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PROF. A. M. PROKHOROV



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PROF. NIKOLAY G. BASOV



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DR. CHARLES H. TOWNES

GENERAL SCIENCE

Nobel Prize Winners

Work on crystallography and the maser-laser principle won Nobel Prizes in Chemistry and Physics for an English woman, two Russians and an American.

► FOR THEIR WORK on lasers and masers and contribution to the field of quantum electronics, an American and two Russians were awarded the 1964 Nobel Prize for Physics.

Dr. Charles H. Townes, provost of the Massachusetts Institute of Technology and recipient of half the \$52,500 award, will share his prize with Profs. Nikolay G. Basov and Aleksander M. Prokhorov of the Lebedev Institute for Physics of the Academy of Sciences of the USSR.

The revolutionary maser-laser principle of concentrated radio and light beams was discovered in 1951 by Dr. Townes and shortly after, Profs. Prokhorov and Basov independently came upon the principle.

Scientists have predicted that the extraordinarily intense laser light will be used to map the moon, act as radar, serve for space communications and, some say, even become that seemingly impossible instrument of warfare, a death ray. It is already being used as a surgeon's scalpel, to illuminate the moon and to pierce steel and diamonds.

By observing the actions of a boy on a swing one can understand how and why a maser or laser works. If the boy sits perfectly still on a moving swing, the amplitude of the swing's motion gradually decreases due to friction.

However, by moving in unison with the swing's motion, the boy can "pump up" or amplify the swinging motion. By opposite body motions—against the rhythm of the swing's motion—the boy can decrease the amplitude and stop the swing much more rapidly than by friction alone.

These three varying effects of the boy's motion on that of the swing correspond respectively to spontaneous emission, absorption and induced emission, which are the three effects on which masers and lasers operate.

Radiant energy is used to force the maser's atoms into excited energy states, since they have absorbed the energy. Some of the atoms will then spontaneously emit radiation and fall back to the lower energy state. However, by hitting the laser material with radiation of precisely the energy that would be emitted spontaneously, the atoms can be stimulated to emit their radiation in one great cascade.

This induced radiation is the secret of the maser's operation and also the source of its name, an acronym for Micromave Amplification by Stimulated Emission of Radiation. For a laser, light is used instead of microwaves.

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Prize for Chemistry

► FEW FIELDS of science have changed more in the first half of the 20th century than crystallography, the field in which Dr. Dorothy Crowfoot Hodgkin won the Nobel Prize in Chemistry for 1964.

The knowledge of the precise way atoms are arranged in crystals has given much new data to chemistry. It has brought about the general rewriting of inorganic chemistry in terms of ions, or electrically charged atoms.

Dr. Hodgkin's X-ray crystallography unit at Oxford did the painstaking work, an-

nounced in 1955, to detect the structure of vitamin B-12. Her unit also worked on the chemical structure of the drug cephalosporin C, closely related to the penicillin family, but able to wipe out many of the infections resisting penicillin.

Vitamin B-12 is the largest and most complex molecule to be defined in complete detail. The final picture, completed after almost a dozen years of work on both sides of the Atlantic, shed new light on blood-building processes. The compound contains cobalt and has a specific curative effect in pernicious anemia which can be fatal.

Dr. Hodgkin determined the atomic structures of this and other important biochemical compounds by studying the X-rays emitted by a crystal of the substance when exposed to an X-ray beam.

The 54-year-old winner of the \$52,500 prize is a research professor of the British Royal Society as well as an Oxford Fellow. She is at present in Accra, Ghana, with her husband, Thomas L. Hodgkin, who is director of the Institute for African Studies at the University of Ghana.

The Swedish Academy of Science, in its Nobel citation of Dr. Hodgkin, praised her "exceptional skill in which chemical knowledge, intuition, imagination and perseverance have been conspicuous."

• Science News Letter, 86:295 November 7, 1964

MEDICINE

Stillbirths High Among Diabetic Women

► UNTREATED DIABETES in pregnant women 30% of the time results in either a stillbirth or an early death for the newly born infant, a physician reported in Postgraduate Medicine, 36:301, 1964.

Dr. Elsie R. Carrington, Woman's Medical College of Pennsylvania, Philadelphia, said from the viewpoints of both individual and public health, a planned screening test for every woman about to have a baby should be made.

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