

Simulation of ^{90}Sr radioactive decay on PSD bar

23/04/2020

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PSD Bar geometry & GEANT4 Simulation

Bar:

X = 1 cm

Y = 3 cm

Z = 50 cm

Wrapping:

Thickness = 500 μm

2 SiPMs (one on each side):

X = 3 mm

Y = 3 mm

Z = 0.5 mm



Simulation:

TileV1 → new version of the GEANT4-based simulation developed in BARI

Particles:

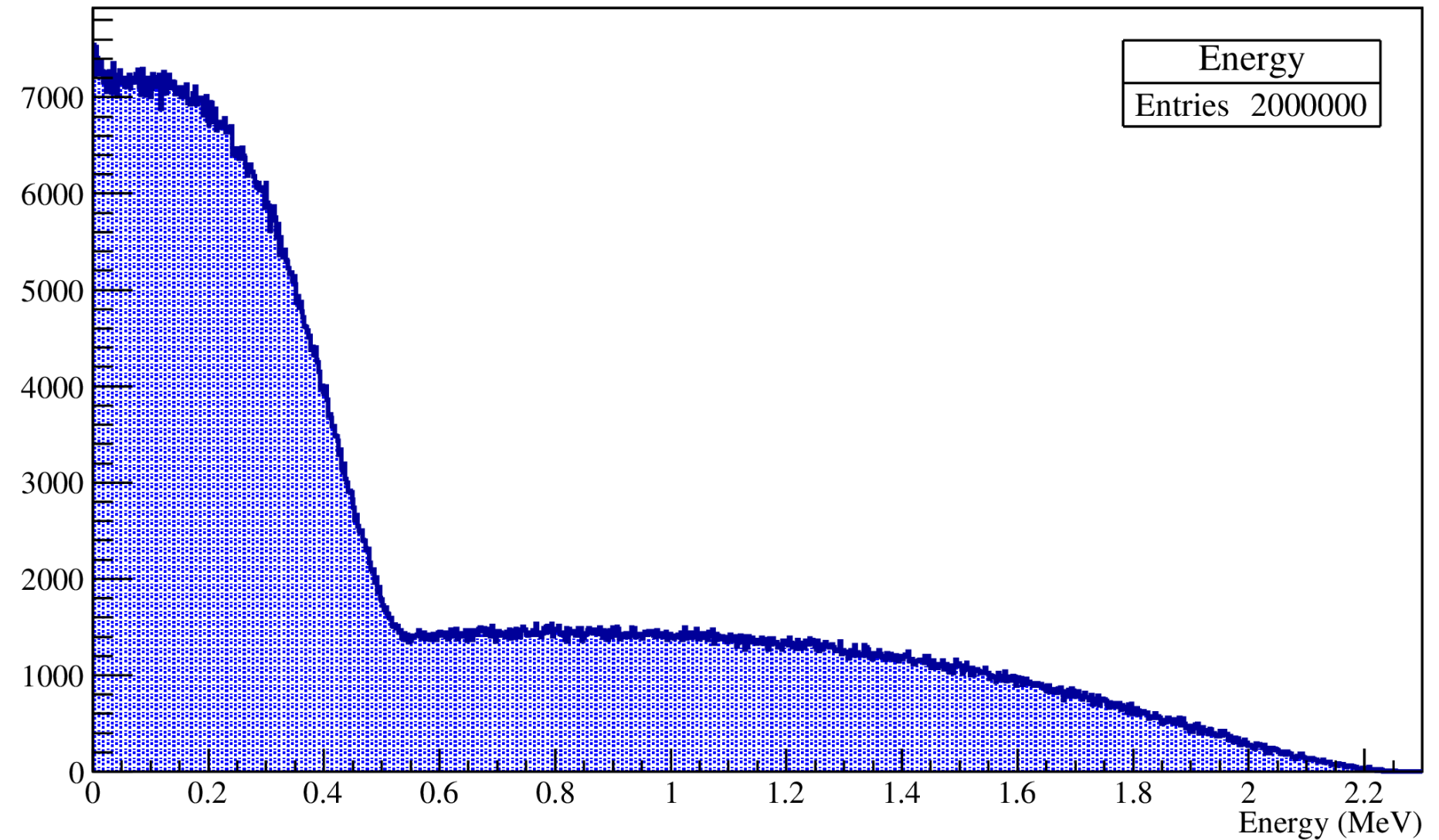
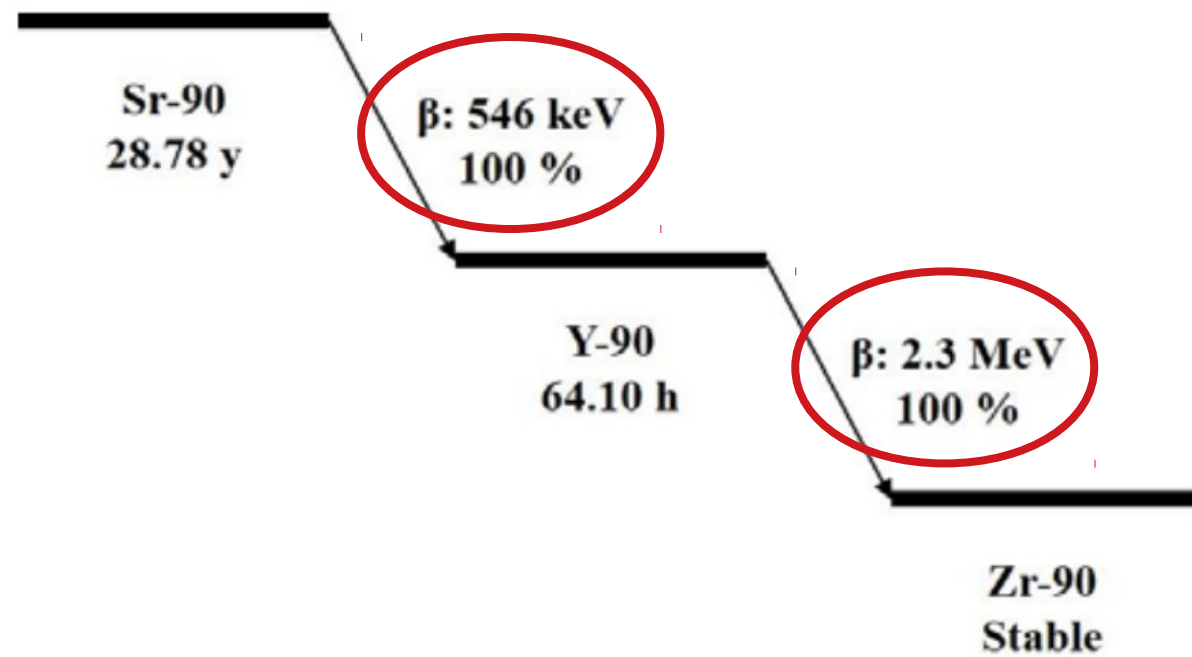
^{90}Sr ions

Position:

$(x, y, z) = (-1, 0, 0)$

Simulation with Sr-90

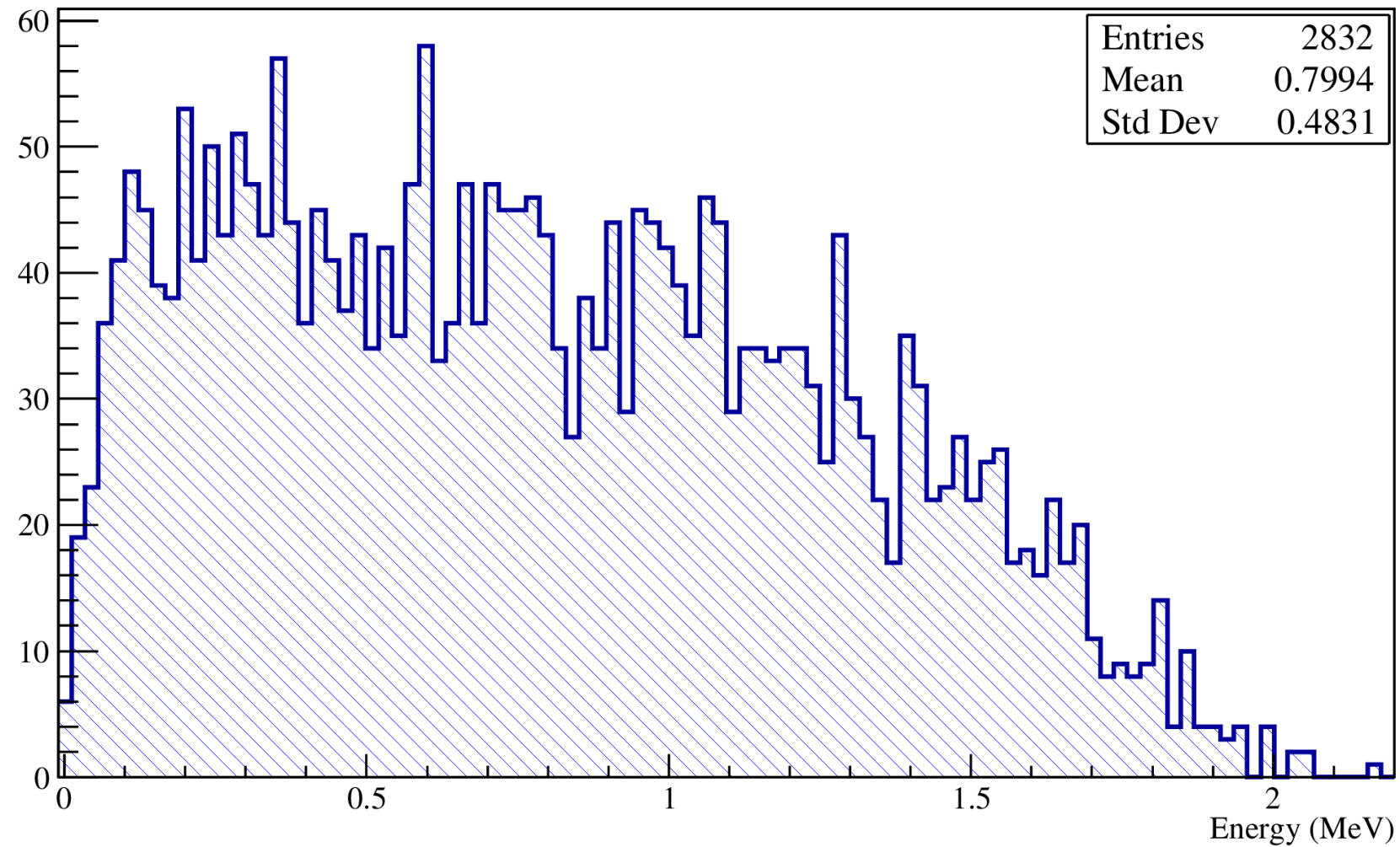
Energy at vertex



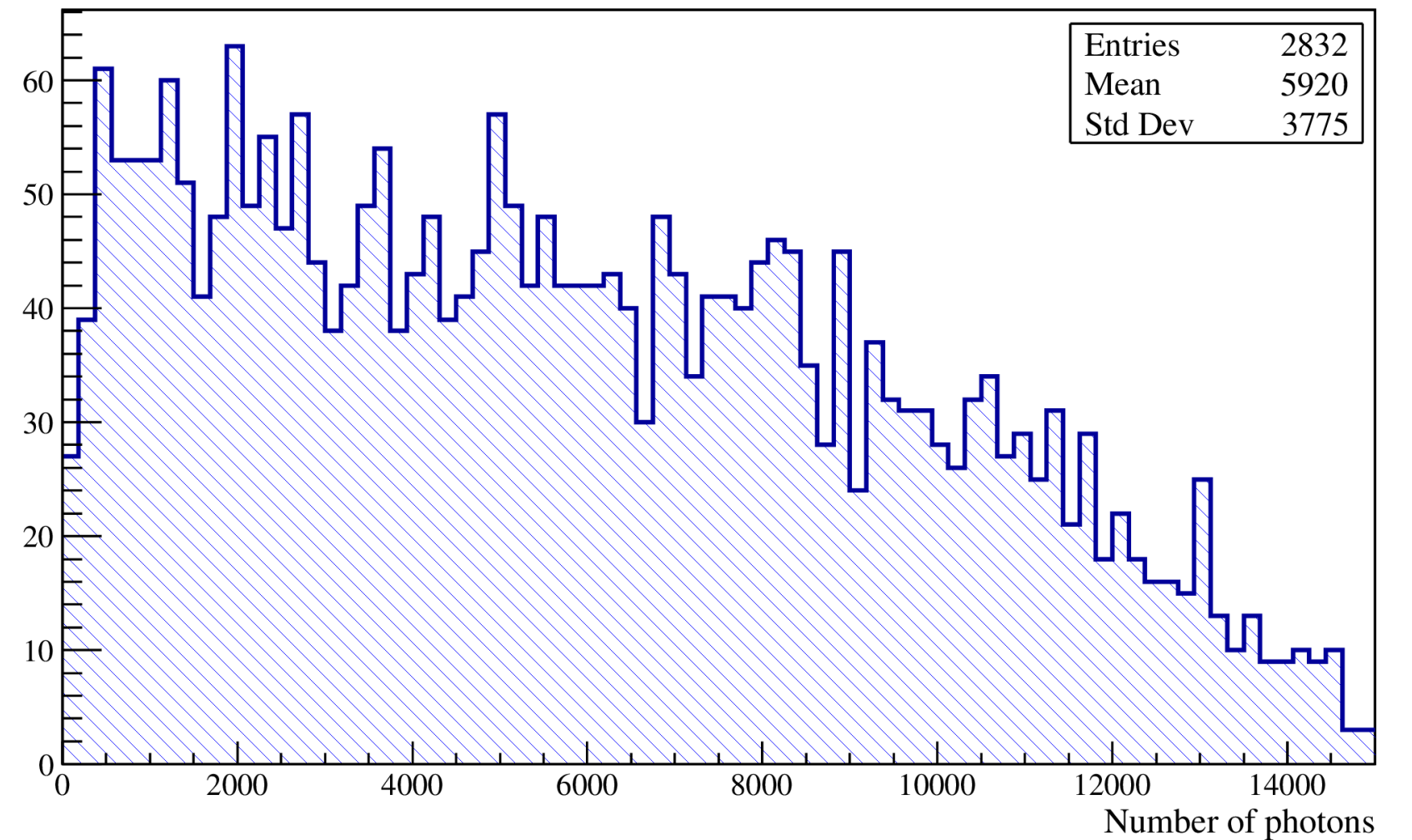
**ONE MILLION EVENTS
OPTICAL PHOTONS OFF**

Electrons in the bar

Energy deposited by electrons



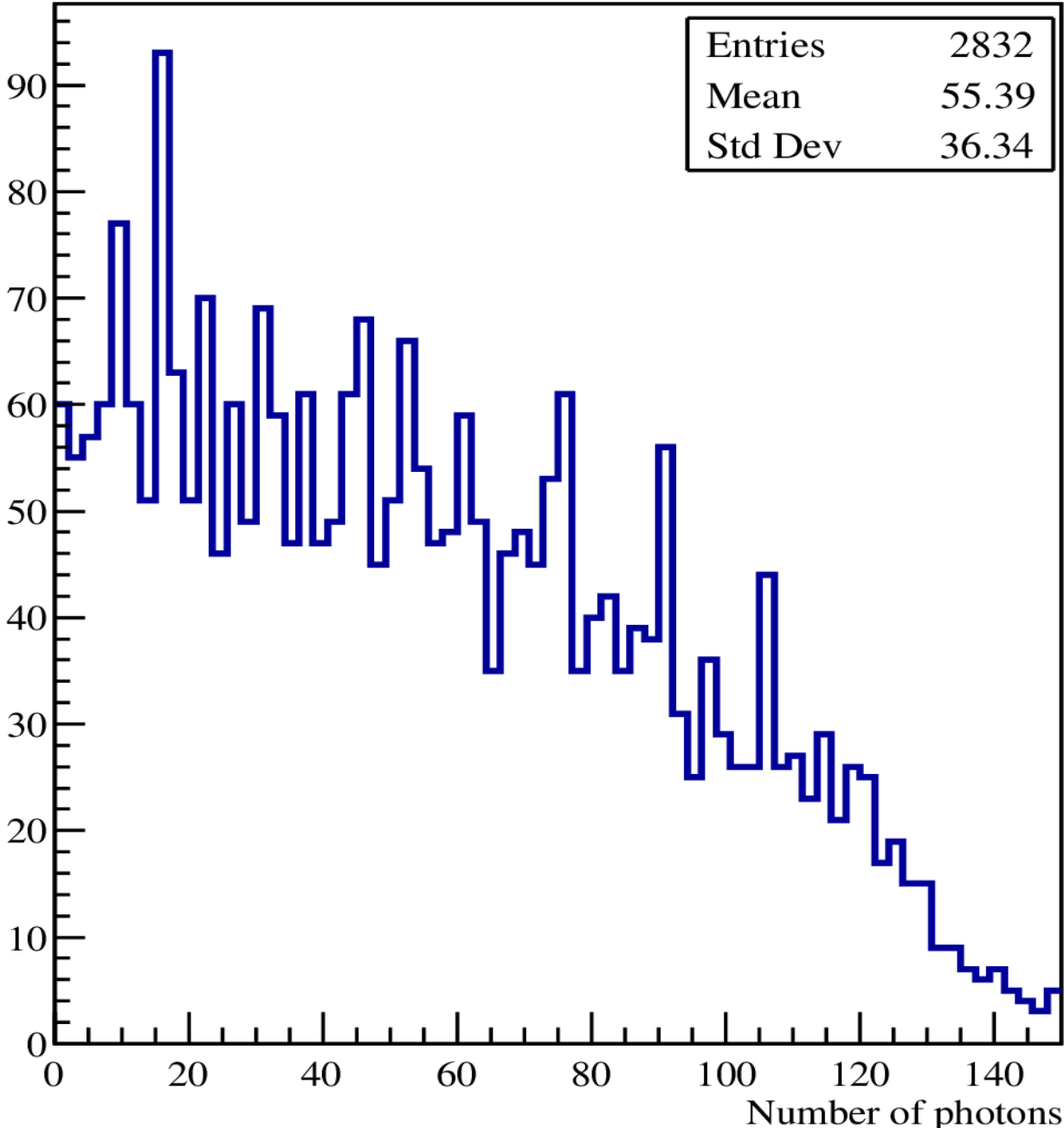
Scintillation by electrons



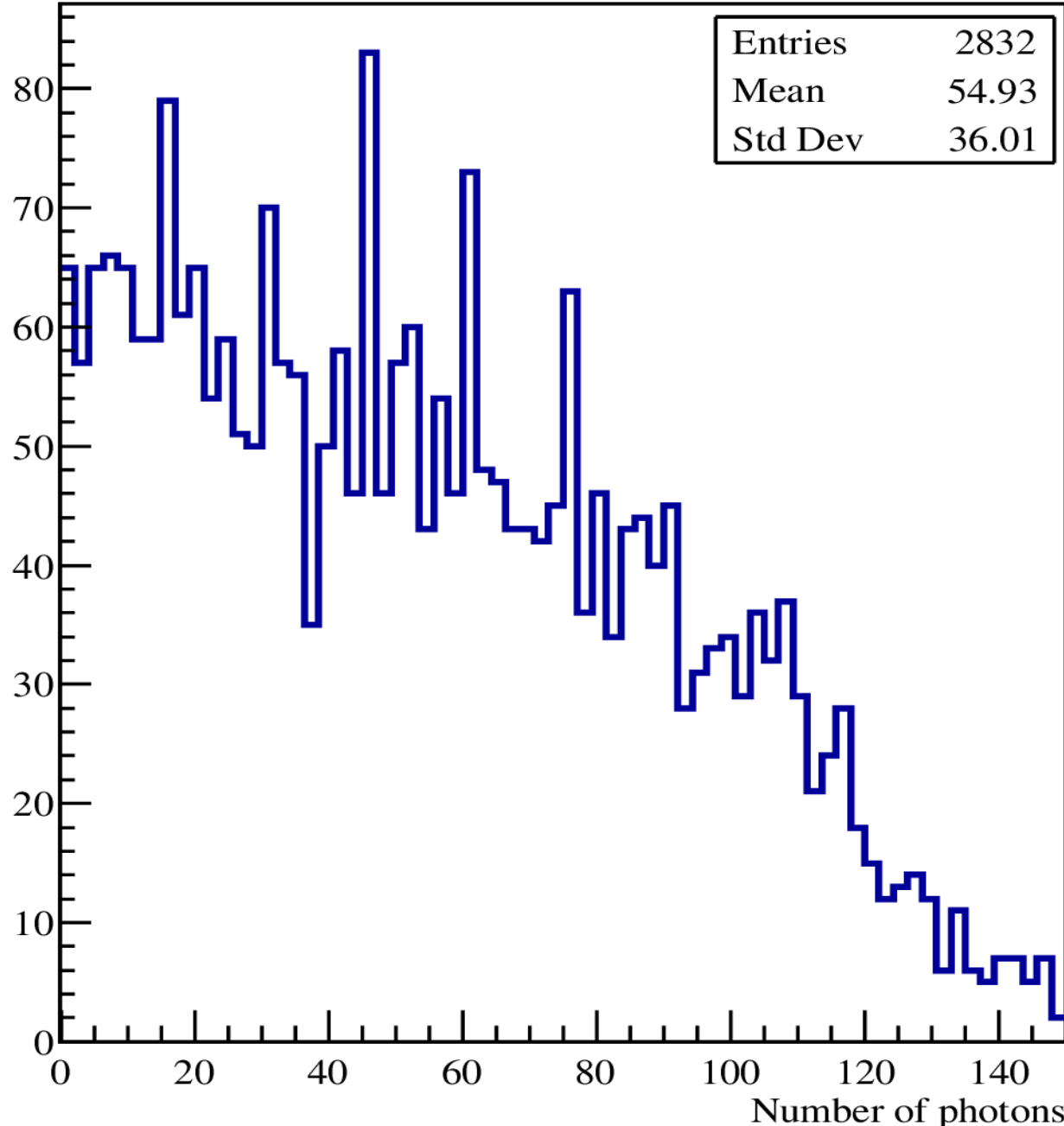
**10000 EVENTS
OPTICAL PHOTONS ON**

Photons at SiPMs

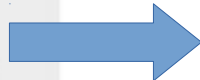
Photons absorbed SiPM Left



Photons absorbed SiPM Right



AdvanSiD ASD-NUV3S
PDE: 43%



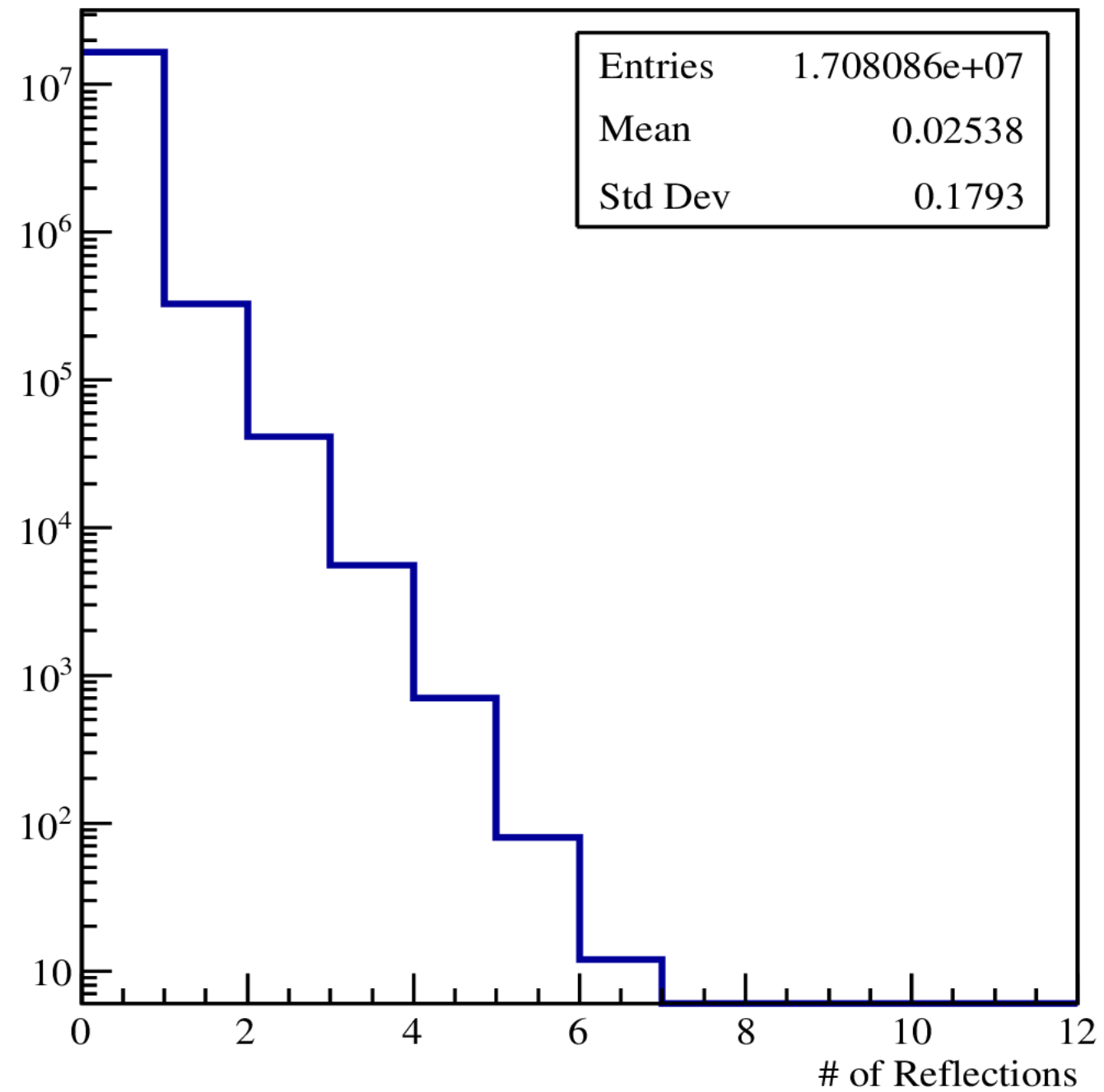
#photons x PDE:
SiPM_Left = 23.82
SiPM_Right = 23.62



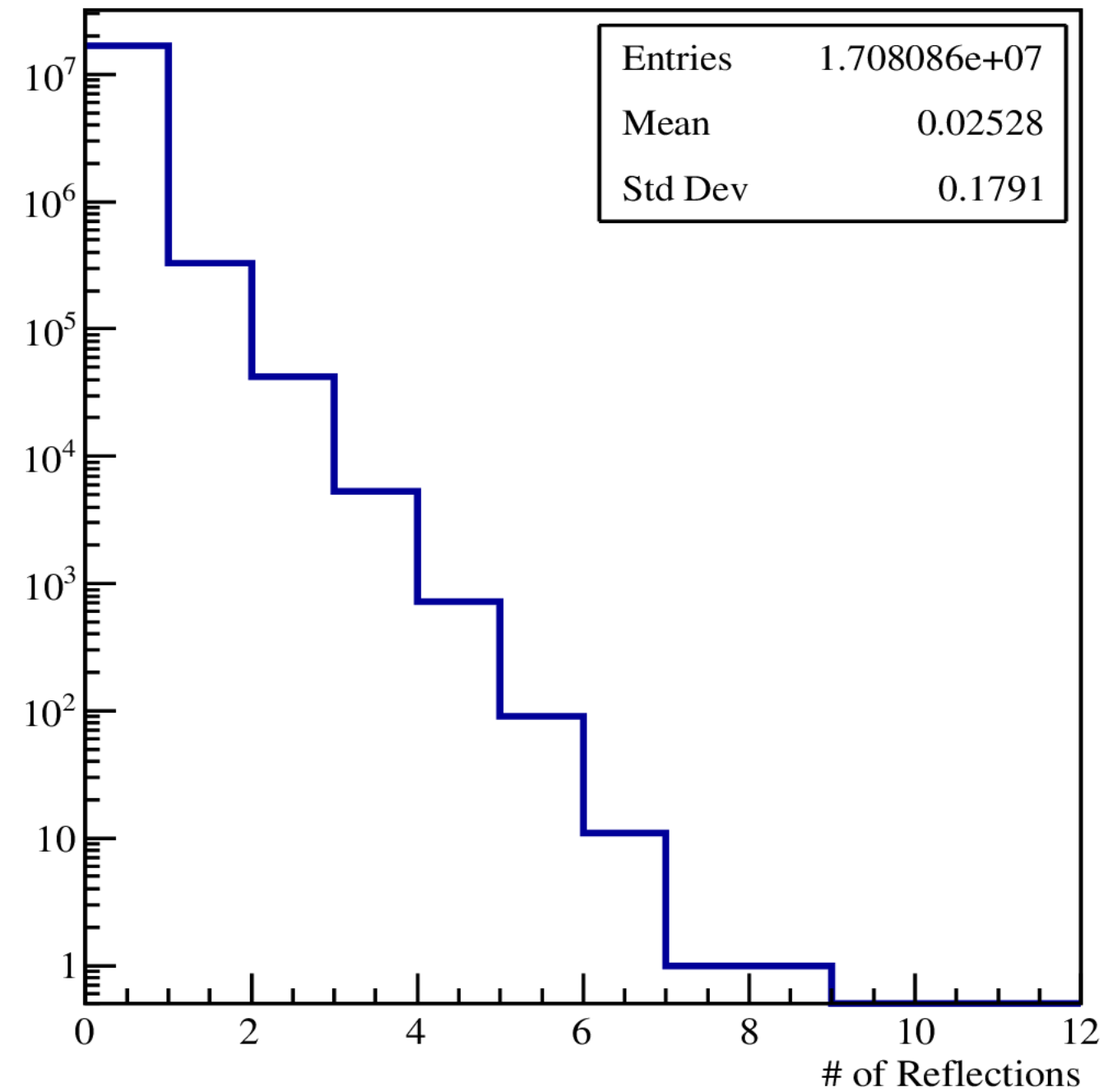
Number of reflections

100% REFLECTIVITY

Number of reflections on SiPM Left

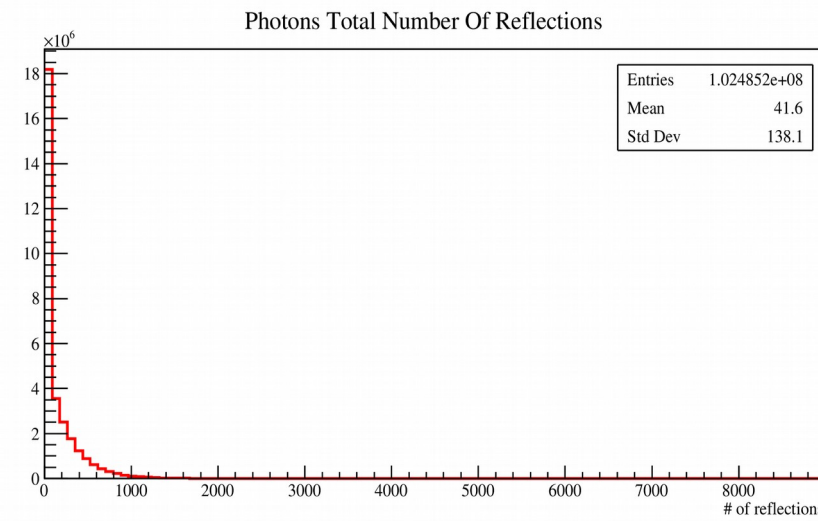


Number of reflections on SiPM Right

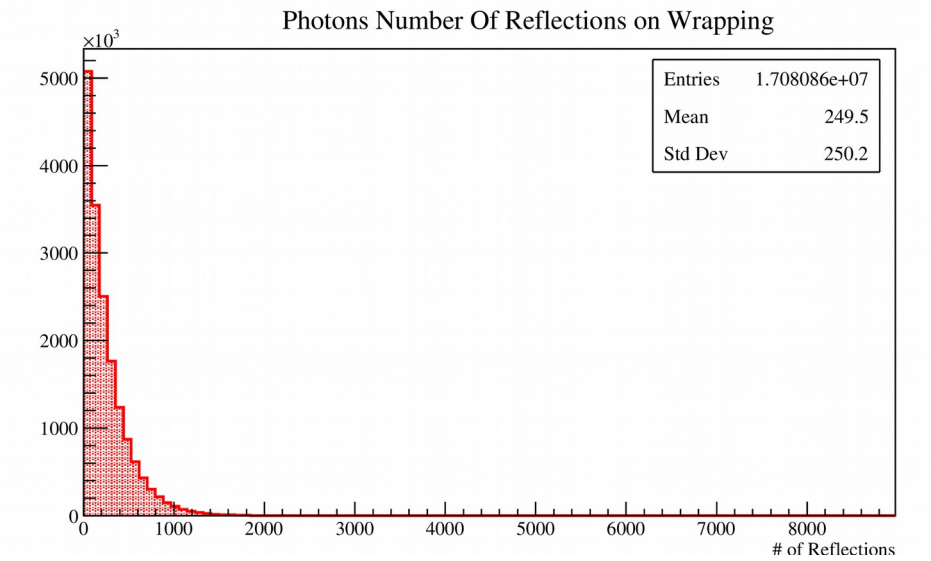


Number of reflections

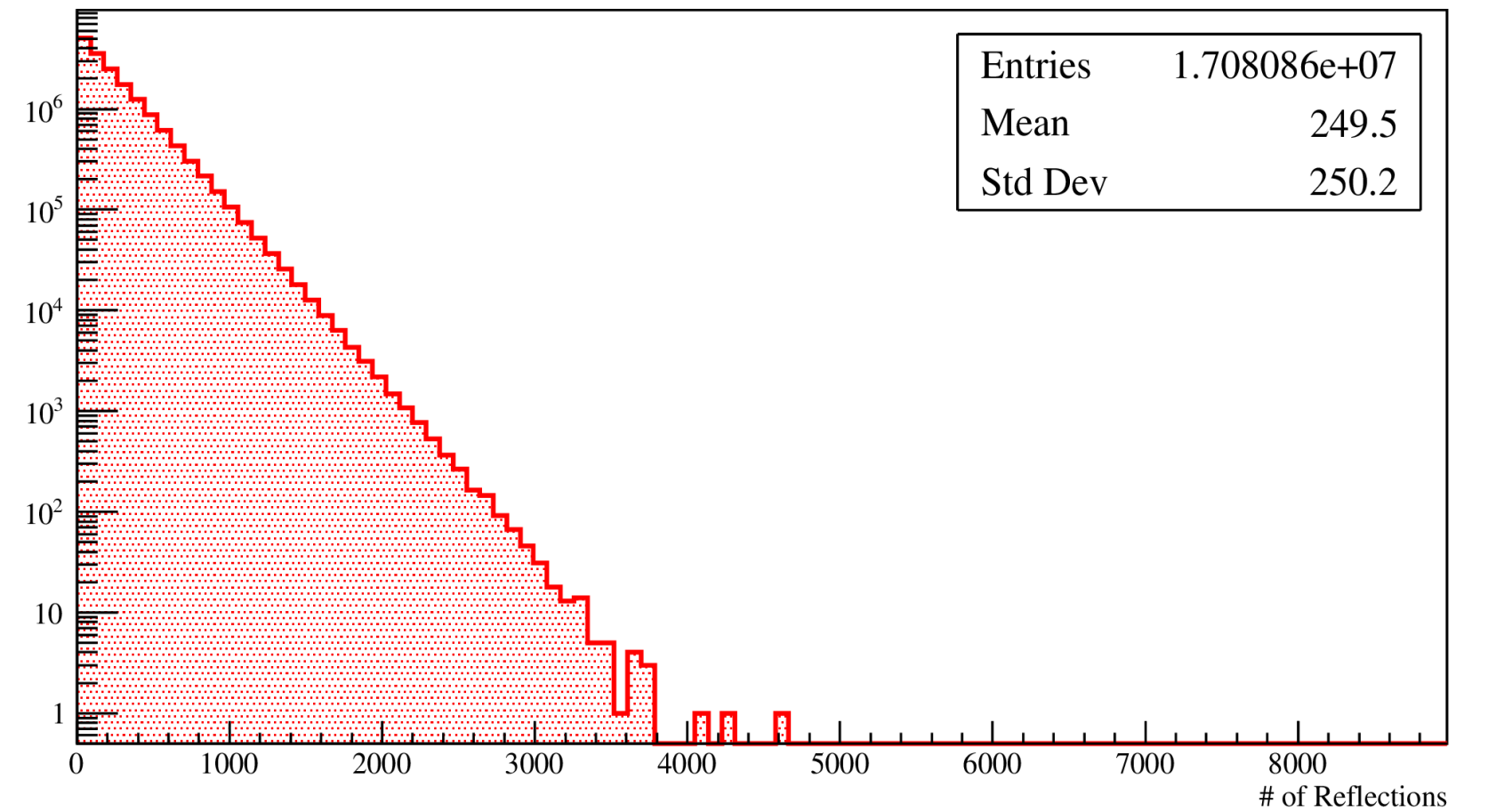
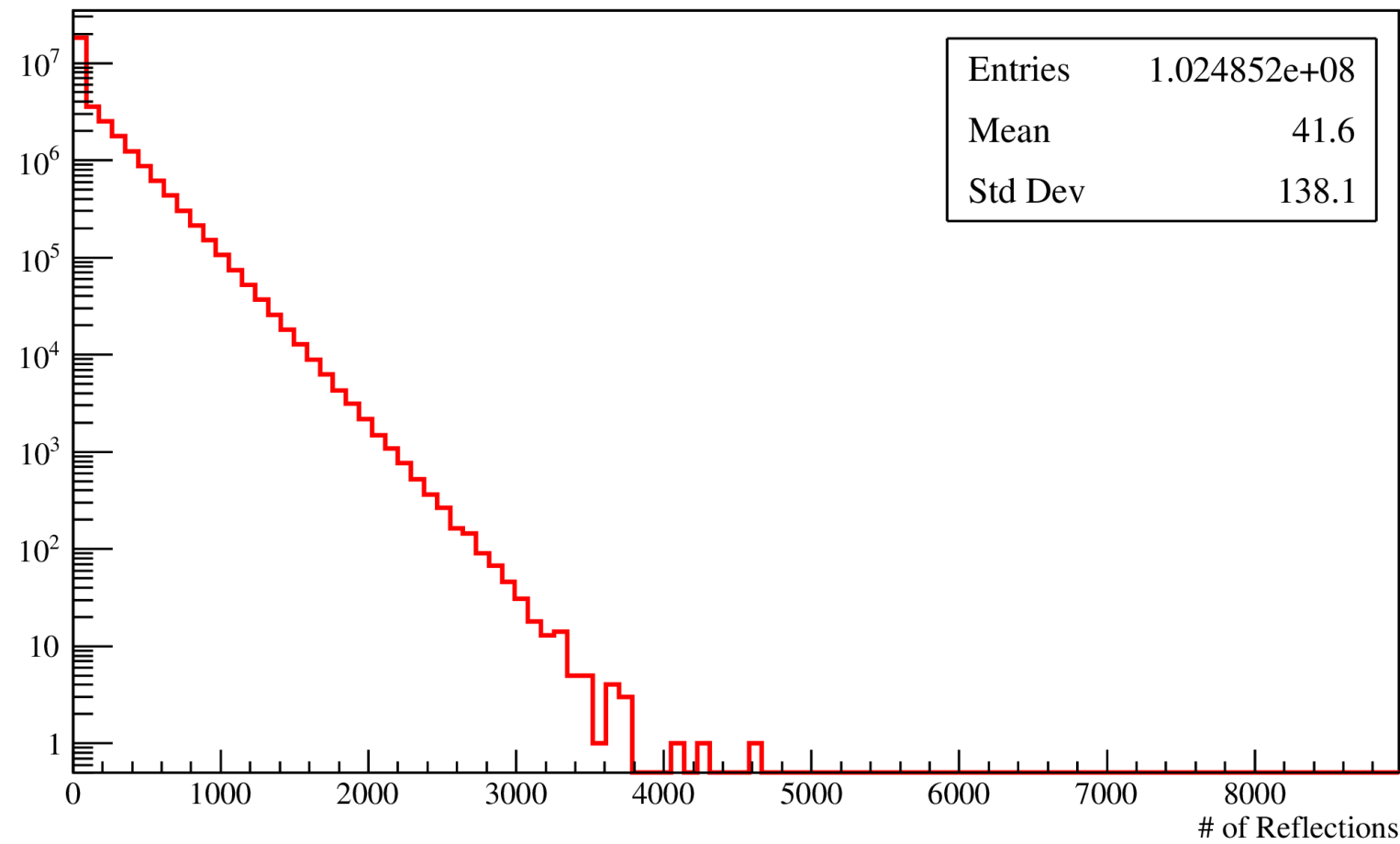
100% REFLECTIVITY



Total number of reflections



Number of reflections on the wrapping

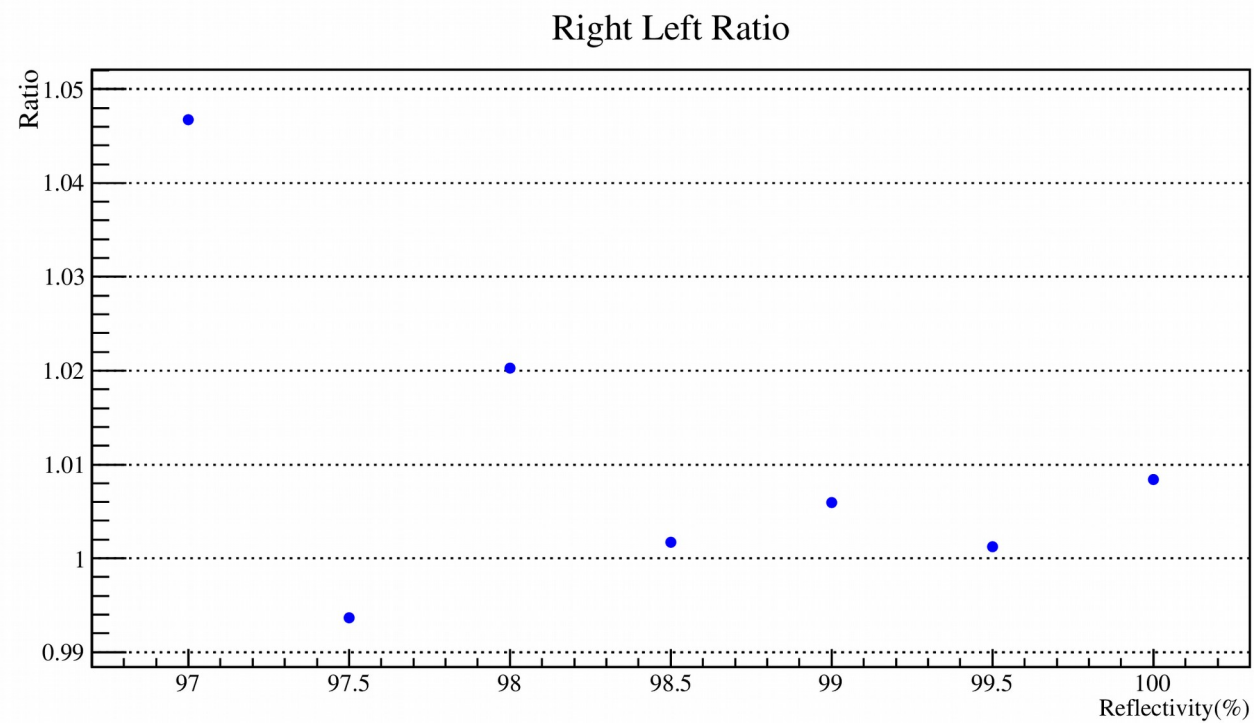
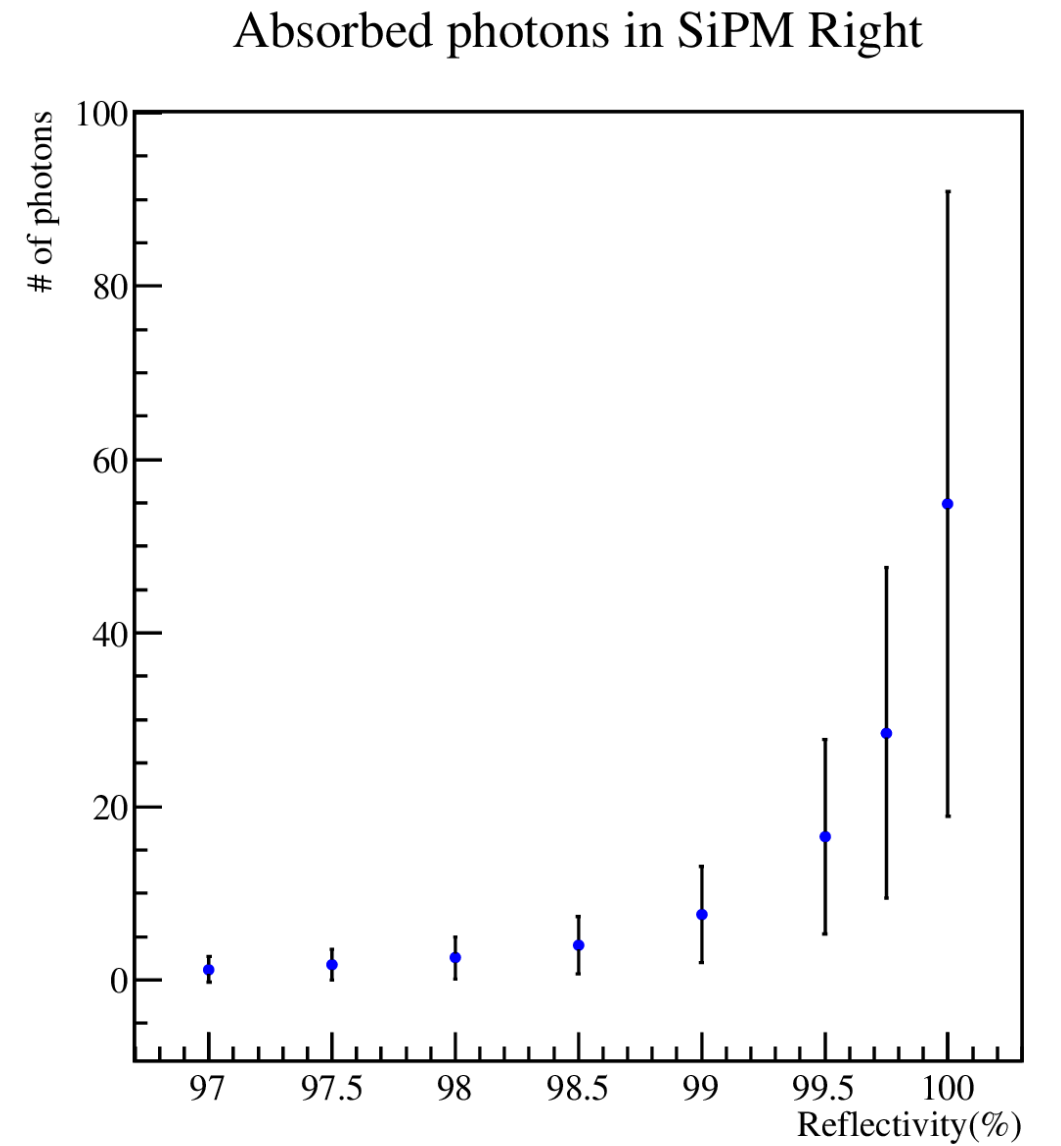
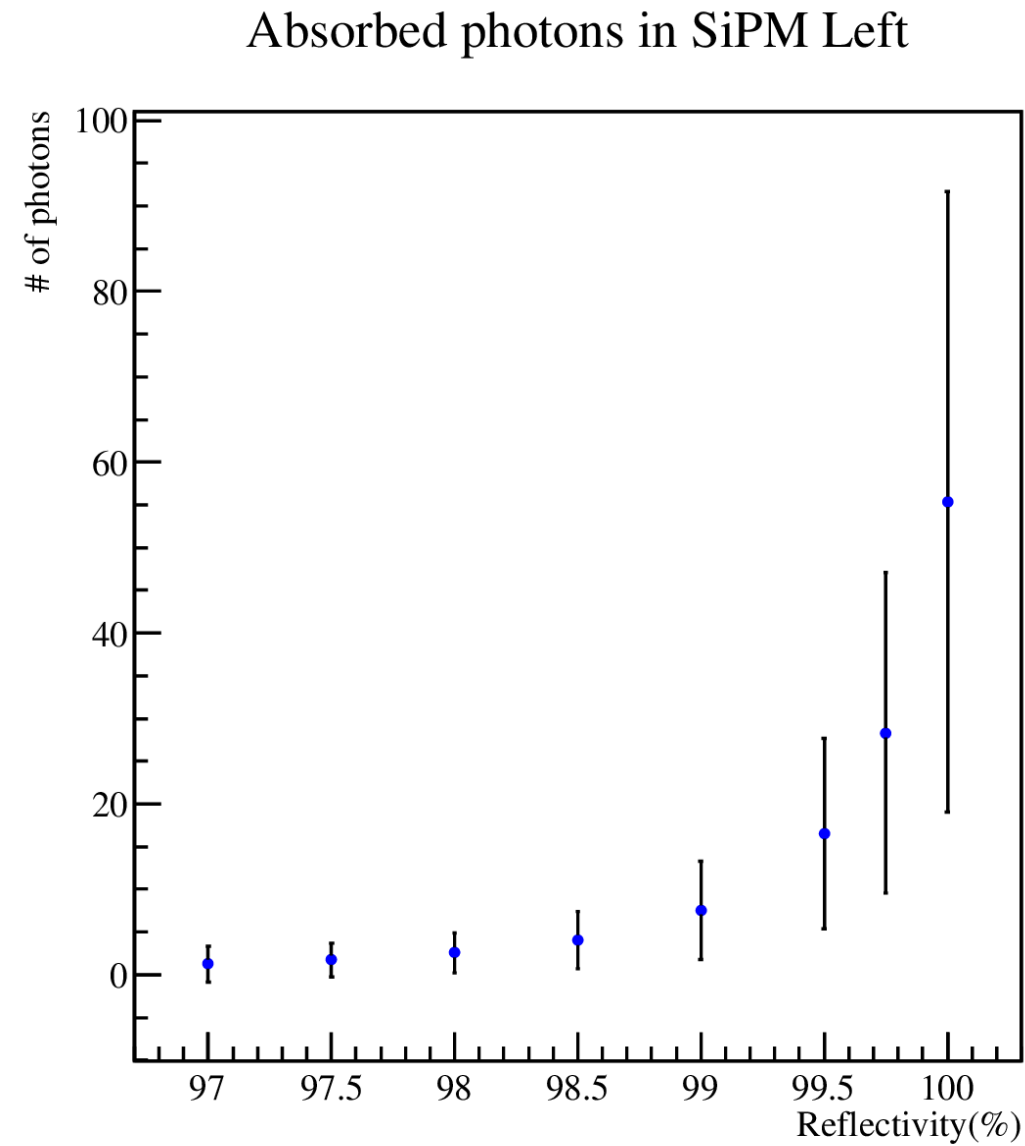
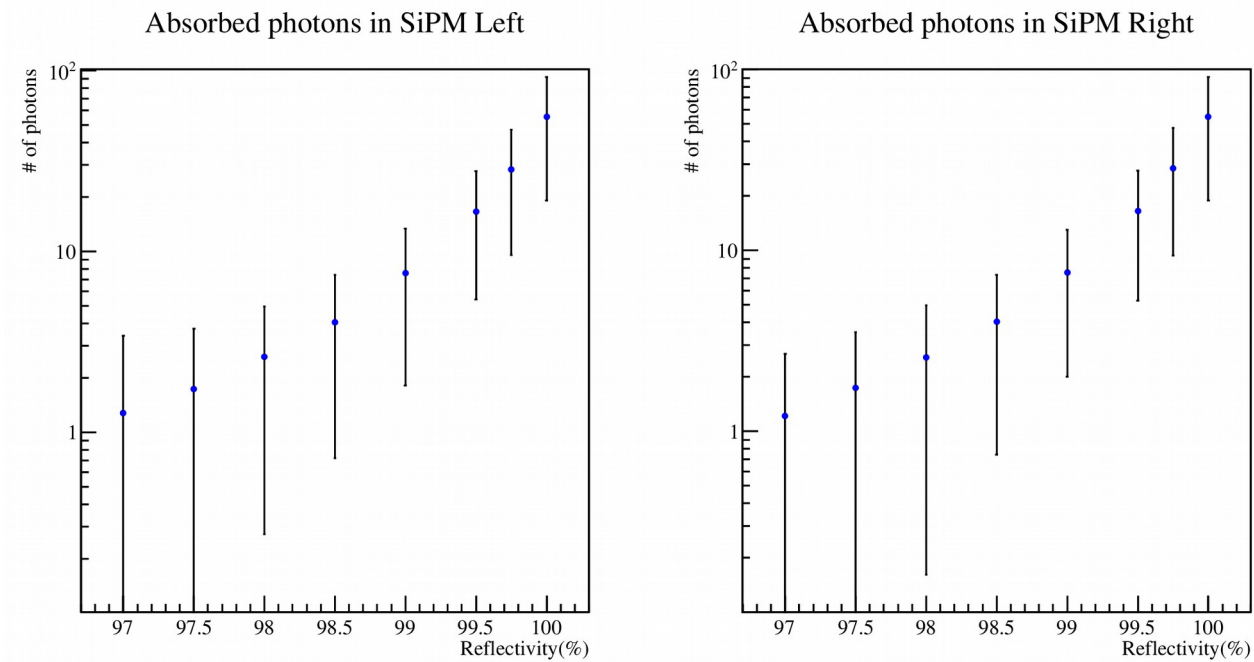


TOTAL:

**World + Bar + Wrapping +
SiPM Right + SiPM Left**

**Reflections taking place
mainly in the wrapping**

Absorbed photons vs Reflectivity



**MEAN VALUE AND STANDARD DEVIATION
FROM THE HISTOGRAM**

Future plans

- Simulations with different:
 - a) geometries
 - b) number of SiPMs
 - c) scintillating materials
- Comparison simulation and data

