saGDH Analysis

Radiative Corrections

Jaideep Singh

University of Virginia

Pol. He-3 Weekly Meeting

CC F226, March 29, 2007

Some notes:

- Ambiguity on normalization of bremsstrahlung spectrum for composite materials, "b" factor $= \frac{4}{3} + a(Z)$. **Looks like a small effect, will worry about it later.**
- "Straggling" function is proportional to a sum of two terms: $\frac{bT\phi(x)}{\omega}$ from bremsstahlung and $\frac{\xi}{\omega^2}$ from collsional loss. In all the codes, it is assumed that ξ ("collisonal thickness") is proportional to T ("radiation thickness"). For composite materials this is not strictly true. In addition, no distinction is made between ξ before and after scattering. **I have calculated ξ_b and ξ_a for our cells and kinematics. I am almost done with implementing this change in the codes to see the size of the effect.**

Some notes:

- Tsai argues that the energy ”triangle” over which the area integral should be done can be safely reduced to a sum of two line integrals. The error in this approximation for $bT = 0.1$ is of order 1%. Our bT around is around 0.09 for 6 degrees. I’m not totally sure about this, but I think that the argument Tsai makes rests on the assumption that the radiation thicknesses before and after scattering are similar. **At some later point, I will implement the full area integral in RADCOR and that should unambiguously answer the question.**
- So far, I’ve gotten comfortable with Mo/Tsai formalism. **However, I am still struggling with POLARD which is almost incomprehensible. Anyway, I’m work on it.**
- I have cleaned up the code for ROSETAIL, RADCOR, and QFS. Many user specified options are no longer “hard” wired into the code. The code is now heavily commented and consquently I have a much better understanding about what’s going on. **Lots of stuff is being documented.**

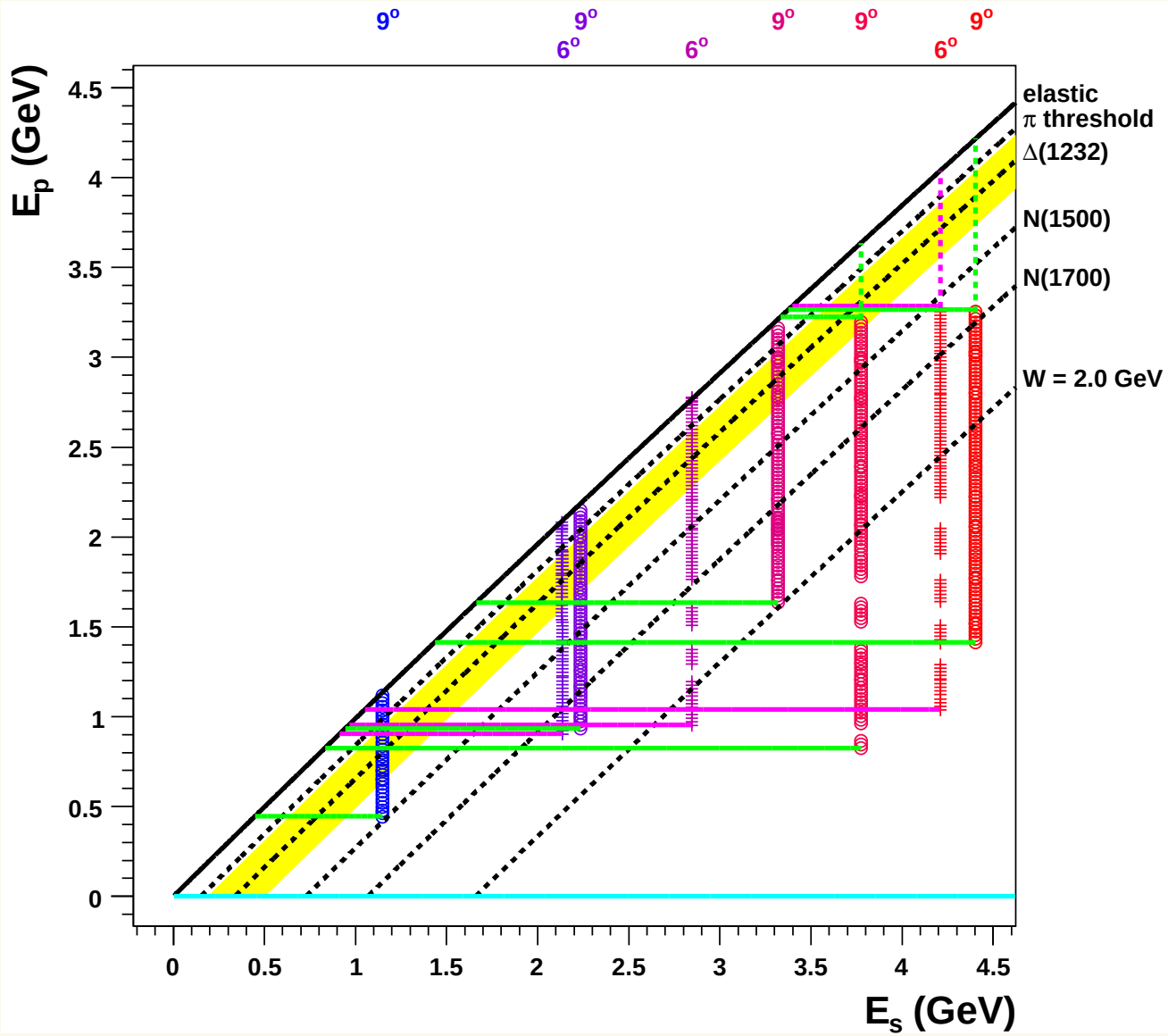
Thicknesses

Cell, Degrees	t_b	t_a	ξ_b	ξ_a	ξ_{old}
Penelope, 6	0.002	0.065	0.008	0.148	0.214
Priapus, 6	0.002	0.063	0.008	0.144	0.214
RC1-Pene, N_2, 6	0.008	0.069	0.022	0.158	0.109
RC2-Pria, N_2, 6	0.008	0.066	0.022	0.152	0.109
Priapus, 9	0.002	0.045	0.007	0.107	0.155
RC2-Pria, N_2, 9	0.008	0.047	0.022	0.112	0.080

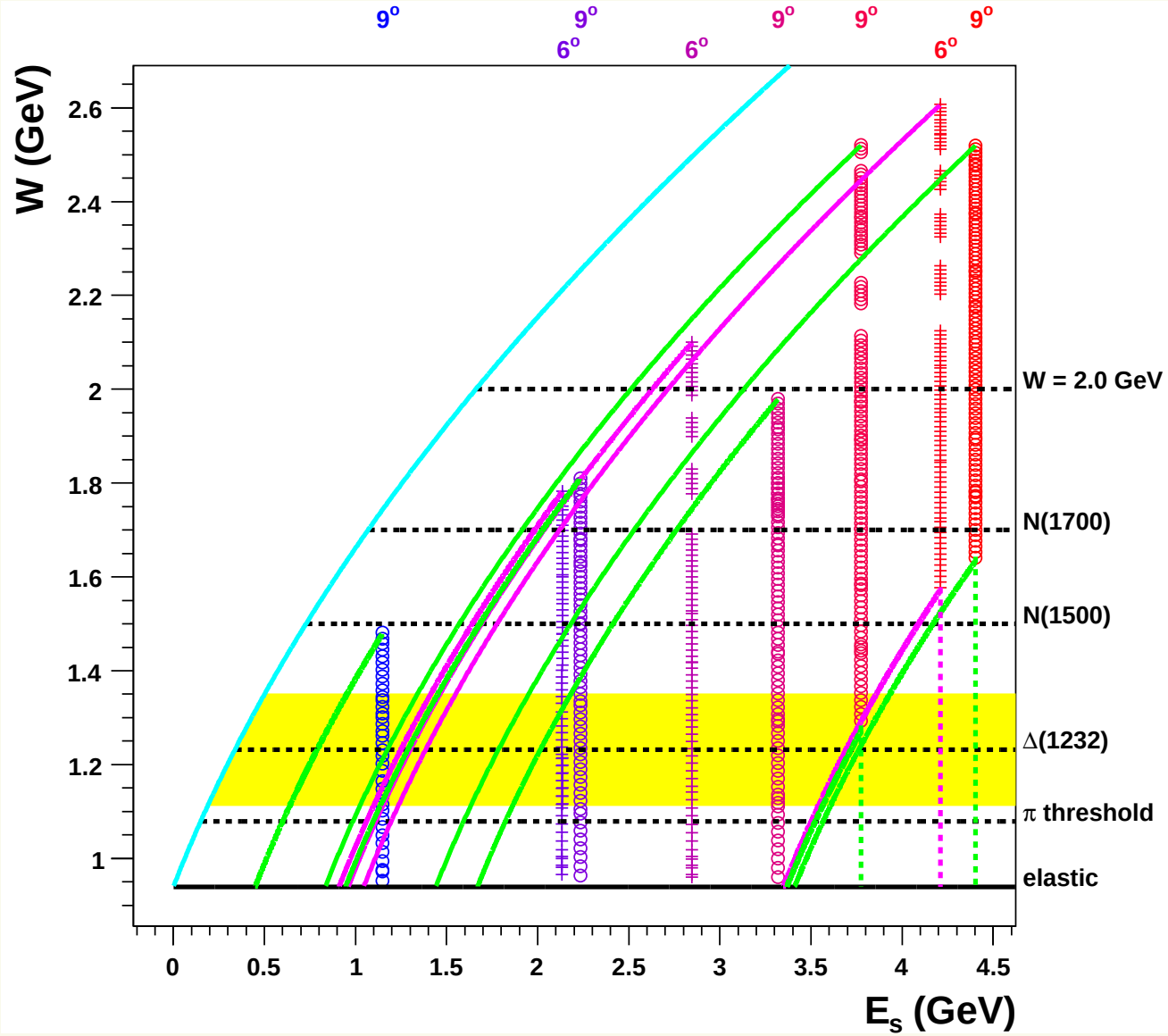
Activities

- **Problem: Non-point acc,target for the Elastic tail**
  Approach: Generate a “look-up” table of internal tails for different scattering angles using ROSETAIL. “Duct-tape” this onto the MC. External tails can be calculated real time using the Mo/Tsai formalism, with radiation lengths that vary with angle.
- **Problem: Non-point acc,target for the inelastic spectrum**
  Approach: Get born xs from our data using “central” kinematics. Generate a model of our born xs. Radiate the model using point acceptance/target. Radiate the model using non-point acceptance/target + MC. Ratio of the two gives us a handle on the size of the effect.
- **Problem: Radiative effects due to collimators.**
  Approach: Haven’t thought about it.
- **Problem: RADCOR interpolates along consant ν/E**
  Approach: Interpolate along constant W.

Interpolation Plots



Interpolation Plots



Interpolation Plots