Overview of Experimental HEP Group

Pierre Savard

- Staff
- Research Programme
- Students, Teaching
- HEP Group and department infrastructure
- Summary

Staff

Faculty:

- Bailey, Orr, Trischuk
- Associated with other institutes: Krieger (IPP scientist), Martin (IPP scientist), Savard (0.5 TRIUMF)
- Significant administrative responsibilities: Luste, Sinervo
- One ongoing search

Research Associates:

- Mazini,Tafirout,Kordas,Fourletov,Gorbounov

Other staff:

- secretary: W. Kam
- engineer: M. Cabadeschi
- Technologist: K. Vincent
- Scientific coordinator of Big Mac cluster: L. Groer

CDF

- Study $p\bar{p}$ collisions at 2 TeV
- Status: have 0.5 fb^{-1} of data on tape. Peak luminosity $>10^{32} cm^{-2} s^{-1}$
- Our group in Toronto includes:
  - 9 graduate students
  - 2.5 research associates (K. Kordas, R. Mazini, R. Tafirout)
  - 4 faculty (Orr, Savard, Sinervo, Trischuk)
- Research:
  - top physics: (6 students)
  - electroweak physics: W mass measurement, WW cross section
  - Search for Supersymmetry, Large Extra Dimensions
  - In Run II: first tevatron top physics publication. 2 other papers in circulation, 3 other papers by end of year (out of $\sim$ 30)

ATLAS

- Study proton-proton collisions at 14 TeV
- Status: first collisions in 2007-2008
- Our group in Toronto includes:
  - 2 graduate students
  - 6 Faculty (Bailey, Krieger, Orr, (Savard), Sinervo, Trischuk)
  - 1.5 RA (Gorbounov, Mazini)
- Research:
  - Built forward calorimeter in Toronto
  - Higgs searches using vector boson fusion
  - Physics beyond the SM: e.g. search for supersymmetry
  - High performance computing: Big Mac HEP cluster one of largest GRID sites in the world.

ZEUS

- Study electron-proton collisions at 27x920 GeV
- Status: began run with new HERA-II with lepton polarization this year. Run will end in 2007
- Our group in Toronto includes:
  - 1 faculty (Martin)
  - 1 RA (Fourletov)
  - 4 students have graduated in last few years
- Research:
  - Involved in the calorimeter (built half of forward and rear calorimeters) and responsible for the 3rd level trigger. BSM searches, forward neutron physics program, pion structure
  - high-Q^2 polarized neutral current analysis

T2K

- Tokai-to-Kamioka Neutrino oscillation experiment to measure θ_{13}
- Status: approved, beam in 2008-2009
- Toronto involvement
  - 1 faculty (Martin), increasing level of activity
  - Canada will likely build TPC and part of fine-grain scintillator system for the near detector
  - Toronto involved in beam monitoring systems and have supplied diamond detectors

Responsibilities in HEP Community

In last 5 years:

- Deputy Spokesperson of ZEUS
- Spokesman for ZEUS Canada
- Zeus Physics Coordinator
- Spokesman for CDF Canada
- CDF offline coordinator
- CDF top and electroweak physics convener
- CDF silicon tracker project leader
- Spokesman for ATLAS Canada
- Member of LHCC (LHC experiments committee)
- Director of Institute of Particle Physics
- TRIUMF Board of management
- SNOLAB Experimental Advisory Committee
- Institute of Particle Physics council member

Graduate Students

Graduate Students in last 5 years:

- 18 Ph.D students (8 have graduated)
- 5 M.Sc. students (4 graduated)
- We expect almost all of our CDF students to graduate within the next 2 years
- We also expect a significant increase in the number of ATLAS students in the next 2-3 years

Funding:

- Students get 22-24k (includes 6k tuition)
- From reaserch over 5(6) years: 4k, 8k ,8k ,13k, 19.5k
- Univ. funding drops to 0 for 5th year of Ph.D

High Performance Computing

Have made extensive use of CFI Beowulf Cluster to enhance scientific contributions to ATLAS and CDF experiments

- CDF
  - MC production major Canadian contribution to CDF experiment
  - Toronto is main “simulation farm” for the CDF expriement. In last two years , more than 100 million events generated in Canada
  - Currently hosting high-pt lepton datasets. Toronto cluster is one of CDF’s analysis farms linked through “GRID-like” infrastructure
  - Cluster also used by Canadians for studies that involve large datasets and necessitate significant cpu resources: jet energy scale studies, silicon detector alignement
  - A fantastic resource for Canadian physics analyses
  - Disk in short supply: have used start-up and Dean research funds to temporarily address shortage

High Performance Computing

- ATLAS:
  - Big Mac cluster one of largest GRID sites in the world.
  - Used for testbeam data analysis and calibration of forward calorimeter
  - Plan to use LCG MC datasets to prepare for ATLAS physics and contribute to next year's ATLAS physics TDR

Summary

- Have very active and productive research programme
  - Members of the group hold and have held significant leadership positions in HEP community
  - Major contributions to ATLAS construction and commissioning
  - Significant contributions to CDF, CDF II and ZEUS physics
  - ATLAS constitutes future physics focus of the group
- Anticipate large influx of new students in coming years