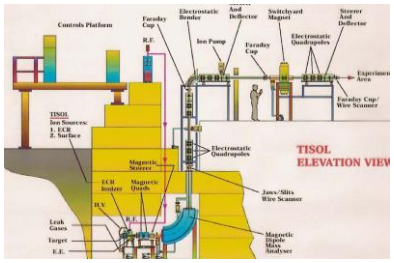
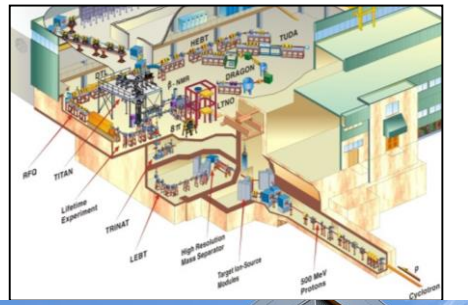
TRIUMF

Two Decades of Discovery with Rare Isotope Beams From TRIUMF-ISAC: Introductory Remarks



ISAC20 Symposium

TRIUMF August 21, 2019



Gordon Ball

TRIUMF-ISAC
Researcher Emeritus

In Memoriam

TRIUMF Staff

Bill Bryson
Norman Carlson
Joe Chuma
Randy Churchman
Mike Craddock
John Cresswell
Terry Farquhar
Jim Fleetwood
Arnold Fletcher
Pat Gormley
Robert Hartridge
Wolfgang Hella
Tom Inglis
Lorne King
Mark Litvinsky
Clint LaForge
Peter LeNobel
John Macdonald
George MacKenzie
Mike McDonald
Hugh Miller
Lutz Moritz
Jack Nelson
Jozef Orzechowski
Keith Parker
Paras Ram
Kim Spring
Grant Sheffer
Wilf Stien
Glen Stinson
Keith Sutton
Ian Thorson
Freeman Tupper
Lorne Udy
Bill Uzat
Pat Walden

University Partners

Simon Fraser University
John D'Auria
Otto Häusser

University of Toronto
Dick Azuma

Western University
Parker Alford

McGill University
Bob Moore

Tel Aviv University
Danny Ashery

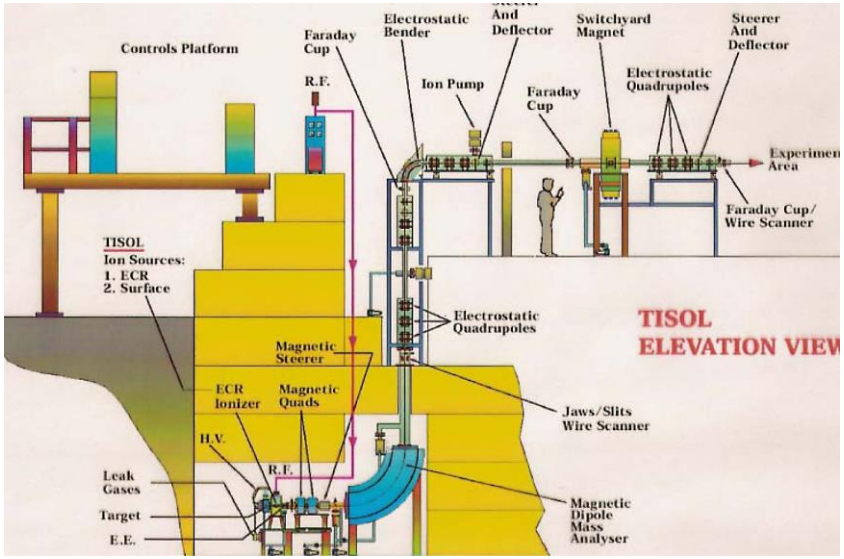
UCLouvain
Jules Deutsch

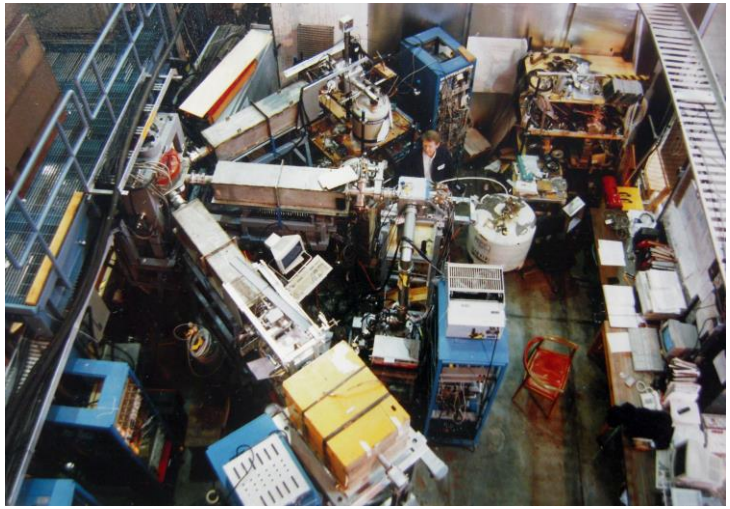
Test Isotope Separator On-Line (TISOL): 1987-1998

Director of TRIUMF
1981-1994

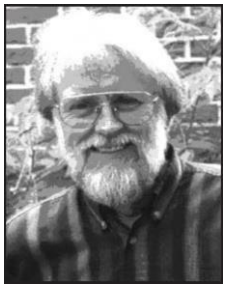
Prof. Erich Vogt
(UBC/TRIUMF)

Prof. John D'Auria
(Simon Fraser Univ.)
Project Leader





ISAC20 Symposium



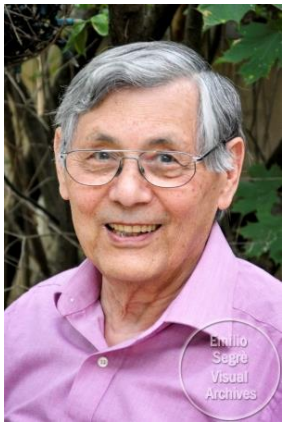
Prof. Robert Moore
(McGill University)

TISOL beam optics design
ISACI: TITAN

TISOL : Science Program

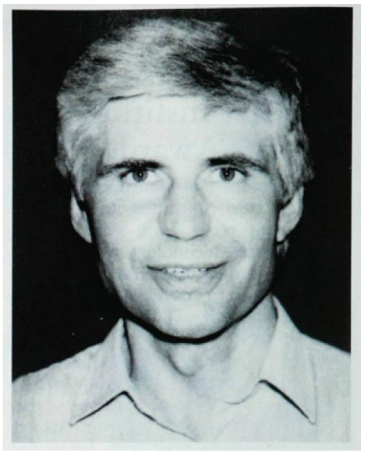
Nuclear Astrophysics

Prof. John D'Auria
(Simon Fraser Univ.)



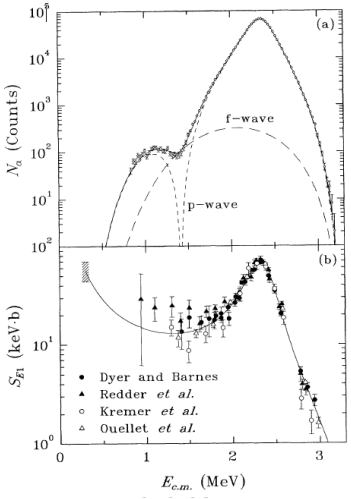
Prof. Richard Azuma
University of Toronto

Fundamental tests of the weak interaction



Prof. Otto Häusser
(SFU/TRIUMF)

The Red Giant Experiment

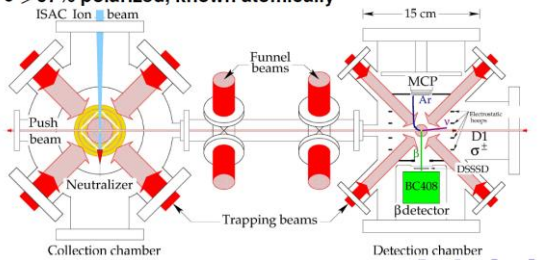


β-delayed α spectrum of ^{16}N and the ^{12}C(α,γ)^{16}O Cross Section at Low Energies This reaction determines the rate of conversion of ^{12}C into ^{16}O in the core of a red giant star

Buchmann et al PRL 70, 726 (1993)

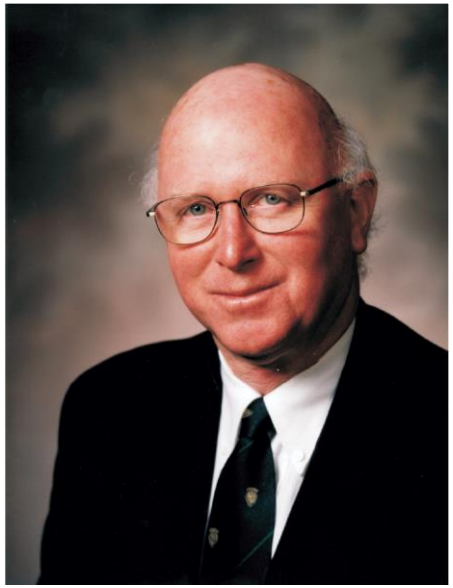
TRIUMF's Neutral Atom Trap, TRINAT

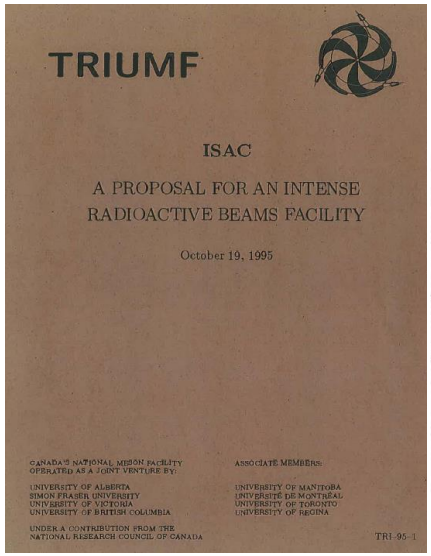
- Isotope/Isomer selective
- Evade 1000x untrapped atom background by → 2nd MOT
- 75% transfer (must avoid backgrounds!); 10^{-3} capture
- 0.7 mm cloud for β-Ar^{+} → ν momentum → β-ν correlation
- >97% polarized, known atomically



The first TRIUMF five year plan 1995-2000: two main priorities CERN and ISAC

Alan Astbury
Director of TRIUMF 1995-2001





TRIUMF

ISAC

A PROPOSAL FOR AN INTENSE
RADIOACTIVE BEAMS FACILITY

October 19, 1995

CANADA'S NATIONAL MESON FACILITY
OPERATED AS A JOINT VENTURE BY:

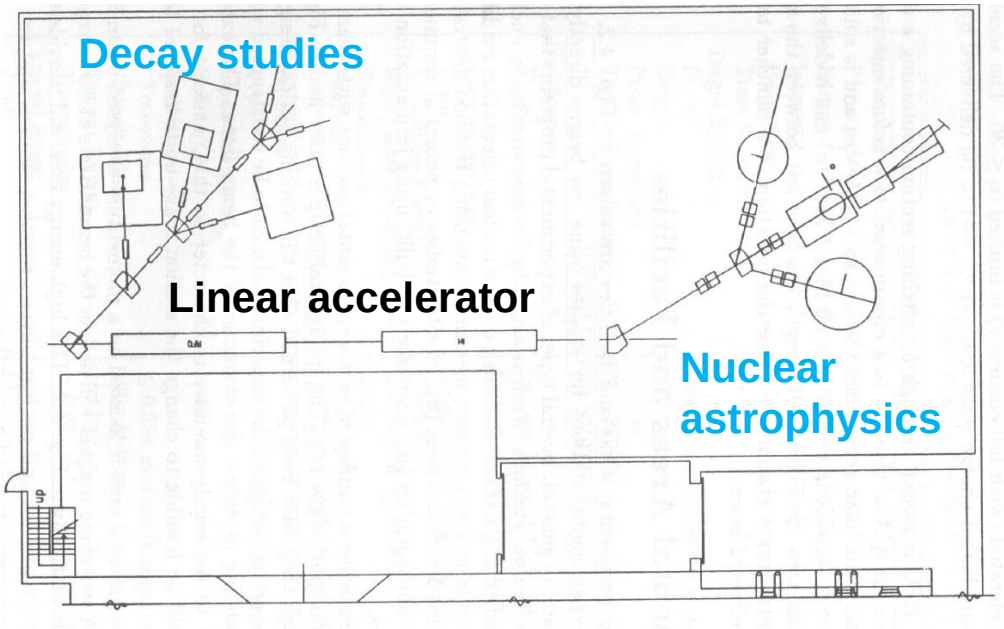
UNIVERSITY OF ALBERTA
SIMON FRASER UNIVERSITY
UNIVERSITY OF VICTORIA
UNIVERSITY OF BRITISH COLUMBIA

ASSOCIATE MEMBERS:

UNIVERSITY OF MANITOBA
UNIVERSITÉ DE MONTRÉAL
UNIVERSITY OF TORONTO
UNIVERSITY OF REGINA

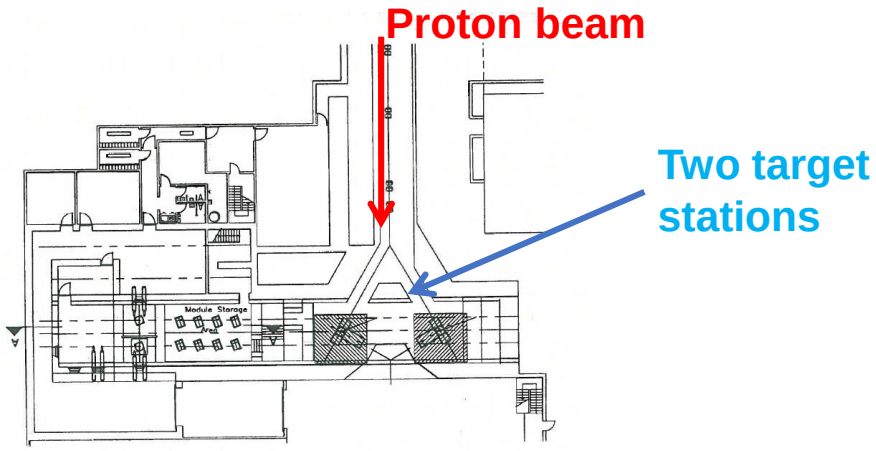
UNDER A CONTRIBUTION FROM THE
NATIONAL RESEARCH COUNCIL OF CANADA

TRI-95-1

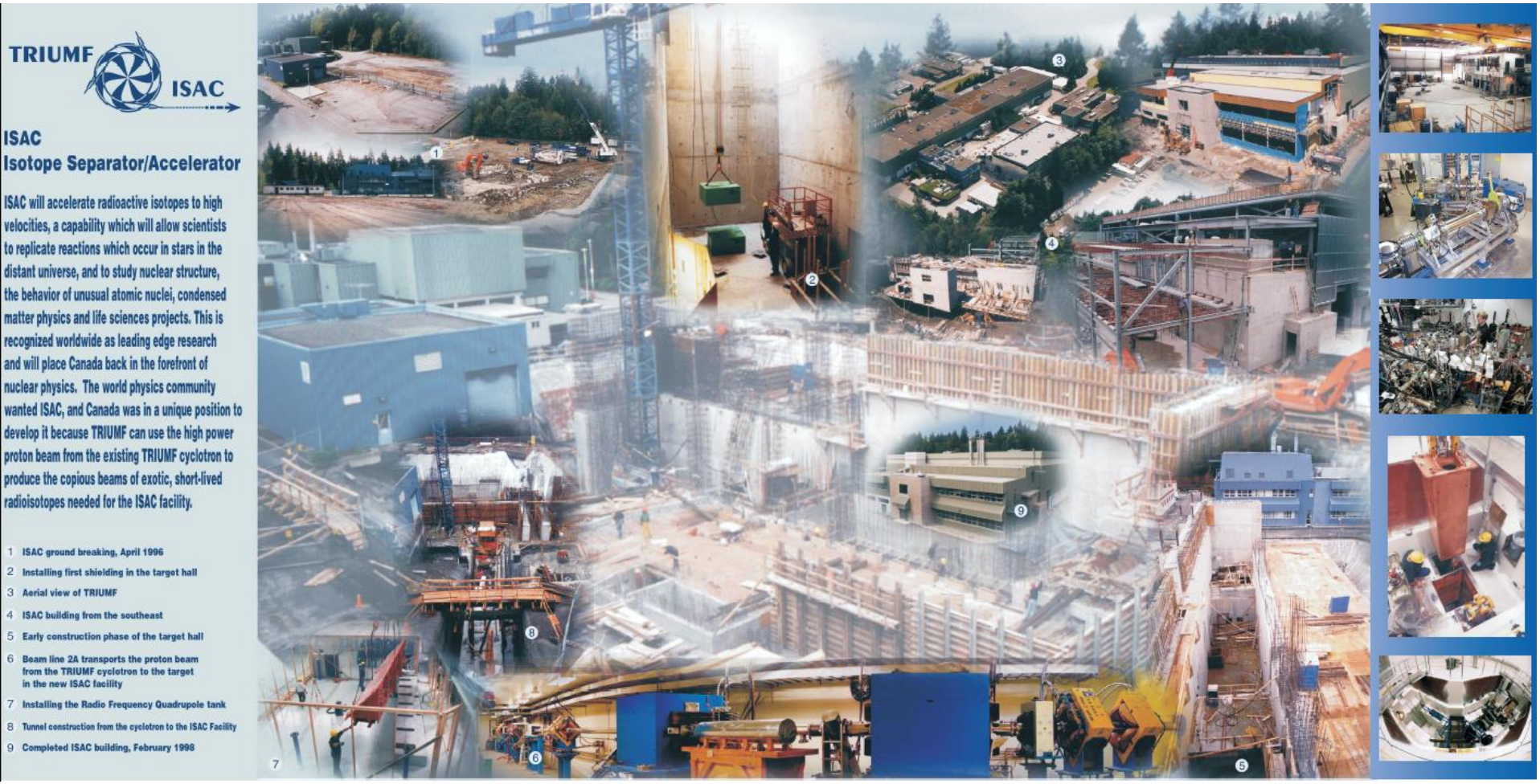


Prof. John D'Auria

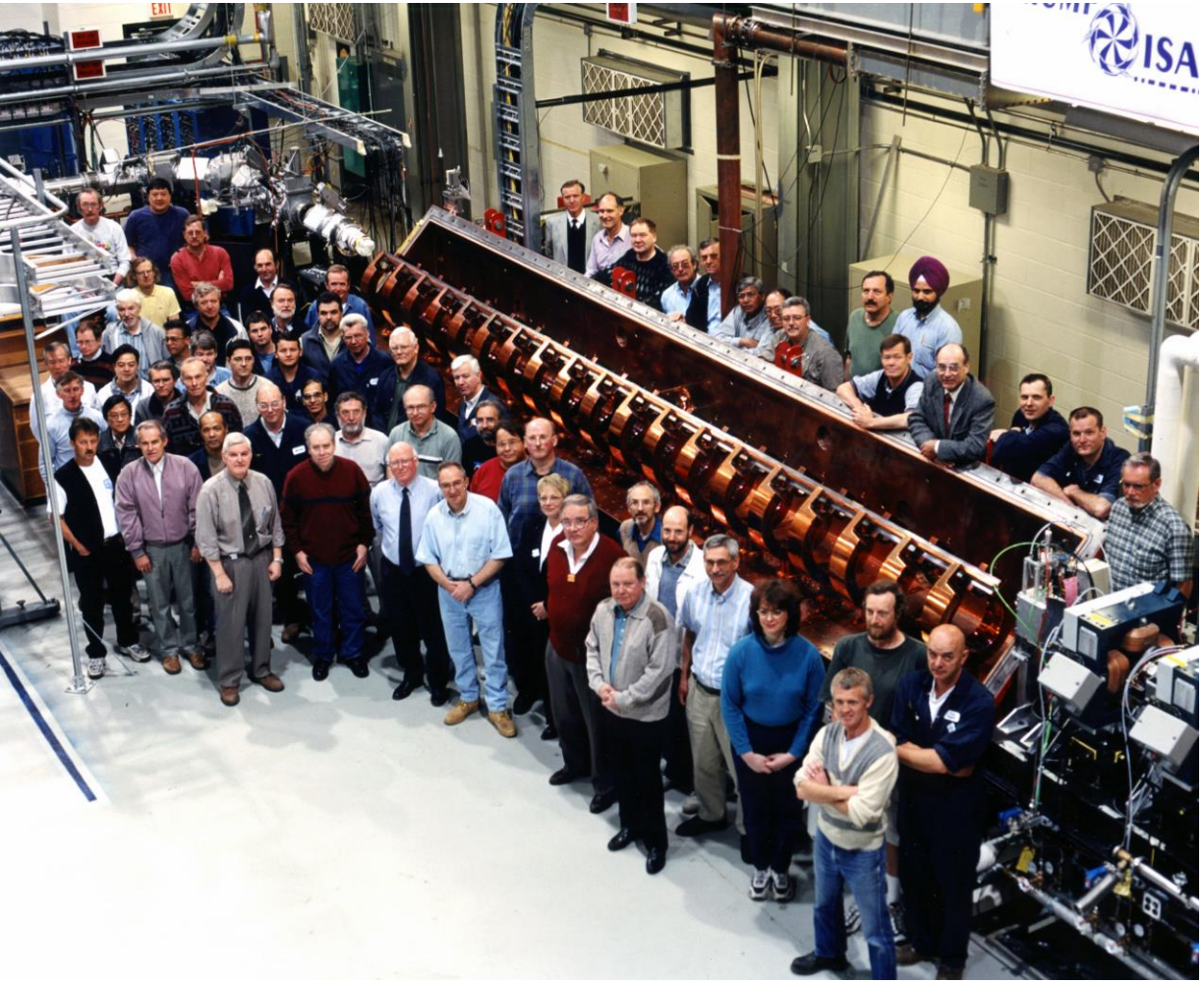
SFU
SIMON FRASER UNIVERSITY



Construction of ISAC-I from ground breaking in April 1996 to completion of ISAC-I building in February 1998



ISAC-I declared commissioning April 2000

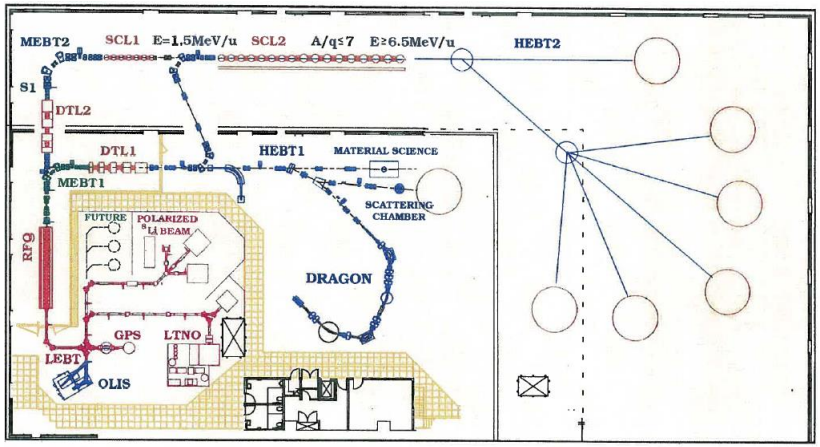


The Second TRIUMF Five Year Plan 2000-2005

Dunsmuir Workshop
February 19-20, 1998

- ISAC
  - doing ISAC "properly" puts TRIUMF on international map
  - prime centre for nuclear astrophysics [DRAGON a mus
  - some views "stop here and use"
  - increase energy 1.5MeV/u → 6.5MeV/u plus good coverage d
    - provide a unique nuclear physics facility
  - baseline design - not cheap - will work - no 'A' restrictio
  - other ways to higher energy - cheaper - "cuter" - riskier
    - Feb 19/20 an ISAC retreat
      - settle the "whether" issue
      - resolve the "how to" issue
- CERN $30M "in kind"
  - current CERN/TRIUMF collaboration works well: PSB.
  - Dec 10th in Ottawa Chris Llewellyn Smith DGCEF
    Peter Jenni ATLAS spokesma
  - met R. Duhamel + T. Brzustowski
  - three components
    - $30M (plus) to CERN/LHC through TRII
    - $2M cash LEP in year 2000
    - ~$10M - ATLAS common fund "in kind" "TRII"
      largely argued on proportionality"
  - surprisingly positive but no undertaking.

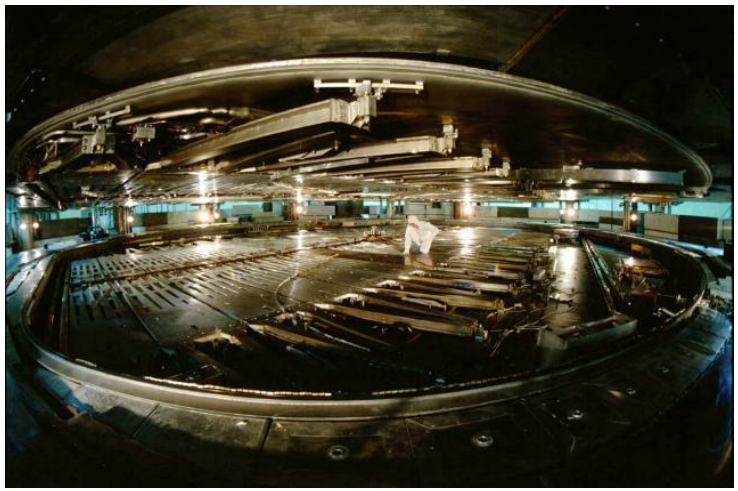
ISAC-II



Accelerator Division

Leading Accelerator Physicist for 33 years

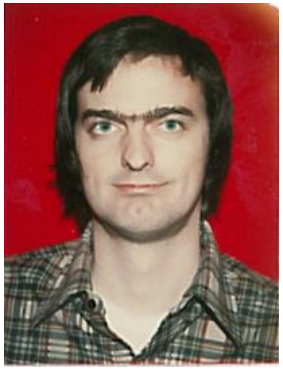
Prof. Michael Craddock
(UBC/TRIUMF)



George Mackenzie
(BAE Physicist)

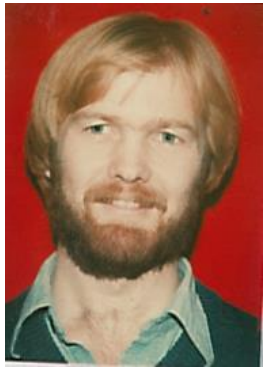
- Long career support for cyclotron
- ISAC Beam Diagnostics

Accelerator Division



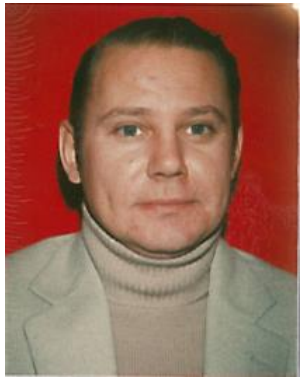
Mike McDonald

- HV and source engineering, technical installations
- Mike made ISAC work



Clint Laforge

Super technician contributed to OLIS, LEBT and target module assemblies and installation



Glen Stinson
U of A/TRIUMF

contributed to magnetic beamlines design and implementation for ISAC-2

Bill Uzat

RF engineer responsible for the development and production of the ISAC RF power amplifiers

Tom Inglis

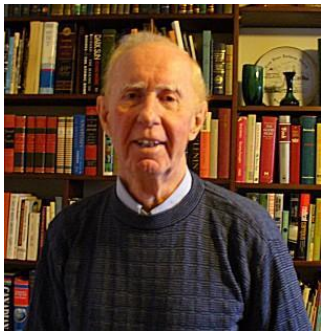
technical support for ISAC's vacuum installations

Environment Health and Safety

Head EH and S

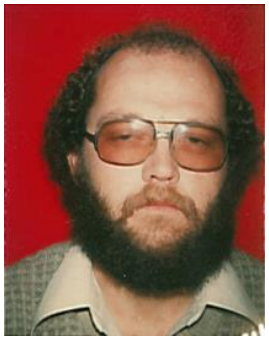
Lutz Moritz

Principal Author of ISAC-I and ISAC-II Safety Analysis Reports



Ian Thorson

Radiation shielding calculations for ISAC-I



Lorne King

ISAC Safety systems

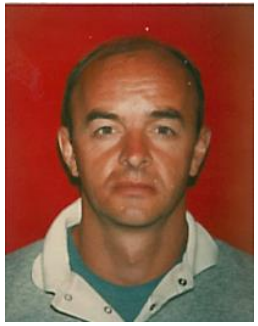
Arnold Fletcher
Radiation Protection

Head Applied Technology Group

Jozef Orzechowski

Plant Group

Riggers



Terry Farquhar

Paras Ram

Carpenter

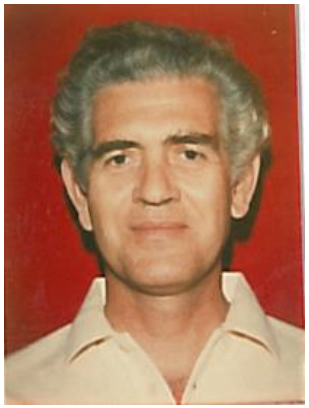
Hugh Miller

General Maintenance

Bill Bryson

Engineering Division

Design Office



Jim Fleetwood

Senior Mechanical Designer

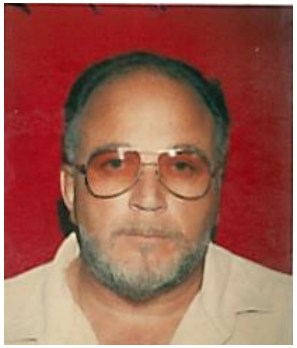
Areas of expertise on ISAC were the mass separator area, the HV platform and the BL2A equipment at the post target area.
TRIUMF was fortunate to have Jim working on these all important seminal beamline designs.

Remote handling

Lorne Udy

technical support for ISAC target module assembly

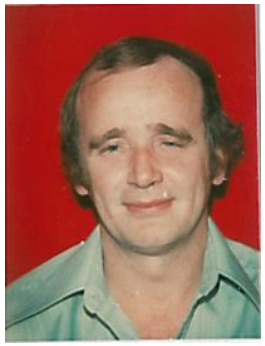
Civil and Structural Services



Freeman Tupper

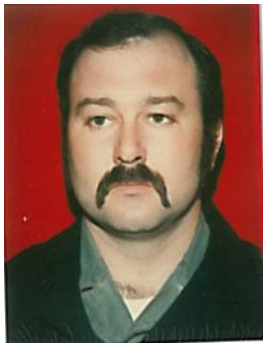
Machine Shop

Foreman

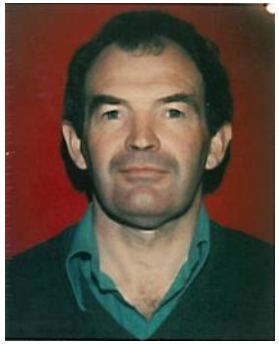


Pat Gormley

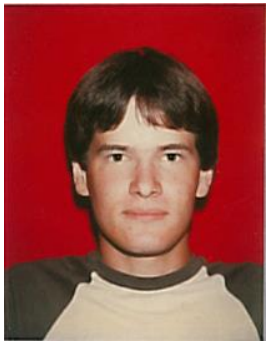
Keith Parker



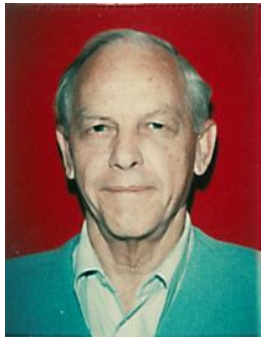
Mark Livinsky



Robert Hartridge



Peter Lenoble



Norm Carlson

Wilf Stien

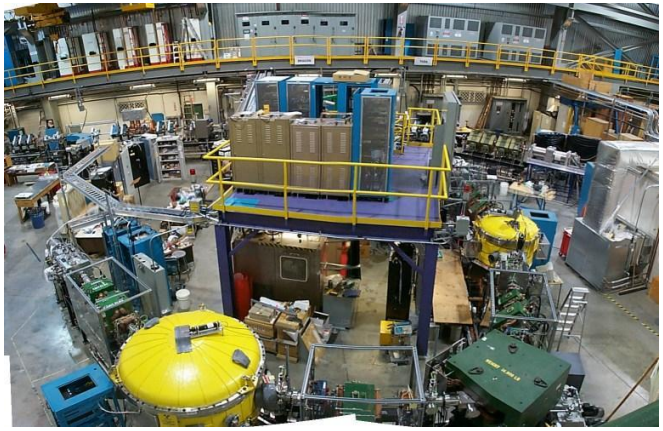
Kim Spring

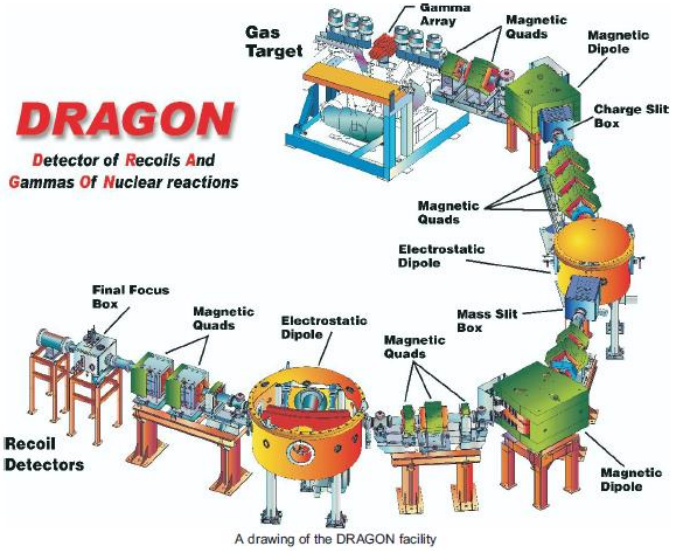
Keith Sutton

Nuclear Astrophysics

Prof. John D'Auria (Simon Fraser Univ.)

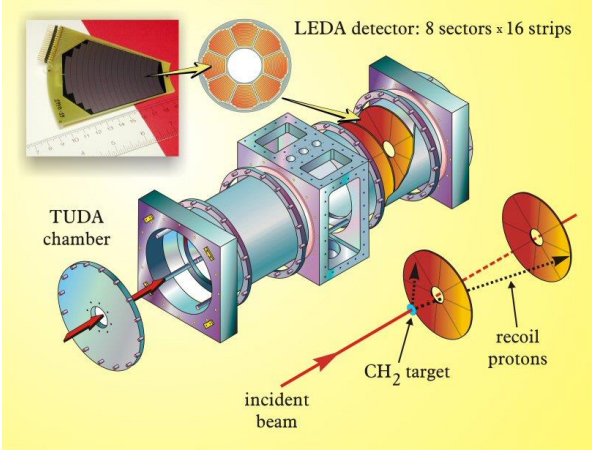
The lead investigator in TISOL project and primary proponent of ISAC, tireless advocate for ISAC facility, Principle Investigator and Group Leader for DRAGON Facility, driving its initial science program.





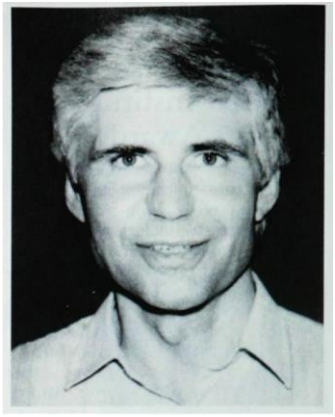
A drawing of the DRAGON facility

Dr. Pat Walden
TRIUMF Research Scientist



lead scientist in the TUDA and TACTIC facilities
TUDA Facility Coordinator

TRINAT at ISAC

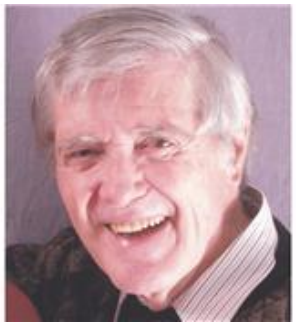


Prof. Otto Häusser (SFU/TRIUMF)

Otto Häusser was involved in planning the move of TRINAT from TISOL to ISAC. Unfortunately he died of cancer in March 1998 but not before he had worked to secure a permanent position at TRIUMF for his post-doc John Behr who has been the lead investigator in TRINAT since then.

Jules Deutsch
UCLouvain

played an early role in interpreting TRINAT's results.



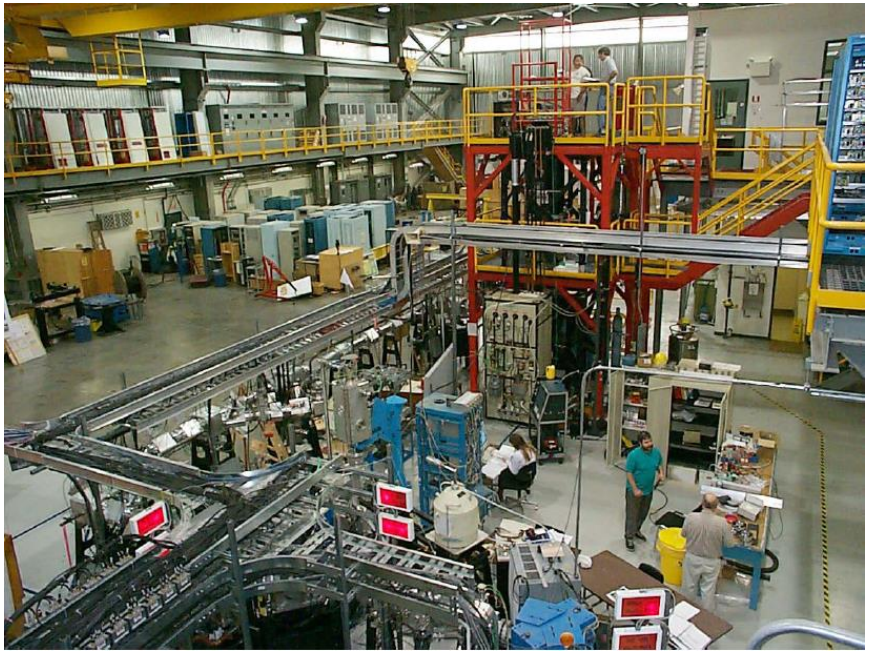
Prof. Parker Alford
Western University

Data analysis and interpretation of beta-neutrino correlation experiments.

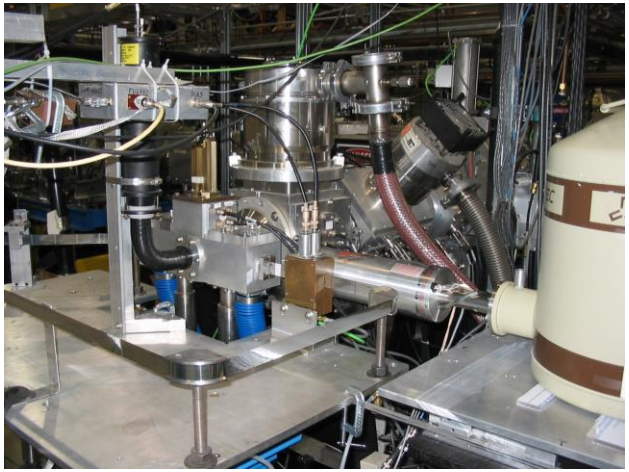
Prof Danny Ashery
Tel Aviv University

Superallowed β-Decay Studies

1998-2003
Collaborator in high-precision lifetime measurements at GPS



Dr. John Macdonald
TRIUMF Research Scientist

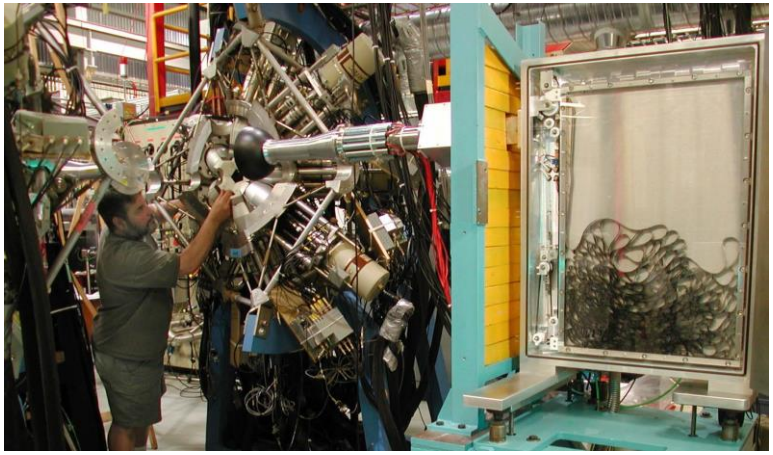


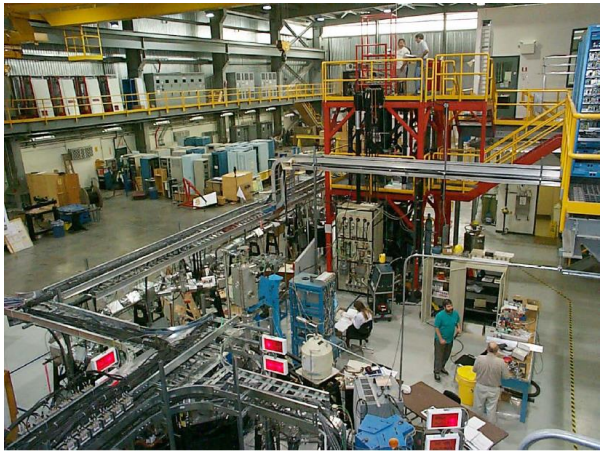
Gamma-Ray Spectroscopy at ISAC

Randy Churchman
Super Technician

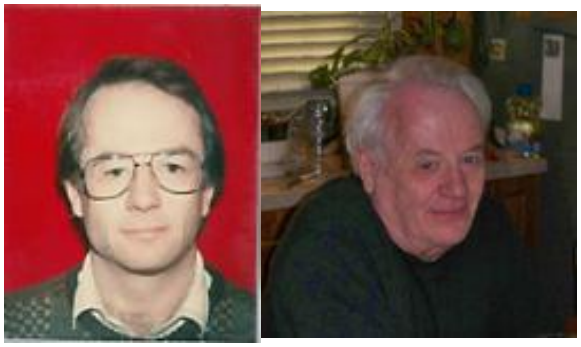
1998-2014

- Technical support for GPS, the 8π Spectrometer TIGRESS and GRIFFIN
- His knowledge and expertise were invaluable to the success of these projects





Physical Science Division



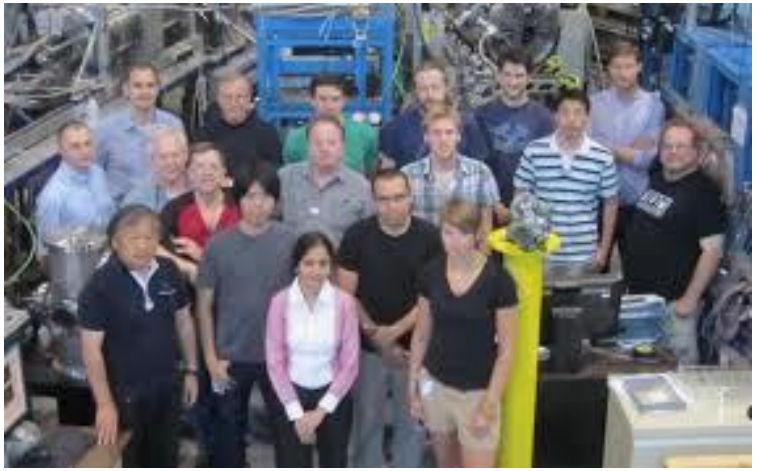
Grant Sheffer

Member of Detector Group

Manager of electronics pool.

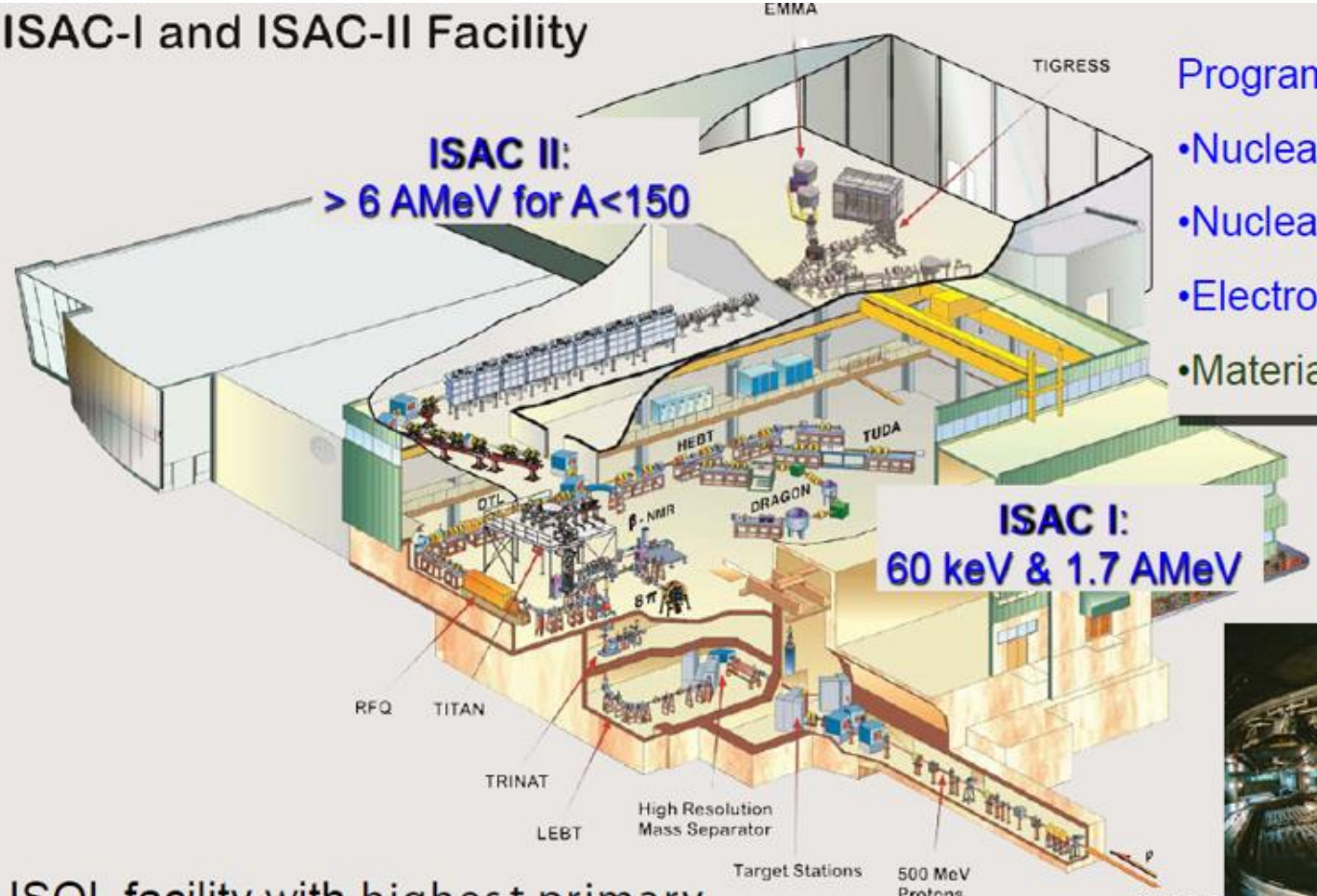
Design and construction of detectors for ISAC experiments

- **Contributed to the design & build of the NEURAL detector for neutron reactions at Los Alamos, for Nuclear Astrophysics, led by TRIUMF team**
- **Design and fabrication of ion chamber for IRIS**



TRIUMF ISAC 20th Anniversary

ISAC-I and ISAC-II Facility

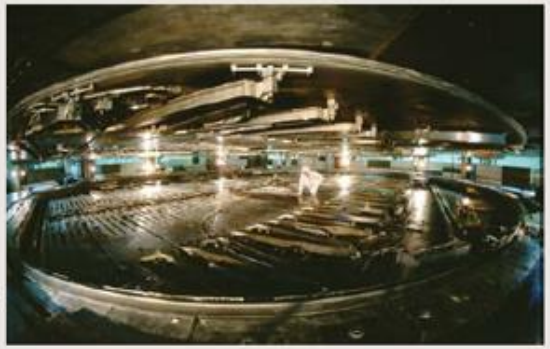


ISAC II:
> 6 AMeV for A<150

ISAC I:
60 keV & 1.7 AMeV

Programs in

- Nuclear Structure & Dynamics
- Nuclear Astrophysics
- Electroweak Interaction Studies
- Material Science
- Medical isotopes



ISOL facility with highest primary beam intensity (100 μA, 500 MeV, p)

target materials: Si, Ti, Zr, Nb, Ta, U **Dec 2011: 10μA on UC_x**

TRIUMF