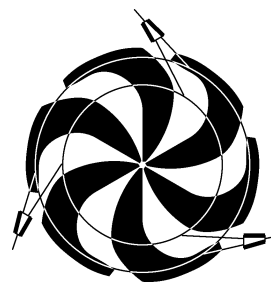


# TRIUMF



## ANNUAL REPORT SCIENTIFIC ACTIVITIES 2001

ISSN 1492-417X

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

OPERATED AS A JOINT VENTURE

MEMBERS:

THE UNIVERSITY OF ALBERTA  
THE UNIVERSITY OF BRITISH COLUMBIA  
CARLETON UNIVERSITY  
SIMON FRASER UNIVERSITY  
THE UNIVERSITY OF VICTORIA

ASSOCIATE MEMBERS:

THE UNIVERSITY OF MANITOBA  
McMASTER UNIVERSITY  
L'UNIVERSITÉ DE MONTRÉAL  
QUEEN'S UNIVERSITY  
THE UNIVERSITY OF REGINA  
THE UNIVERSITY OF TORONTO

UNDER A CONTRIBUTION FROM THE  
NATIONAL RESEARCH COUNCIL OF CANADA

OCTOBER 2002

# TRIUMF

ISSN 1492-417X

ANNUAL REPORT  
SCIENTIFIC ACTIVITIES  
2001

Postal Address:

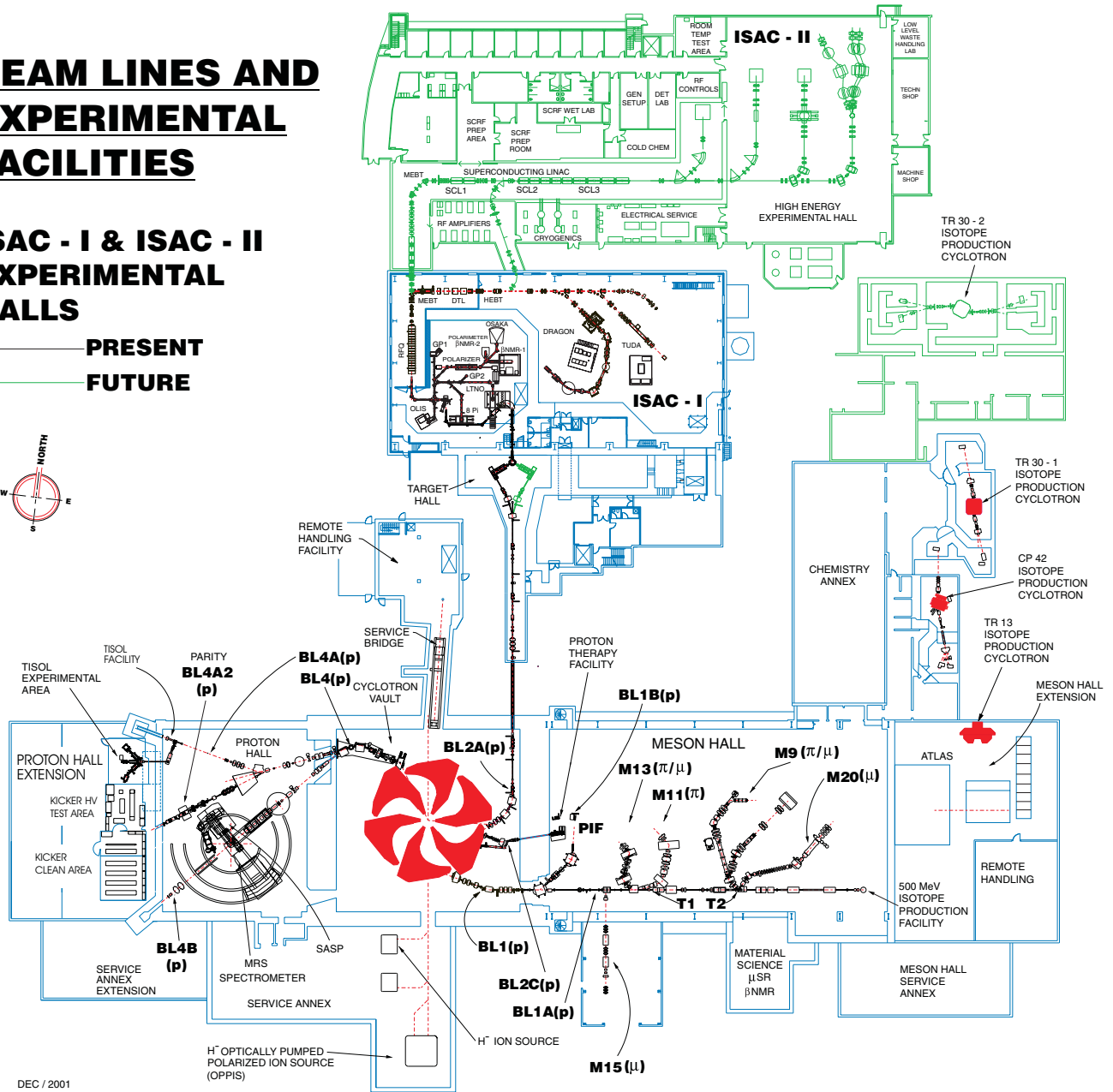
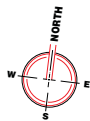
TRIUMF  
Publications Office  
4004 Wesbrook Mall  
Vancouver, BC V6T 2A3  
Canada

<http://www.triumf.ca/annrep>

# BEAM LINES AND EXPERIMENTAL FACILITIES

## ISAC - I & ISAC - II EXPERIMENTAL HALLS

— PRESENT  
 — FUTURE



*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

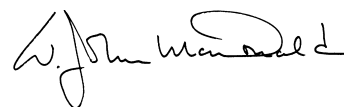
It is with much pleasure that I take the opportunity to report on the activities of the TRIUMF Board of Management. I know that I speak for all of the members of the Board when I say that it is an honour to be associated with this fine organization. We are proud of the extraordinary way that TRIUMF staff have managed to succeed in building and operating new facilities such as ISAC-I, have carried out the program for building ISAC-II, contributed key components for the LHC and ATLAS at CERN, and all the while continuing an exciting program of science in nuclear and astrophysics, precision tests of fundamental processes, medical physics, condensed matter physics, and nuclear chemistry. The growth that has taken place in the transfer of TRIUMF technology to applications that benefit society and aid Canadian industries is an important indicator of the innovative skills and hard work of TRIUMF staff.

Like all successful organizations, TRIUMF relies on many individual contributions. I would be remiss if I did not also explicitly comment on the very able clerical and support staff that do so much to create the working environment that makes it possible for the technical, engineering and scientific staff to function at the high level of excellence they have demonstrated. For example, one cannot help but be struck by the positive comments one hears about a stay in TRIUMF House, the good food provided for a meeting by the cafeteria staff, or the efficient way the business office handles a variety of complex accounts and travel claims. It is clear that TRIUMF's successes have been achieved in large part because so many individual staff, including scientists, engineers, technicians, computer and management professionals as well as secretaries, clerks and other support staff have done their jobs well. I have only touched on a few of the many examples that could be given.

The Board's responsibilities include the appointment of Director, and I had the privilege of chairing the search committee which recommended that Alan Shotter be selected. With the support of the Board, the committee made an early decision to have as open a process as was possible. Accordingly, the community was invited to comment on the process and suggest candidates. Several helpful responses were received and the committee acquired a good list of potential candidates. Once a short list of three excellent candidates was formed, the committee invited, and carefully considered, feedback from inside and outside the community. It then completed the difficult task of forming a recommendation for the Board. The Board, having considered the committee's recommendation, offered the position of Director to Dr. Alan Shotter. Dr. Shotter accepted and took up his duties as Director on September 1, 2001.

As in the past, the Board has been regularly considering matters brought to it from its standing committees: Finance, Personnel, and Safety. Other matters discussed in the past year include communications strategy, university relations, technology transfer and preparations for the next 5-year plan. In order to focus on particular issues the Board has decided that in the future, each of its meetings will have one extended discussion on a specific theme. The objective is to ensure that, over a period of two to three years, the Board would be able to review and make changes as appropriate to all of its key policies.

Before closing, I wish to acknowledge and thank Colin Jones and Alan Astbury. These two people provided wise and sure guidance to accomplish the successful shaping of a new future for TRIUMF following the Government's decision not to build KAON. Canada owes much to both of them for giving us the vision and the reality of a National Laboratory supporting the Canadian particle physics program abroad, and extending the in-house science program with the addition of a world leading radioactive beam facility. I am also personally grateful to Colin for the willing help and sage advice he gives to me as I attempt to follow his example as Board Chair and to Alan for his generosity in helping me during the search for a new Director and for making the transition to Alan Shotter's directorship go so smoothly.



W.J. 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 as a full member, and the University of Manitoba, McMaster University, the Université de Montréal, Queen's University, the University of Regina and the University of Toronto 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  $\mu\text{A}$  at 500 MeV to 300  $\mu\text{A}$  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 325 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.