Nuclear energy: U at the fore

"TRIUMF is the biggest project ever undertaken by any Canadian university," says Dr. C. Nielson.

Dr. Nielson, director of the Nuclear Research Center here, was referring to the largest and most complex cyclotron ever built. Located at the University of British Columbia, it will be opened by Prime Minister Trudeau Monday.

TRIUMF is a joint project of four Universities (The University of Alberta, Simon Fraser University, University of Victoria, and the University of British Columbia) for research in nuclear science and its applications. The total cost of construction of TRIUMF was $36 million, with the Universities providing the buildings ($5,650,000) and the Federal Government the remainder (through the Atomic Energy Control Board).

Of the total budget, 85% was spent in Canada; this presented major challenges to many industries in B.C. and Alberta.

The core of the project is a particle accelerator called a cyclotron. It uses two essential principles (acceleration of negatively charged hydrogen ions and sector focussing) in combination for the first time to produce 500-million-volt proton beams with an impressive total intensity of 100 microamperes.

One of these beams is directed into an experimental area to the west, where experiments with the protons themselves are performed. A second, more intense, beam is simultaneously directed to the east, where it is used to produce *mesons*, in an intensity one thousand times greater than has been available hitherto.

Thus the project is called a "meson-factory." Along with two other meson-factories of different design and capabilities (in Zurich, Switzerland, and at Los Alamos, New Mexico) TRIUMF will pioneer the use of mesons in pure and applied research in a variety of fields ranging from nuclear science to cancer therapy. Important in the applied research at TRIUMF is the use of mesons in the treatment of cancer, for which they have the unique advantage of localized deposition of energy. The programme of the B.C. Cancer Foundation in this area has received funding through the Health Resources Fund, and in this connection TRIUMF will produce radioactive materials superior to those produced in nuclear reactors for the diagnosis and treatment of certain conditions of disease.

The beams of TRIUMF are also useful for non-destructive analysis of materials in fields ranging from environmental protection to industrial process control and forensic scienct. Work at present under way is in addition directed to potential improved nuclear power systems.

The project was built in a six-year period, and to very high standards of safety. Much of the visual impact at the project is of the concrete blocks that shield personnel of the project (and the general public) against the radiations produced. The shielding above the cyclotron (on top of which the ceremony will take place) consists of three layers of concrete beams, each one hundred feet long and five feet thick.