Particle Physics Research - Birmingham group

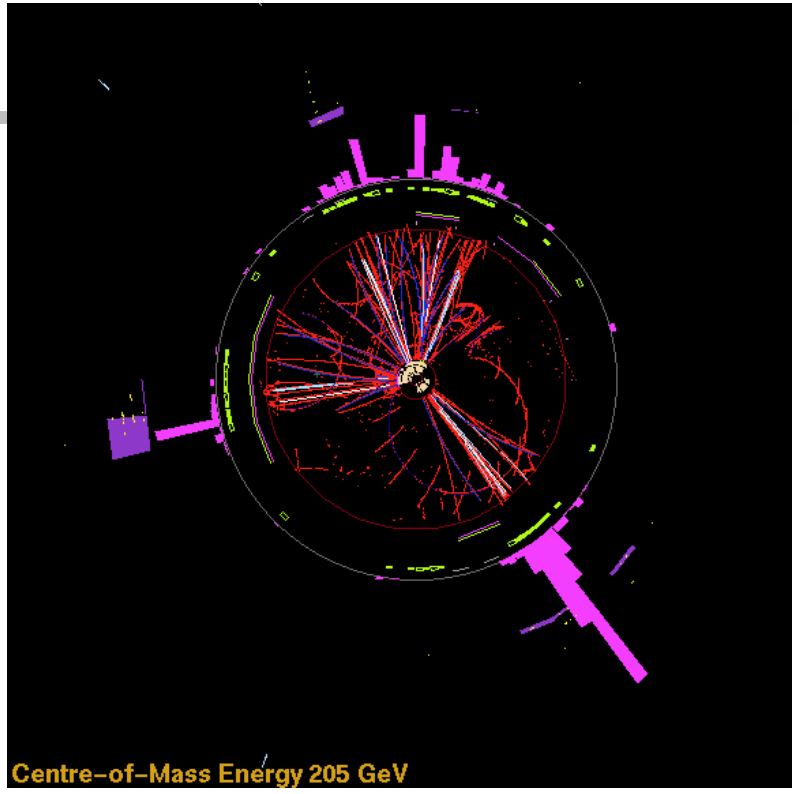
HEFCE academic staff 7

Technicians 2

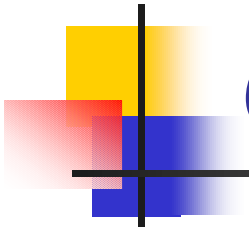
Engineers 2,

Research staff 13,

PPARC PhD students 12

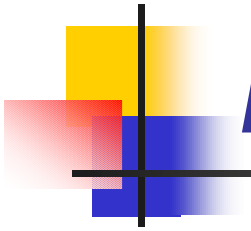


Steve O'Neale(1948-2003)



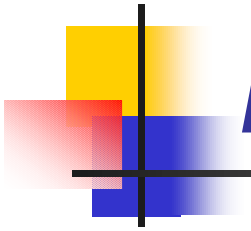
Outline of Session

- Introduction
- BaBar (Chris Hawkes)
- H1 (Paul Newman)
- ALICE (David Evans)
- ATLAS (Dave Charlton)
- Linear Collider (Nigel Watson)
- Conclusions



Key questions

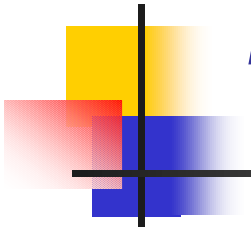
- Origin of mass
- Properties of neutrinos
- Properties of strong interaction
- Origin of matter-antimatter asymmetry
- Unification of particles and forces including gravity



PPARC Particle Physics

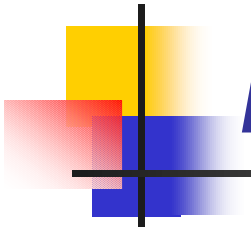
- Current experiments
  - Hera (H1)
  - Tevatron
  - CP violation (BaBar)
  - Neutrino
- In-Build experiments
  - LHC (ATLAS, ALICE)
  - Neutrino
- Future facilities
  - Linear collider (CALICE)
  - Neutrino factory/ Muon collider

Collaboration and Timescale of Experiments



- All our experiments are international collaborations at particle colliders at

  CERN, DESY and SLAC
- Most involve detector construction and operational responsibilities as well as physics preparation and analysis
- Most take data and perform physics analyses for up to 10 years (total time 15-20 years)
- We contribute to the physics analysis on all of our experiments

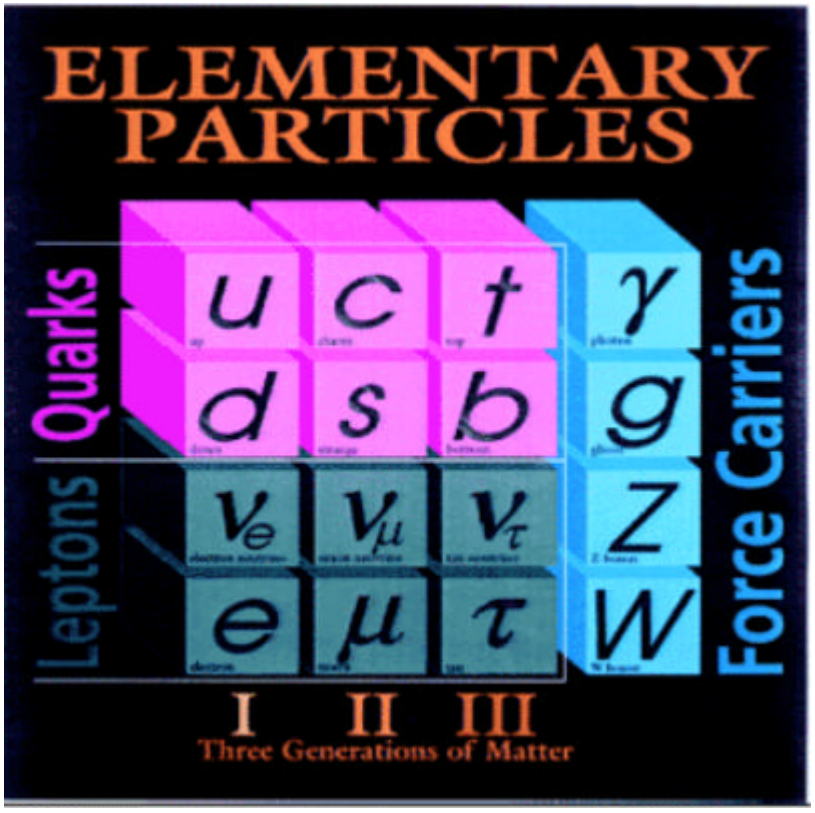


Life cycle of experiments

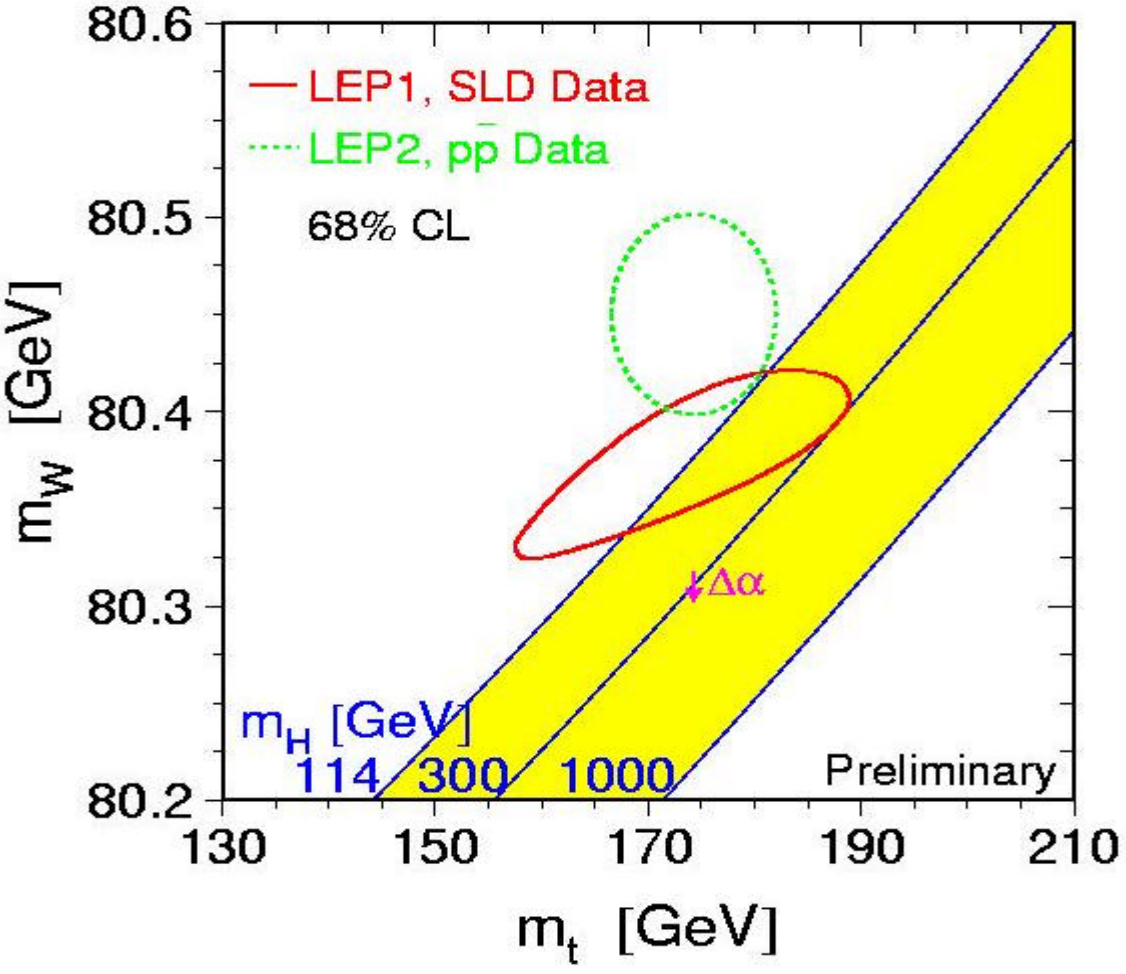
- Data taking and physics analysis (BABAR, H1)
- Construction and software/physics preparation (ALICE, ATLAS)
- Design and planning phase (Linear Collider)

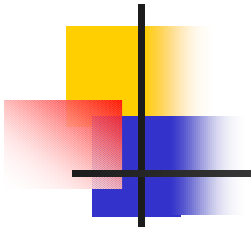
- Top research rating for PP group impossible to maintain without leading roles in all types of experiment

Quarks,leptons & bosons



Precision results probe quantum corrections

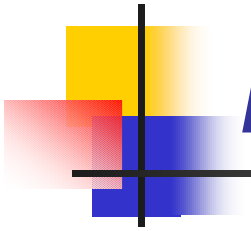




Links to other fields

- Challenging detector and electronics requirements – spin off technologies
- Data handling and processing for LHC experiments will require world-wide Grid computing (Group has 3 linux clusters)
- Midlands e-science centre of excellence MeSc

PRIMARY AIM – Fundamental science and exploring the unknown



Rest of Session

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