# DualReadout Calorimeter Simulation Summary

D. Boccanfuso, F. Cirotto, A. D'Avanzo, C. Di Fraia 04/12/2024

## Saved the time of arrival of photons on SiPMs.

- Added rotation of SiPMs.
- Small test of optical filter.





#### BGO scintillation components: fast 50 ns 32% of the yield, slow 321 ns 68% of the yield.

scint timing event 0



Cerenkov photons seem to reach CH2 slightly faster compared to channel 1. t=0 when primary is fired.





## e+ 10GeV, filter off, sum of 100 events, BGO



## e+ 10GeV, filter off, sum of 100 events, BGO



~0,4 ns difference is consistent with the time of flight of the primary through the crystal





## Mu+ 120GeV, filter off, sum of 100 events, BGO



## Mu+ 120GeV, filter off, sum of 100 events, BGO



## FilterON

Photons in CH2 without filter: scintillation=789673, cerenkov=2210 Photons in CH2 with filter, scintillation =3479, cerenkov= 217

scintillation 
$$\frac{3479}{789673} = 0,004$$
  
Cerenkov  $\frac{217}{2210} = 0,09$ 

> mu+ at 120 GeV,  $\sigma_{\text{beam}} = 0.25$  cm, 1k events > 0 deg



> mu+ at 120 GeV,  $\sigma_{\text{beam}} = 0.25$  cm, 1k events  $> 0 \deg$ 

tot phot scint SiPM CH2 {tot phot scint SiPM CH2 < 200000} htemp htemp 998 Entries 997 Entries 3.083e+04 Mean 33.18 Mean 140 160 Std Dev 1.567e+04 Std Dev 47.28 140 120 120 100 100 80 80 60 60 40 40 scintillation cerenkov 20 20 lm  $\times 10^{3}$ \_ | 🛛 ı 0<sub>0</sub> 20 40 80 100 120 180 100 200 300 500 60 140 160 400 tot\_phot\_cer\_SiPM\_CH2 tot\_phot\_scint\_SiPM\_CH2

tot\_phot\_cer\_SiPM\_CH2 {tot\_phot\_cer\_SiPM\_CH2 < 500}

> mu+ at 120 GeV,  $\sigma_{\text{beam}} = 0.25$  cm, 1k events > 45 deg



> mu+ at 120 GeV,  $\sigma_{\text{beam}} = 0.25$  cm, 1k events > 45 deg



> mu+ at 120 GeV,  $\sigma_{\text{beam}} = 0.25$  cm, 1k events > 90 deg



> mu+ at 120 GeV,  $\sigma_{\text{beam}} = 0.25$  cm, 1k events > 90 deg



> mu+ at 120 GeV,  $\sigma_{\text{beam}} = 0.25$  cm, 1k events > 120 deg



> mu+ at 120 GeV,  $\sigma_{\text{beam}} = 0.25$  cm, 1k events > 120 deg



> mu+ at 120 GeV,  $\sigma_{\text{beam}} = 0.25$  cm, 1k events > 135 deg



> mu+ at 120 GeV,  $\sigma_{\text{beam}} = 0.25$  cm, 1k events > 135 deg



> mu+ at 120 GeV,  $\sigma_{beam} = 0.25$  cm, 1k events > 180 deg



> mu+ at 120 GeV,  $\sigma_{\text{beam}}$  = 0.25 cm, 1k events > 180 deg

![](_page_24_Figure_2.jpeg)

## To do

Check for cerenkov photons with negative pz.

Check correlation between cerenkov timing and position from which they originate.

Check number of riflessions.

Timing for every angle.

Check on scintillation components.