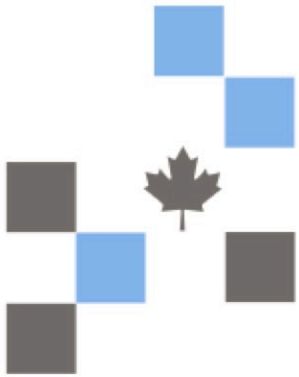

TOGETHER SINCE
ENSEMBLE DEPUIS
1971

Celebrating IPP's 50 Years 'Round Table'

28 May 2022

Moderator: J. Michael Roney

INSTITUTE OF PARTICLE PHYSICS
50 YEARS
INSTITUT DE PHYSIQUE DES PARTICULES

https://cns-snc.ca/media/history/early_years/earlyyears.html

Some of the initial research staff of the Montréal Laboratory, 1943.

Standing: A.M. Munn (C), B.L. Goldschmidt, J.W. Ozeroff (C), B.W. Sargent (C), G.A. Graham (C), J. Guéron, H.F. Freundlich, H.H. Halban, R.E. Newell, F.R. Jackson, J.D. Cockroft (visiting the laboratory), P. Auger, S.G. Bauer, N.Q. Laurence, A. Nunn May. Seated: W.J. Knowles (C), P. Demers (C), J.R. Leicester, H. Seligman, E.D. Courant, E.P. Hincks (C), F.W. Fenning, G.C. Laurence (C), B. Pontecorvo, G.M. Volkoff (C), A. Weinberg (U.S. Liason officer), G. Placzek.

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Reminiscences of some Canadian Particle Physicists

- Robert Carnegie (IPP Director 1995-2001)
- Richard Hemingway (IPP Research Scientist, retired)
- Penny Estabrooks (IPP Research Scientist, retired)
- Francois Corriveau (IPP Research Scientist)
- Janis McKenna (UBC prof &former IPP RS)
- William Trischuk (IPP Director 2004-2013)
- David Sinclair (First SNOLAB Director)
- Michael Roney (IPP Director 2013- present)

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Bob Carnegie
IPP Director 1995-2001

1. The Early Years: It is important to recognize the initial team that formed IPP in 1971 and then led IPP for the next 20 years: Bernie Margolis and Doug Stairs of McGill, Jim Prentice at Toronto, and Ted Hincks at Carleton-NRC. The IPP Council structure with its 5 year term chair and it's rotating 3 year term members has always been very effective in representing our particle physics community. By the mid 1970s, the IPP chair and council were already recognized as the collective spokesperson and advocates for particle physics in Canada, both with government agencies and with the other sub-fields of physics.

It should be highlighted that within the first 10 year period, (i) the research scientist program was established and six appointments were made, (ii) a separate HEP GSC was split off from the NRC general physics granting committee; and the HEP GSC committee membership evolved quickly to include both CDN and non-CDN members with a CDN GSC chair. When NSERC was established in 1978, the existing HEP GSC committee makeup and procedures were transferred without change to NSERC. This included the use of multi-institution project grants.

By the late 1970s the growing IPP community was participating in a few larger fixed target collaborations at Fermilab and SLAC. But already in 1980, IPP had started to explore participation in the next generation of collider experiments. In 1981-82, IPP joined three new longer term collider experiment initiatives: at DESY - ZEUS at HERA and ARGUS at DORIS, and at CERN - OPAL at LEP.

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Bob Carnegie
IPP Director 1995-2001

2. IPP 1995-2001 : My term as director of IPP began in Jan. 1995 when I succeeded Alan Astbury after he had become the TRIUMF director.

The first few years coincided with an unexpected SAP funding crisis that resulted from the 1994 NSERC first Reallocation review, a process that attempted to rank, and then redistribute funds between all of its science and engineering GSCs. SAP received a low ranking in this review; the total SAP annual funding was to be cut by 10% phased in over four years.

This situation led to a series of internal IPP and SAP program reviews to understand the consequences of the reduced funding level. By 1997 the combined IPP, TRIUMF and nuclear communities had developed a "SAP survival plan" that identified and prioritized funding for SNO, ATLAS, and ISAC as the key longer term future projects; funding for everything else was to be scaled back as needed to protect these areas. Fortunately as this plan was being implemented, in 1998 NSERC received a significant increase in its total annual funding. This new funding was widely distributed to most NSERC programs including SAP.

One very positive highlight of my director years involved a series of meetings in Sudbury between IPP council and the SNO physicists to discuss having the SNO team join IPP. This was agreed, and led to a substantial expansion of IPP membership and the addition of SNO as an IPP project.

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Richard Hemingway
IPP Research Scientist 1977-2007

Firstly, thanks to you Mike Roney, for having organized such an excellent meeting.

Secondly, I want to thank IPP, Carleton University, and Canada for offering me a career position as a research scientist in 1977, an office amongst great colleagues in a university environment, and citizenship in a new country. Over my 30 years of research, I can honestly say that every single year was exciting and memorable!

When I reflect on my career in Canada I have chosen CHEER as my most significant contribution to the advancement of particle physics. The NSERC funded feasibility study to design a 10 GeV electron ring, construct it here in Canada, and to mount it tangentially to a spare straight section at the FNAL Tevatron, would have allowed e-p collisions at the highest energies. The project captured the excitement of many IPP scientists within Canada and several others in the USA. Unfortunately the 83M$ price tag was too much at that time and the project was not approved. Nevertheless Canada was noticed abroad and IPP was invited to join major collider projects in Europe, including Argus and Zeus at DESY and OPAL at CERN. Perhaps CHEER signalled a “coming of age” for IPP?

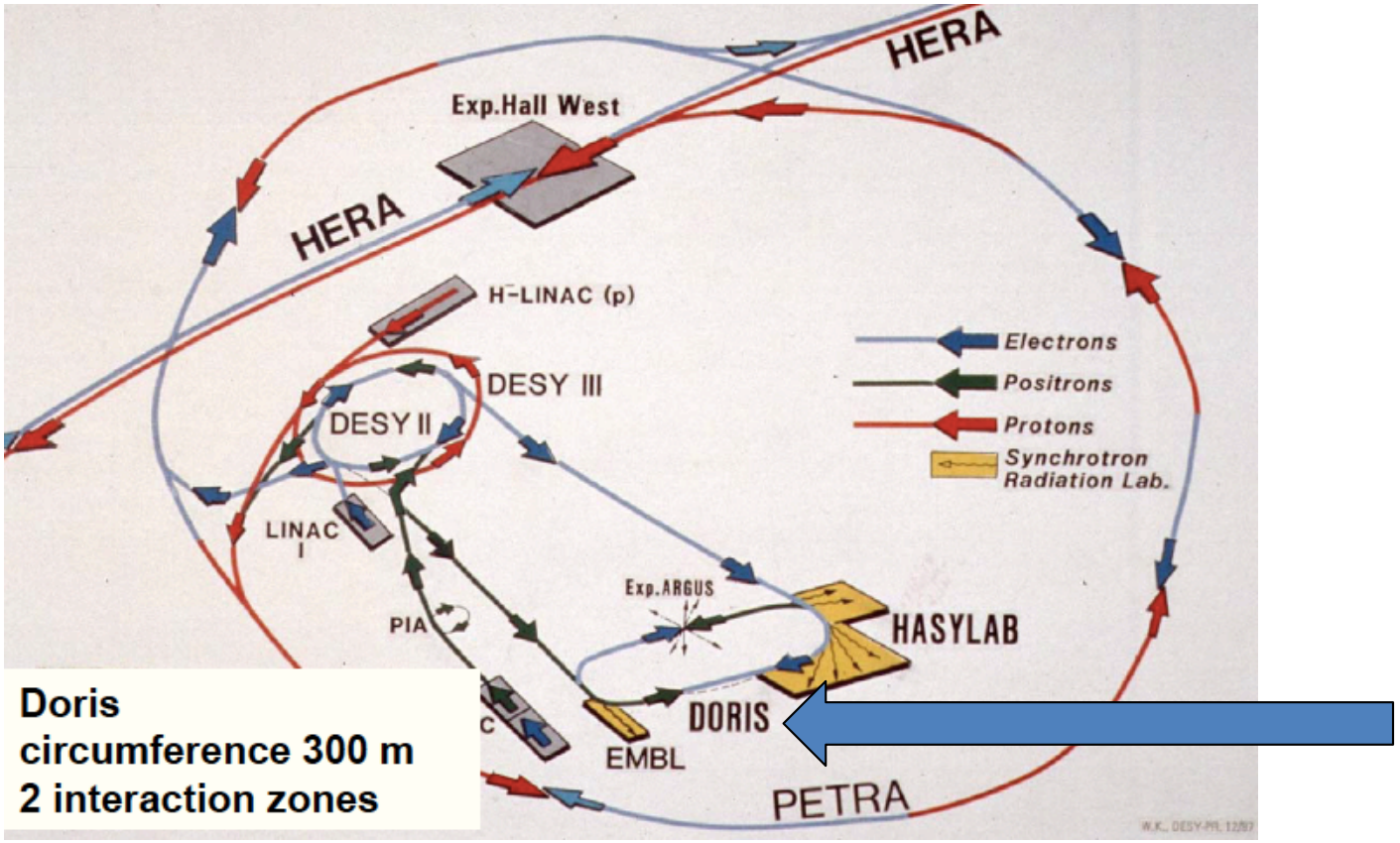
ARGUS

A Russian, **G**erman, **U**S, **S**wedish detector

IPP joined: A Rather **G**ood **U**psilon **S**pectrometer

Small experiment !

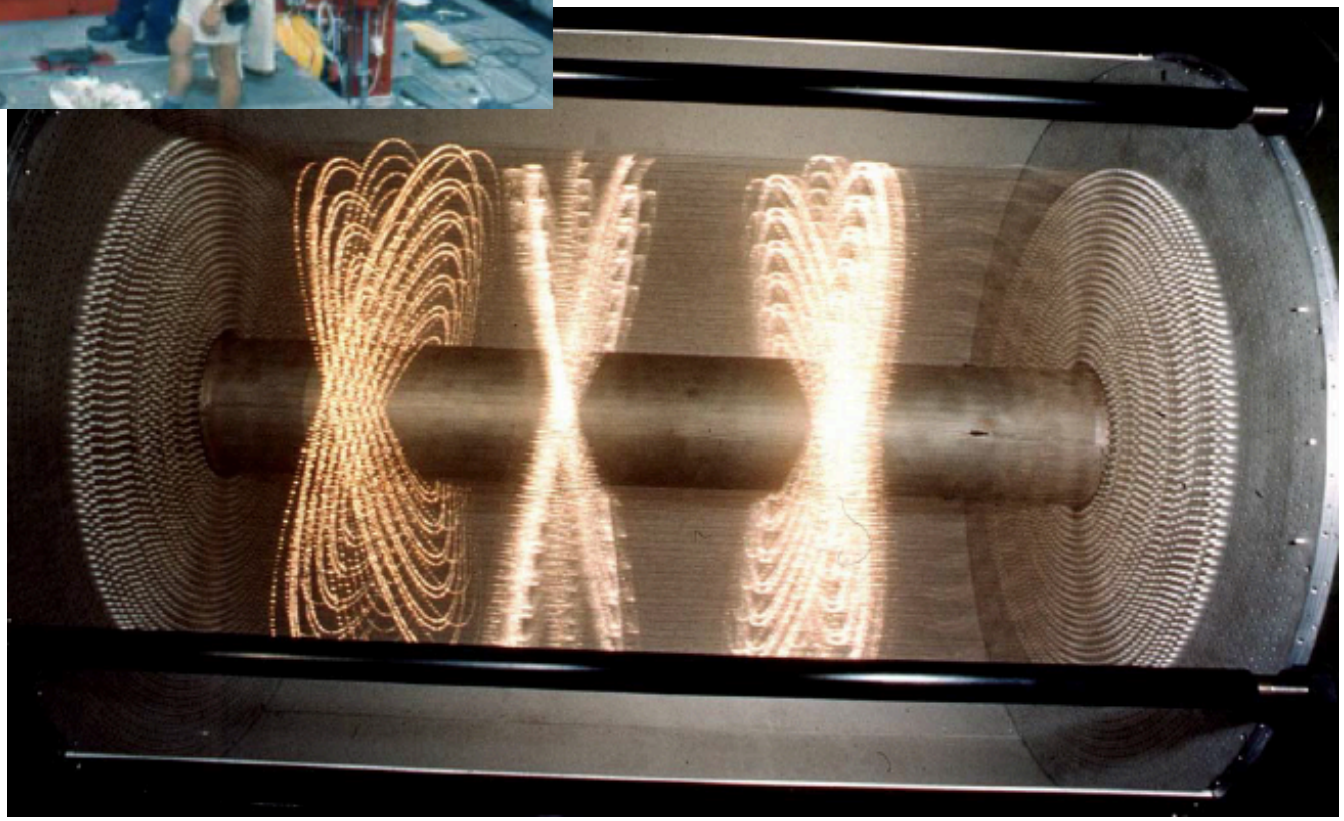
ARGUS – on DORIS ring at DESY



e+ e- collider, ~10.5 GeV ARGUS and Crystal Ball at DORIS

(for first 2-3 years, Crystal Ball seemed higher priority)

Small detector!

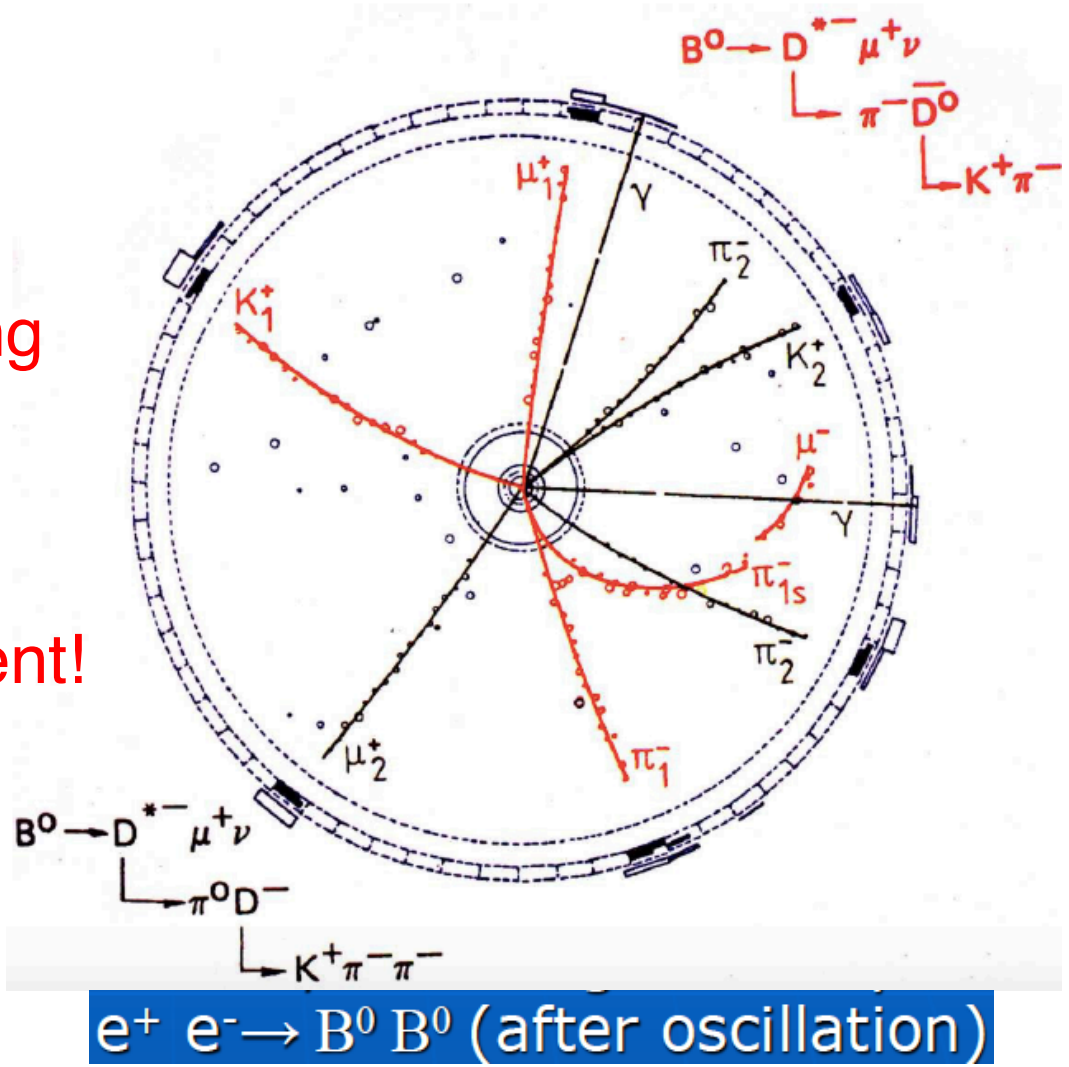


Stereo drift chamber with dE/dx
–innovative at that time

ARGUS ran 1983-1992 highlight in 1987:

First observation of B $\bar{B}$ mixing

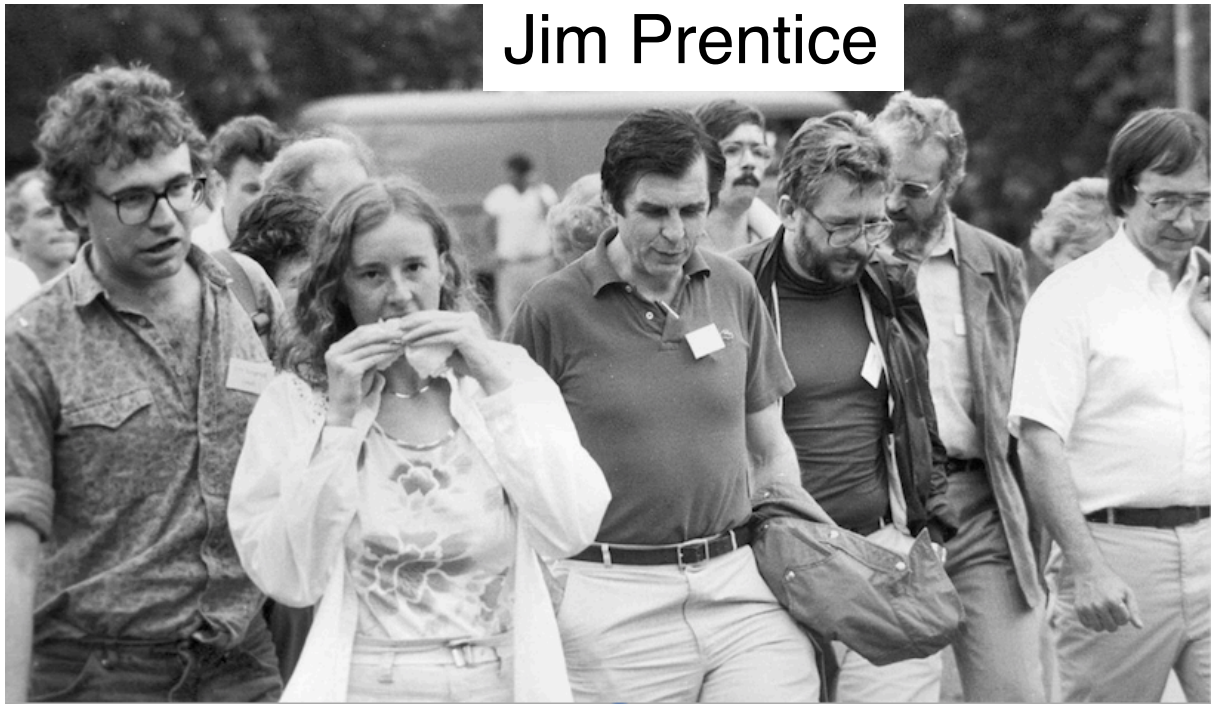
Even got one fully reconstructed B-B mixing event!



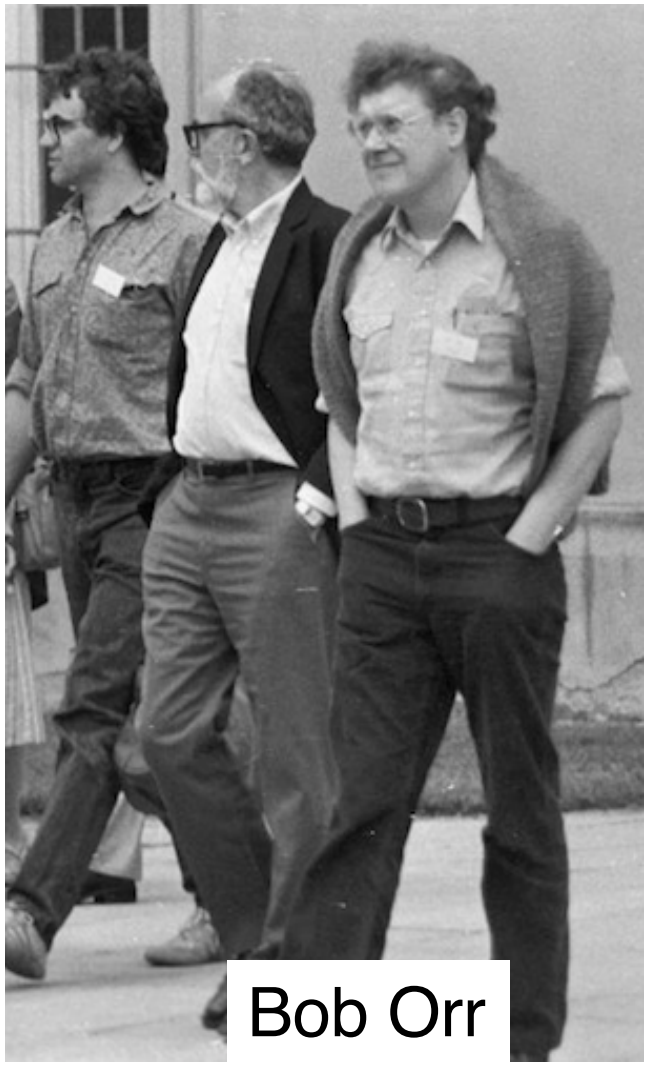
$e^+ e^- \rightarrow B^0 B^0$ (after oscillation)

ARGUS: "Observation of B^0–$\overline{B}^0$ mixing"

[June 25: Phys. Lett. B **192** (1987) 245]



Jim Prentice



Bob Orr

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IPP was a huge part of ARGUS

Volume 192, number 1,2 PHYSICS LETTERS B 25 June 1987

OBSERVATION OF B^0–$\bar{B}^0$ MIXING

ARGUS Collaboration

H. ALBRECHT, A.A. ANDAM [1], U. BINDER, P. BÖCKMANN, R. GLÄSER, G. HARDER, A. NIPPE, M. SCHÄFER, W. SCHMIDT-PARZEFALL, H. SCHRÖDER, H.D. SCHULZ, R. WURTH, A. YAGIL [2,3]
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Institute of Particle Physics [10], Canada

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L. JÖNSSON
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A. BABAEV, M. DANILOV, B. FOMINYKH, A. GOLUTVIN, I. GORELOV, V. LUBIMOV, V. MATVEEV, V. NAGOVITSIN, V. RYLTSOV, A. SEMENOV, V. SHEVCHENKO, V. SOLOSHENKO, V. TCHISTILIN, I. TICHOMIROV, Yu. ZAITSEV
Institute of Theoretical and Experimental Physics, 117 259 Moscow, USSR

R. CHILDERS, C.W. DARDEN, Y. OKU
University of South Carolina [14], Columbia, SC 29208, USA

and

H. GENNOW
University of Stockholm, S-113 46 Stockholm, Sweden

Great Physics, Good place to learn, and so many ARGUS-group bicycle trips through northern Germany!

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CDF and the IPP

- One of the first 'small' IPP projects
  - Sinervo, Ragan, Trischuk, Pinfold, Orr, Warburton, Savard, …
- Trail-blazing hadron collider physics
  - Top quark discovery
  - Precision *W* mass(es)
  - CP violation in *B* meson decay
  - Higgs searches
- Connections to Lockyer
  - SAPES chair in early 2000's
  - IPP/TRIUMF connections

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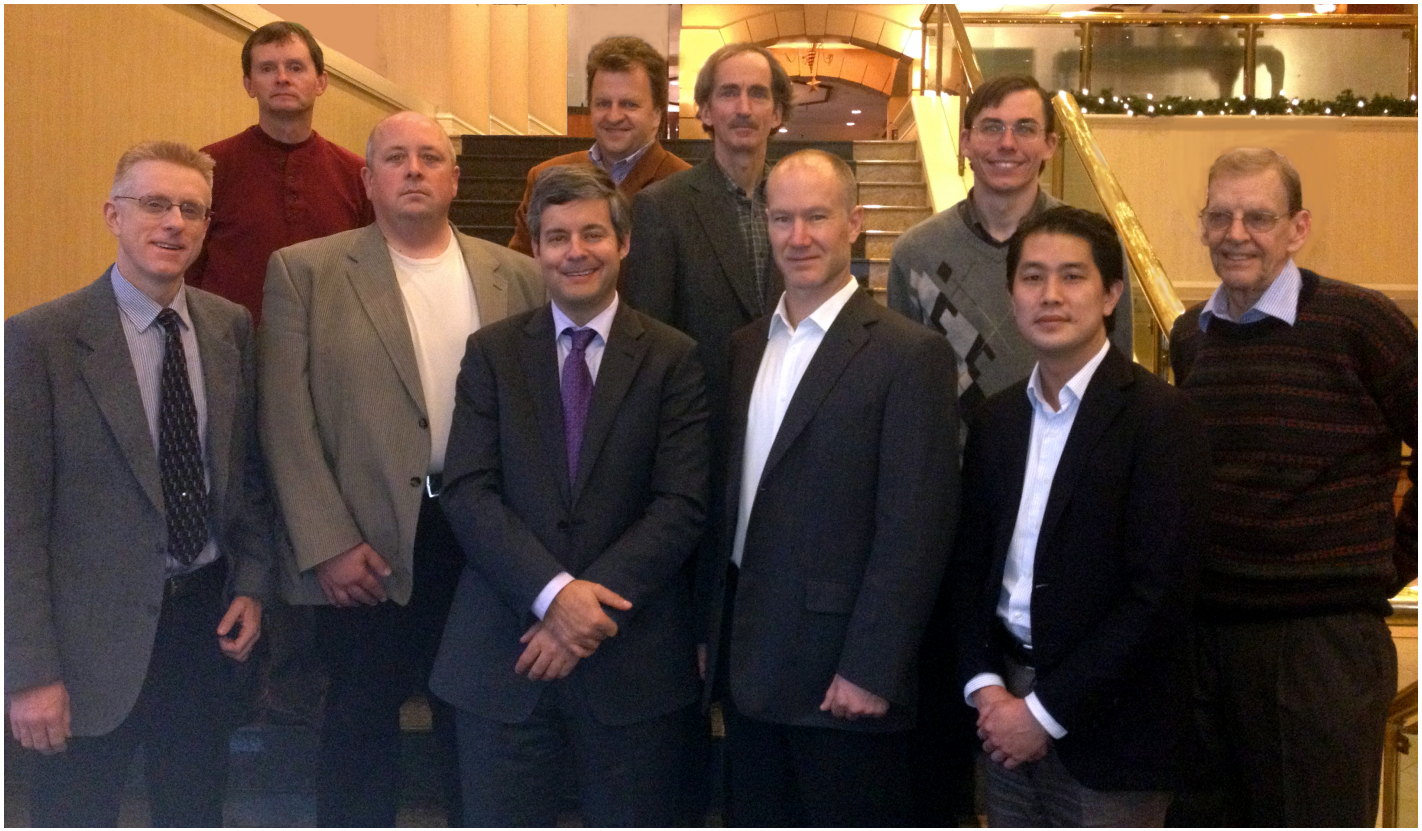
Large Projects Day 2013 – Montreal



William Trischuk (Toronto)
IPP celebration

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Past IPP Summer Students

Last updated 2013…

Year	Name	Undergrad	Supervision	Grad School	Field
2007	Rabinovitch	Yale	TRIUMF	Cal Tech	Aerospace Eng.
2008	Guindon	Ottawa	Carleton	Germany	ATLAS
	Ilic	Waterloo	Toronto	Toronto	ATLAS
	Louca	Waterloo	McMaster	McMaster	Biology
	McCarthy	Queens	Carleton	Carleton	ATLAS
2009	Abouzeid	Carleton	Toronto	Toronto	ATLAS
	Dupuis	Victoria	Victoria	McGill	Theory
	Feige	McGill	Toronto	Harvard	Theory
	LaFlamme	McGill	McGill	Austria	Condensed Matter
	Low	UBC	McGill	Chicago	ATLAS
2010	Krizka	Simon Fraser	Toronto	Chicago	ATLAS
	Moult	UBC	Victoria	MIT	Theory
	LeBlanc	Acadia	TRIUMF	Victoria	ATLAS
	Pachal	Victoria	Victoria	Oxford	ATLAS
	Picard	Victoria	Montreal	McGill	Mathematics
2011	Buck	Carleton	Carleton	UBC	Accelerator physics
	Burke	Victoria	UBC		
	Collins-Fekete	Laval	Carleton	Carleton	ATLAS(?)
	McDonald	MacMaser	Simon Fraser	Alberta	Condensed Matter
	Portillo	Alberta	Alberta	Harvard	Astrophysics
2012	Abdel-Aziz	Toronto	Toronto		
	Bluteau	Acadia	TRIUMF		
	Boone	UBC	UBC		
	Friedl	Carleton	Carleton		
	Killick	Carelton	Carleton		
2013	Abidi	Toronto			
	Hedrich	Thompson Rivers			
	Layden	Waterloo			
	Rettie	Ottawa			
	Waslaski	UBC			

Screenshot

William Trischuk (Toronto)
IPP celebration

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Canadian Subatomic Physics Long Range Plans

Ragan (2006 LRP chair)

Butler (2011 LRP chair)

Screenshot

William Trischuk (Toronto)
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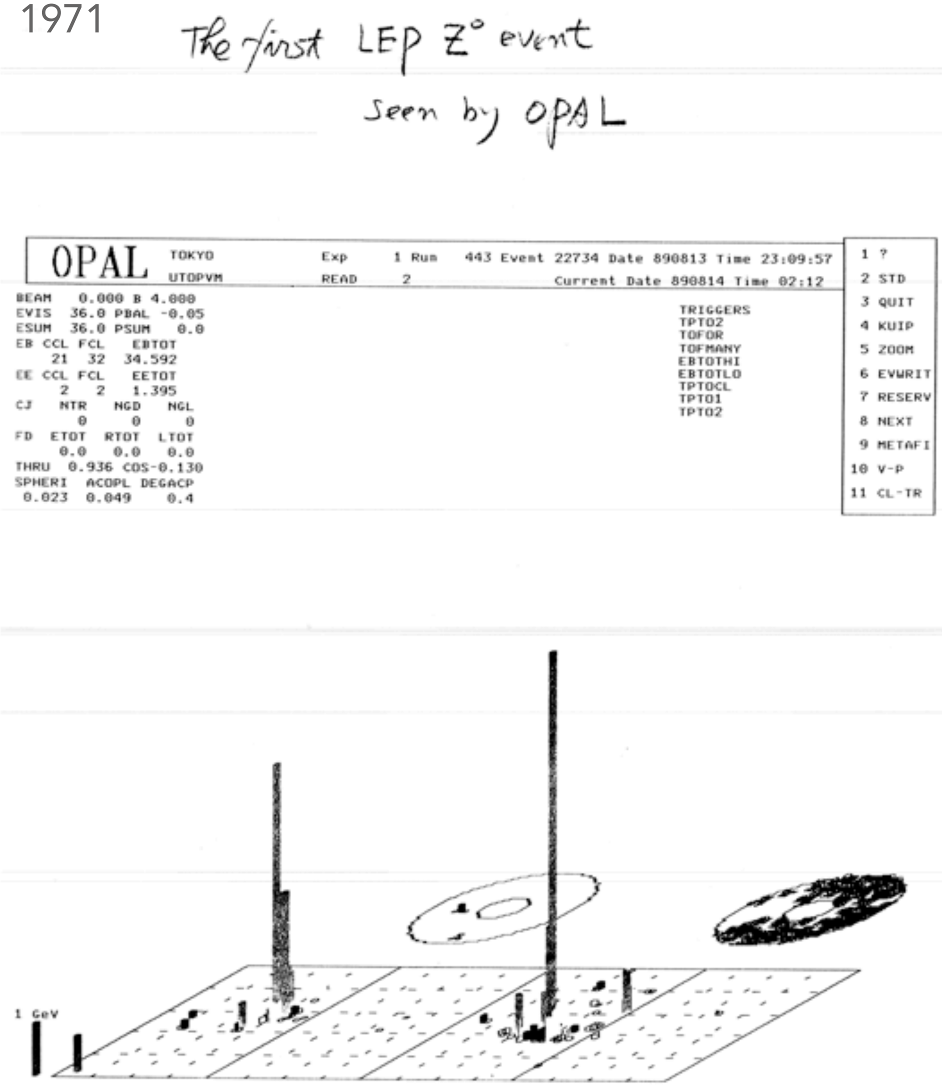
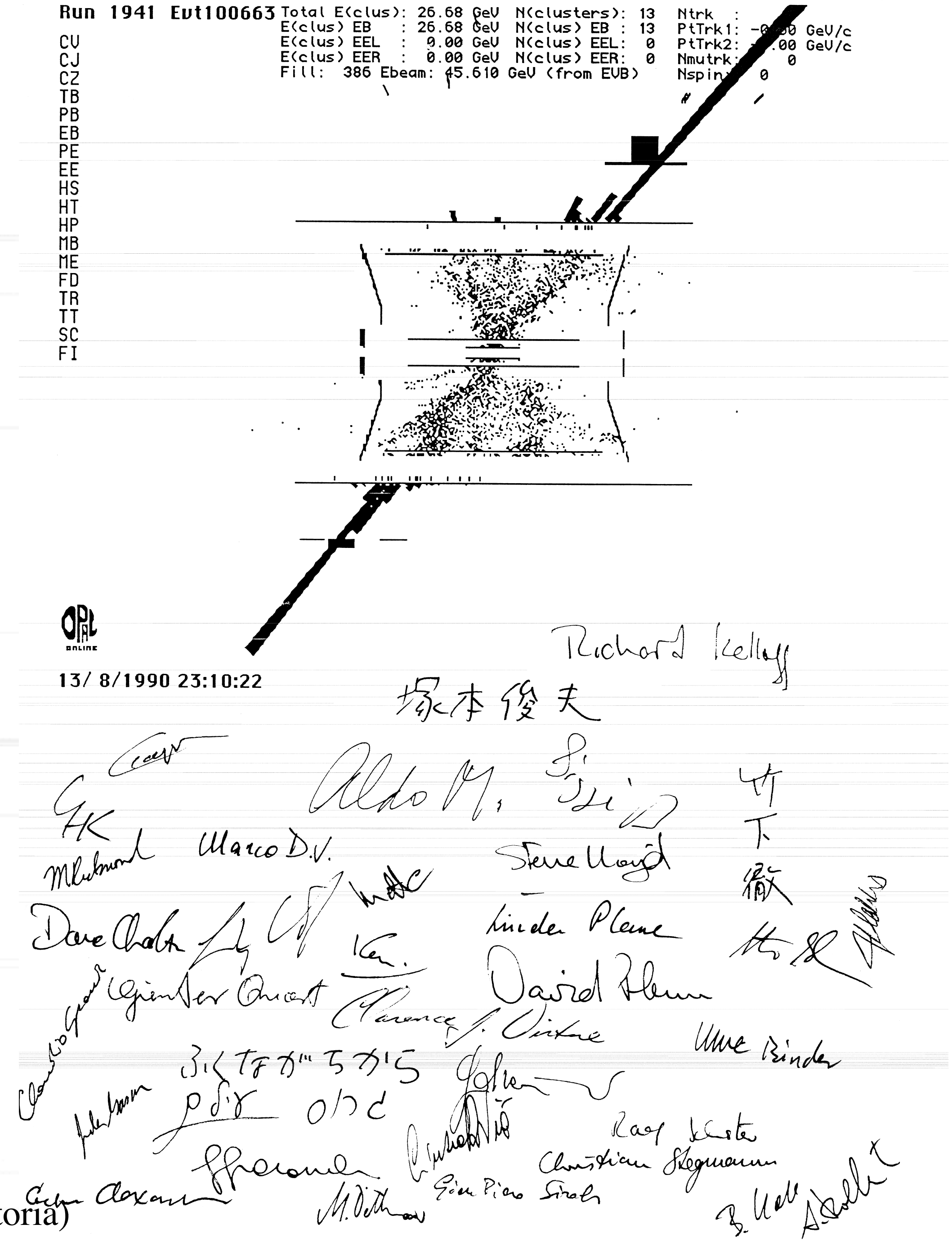
First OPAL Event and event one year later...





Michael Roney (Victoria)
IPP celebration

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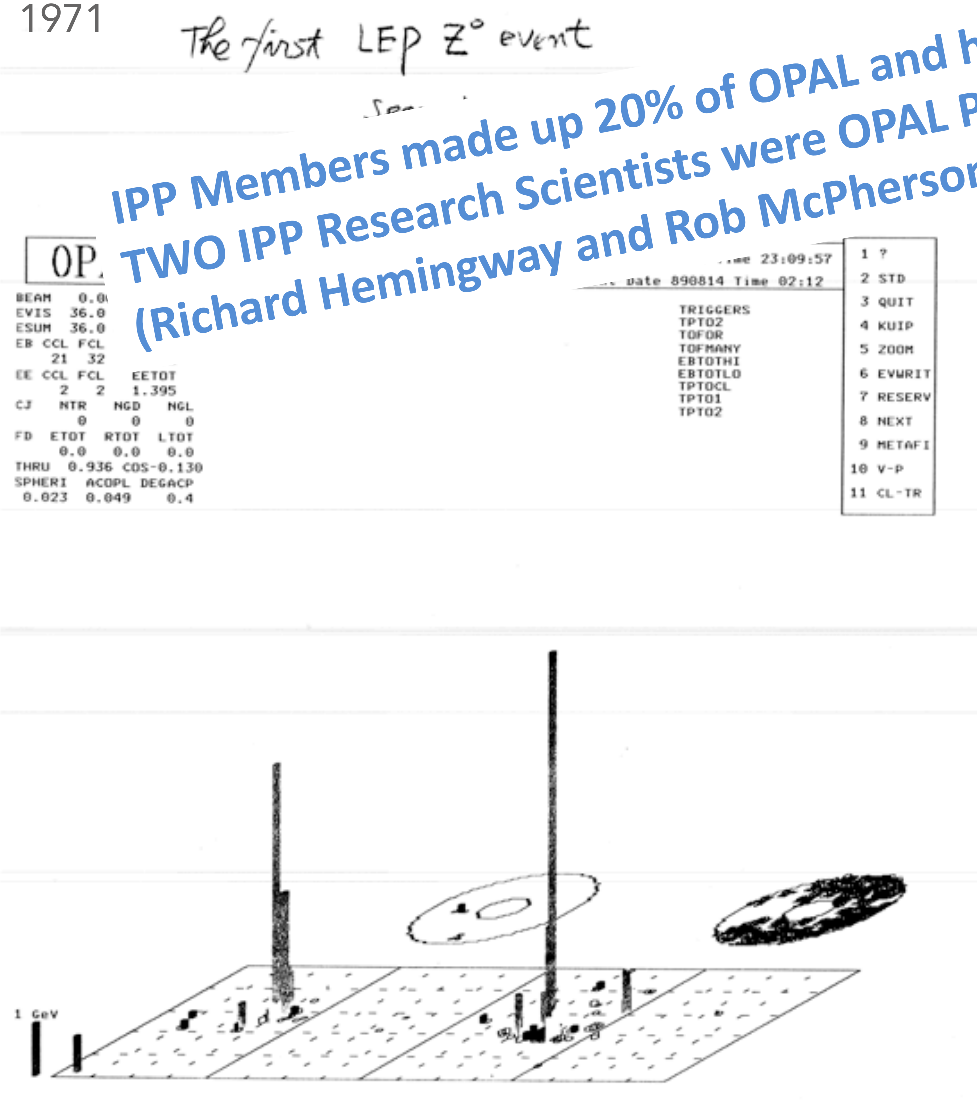
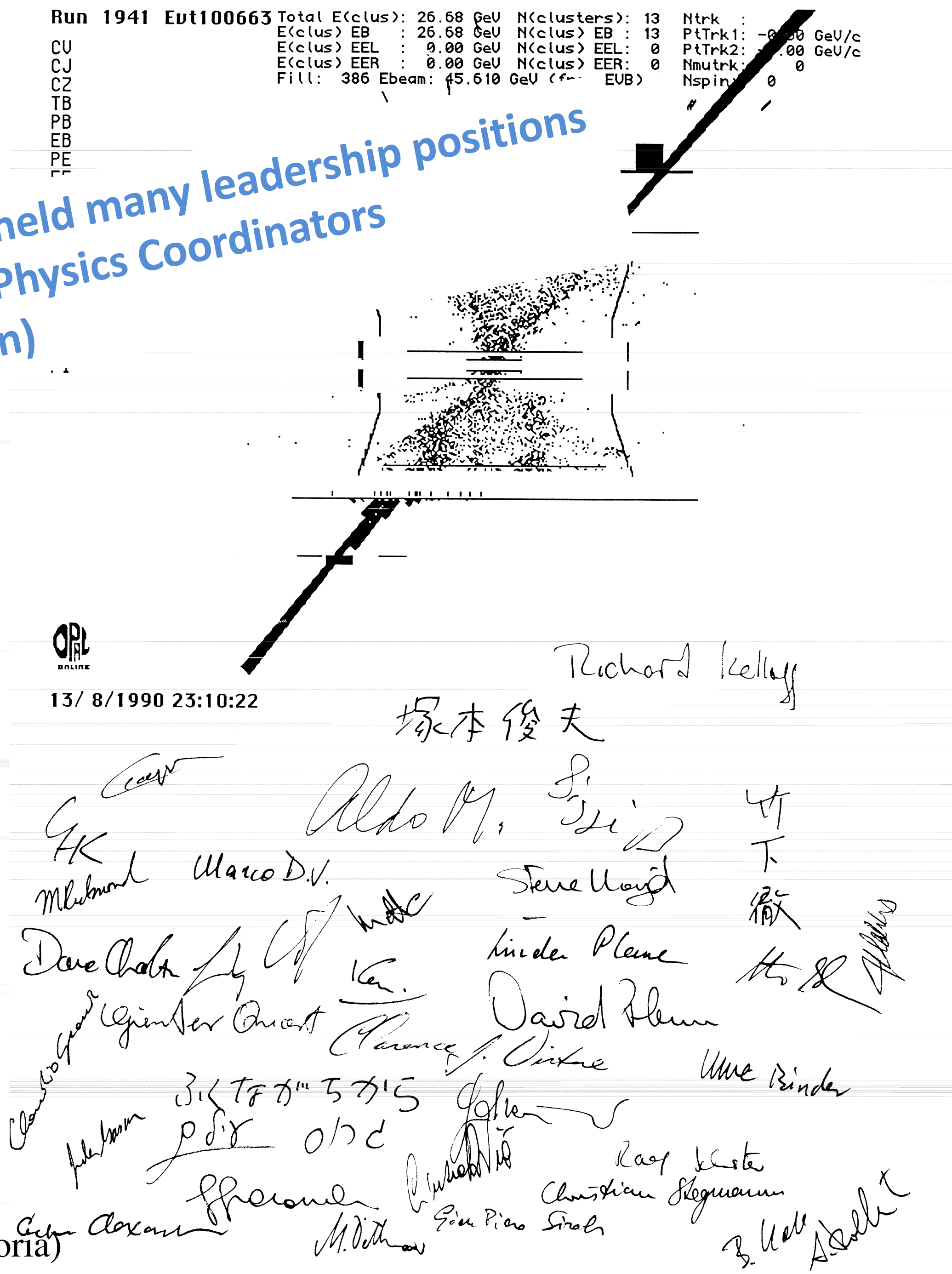
First OPAL Event and event one year later...

IPP Members made up 20% of OPAL and held many leadership positions

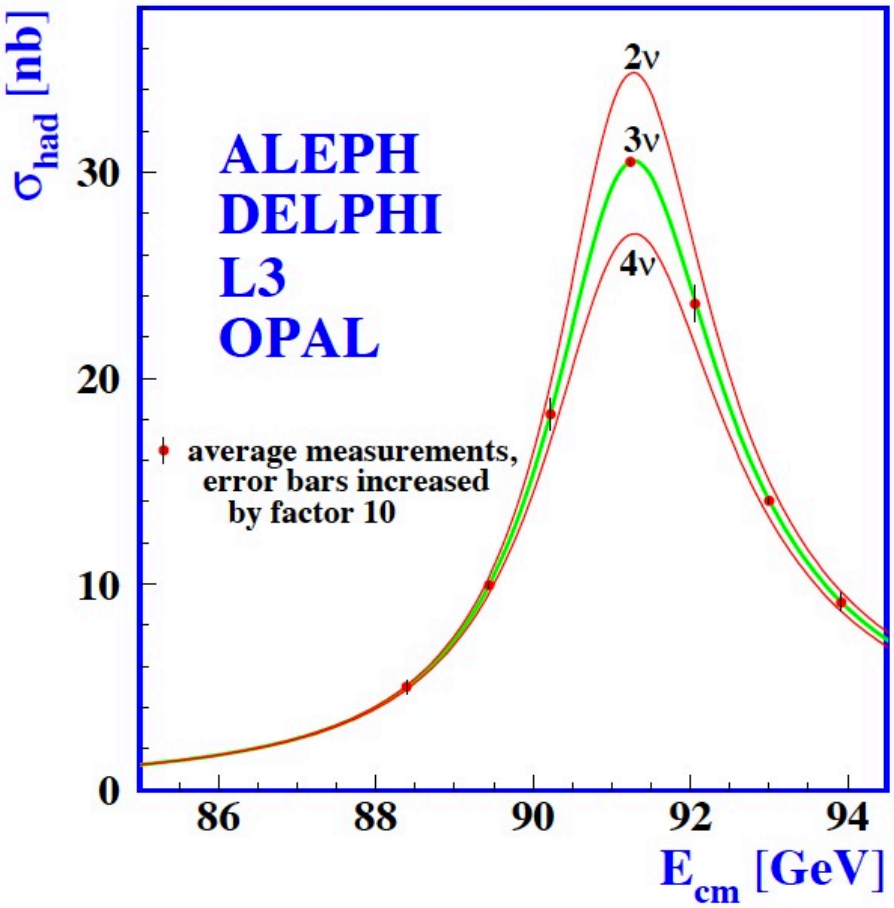
TWO IPP Research Scientists were OPAL Physics Coordinators (Richard Hemingway and Rob McPherson)





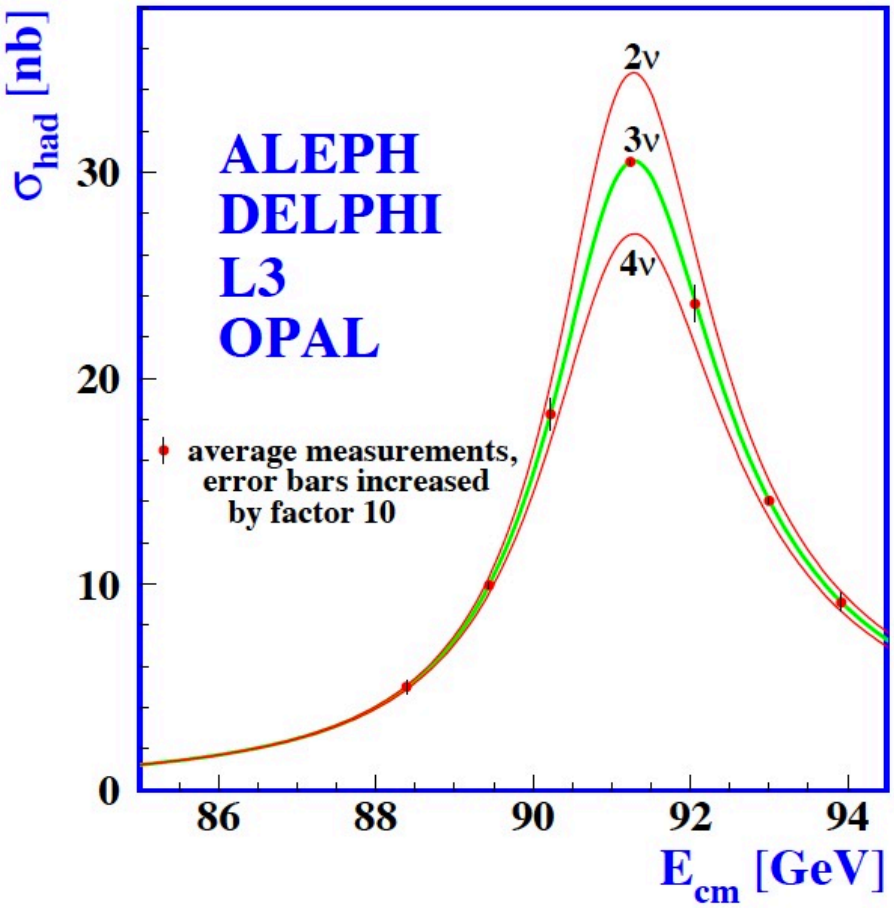
Michael Roney (Victoria)
IPP celebration

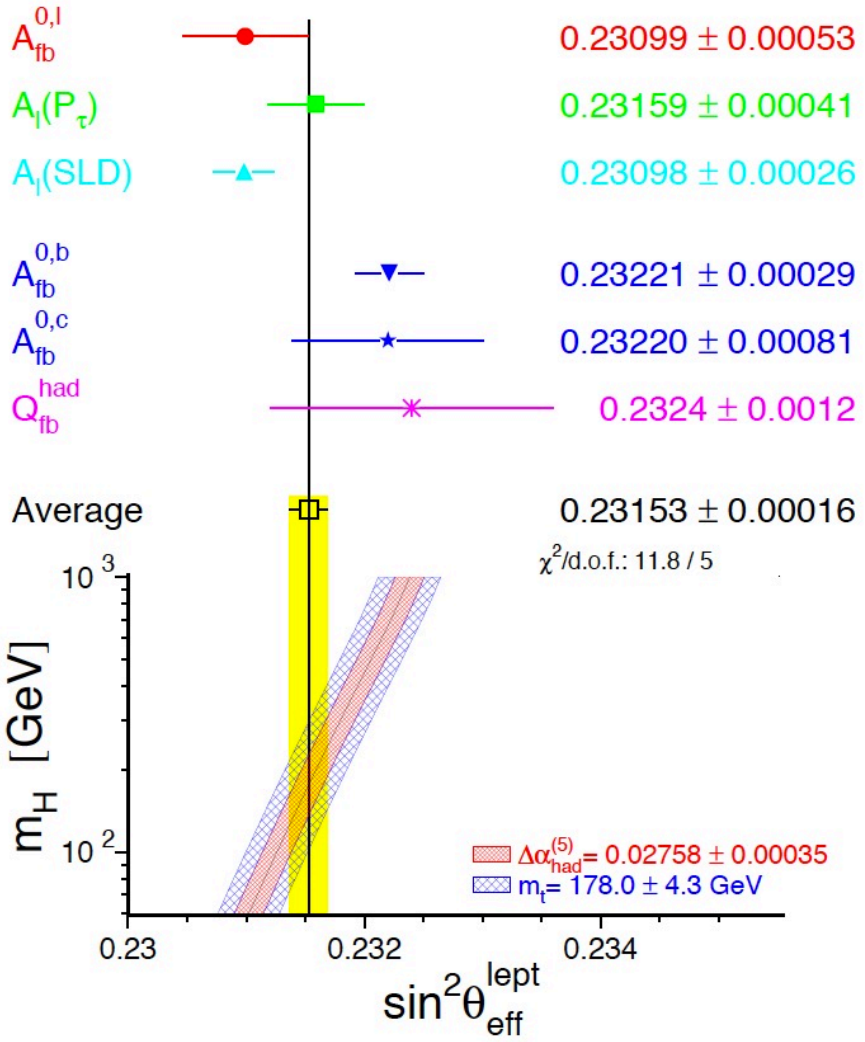
LEP – produced the three neutrino result....



LEP – produced the three neutrino result....

plus $\sin^2\theta_W$





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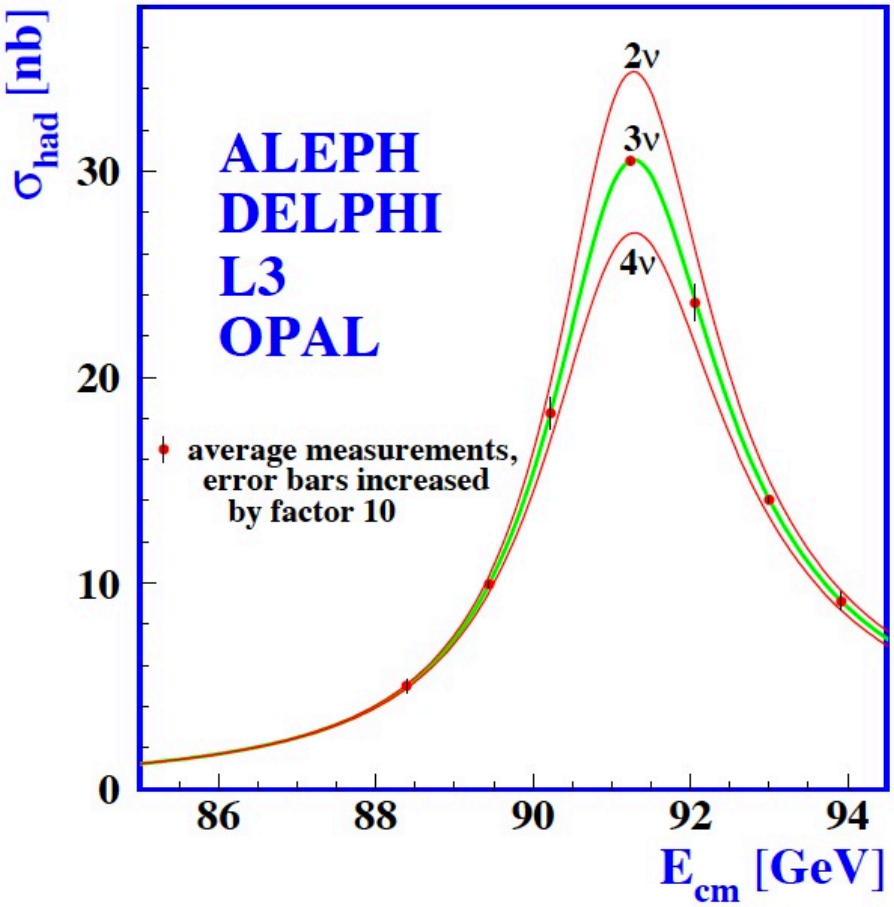
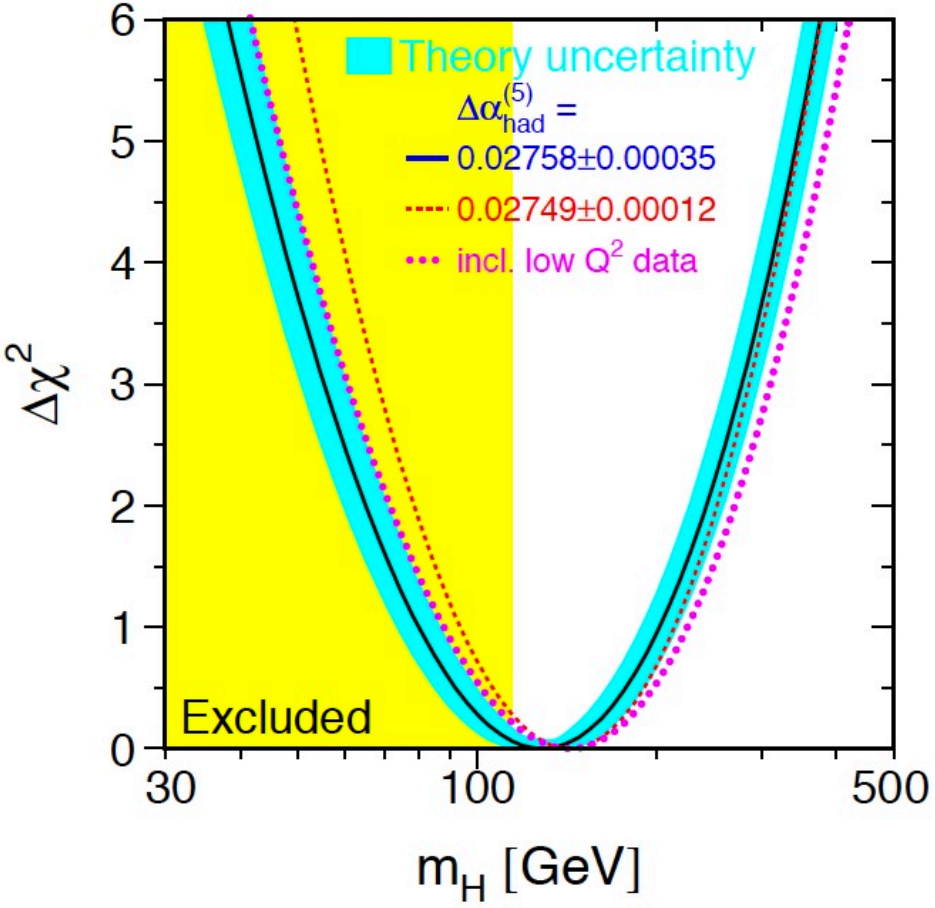
LEP – produced the three neutrino result....

plus $\sin^2\theta_W$

plus the Higgs mass constraints





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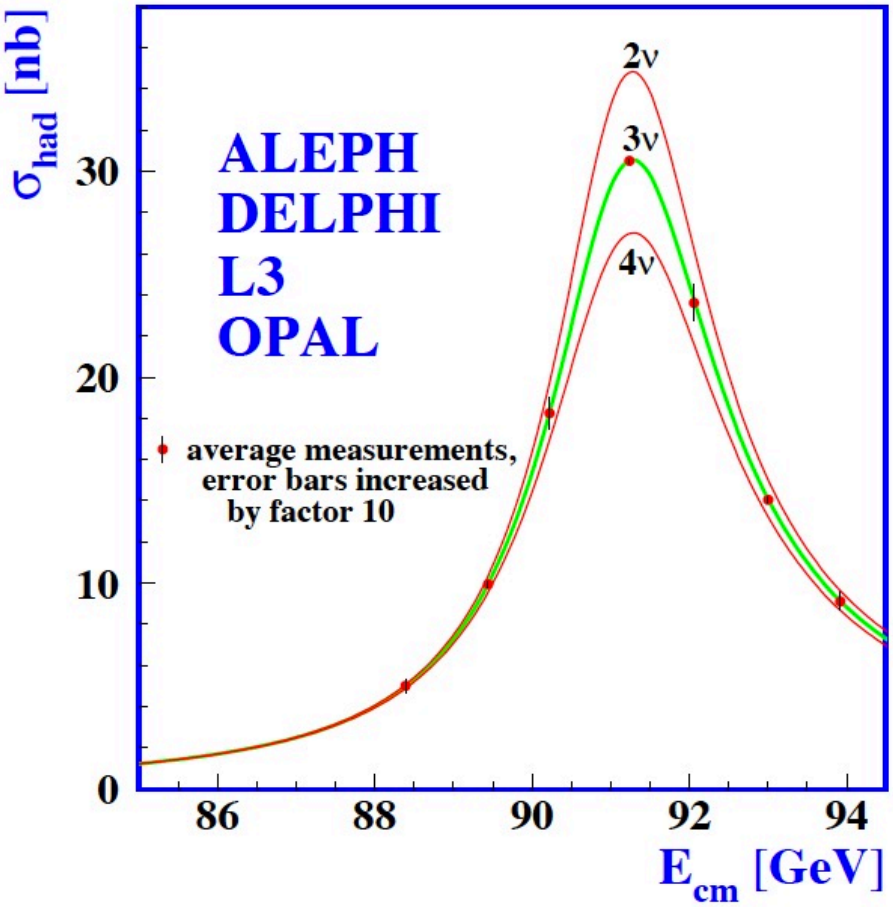
LEP – produced the three neutrino result....

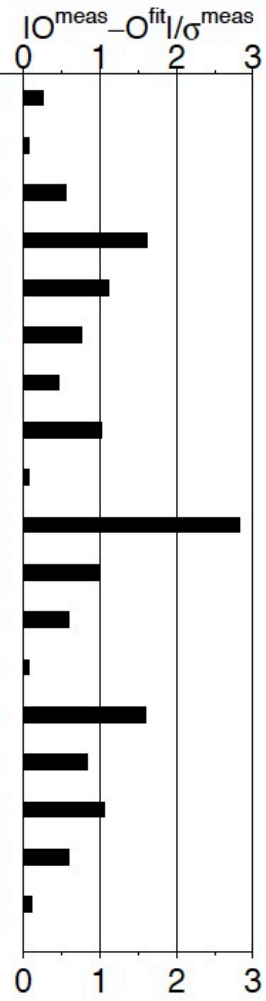
plus $\sin^2\theta_W$

plus the Higgs mass constraints

Plus much, much more....



	Measurement	Fit
$\Delta\alpha^{(5)}_{had}(m_Z)$	0.02758 ± 0.00035	0.02767
m_Z [GeV]	91.1875 ± 0.0021	91.1874
Γ_Z [GeV]	2.4952 ± 0.0023	2.4965
σ^0_{had} [nb]	41.540 ± 0.037	41.481
R_l	20.767 ± 0.025	20.739
$A^{0,l}_{fb}$	0.01714 ± 0.00095	0.01642
$A_l(P_\tau)$	0.1465 ± 0.0032	0.1480
R_b	0.21629 ± 0.00066	0.21562
R_c	0.1721 ± 0.0030	0.1723
$A^{0,b}_{fb}$	0.0992 ± 0.0016	0.1037
$A^{0,c}_{fb}$	0.0707 ± 0.0035	0.0742
A_b	0.923 ± 0.020	0.935
A_c	0.670 ± 0.027	0.668
A_l(SLD)	0.1513 ± 0.0021	0.1480
$\sin^2\theta^{lept}_{eff}(Q_{fb})$	0.2324 ± 0.0012	0.2314
m_W [GeV]	80.425 ± 0.034	80.389
Γ_W [GeV]	2.133 ± 0.069	2.093
m_t [GeV]	178.0 ± 4.3	178.5



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IPP Early Career Theory Fellowship

Launched in 2019, Fellowships, awarded in national competition, enable outstanding theory PhD students and postdocs to be present for a period between two weeks and six months at an international university, laboratory, or institute.

Purpose: encourage scientific collaboration between theorists in Canada and those abroad and enhance the career prospects of junior researchers

More information about the fellowship:

https://particlephysics.ca/research-activities/early-career-theory-fellowship/?lang=en

COVID19 TRAVEL RESTRICTIONS FORCED THE PROGRAM TO BE ON HOLD

Competition will for coming year will proceed

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LAUNCHING
IPP 50th Anniversary Connect Fellowship

- The IPP 50th Anniversary Connect Fellowship will strengthen the Canadian particle physics research effort through the support of connections between IPP institutions
- It will be a four year fellowship partnering at least two IPP institutions where the first two years are located at one institution and the other two at the second institution. It could be with TRIUMF, SNOLAB, PI or any university with an IPP Member.
- This fellowship is to support research that connects and adds value to at least two particle physics research domains (two experiments, two theory areas, or experiment-theory).

More Information in the Closeout session

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Some 'telegrams' – read at the Banquet

Congratulations to IPP on 50 years of accomplishment. I well remember the excitement associated with new opportunities opening up in Canadian HEP during the 1980s under my "watch" at NSERC, facilitated by a young IPP and an active Physics and Astronomy Committee that included the formidable Dick Taylor who pushed for us being bold and ambitious at the high energy frontier. It is wonderful to see how IPP and HEP have evolved. Again – my congratulations on reaching 50.

From - *Janet E. Halliwell, Director General, Research Grants NSERC, 1980-1990*

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Some 'telegrams' – read at the Banquet

IPP can be very proud of its extensive achievements over the last 50 years in support of the Canadian particle physics research community. Personally, it has been a pleasure and a privilege to work with IPP's members and serve them while I oversaw the subatomic physics portfolio within NSERC's Research Grants. I wish IPP and its members the very best for the future.

From: *Samir Boughaba, NSERC, Deputy Director Research Partnerships*

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Some 'telegrams' – read at the Banquet

" I wish you and your colleagues a wonderful 50th anniversary event!"

From: Danika Goosney , Vice President, Research Grants and Scholarships, NSERC

"Congratulations on your 50th anniversary"

From: *Alejandro Adem, President of NSERC*