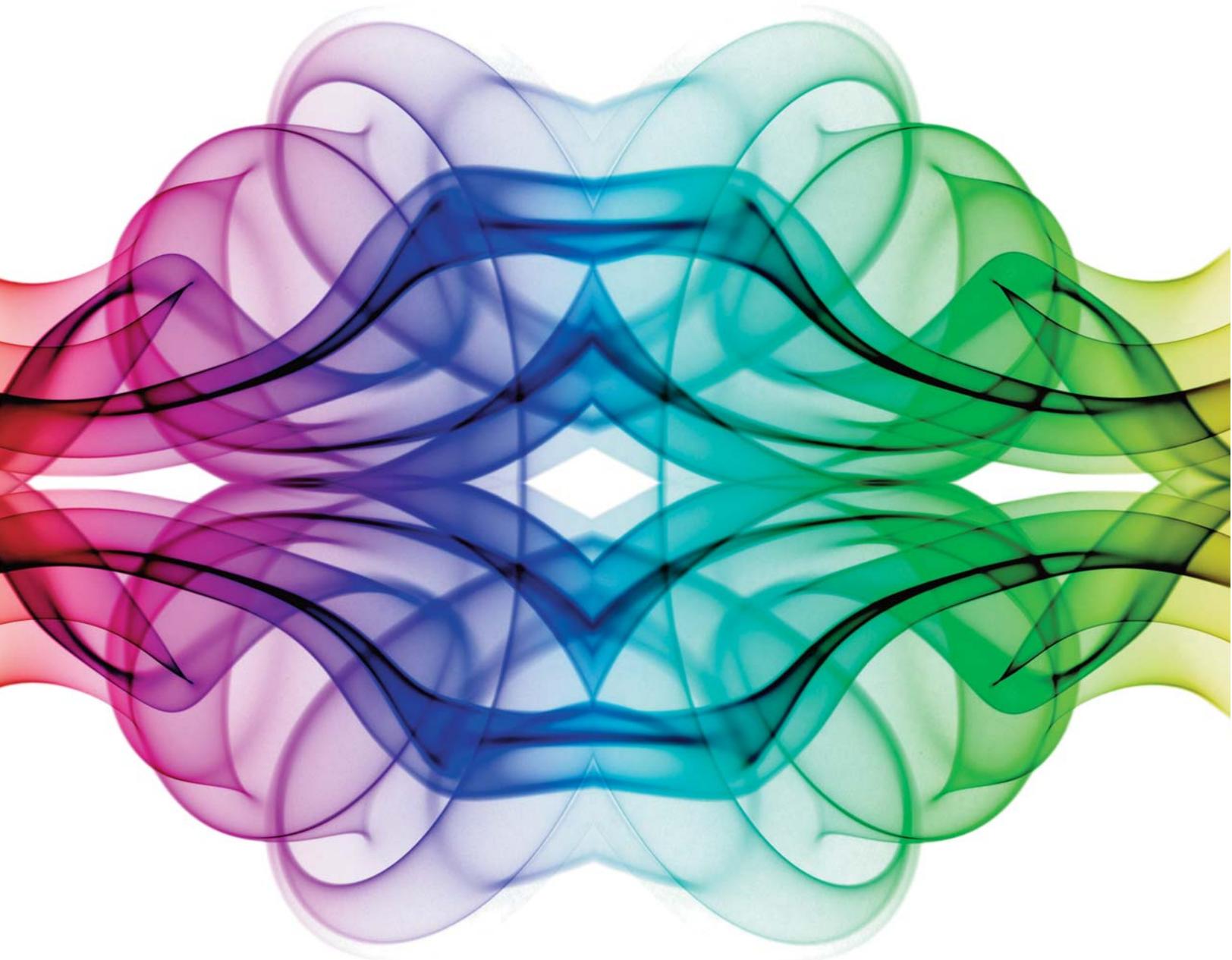




Five-Year Plan

2015 – 2020

R E A L I Z I N G T H E V I S I O N





Five-Year Plan

2015 – 2020

R E A L I Z I N G T H E V I S I O N



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Five-Year Plan 2015–2020: Realizing the Vision

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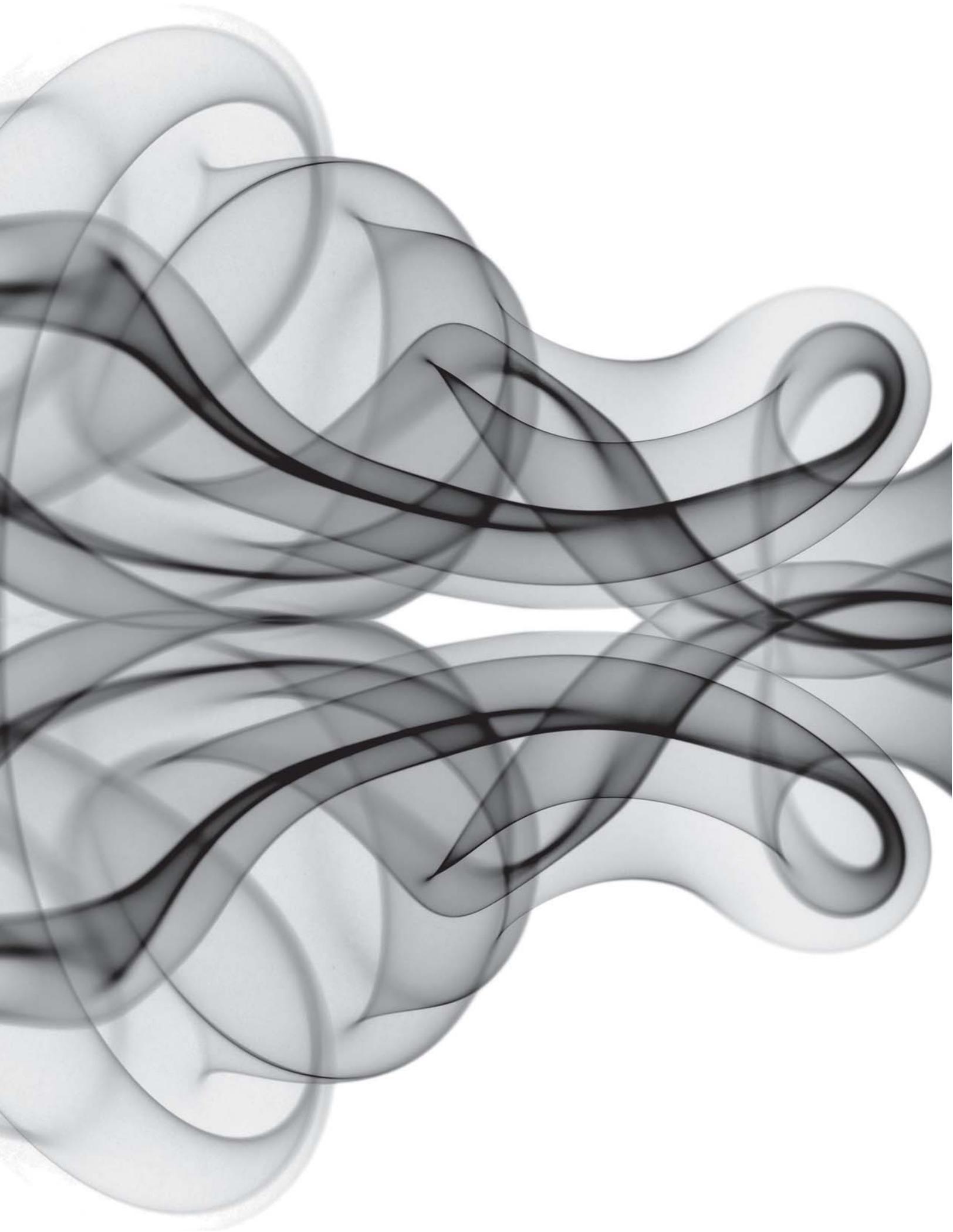
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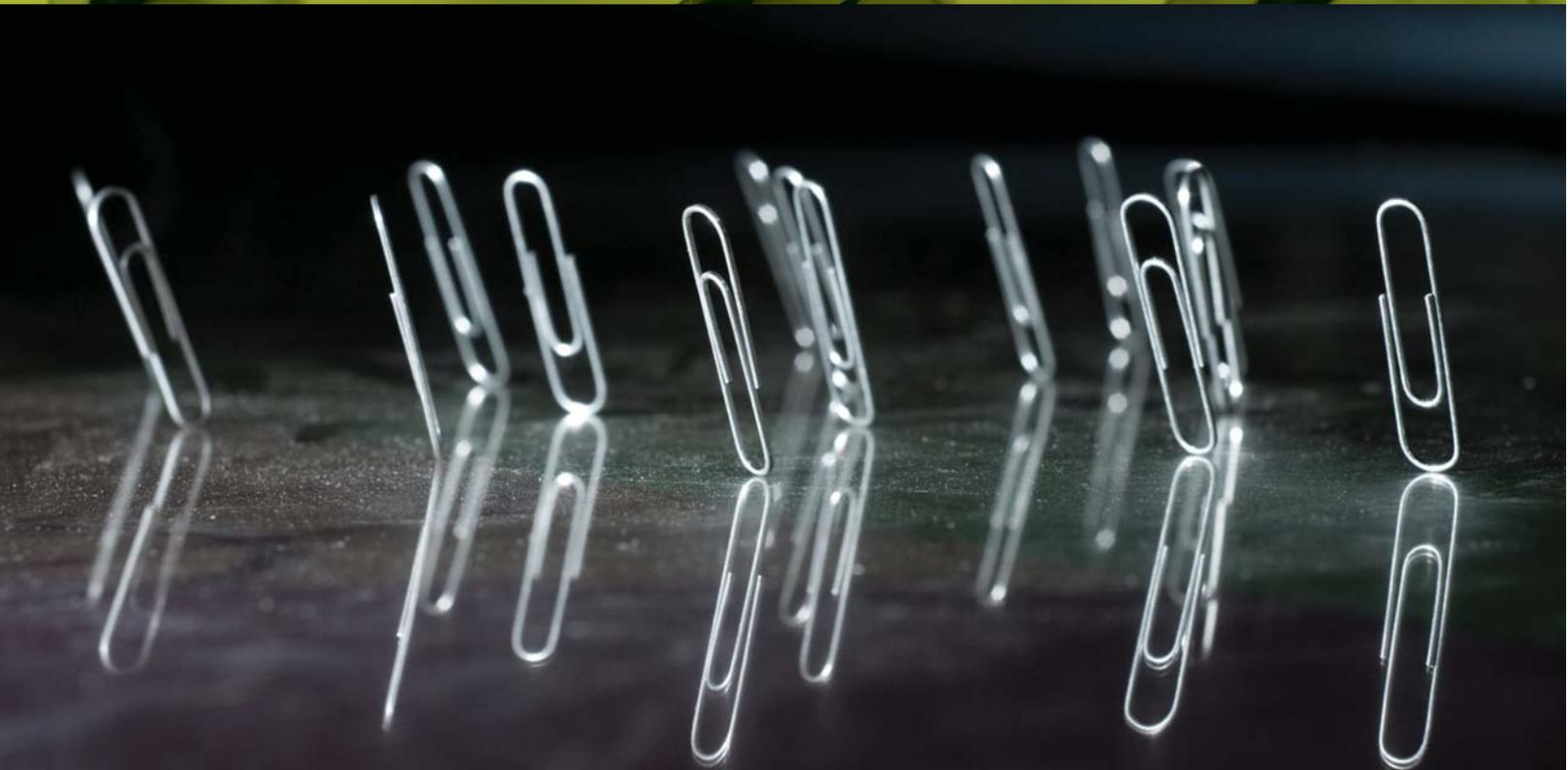
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Executive Summary

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Photographer: J. Gazzari

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1.1 TRIUMF: ACCELERATING SCIENCE FOR CANADA

TRIUMF is a publicly-funded, national laboratory with a basic research mission. Owned and operated as a joint venture by a consortium of Canadian universities, it provides a pool of talent, skills, and capabilities that no single university could maintain on its own.

The laboratory's activities are framed within its Mission and Vision with a strategic plan developed every five years and subject to review, approval, and funding by the Government of Canada and other agencies.

TRIUMF's many important achievements were enabled by public funding from the provincial and federal governments and through the judicious use of all available resources: financial, intellectual, and physical. Similarly, TRIUMF's plans for the future are enabled by new funding and by continuing to build on the foundation of the current resources. The present resources are a culmination of more than \$1 billion of public investments over the past 40 years coupled with the wisdom and experience of a highly trained staff. Taken together, these resources represent a formidable asset that can be deployed in key areas of Canada's national agenda.



Advancing Knowledge

ACCELERATOR PHYSICS
MATERIALS SCIENCE
NUCLEAR MEDICINE
NUCLEAR PHYSICS
PARTICLE PHYSICS

1,300 scientific papers published

3,300 technical and engineering systems designed and fabricated

40,500 hours of isotope beams delivered for science

SOCIAL MEDIA NUMBERS

73,100 social-media impressions on facebook, flickr, twitter, vimeo, and youtube

1,739,000 website visits (since 2009)

OTHER NUMBERS

18 full and associate-member universities

350 staff members

12 acre site

44 years of safe, reliable operation

1,000 member scientific user community

Creating Leaders

370 undergraduate research experiences

30,000 informal science experiences for the public

195 graduate student researchers

Driving Growth

\$941,000,000 total attributable GDP (decade)

11,700 person years of employment (decade)

5,000,000 patient doses of medical isotopes

6 new companies and products

CORE VALUES

The following core values reflect how TRIUMF operates as one of the leading physics laboratories in the world. These values are instilled in all those who work here, and guide how the laboratory approaches its goals.

excellence + impact

A commitment to excellence in achieving TRIUMF's mission and vision while making a real difference.

collaboration + teamwork

Working together with others (individuals, groups, or institutions) for our mutual benefit.

honesty + transparency

Being responsible and accountable for our actions and their consequences; respecting people, their ideas and diversity; working safely and sustainably with openness, authenticity, generosity, and equity.

innovation + relevance

Approaching assignments, tasks, and problems in new and efficacious ways; creating novel ideas and techniques.

MISSION

TRIUMF is Canada's national laboratory for particle and nuclear physics. It is owned and operated as a joint venture by a consortium of Canadian universities via a contribution through the National Research Council Canada, with building capital funds provided by the Government of British Columbia. Its mission is:

- To make discoveries that address the most compelling questions in particle physics, nuclear physics, nuclear medicine, and materials science;
- To act as Canada's steward for the advancement of particle accelerators and detection technologies; and
- To transfer knowledge, train highly skilled personnel, and commercialize research for the economic, social, environmental, and health benefit of all Canadians.

VISION

TRIUMF will:

LEAD IN SCIENCE

The world sees TRIUMF as Canada's leader in probing the structure and origins of matter and in advancing isotopes for science and medicine.

LEVERAGE UNIVERSITY RESEARCH

The Canadian university research community views TRIUMF as a way to strengthen and expand their research programs.

CONNECT CANADA TO THE WORLD

International subatomic physics laboratories look to TRIUMF when partnering with Canada and its research community.

CREATE SOCIAL AND ECONOMIC GROWTH

The global scientific community sees TRIUMF as a bridge between academia and the private sector and as a model for commercialization and social impact.

Member Universities University of Alberta | University of British Columbia | Carleton University | University of Guelph | University of Manitoba | Université de Montréal | Simon Fraser University | Queen's University | University of Toronto | University of Victoria | York University

Associate Members University of Calgary | McGill University | McMaster University | University of Northern British Columbia | University of Regina | Saint Mary's University | University of Winnipeg

1.2 FOREWORD

Five-Year Plan 2015–2020 represents a defining document for TRIUMF. Not only does it recap the performance of the past five years—2008–2012—it also presents an implementation plan for the second half of the decadal vision laid out in Five-Year Plan 2010–2015. That vision encompassed plans and goals for several different constituents: TRIUMF, scientists, and industry, as well as everyday Canadians. We have organized this report to appeal to a variety of audiences with a variety of needs and goals.

Chapter 1 presents an overview of the document that will appeal to senior executives and cabinet ministers with portfolios covering areas in which TRIUMF does research. Chapters 1, 2 and 3 will interest political staff, government policy makers, and intellectual leaders and experts. These chapters provide an overview of how TRIUMF plans to advance, even further, its work in service of the national agenda. Chapter 2 in particular places TRIUMF and its activities in the national context, while Chapter 3 discusses the key national and international partnerships that characterize TRIUMF's future commitments.

Chapters 4 to 6 will attract more technically advanced readers, theoretical and experimental physicists and academics, as well as those familiar with modern subatomic physics. These chapters provide the evidentiary basis for assessing TRIUMF's performance over the past five years and determining what comes next. Chapter 4 highlights TRIUMF's chief accomplishments 2008–2012 in terms of the three core benefits of science to society: new discoveries and knowledge, recruitment and training of talented individuals, and societal and economic growth. Chapter 5 summarizes what TRIUMF "brings to the table," that is, what physical and structural assets are already available to be deployed in service of the national agenda. Chapter 6 proposes the plan for 2015–2020 and includes an analysis of required resources and roles for TRIUMF's family of stakeholders and supporters. Finally, the concluding chapter provides supporting information as appendices.

The strategic-planning process cannot be done in isolation, and it is the most successful when the community plays an important and substantive role. Some individuals responded far beyond the ordinary call of duty to shoulder the thoughtful and soul-searching work to assemble this plan. They are: Nigel Lockyer, Reiner Kruecken, Byron Jennings, Jens Dilling, Hiro Tanaka, Isabel Trigger, Sampa Bhadra, Lia Merminga, Paul Schaffer, Colin Gay, Iain Mackenzie, Ken Ragan, Khashayar Ghandi, Carsten Krauss, and Paul Garrett. Finally, the entire manuscript here would never have made any sense without the efforts of Melva McLean, Melissa Baluk, and Jennifer Gagne, along with critical contributions from Gabriel Baron and Ariane Madden.

One of these acknowledgments needs to be expanded. On behalf of TRIUMF and the Five-Year Plan Steering Committee, I extend warm thanks and deep appreciation to outgoing laboratory director Nigel S. Lockyer. Without his ambition and guidance, TRIUMF's decadal vision of 2010–2020 would not have been possible. A man both bold and generous, Nigel assembled an impressive leadership team and brought electrons, (ultra-cold) neutrons, actinide targets, new international partners, and a spirit of entrepreneurialism to TRIUMF that has transformed and elevated the entire laboratory. Farewell, Nigel; we will miss you (and your shiny, red car). And we know that the U.S. Fermi National Accelerator Laboratory will continue to blossom under your leadership.

I wholeheartedly acknowledge everyone for their contributions and their incredible commitment to TRIUMF, the progress of science, and Canadian excellence. The future is bright.

T.I. Meyer

Head, Strategic Planning & Communication
TRIUMF

August 2013

1.3 PREFACE

TRIUMF, a joint venture of Canadian universities, is a premier subatomic-physics laboratory located in Vancouver. Canada has been recognized for above-average contributions in research excellence in subatomic science. TRIUMF, as the hub for Canadian subatomic research, brings together the network of international, industrial, and government partners to generate societal and economic growth from these strengths.

This document outlines a strategic plan for 2015–2020. We trust that you will find the future outlined within this report just as exciting as we do. We hope it inspires action to invest and to expand what TRIUMF can do for Canada.

With broad and sincere thanks and appreciation to everyone who has contributed to this vision, we remain,

Respectfully yours,

Nigel S. Lockyer

Outgoing Director, TRIUMF and,
Incoming Director, U.S. Fermi National Accelerator Laboratory

R. Paul Young

Chair, Board of Management, TRIUMF, and
Vice-President, Research and Innovation, University of Toronto



CANADA IS PHYSICS POWERHOUSE

27 September 2012

In a groundbreaking report released this morning by the Council of Canadian Academies, Canada's six world-leading fields of research were identified. Not only did "physics and astronomy" rank among the top six, but the subfield of "particle and nuclear physics" was also recognized as one of the key drivers for Canada's strength. About the report, the Council says it is, "An authoritative, evidence-based assessment of the state of science and technology in Canada and has found that Canadian science and technology is healthy and growing in both output and impact."

The report found that the six research fields in which Canada excels are: clinical medicine, historical studies, information and communication technologies (ICT), physics and astronomy, psychology and cognitive sciences, and visual and performing arts. With less than 0.5% of the world's population, Canada produces 4.1% of the world's research papers and nearly 5% of the world's most frequently cited papers.

1.4 EXECUTIVE SUMMARY

TRIUMF is Canada's largest basic science enterprise probing the fundamental structure and origins of matter. In Canada, TRIUMF is synonymous with advancing isotopes for science and medicine. Internationally, TRIUMF is known for its leadership in rare isotope science and particle physics. In schools and among students, TRIUMF is an inspiration, a career path, and a resource for learning and sharing. In business circles, TRIUMF is recognized for its advanced-accelerator technologies and production of medical isotopes. In academia, TRIUMF is known as the regional hub for Canadian university researchers in particle and nuclear physics and the platform to work globally.

In the last five years, TRIUMF has lived up to this reputation. Building Canada's scientific prominence throughout the world of subatomic physics, TRIUMF has emerged on the international stage as a leader. TRIUMF along with Canadian physicists are known for their contribution to the discovery of the Higgs boson, a particle that captured the imagination of over one billion people during the announcement on BBC. TRIUMF scientists received international attention for trapping antimatter. The laboratory is known globally for pursuing an alternative, innovative solution for producing the world's most-popular medical isotope (Tc-99m) with existing accelerators. TRIUMF's rare isotope program is among the best in the world, attracting hundreds of users to Vancouver each year. Over the last five years, two small Canadian firms, building on TRIUMF's accelerator technologies, have more than doubled their number of employees and floor space and have expanded their business internationally. TRIUMF is partnering with India and Japan to further technology developments and open new markets for Canadian companies. TRIUMF's 35-year partner company, Nordion, continues to touch the lives of millions of people each year with medical isotopes produced on small TRIUMF-designed, Canadian-manufactured cyclotrons in Vancouver.

The core investment in TRIUMF by the Government of Canada through a contribution via the National Research Council drives these results and leverages the resources and talents of Canada's world-class research universities. Eighteen of those universities together form the consortium that owns and operates the laboratory.

In the next five years, TRIUMF will begin its march towards major scientific discoveries with ARIEL, the new facility for ultra-cold neutrons shared with Japan, and with crucial support for Canada's engagements on the international stage of particle physics. TRIUMF will commercialize new technologies, stimulate and train science and engineering students, challenge engineers and technicians with the latest accelerator-associated technologies, and impact up to 5% of Canadian citizens with the accelerator-produced medical isotope Tc-99m.

Five-Year Plan 2015–2020 seeks continued investment in TRIUMF and this vision. Optimal exploitation would require \$290 million via the NRC Contribution Agreement combined with additional competitively-awarded funds. This request takes into account opportunities to complete the ARIEL laboratory, fully operate facilities, address deferred maintenance, and relieve pressures on ten-year-old buying power.

We have established that past investments generate significant dividends. TRIUMF is strong and continually advancing; a coordinated investment will allow Canada to make major strides forward in creating knowledge, developing technology, attracting and training talent, and contributing to economic growth.