

## PHYSICS

# Atomic Research

Nobelists describe their work in exploring the powerful nuclear forces and other fundamental questions of atomic physics.

By DR. ISIDOR I. RABI

Columbia University  
Nobelist in Physics, 1944

➤ JUST AS a century ago we were studying electrical and magnetic forces which culminated in great electrical and electronic industries, but could not foretell that fact with certainty, now these immensely more powerful nuclear forces may be turned to the advantage of mankind.

My work was directed toward investigating the magnetic and electric properties of the atomic nucleus. The purpose was to gain further knowledge of the nature of the forces that hold the nucleus together and contribute to atomic energy. In the course of these investigations my colleagues and I developed the "molecular beam magnetic resonance methods" which employed the effect of radio waves on beams of atoms and molecules. This method was a million times more sensitive than anything (*Turn to page 340*)

By DR. OTTO STERN

Carnegie Institute of Technology  
Nobelist in Physics, 1943

➤ FINDING that the magnetic moment of the proton was two and one-half times the value expected from the theory is fundamentally important because of the character of the proton as an elementary particle.

The molecular-ray method is much more sensitive than any other known methods for the determination of magnetic moments of atoms or molecules.

The method of molecular rays consists in preparing a stream of molecules by means of a system of fine slits. All molecules travel in the same direction in a highly evacuated apparatus.

Experiments with these molecular rays contribute to the solution of fundamental questions in atomic physics. Three examples may be mentioned: direct experimental proof for the space quantization of atoms by splitting a molecular ray of silver atoms in two beams in a

magnetic field; experimental proof of de Broglie's theory that moving particles show wave properties by diffracting a molecular ray of helium or hydrogen molecules at a crystal lattice, and measurement of the magnetic moment of the proton by magnetic deflection of a beam of hydrogen molecules.

*Science News Letter, November 25, 1944*

## CHEMISTRY

## New Household Fly Spray To Be Available After War

➤ AN ODORLESS, nonirritating household fly spray for postwar use in homes and restaurants has been developed by W. F. Barthel, H. L. Haller and F. B. LaForge, chemists of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture.

Used in the aerosol "bomb" developed by the Department of Agriculture for use by the armed forces against mosquitoes, the new fly spray promises to be an effective postwar weapon against flies, roaches, bedbugs, ants, mosquitoes, house spiders, silverfish, chiggers, carpet beetle larvae, dog ticks and dog fleas. It will be suitable for use in homes, restaurants, airplanes and any place where people congregate.

The spray is made from the powerful insect-killer, pyrethrum, purified by a new method to eliminate the odor and the irritating impurities which in the past have been the cause of irritating rashes or hay fever symptoms in some pyrethrum spray users. The method involves the use of a new solvent, nitromethane, for removing practically pure pyrethrins from the impure petroleum extract of pyrethrum flowers.

The new process produces not only a much more concentrated and powerful insect poison but one in a form called "ideal" for use in the Freon-aerosol bomb. This bomb or aerosol sprayer is a small handy can dispenser that holds a liquefied gas such as Freon which is now used in household refrigerators. When a valve is opened this aerosol dispenser emits a foglike spray of poisonous droplets so tiny that they kill more insects than ordinary coarse sprays.

While not yet available for civilian sale, Agriculture Department officials state, more than 13 million of these Freon-aerosol "bombs" have been supplied to the armed forces for use against disease-carrying insects. As a result of such extensive use, this kind of aerosol spray dispenser has been thoroughly tested.

*Science News Letter, November 25, 1944*



**NOBELISTS IN PHYSICS**—Dr. Otto Stern (left), was awarded the 1943 Nobel prize in physics and Dr. Isidor I. Rabi received the 1944 award, both for atomic research.

## PSYCHOLOGY

# Job Important to Health

When a worker appears to be neurotic it may be because he is underplaced or overplaced; the difficulties should be analyzed to get at the real source of trouble.

► WHEN A worker is more concerned with trying to "be" something than with any effort to "do" anything on his job, even though he may not himself be aware of this, it may be because he is neurotic, or it may be because it is impossible for him to meet the demands of his job, Dr. Bruno Solby, of the U. S. Public Health Service, told the meeting of the National Committee for Mental Hygiene, held in New York.

In the course of growing up, Dr. Solby said, every individual goes through a period in childhood when personal affection and admiration are all-important. A little boy or girl wants to please, and mother's or father's approval is all-important.

In the next state, when the individual gets out of the home and begins to join gangs, fraternities, sororities and other social circles, the "role" becomes of top importance. Then it is important to "belong." In school and college, students pick out what they want to "be" when they graduate.

But, once out of school and in a job, the measure of a man's mental health is in terms of what he can do rather than who he is or whether he is the favorite of the boss.

The unhappy employee, Dr. Solby said, nearly always blames the trouble on not being able to get along with some individual on the job. He complains that "the boss doesn't like me," or that the other employees "are prejudiced against me." This is a reaction pattern which points back to the days when it was necessary to be mother's pet or take an apple to the teacher. But although personal friction is most often blamed, this complaint can't be trusted as the real explanation of the difficulty, Dr. Solby indicated.

More often, he said, the worker is living in the second state of development—the stage where role was all-important. For some, this role stage was never outgrown. Maybe the worker is a girl who had decided to be an actress. She still thinks of herself as a great actress; it is not unnatural that she should fall down on her job as a secretary.

Others go back to a role previously outgrown because of frustration from being

either "overplaced" or "underplaced" on the job. The underplaced person may be a bright young man or woman with great abilities but without the necessary experience or training to fill the job they ought to have. The overplaced include those who "dress the part" and talk glibly enough to impress an interviewer favorably, but who do not have the mental ability to fill adequately the jobs that they get in this manner.

Both overplaced and underplaced workers may be anxious and sleepless. They do not see the real cause of their troubles, but always blame friction with some other person on the job.

The task of the industrial psychiatrist, Dr. Solby said, is to analyze the difficulties of such employees to get at the real source of the trouble. He must distinguish between those who are really neurotic and cannot outgrow the role they have unconsciously assumed and those who have similar symptoms but who are suffering only from faulty job placement.

"It is the responsibility of personnel management, supervisor and industrial psychiatrist," he said: "to cooperate in fostering the mental health of the adult population through scientific job placement."

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previously known.

Chief results of this work were the very precise measurements of the amount of spin and magnetism of a number of atomic nuclei, including the proton and the deuteron (the nucleus of heavy hydrogen). In addition it was discovered that the deuteron is shaped like a football spinning on its long axis. This fact has important consequences concerning the properties of nuclear forces.

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## CHEMISTRY

## Hundred-Octane Gasoline To Be Produced in Curacao

► HUNDRED-OCTANE gasoline for United Nations bombers and fighter planes will be made on the spot in the oil-producing area of the Netherlands

West Indies centering near Curacao. The Curacao Petroleum Industry's great refinery has just completed the construction of several new installations, with the aid of engineers and contractors from the United States. Among them is a three-tower plant for the production of cumene, a synthetic substance important in the compounding of high-octane aviation fuel. This plant is now undergoing test runs.

The Curacao Petroleum Industry has instituted a new school for on-the-job training of technical personnel.

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