Vision

for accelerator science & facilities

TRIUMF

Vision

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Who?
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What?
not a plan

Why?
self-fulfilling prediction…

Objectives of this talk

(1) Make you want to read our 5-page vision statement: acc.pdf

(2) Keep it short: discussion time follows

TRIUMF

PROCEEDINGS
OF THE
TRIUMF-ISOL WORKSHOP

MONT GABRIEL, QUÉBEC
JUNE 13-16, 1984

Editors:
J. Crawford, McGill University
J.M. D'Auria, Simon Fraser University

1984

TRI-85-1

PROCEEDINGS
OF THE
ACCELERATED RADIOACTIVE BEAMS WORKSHOP

PARKSVILLE, CANADA
September 5-7, 1985

Editors:
L. Buchmann, University of Toronto
J.M. D'Auria, Simon Fraser University

Organized by: O.A. Barnes, California Institute of Technology
L. Buchmann, University of Toronto
J.M. D'Auria, Simon Fraser University
C. Rolfs, Universität Münster

Sponsored by: Natural Sciences and Engineering Research Council of Canada
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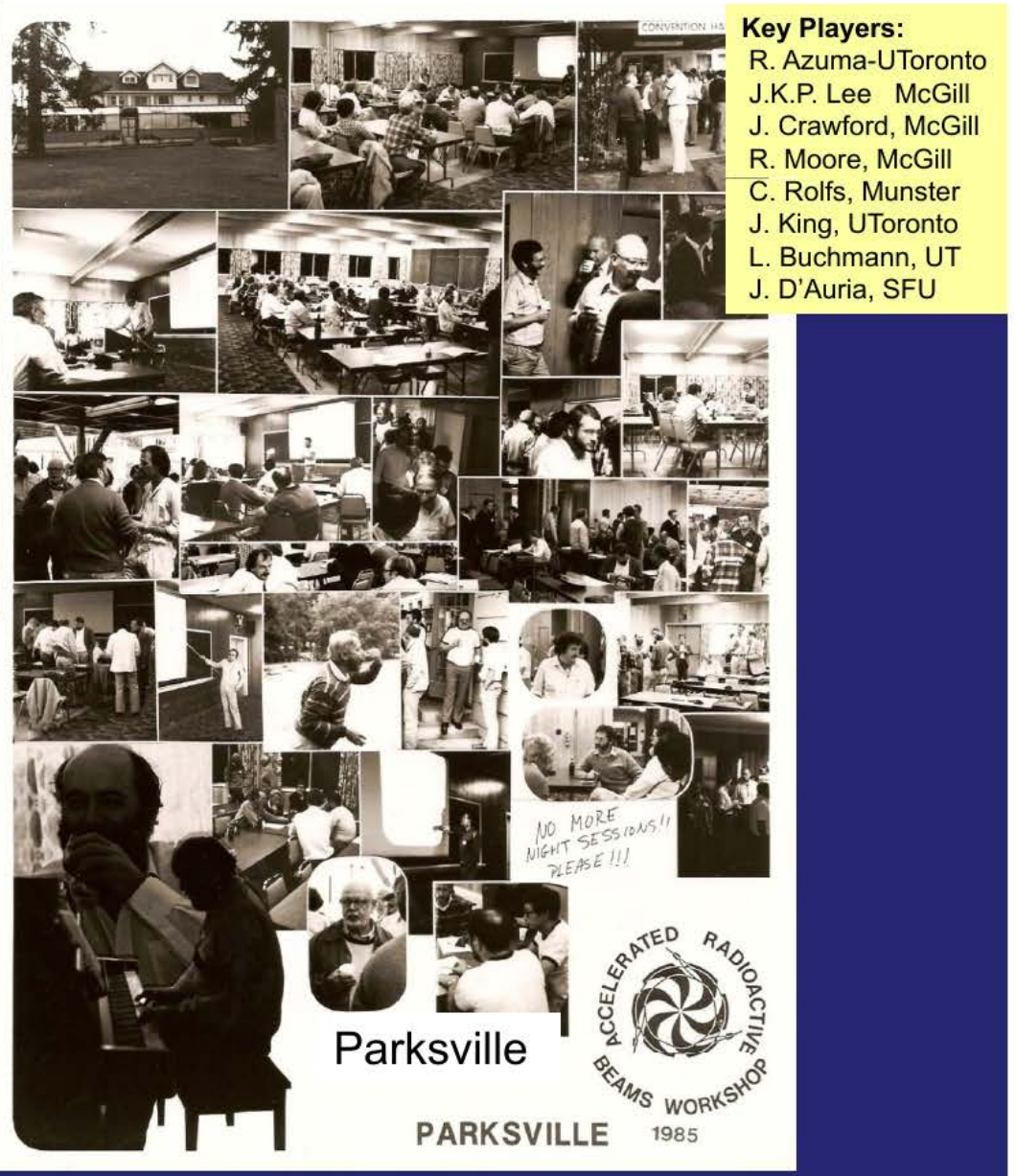

Key Players:
R. Azuma-UToronto
J.K.P. Lee McGill
J. Crawford, McGill
R. Moore, McGill
C. Rolfs, Munster
J. King, UToronto
L. Buchmann, UT
J. D'Auria, SFU

20+ years ago: they shared a strong vision

- A world-class facility, yet within our reach
- A proposal that was building of TRIUMF's strength and expertise: TRIUMF had ~50 times more beam power than CERN ISOLDE.
- A strong user community
- They anticipated the trends that were about to shape TRIUMF's future

Trends that will shape TRIUMF's future

- **Nuclear Physics**: large scale facilities with worldwide collaboration
- **IAMI & life science**: the existing match between nuclear medicine needs and TRIUMF core expertise in accelerator and target technologies will continue to reinforce this trend
- **Technological breakthrough**: will transform accelerator technologies (SRF, high-gradient, AI, etc). Our research program will enable some of the breakthroughs which will, in turn, change our future.
- Transition to the **knowledge economy**: knowledge-intensive productions and a highly skilled workforce
- **The global environmental crisis**: TRIUMF must become a key contributor for its research program to remain relevant in 20 years

Vision Summary: Accelerator Science & Facilities

Isotope Valley

With ISAC+ARIEL+IAMI we will greatly expand our capabilities, and establish TRIUMF as a leading global center for isotope research.

- Isotopes for physical science
- Isotopes for life science
- Isotopes to cure Canadians

Canadian Hub

We are Canada's center of excellence in accelerator-related science and technology.

We centralize knowledge, and diffuse it through training, counsel, and collaborations.

With our always evolving expertise we remain a leader in Canada's transformation to a knowledge based economy.

Big Science — Big Tech

International collaborations are key to contribute to the most significant discoveries, attract talent, and maintain cutting-edge expertise.

We support international projects by leveraging our core knowledge and engaging Canadian industry.

We build on our strengths to serve science and invent life-changing technologies.

TRIUMF as global center for the study and development of isotope science and applications.

- Develop the full potential of the new ARIEL/CANREB/IAMI infrastructures including their high-power drivers: cyclotron & e-linac
- Leverage infrastructure and know-how to pursue new capabilities
  - ARIEL targets to develop revolutionary RIB (neutron-rich, molecules..)
  - ARIEL e-linac to develop Canadian THz source
  - SRF capability to advance ISAC post-accelerator to world highest energy
  - Beam physics know-how to develop and implement unique low energy storage ring for neutron capture
- Design and build next generation medical accelerators
  - Develop next generation TR100 cyclotron + targets
  - Exploit it for medical isotope production to support Canadian industry and community health

TRIUMF as central hub in Canada for teaching accelerator physics and technology with well recognized programs across broad platforms.

- Expand teaching to enhance inclusion across broad national platform. Train a wide diversity of HQP, all across the country:
  - Develop teaching modules with Canadian universities
  - Develop `in house' workshops for hands-on training
- ‘Farm’ HQP
  - Cutting-edge know-how = people. Recruit, grow, retain.
- Develop clear paths between Canadian accelerator related projects and TRIUMF expertise.
  - Establish liaison office to bridge between Canadian projects and TRIUMF know-how

TRIUMF as key global partner with critical expertise in cutting edge technologies and key links with Canadian industry.

- Complete Hi-Lumi deliverables on crab cavity cryomodules, beam physics and wire correctors
- Establish deliverables for EIC, ILC and other large global initiatives to support and strengthen our partnership with CINP and IPP
- Develop and strengthen core competencies in SRF, beam physics, and high-power accelerator and target technologies.
- Develop key relationships with Canadian industry while delivering cutting edge technology (health, environment, security)
- Contribute to international collaborations on future energy sources: SMR, ADS (with CNL), material science for fusion reactors

	Now	Action	2042
Isotope Valley	• ISAC • Building ARIEL • ATG/BWXT • Building IAMI	Develop the full potential of the new infrastructures. Leverage infrastructure to pursue new technologies/capabilities: e^- beams and targets, THz, high-energy ISAC, RIB ring. Design and build next generation medical accelerators	TRIUMF as global center for the study and development of isotope science and applications.
TRIUMF Hub	• Train HQP, make our teaching more accessible all across the country • We put our expertise to the service of Canadian projects	Improve our advertising strategy for the courses we teach, and the training we provide. Develop clear paths between Canadian accelerator related projects and TRIUMF expertise.	TRIUMF as central hub in Canada for teaching accelerator physics and technology with well recognized programs across broad platforms.
Big Science Big Tech	• International collaborations • World leaders in beam physics and cutting edge technology: high-power accelerator & targets, SRF, …	Develop/strengthen core competencies while supporting Canadian science and Canadian industry through participation in key international projects like Hi-Lumi, EIC, ILC.	TRIUMF as key global partner with critical expertise in cutting edge technologies and key links with Canadian industry.

Vision Statement: Accelerators

20 Years Vision – Accelerators

Accelerator Science and Facilities Working Group

May 18, 2021

Our vision for TRIUMF, Canada's particle accelerator centre, is to build on our strengths to serve science, invent life-changing technologies, and build a better world starting here: in Canada. To remain competitive internationally, we will continue to rely on TRIUMF's very own old recipe: we use internal projects and external collaborations as springboards to consolidate and expand our core competencies or acquire new ones. This allows us to gain and maintain a broad expertise within a relatively small laboratory. With our always evolving knowledge and technical expertise TRIUMF will remain a leader in Canada's transformation to a knowledge based economy.

1 What is TRIUMF today?

TRIUMF has five decades of experience in building a particle accelerator infrastructure that enables cutting-edge research and discovery. Throughout these years, our expertise in accelerator physics and technology is unparalleled in Canada, and envied internationally. The wide variety of accelerator technologies that populate our campus, and the very diverse team of professionals and students who run the place testify to what TRIUMF is today: Canada's particle accelerator center.

2 What trends and changes will shape TRIUMF's future?

Particle accelerators have first been developed for subatomic research. Nowadays this discipline is dominated by large scale facilities with worldwide collaboration. TRIUMF will be a major contributor in this area using its accelerator expertise but different trends will likely shape the local accelerator infrastructure.

The growing contribution of TRIUMF to life science will undoubtedly shape its future. The construction of IAMI is a clear sign that the wheels are already in motion. The easily quantifiable societal impact of a strong life-science program, and the existing match between nuclear medicine needs and TRIUMF core expertise in accelerator and target technologies will continue to reinforce this trend.

The global environmental crisis, and the growing awareness of the general public to this overarching issue will change the future of nations. It will thereby necessarily guide scientific research and funding policies. Minimizing our impact with energy-saving initiatives is commendable: but is it sufficient? For TRIUMF's research program to be still relevant in 20 years time, we must take the lead on this topic.

Technological breakthroughs will drive the evolution of our facilities. For example: accelerating gradients in superconducting rf technology will continue to increase; very high-gradient accelerator technologies such as laser wakefield may lead to important applications; material science will continue to provide us with better superconducting materials for magnets and accelerating structures; artificial intelligence will change the way we design and operate particle accelerators. The important point

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Link to the Accelerator Science & Facilities Vision Statement: **acc.pdf**

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