

Introduction to Particle Detectors

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- Introduction
- Energy Loss of heavy particles
- Energy Loss of light particles (electrons & positrons)
- Interactions of photons
- Scattering

Information Sources

Several good books cover the basic theory and application to particle detectors. I'll list a couple of these here, more specialised resources will also be noted in other lectures.

Do not forget the *Particle Data Group* which is an excellent point of contact: <http://pdg.lbl.gov/>

Techniques for Nuclear and Particle Physics Experiments, Leo W R, Springer, 1994
Experimental Techniques in High-energy Nuclear and Particle Physics, Ferbel T, World Scientific, 1992
Principles of Radiation Interaction in Matter and Detection, Leroy C, Rancoita P-G, World Scientific, 3rd edition 2012

I have a simple aim!

To revise basic particle/matter interactions

To provide an “order-of-magnitude” feeling for key processes

To act as an introduction to later lectures on calorimeters and tracking detectors

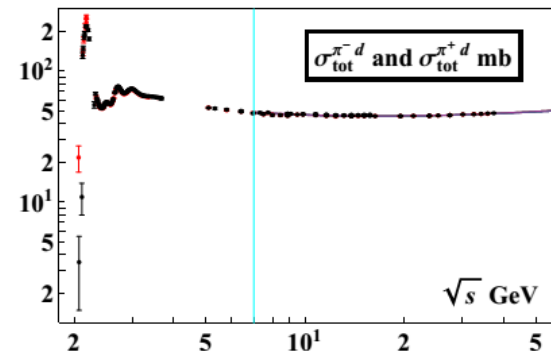
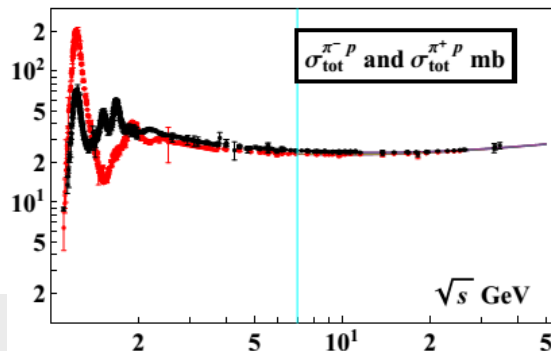
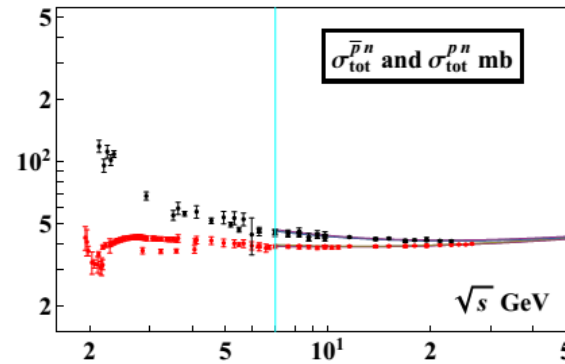
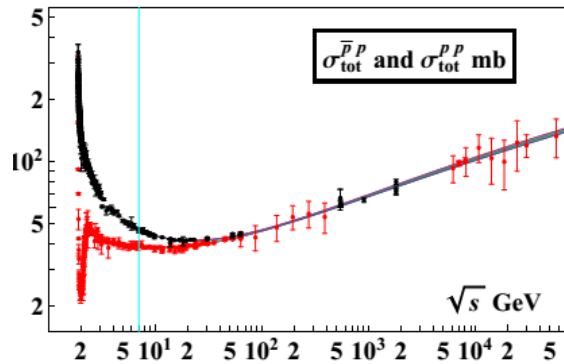
How to contact me:

Email is best! Peter.Hobson@brunel.ac.uk

I will try to respond to you within 48 hours, **please use your University email account and a sensible subject (not Hi! for e.g.)** as I get a massive amount of spam mail and generally delete most without opening it.

Heavy Charged Particles

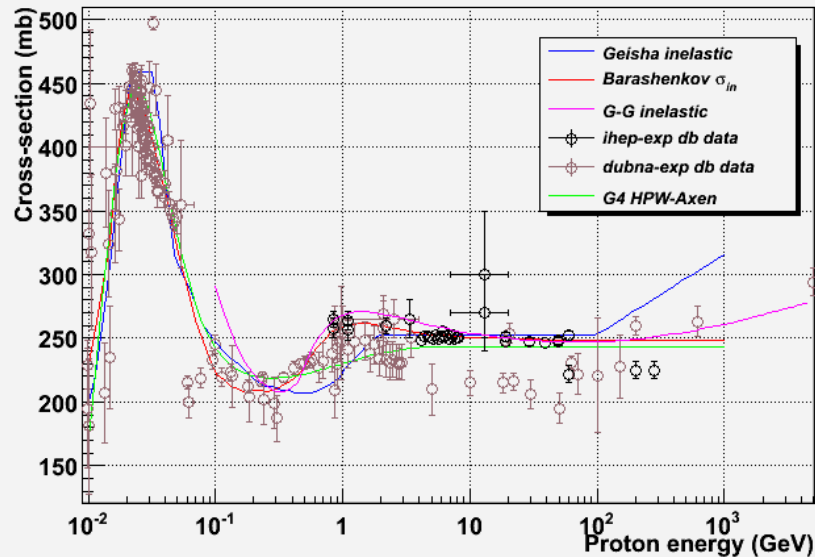
- Pions, protons, alpha particles etc.
 - Energy Loss
 - Scattering (change of direction)
- Main processes
 - Inelastic Scattering (cross-section is about 10^{-29} to 10^{-27} cm²)
 - Elastic scatter from nuclei
- Other processes
 - Cerenkov, nuclear dissociation, bremsstrahlung



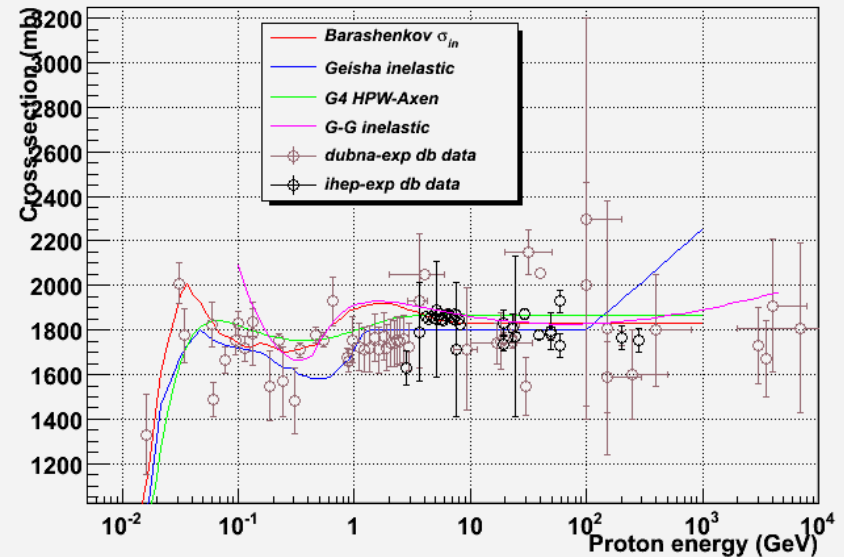
p-C and p-Pb cross-sections

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p-C inelastic cross-section



p-Pb inelastic cross-section



These plots are credited to:

http://geant4.web.cern.ch/geant4/results/validation_plots/cross_sections/hadronic/inelastic/test1/inelastic.shtml

Now move back to “Lecture 1” pdf from slide 8 (dE/dx) onwards ...