentz Society Memorial Prize. The prize is given annually (since 1964) to a molecular spectroscopist less than 36 years old. Durig, a chemistry professor at the University of South Carolina, is scheduled to receive the award 5 March.

Pioneer of Quantum Mechanics, Max Born, Dies in Göttingen

Max Born died 5 Jan. in Göttingen, Germany. He will be mourned by his family and by everybody who knew him, perhaps most of all by his former students who owe so much to him. Born's passing is the end of an era; he was the last living member of the generation of great physicists who developed the theory of atomic structure, worked on the first quantum theory and finally saw it blossom out into quantum mechanics as we know it in our own time.

Born 11 Jan. 1882, in Breslau (which was then in Germany and is now in Poland), he studied in Berlin, Heidelberg and Zürich, then took his PhD at the University of Göttingen where he remained as privatdozent until 1915. After several years as professor in Berlin and Frankfurt,

and some time spent in the army during the first world war, he returned to Göttingen.

During the early years, Born's interests centered about lattice dynamics and theory of the solid state. A paper by Born and Theodore von Karman, on the vibrational spectrum of crystals, was published in 1912, before the observations of Max von Laue that finally demonstrated the lattice structure of crystals. This was a new and very fertile field. In 1925 Born published a book, *Dynamik der Kristallgitter*, that is one of the foundations of crystal theory. He returned to the subject several times; his last book on crystals was written with Kun Huang in 1954.

Born's main interest changed in the early 1920's. He turned more and

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more to atomic structure. In 1923 Wolfgang Pauli and Werner Heisenberg were Born's assistants. Then one of the most exciting times in physics began. Born, in collaboration with Heisenberg and Pascual Jordan, found changes in mechanics that explained many of the puzzles and troubles of atomic theory that still existed in the Bohr-Sommerfeld quantum theory. The Born-Heisenberg-Jordan matrix formulation had a different form from Erwin Schrödinger's wave mechanics, but the two were soon shown to be equivalent. It is now generally accepted that the Born-Heisenberg-Jordan approach was the more fundamental of the two theories.

WILLIAM J. NUMEROFF



BORN

As late as 1954, Born, along with Walther Bothe, was awarded the Nobel Prize for one of his many contributions to "statistical interpretation of the wave function."

Göttingen was, during the 1920's, one of the main centers of theoretical physics, due largely to the presence of Born and James Franck. Many post-doctoral students from all over Europe and the US came for extended visits. Born was an excellent lecturer. His courses were not simple, but were given with great clarity. Neither Born nor Franck were typical classical

German professors, who would not even shake hands with a student. There was a very pleasant and informal atmosphere in the physics institutes, although not as informal as in US institutes nowadays.

Born took a great personal interest in his students. It was a tradition in Göttingen that after the theoretical seminars, Born and his graduate students would go for a walk in the hills to have a supper at some village inn (when it didn't rain too hard). The students then had a chance to ask him anything about physics or nonphysics. Discussions with Born on any subject were interesting. As a beginning student I learned a great deal from these completely informal physics discussions. Most of all we learned at that time to appreciate and cherish the friendship of Born. He was an excellent pianist, and I remember several evenings when Born and Heisenberg played concerts on two pianos.

And then in 1933 Hitler's axe fell; Born left Germany immediately. He first became Stokes lecturer at the University of Cambridge, UK, then spent a year at the Indian Institute of Science in Bangalore. In 1936 he became professor of natural philosophy in Edinburgh, Scotland. Here he again established a flourishing center of physics with many students.

Born's new interest was in unifying quantum mechanics and relativity. His reciprocity theorem, developed in 1938, holds that the fundamental laws of physics are invariant in a change from position to momentum representations. This theorem was originally applied to general relativity; Born later applied it to elementary particles.

In 1953, when Born retired from Edinburgh, he returned to Göttingen. He won many honors, wrote more than 300 articles and about 20 books; among the books is the charming, semipopular "The Restless Universe." I saw Born for the last time about three years ago at Bad Pyrmont, where he lived with his wife in a lovely house. As recreation, he translated poems of Wilhelm Busch, the 19th-century humorist, into English. At the time I saw him, and even earlier, Born condemned all warlike applications of scientific knowledge. He felt it to be his responsibility as a physicist to warn that mankind might be destroyed if such activities were not stopped.

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