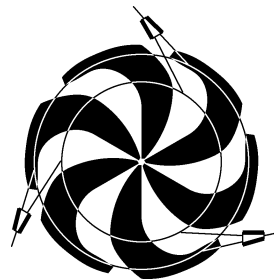


TRIUMF



ANNUAL REPORT SCIENTIFIC ACTIVITIES 2004

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**CANADA'S NATIONAL LABORATORY
FOR PARTICLE AND NUCLEAR PHYSICS**

OPERATED AS A JOINT VENTURE

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UNDER A CONTRIBUTION FROM THE
NATIONAL RESEARCH COUNCIL OF CANADA

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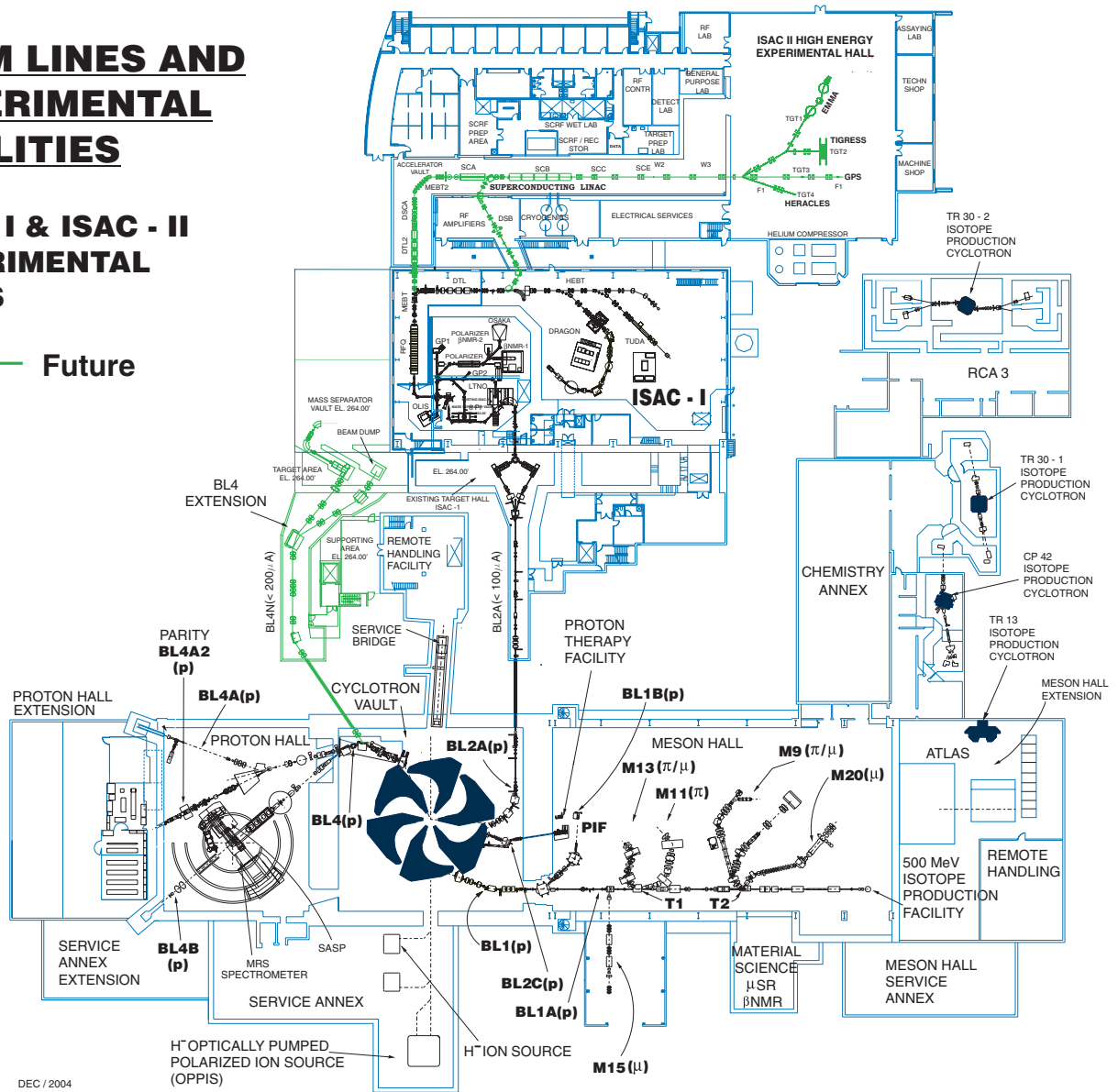
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BEAM LINES AND EXPERIMENTAL FACILITIES

ISAC - I & ISAC - II EXPERIMENTAL HALLS

— Future



DEC / 2004

The contributions on individual experiments in this report are outlines intended to demonstrate the extent of scientific activity at TRIUMF during the past year. The outlines are not publications and often contain preliminary results not intended, or not yet ready, for publication. Material from these reports should not be reproduced or quoted without permission from the authors.

FOREWORD

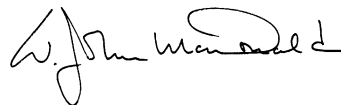
For all of the TRIUMF community, 2004 was a year of satisfaction as a result of the very positive response that the Five Year Plan 2005–2010 received. Prime Minister Martin responded to his copy of the plan in a letter to me dated October 25, 2004. The letter includes the following comment on TRIUMF accomplishments:

“The work undertaken by the TRIUMF laboratory, housed at the University of British Columbia, is a tremendous example of the world-class research facilities Canada has been able to build and operate in the last decade. I am especially pleased at the level of domestic and international cooperation among scientists and researchers which TRIUMF promotes and encourages.”

The Board of Management was impressed with the many TRIUMF supported scientific achievements that were reported in 2004. It was particularly satisfying to congratulate Donald Fleming on his Seaborg Award for pioneering work in muonium chemistry. This is a prestigious US award not often given for work originating outside that country. Also of special note was the publication of first results on the Michel parameters rho and delta from the TWIST experiment.

The success TRIUMF enjoys relies on the dedication and hard work of many groups and individuals and it is important to acknowledge contributions that do not always make the headlines. One example is the vital work of the Safety group. The Board of Management is pleased that TRIUMF continues to have a very good safety record and I wish to acknowledge Lutz Moritz and his staff for their leadership in this regard and for all TRIUMF staff for making sure that safety is practised in all TRIUMF activities. I also wish to encourage continued efforts on the part of staff and visitors to make TRIUMF safety practices as professional and effective as possible.

It was a special pleasure to welcome the University of Toronto as a full member at the June Board meeting which was held in Toronto to mark the occasion. The University of Toronto has a long association with TRIUMF and its researchers have made major contributions to the science program. Its representatives on the Board have also made important contributions and will be of even more help as full voting members. The Joint Venture was further strengthened in December when St. Mary’s University became an associate member.



W. John McDonald
Chair, Board of Management

TRIUMF was established in 1968 as a laboratory operated by the University of Alberta, the University of British Columbia, Simon Fraser University and the University of Victoria under a contribution agreement from the National Research Council of Canada. The initial consortium has been expanded to include Carleton University and the University of Toronto as full members, and the University of Guelph, the University of Manitoba, McMaster University, the Université de Montréal, Queen's University, the University of Regina, and St. Mary's University as associate members. The facility is operated for all Canadian as well as foreign users.

The experimental program is based on a cyclotron which is capable of producing four simultaneous beams of protons, two of which are individually variable in energy from 180–520 MeV, the third from 472–510 MeV, and the fourth between 70 and 110 MeV. The potential for high beam currents – 100 μA at 500 MeV to 300 μA at 400 MeV – qualified this machine as a “meson factory”. The third high intensity beam line feeds the new isotope production facility, ISAC, which started operation in 1998 and qualifies as a second generation radioactive beam facility.

Fields of research include basic science, such as particle physics, nuclear physics, nuclear astrophysics, and condensed matter research, as well as life sciences based primarily on isotope research. There is also a biomedical research facility which uses protons for treatment of ocular melanomae. TRIUMF is providing the Canadian contribution to the Large Hadron Collider at CERN and TRIUMF resources are also available to support the Canadian subatomic program at other laboratories.

The ground for the main facility, located on the UBC campus, was broken in 1970. Assembly of the cyclotron started in 1971. The machine produced its first full-energy beam in 1974 and its full current in 1977.

The laboratory employs approximately 350 staff at the main site in Vancouver and 19 based at the participating universities. The number of university scientists, graduate students and support staff associated with the present scientific program is about 625.