

Particle Physics Department Introduction

Oliver Stelzer-Chilton, Mark Hartz

ACOT Meeting, April 22nd, 2021

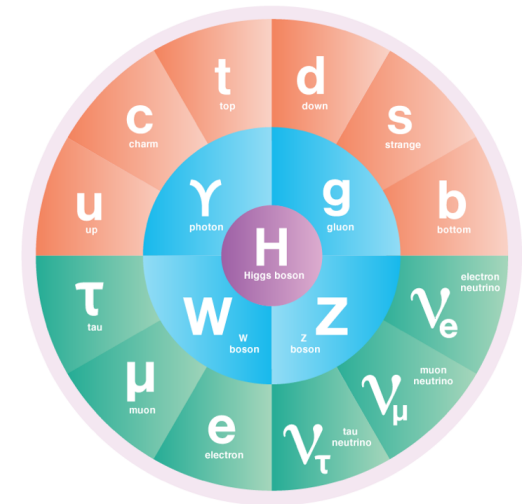
Particle Physics within the Physical Sciences Division

The Departments for **Particle Physics**, as well as **Theory** and **Science & Technology** address the following Research topics:

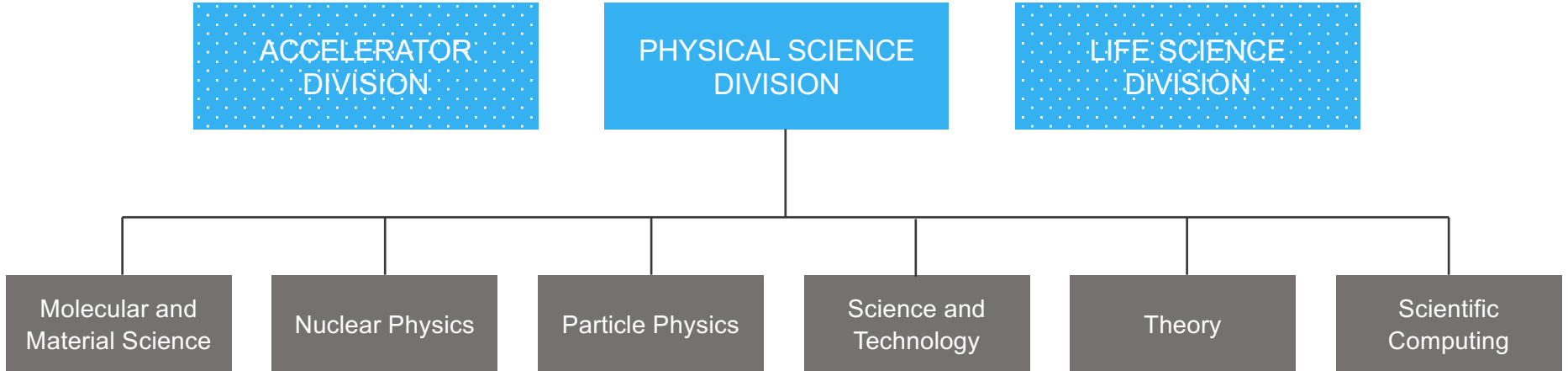
- High Energy Frontier
- Neutrinos and Dark Matter
- Precision Tests of Fundamental Interactions

*Monthly meetings inclusive to Particle Physics Theory,
Science and Technology and
Scientific Computing Department members*

*Dark Matter Forum Meetings
Science and Technology Seminars*



Physical Sciences Division and its Departments



Particle Physics Department

Particle Physics – O. Stelzer-Chilton
Deputy – M. Hartz

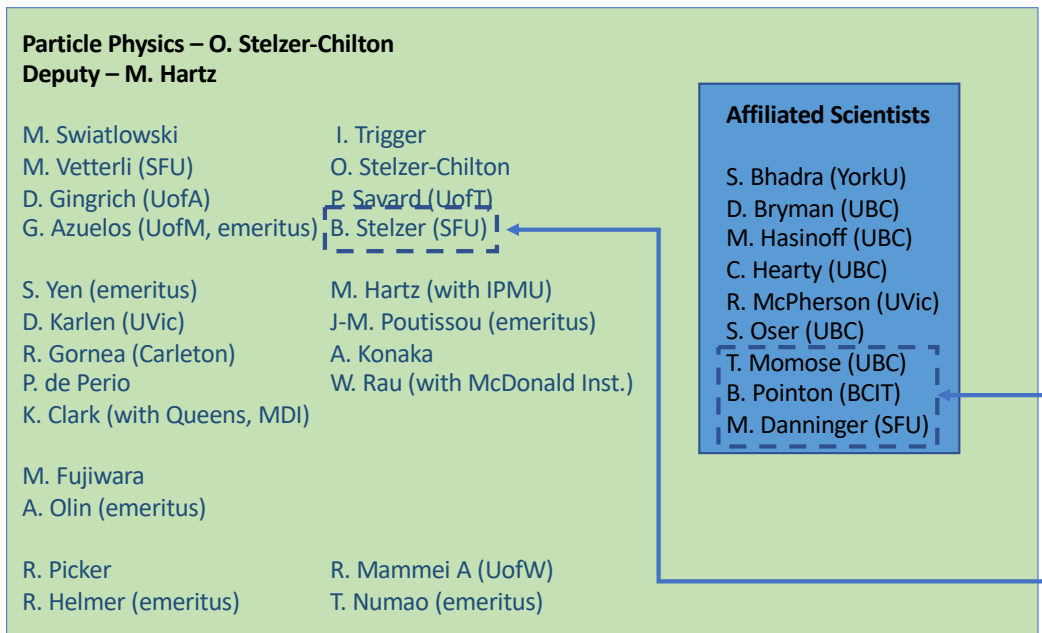
M. Swiatlowski	I. Trigger
M. Vetterli (SFU)	O. Stelzer-Chilton
D. Gingrich (UofA)	P. Savard (UofT)
G. Azuelos (UofM, emeritus)	B. Stelzer (SFU)
S. Yen (emeritus)	M. Hartz (with IPMU)
D. Karlen (UVic)	J-M. Poutissou (emeritus)
R. Gornea (Carleton)	A. Konaka
P. de Perio	W. Rau (with McDonald Inst.)
K. Clark (with Queens, MDI)	
M. Fujiwara	
A. Olin (emeritus)	
R. Picker	R. Mammei A (UofW)
R. Helmer (emeritus)	T. Numao (emeritus)

Affiliated Scientists

S. Bhadra (YorkU)
D. Bryman (UBC)
M. Hasinoff (UBC)
C. Hearty (UBC)
R. McPherson (UVic)
S. Oser (UBC)
T. Momose (UBC)
B. Pointon (BCIT)
M. Danninger (SFU)

Carry out and support particle physics experiments with the TRIUMF community
Focus projects:
ATLAS
T2K/HyperK
UCN
ALPHA
SuperCDMS

Particle Physics Department



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- Focus projects:
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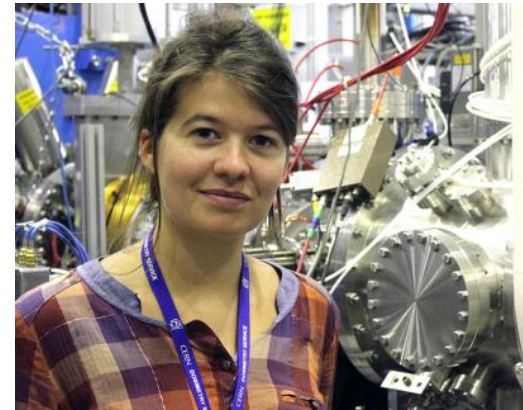
New!

Opportunity BAE Hire

- Chloe Malbrunot (CERN, fundamental symmetries)
- In the process of the recent Nuclear Physics BAE hire, opportunity for a dual career BAE hire
- Procedure was discussed and agreed on with the Personnel Committee of the Board

- Hiring Committee
 - Chair: Roxanne Guenette (Harvard)
 - Michele Lefebvre (Victoria)
 - Gerald Gwinner (Manitoba)
 - David Morrissey
 - Beatrice Franke
 - Oliver Stelzer-Chilton

- Committee reviewed application followed by a public colloquium including meetings with BAE's in various departments as well as graduate students and postdocs
- Hire was successful, Chloe will start January 2022 in the Particle Physics Department focusing on onsite "New Directions" in Particle Physics



Opportunity BAE Hire

- Kate Pachal (Duke, ATLAS)
- In response to an offer by a US university for M. Swiatlowski and K. Pachal a dual career opportunity was identified by TRIUMF
- Same procedure as applied to Chloe Malbrunot

- Hiring Committee
 - Chair: Ken Regan (McGill)
 - Corina Andreoiu (SFU)
 - Carsten Krauss (Alberta)
 - Monika Stachura (TRIUMF)
 - Isabel Trigger (TRIUMF)
 - Nigel Hessey (TRIUMF)

- Committee reviewed application followed by a public colloquium including meetings with BAE's in various departments as well as graduate students and postdocs
- Hire was successful, Kate will start October 2021 in the Science and Technology Department focusing on onsite "New Directions" in Particle Physics



Particle Physics Experiment Evaluation Committee

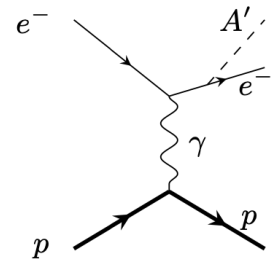
- Recent interest in carrying out more Particle Physics experiments onsite lead to the creation of the new Particle Physics - EEC
- The former SAP-EEC has been renamed to Nuclear Physics - EEC
- Terms of reference:
 - Approve proposals that have sufficiently high scientific merit and a realistic chance, based on the readiness of beams and experimental facilities
 - The purpose of the review is to advise TRIUMF on the scientific merit and technical feasibility of the experiment
 - Technical feasibility with respect to the beam is reviewed separately by the Beam Readiness Review Committee -> pre-proposal evaluation
 - Committee members are selected based on their expertise in areas of Particle Physics appropriate for the ongoing scientific program at TRIUMF. The PP-EEC is comprised of members from both the national and international scientific communities (including two from TRIUMF)

PP-EEC

- First meeting taking place April 22nd (open talks 7:30 am - 9:30 am)
- Four contributions
 - Search for New Physics in e^+e^- with an Invariant Mass of 13-17 MeV using ARIEL (Darklight)
 - Rare Pion Decays: PIENUX, 10 x precision on $R_{e/\mu}$ and Pion Beta decay
 - Search for a cosmologically-relevant boson in μ^+ decay
 - Progress Report TUCAN EDM Experiment

- Committee:

- Natalie Roe (LBNL) chair
- Concettina Sfienti (Mainz)
- Deborah Harris (York/FNAL)
- Ralf Kaiser (Glasgow)
- Natalia Toro (SLAC)
- Dave McKeen
- Makoto Fujiwara
- OSC (ex officio)



$$\mu^+ \rightarrow e^+ X^0$$

$$R_{e/\mu} = \frac{\Gamma(\pi^+ \rightarrow e^+ \nu(\gamma))}{\Gamma(\pi^+ \rightarrow \mu^+ \nu(\gamma))}$$



20-year Vision

- The TRIUMF 20-year Vision has several major functions:
- **To articulate TRIUMF's ambitions for future accomplishments** with respect to Science & Technology, People & Skills, and Innovation & Collaboration
- **To describe the long-term facilities development, consistent with TRIUMF's Vision, Mission, and its Strategic Plan.** The 20-year Vision will allow TRIUMF to update its facilities plan so that all future developments are consistent with the updated Master Plan.
- **To involve and inform the TRIUMF's community and stakeholders.** The plan provides clarity and a better understanding of the developments proposed at TRIUMF so that stakeholders have meaningful information to base their planning on and to engage us about their plans.

20-year Vision

- The Vision will be developed in 3 phases:
- Phase 1: Visioning and listening (Fall 2020-Spring 2021)
 - A broad spectrum of stakeholders will be engaged through various means to capture the full diversity of ideas and perspectives of our community.
- Phase 2: Convergence on vision framework (Spring 2021 –Summer 2021)
 - Based on the input received, the high-level pillars of the vision and supporting elements will be developed and refined through consultations.
- Phase 3: Finalization (Summer 2021 –Winter 2021)
- The 20-year Vision document will be drafted, refined, and the final version approved by the TRIUMF Board.

20-year Vision: Topical Groups

- Twelve Topical Groups (most relevant to this group listed below) will summarize by May 31, 2021 in a 5-page brief and summary slides answers to the Guiding Questions of the 20-year vision process

- Most relevant Topical Groups
- Particle Physics
 - covers and builds on the scope of the IPP brief to SAP-LRP process and the community consultation associated with the development of this brief
- Fundamental Physics with AMO techniques
 - covers AMO techniques and how they can be used to address Fundamental Physics questions from Dark Matter to Gravitational Waves
- Quantum Technologies
 - covers application of quantum technologies from radiation detectors, photon sensors, and AMO techniques from the fundamental to the applied
- Scientific Computing
 - covers big data, advanced research computing infrastructure, machine learning and artificial intelligence as well as quantum computing

20-year Vision: Community Consultation

- Community survey through Thought Exchange and Topical Groups Survey
- A ThoughtExchange platform will help identify the ideas that most resonate with the community, and these will then be fed back to the various Topical Groups as one of the inputs into their listening and visioning activities.
- Complementing the ThoughtExchange effort, a Topical Group survey has been developed that allows for response in greater detail on areas of specific research and program development. This survey is open-ended and also collects no personal information.



Long Range plan

- New plan will cover the period from 2022 – 2026 with its scope extending to 2036



- April 20/21 meeting format: Presentations to the community from the LRPC, CINP and IPP as well as moderated Q&A session based on an emerging themes document, and open discussion

Summary

- Particle Physics engaged in shaping the present and future of TRIUMF
- We will ensure the continued relevance and success of Canadian and TRIUMF's particle physics by exploiting previous and forthcoming investments in experiments in Canada and abroad and by planning for future initiatives as part of the TRIUMF's 20-year vision
- Two significant BAE hires will strengthen TRIUMF's on-site Particle Physics program including emerging New Directions
- Created new Particle Physics – Experiment Evaluation Committee
- Excellent track record on designing, enabling and extracting science from particle physics experiments (see Research Highlights)



Thank you
Merci

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