

**Pure Physics.**—Investigations are under way on cosmic rays and high-energy particle physics, solid state physics, laser and plasma physics, spectroscopy, and X-ray diffraction. 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. Important advances in the study of cosmic rays and energetic particles are being made by means of a specially designed instrument package operating aboard the Canadian earth satellite *Alouette II*. The package is sending back vital new information about the Van Allen radiation belts and about the artificial belts created by atomic explosions.

The solid state group studies the electrical, thermal and mechanical properties of metals and semi-conductors especially at very low temperatures. The laser and plasma physics group, established in 1962, has already made an important contribution by observing the scattering of a ruby-maser beam by a plasma. This study leads to a determination of electron temperature and electron concentration. In the spectroscopy group, the structures of atoms and molecules are investigated by means of their microwave, visible and ultra-violet spectra, and considerable work has been done on optical masers.

The X-ray diffraction laboratory undertakes fundamental work in molecular and crystal structure and identification problems for government laboratories. Two of the major projects concern narcotics and vanadium minerals. X-ray diffraction methods are extremely valuable for identification purposes as they are non-destructive and require only very small amounts of material.

**Building Research.**—The provision of a comprehensive research service for the construction industry of Canada is the primary concern of the Division of Building Research. Its program therefore covers various aspects of construction, building design, building materials and components, fire research, and studies in soil, snow and ice mechanics; it also serves as the technical research wing of the Central Mortgage and Housing Corporation. Regional stations located at Halifax, N.S., Thompson, Man., Saskatoon, Sask., Vancouver, B.C., and Inuvik, N.W.T., assist in the research and information functions of the Division.

Division projects are concerned with: the behaviour of cement, concrete, mortars, plasters, plastics and sealing and caulking compounds; atmospheric corrosion of metals and paint research; acoustics research; the over-all performance of foundations, walls, windows and roofs; humidity in buildings; air-conditioning design; snow and wind loads on structures; the properties of various soil types including permafrost and muskeg; and the effects on buildings of ground vibrations caused by earthquakes. A fire research laboratory contains facilities for studying the initiation, development and extinguishment of building fires as well as for fire tests on materials and structures.

Because concentration is placed on building problems peculiar to Canada, much of the work concerns the performance of buildings and building materials in cold weather. Double-glazed windows and lightweight metal and glass curtain walls, used increasingly in modern buildings, have been examined, improvement of winter building techniques have been studied, and the work of one section is devoted to problems of building in the Far North. Educational work is conducted in a number of directions to alert the designers, manufacturers and others to new principles and new information as well as to design features that should be avoided. Similar liaison exists with federal and provincial public works departments and many useful field studies have been made on public and privately owned buildings.

Many results of the Division's research are used in the improvement of the National Building Code, an advisory document offered as a model building by-law, and now used by municipalities accounting for about three quarters of the urban population of Canada. The Division also provides the secretariat and considerable technical assistance to the Associate Committee that produces the Building Code on behalf of the National Research Council.