

**Pure Physics.**—Investigations are under way on cosmic rays, low temperature and solid state physics, spectroscopy, X-ray diffraction and theoretical physics. The work is on fundamental problems which do not have immediate application but advance the frontiers of knowledge and supply the basis for further progress in the applied fields.

Cosmic ray data from Canadian stations were forwarded to the International Geophysical Year world data centres, where they are being used by many countries. These results are also being used with the results from stations in the Southern Hemisphere operated by the University of Tasmania in a joint analysis designed to give a clearer picture of the modulating mechanism, known to be of solar origin, effecting great decreases in cosmic ray activity over large areas of the earth's surface. A search was also made for particles in the cosmic ray flux of mass equivalent to about 500 times the electron mass, but their presence was not confirmed.

Investigations on the physical properties of metals and semiconductors have revealed that the thermoelectric powers of gold, silver and platinum at temperatures below 1° absolute are about 1,000 times greater than those predicted by current theory. Some interesting results have also been obtained about semiconductors (transistors are semi-conducting devices), which are playing an increasingly large role in industry.

The structure of atoms and molecules has been investigated by means of their ultra-violet, visible, infrared and microwave spectra. Precise determination of the distances between the atoms in a molecule has been obtained for several compounds. The rotation of one group of atoms with respect to another group within some molecules has also been investigated. Because a certain amount of energy is required to produce this internal rotation, knowledge of the rotation provides additional information about the forces between atoms in a molecule.

One of the studies of the theoretical physics group has been the problem of multiple scattering of charged particles. Single collisions of charged particles such as protons and electrons, with the electrons and nuclei of absorbing matter, are fairly well understood. The group has formulated a detailed theory for multiple scattering which seems to agree with experimental findings.

**Building Research.**—The search for technical improvements in housing dominates the work of this Division. The research program therefore covers all aspects of housing design, building materials and components, and studies in soil, snow and ice mechanics. Regional stations engaged in research and information are maintained in Halifax, Saskatoon and Vancouver.

Many of the results of Divisional work are expressed in the National Building Code of Canada, an advisory document on building regulations for the municipalities and provinces. The Code is now in use for over 40 p.c. of Canada's population, representing more than 50 p.c. of the urban population, and is gaining increasing recognition. One section of the Division also administers the housing regulations used for all houses built with National Housing Act assistance. Another acts as the secretariat of the Canadian Government Specifications Board.

Examples of Divisional projects are the behaviour of cement aggregates and light-weight concretes; the materials and techniques of masonry construction and plastering; atmospheric corrosion of metals; paint and acoustics research, and examination of the performance of walls, windows, chimneys and domestic heating systems. Other studies involve the bearing strength of ice; the fundamental properties of various soil types, including permafrost and muskeg; frost action in soils; avalanche research; and the effects on buildings of ground vibrations caused by blasting or earthquakes. A fire research laboratory provides facilities for all types of fire resistance, fire prevention and fire fighting tests.

Special studies have been made of techniques for winter construction, including the enclosure of construction projects and use of materials such as precast concrete. There is also a section devoted to problems of building in Northern Canada, where the presence of permafrost necessitates special building practices and economics. The applicability of prefabrication techniques to northern building is being investigated.