Date: 02/28/2020

J/ψ production from ^{4}He

Electron beam energy: 11 GeV
Luminosity: 1.2×10^{37} eN cm^{-2} s^{-1}
Target: 15-cm liquid ^{4}He (~ 2% radiation length)
Acceptance: p > 300 MeV, 6˚ < θ < 29˚, full azimuthal
Cross section model: grids "duke-jpsi-02-19-2020" with and without the restriction "p" (initial nucleon in ^{4}He) < 300 MeV

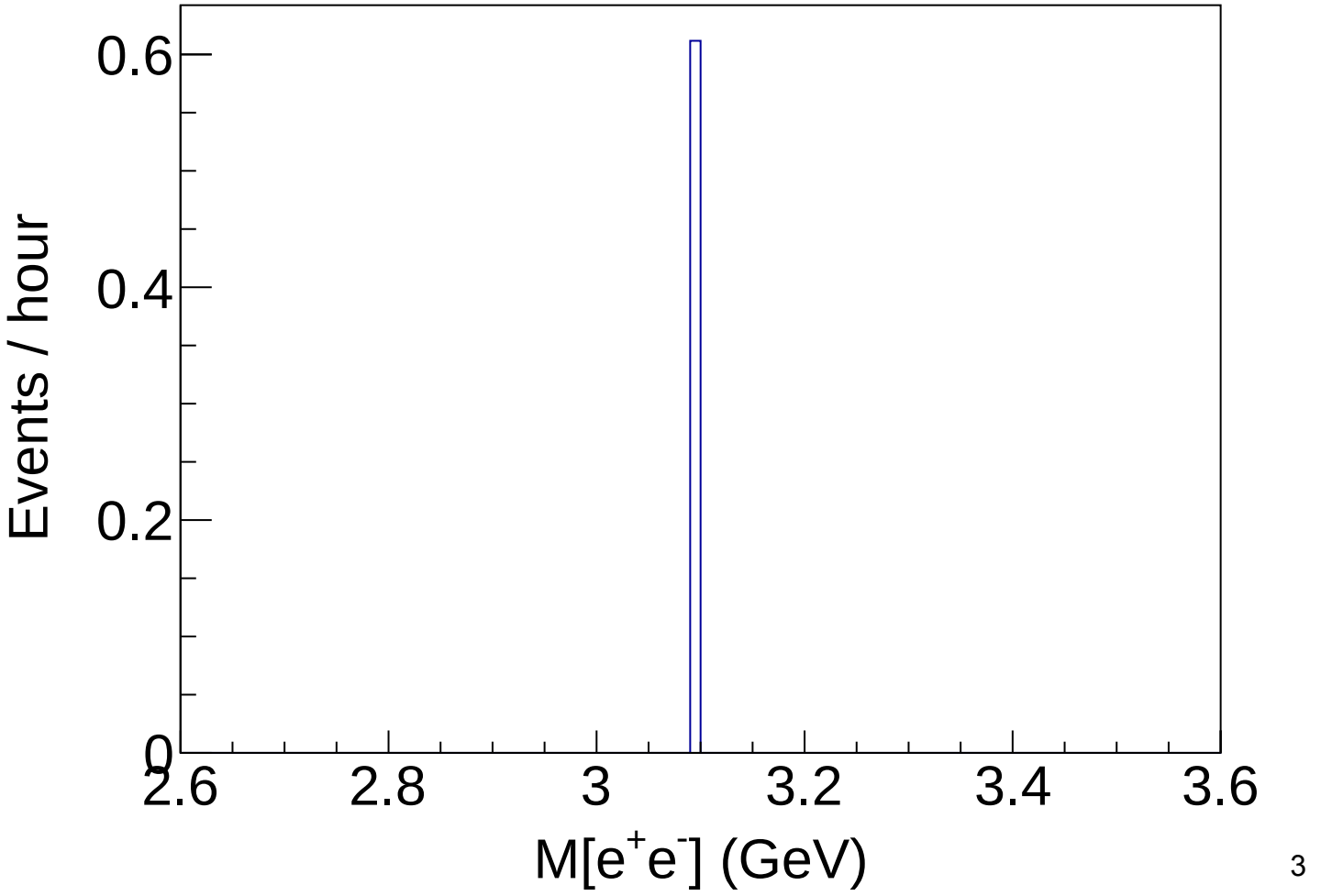
Photoproduction:
Bremsstrahlung photon with target as the radiator, select $6.2 < E_\gamma < 9.2$GeV
Subthreshold cut: $E_\gamma < 8.2$ GeV
Note: E_γ is known in simulation

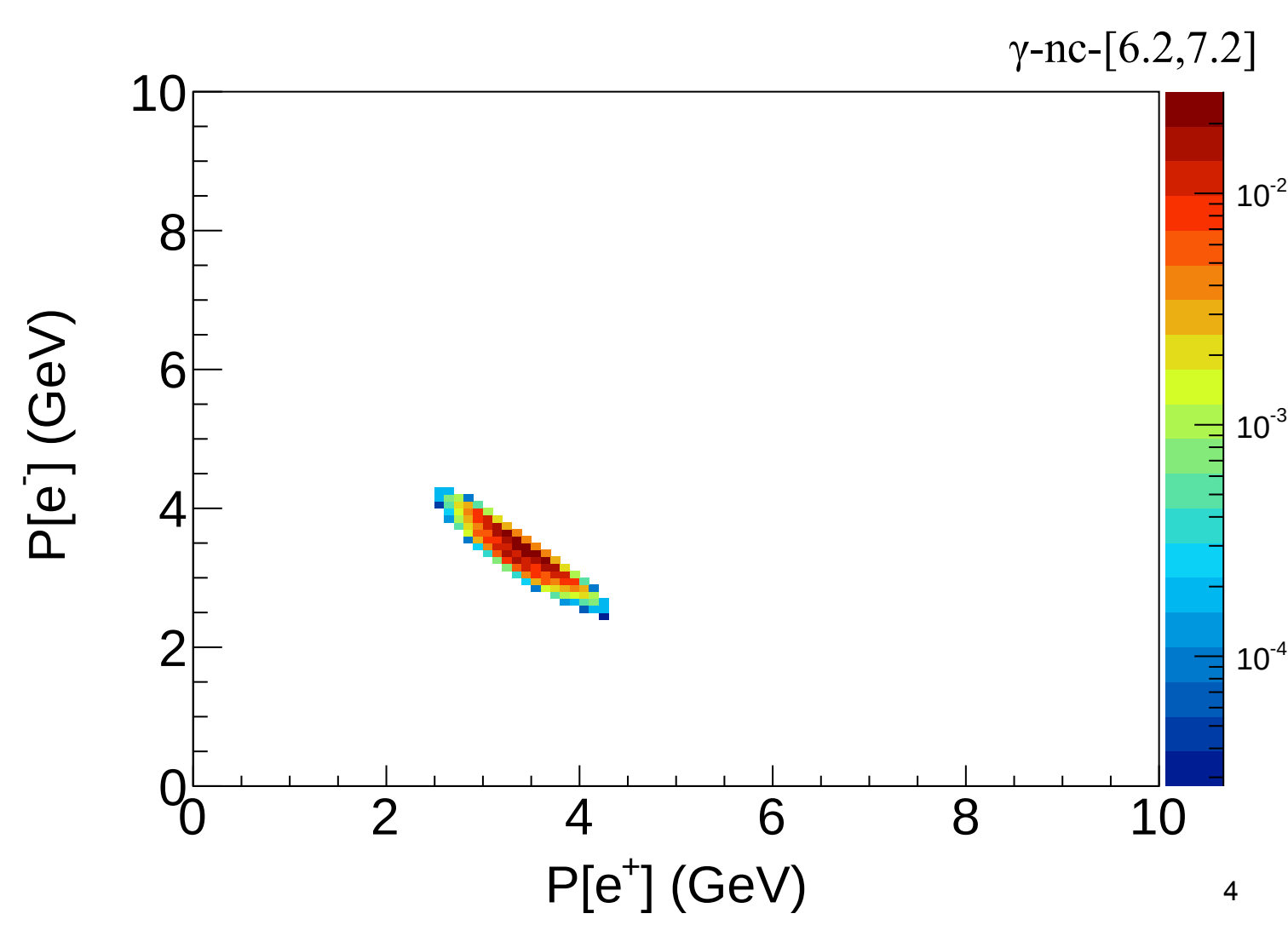
Purpose:
Divide the subthreshold region into two bins [6.2, 7.2] and [7.2, 8.2] GeV of the photon energy

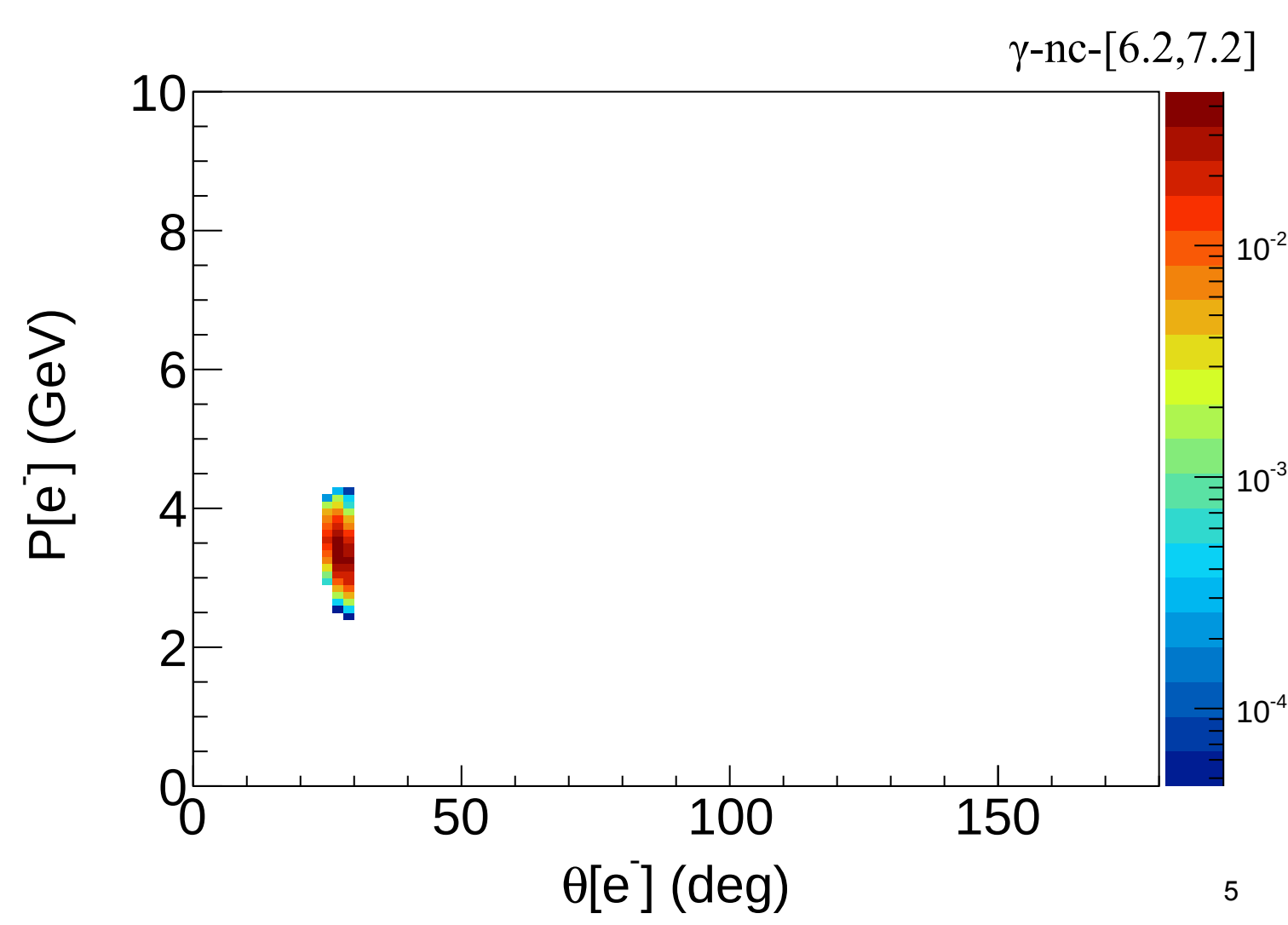
J/ψ production from ^{4}He

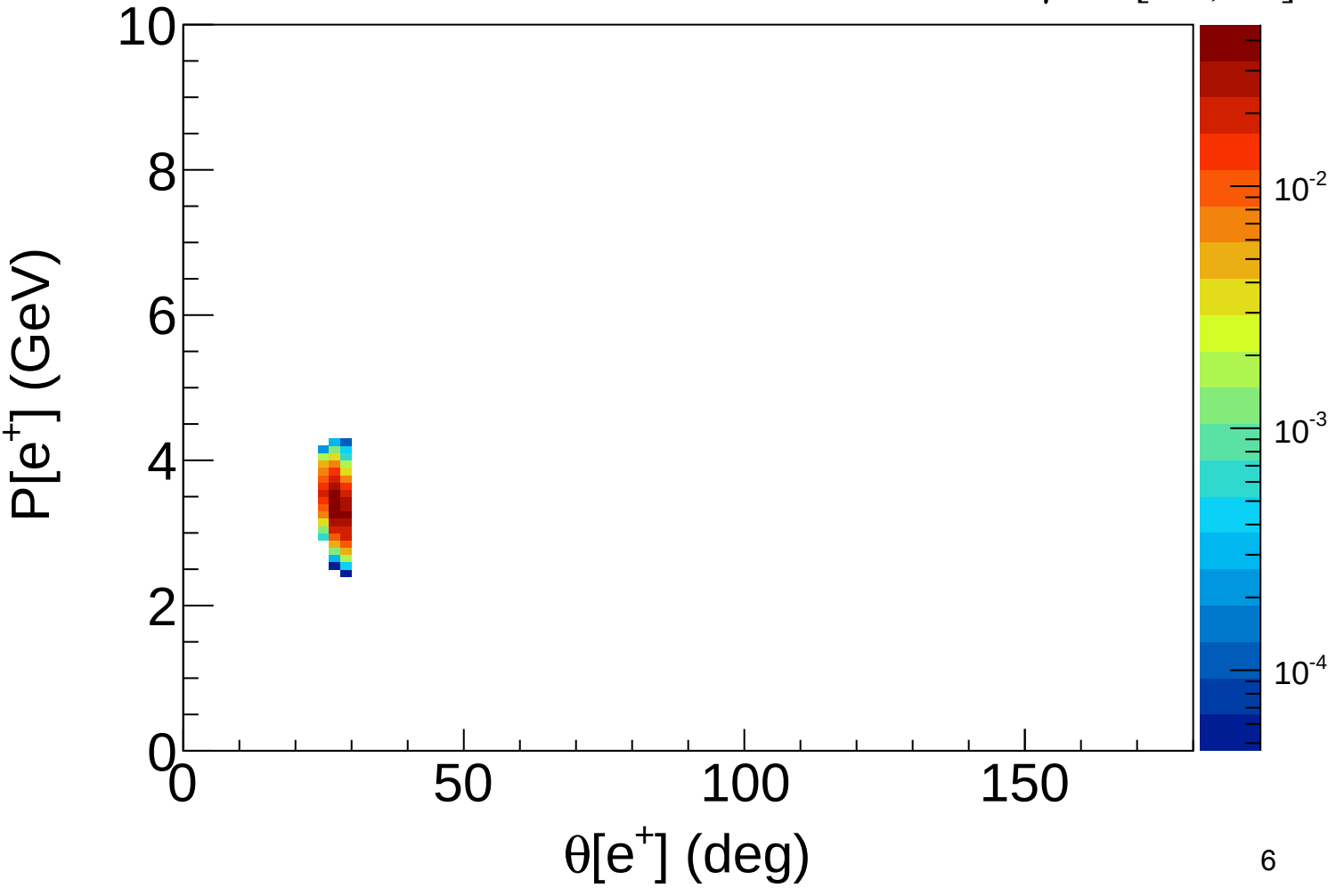
Simulated cases

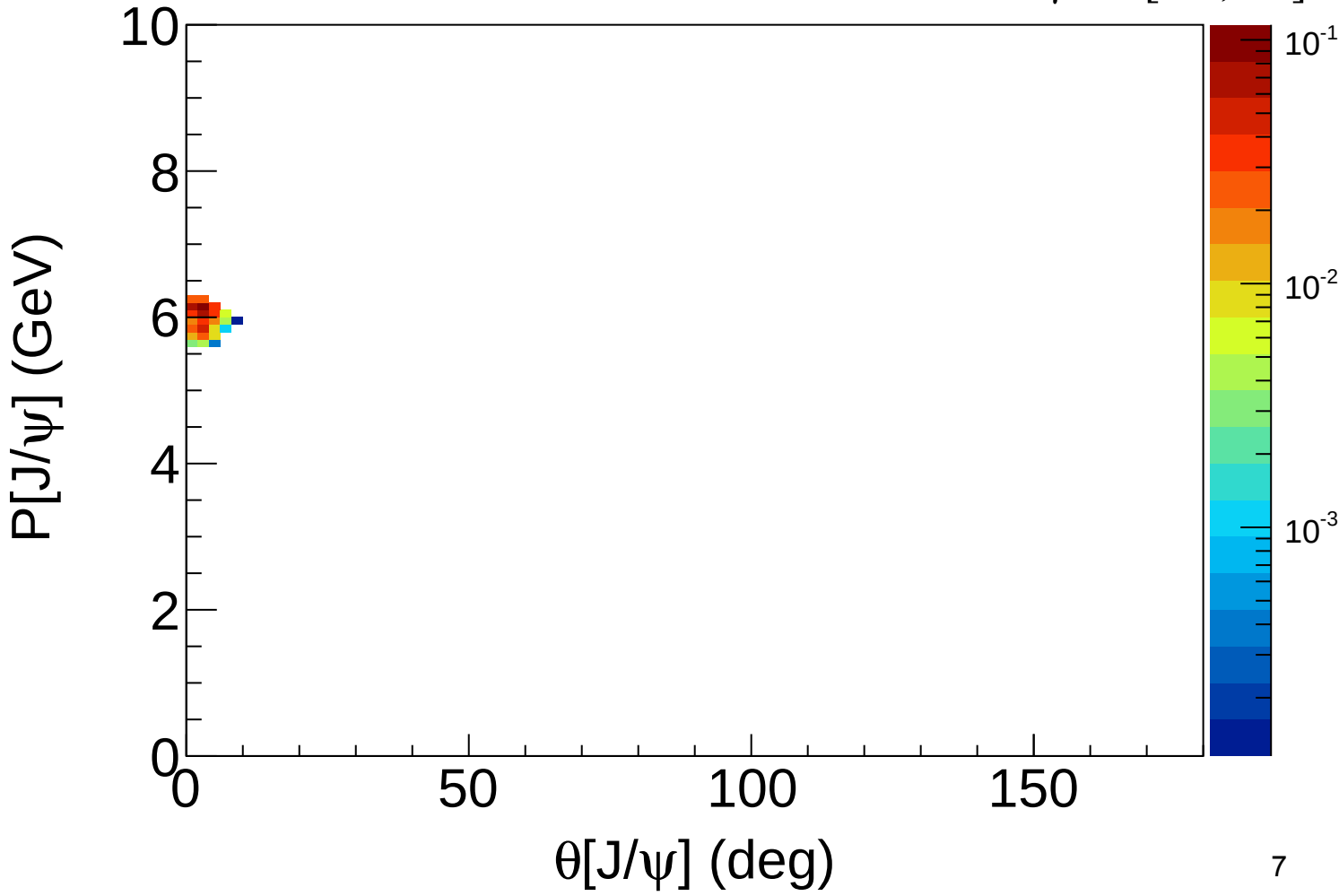
Label	γ energy (GeV)	initial “p”
γ-nc-[6.2,7.2]	[6.2, 7.2]	No cut
γ-c300-[6.2,7.2]	[6.2, 7.2]	< 300 MeV
γ-nc-[7.2,8.2]	[7.2, 8.2]	No cut
γ-c300-[7.2,8.2]	[7.2, 8.2]	< 300 MeV


γ-nc-[6.2,7.2]
Events / hour
0.6
0.4
0.2
0
2.6
2.8
3
3.2
3.4
3.6
M[e+e-] (GeV)

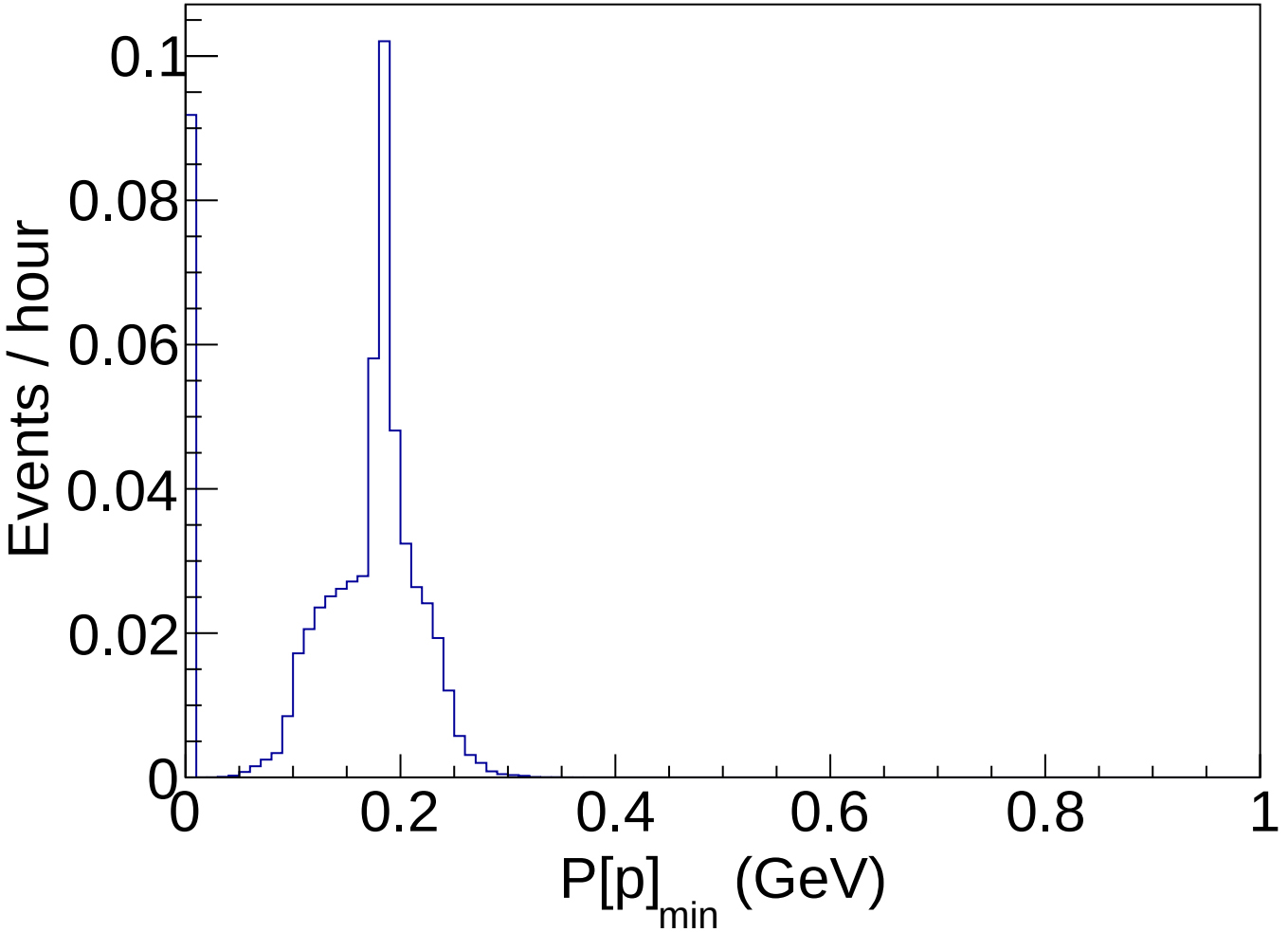

γ-nc-[6.2,7.2]
P[e⁻] (GeV)
P[e⁺] (GeV)
0
2
4
6
8
10
10⁻²
10⁻³
10⁻⁴

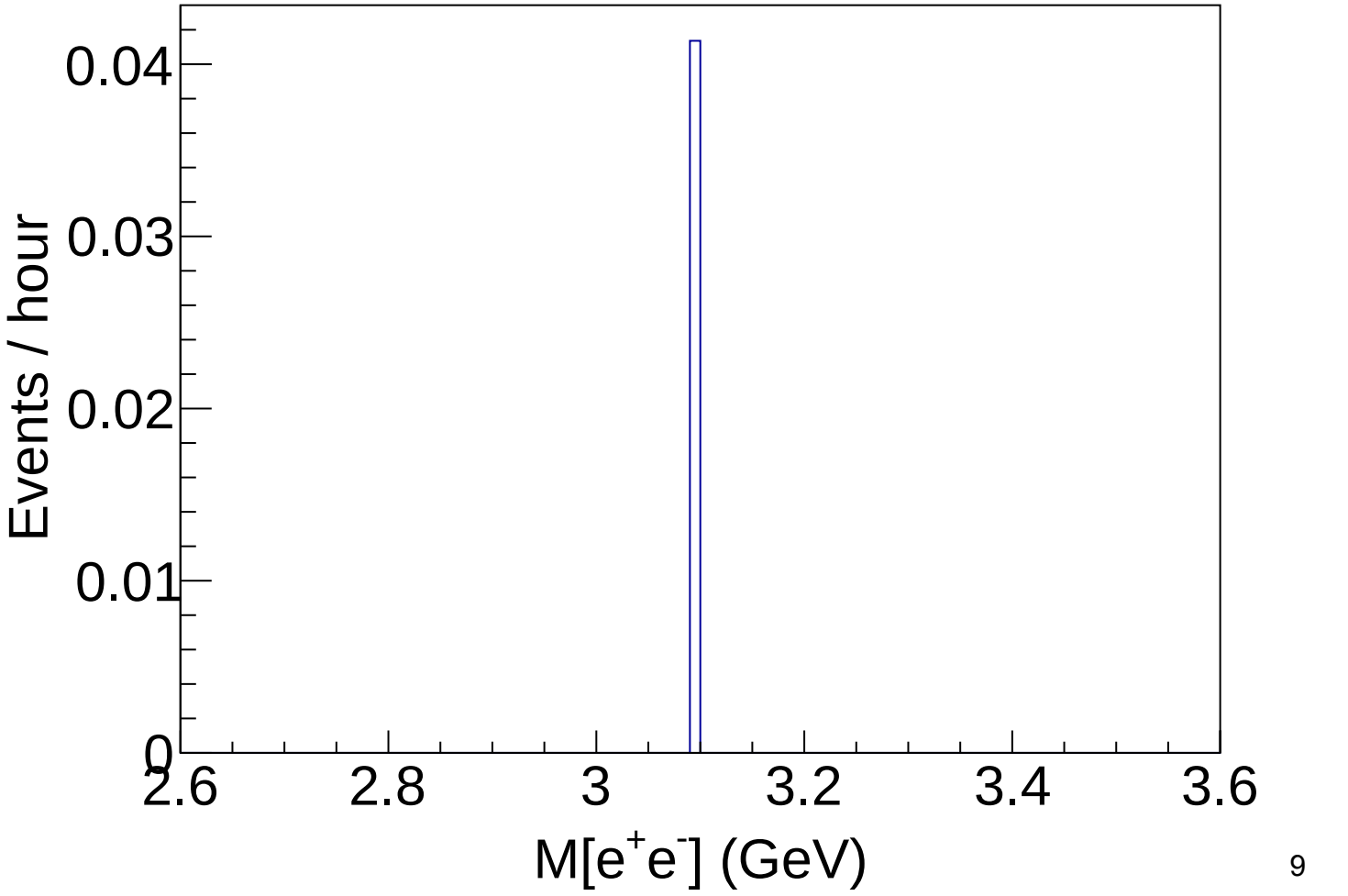

γ-nc-[6.2,7.2]
P[e⁻] (GeV)
θ[e⁻] (deg)
0
2
4
6
8
10
0
50
100
150
10-2
10-3
10-4

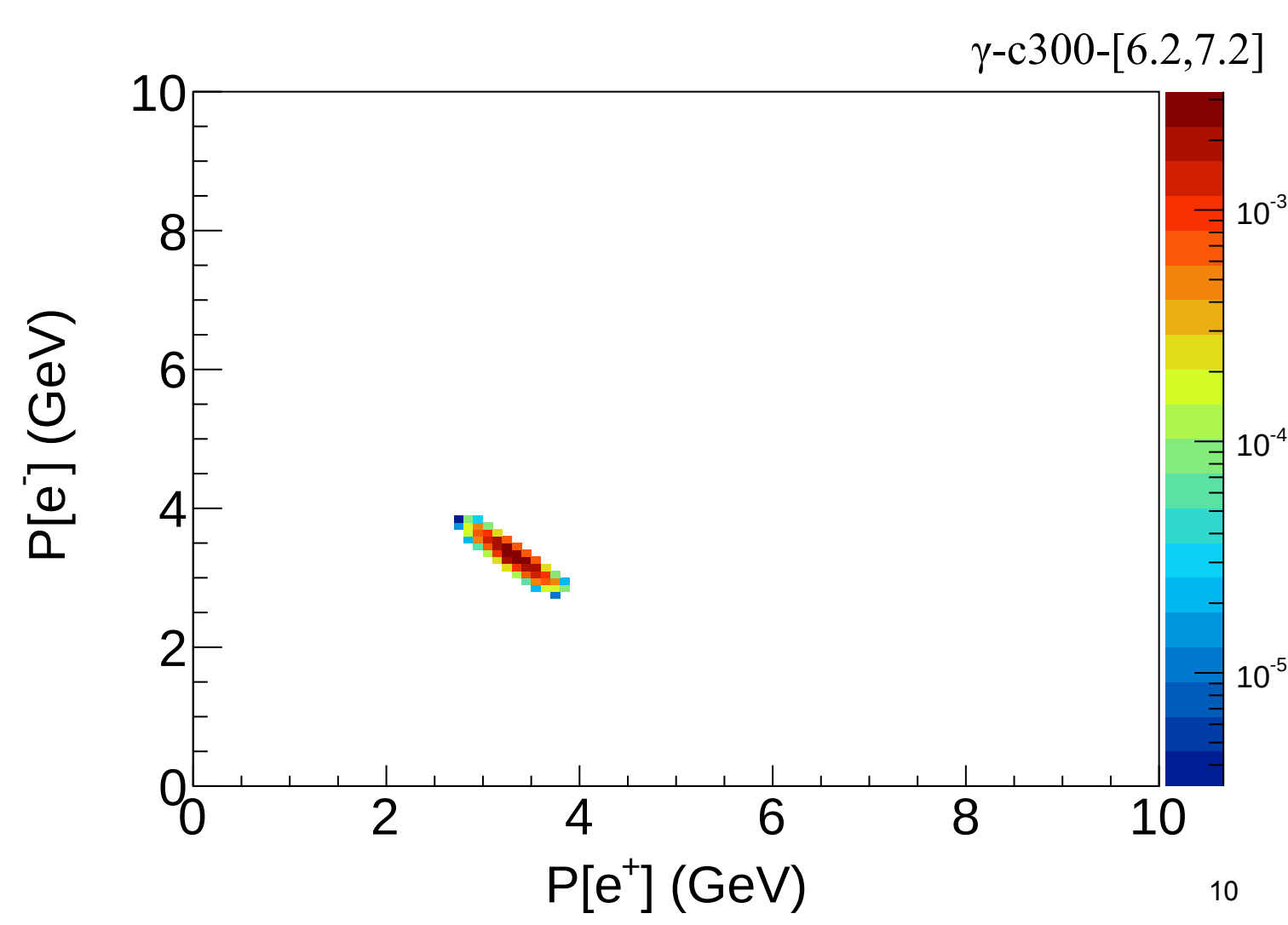

γ-nc-[6.2,7.2]
P[e+] (GeV)
θ[e+] (deg)
0
2
4
6
8
10
0
50
100
150
10-2
10-3
10-4

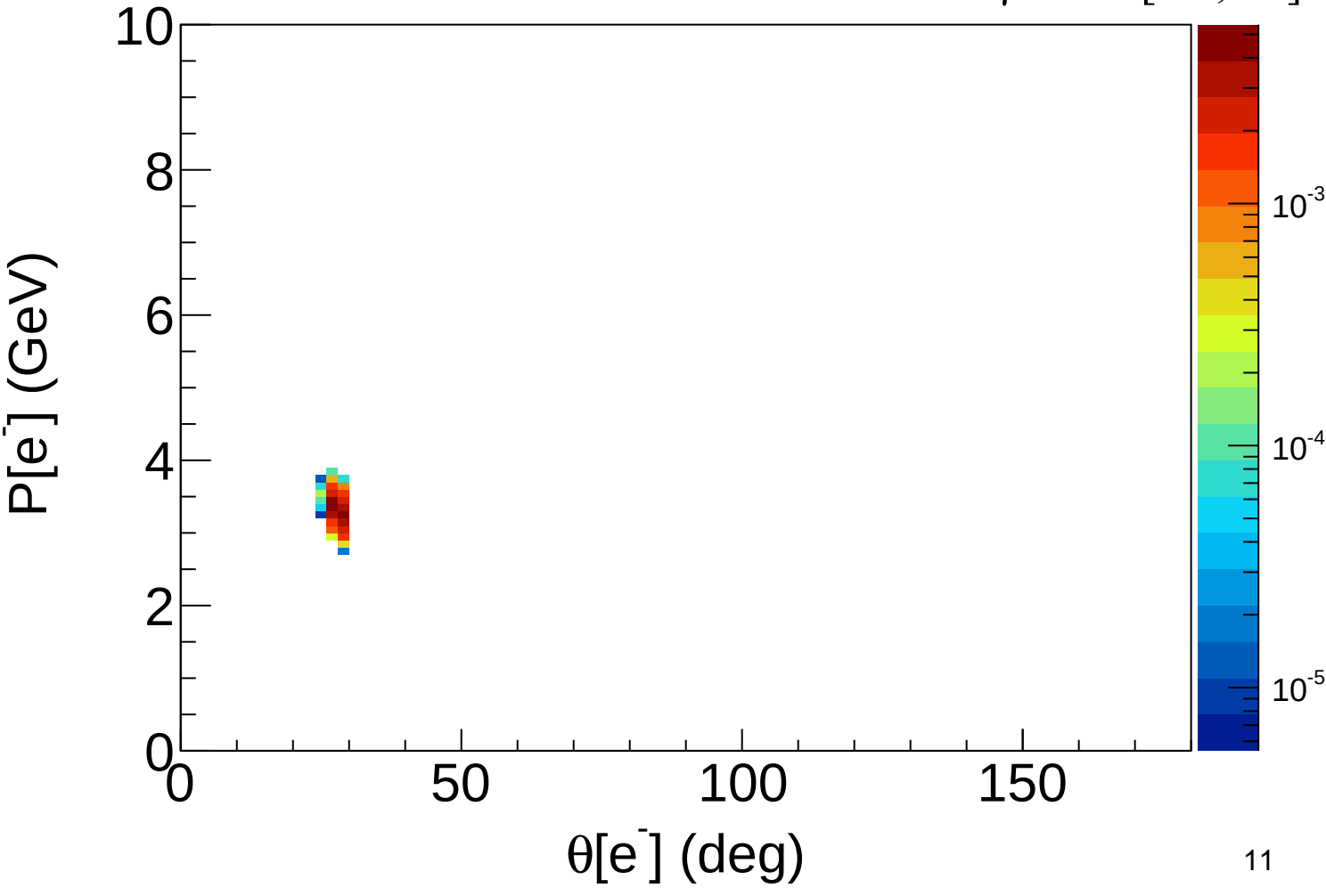

γ-nc-[6.2,7.2]
P[J/ψ] (GeV)
θ[J/ψ] (deg)
0
2
4
6
8
10
0
50
100
150
10-1
10-2
10-3

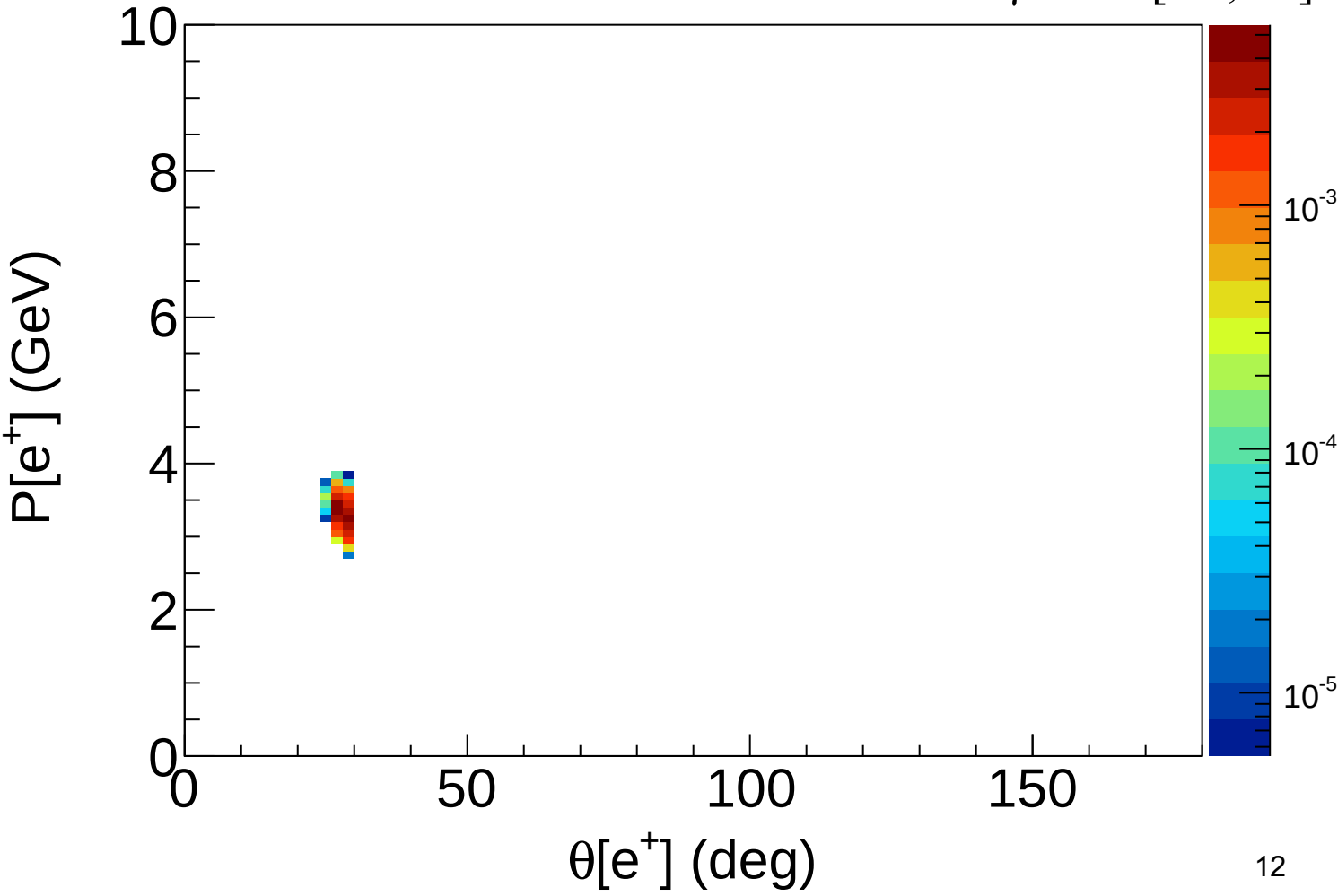
γ-nc-[6.2,7.2]

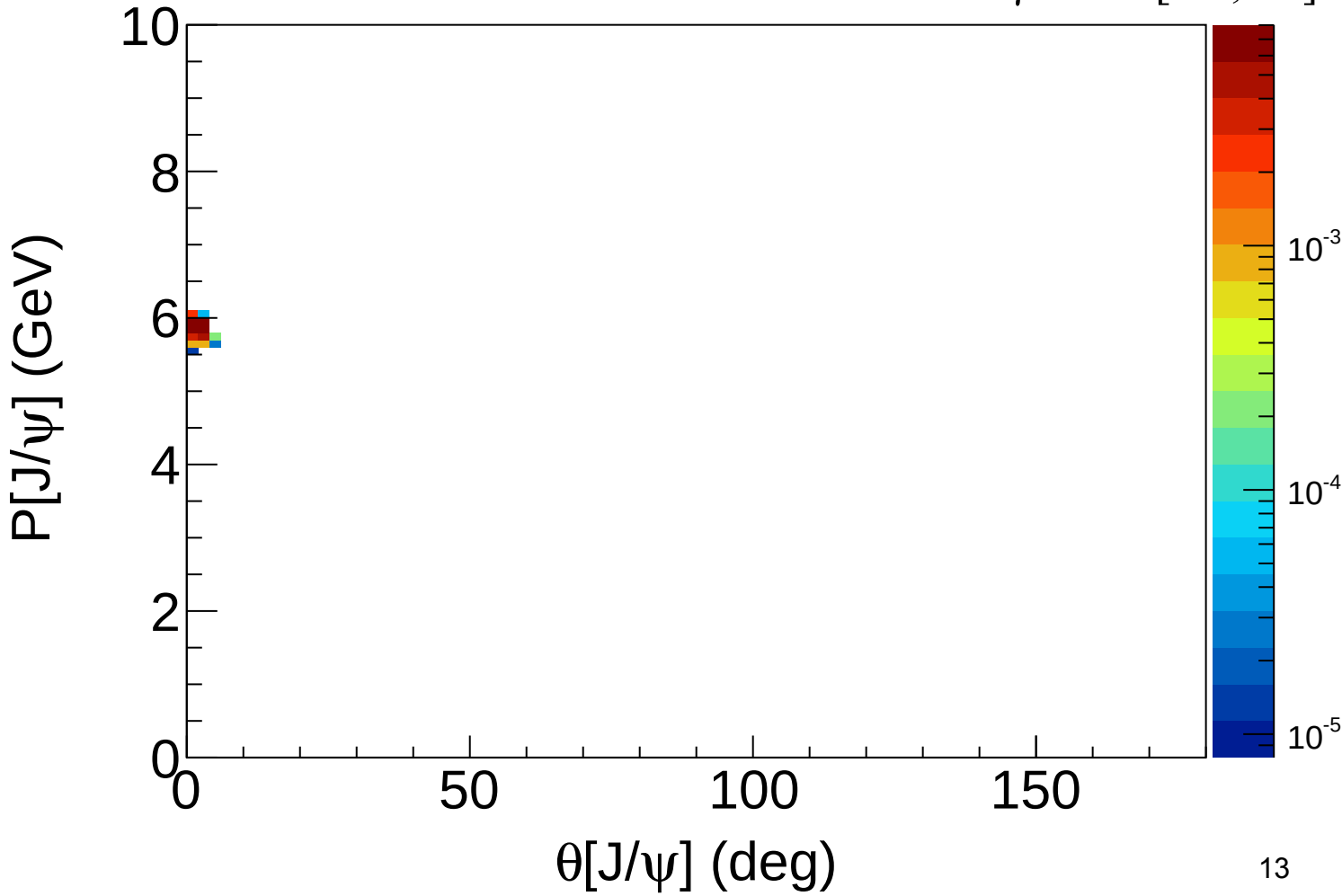



γ-c300-[6.2,7.2]
Events / hour
0.04
0.03
0.02
0.01
0
2.6
2.8
3
3.2
3.4
3.6
M[e+e-] (GeV)

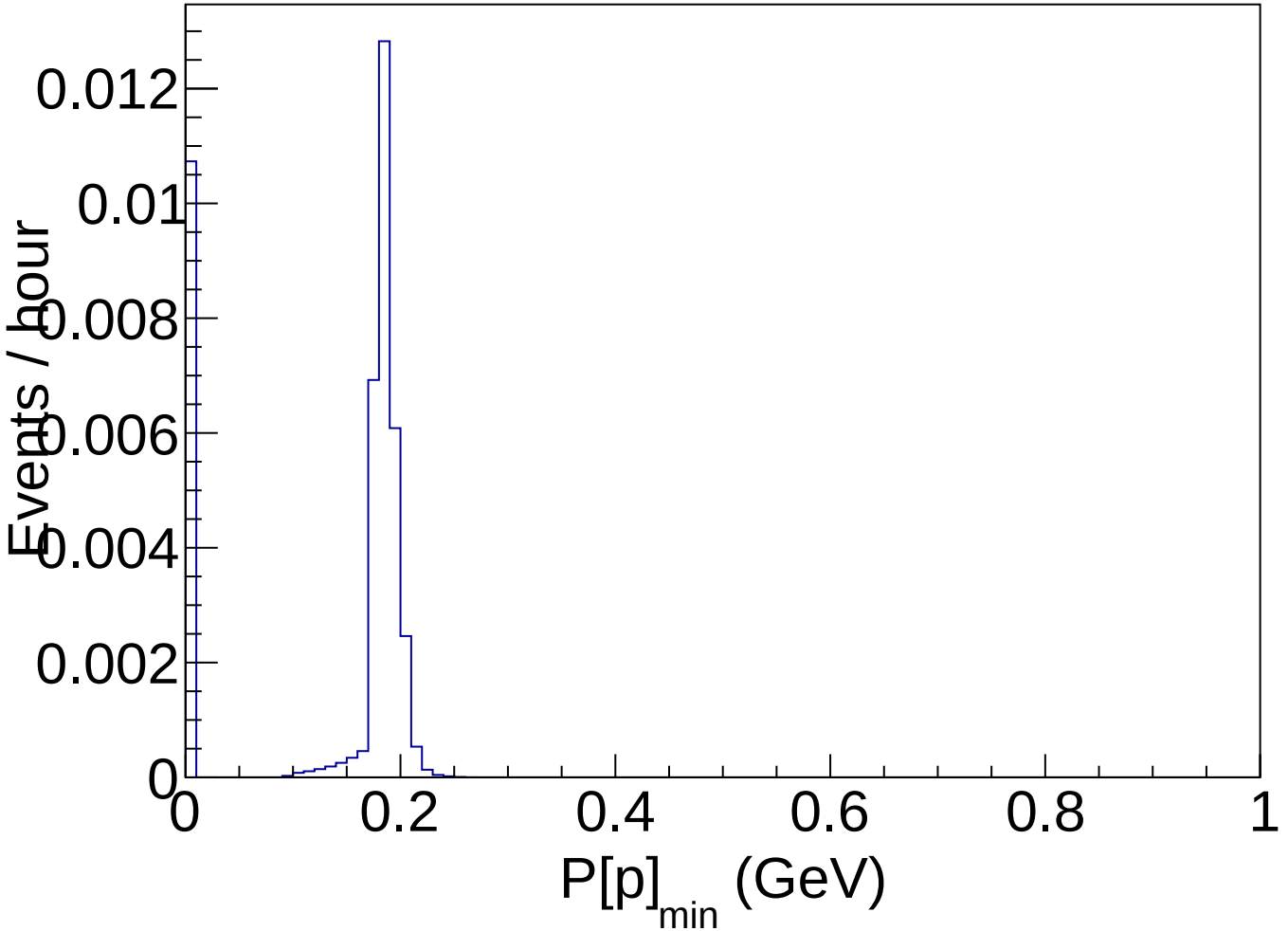

γ-c300-[6.2,7.2]
P[e⁻] (GeV)
P[e⁺] (GeV)
0
2
4
6
8
10
10⁻³
10⁻⁴
10⁻⁵

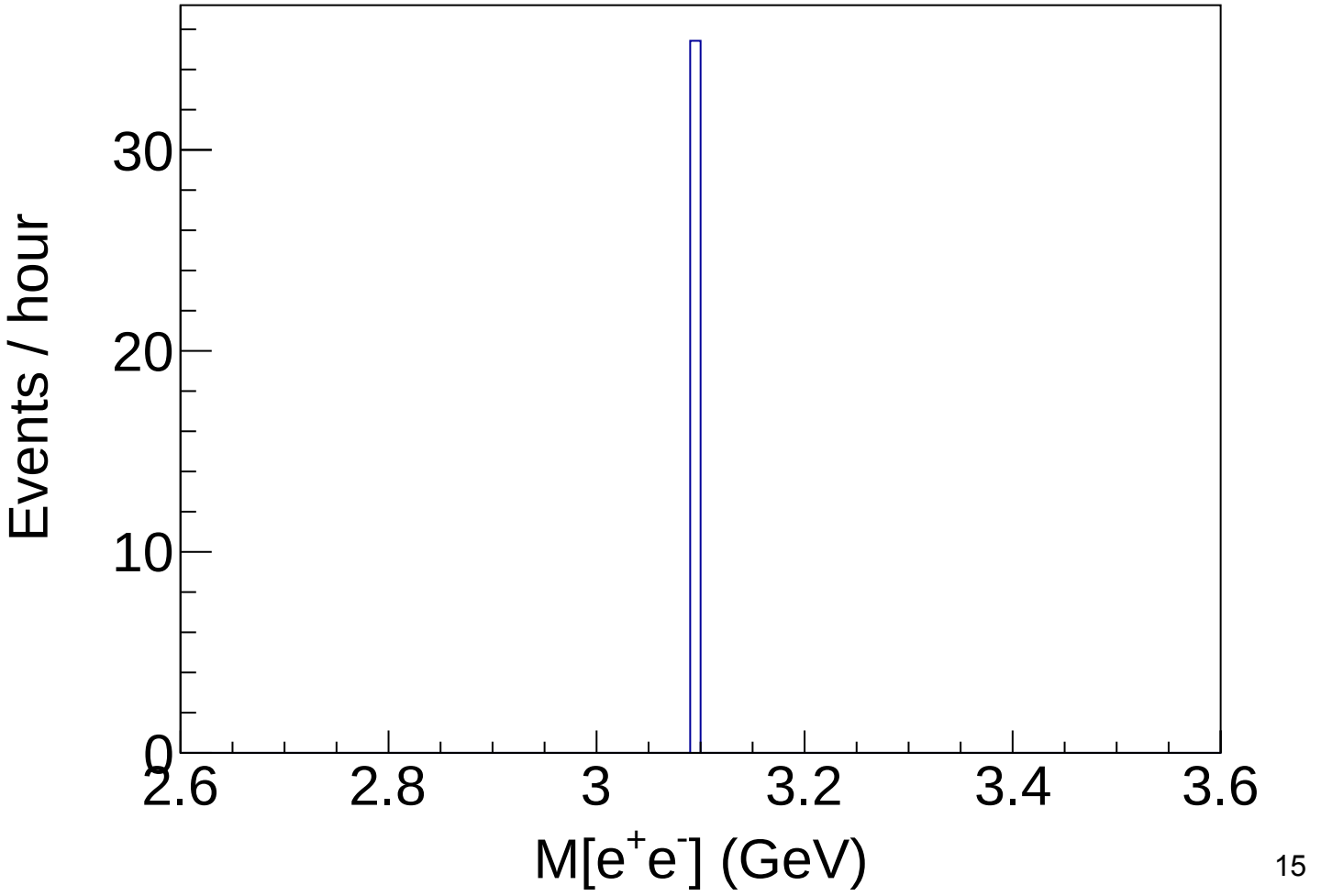

γ-c300-[6.2,7.2]
P[e⁻] (GeV)
θ[e⁻] (deg)
0
2
4
6
8
10
0
50
100
150
10-3
10-4
10-5

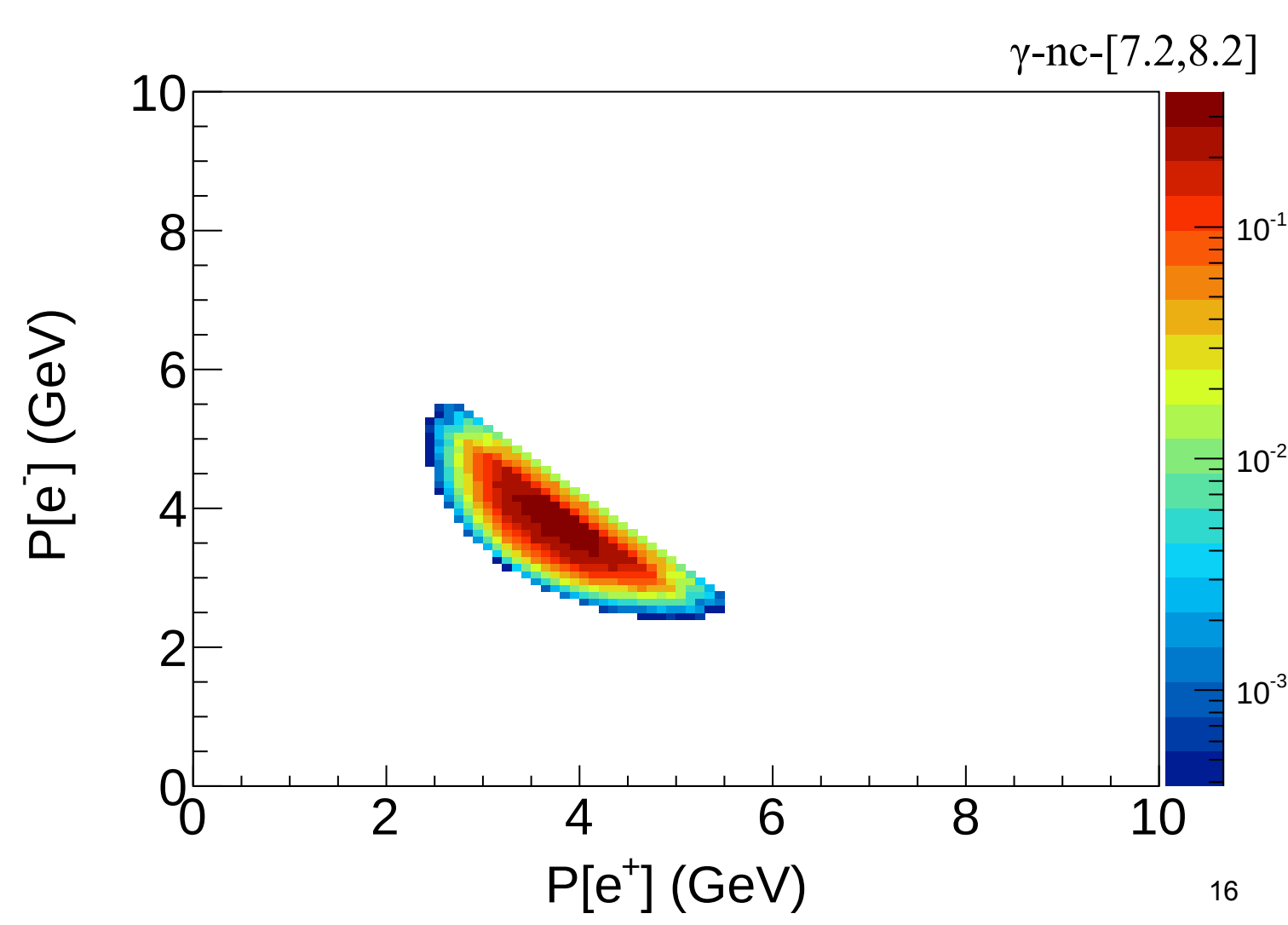

γ-c300-[6.2,7.2]
P[e+] (GeV)
θ[e+] (deg)
0
2
4
6
8
10
0
50
100
150
10-3
10-4
10-5

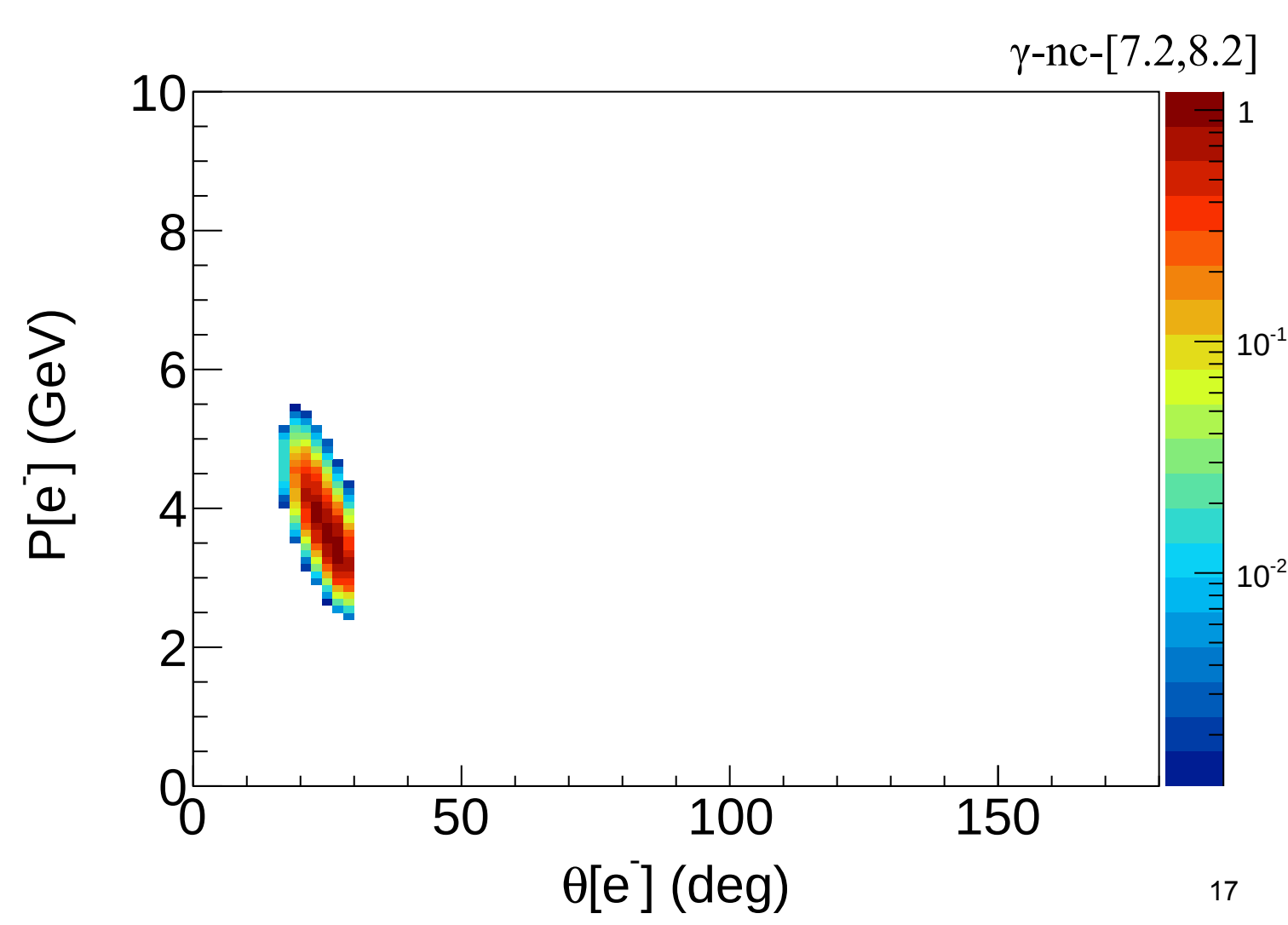

γ-c300-[6.2,7.2]
P[J/ψ] (GeV)
θ[J/ψ] (deg)
0
2
4
6
8
10
0
50
100
150
10-3
10-4
10-5

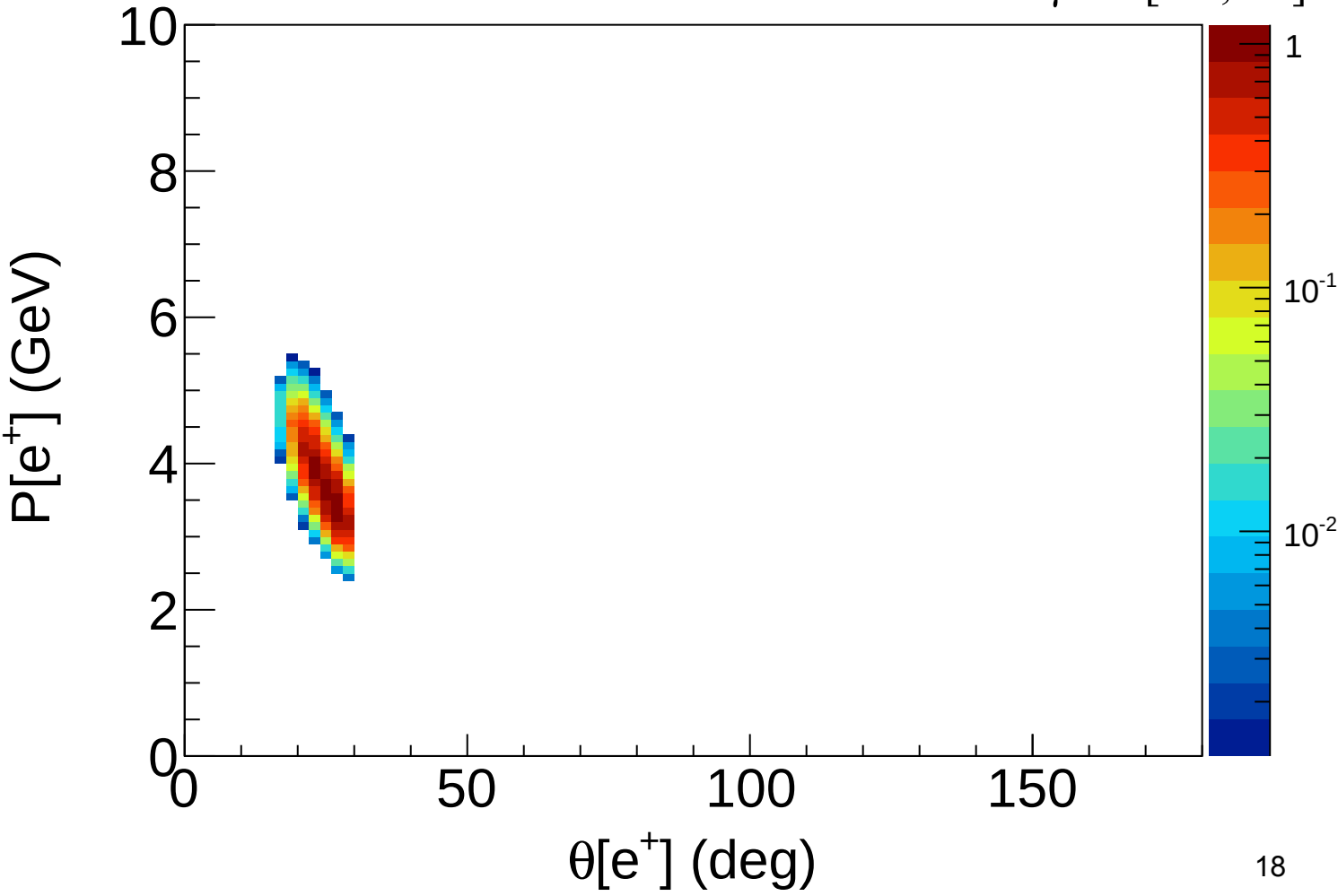
γ-c300-[6.2,7.2]

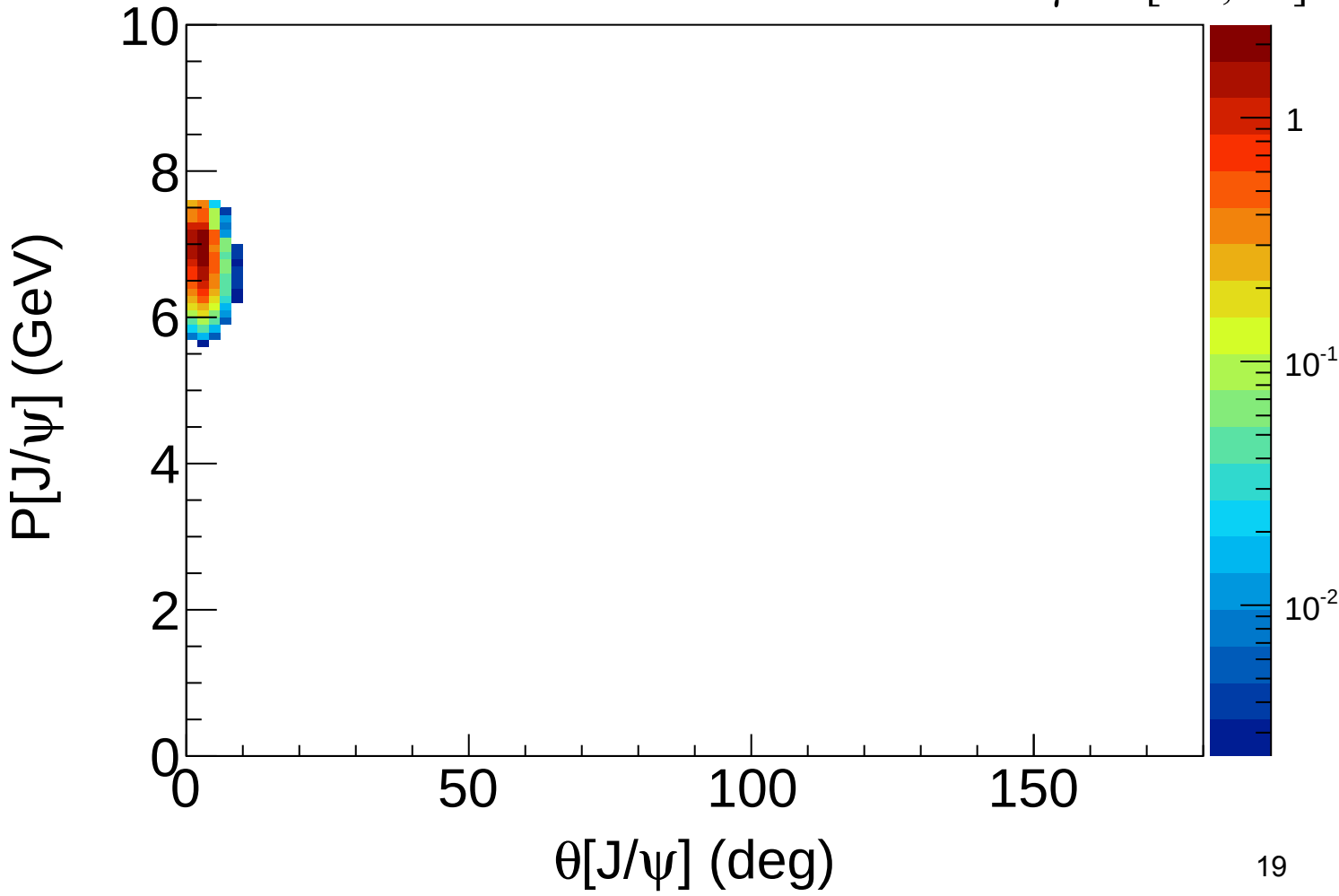

0.012
0.01
0.008
0.006
0.004
0.002
0
Events / hour
0
0.2
0.4
0.6
0.8
1
P[p]min (GeV)

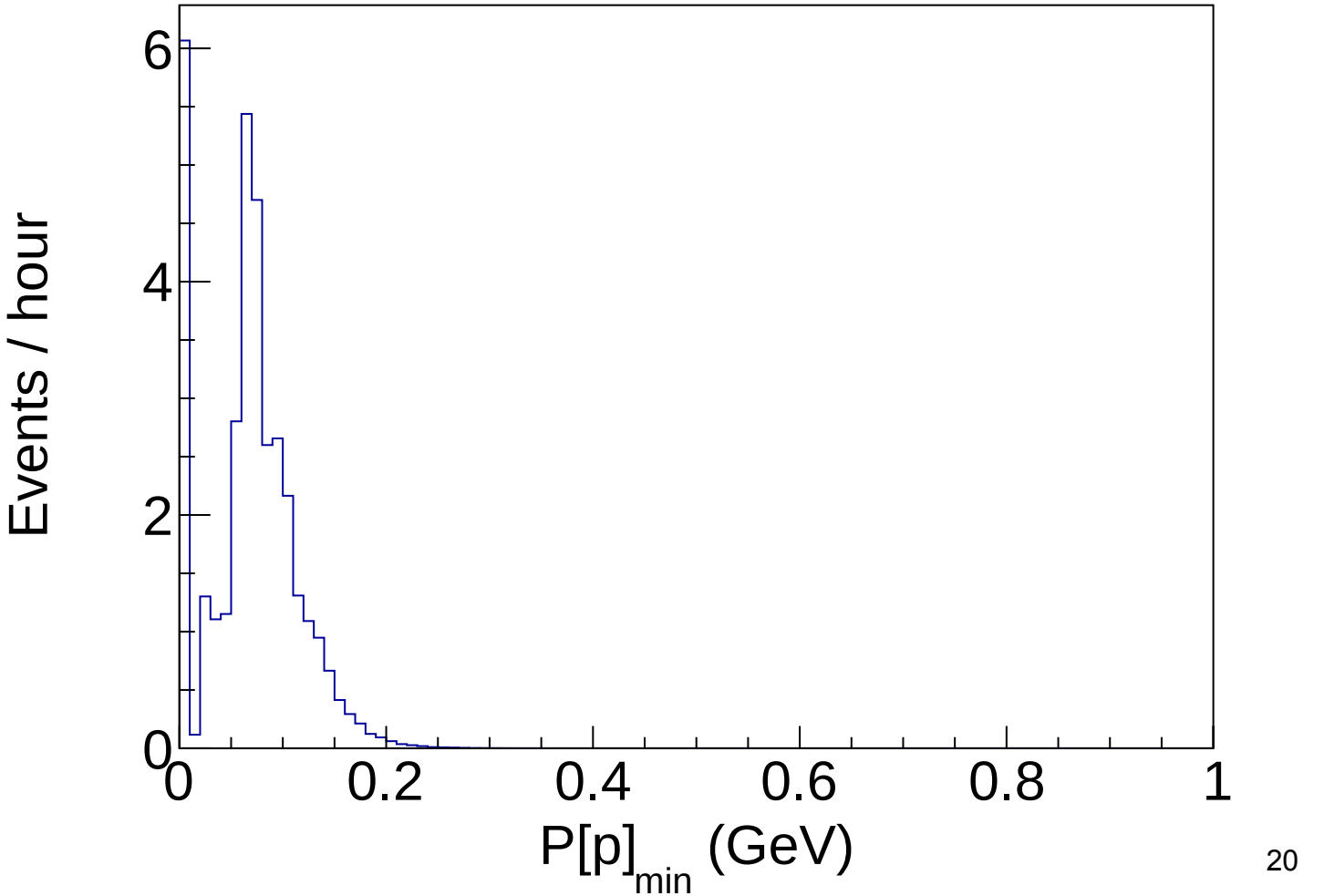

γ-nc-[7.2,8.2]
Events / hour
0
10
20
30
2.6
2.8
3
3.2
3.4
3.6
M[e+e-] (GeV)

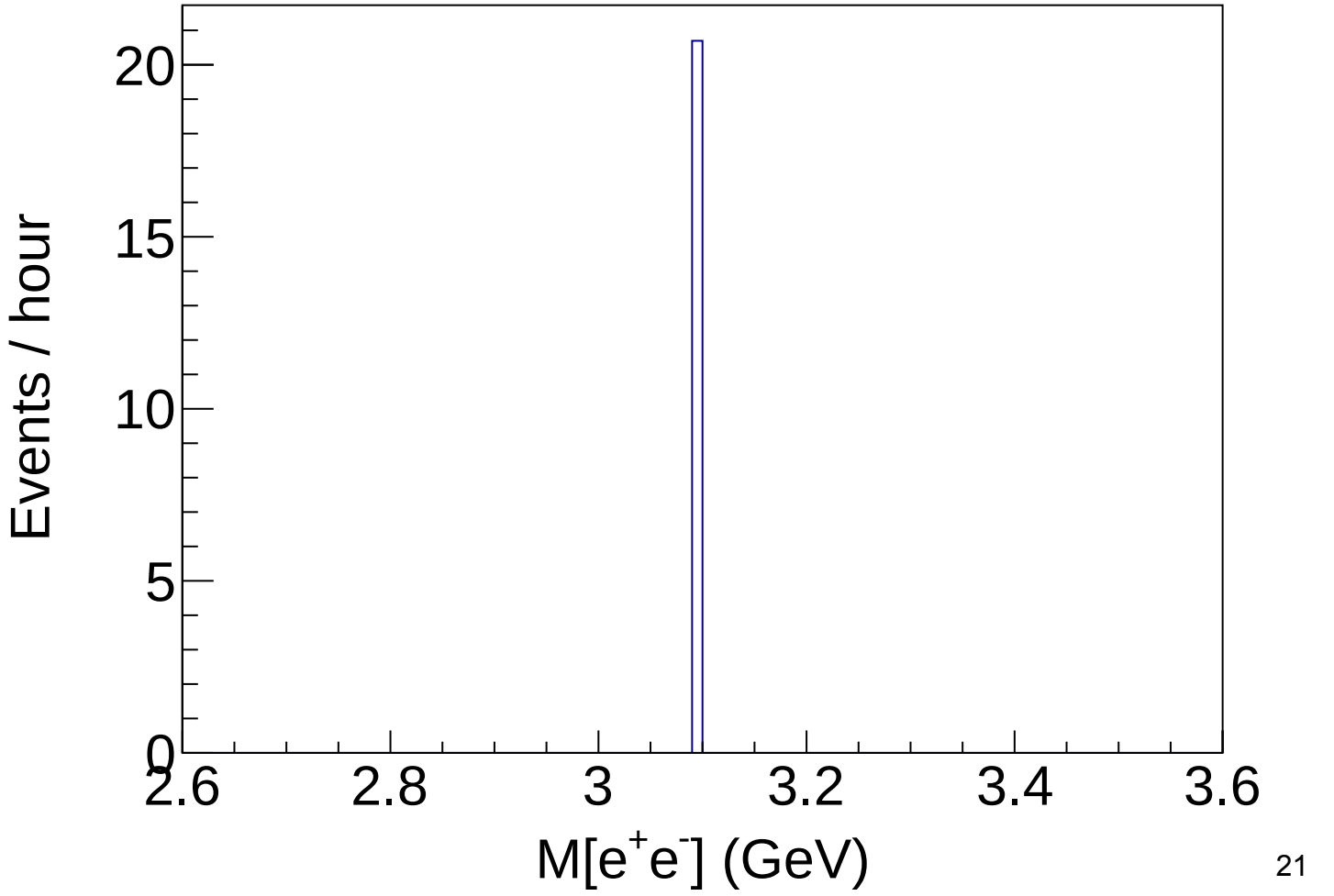

γ-nc-[7.2,8.2]
P[e⁻] (GeV)
P[e⁺] (GeV)
0
2
4
6
8
10
10⁻¹
10⁻²
10⁻³

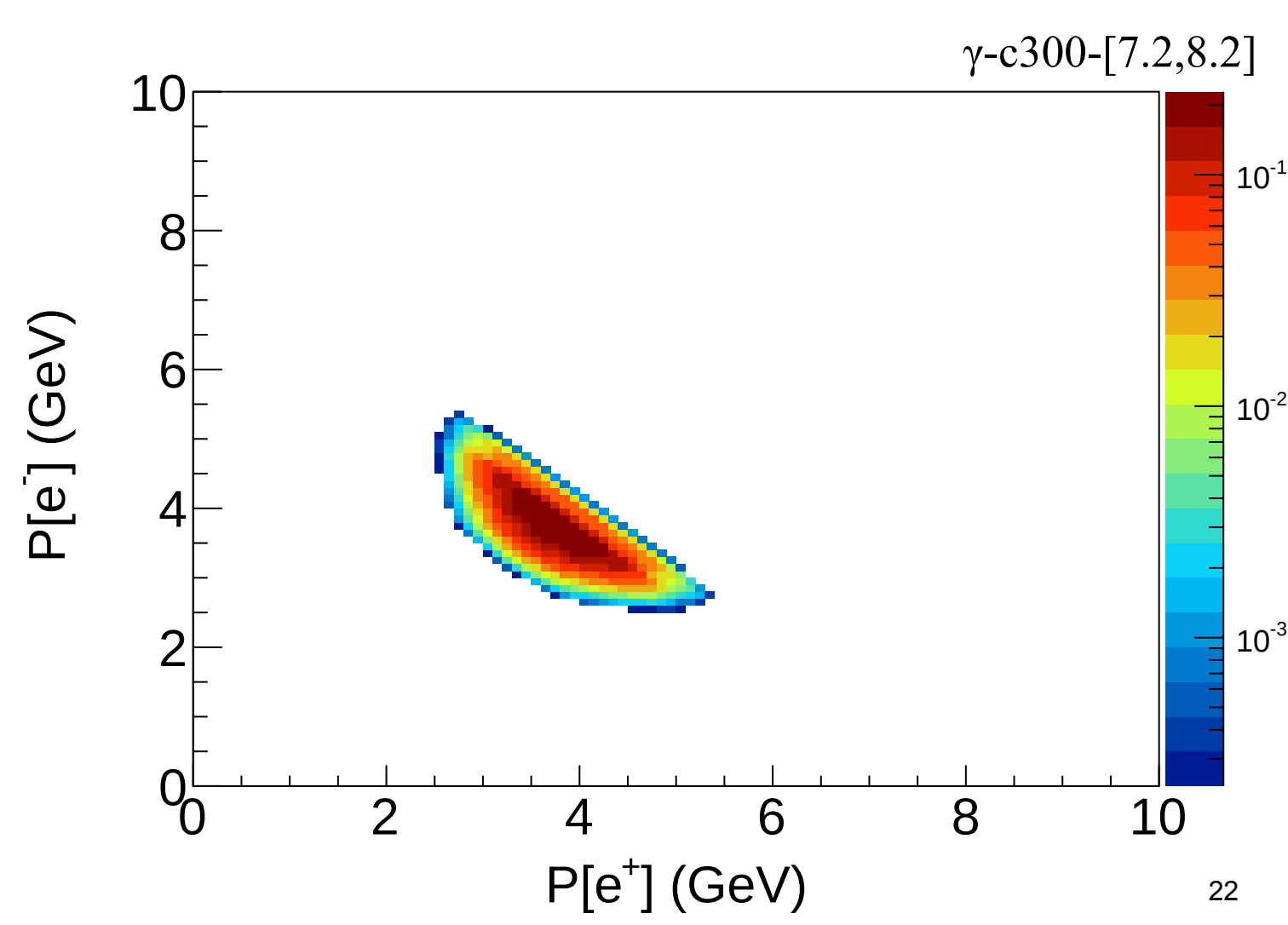

γ-nc-[7.2,8.2]
P[e⁻] (GeV)
θ[e⁻] (deg)
0
2
4
6
8
10
0
50
100
150
1
10⁻¹
10⁻²

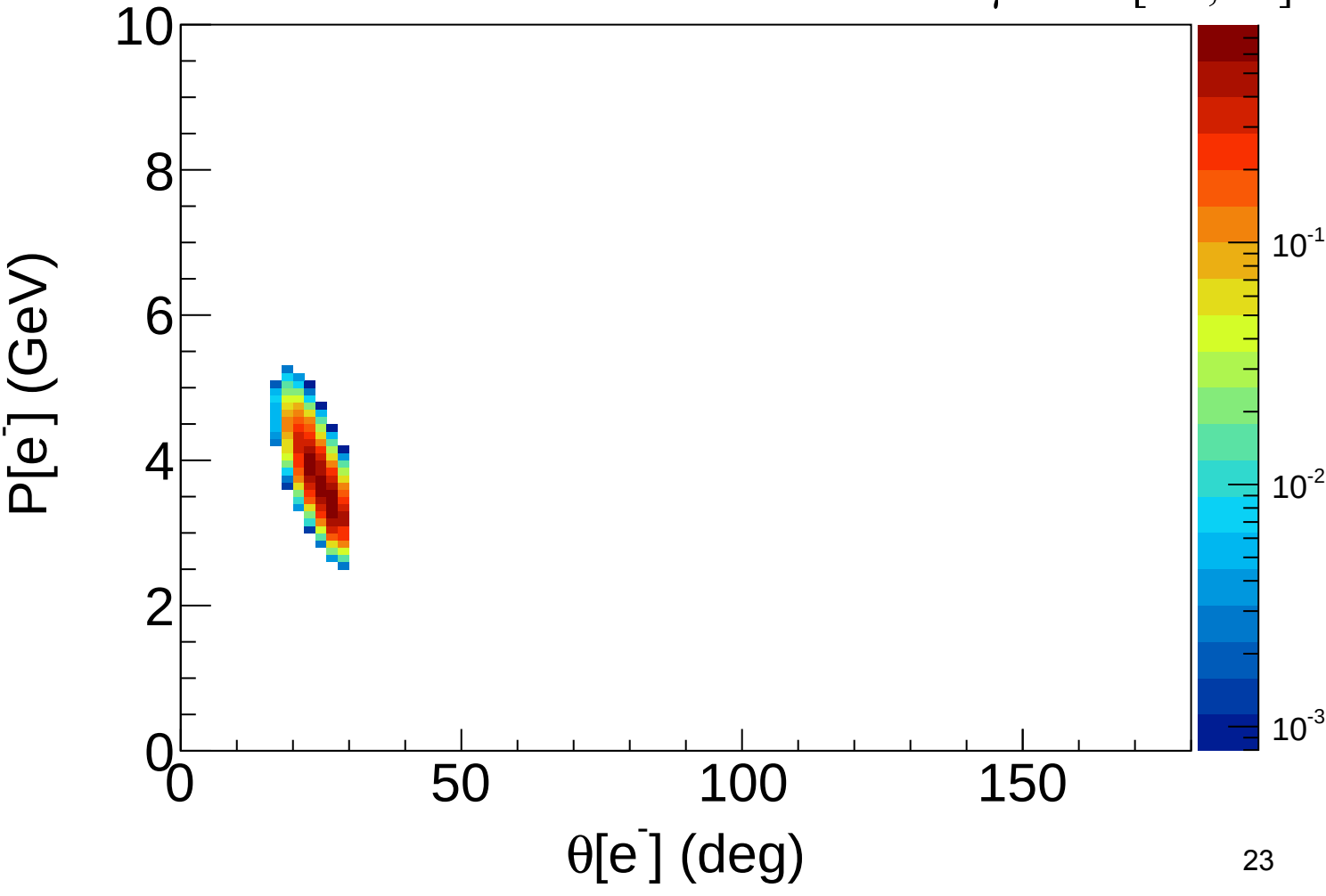

γ-nc-[7.2,8.2]
P[e+] (GeV)
θ[e+] (deg)
0
2
4
6
8
10
0
50
100
150
1
10-1
10-2

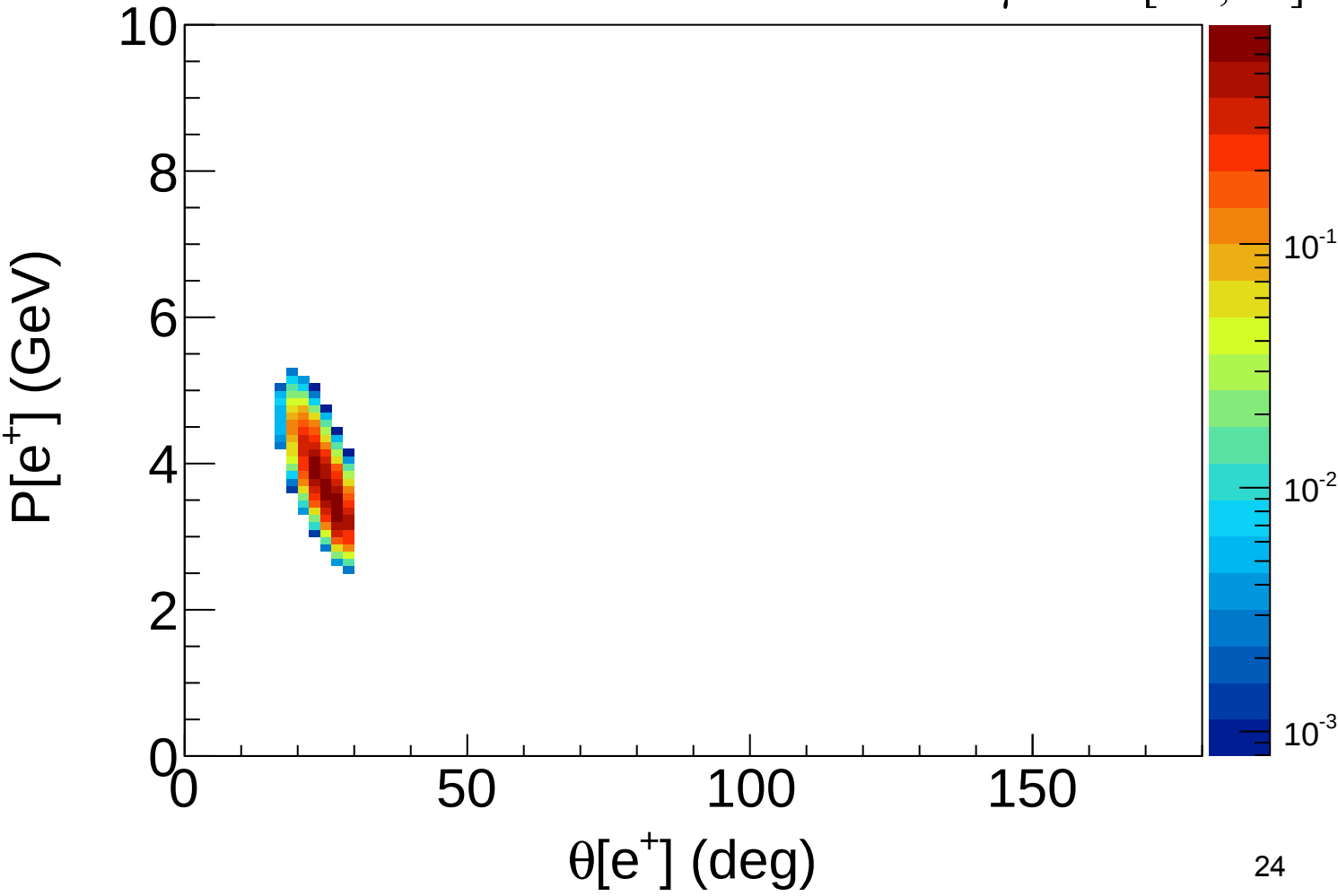

γ-nc-[7.2,8.2]
P[J/ψ] (GeV)
θ[J/ψ] (deg)
0
2
4
6
8
10
0
50
100
150
1
10-1
10-2

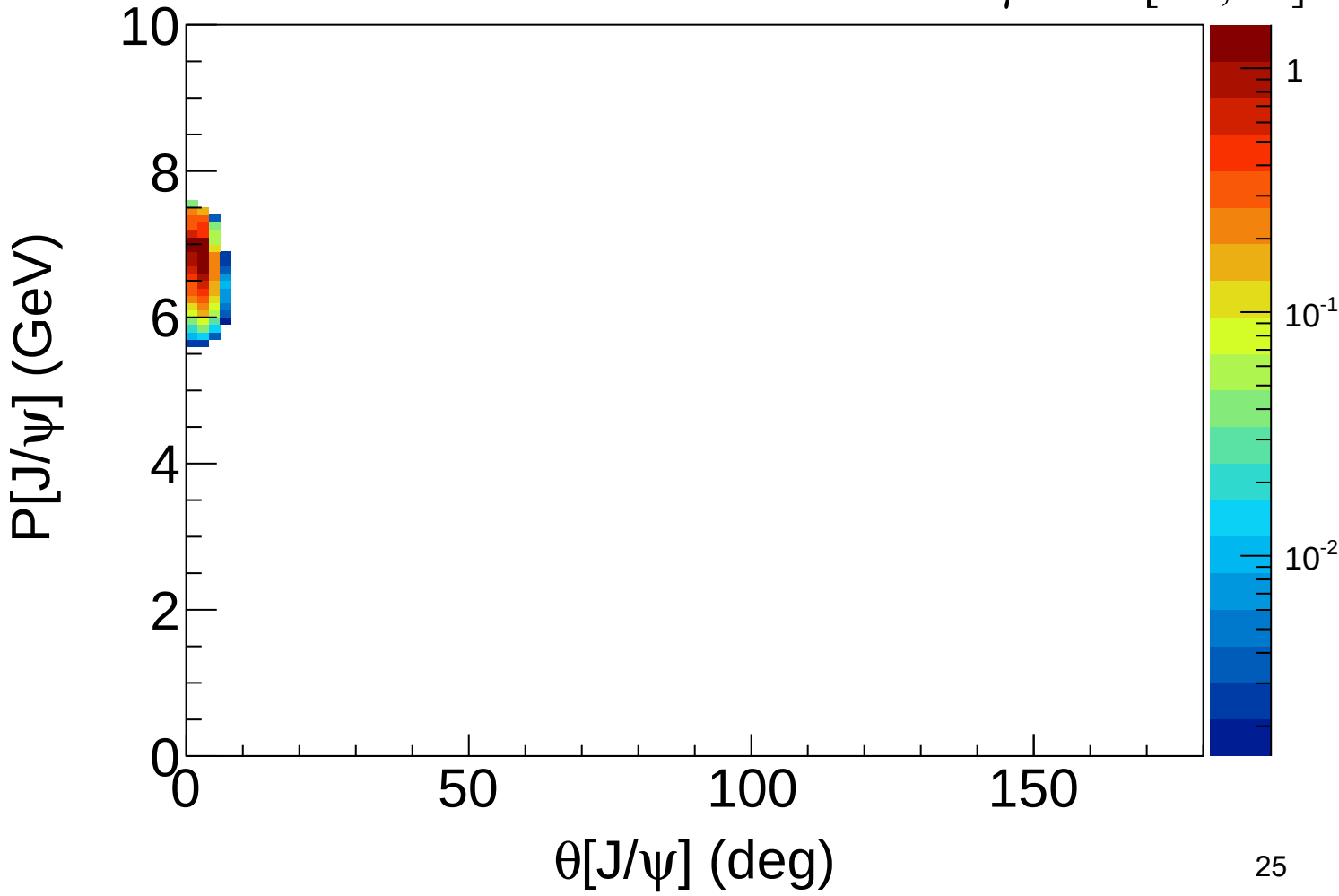

γ-nc-[7.2,8.2]
Events / hour
0
2
4
6
0
0.2
0.4
0.6
0.8
1
P[p]min (GeV)

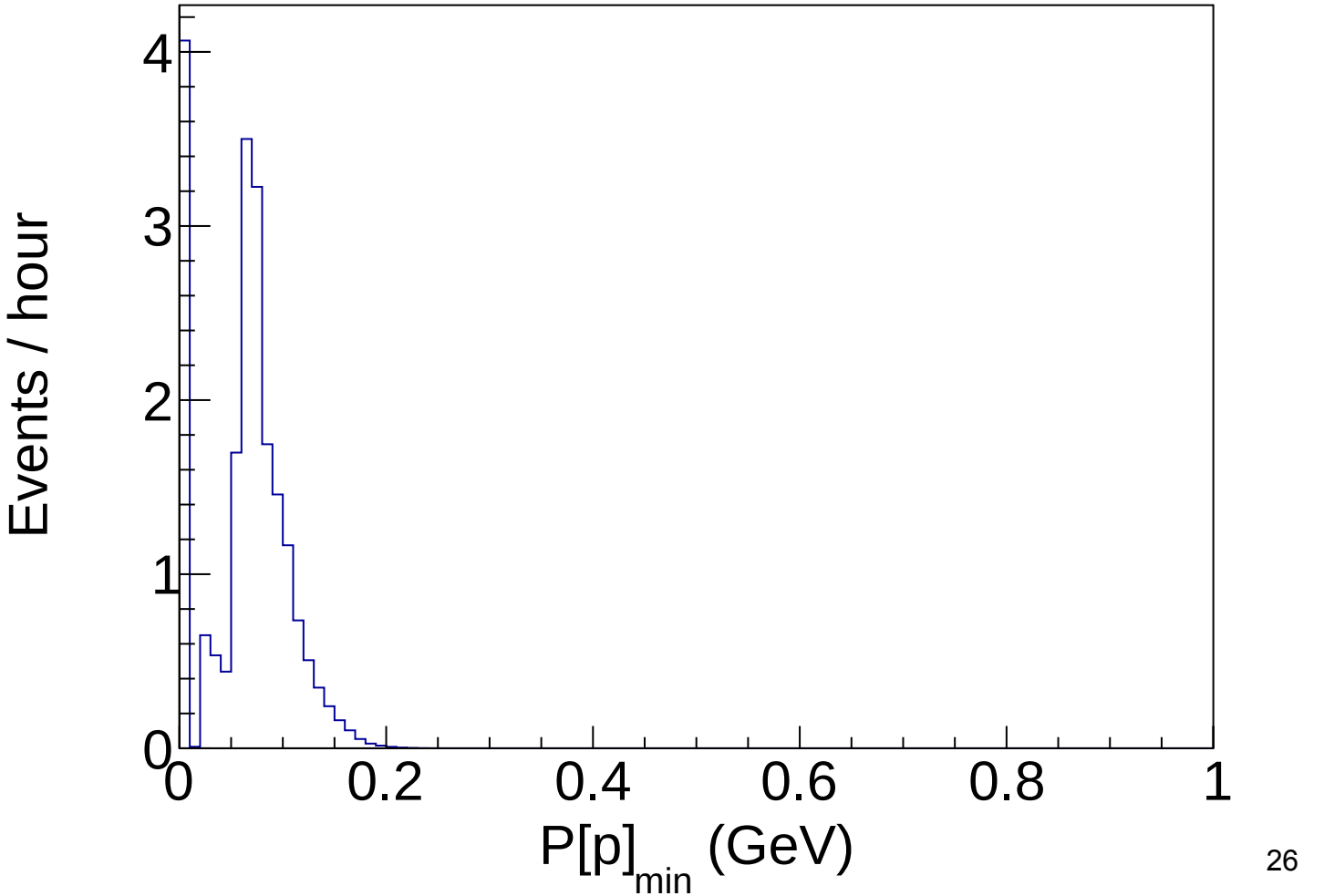

γ-c300-[7.2,8.2]
Events / hour
0
5
10
15
20
2.6
2.8
3
3.2
3.4
3.6
M[e+e-] (GeV)


γ-c300-[7.2,8.2]
P[e⁻] (GeV)
P[e⁺] (GeV)
0
2
4
6
8
10
10⁻¹
10⁻²
10⁻³


γ-c300-[7.2,8.2]
P[e⁻] (GeV)
θ[e⁻] (deg)
0
2
4
6
8
10
0
50
100
150
10⁻¹
10⁻²
10⁻³


γ-c300-[7.2,8.2]
P[e+] (GeV)
θ[e+] (deg)
0
2
4
6
8
10
0
50
100
150
10-1
10-2
10-3


γ-c300-[7.2,8.2]
P[J/ψ] (GeV)
θ[J/ψ] (deg)
0
2
4
6
8
10
0
50
100
150
1
10^-1
10^-2


γ-c300-[7.2,8.2]
Events / hour
0
1
2
3
4
0
0.2
0.4
0.6
0.8
1
P[p]min (GeV)