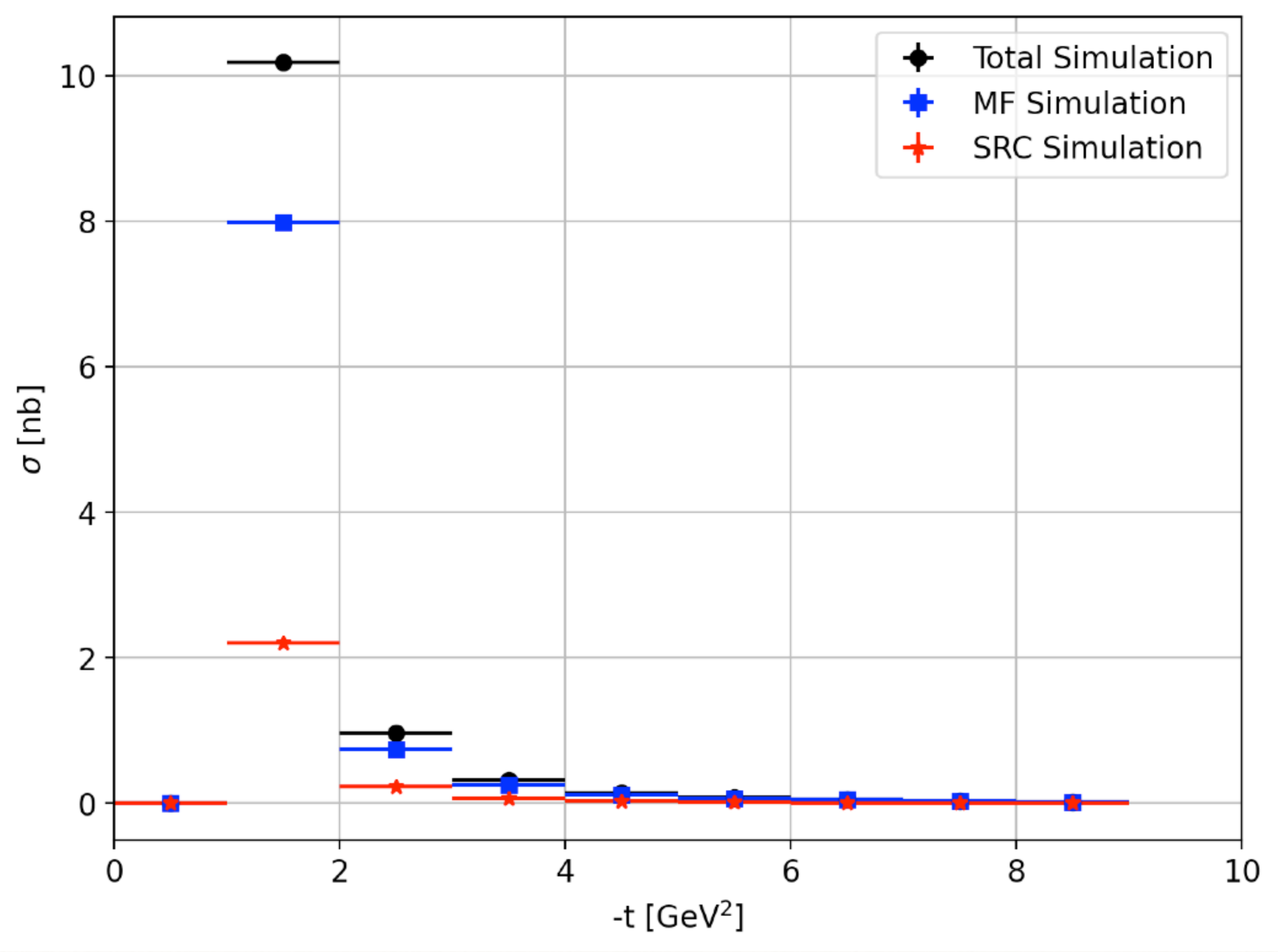
Rate vs. 0.1

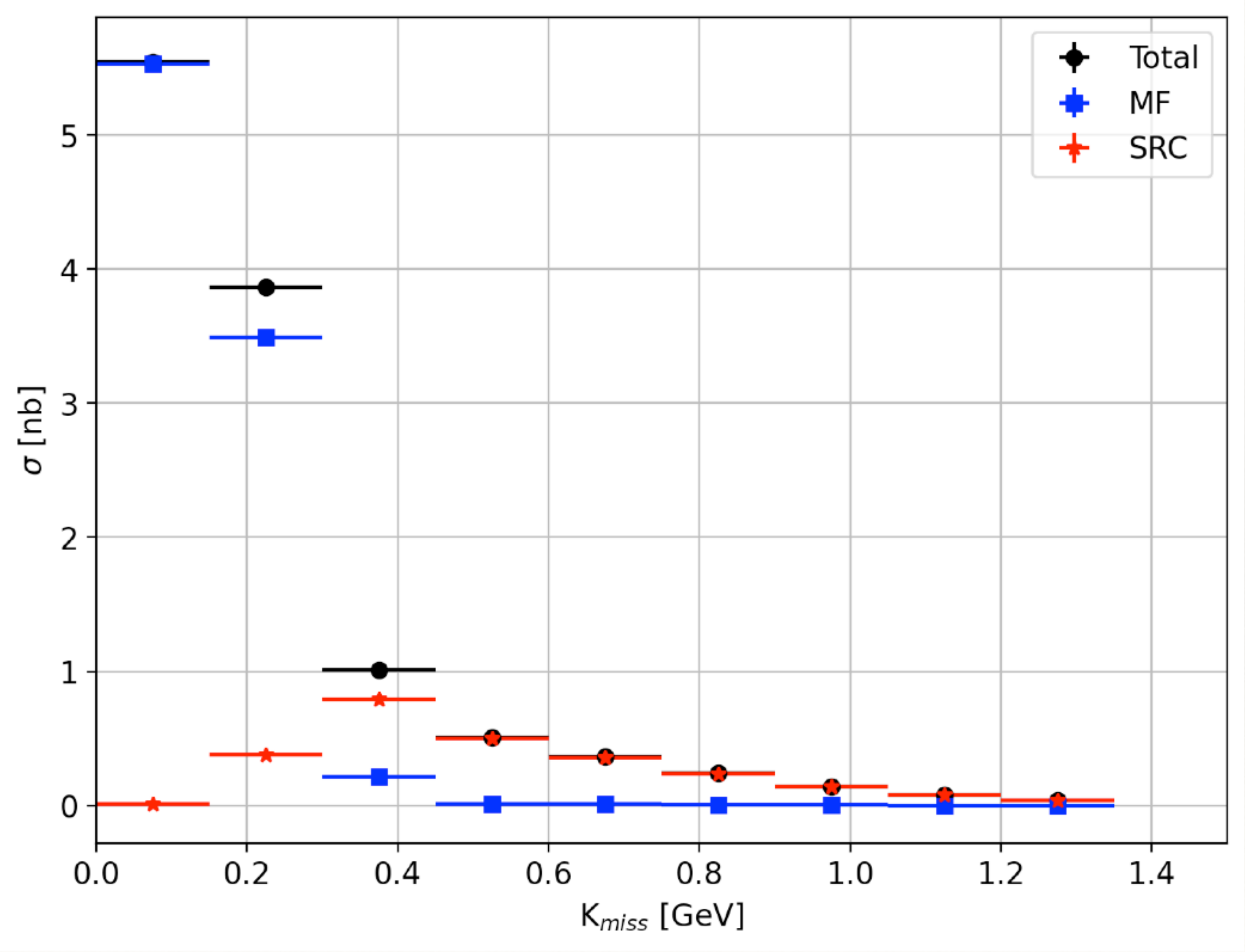
$\gamma + p \rightarrow \rho p \rightarrow \pi^+ \pi^- p$

Nathaly Santiesteban

Recalling for ^{4}He

$E_\gamma > 7$ GeV
-t > 1 GeV^2
-u > 2 GeV^2





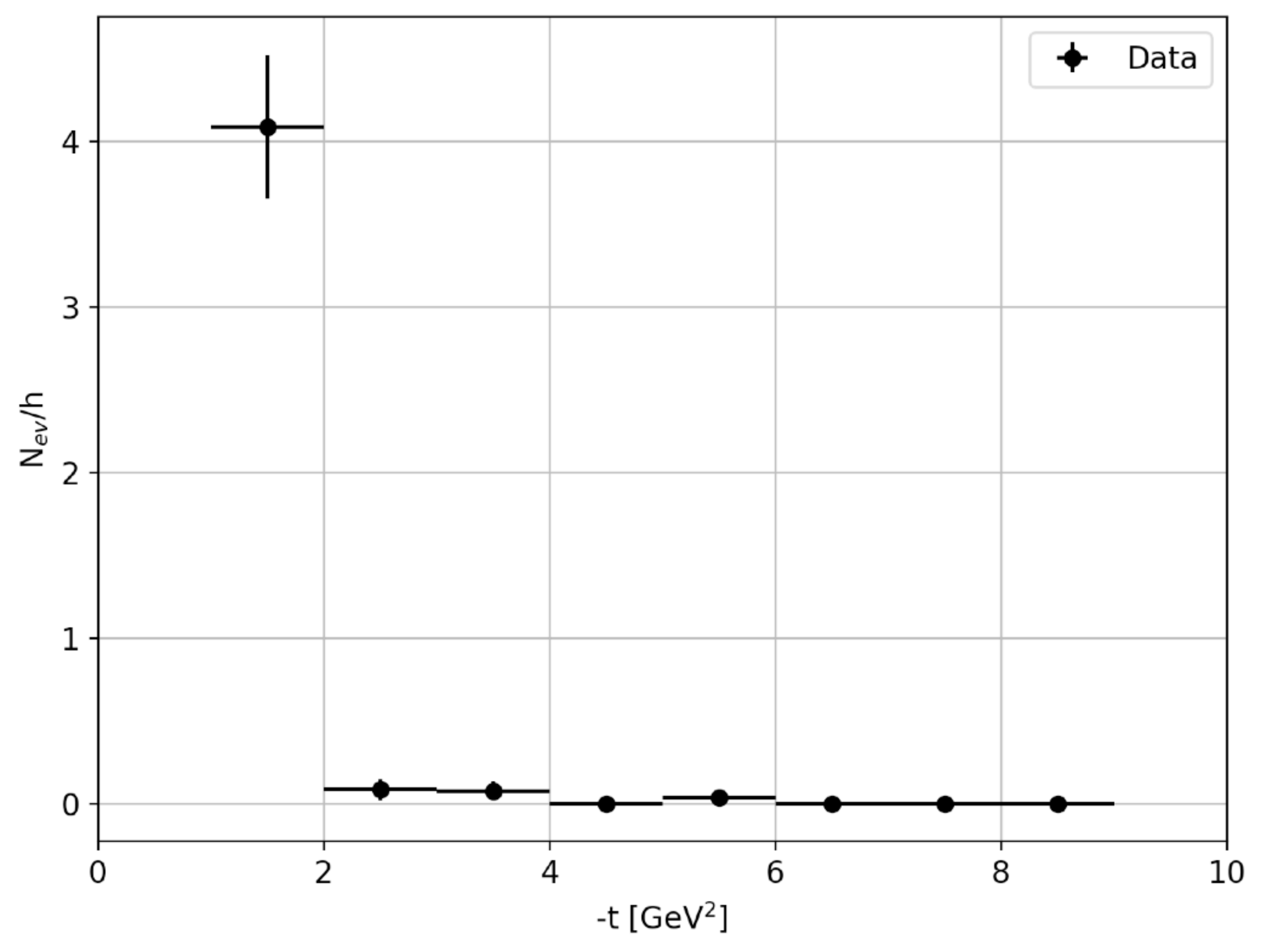
Note: horizontal lines represent the bin size

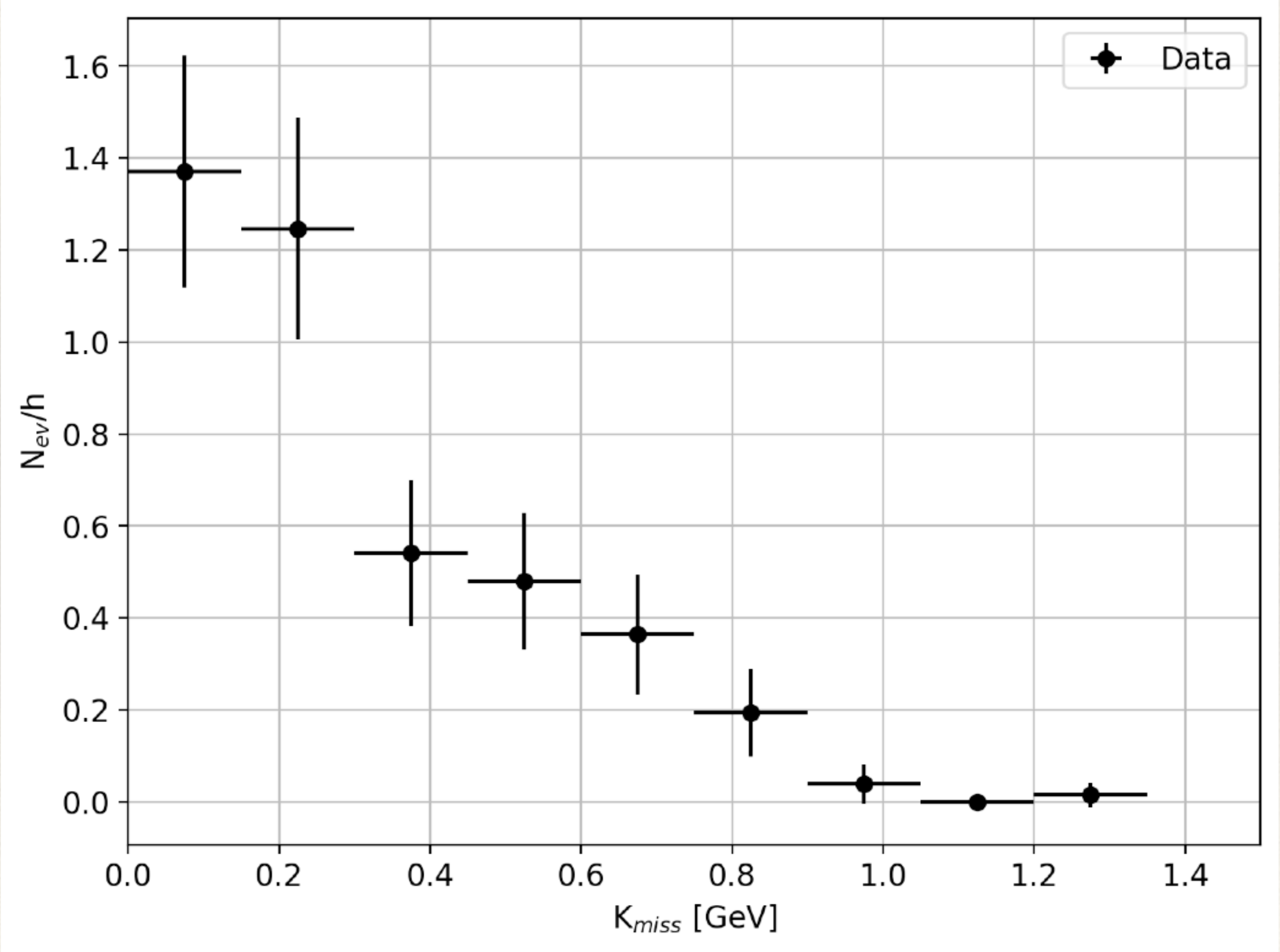
From Empty Cell runs

Runs: 30333, 30334, 30336, 30337, 30564, 30728, 40903, 41386, 41615, 51011, 51013, 51556

Total Flux: 1.55E+12 γ on target for the empty cell run

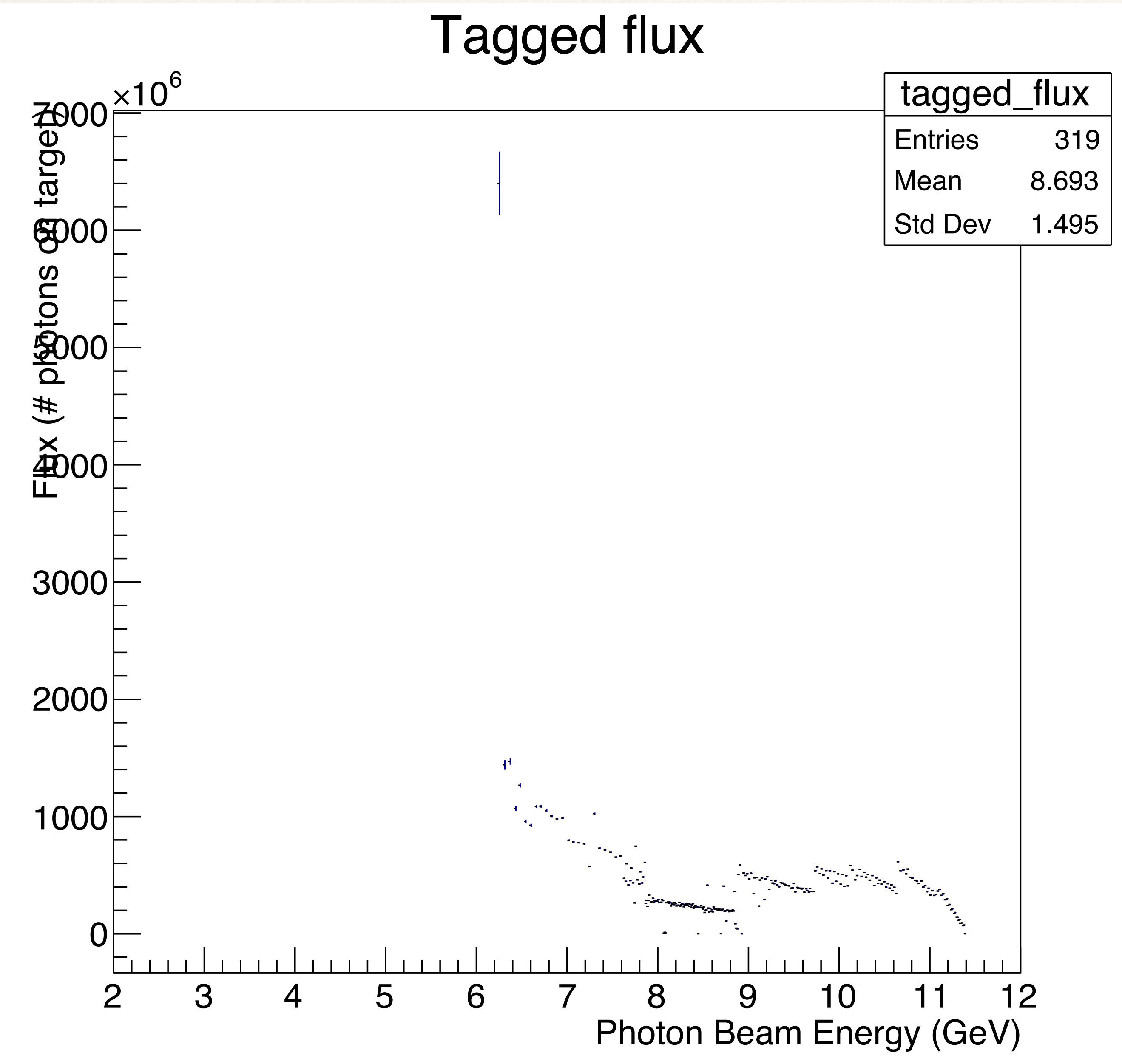
Number of events calculated estimating: 2E7 γ/s

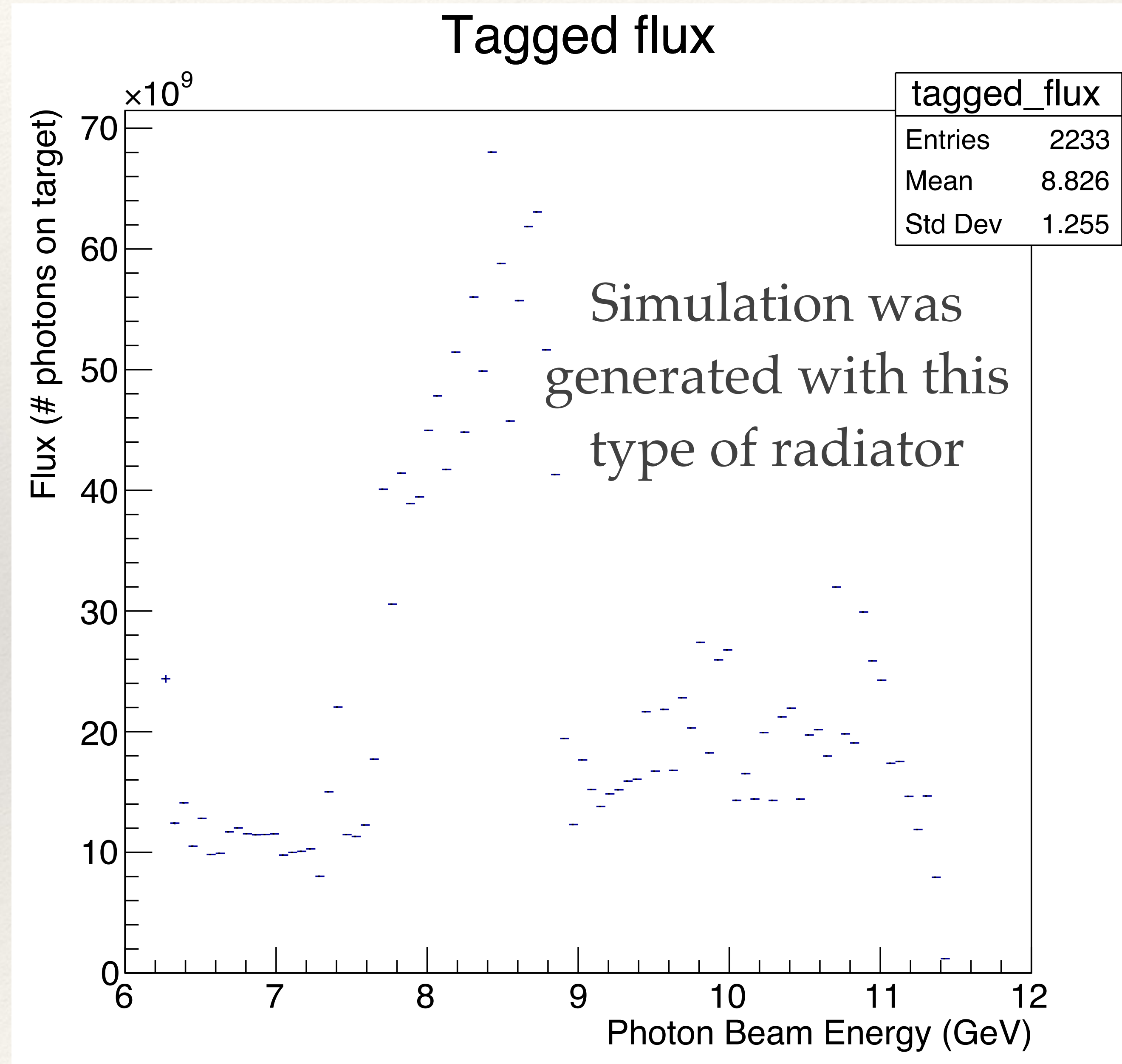




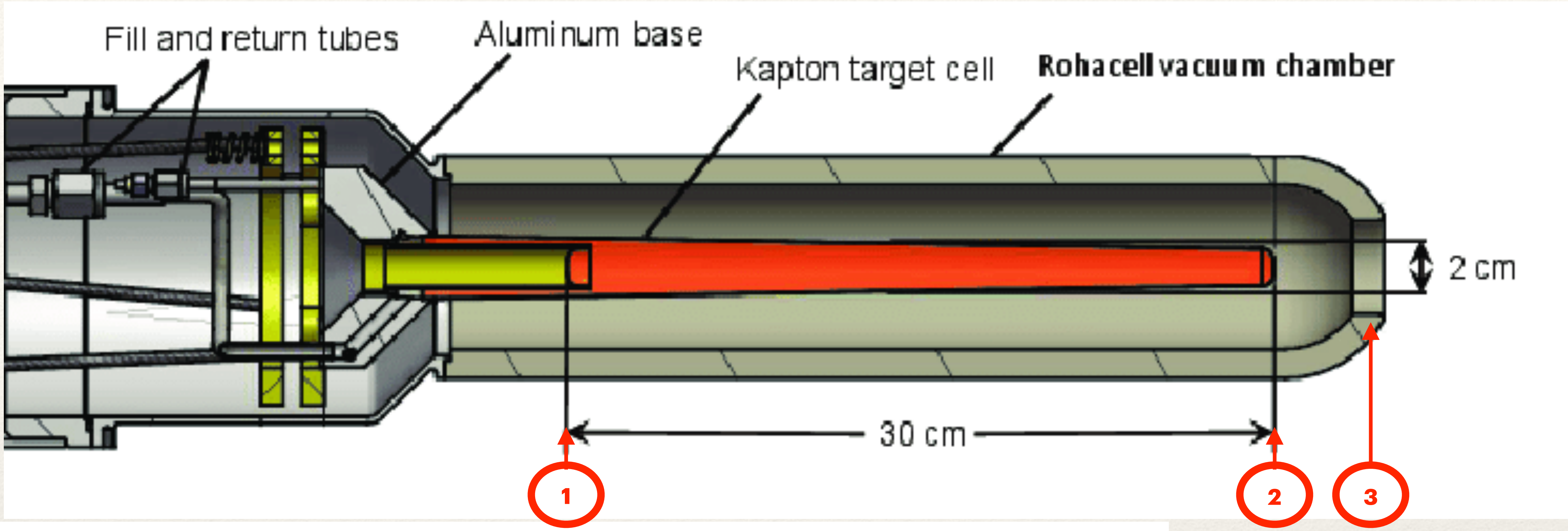
Note: horizontal lines represent the bin size

Note: the empty cell used an amorphous radiator





Simulation was generated with this type of radiator



Target cell

Hall D LH2 Cryotarget
Values listed below are nominal. Final dimensions will be determined on an as-built basis.
CD Keith, Jan 28, 2014

	Item	Material	Z position (cm)	Density (g/cm³)	Dimensions (cm)
1	Target entrance window	Kapton, 75um	0	1.42[1]	1.56 id, 75 um thick
	Target fluid, conical ~18 K, 16 psiA	Liquid hydrogen, 30 cm	0-30	0.0734[2]	2.42 dia. at entrance 1.56 dia. at exit
2	Target Exit window	Kapton, 75 um	30	1.42	1.56 id
	Super-insulation	Aluminized-mylar+cerex (5 layers)	30	2.9 mg/cm² per layer[3]	--
3	Scattering chamber exit window[4]	Aluminum, 25 um	TBD	2.70	2.54 dia.
	Target cell, conical (not in beam path)	Aluminized kapton, 127 um	--	1.42	2.42 id at ent. window 1.56 id at exit window
	Super-insulation (not in beam path)	Aluminized-mylar+cerex (5 layers)	--	2.9 mg/cm² per layer[5]	--
	Scattering chamber[6] (not in beam path)	Aluminum-lined Rohacell	--	~110 mg/cm³	11.1 OD, 1 thick

Data is analyzed by selecting windows 2 and 3

100 um in the NIM paper

Currently checking this value

	g/cm3	Length [cm]	Atoms/cm2
Kapton	1.42	0.01	8.55E+25
Aluminum	2.7	0.0025	6.5E+26

To calculate the rate from the simulation for the end-caps:

Thickness: 1.73E20

Flux: 2E7 γ/s

Scale it by :

$\rho(^4\mathrm{He}) = 0.117\ \mathrm{g/cm^3}$

$\rho(\mathrm{Kapton}) = 2.7\ \mathrm{g/cm^3}$

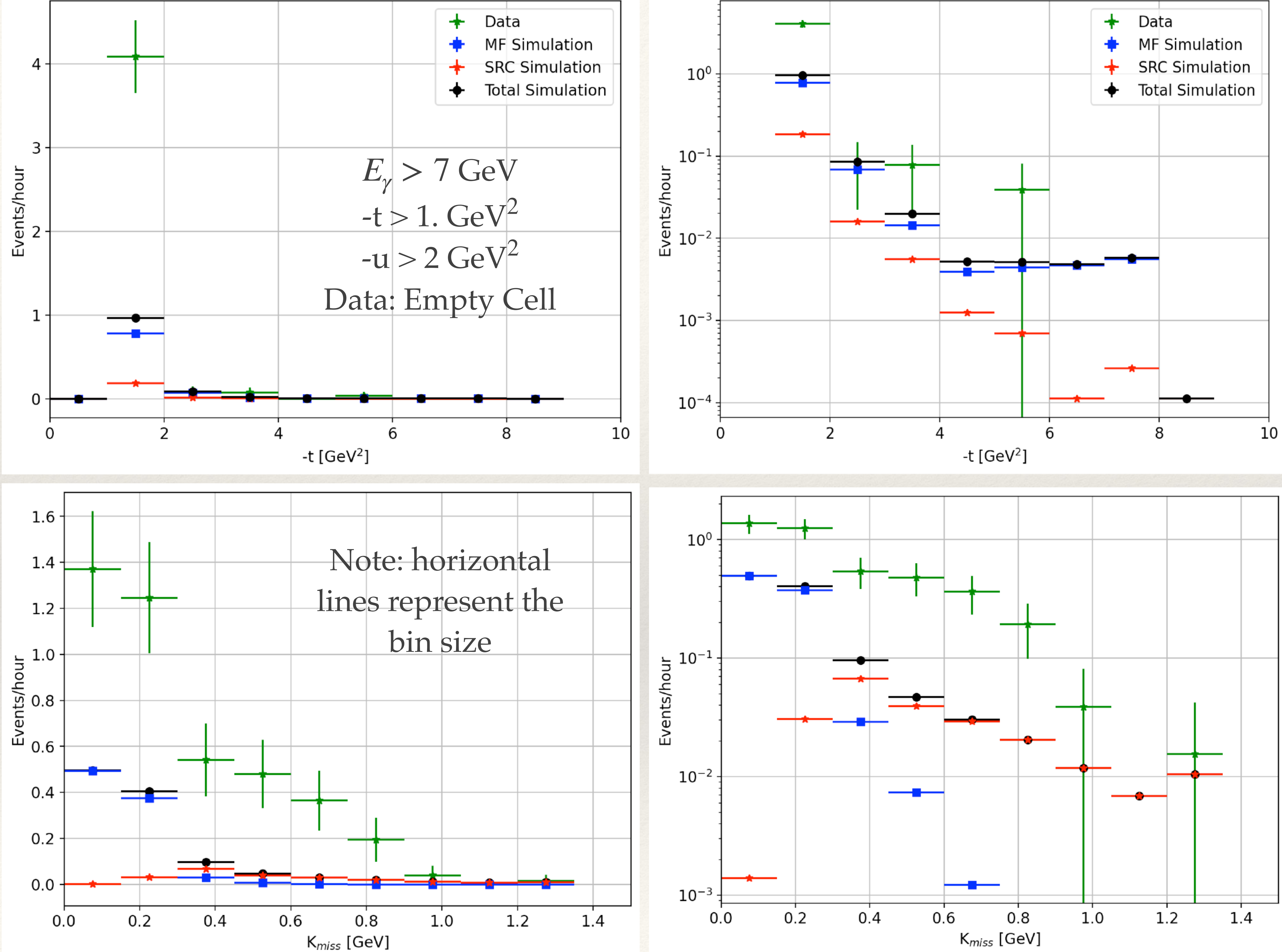
$\rho(\mathrm{Al}) = 1.42\ \mathrm{g/cm^3}$

$(0.2{*}\rho(\mathrm{Al})+0.8{*}\rho(\mathrm{Kapton}))/\ \ \rho(^4\mathrm{He}) = 14.32$

$$N_{ev} = \sigma \cdot flux \cdot thickness \cdot 14.32$$

Units:

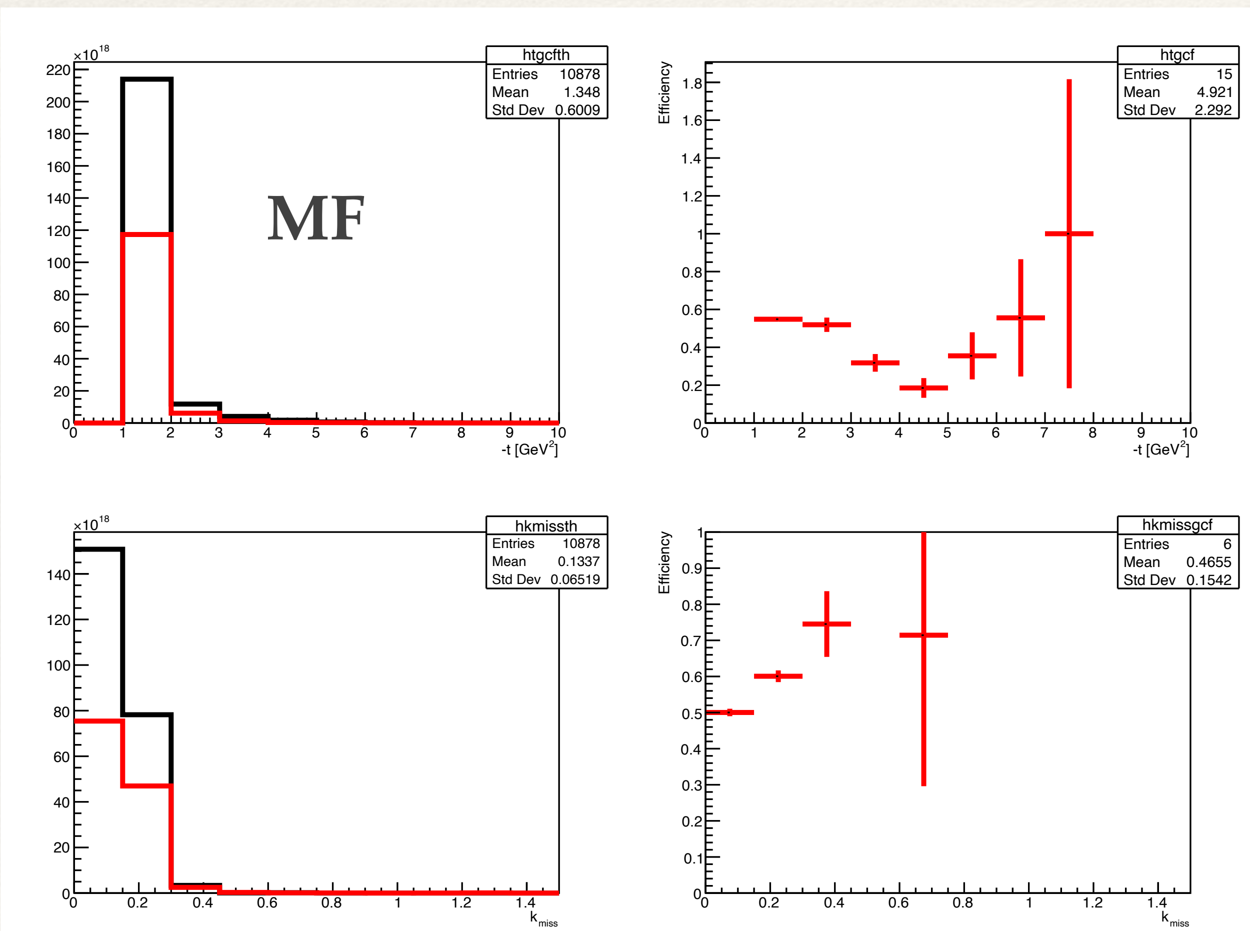
[ev/hour] = [nb] [γ/hour] [atoms/nb]

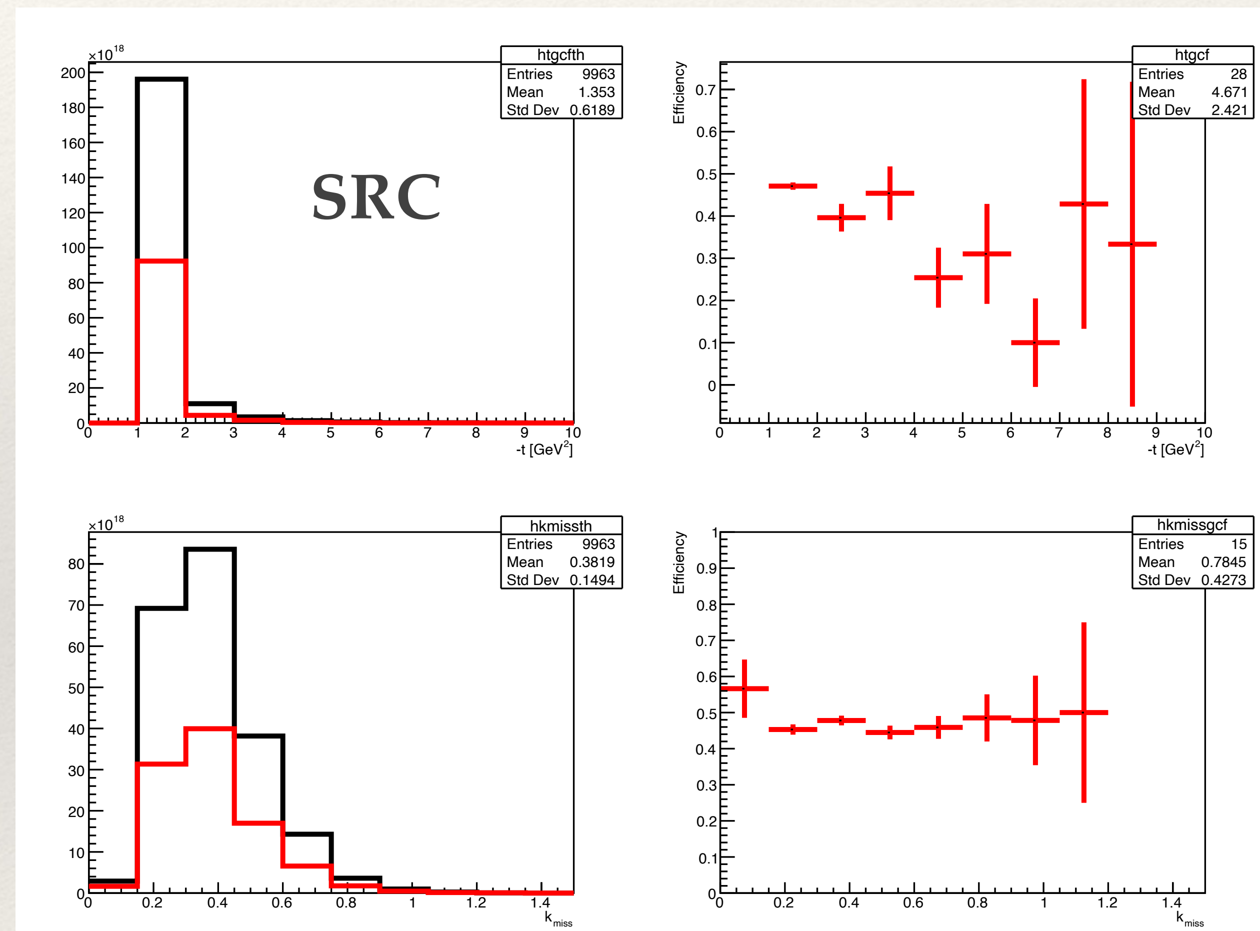


Data
MF Simulation
SRC Simulation
Total Simulation
$E_\gamma > 7$ GeV
-t > 1. GeV^2
-u > 2 GeV^2
Data: Empty Cell
Events/hour
-t [GeV^2]
Note: horizontal lines represent the bin size
K_{miss} [GeV]

Current work

- Understanding the efficiencies:



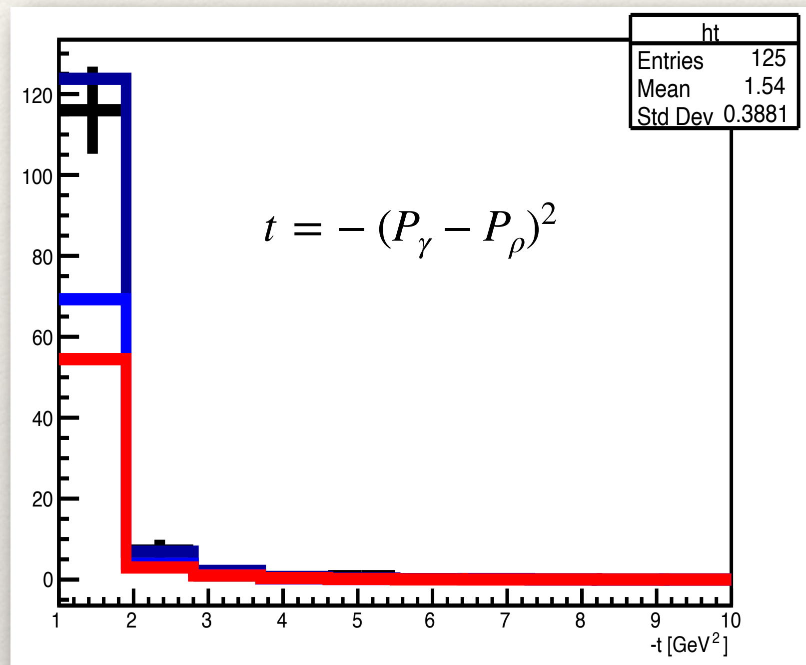


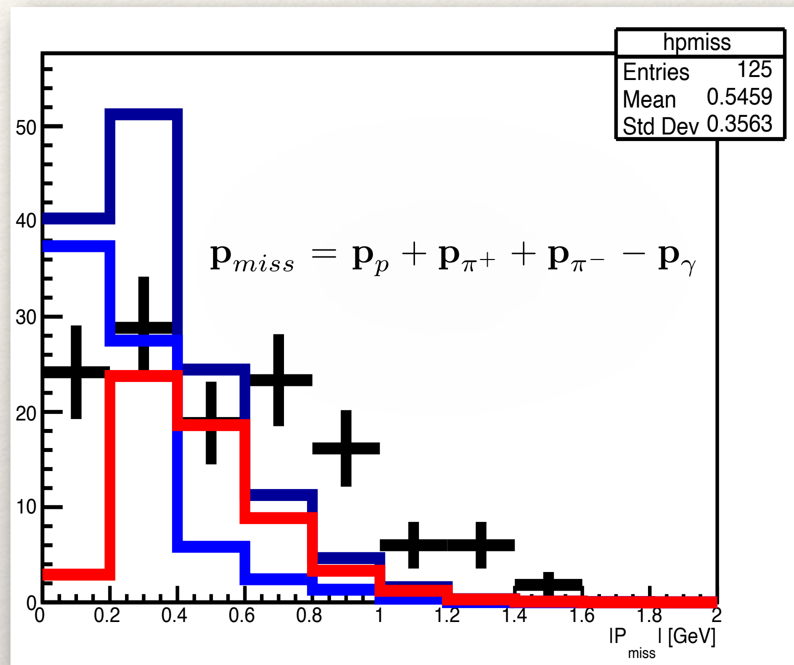
Why they are lower than 50%?

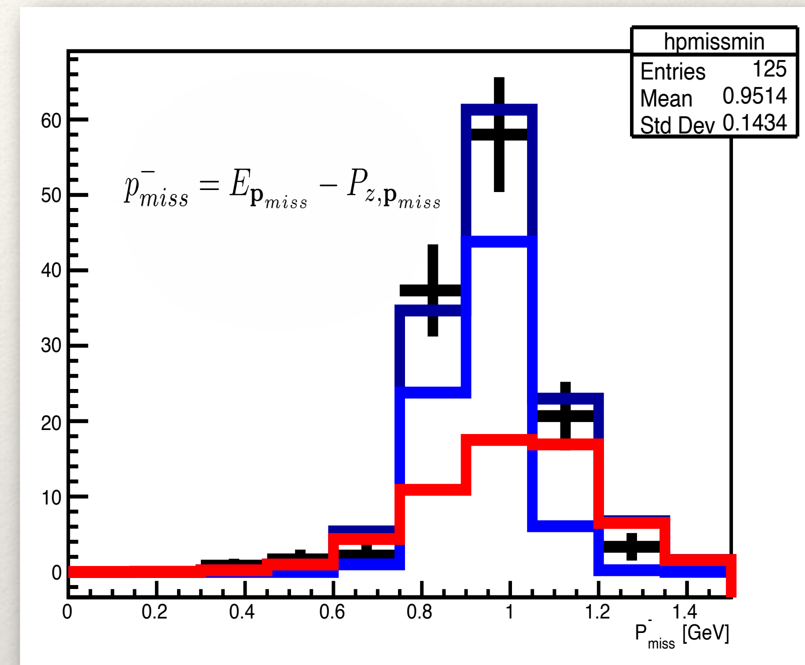
Current work

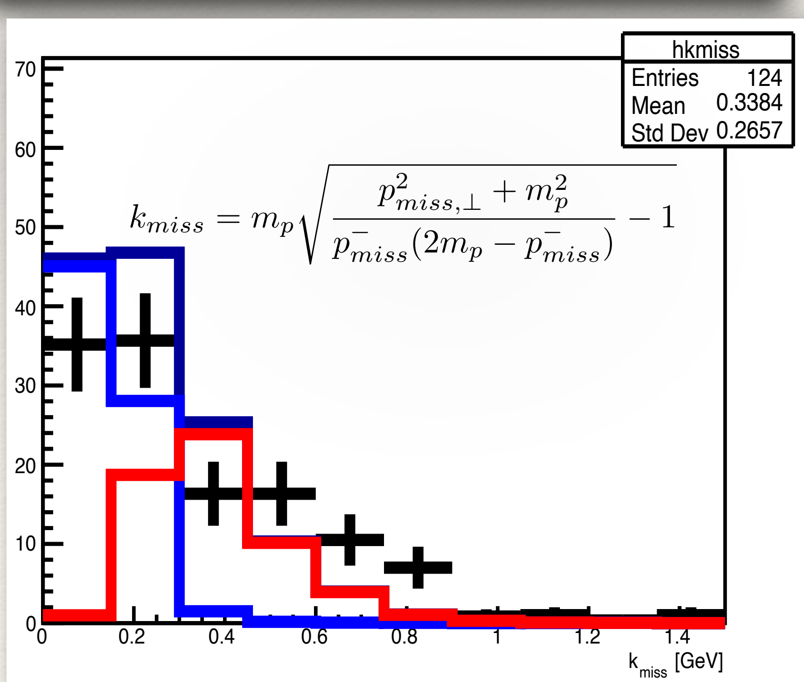
+ Data
MF+SRC Simulation
MF Simulation
SRC Simulation

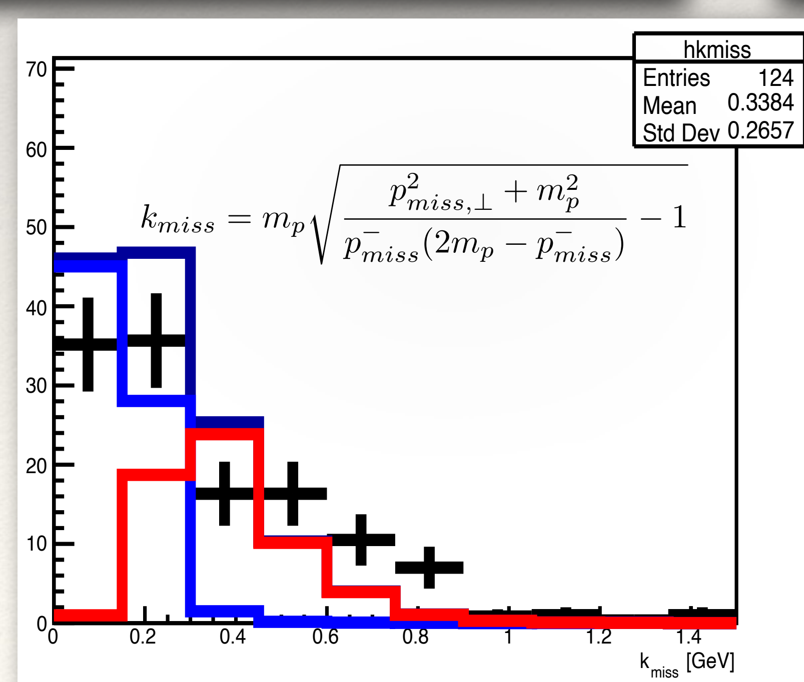
- Use the proper thickness of the target.
- Implement the final conclusion in the offline monitoring to properly normalize the data.











Plots are area normalized to match the data.

For monitoring

- Currently for Monitoring
  - 2pi1p Plugins creates a root file with all candidates. Running time: ~6-8 hours in a raw data file and ~2 hours in a rest file
  - Macro reads the root file and make the plots.

$E_\gamma > 7$ GeV
$-t > 1.$ GeV^2
$-u > 2$ GeV^2

^{4}He