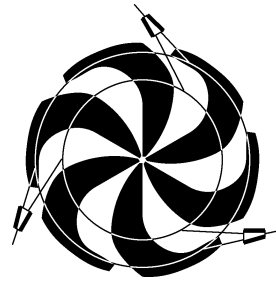


TRIUMF



ANNUAL REPORT SCIENTIFIC ACTIVITIES 1997

CANADA'S NATIONAL MESON FACILITY
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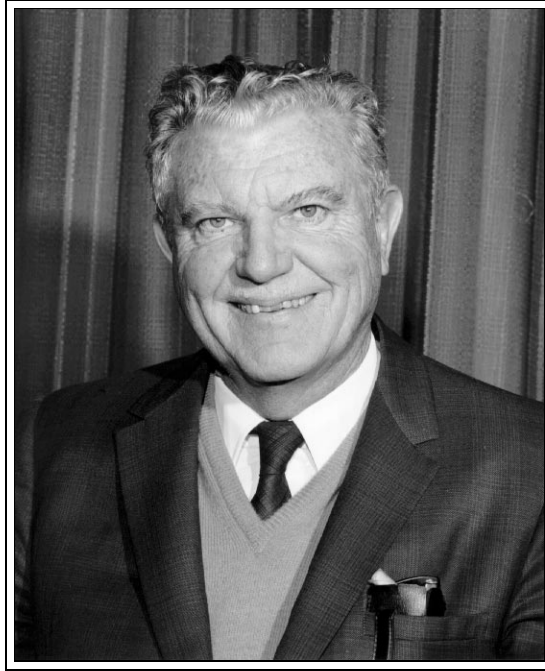
APRIL 1998

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ANNUAL REPORT
SCIENTIFIC ACTIVITIES
1997

Postal Address:

TRIUMF
Publications Office
4004 Wesbrook Mall
Vancouver, B.C.
Canada
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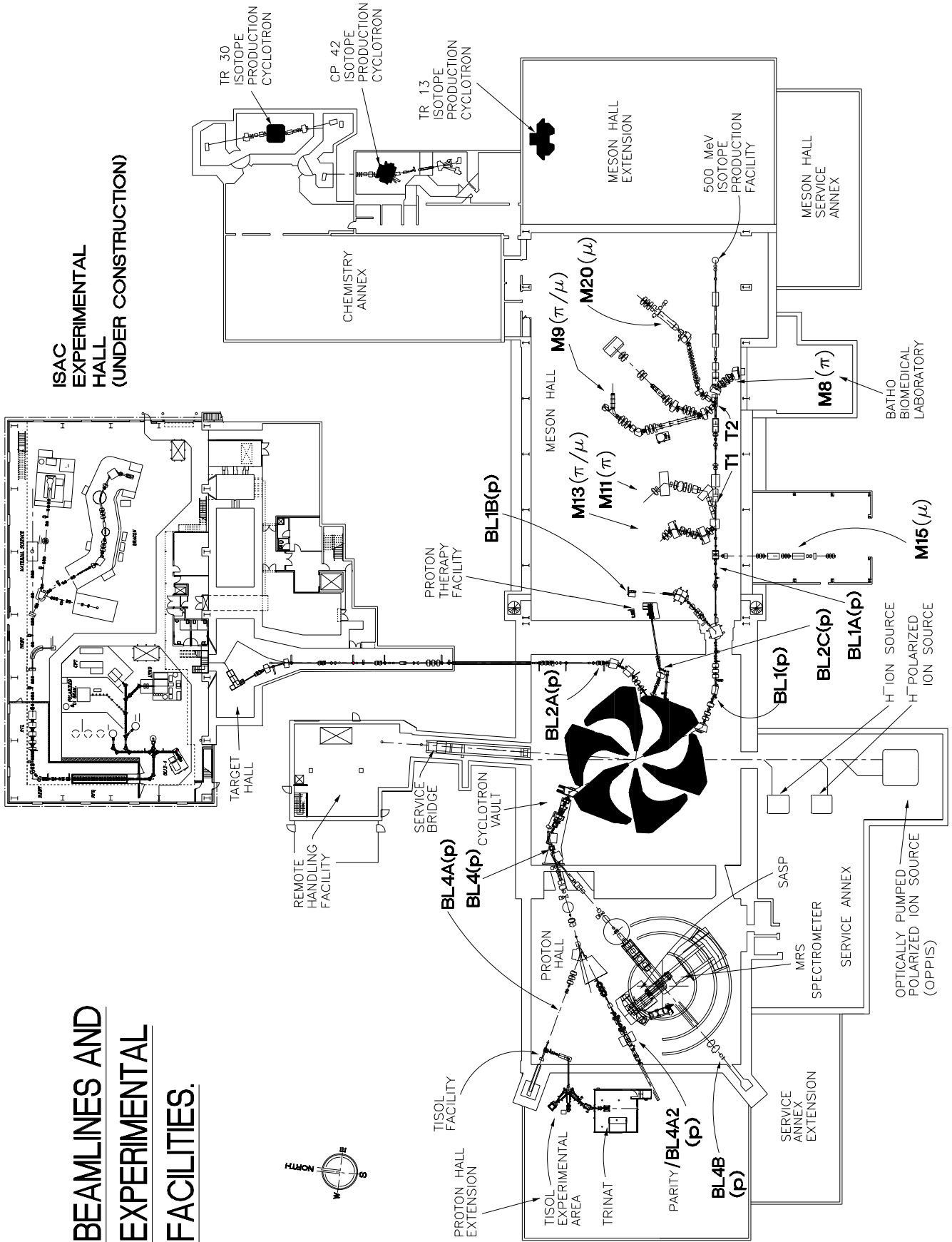
This annual report is dedicated to the memory of
J. Reginald Richardson
(1912–1997)

Reg Richardson died in California on November 25, 1997. He was a native of Edmonton, moving to the United States at age 12, but throughout his life he maintained close ties with Canada. He can be regarded as the father of the TRIUMF cyclotron, since the 520 MeV H^- sector-focused cyclotron was based directly on his design. It was successfully built in TRIUMF, and continues to serve the laboratory well today. He was TRIUMF's second director from 1971 to 1976 when he presided over the construction and commissioning of the machine.

Reg, until comparatively recent years, was a regular summer visitor to TRIUMF. He remained very ambitious for his old laboratory and was a continued source of bright ideas for energy and intensity upgrades which would give access to new science. In 1991 he was awarded the prestigious Wilson Prize of the American Physical Society.

Reg will be greatly missed by his many friends in TRIUMF. He will be remembered for his elegant style and warm hospitality which he and his family bestowed on so many TRIUMF colleagues at their delightful summer residence on Galiano Island, B.C.

BEAMLINES AND EXPERIMENTAL FACILITIES.



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

TRIUMF is now firmly embarked on all the aspects of the five year plan. Even the most casual visitor to the laboratory can scarcely fail to notice the new ISAC facility as it towers out of the old parking lot. The laboratory is to be congratulated on bringing this building to completion essentially within the original timescale and the predicted budget – so much could have gone wrong! The project is also progressing well technically with low energy beams planned for the end of 1998. ISAC, and its possible increase in energy as part of a future upgrade, will provide Canada with a forefront international facility for any science which employs nuclei far from stability; this of course includes exotic nuclear physics.

Another major component of the laboratory's five year plan is an "in kind" contribution to the Large Hadron Collider in CERN on behalf of Canada. The TRIUMF/CERN collaboration is well established and Canadian industry is being engaged very effectively to provide components which will eventually be built into the CERN accelerator complex. The collaboration is very successful with equipment making the deadlines in good working order. There is every reason to believe that this success will continue into the future.

For those of us who were around the scene of the TRIUMF Board of Management during the uncertain days of 1994 and 1995 when the laboratory's future was unclear, it is hard to realize that already a new review and assessment of TRIUMF is bearing down on us. The Agency Committee of TRIUMF is organizing a major review which will occur during November 1998, and at last November's meeting of the Advisory Committee on TRIUMF much time was spent discussing the composition of the panel and the terms of reference of the review. One thing has been made abundantly clear; TRIUMF will be reviewed for its performance as a basic science facility. This should be a source of great reassurance to all TRIUMF staff.

It is entirely appropriate that TRIUMF's future depends on the laboratory giving a good account of its performance. In the past there has been a tendency to view support for the basic sciences as our due. Those days have gone and even in the improved, post-deficit, economic climate in Canada, we must all be prepared to explain the value of what we do for the benefit of society as a whole. If we fail to do this, we may fail in providing the environment in which basic science can prosper. The upcoming year of 1998 will be a challenging one for the laboratory and its management, a challenge which I am confident we will meet.

Colin Jones
Chairman, Board of Management

TRIUMF was established in 1968 as a laboratory operated and to be used jointly by the University of Alberta, Simon Fraser University, the University of Victoria and the University of British Columbia. The initial consortium has been expanded to include the University of Manitoba, Université de Montréal, the University of Regina and the University of Toronto as associate members. The facility is also open to other Canadian as well as foreign users.

The experimental program is based on a cyclotron capable of producing three simultaneous beams of protons, two of which are individually variable in energy, from 180–520 MeV, and the third between 70 and 100 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’.

Fields of research include basic science, such as particle and nuclear physics and condensed matter research, as well as life sciences based primarily on isotope research. There are also biomedical research facilities which used π mesons and now use protons in cancer research and treatment.

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.