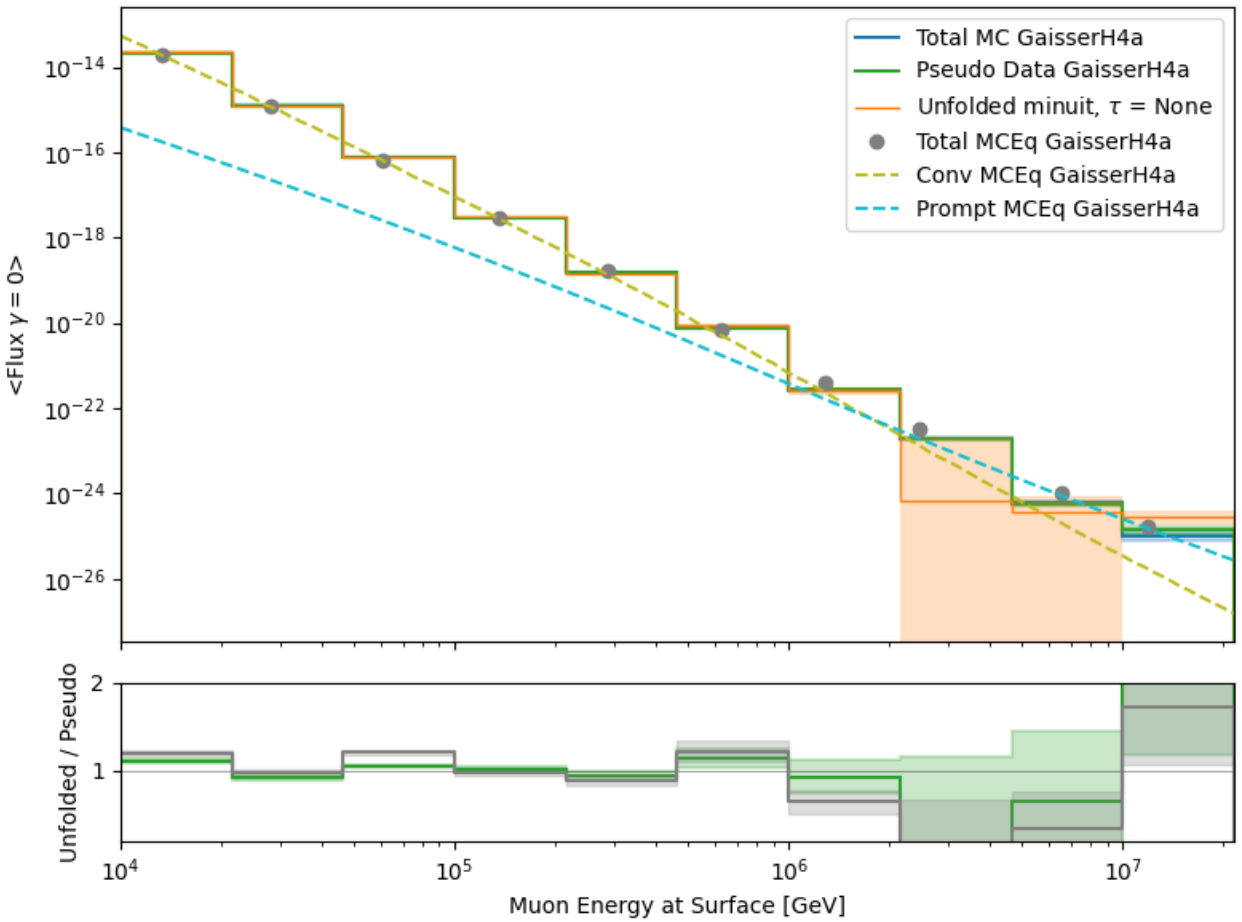
28.01.2025

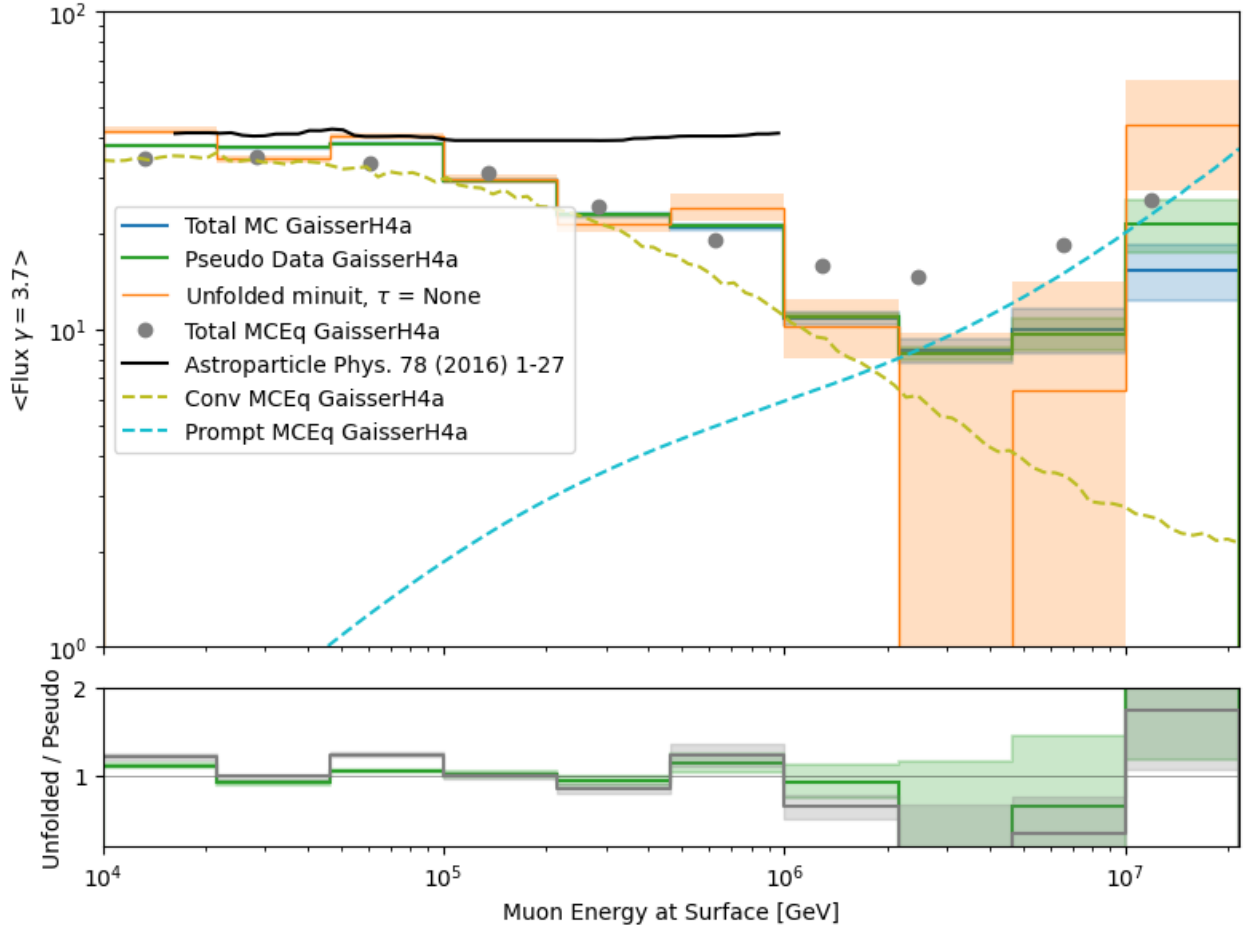
Pascal

Test different input spectrum

Unfolding with 5 systematics

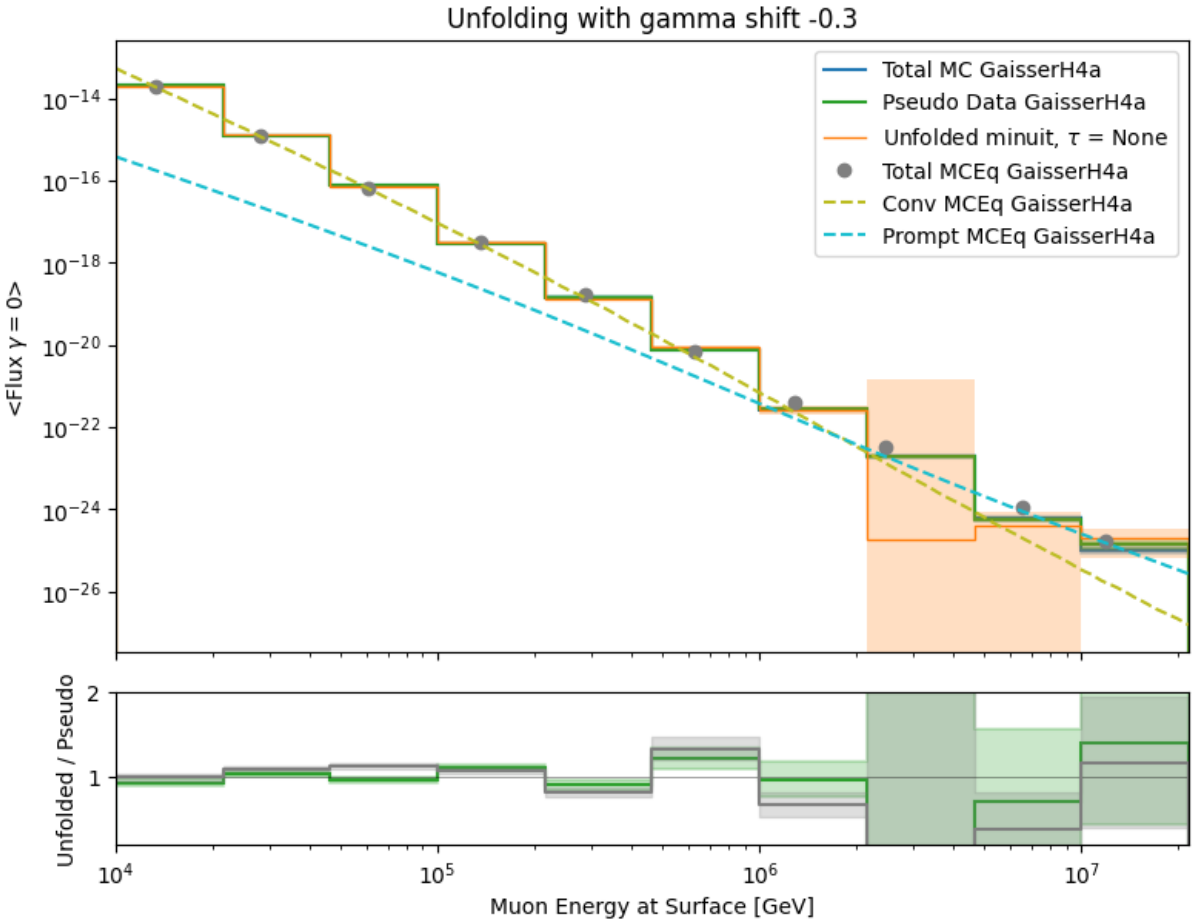
x0 = [1e5, ..., 1, 1, 1, 0.2, -0.05], bounds = [True values * 100 (/0.001),..., simulation bounds]

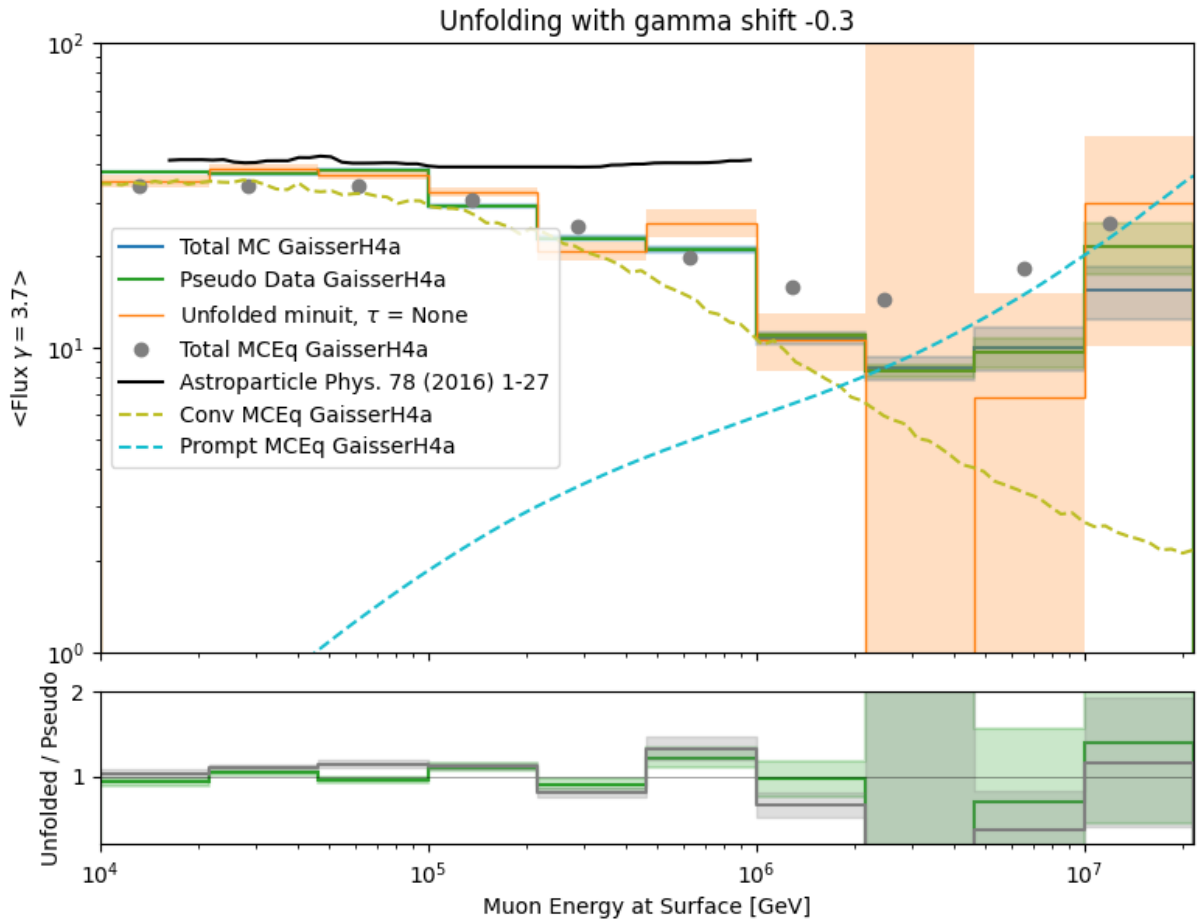




Unfolding with 5 systematics, gamma = -0.3

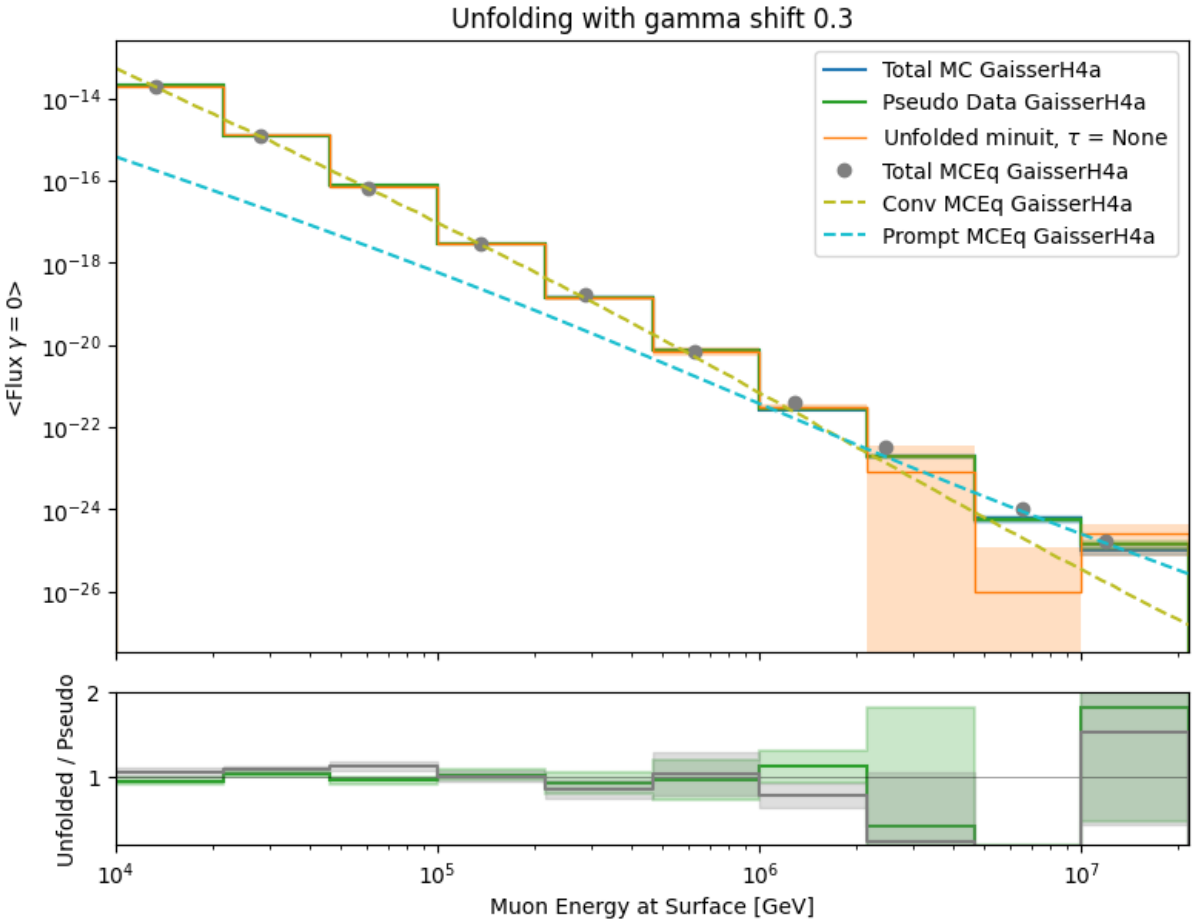
x0 = [1e5, ..., 1, 1, 1, 0.2, -0.05], bounds = [True values * 100 (/0.001),..., simulation bounds]

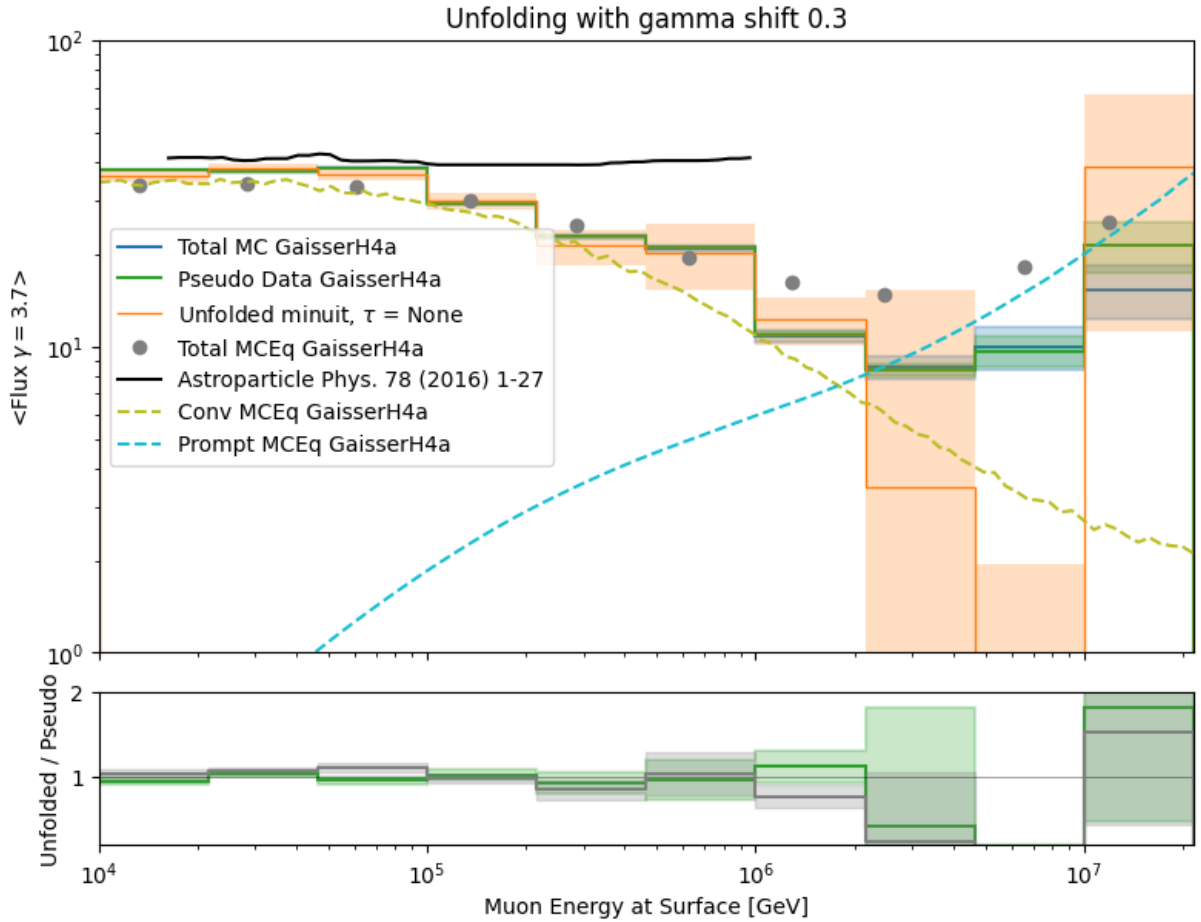




Unfolding with 5 systematics, gamma = +0.3

x0 = [1e5, ..., 1, 1, 1, 0.2, -0.05], bounds = [True values * 100 (/0.001),..., simulation bounds]



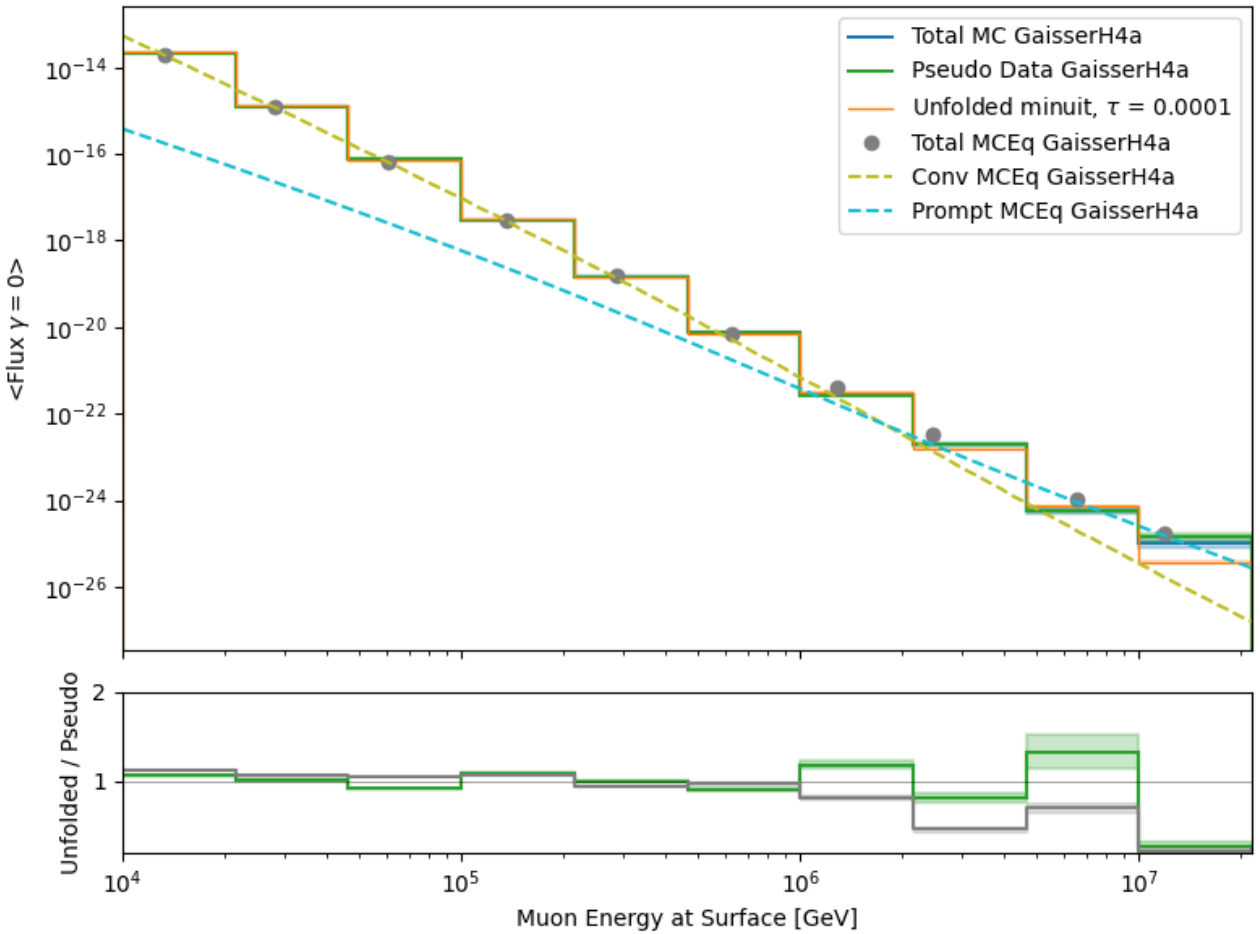


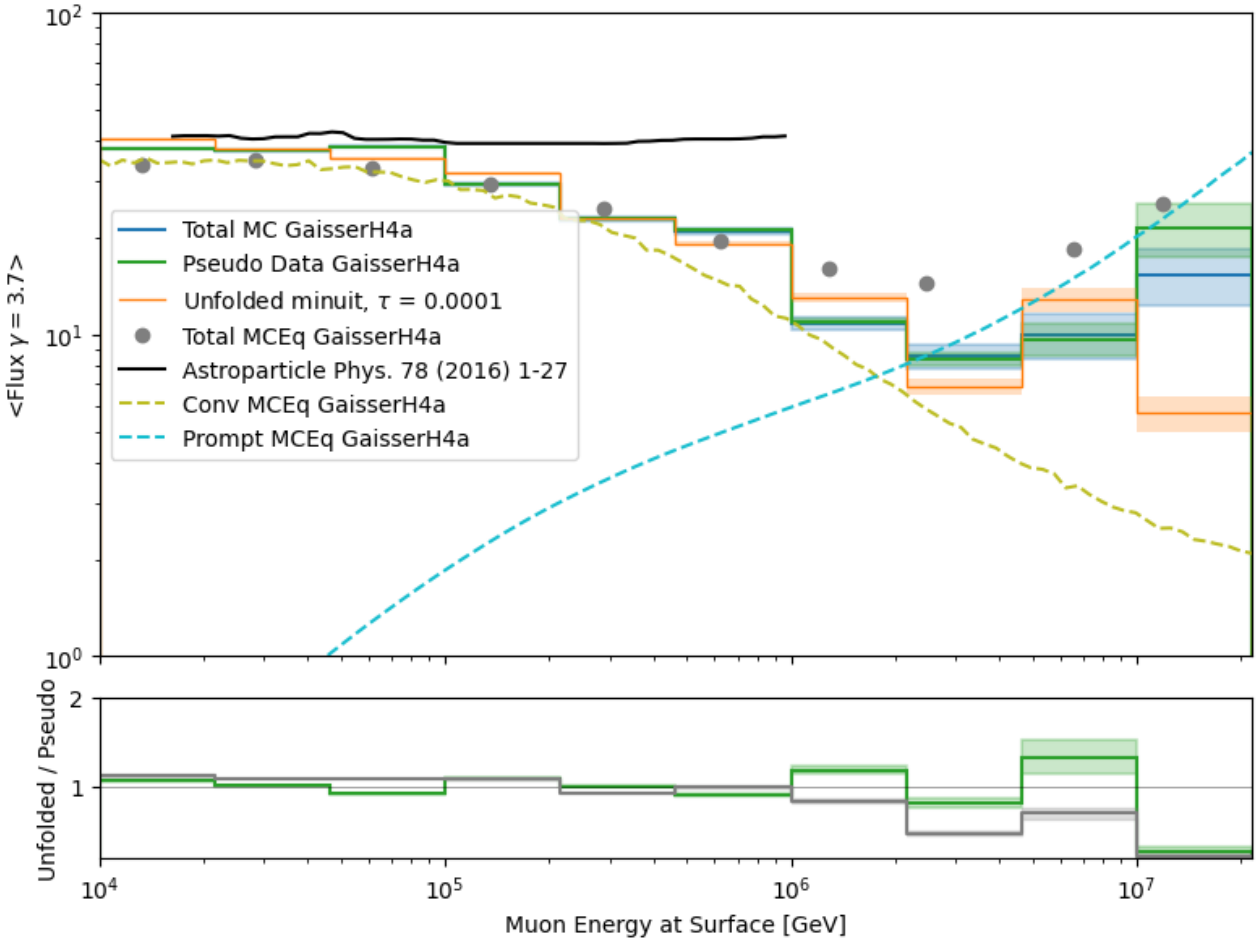
Test different input spectrum with regularization

tau = 0.0001

Unfolding with 5 systematics, tau = 0.0001

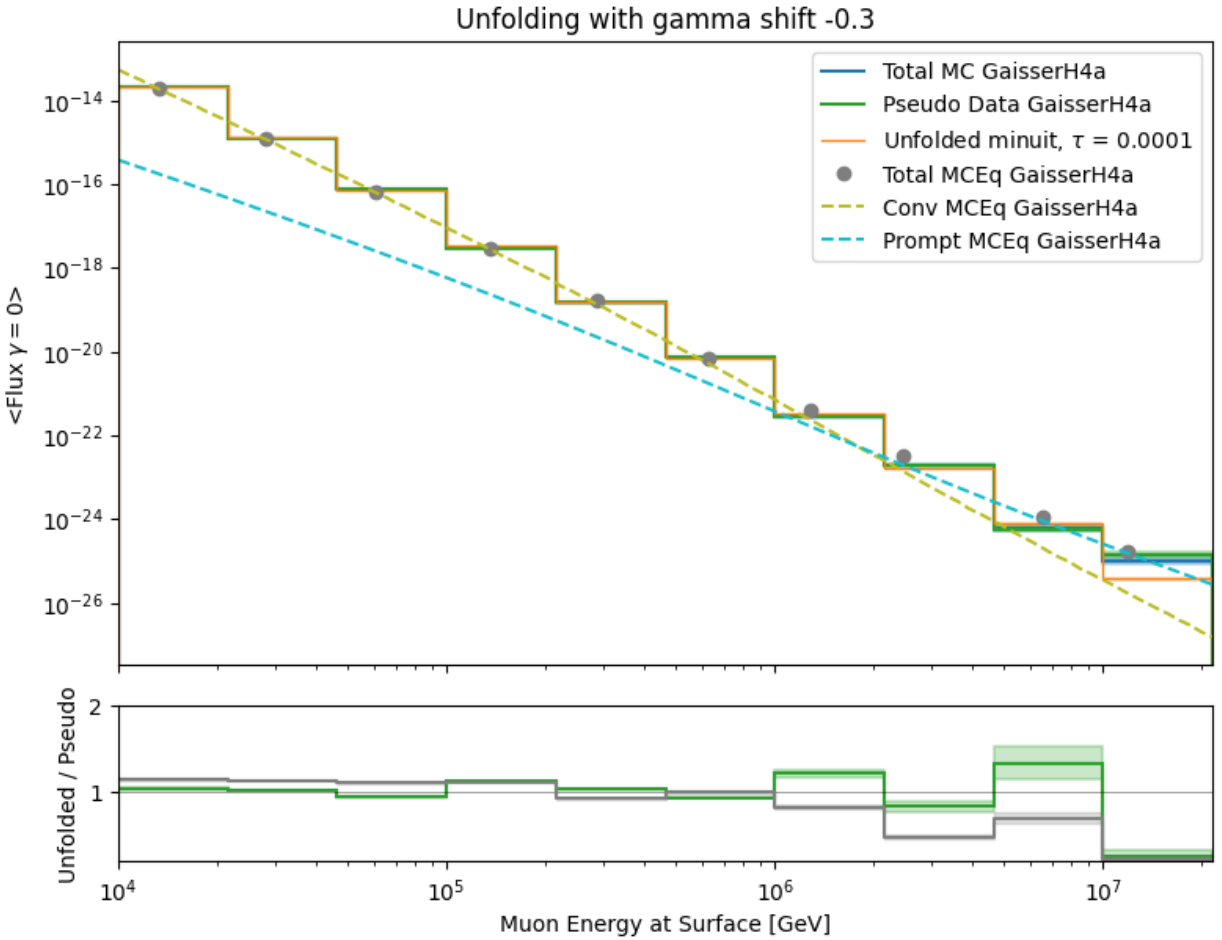
x0 = [1e5, ..., 1, 1, 1, 0.2, -0.05], bounds = [True values * 100 (/0.001),..., simulation bounds]

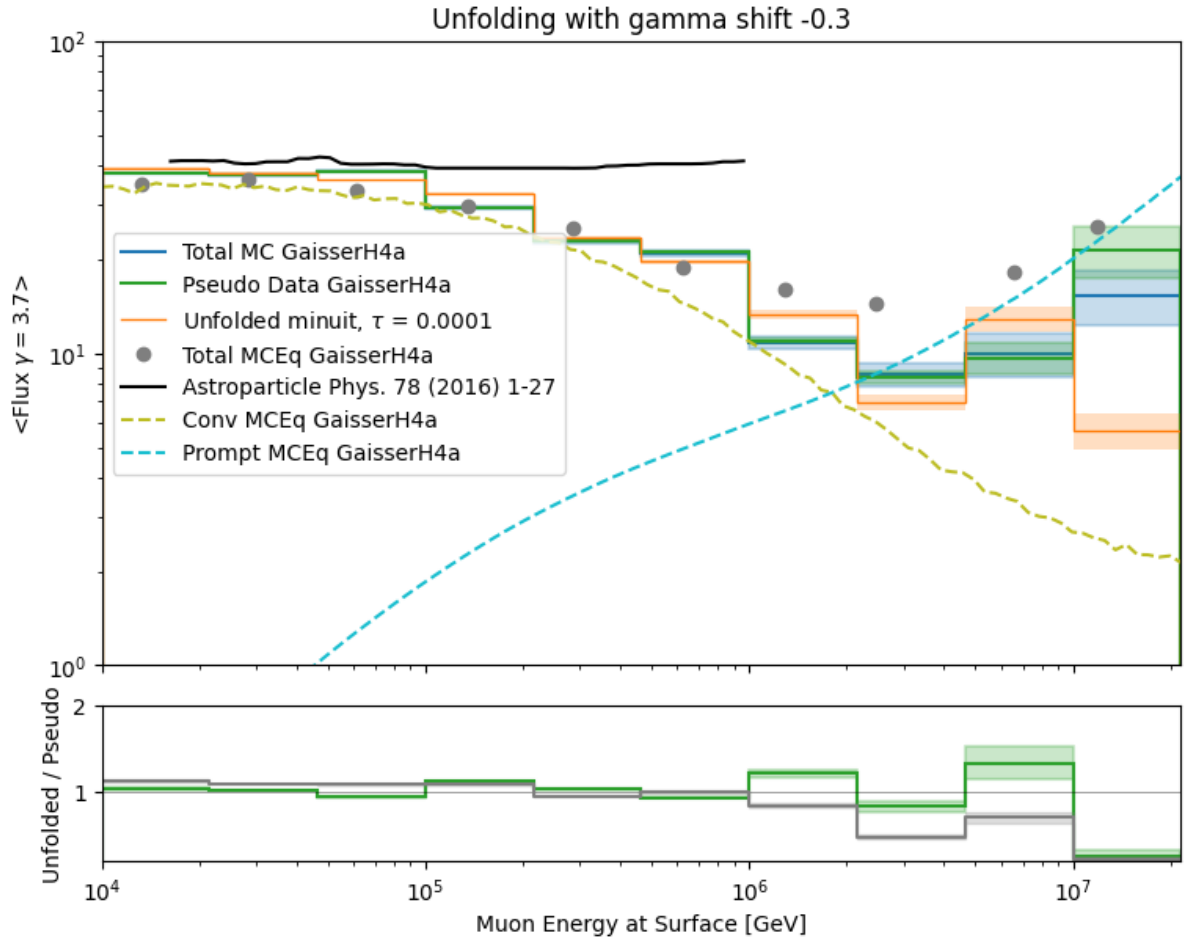




Unfolding with 5 systematics, gamma = -0.3, tau = 0.0001

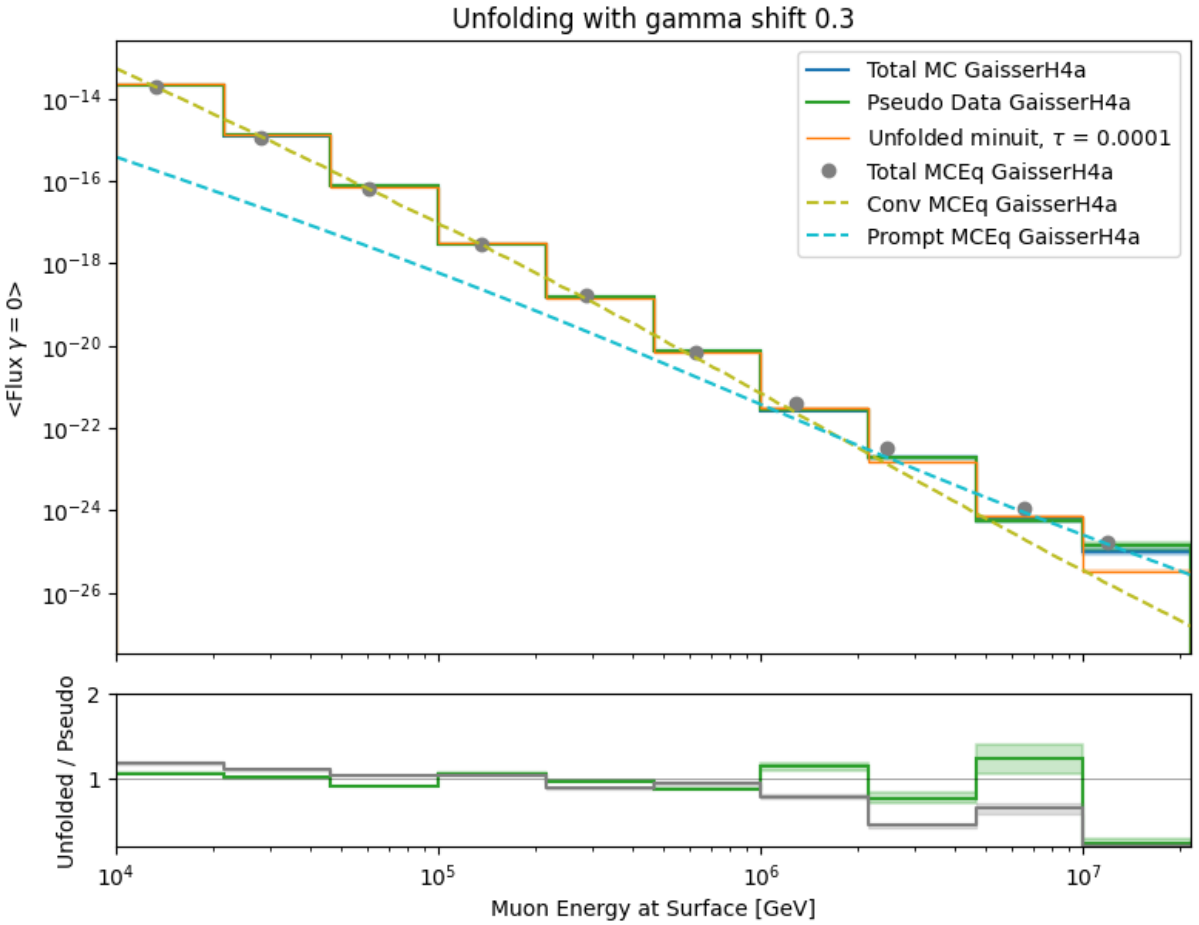
x0 = [1e5, ..., 1, 1, 1, 0.2, -0.05], bounds = [True values * 100 (/0.001),..., simulation bounds]

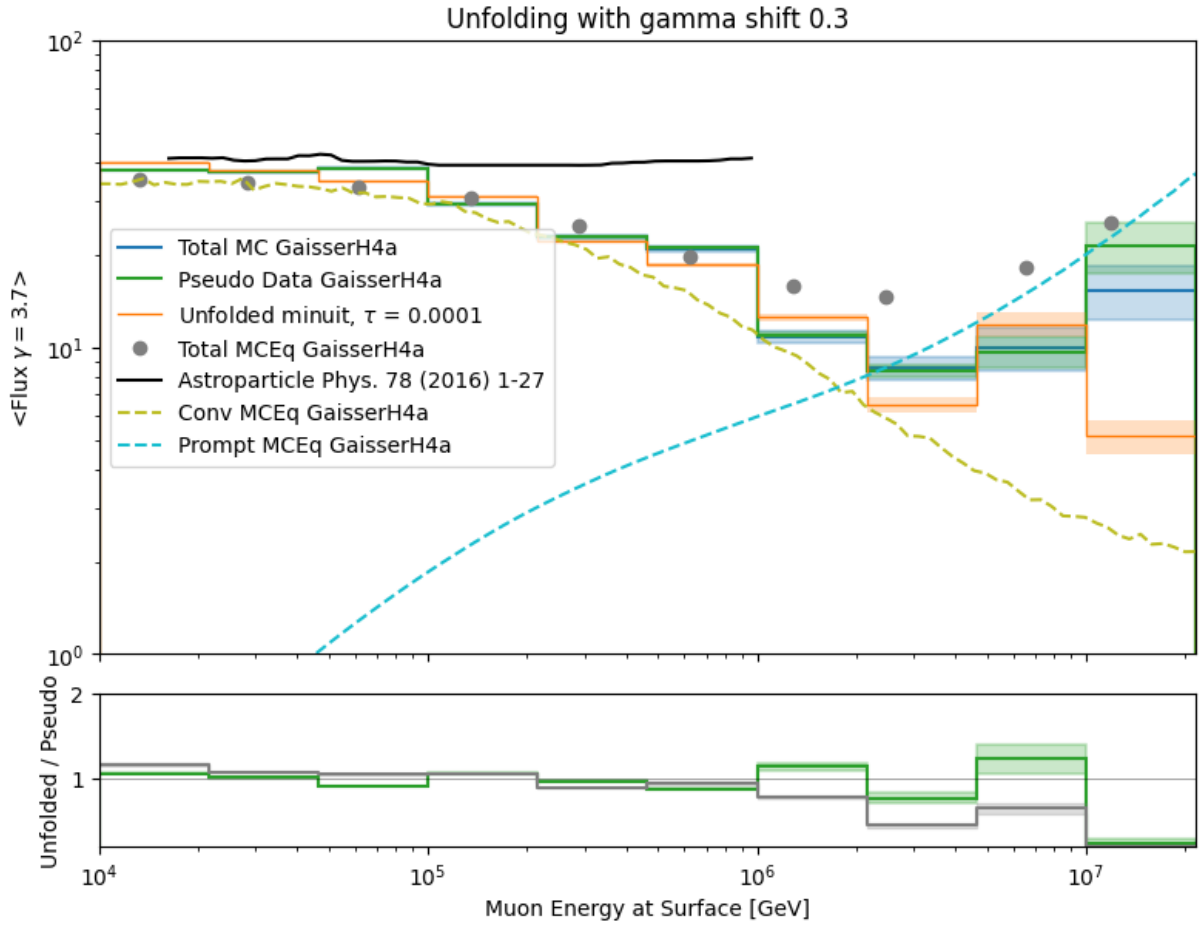




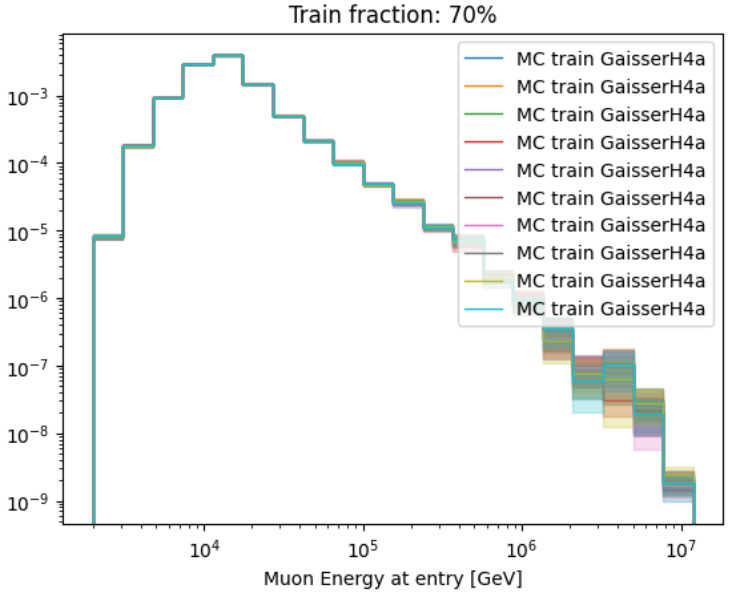
Unfolding with 5 systematics, gamma = +0.3, tau = 0.0001

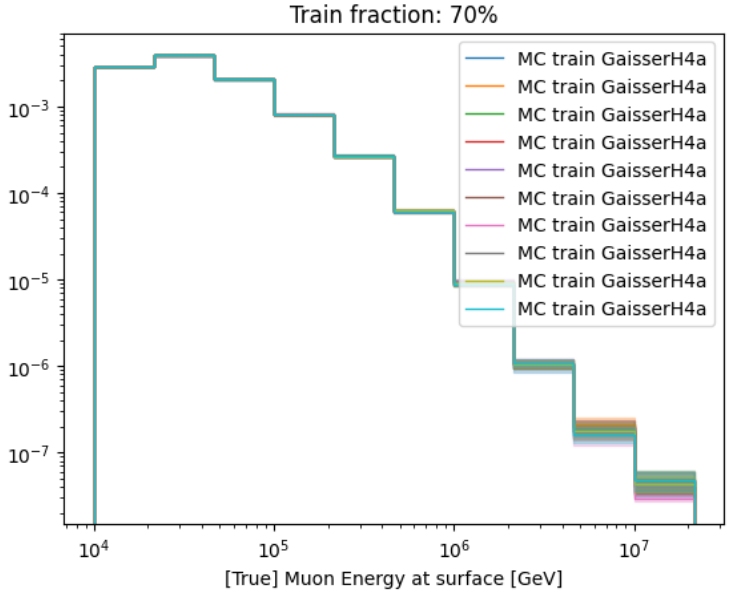
x0 = [1e5, ..., 1, 1, 1, 0.2, -0.05], bounds = [True values * 100 (/0.001),..., simulation bounds]

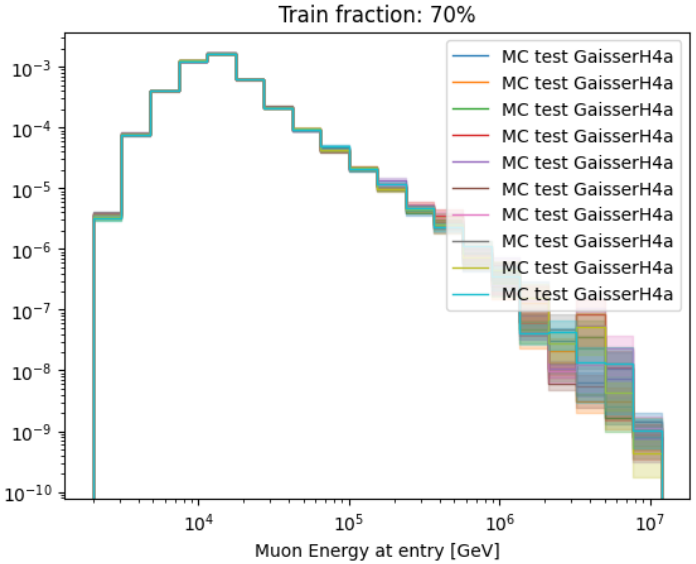


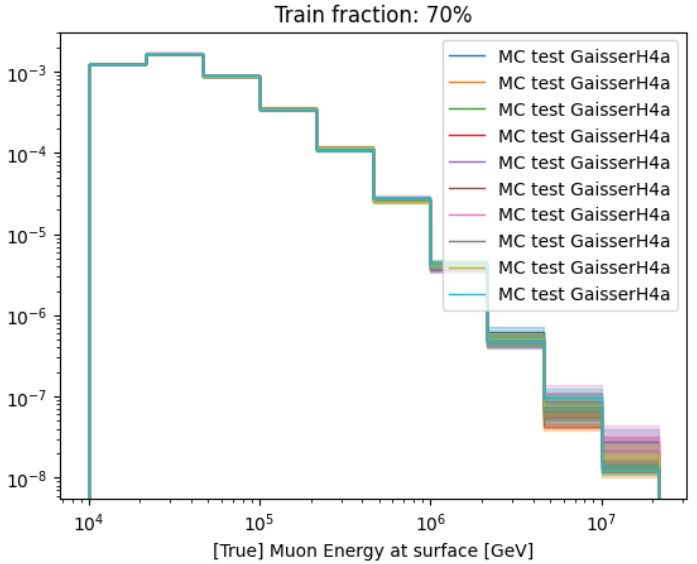


Train-Test-Split

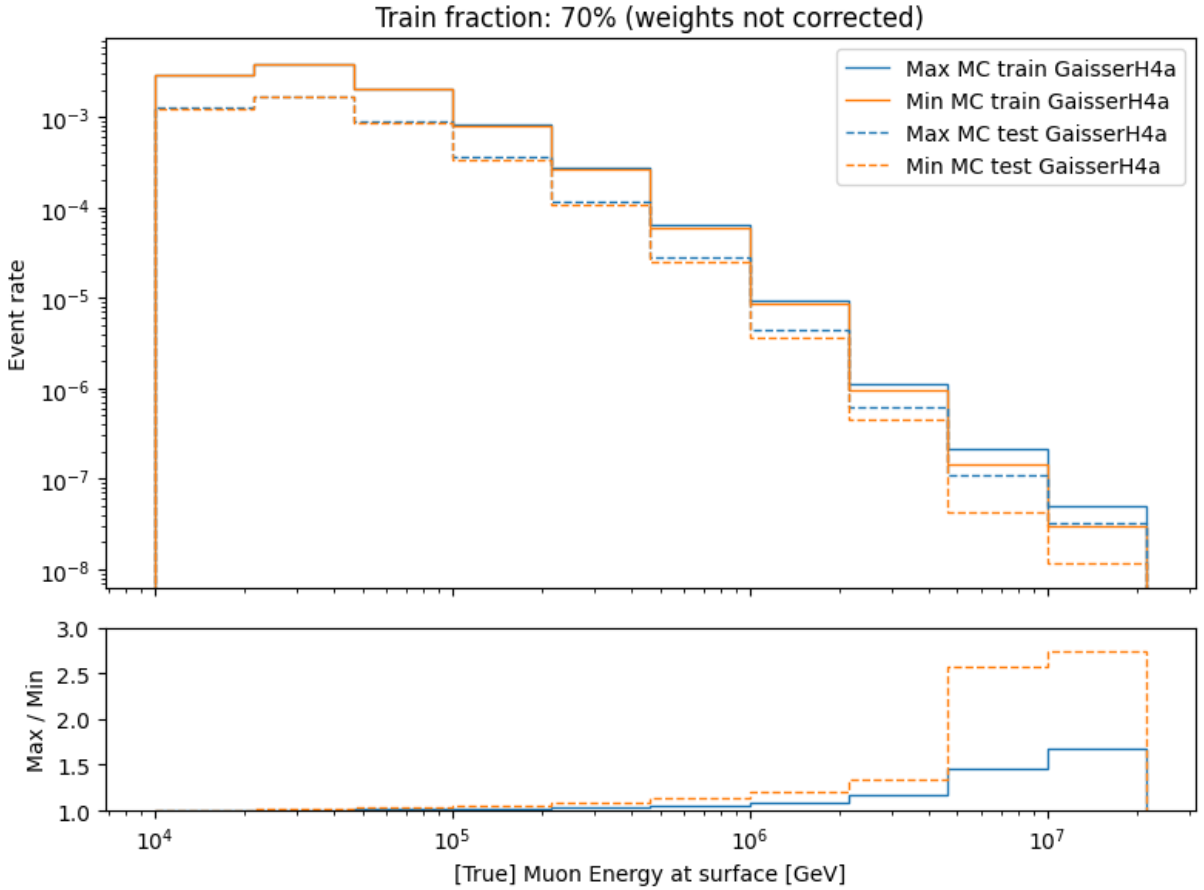

Train fraction: 70%
MC train GaisserH4a
Muon Energy at entry [GeV]

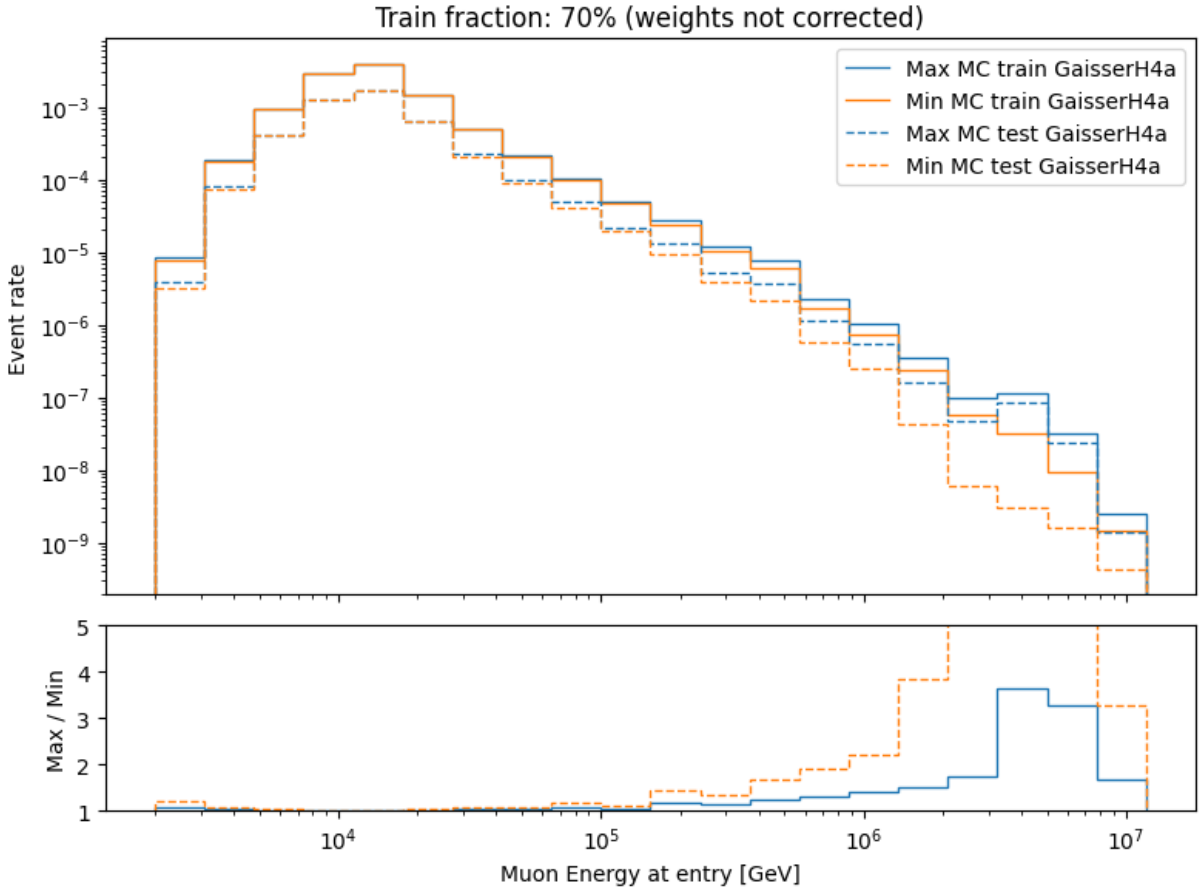

Train fraction: 70%
MC train GaisserH4a
[True] Muon Energy at surface [GeV]


Train fraction: 70%
MC test GaisserH4a
Muon Energy at entry [GeV]


Train fraction: 70%
MC test GaisserH4a
[True] Muon Energy at surface [GeV]

Plot min & max of train & test distribution after splitting

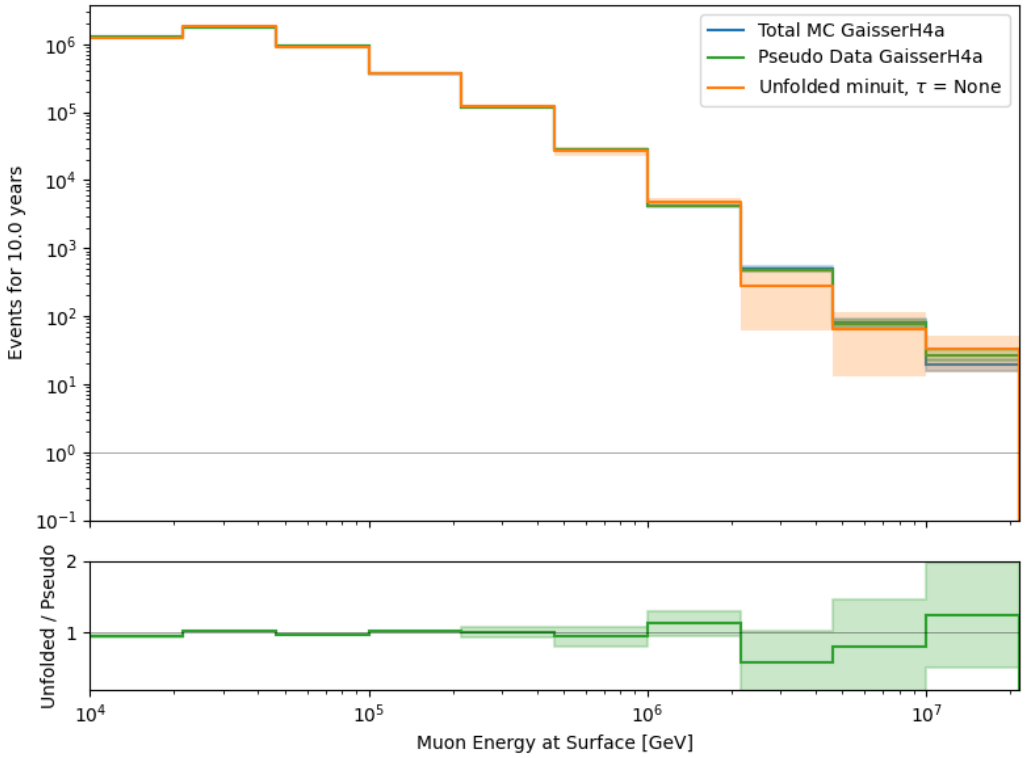




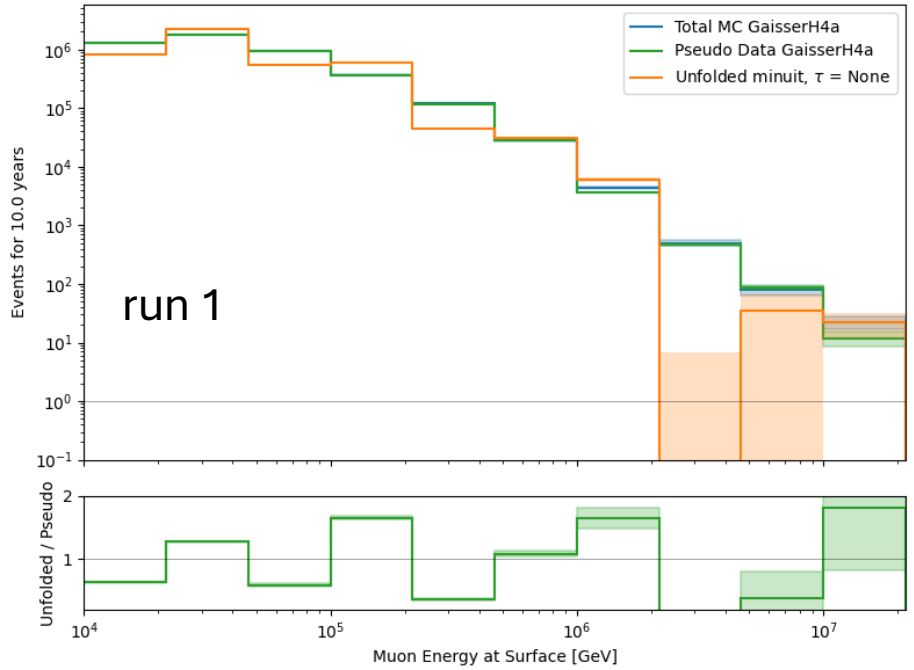
- too less MC above ~1PeV muon energy at surface

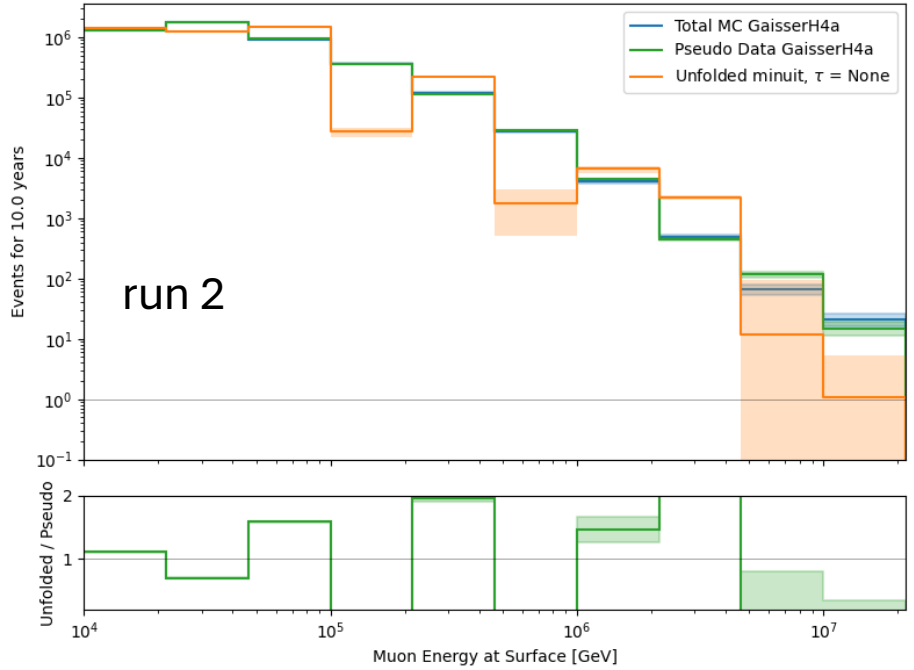
Unfold event rate, not systematics

no train test split



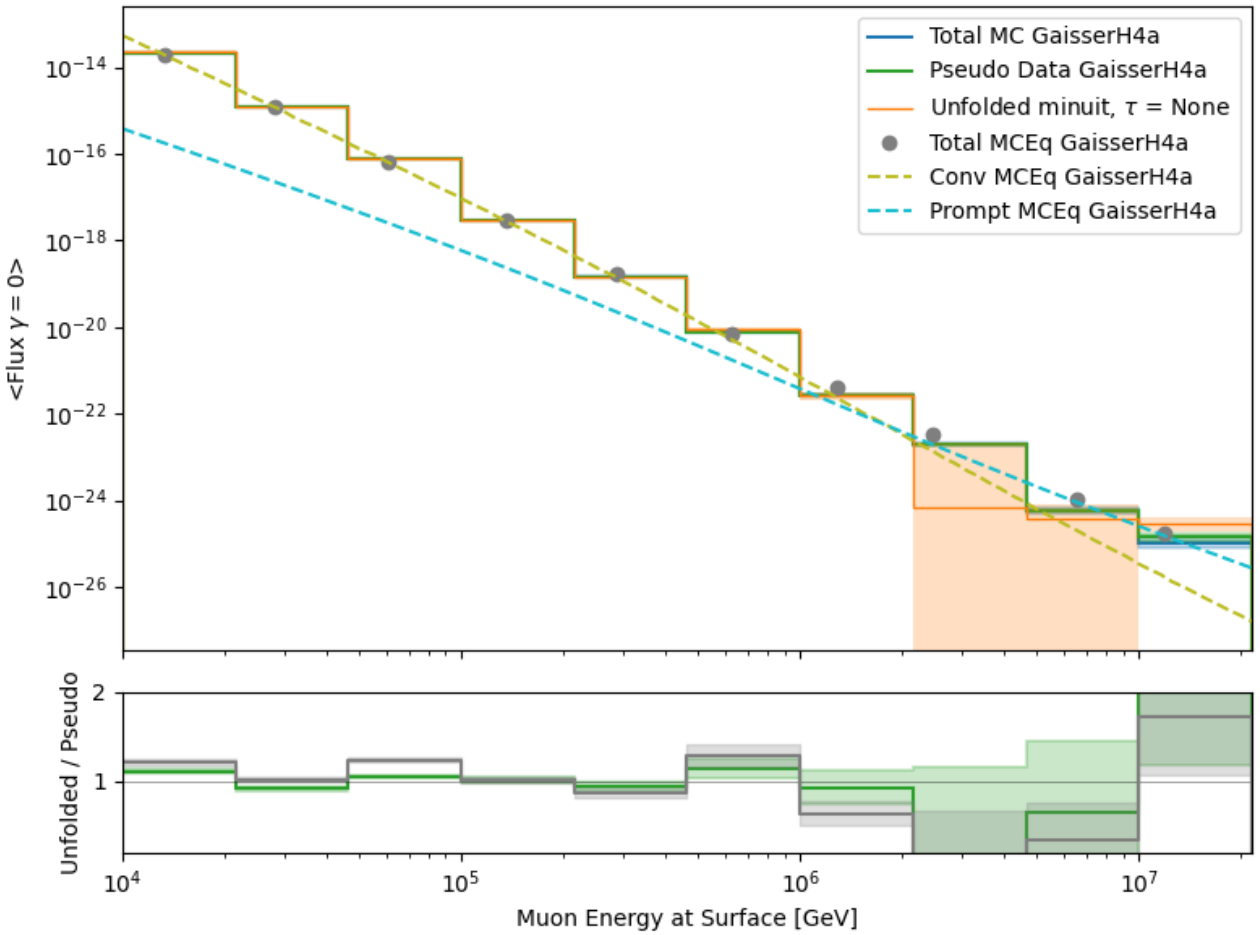
train fraction: 70%

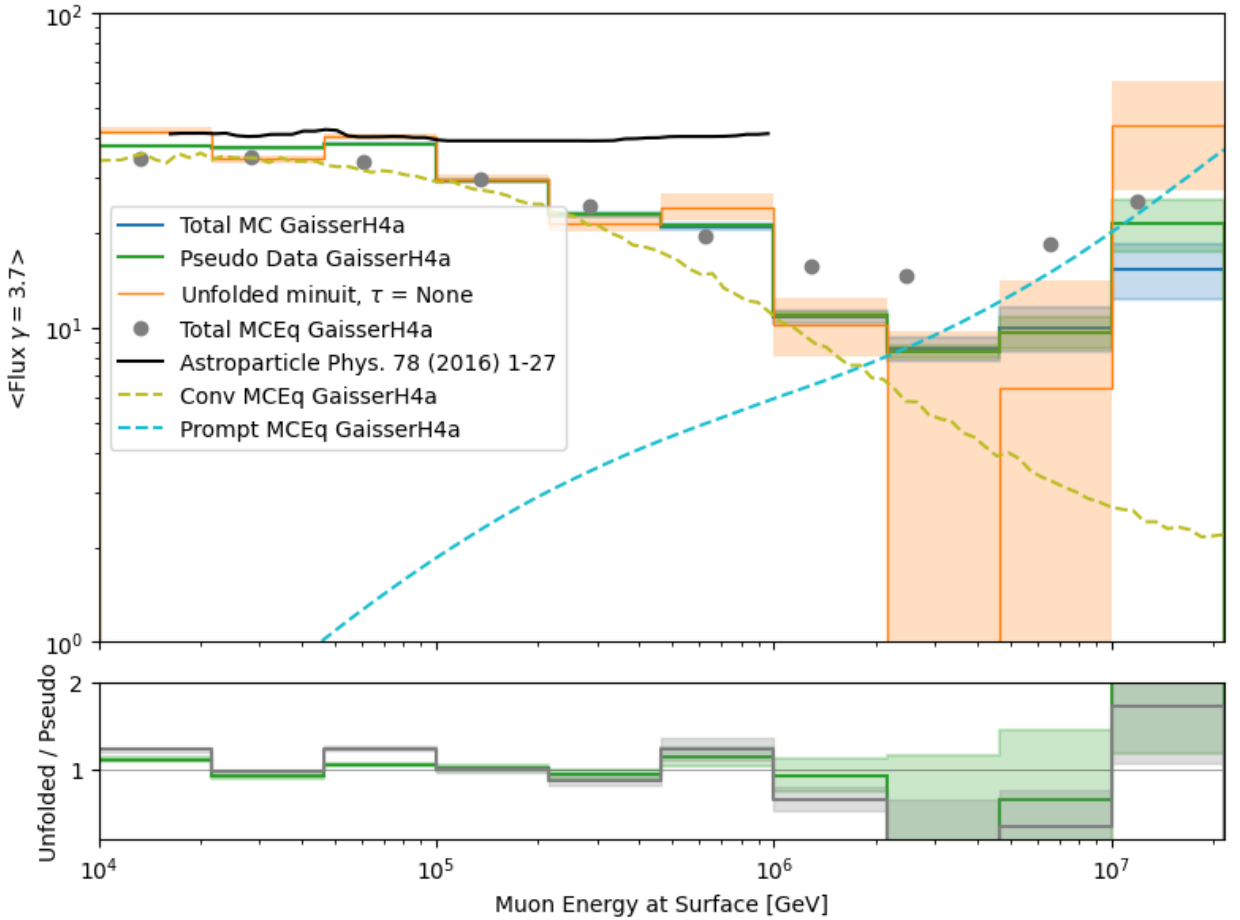




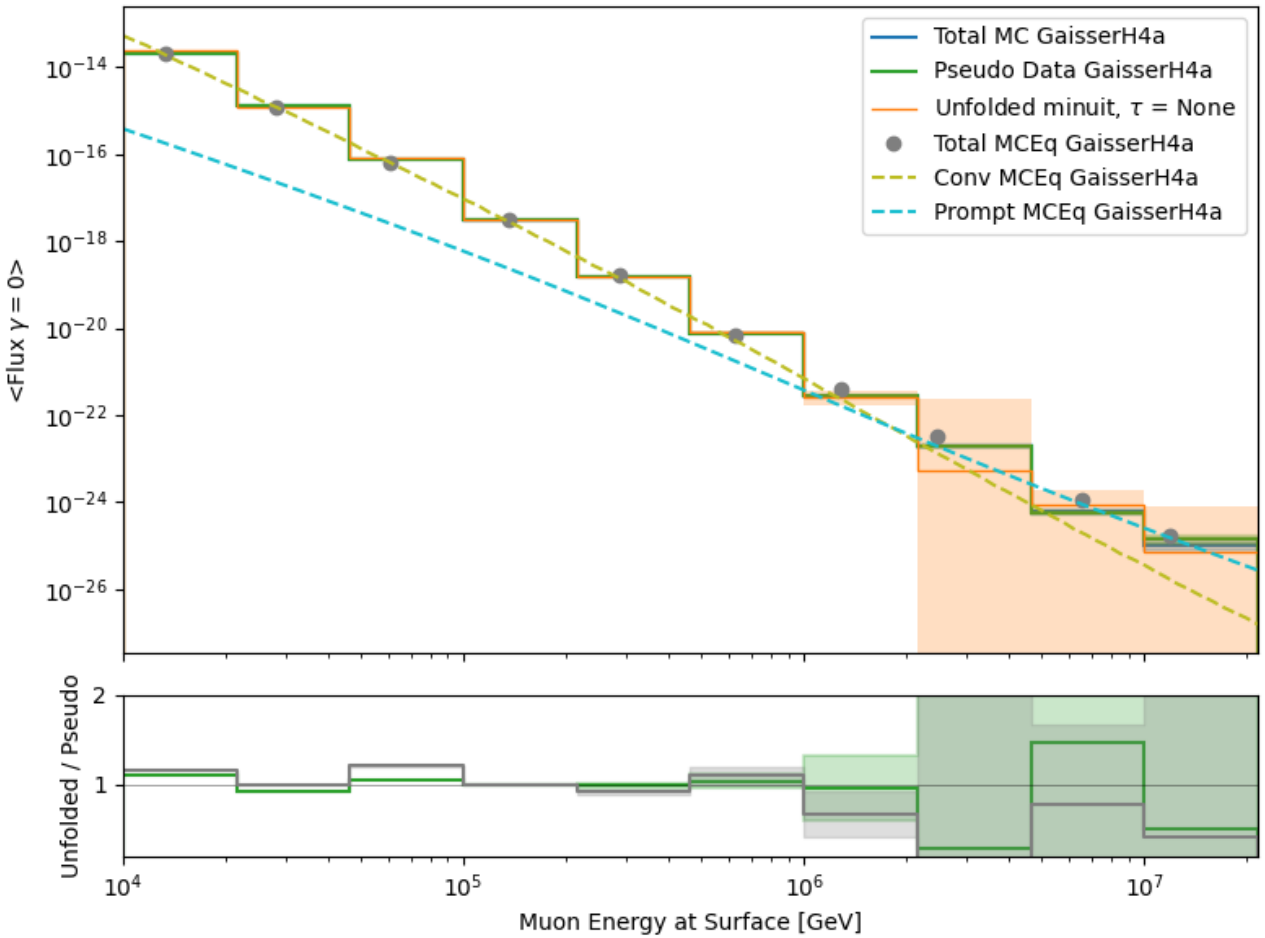
Test prior

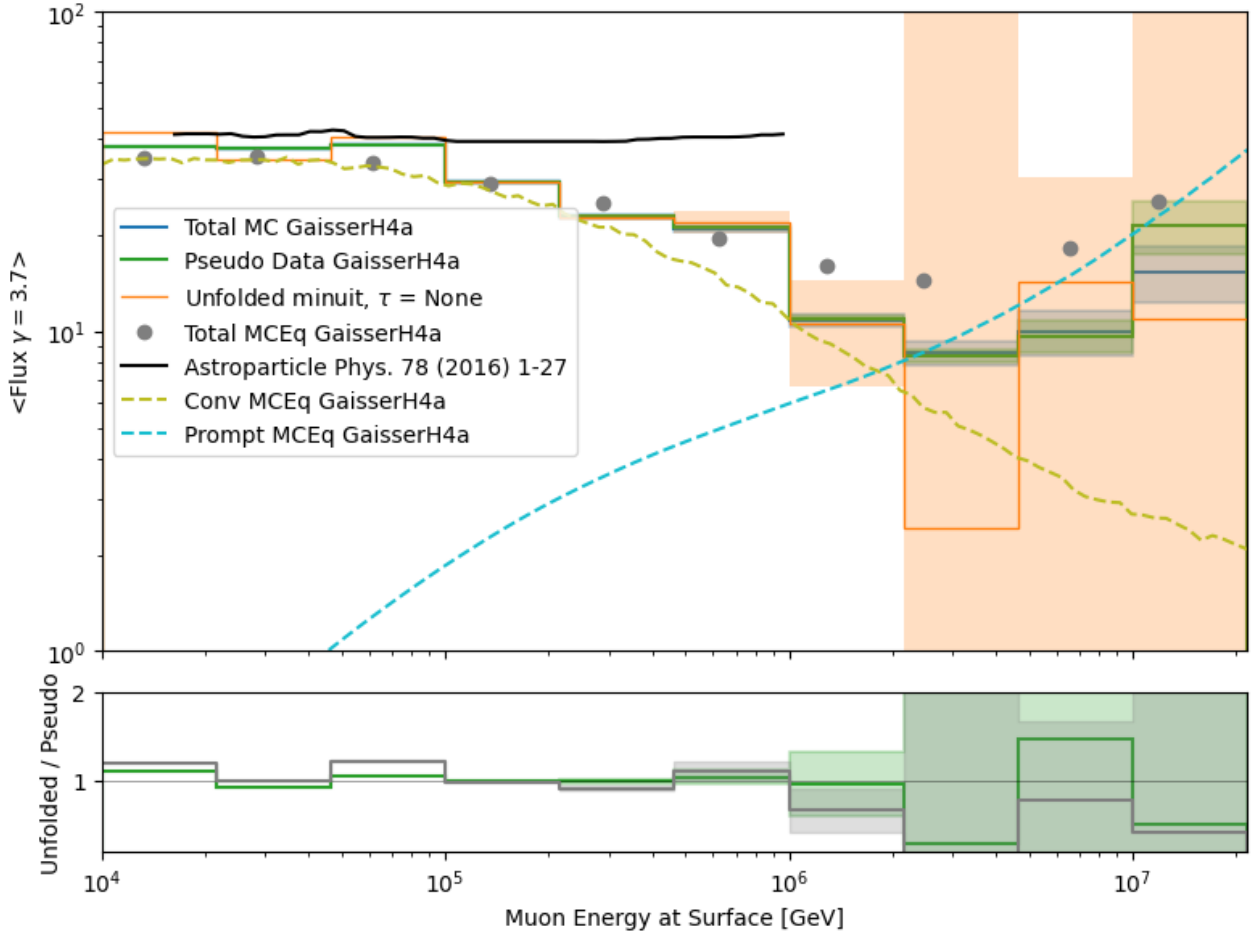
Gauss: scale=0.5 * (bounds[1] - bounds[0])



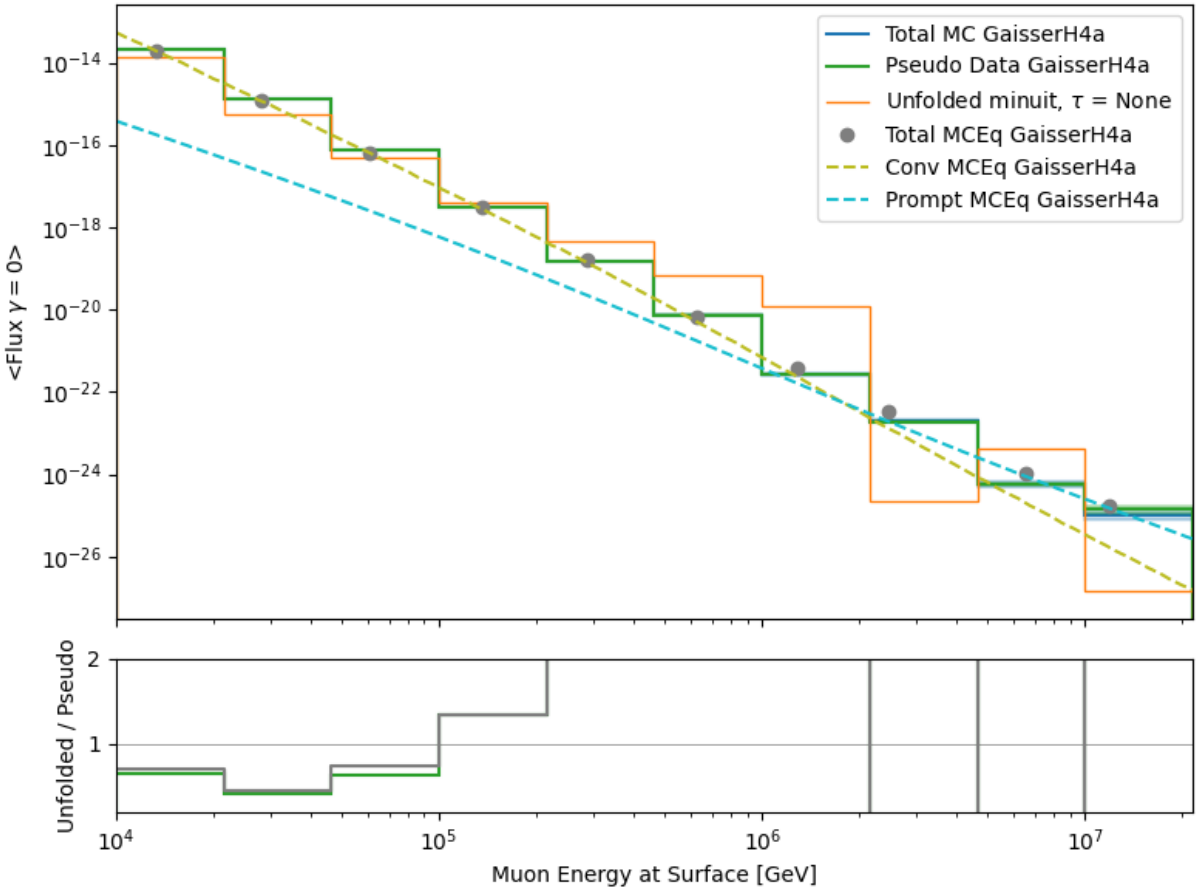


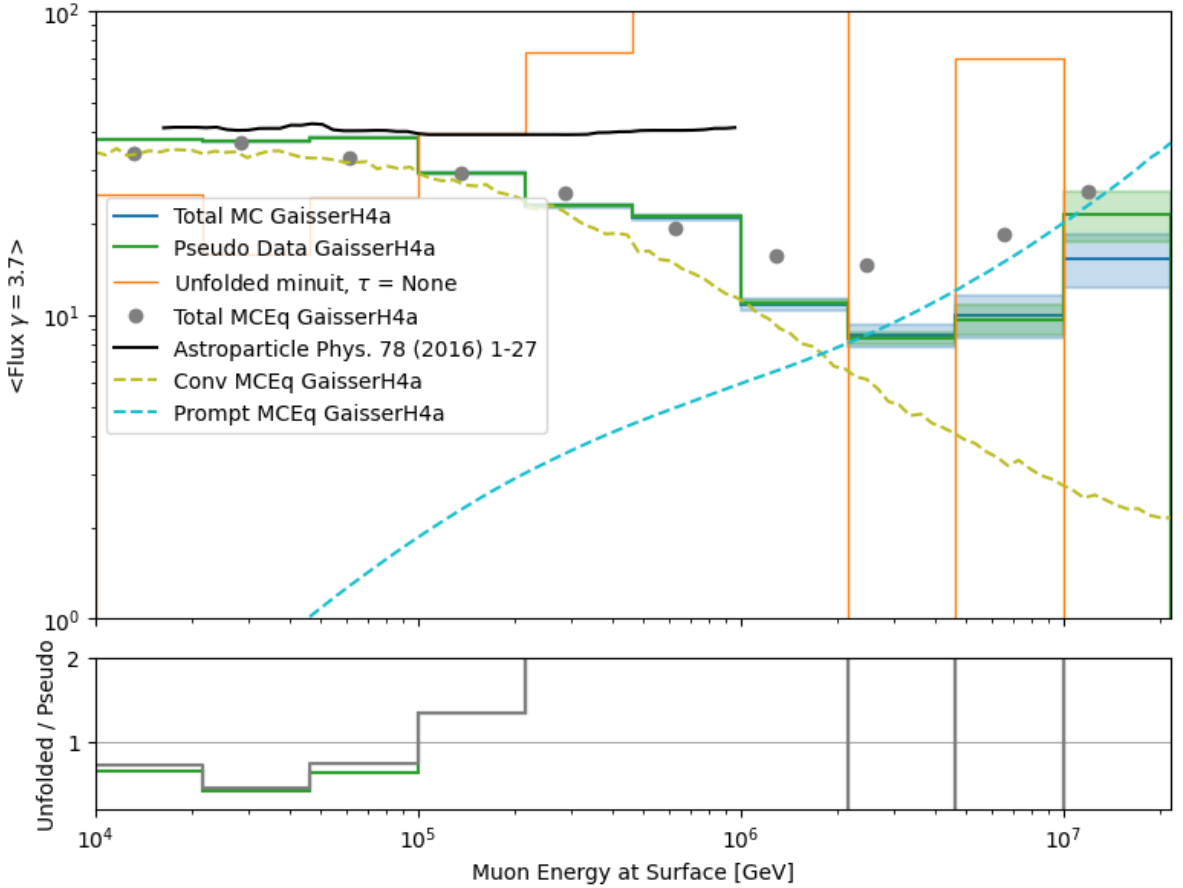
Gauss: scale=10 * (bounds[1] - bounds[0])





Flat


Total MC GaisserH4a
Pseudo Data GaisserH4a
Unfolded minuit, τ = None
Total MCEq GaisserH4a
Conv MCEq GaisserH4a
Prompt MCEq GaisserH4a
<Flux γ = 0>
Unfolded / Pseudo
Muon Energy at Surface [GeV]


Total MC GaisserH4a
Pseudo Data GaisserH4a
Unfolded minuit, τ = None
Total MCEq GaisserH4a
Astroparticle Phys. 78 (2016) 1-27
Conv MCEq GaisserH4a
Prompt MCEq GaisserH4a
<Flux γ = 3.7>
Unfolded / Pseudo
Muon Energy at Surface [GeV]