Status report

Geant4 simulation segmented calorimeter

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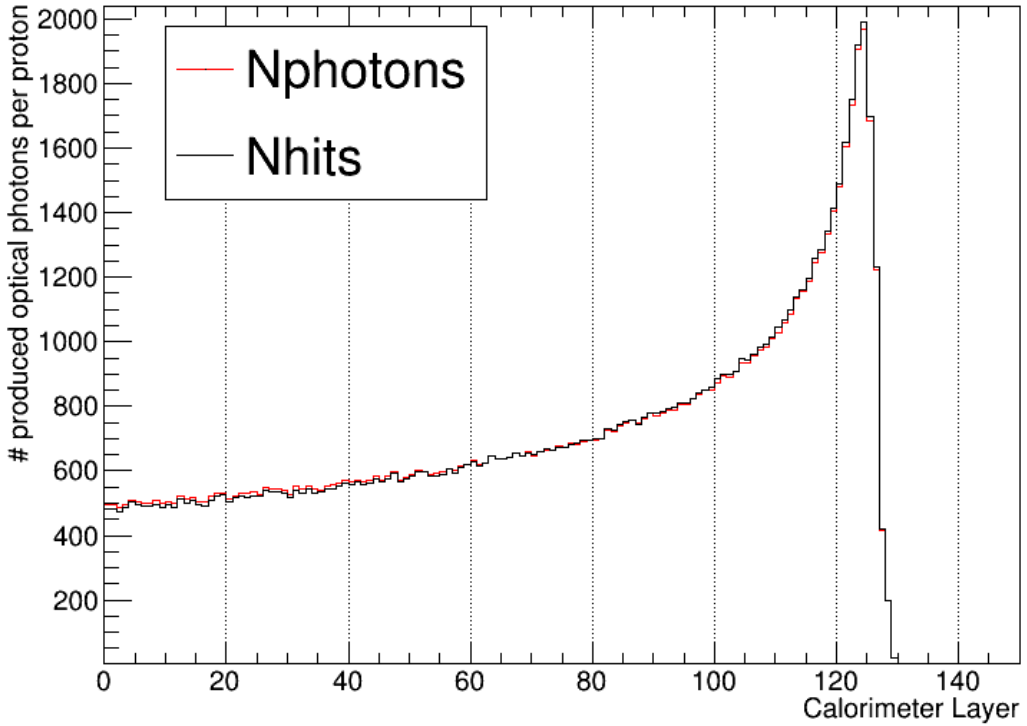
Scintillation photon counting

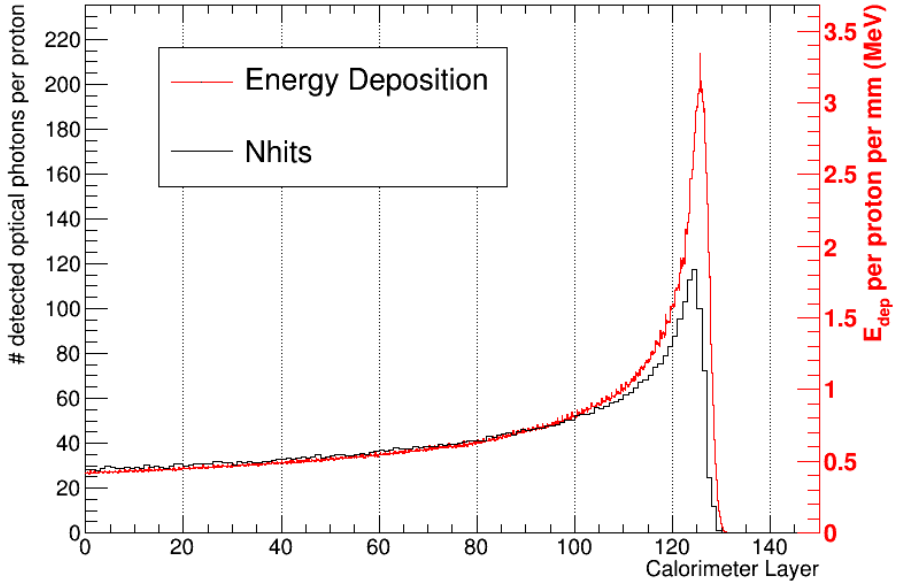
- Problem: Full calculation of reflection of scintillation photons is very time consuming (1 week for 100 protons)
- Idea: Leave everything as it is (reflection coefficients, light yield, etc.) and kill photon immediately after creation. Just save the scintillator layer where it was produced.
- Photon distributions look the same when scaled by a constant factor!
- Simulation time for 100 protons: 1 hour



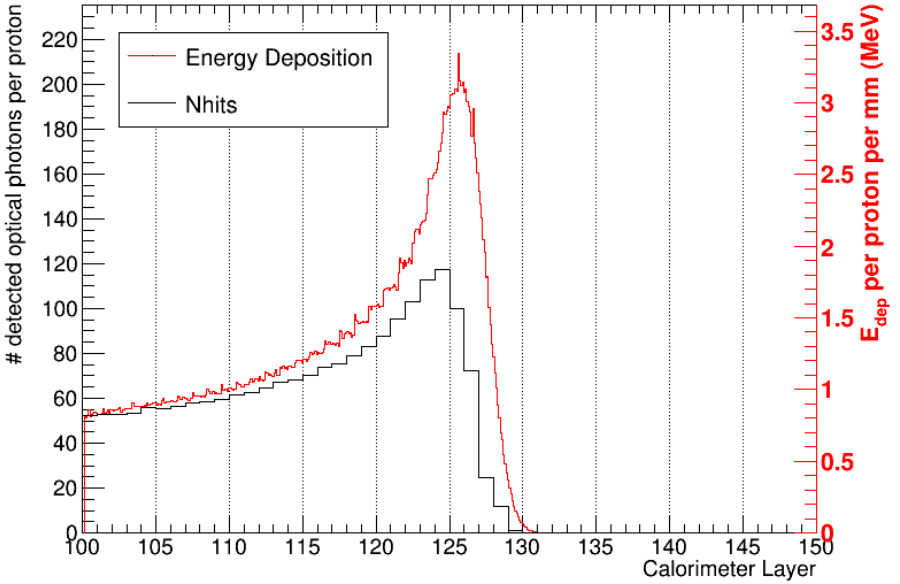
- Nphotons: Total number of created photons in the calorimeter layer (scaled by constant factor)
- Nhits: Number of photons that reach the diode

Bragg curve in segmented calorimeter

- Bragg curve recorded a higher spatial resolution than layer size in order to compare light yield to “simulated reality”
- Problem: Steps in energy deposition occur in the middle of each layer
- Changed wrapping material to scintillator material: steps remain
- Removed wrapping: steps remain
- Reason for that might be a problem with step length or my depth calculation in the Geant4 code – to be investigated



Zoom to peak



Outlook

- Still to investigate: Influence of diode placement
- Fix energy-deposition step bug
- Still not 100% sure if all material parameters are correct: Talk to a SuperNemo simulation expert?
- Need to develop algorithm to go from maximum light yield position to proton range?
- Fit of analytical function to Bragg curve important?
- I played a bit with the transformation of light yield to energy deposition (using Birk's law and beam attenuation): procedure is very unstable and doesn't lead to nice results (reproduction not easily possible)