GEANT4/Atlsim TR spectra comparison

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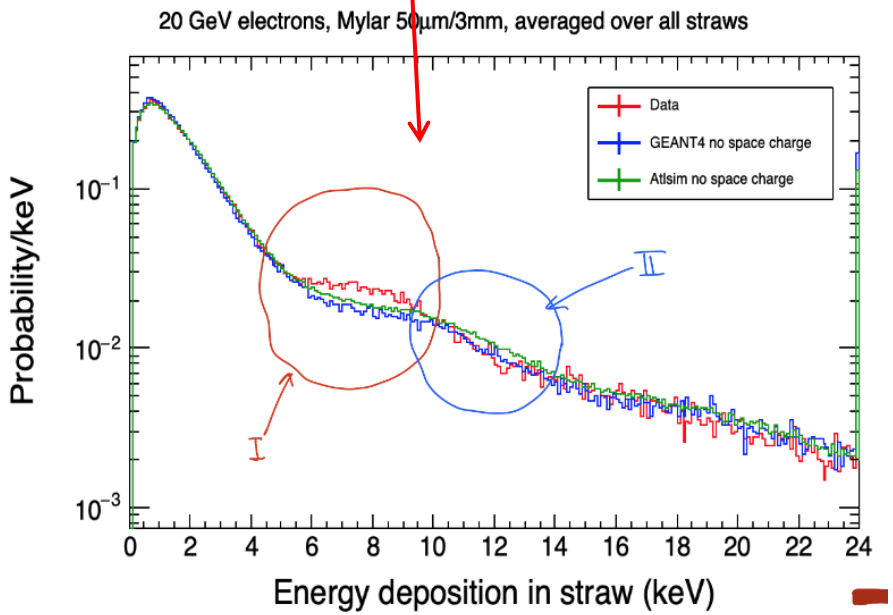
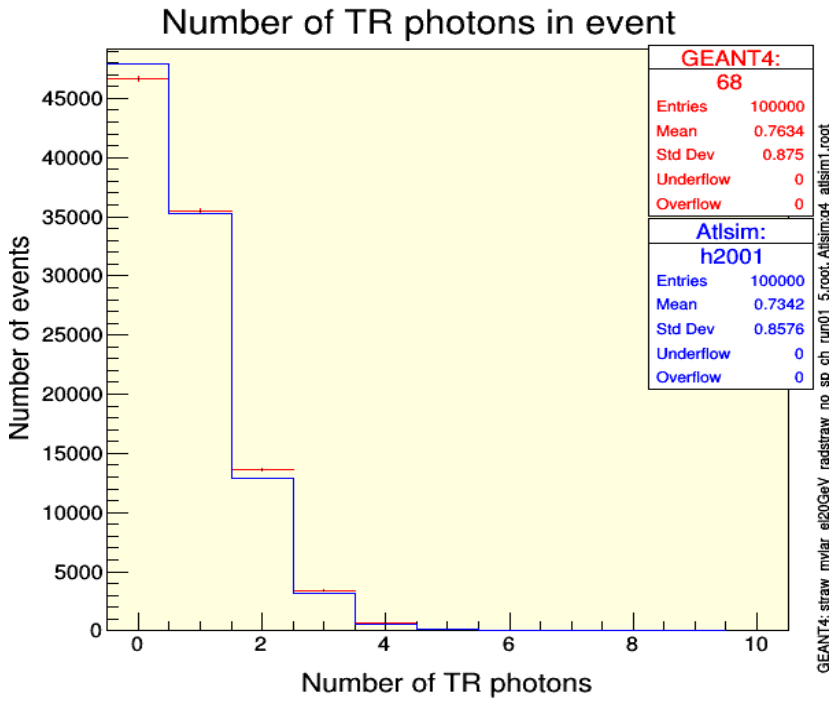
- Motivation:
- Some small discrepancy between GEANT4 and Atlsim programs are observed in simulation of TR for straw detectors (even before implementation of space charge effect).
- To find the origin of this discrepancy it was decided to first compare spectra of TR photons produced in radiator (i.e. before absorption and registration in straws). Mylar radiator block like in our test beams (15 foils of 50 μm thickness and 3 mm gap) was considered.

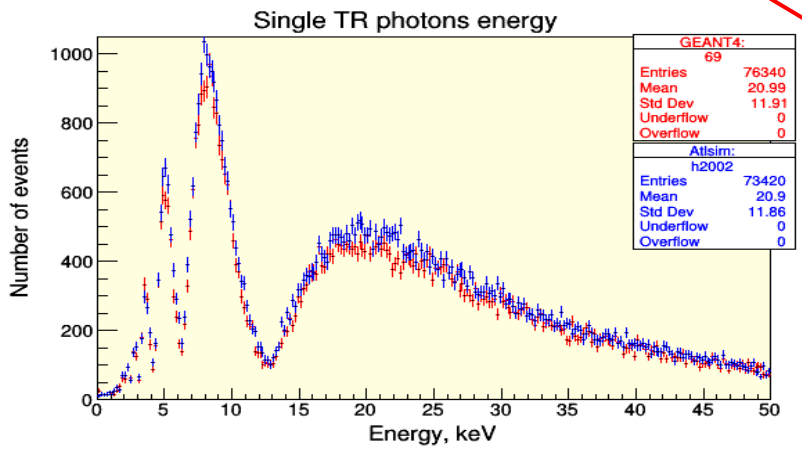


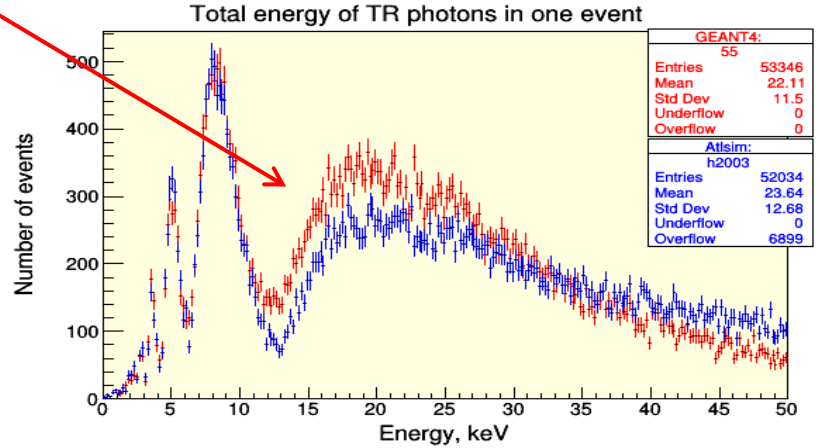
Results shown by Serafima at the previous meeting:

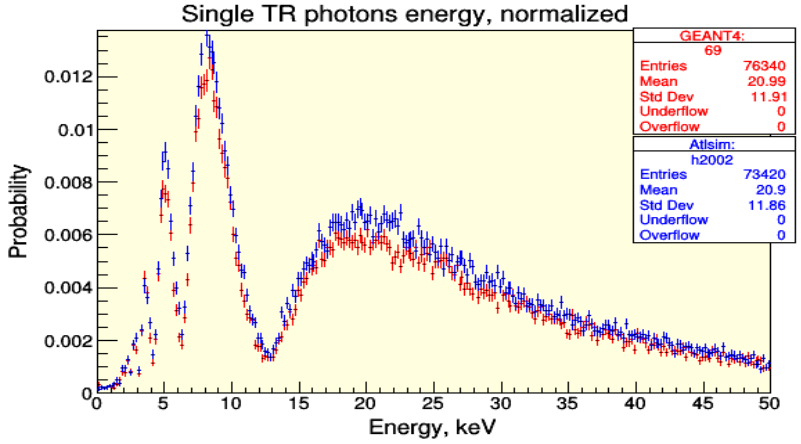
1. Spectra were generated in different energy intervals: up to 100 keV in GEANT4 and up to 50 keV in Atlsim. It affects the number of TR photons.
2. Seems, some bug in GEANT4 spectra for the cases with more than one TR photons.

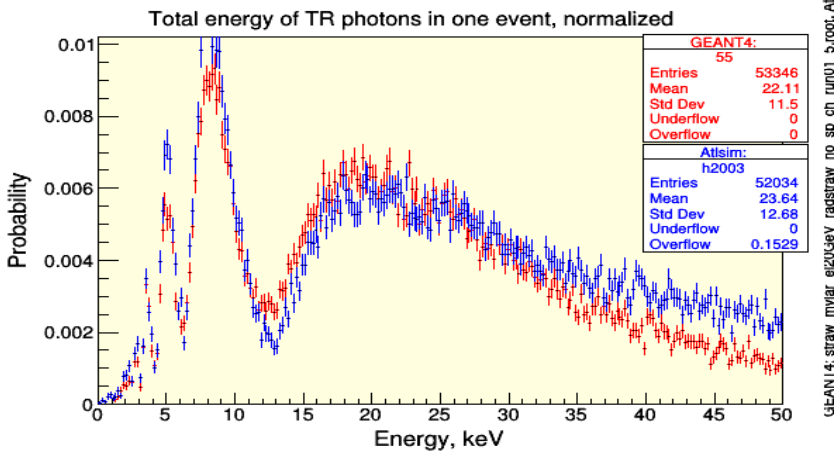
So these results are disavowed.



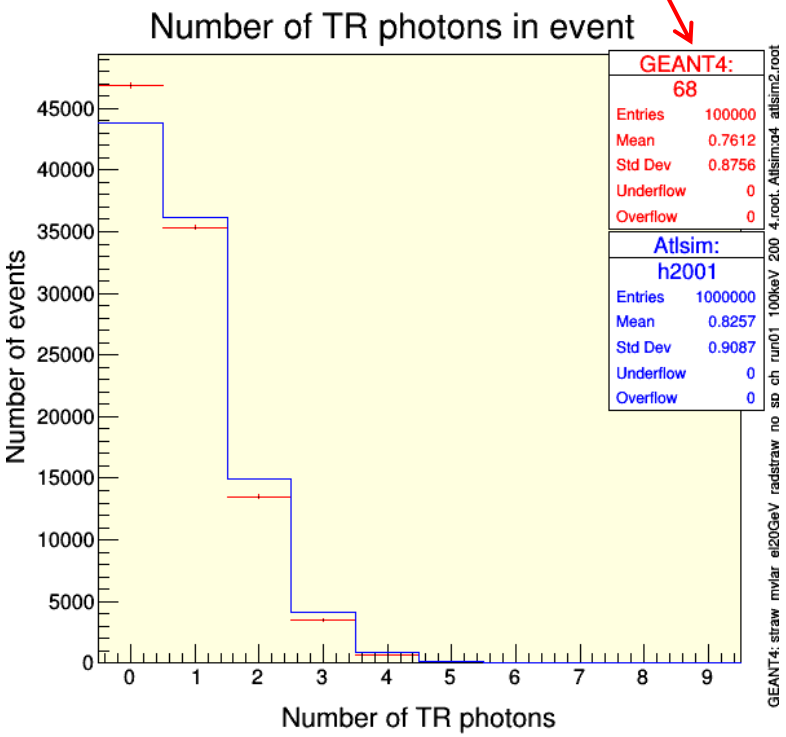


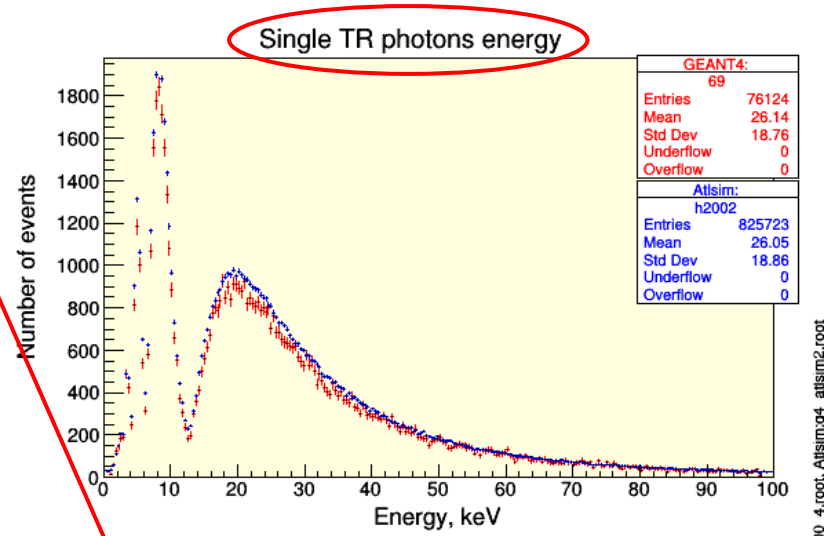


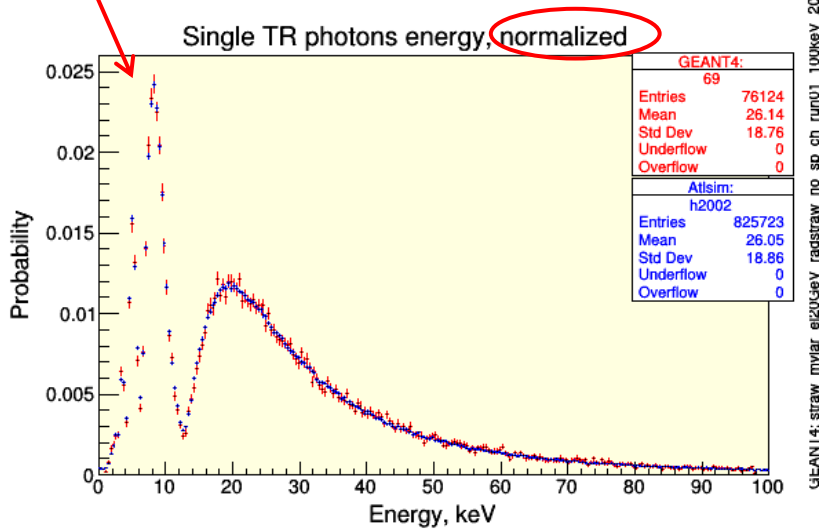


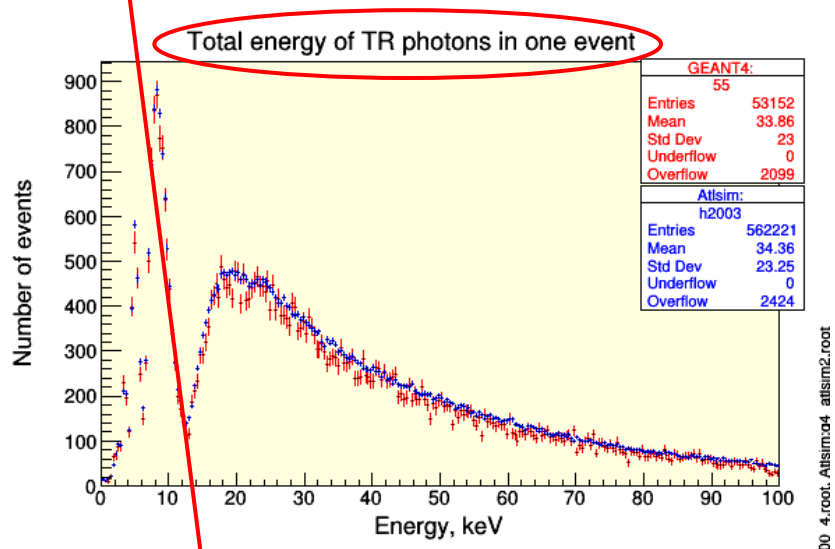


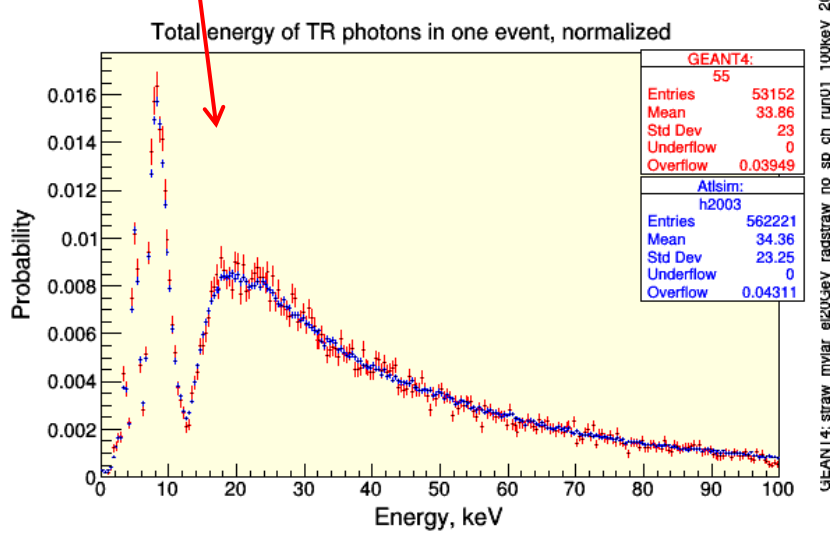
- Now both GEANT4 and Atlsim photons are simulated up to the same 100 keV limit.
- Atlsim gives 8.5% larger mean number of TR photons: 0.83 vs 0.76.
- Perfect agreement in shape of single photon spectra, a little bit worse – in total energy of TR photons in event.



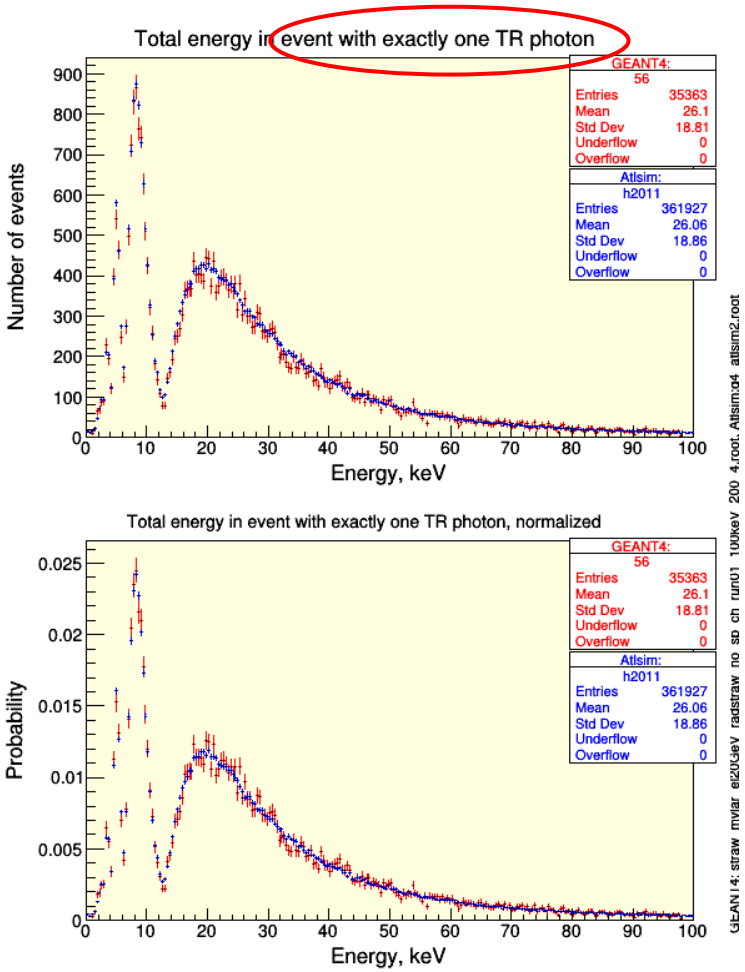


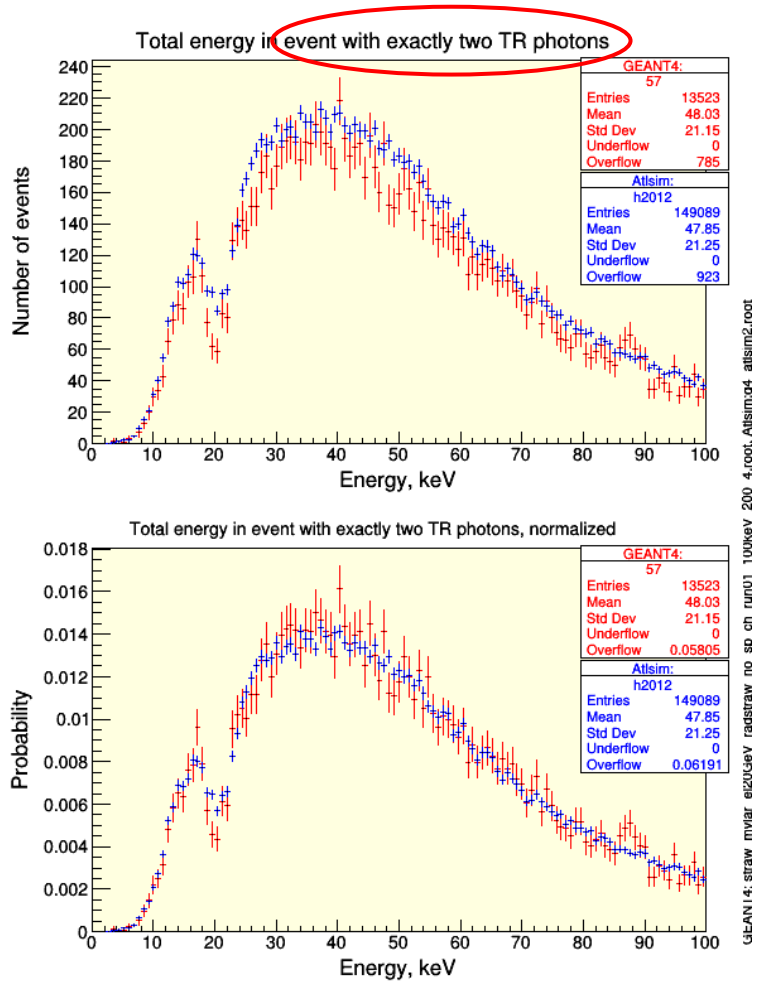


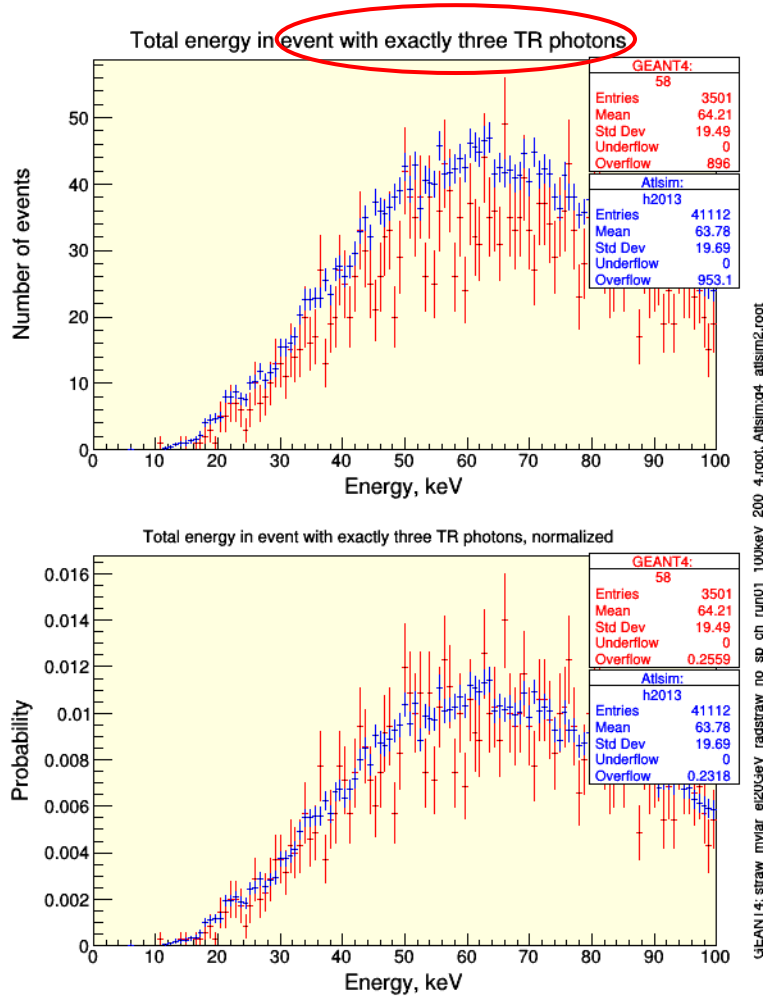




Remark: total energy spectra for events with more than one TR photons are, of course, differs from the single photon spectra. So, the final spectra of total energy in event will be different in case of different TR photons multiplicity – even if single photon spectra are identical.







Conclusions:

- Shape of single TR photon spectra are in perfect agreement.
- Atlsim gives 8.5% larger mean number of TR photons than GEANT4. The reason are still unknown.
- Due to different multiplicity in photon numbers, spectra of total TR energy in event are slightly differs.