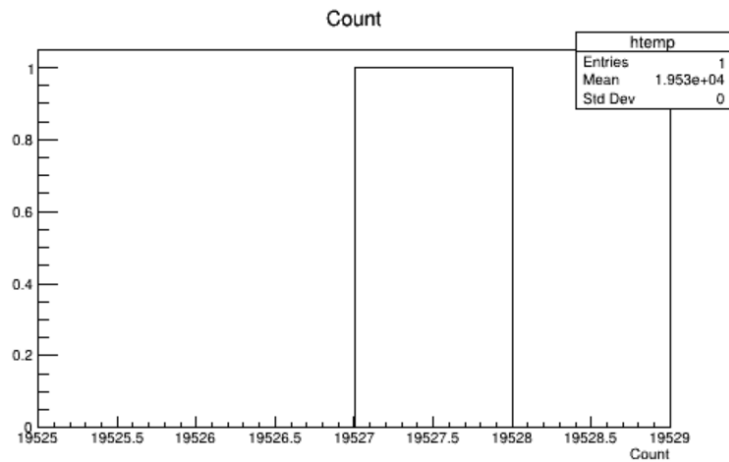
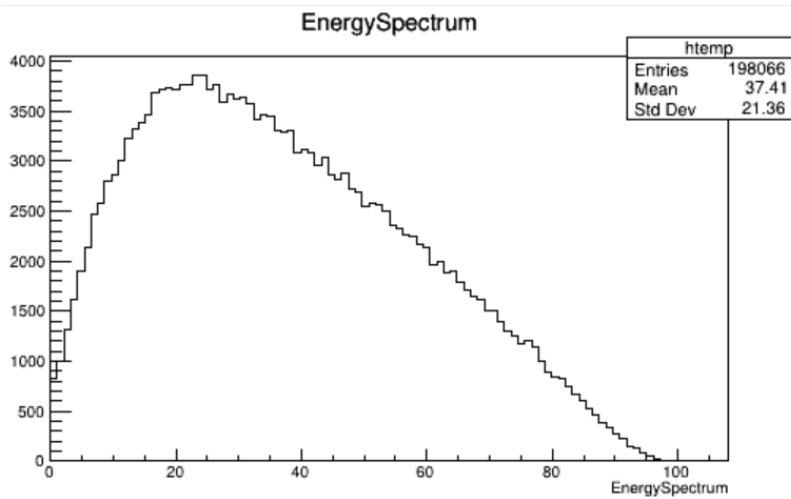


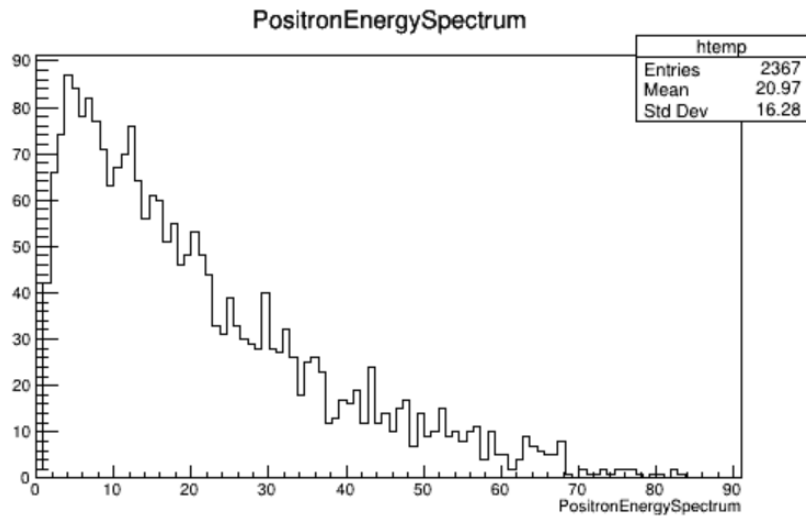
Total number of photon conversion events $\sim 4e4$ times.



Total number of photon conversion events happening in target $\sim 1.95e4$ times.



RMC gamma energy spectrum.



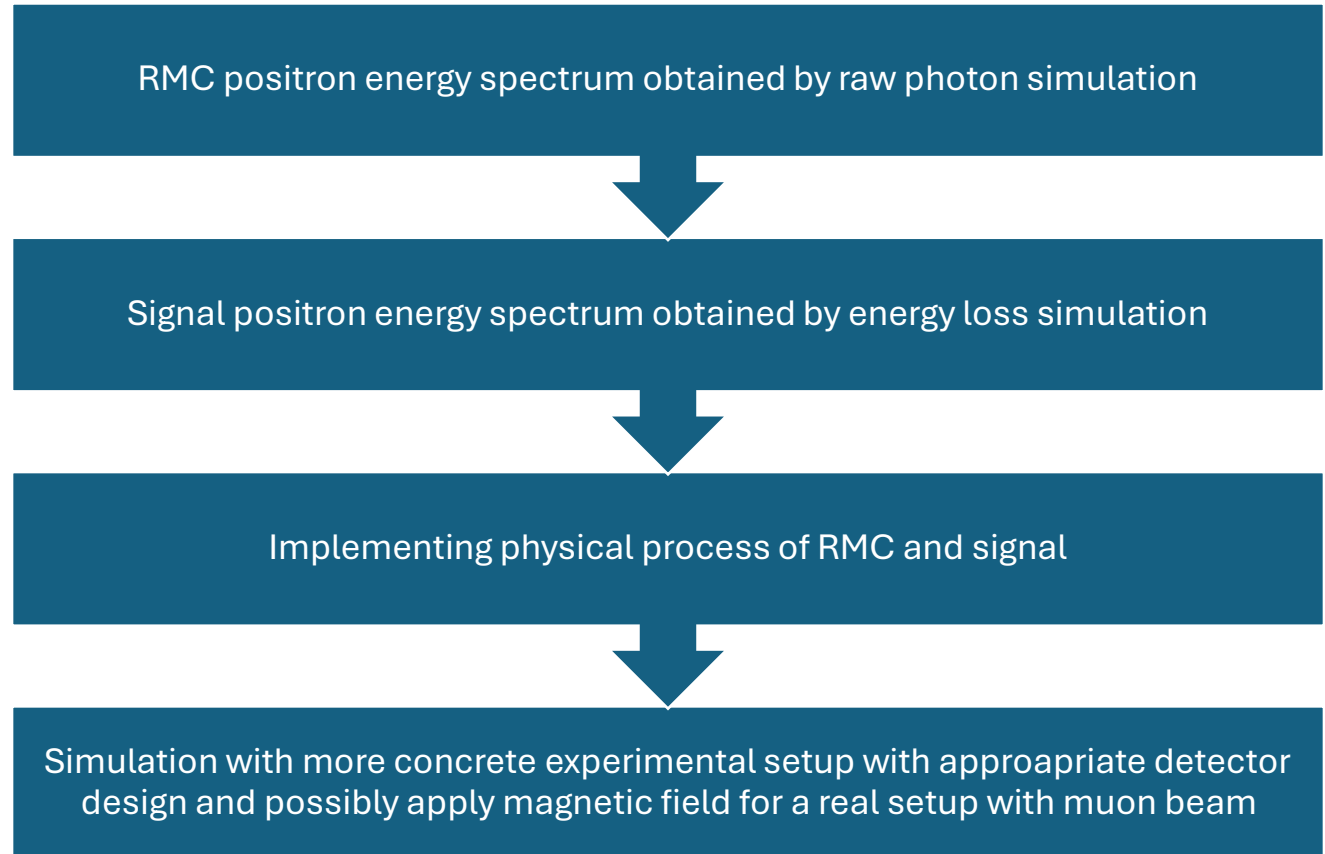
RMC positron energy spectrum

Several points can be observed by initial simulation with full range of energy spectrum of RMC photons:

1. By the ratio of “conv” processes of events in target and in total, one obtains the pair production in target probability is about **50%**, much higher than the paper results **~0.1%**. Could be the energy threshold difference as this is the whole energy spectrum result without energy cut applied.
2. Pair production probability is **~20%**, lower than the paper result **~97%**, again, it could be due to the energy cut not applied yet, so lower energy photon has a lower probability to pair produce.
3. $P_{E>E_{min}} < 0.04\%$ for whole energy spectrum. According to the paper, for input photon energy > 90 MeV, $P_{E>E_{min}} \sim 1.8\%$, so the sample size ($2e5$ input particles) is too small to see the positron events having energy closer to the signal positron energy.

Note: All results from the paper refer to the aluminum target only, but other target materials produce similar results with main difference comes from $P_{E>E_{min}}$.

Summary of Mu2e+ plan:



RMC process summary:

Capture to atom -> muonic atom decay emitting a photon -> photon pair produce background positron.

Signal process summary:

Capture to atom -> conversion happen and produce e+ signal