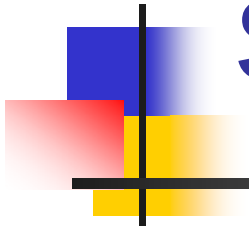
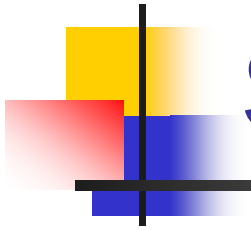


Summary EM Parallel Sessions

12th Geant4 Workshop

Hebden Bridge

13-19 Sep. 2007



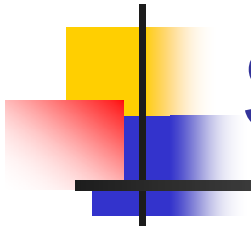
Session I (Tuesday 14-15.30)

Polarisation:

- EM Polarisation Library (A.Schälicke)

Medical Application:

- Comparison of Geant4 to EGSnrc and measured data in large field electron dose distributions (J. Perl)
- Carbon ion depth dose profile in HIBMC facility (T. Toshito)
- Geant4 energy loss of proton, electron and magnetic monopole (M. Vladymyrov, V.I.)



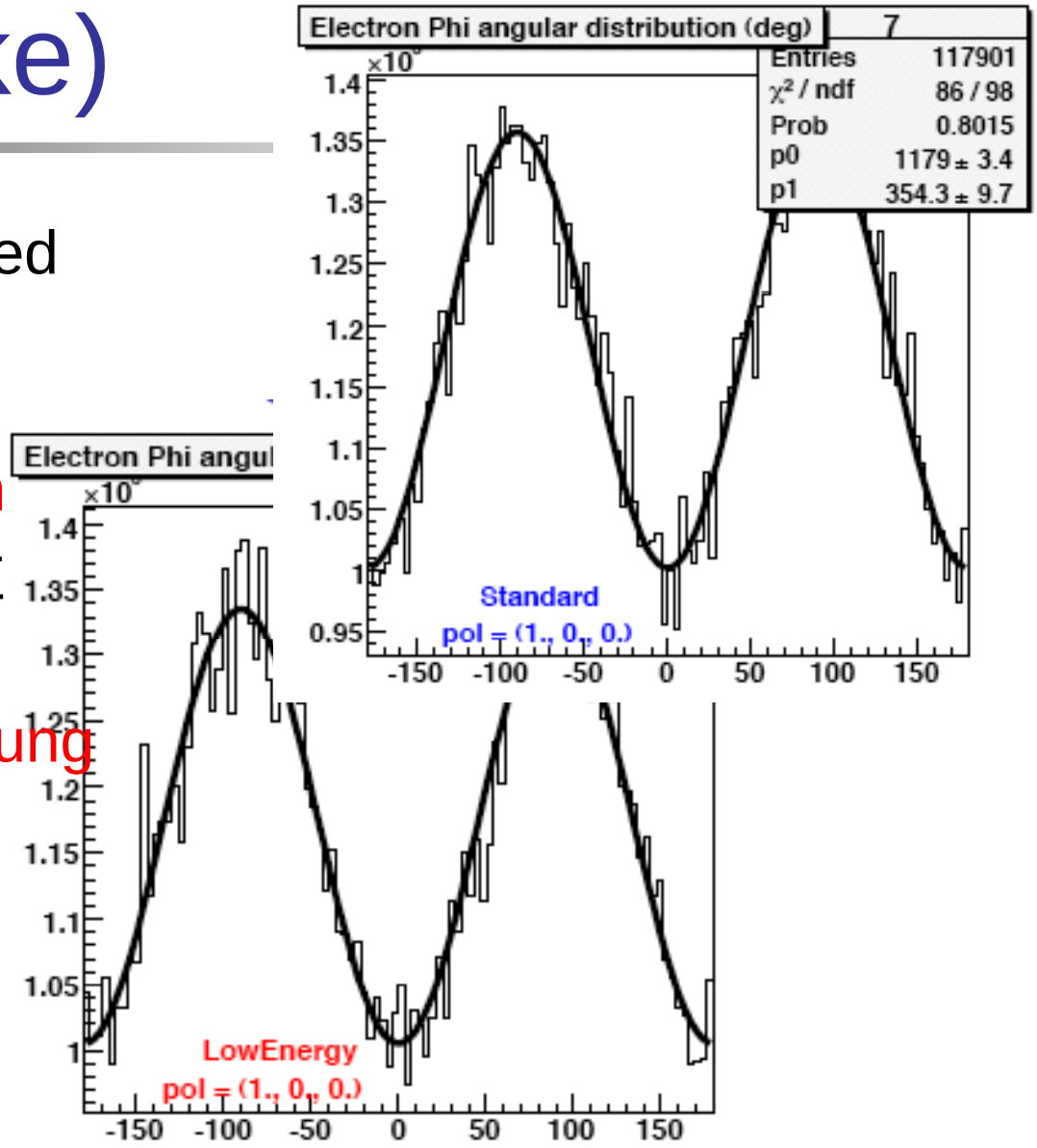
Session II (Wednesday 10-11)

Coulomb scattering:

- Single Coulomb scattering process (V. Ivantchenko)
- Diffuse elastic scattering model for charged particles (V. Grichine)
- CHIPS approximation of proton/pion-nuclear Coulomb scattering (M. Kosov)

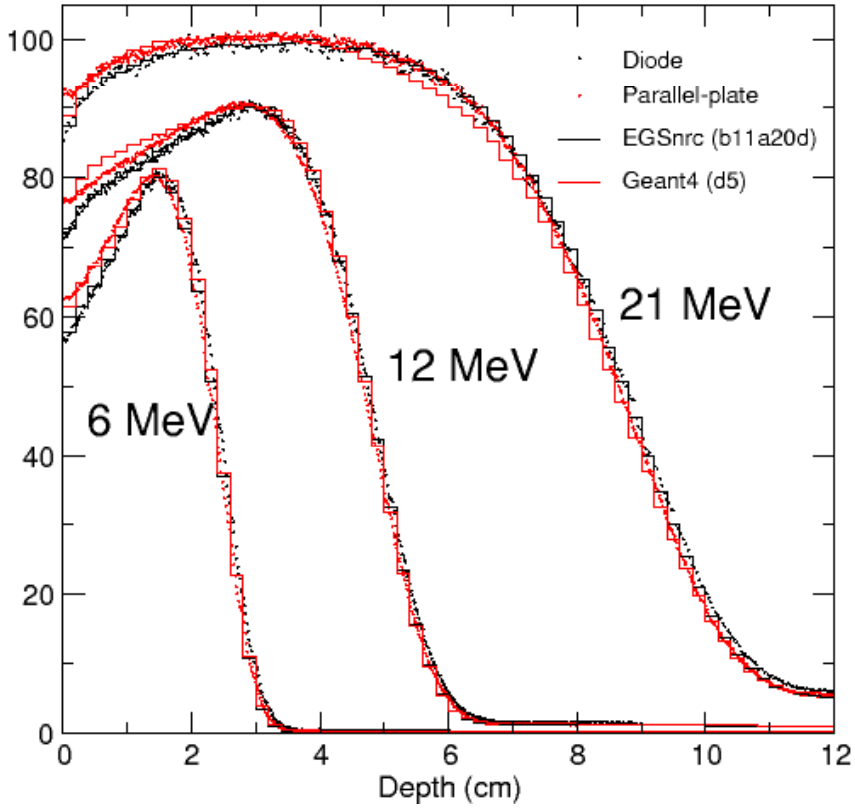
EM Polarisation Library (A.Schälicke)

- currently 5 (+1) polarised processes
- Highest priority on validation & publication
- Comparison with LowE (Compton)
- Review of Bremsstrahlung & Gamma conversion needed



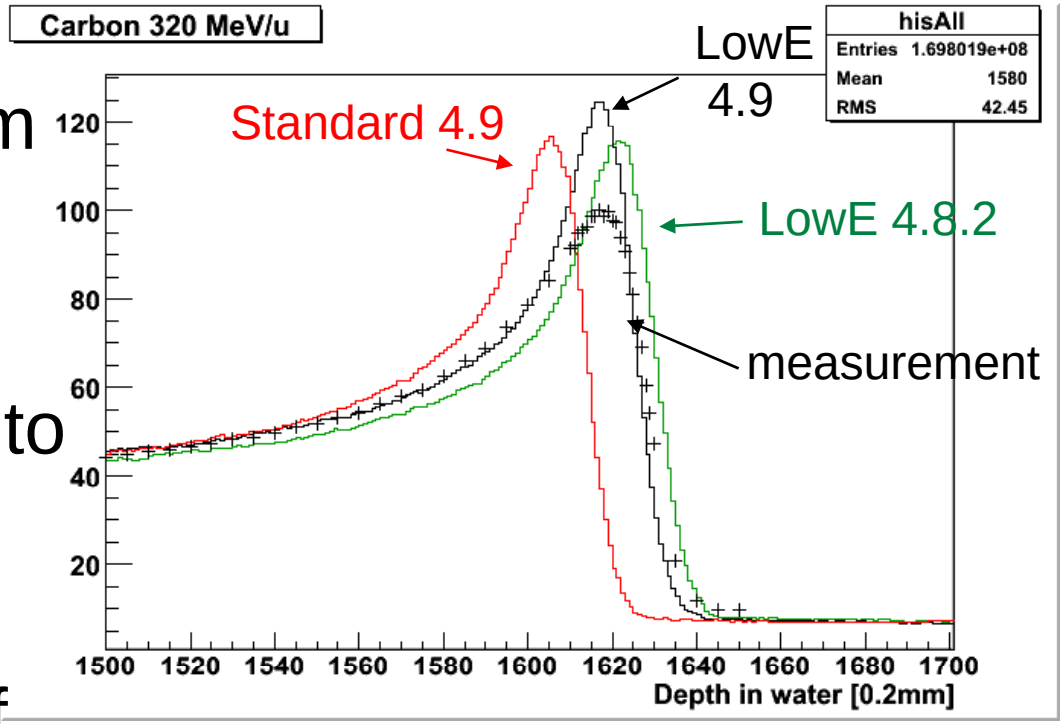
Comparison of Geant4 results to EGSnrc and measured data in large field electron dose distributions (J. Perl)

- EGS4 (2004) had problems
- EGSnrc (2006) showed good agreement after tweaking of geometry definition
- Geant4.8.2.p01 equally good (after similar tweaking)
- Study will be continued with Geant4.9

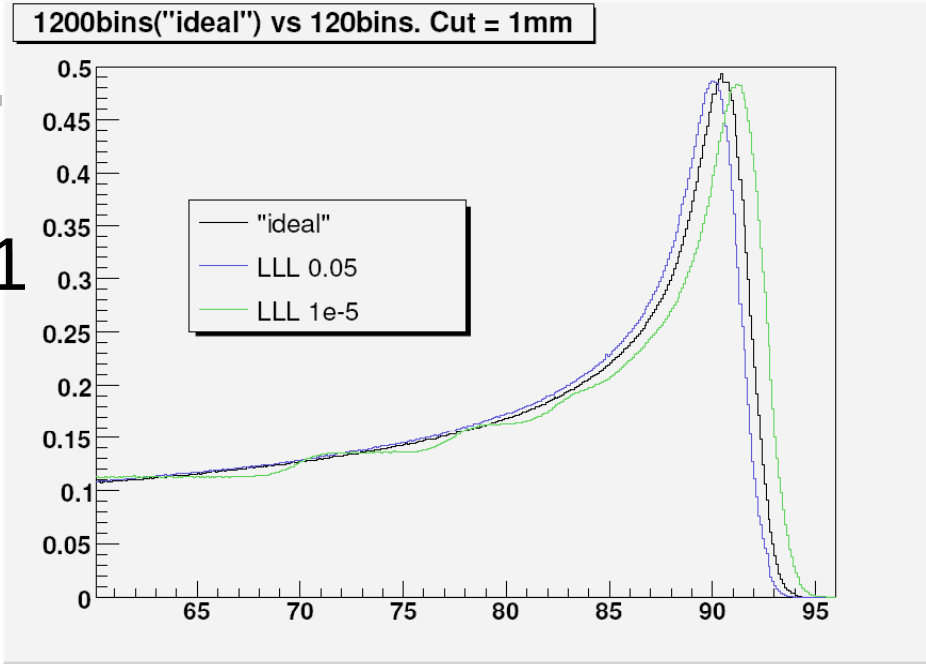


Carbon ion depth dose profile in HIBMC facility (T. Toshito)

- 320 Mev/n carbon beam on water phantom
- Geant4.8.2.p01/4.9.0
- No configuration found to reproduce the height of Bragg peak in HIBMC
- Better understanding of hadronic and electromag. contributions needed



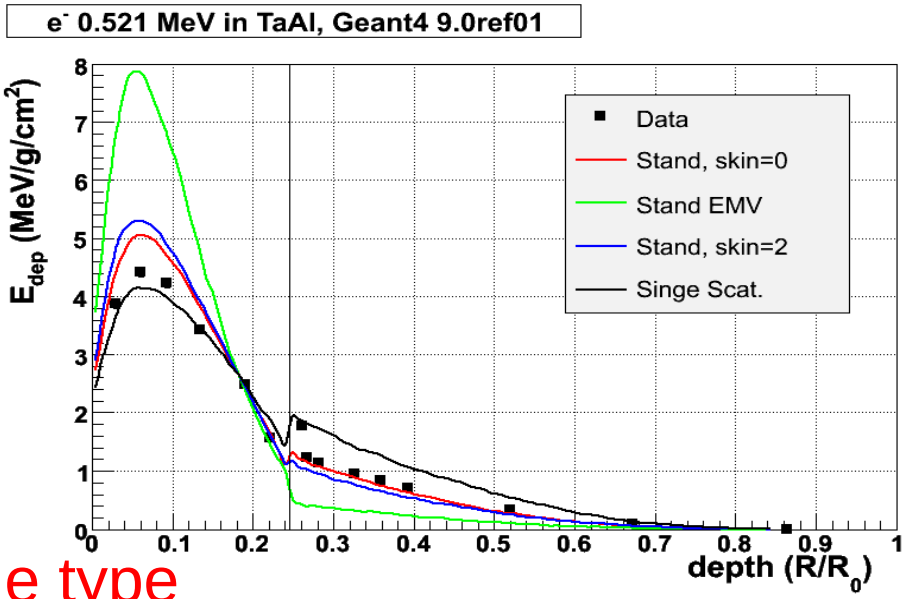
Geant4 energy loss of proton, electron and magnetic monopole (M. Vladymyrov)

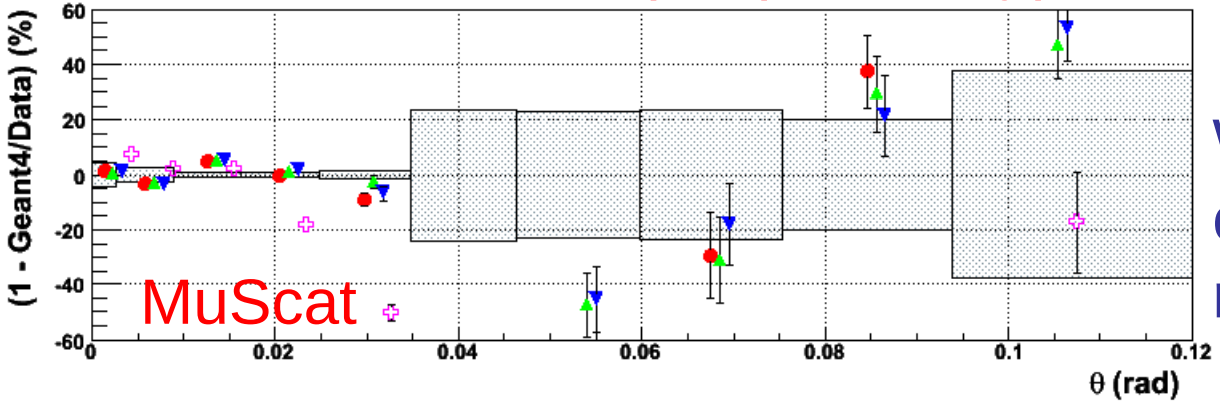


- Study on example Hadr01 effect of linLossLimit, & # of bins in range table
- Protons/Electrons: recommend small LLL & large table
- Spline interpolation should be integrated in PhysicsVector (by who?)

Single Coulomb Scattering process (V.Ivantchenko)

- G4CoulombScattering
- G4eCoulombScatteringModel
  - no nuclear recoil
- G4CoulombScatteringModel
  - Recoil nucleus is provided
  - Need more validation
- Combine models per particle type





We need to introduce cut in range for nuclear recoil

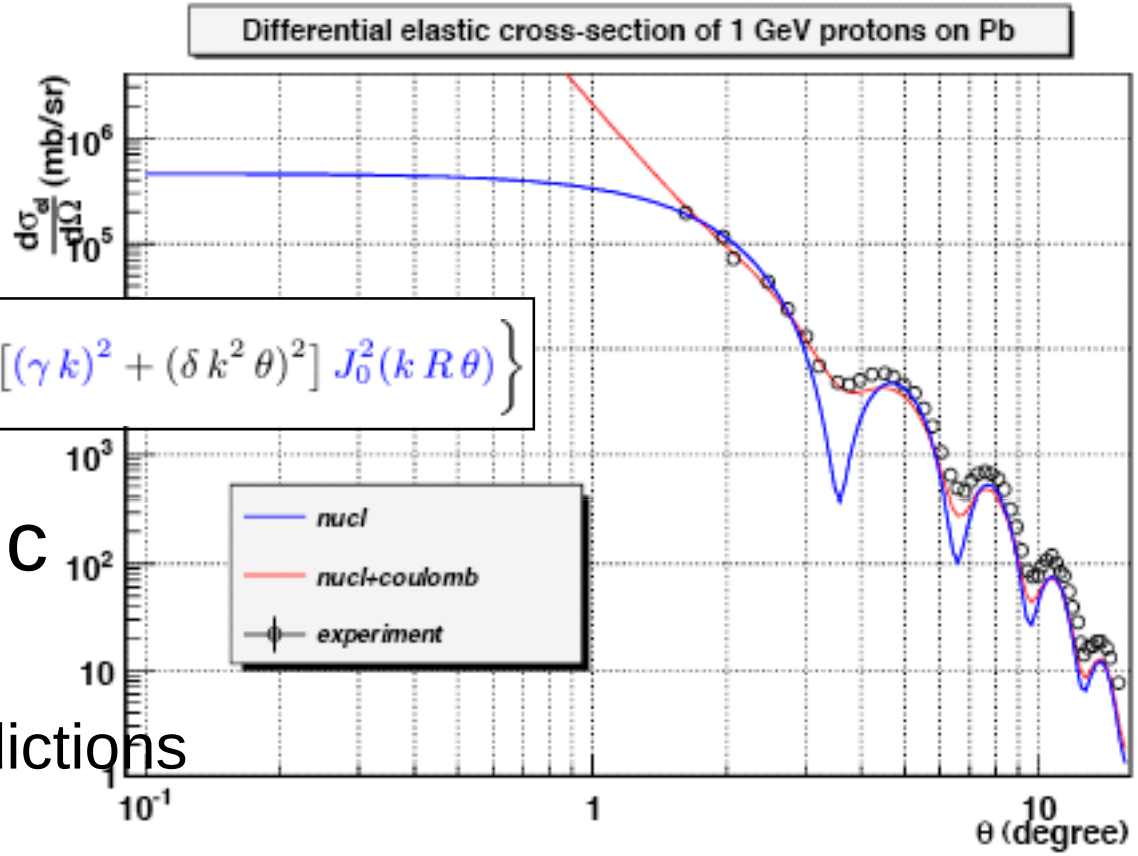
Diffuse elastic scattering model for charged particles (V. Grichine)

- Model based on optical approach
- defraction & refraction

$$\frac{d\sigma_{el}}{d\Omega} = R^2 F_d^2(k\,d\,\theta)\left\{\frac{J_1^2(k\,R\,\theta)}{\theta^2} + \left[(\gamma\,k)^2 + (\delta\,k^2\,\theta)^2\right] J_0^2(k\,R\,\theta)\right\}$$

- G4DiffuseElastic

parameter fitting will be needed to improve predictions



CHIPS approximation of proton-nuclear Coulomb scattering (M. Kosov)

- The final state for electromagnetic and hadronic scattering is the same, so they interfere **utilise data!**
- „*If the Electromagnetic group is ready for the consistent improvement of "Multiple Scattering", CHIPS can provide a discrete process G4QEMElastic for pions & protons*"

pPb elastic scattering