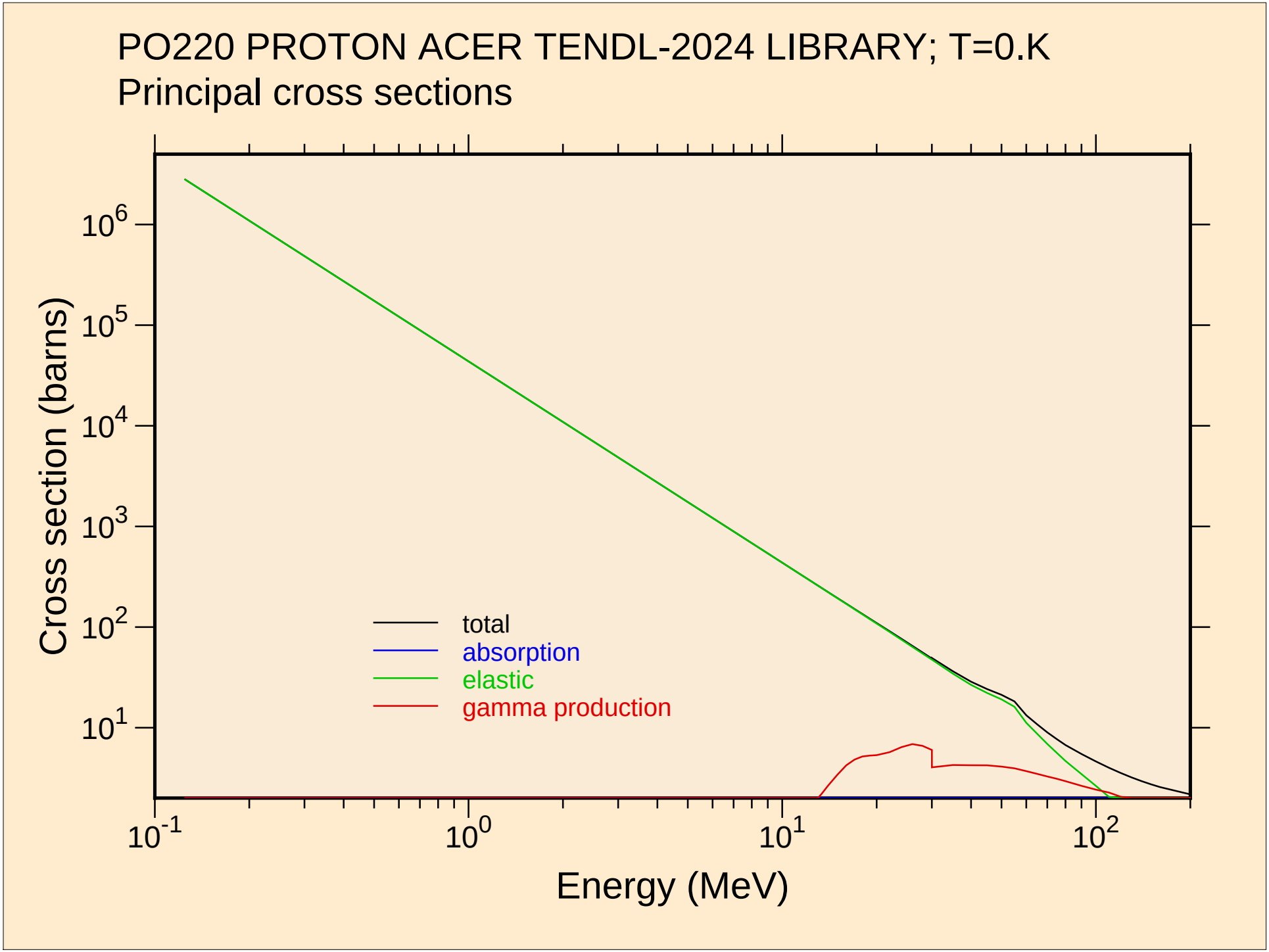
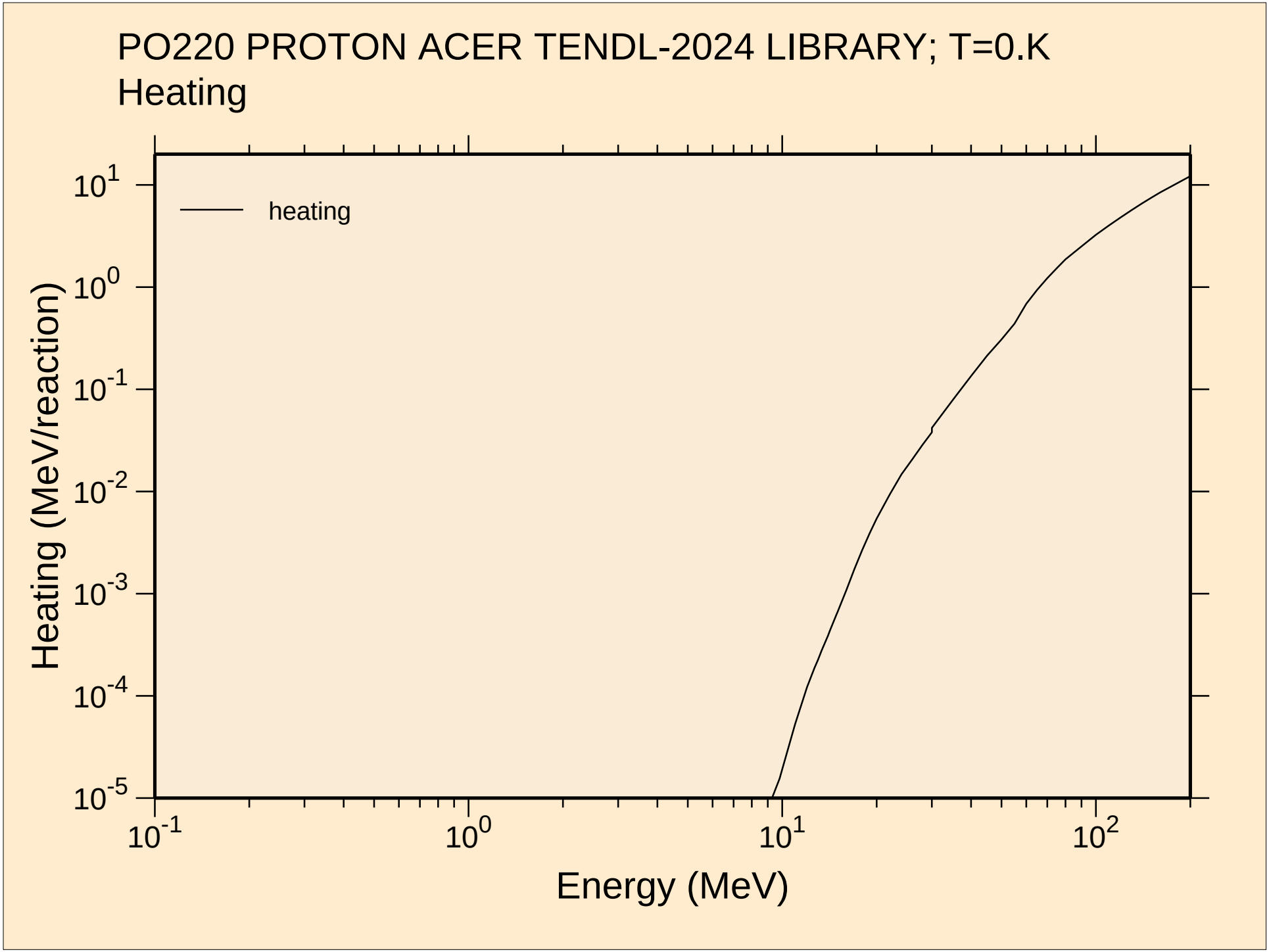
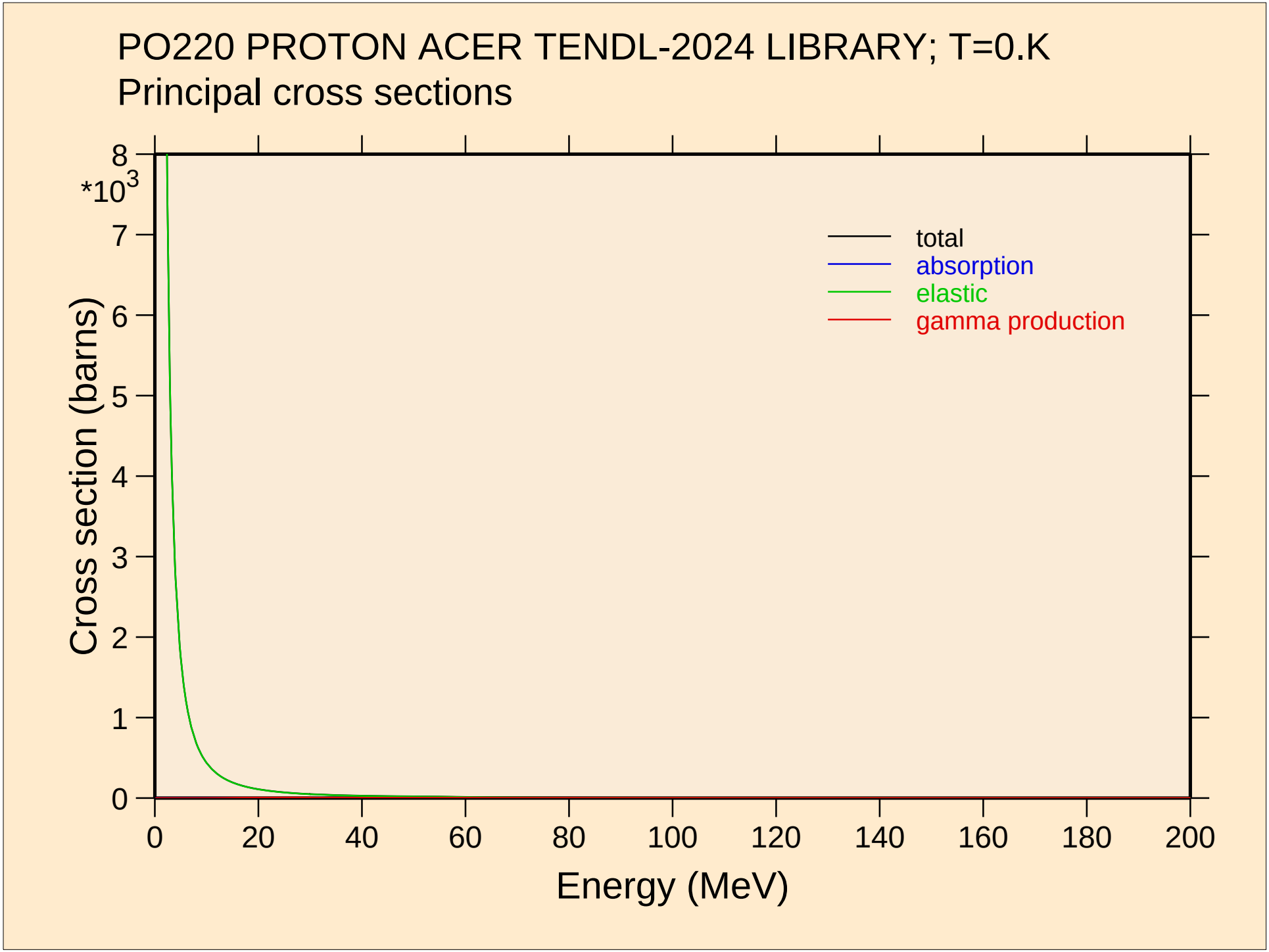
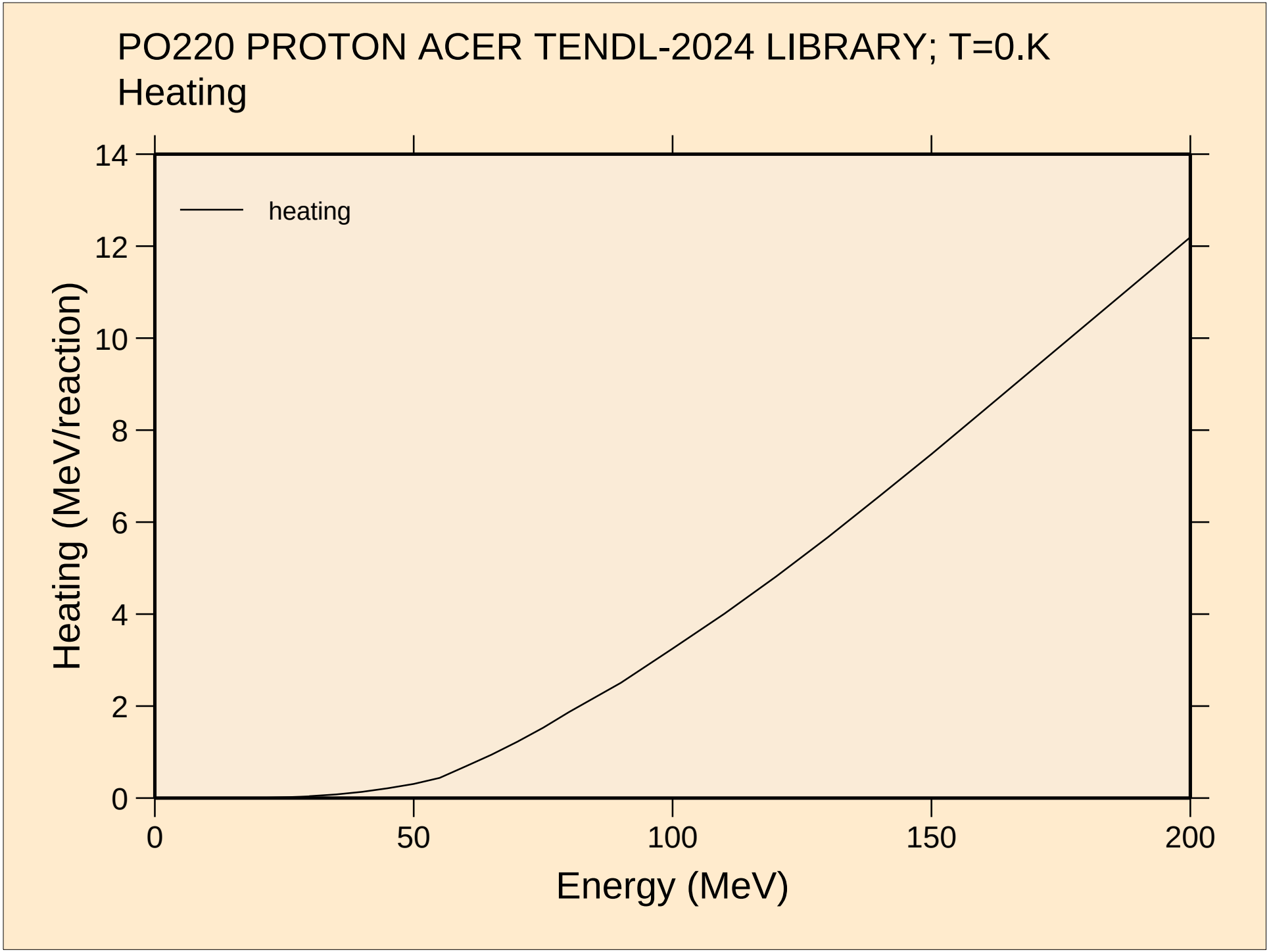
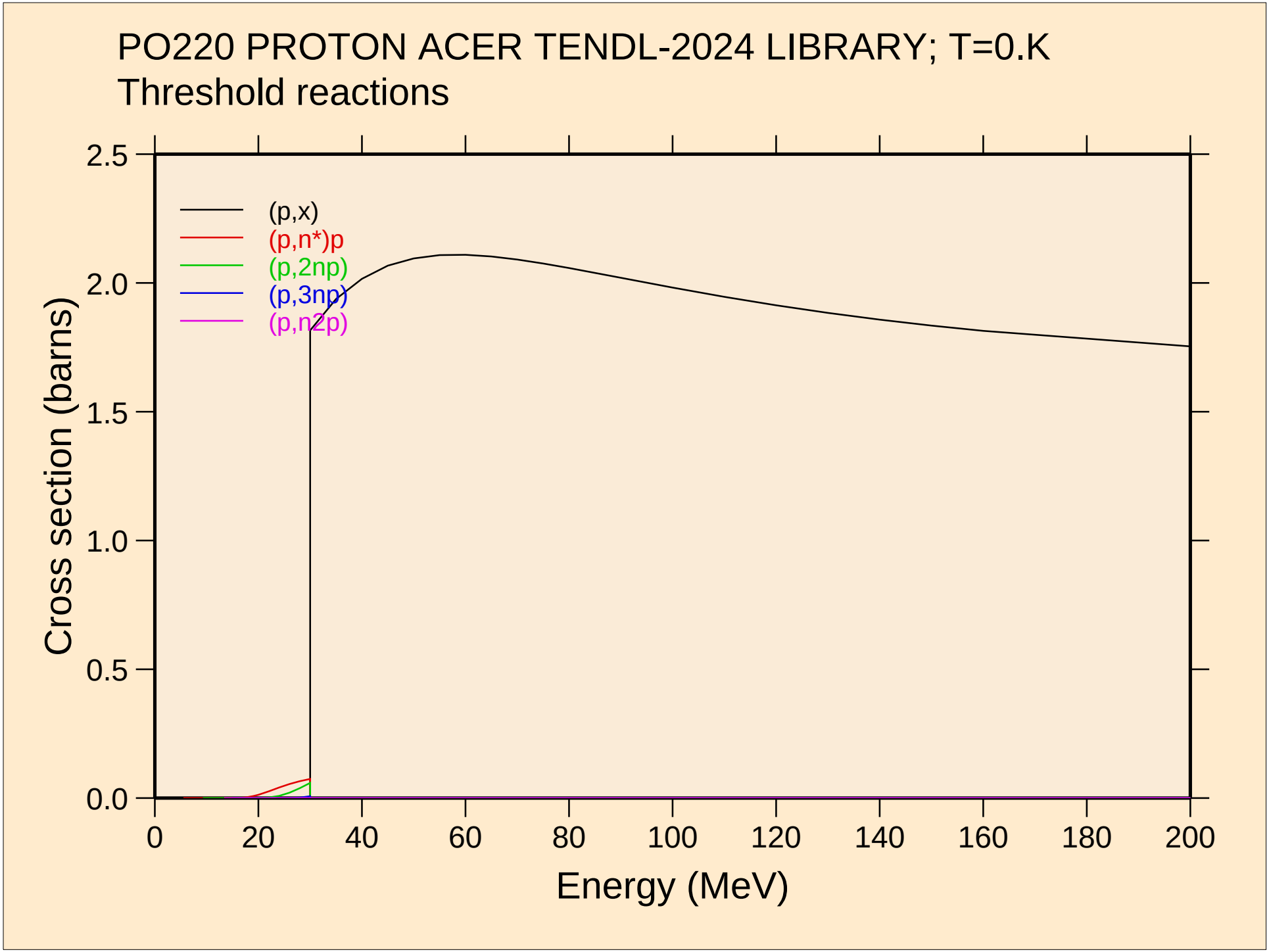
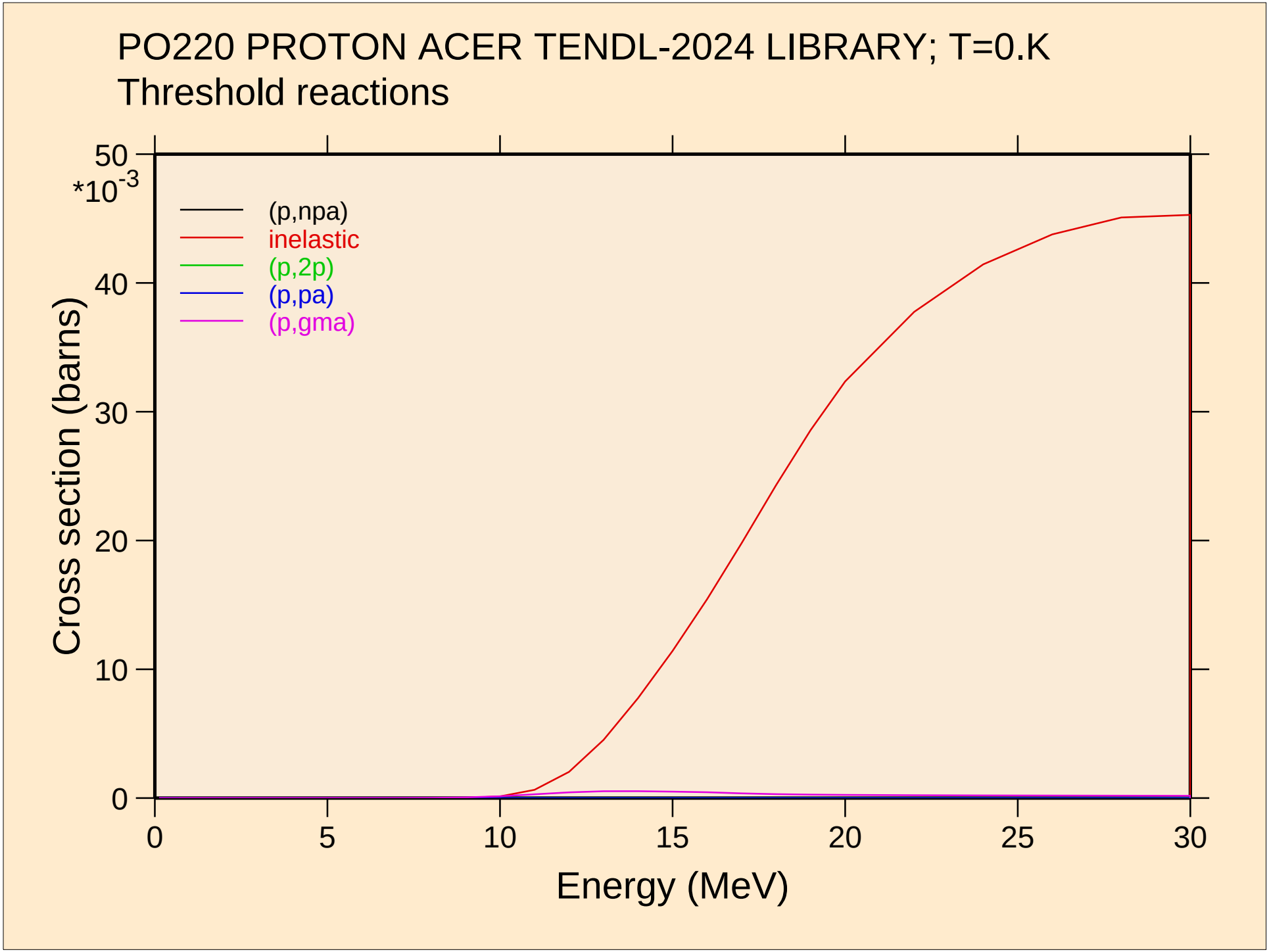

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production

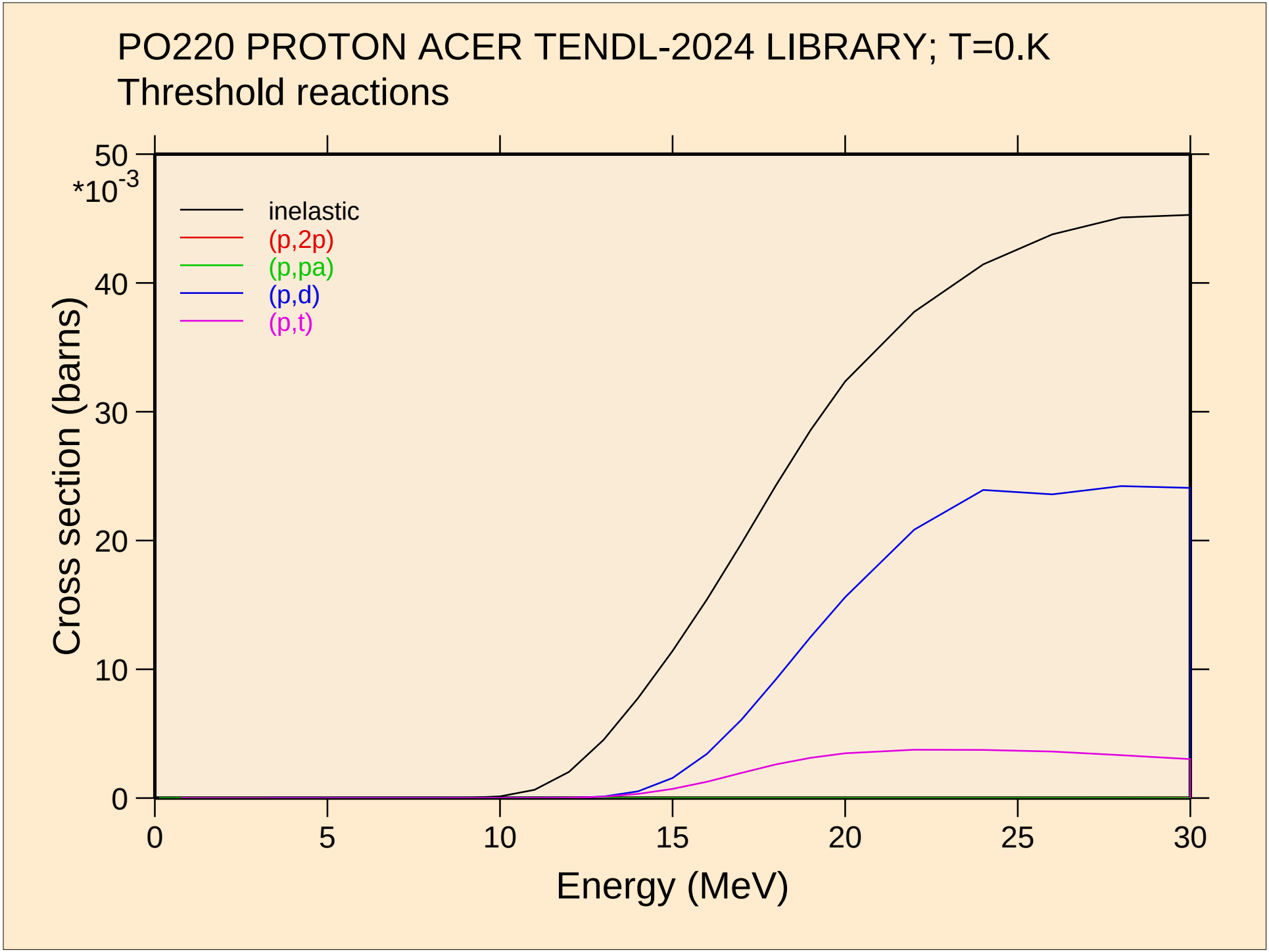

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-1}
10^{0}
10^{1}
10^{2}

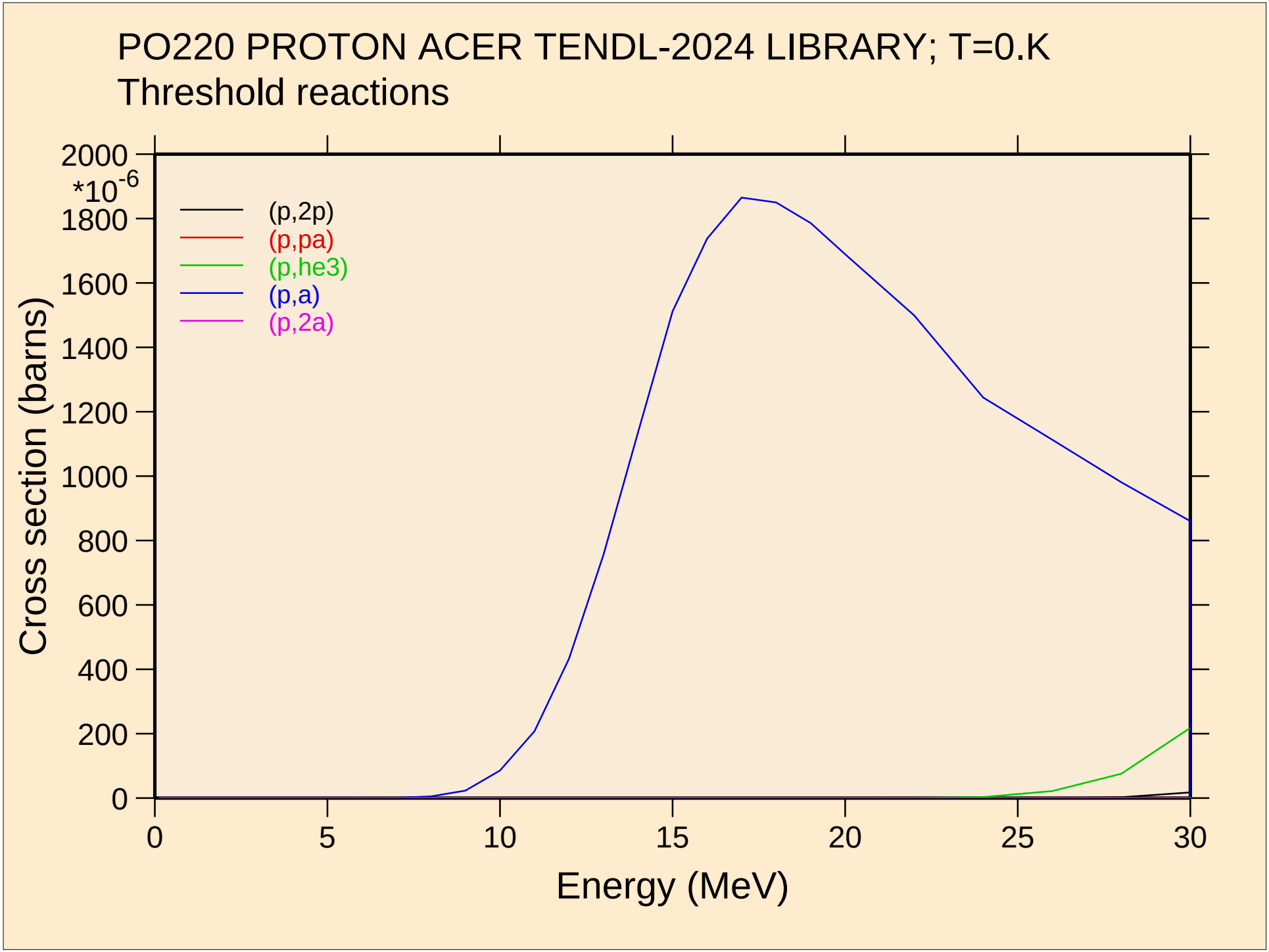

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Principal cross sections
Cross section (barns)
*10^3
8
7
6
5
4
3
2
1
0
0
20
40
60
80
100
120
140
160
180
200
Energy (MeV)
total
absorption
elastic
gamma production

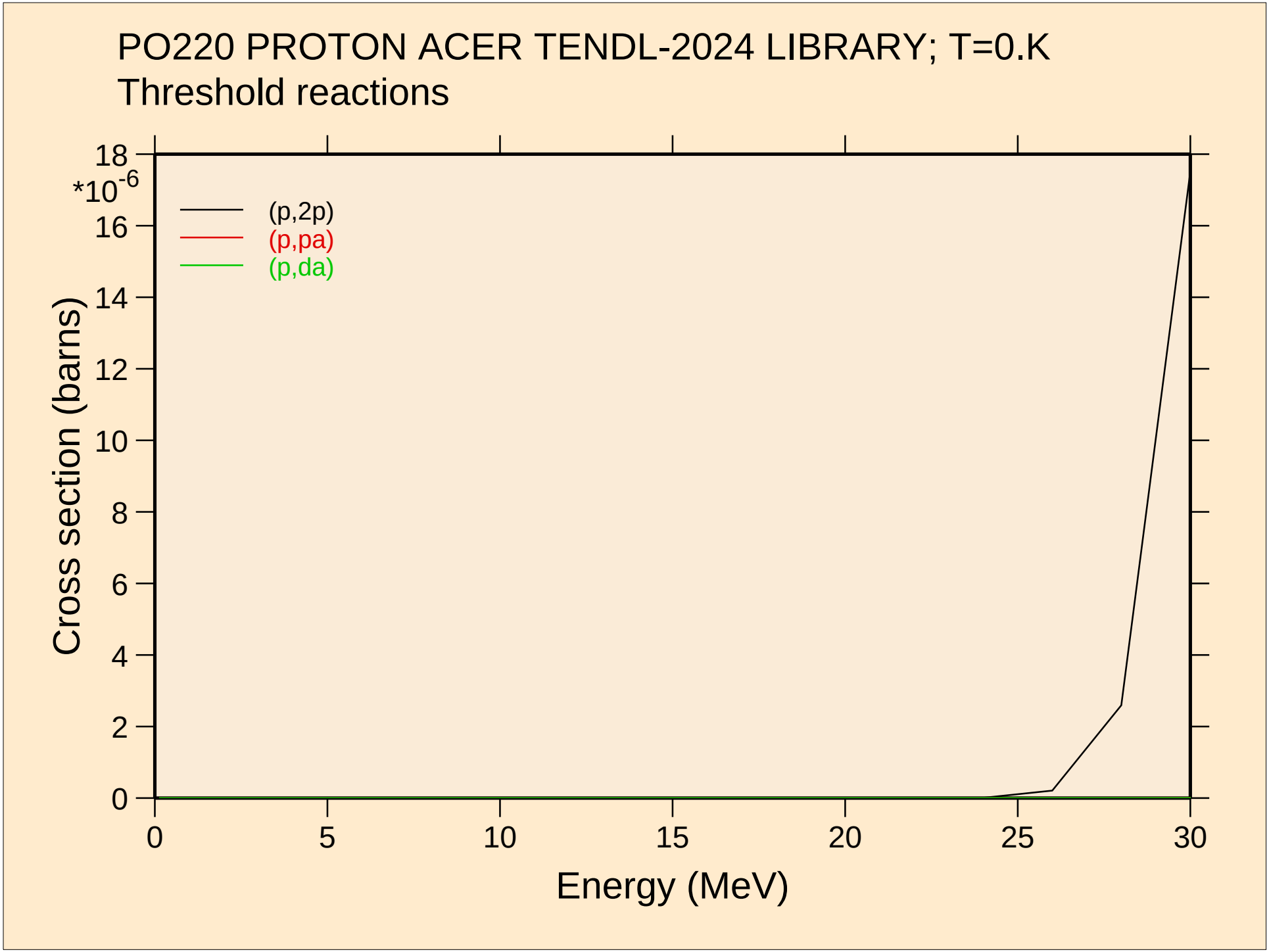

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
0
2
4
6
8
10
12
14
0
50
100
150
200

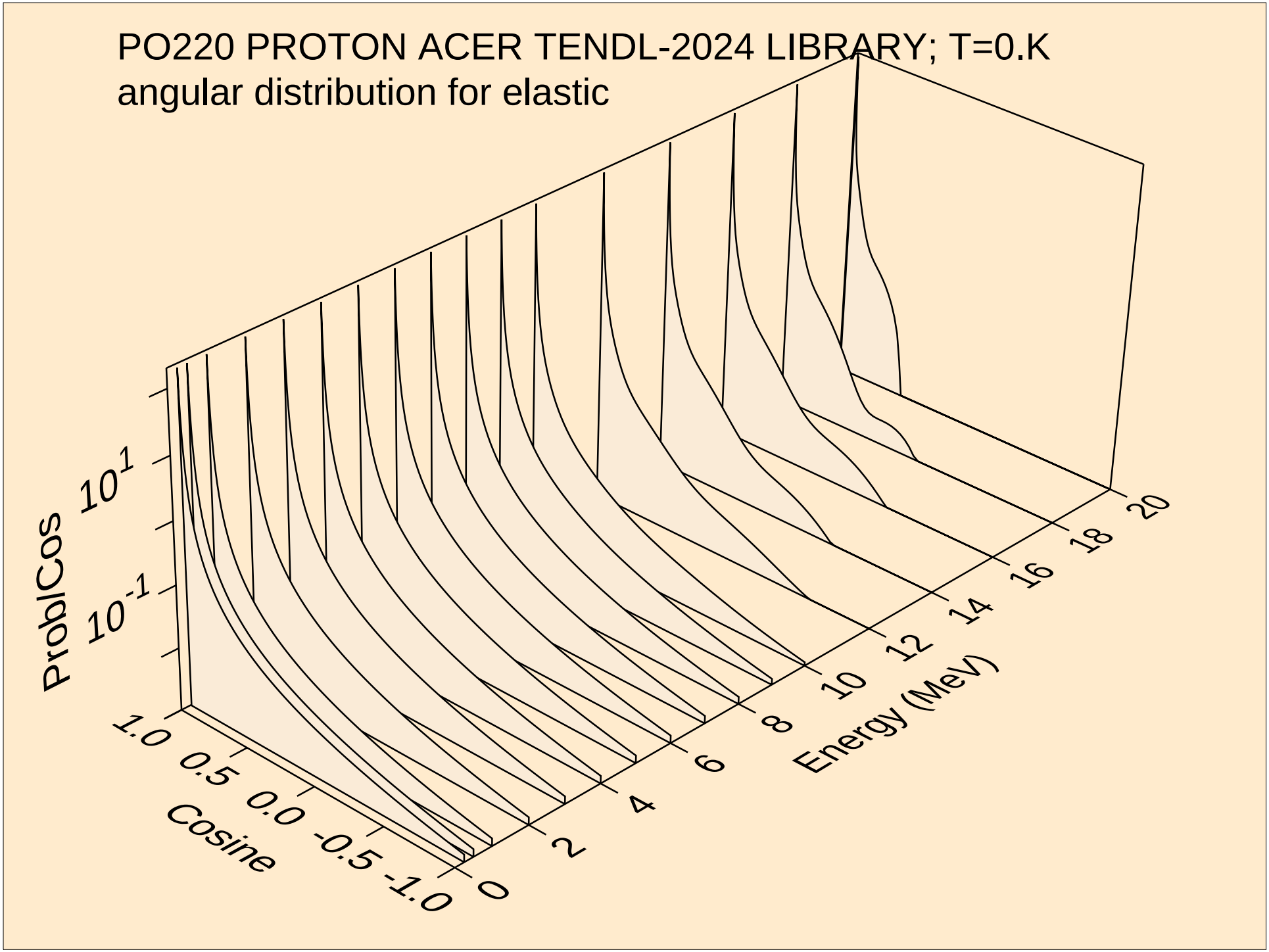

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Threshold reactions
(p,x)
(p,n*)p
(p,2np)
(p,3np)
(p,n2p)
Cross section (barns)
Energy (MeV)
0.0
0.5
1.0
1.5
2.0
2.5
0
20
40
60
80
100
120
140
160
180
200

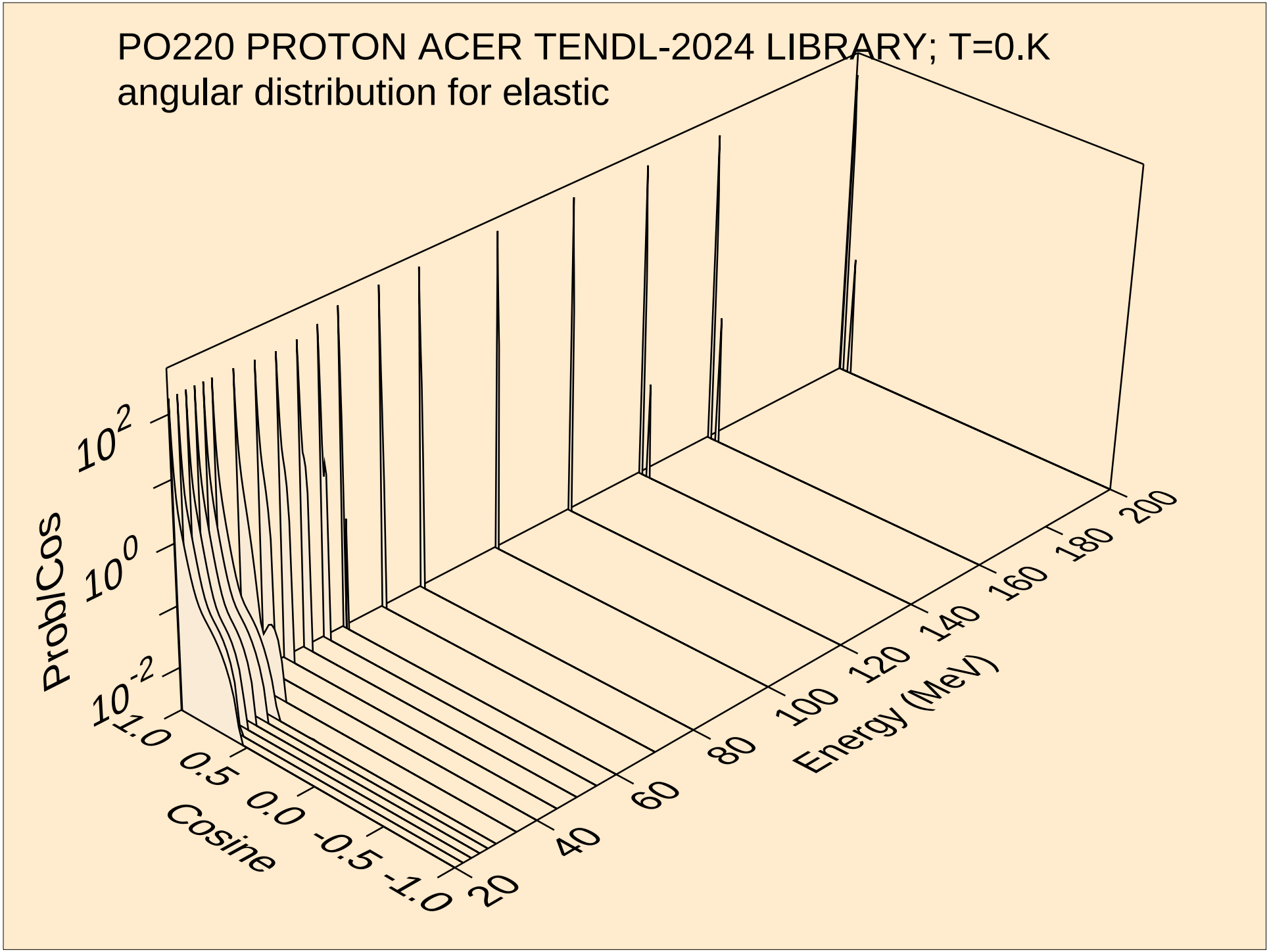

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Threshold reactions
*10-3
(p,npa)
inelastic
(p,2p)
(p,pa)
(p,gma)
Cross section (barns)
Energy (MeV)
0
10
20
30
40
50
0
5
10
15
20
25
30

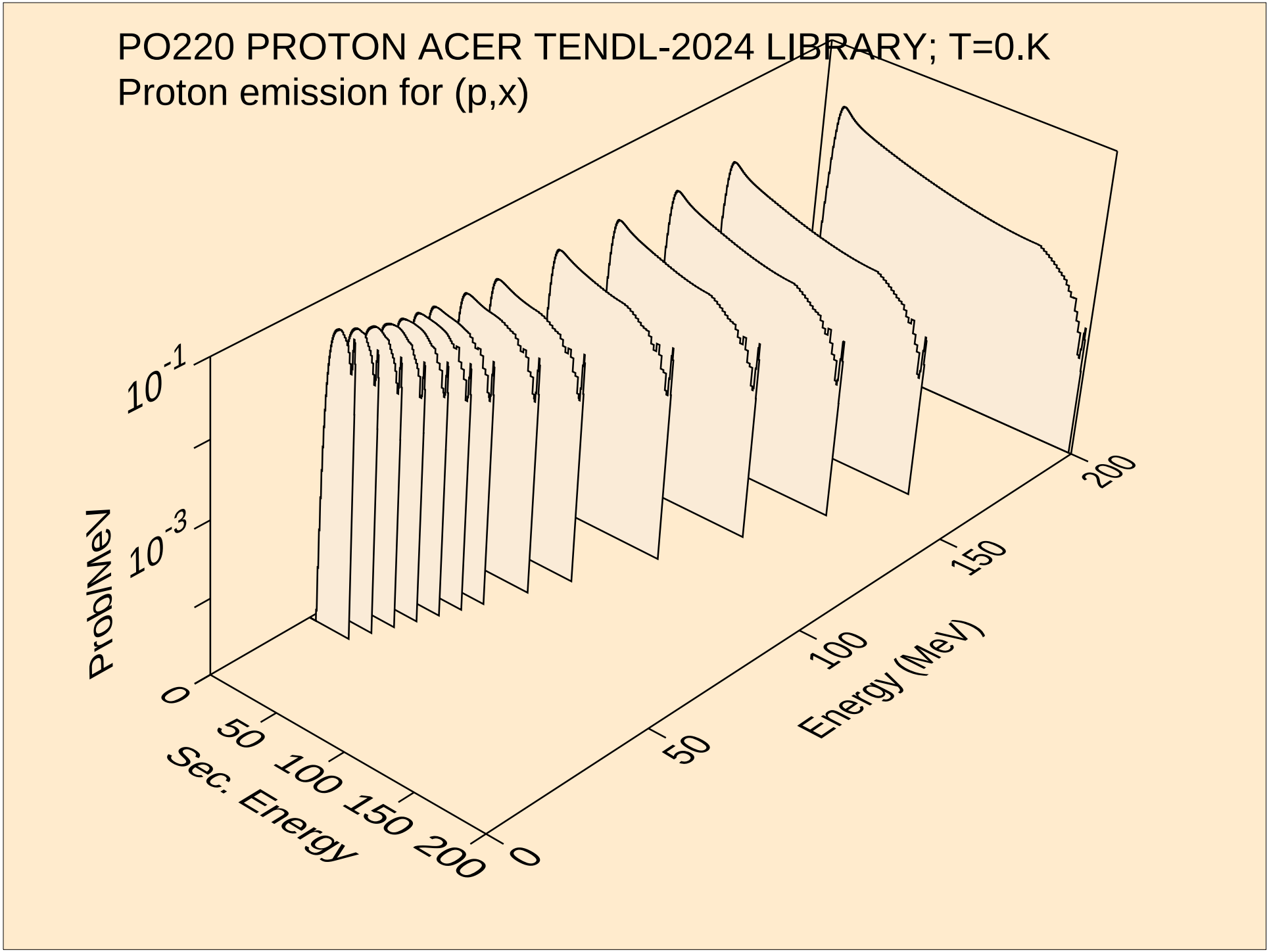

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Threshold reactions
*10-3
inelastic
(p,2p)
(p,pa)
(p,d)
(p,t)
Cross section (barns)
Energy (MeV)
0
10
20
30
40
50
0
5
10
15
20
25
30

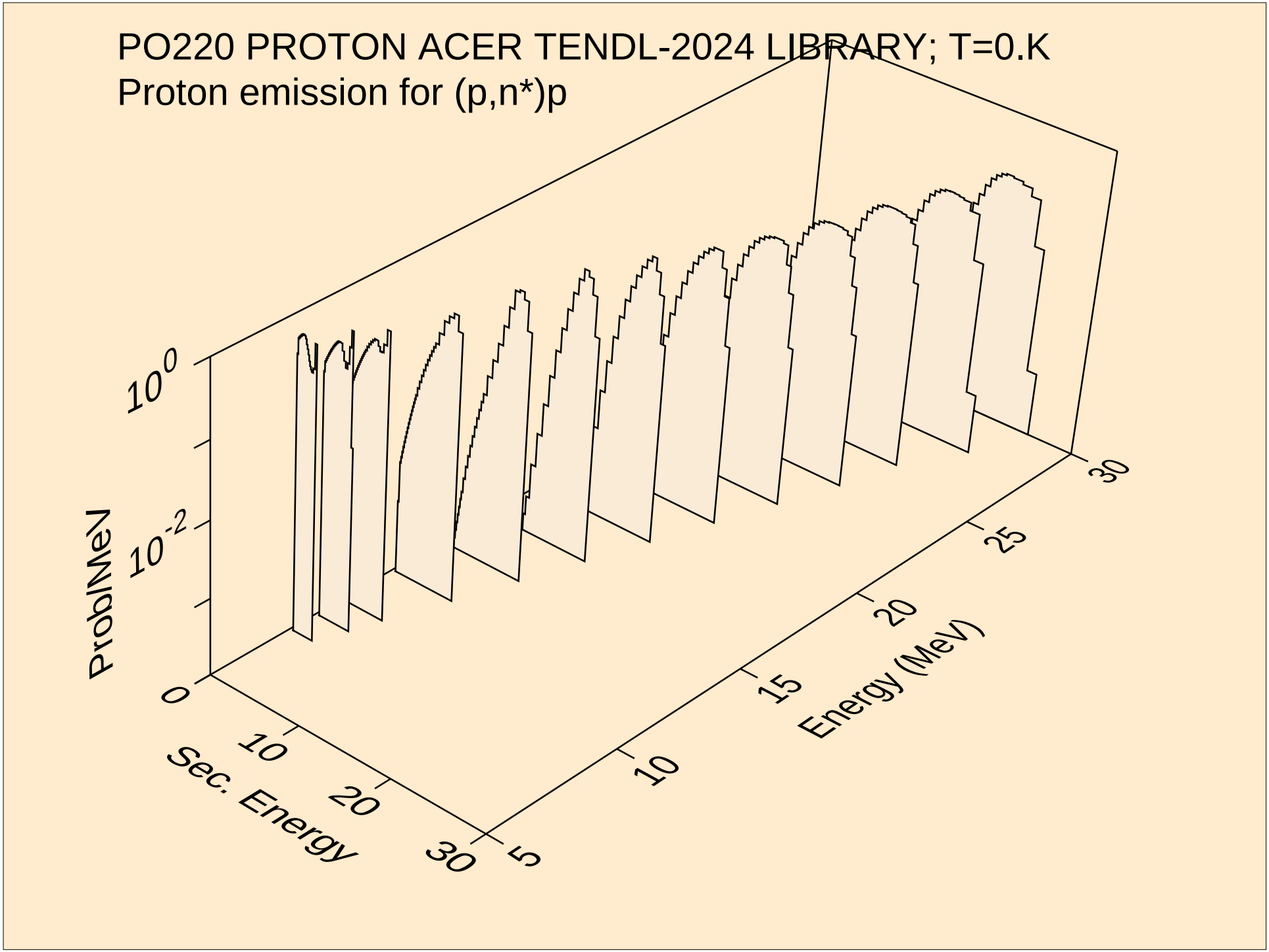

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Threshold reactions
*10^-6
(p,2p)
(p,pa)
(p,he3)
(p,a)
(p,2a)
Cross section (barns)
Energy (MeV)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
0
5
10
15
20
25
30

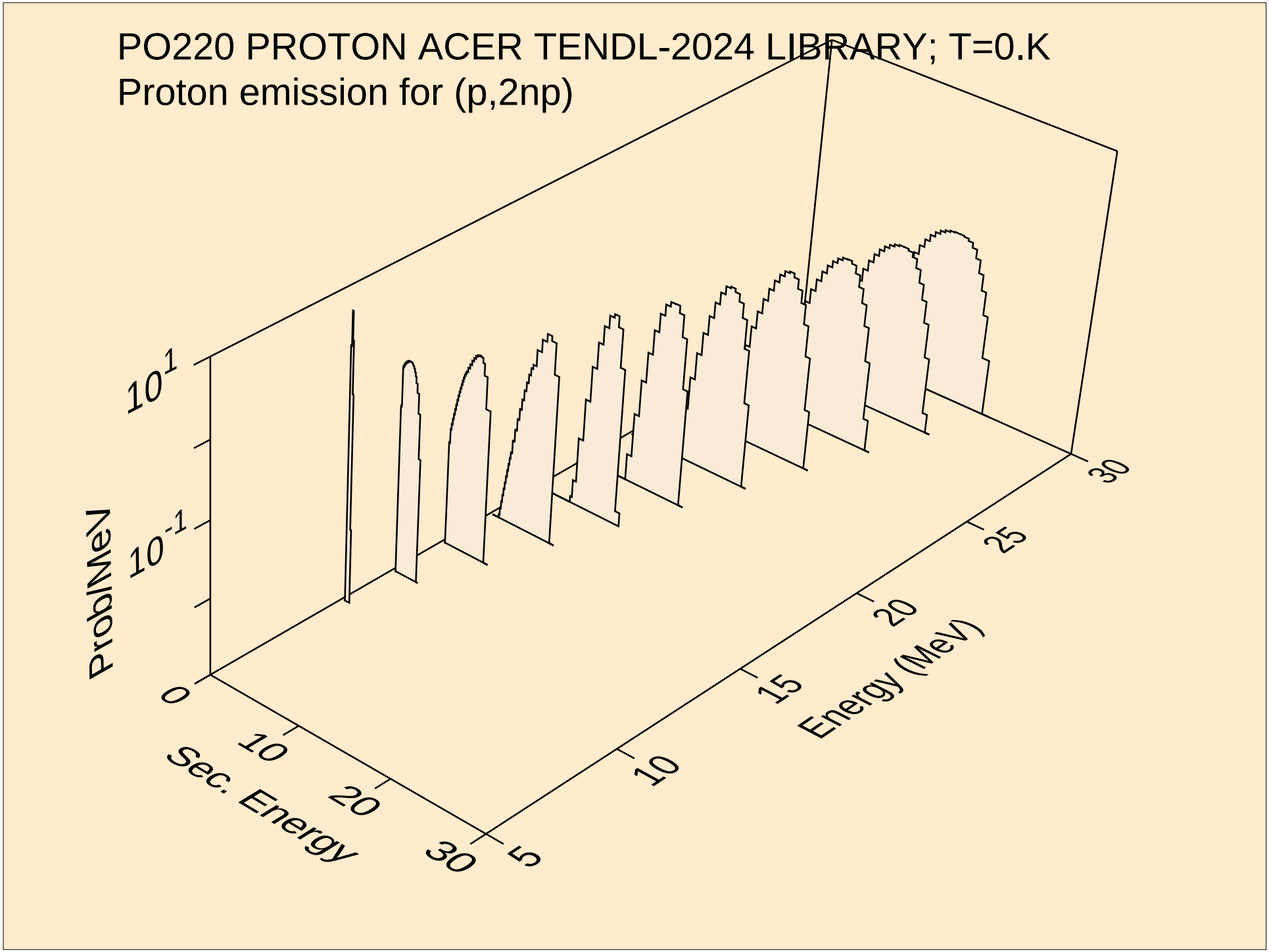

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Threshold reactions
*10-6
(p,2p)
(p,pa)
(p,da)
Cross section (barns)
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
0
5
10
15
20
25
30

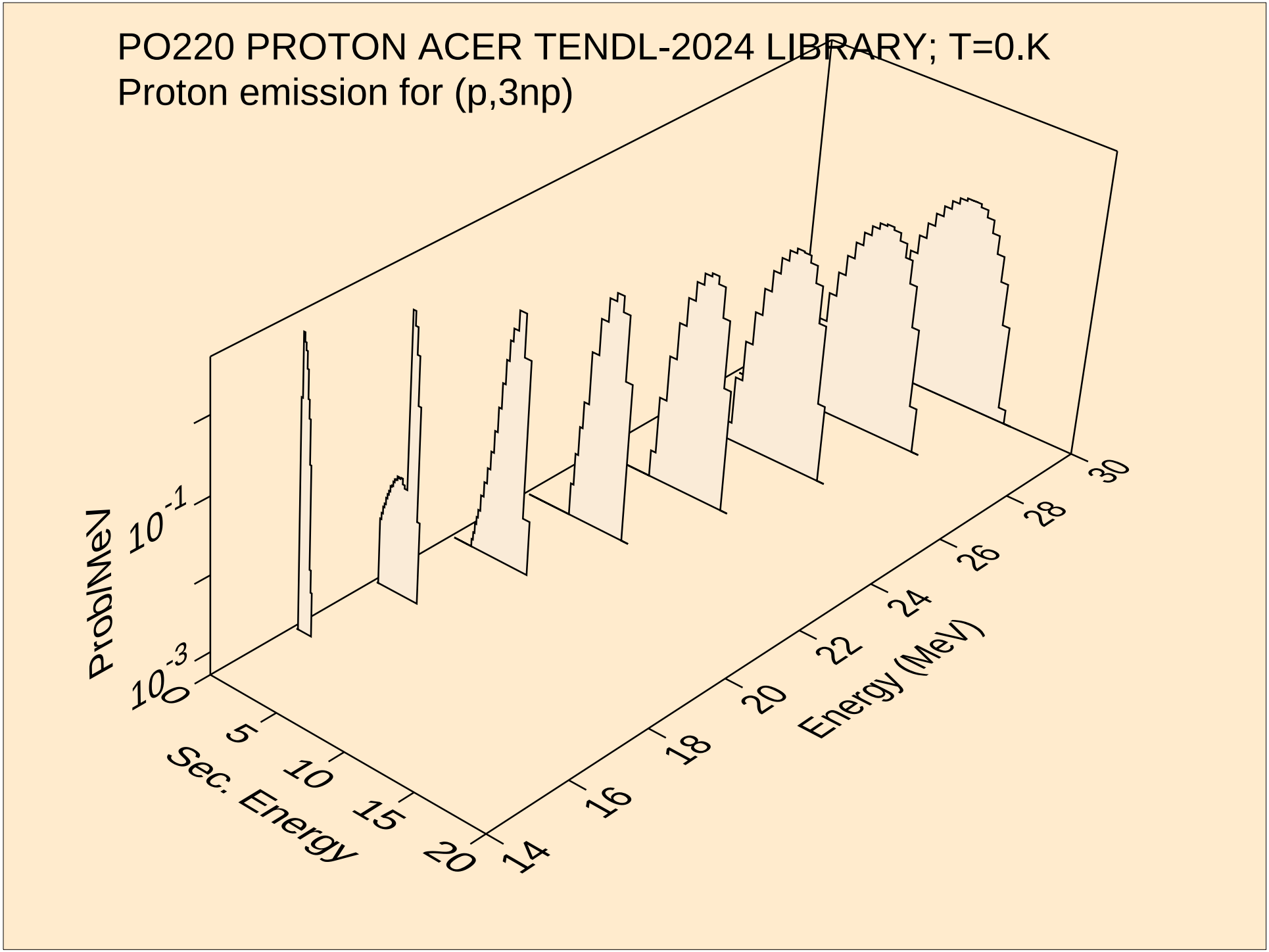

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
angular distribution for elastic
Prob/Cos
10^{1}
10^{-1}
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

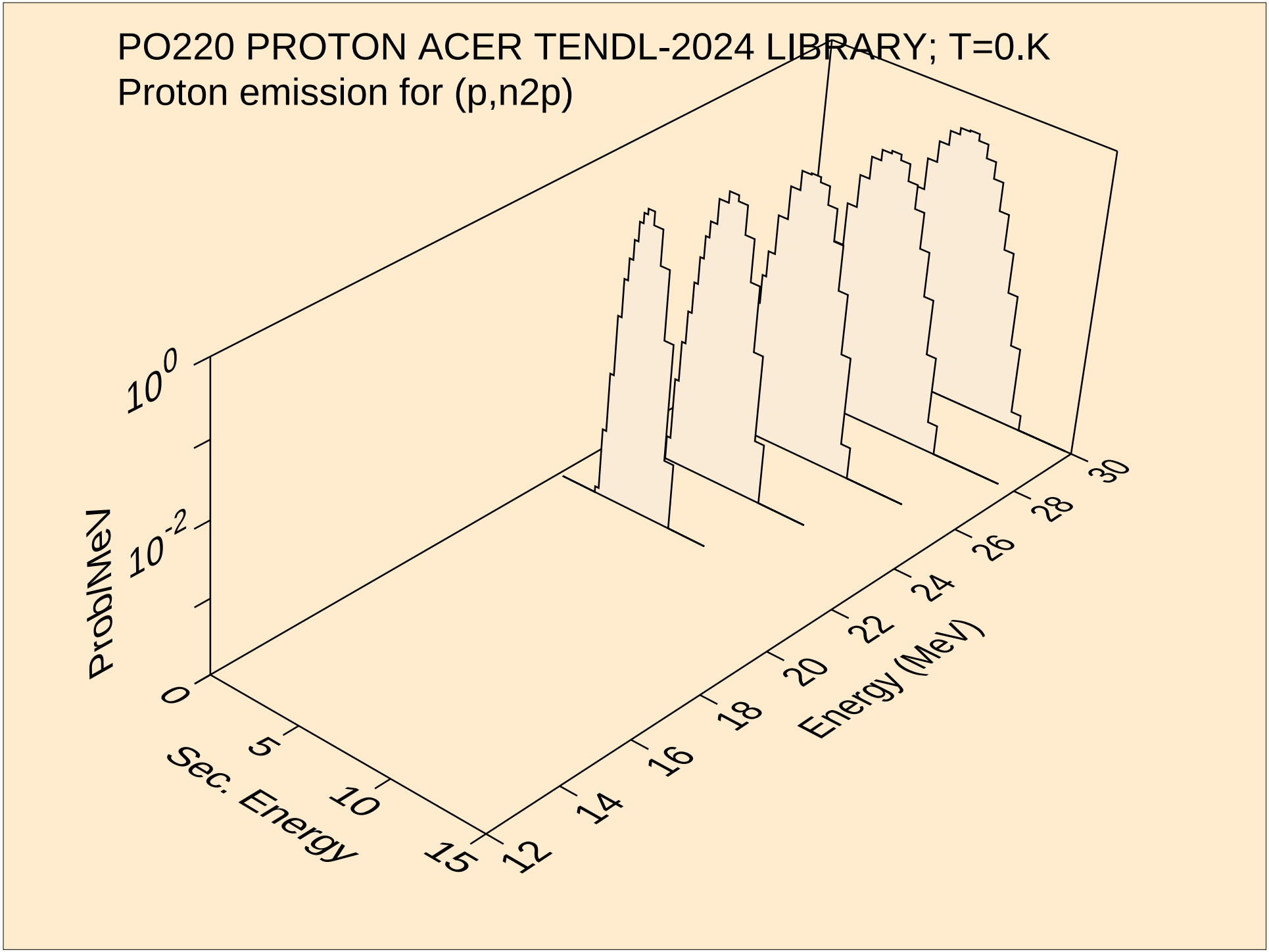

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
angular distribution for elastic
ProbCos
10^{2}
10^{0}
10^{-2}
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
20
40
60
80
100
120
140
160
180
200

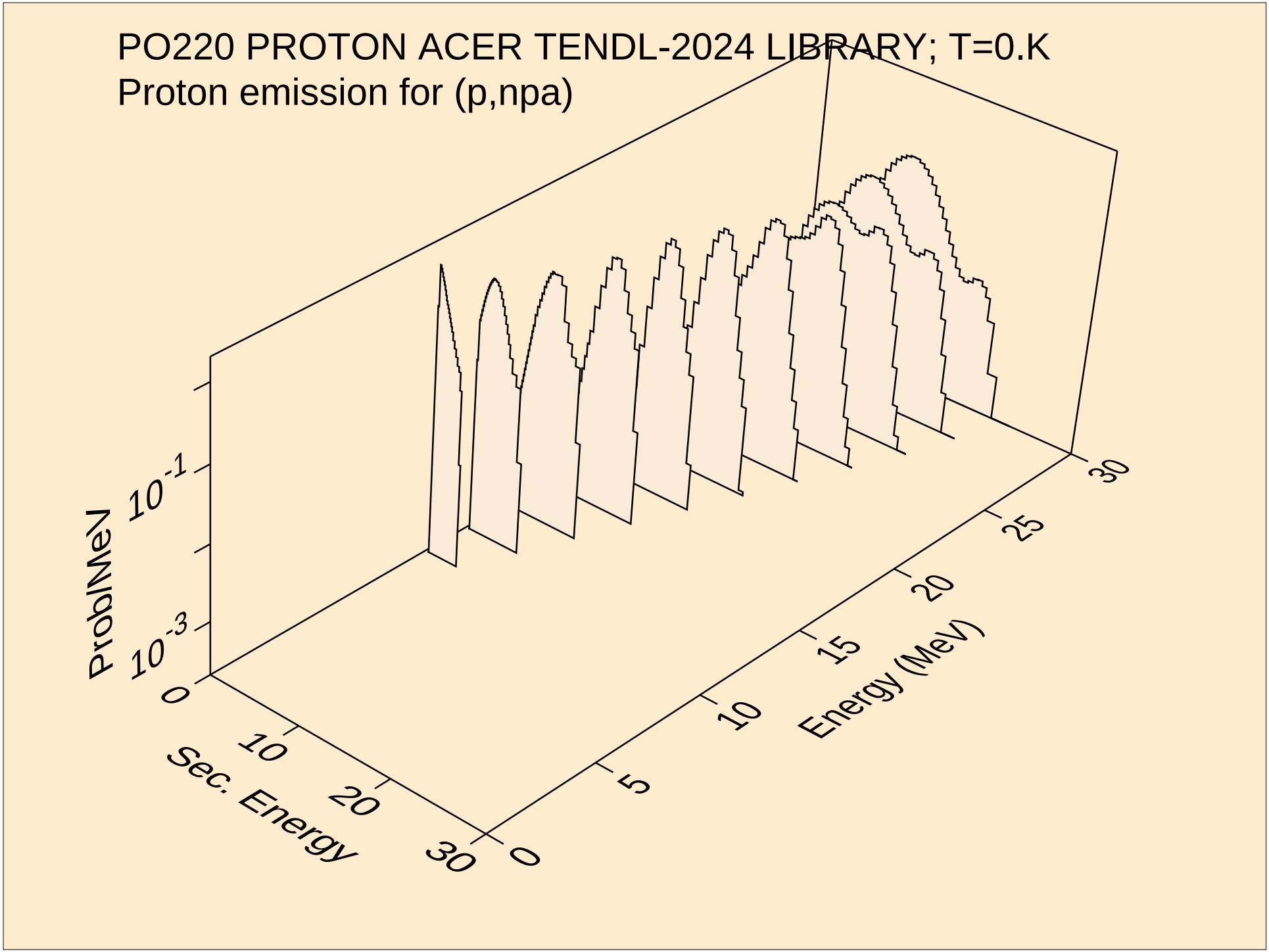

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Proton emission for (p,x)
Prob/MeV
10-1
10-3
0
50
100
150
200
Sec. Energy
0
50
100
150
200
Energy (MeV)

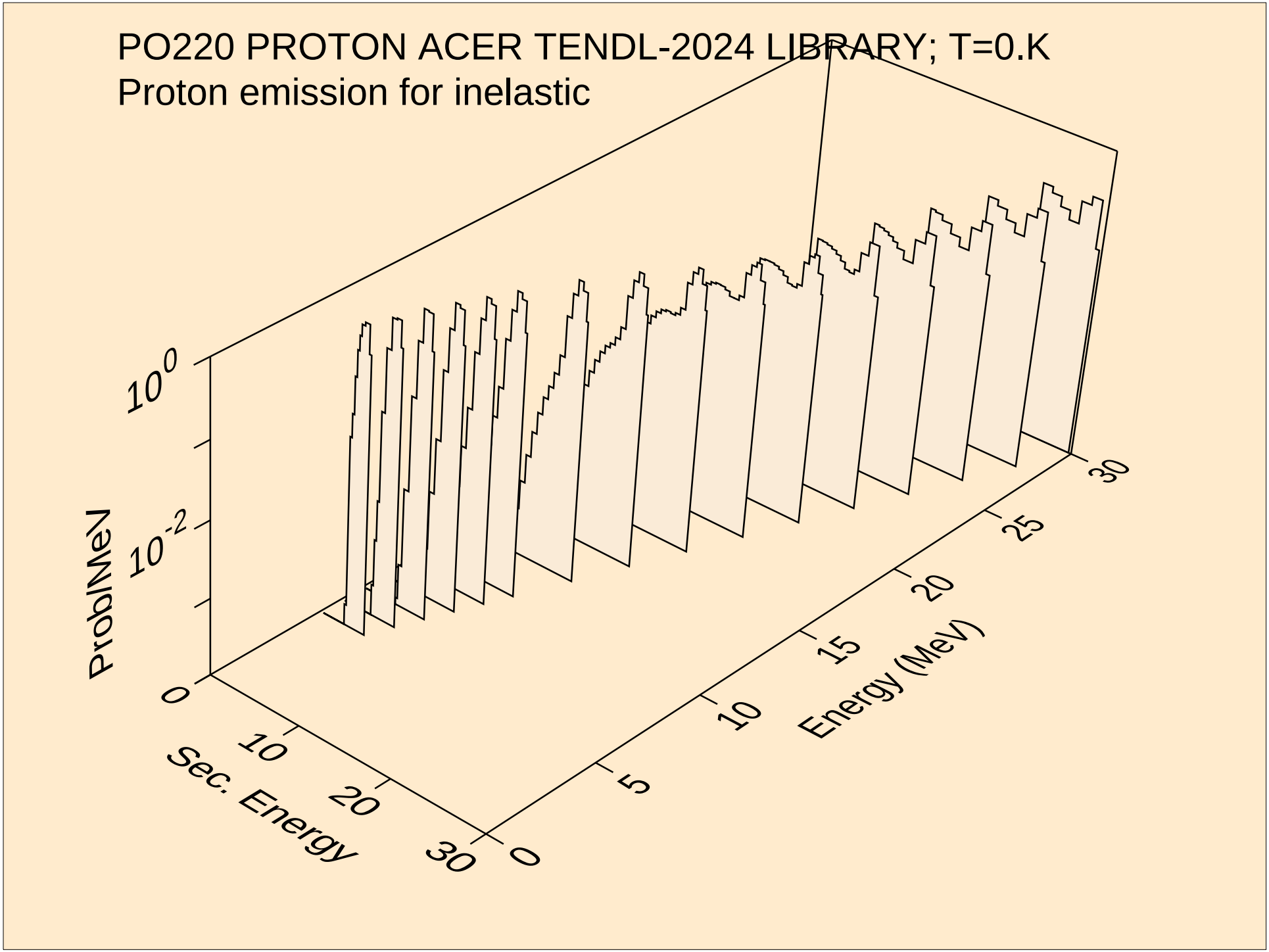

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Proton emission for (p,n*)p
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
10
20
30
Energy (MeV)
5
10
15
20
25
30

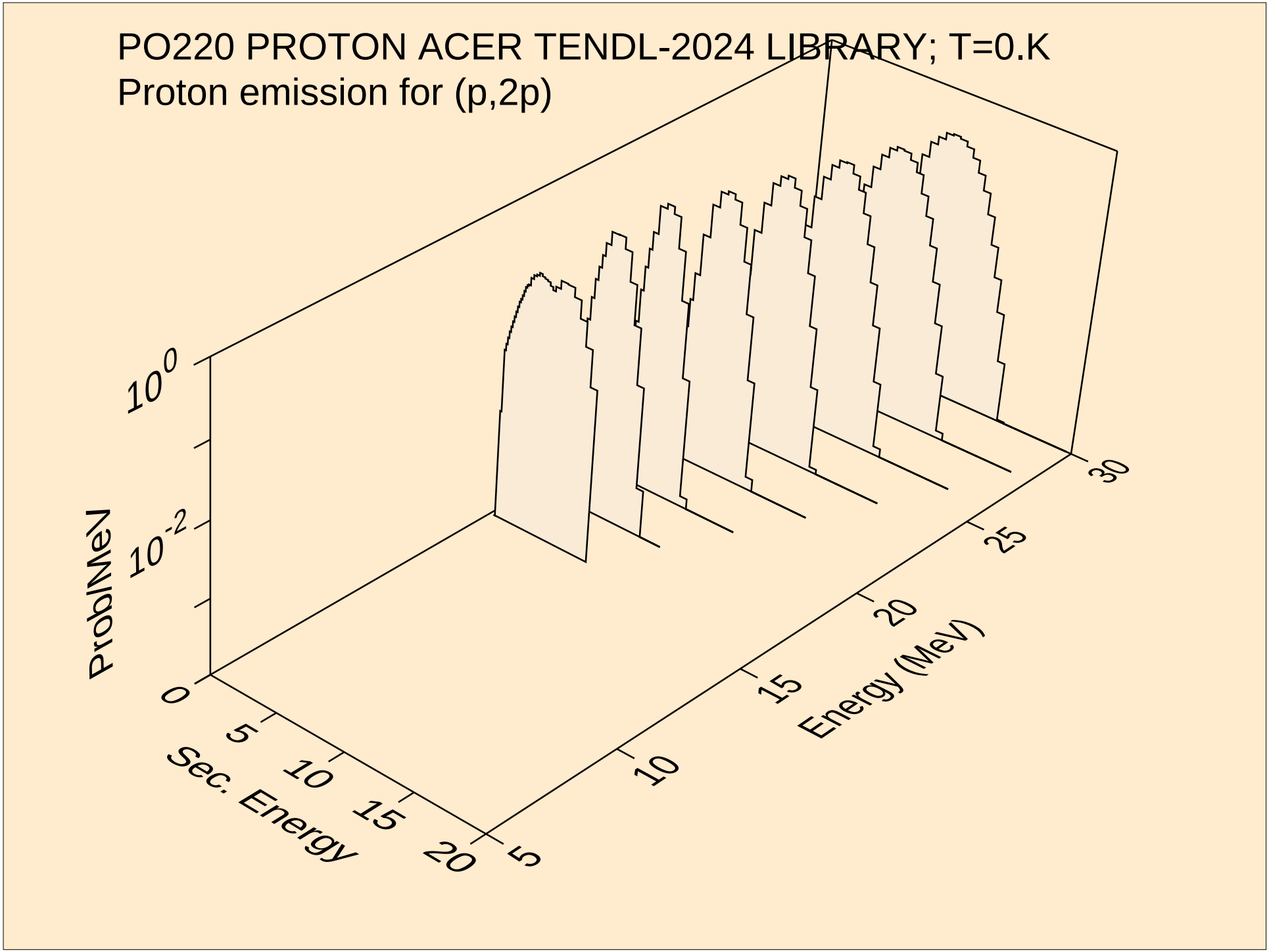

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Proton emission for (p,2np)
Prob/MeV
10^1
10^-1
0
Sec. Energy
10
20
30
Energy (MeV)
5
10
15
20
25
30

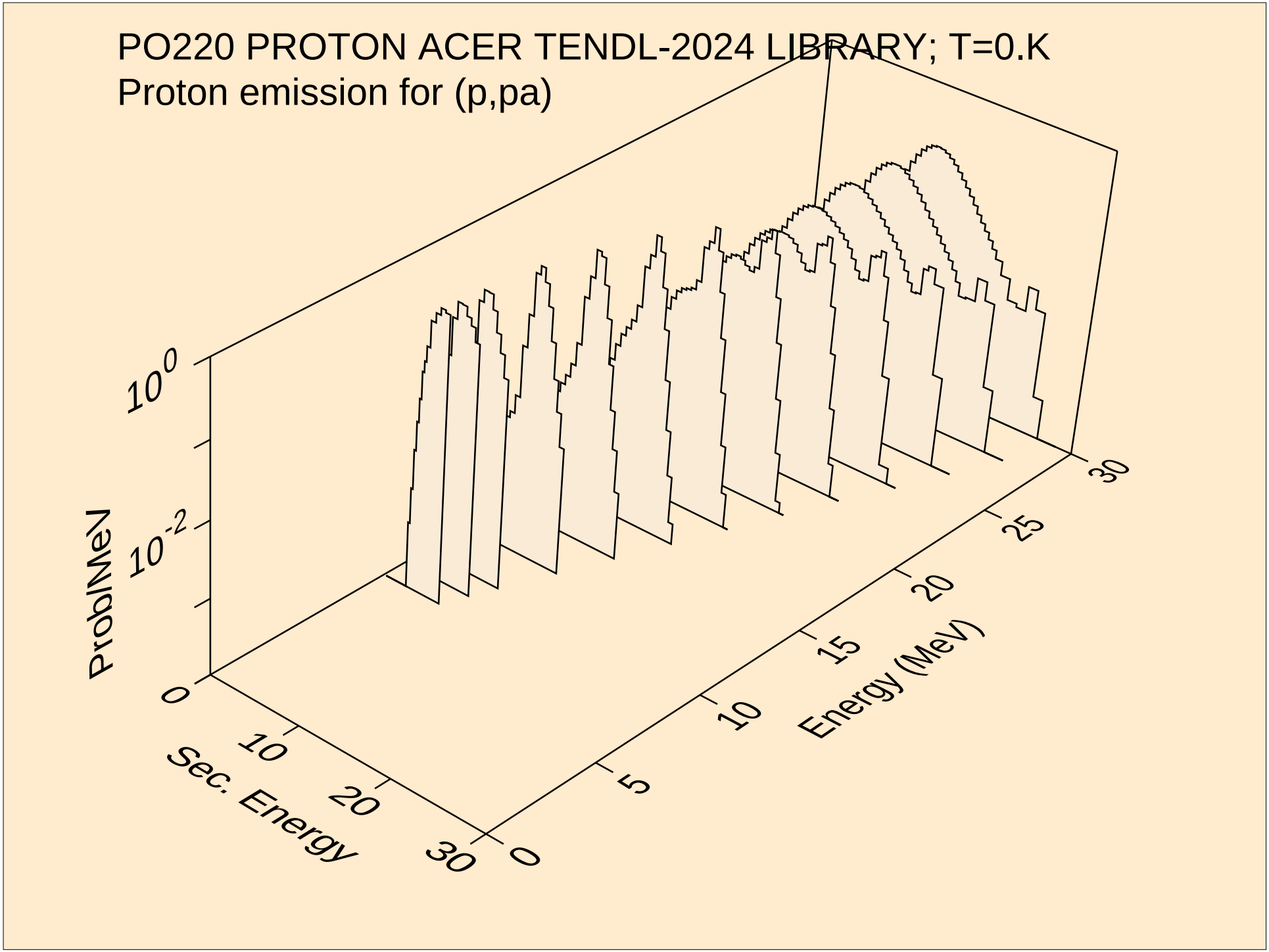

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Proton emission for (p,3np)
Prob/MeV
10^-1
10^-3
0
5
10
15
20
Sec. Energy
14
16
18
20
22
24
26
28
30
Energy (MeV)

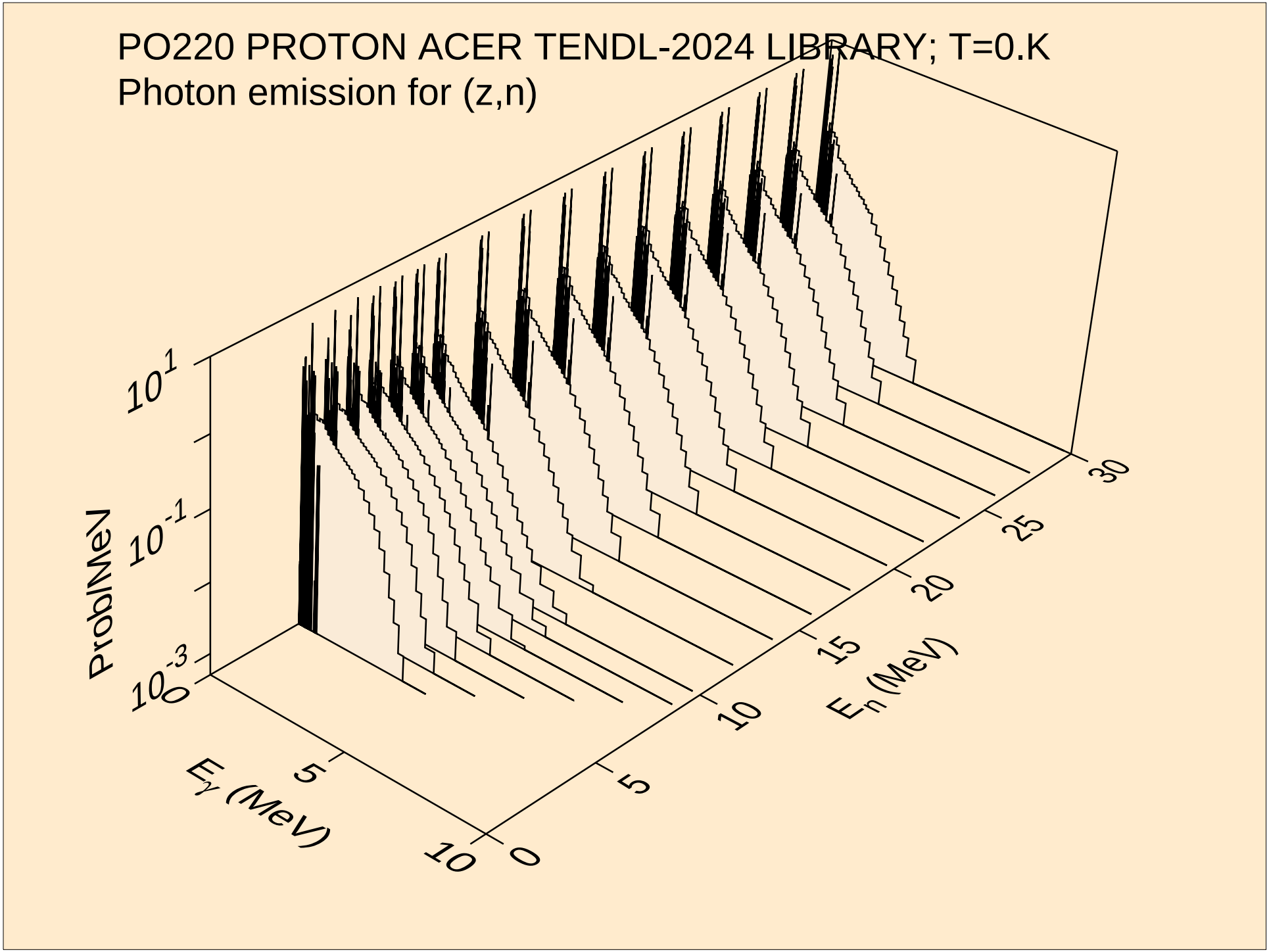

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Proton emission for (p,n2p)
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
5
10
15
Energy (MeV)
12
14
16
18
20
22
24
26
28
30


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Proton emission for (p,npa)
Prob/MeV
10-1
10-3
0
10
20
30
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

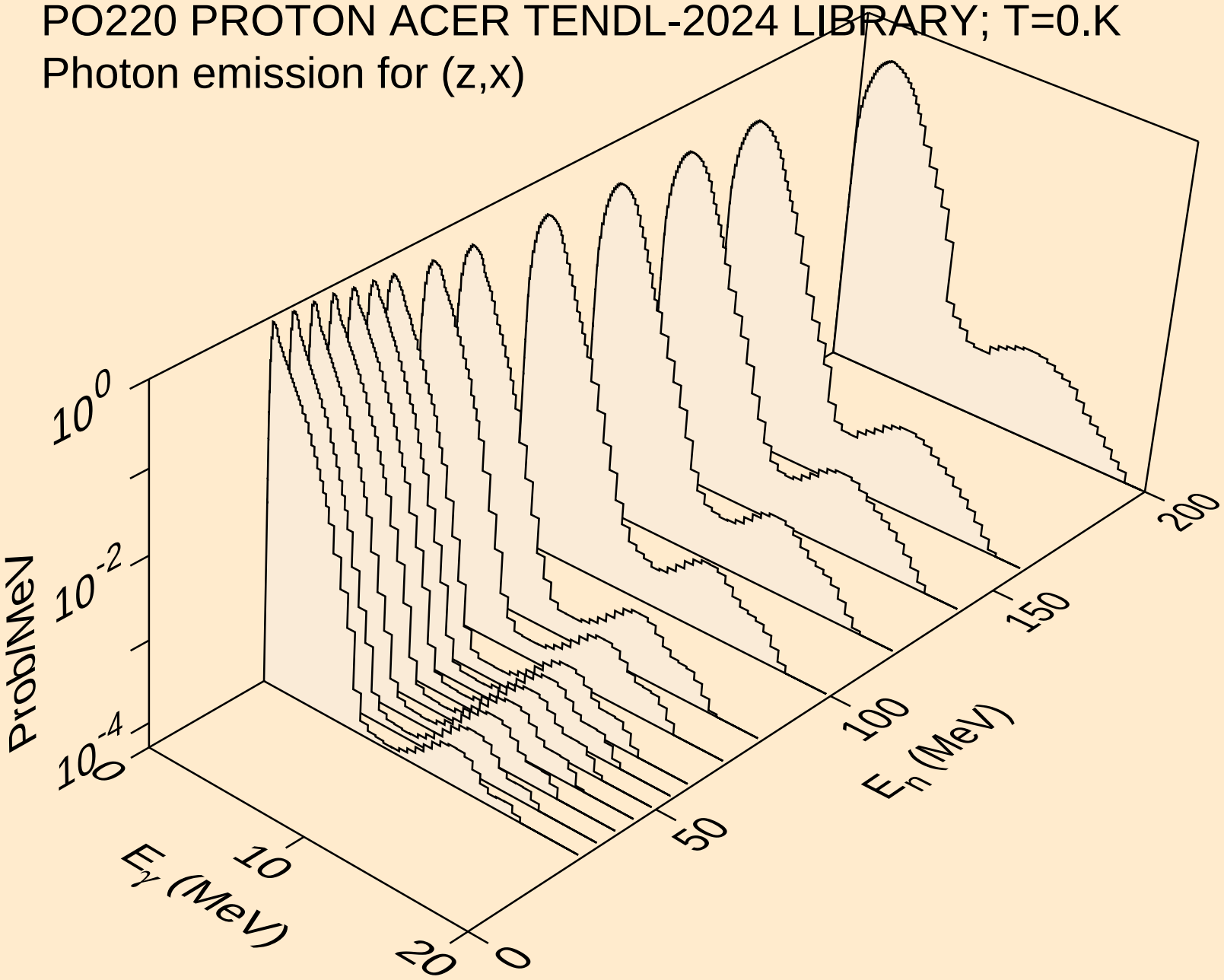

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Proton emission for inelastic
Prob/MeV
10^0
10^{-2}
0
10
20
30
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Proton emission for (p,2p)
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
5
10
15
20
Energy (MeV)
5
10
15
20
25
30

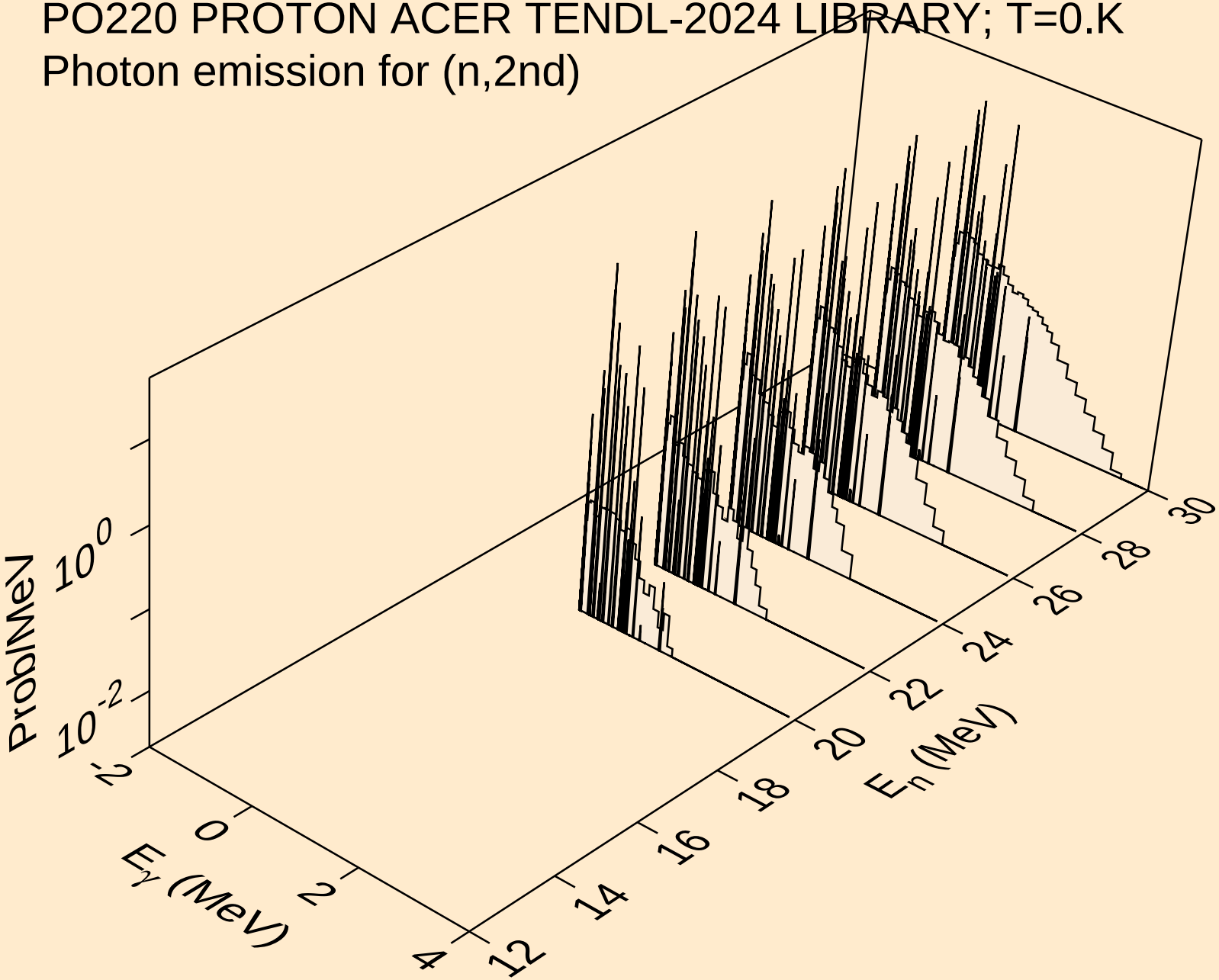

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Proton emission for (p,pa)
Prob/MeV
10^0
10^{-2}
0
10
20
30
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

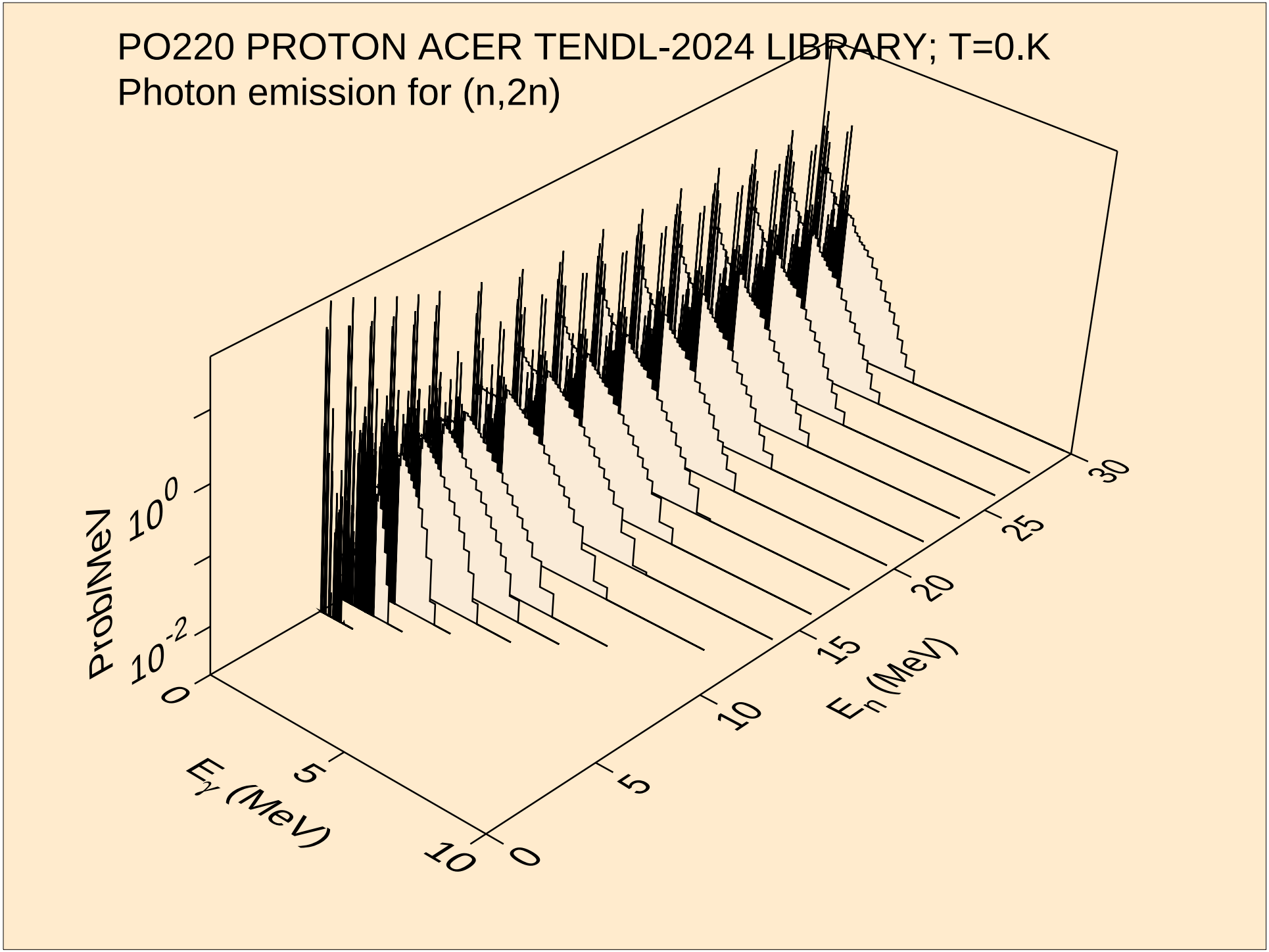

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (z,n)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
E_γ (MeV)
0
5
10
E_n (MeV)
0
5
10
15
20
25
30

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (z,x)

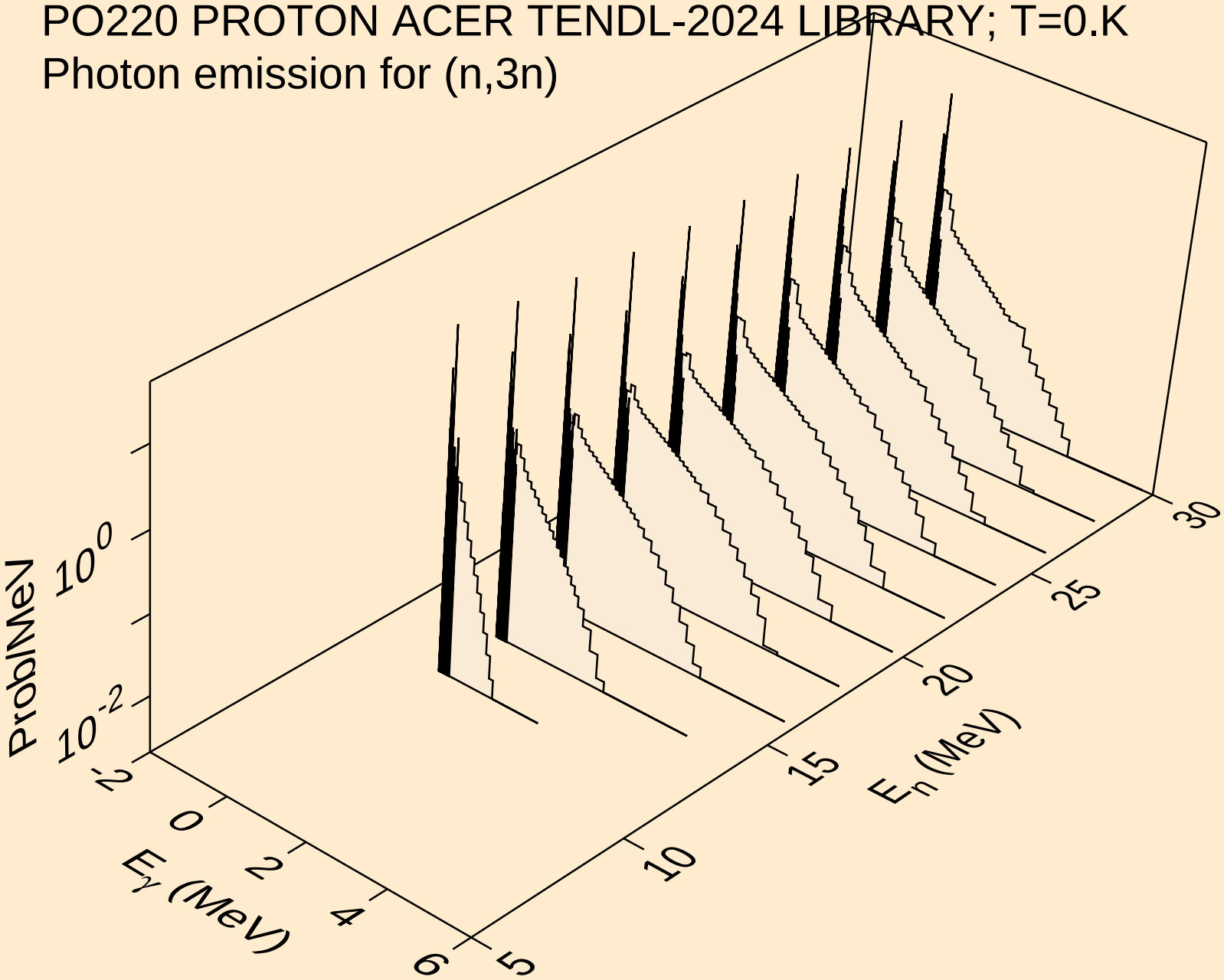


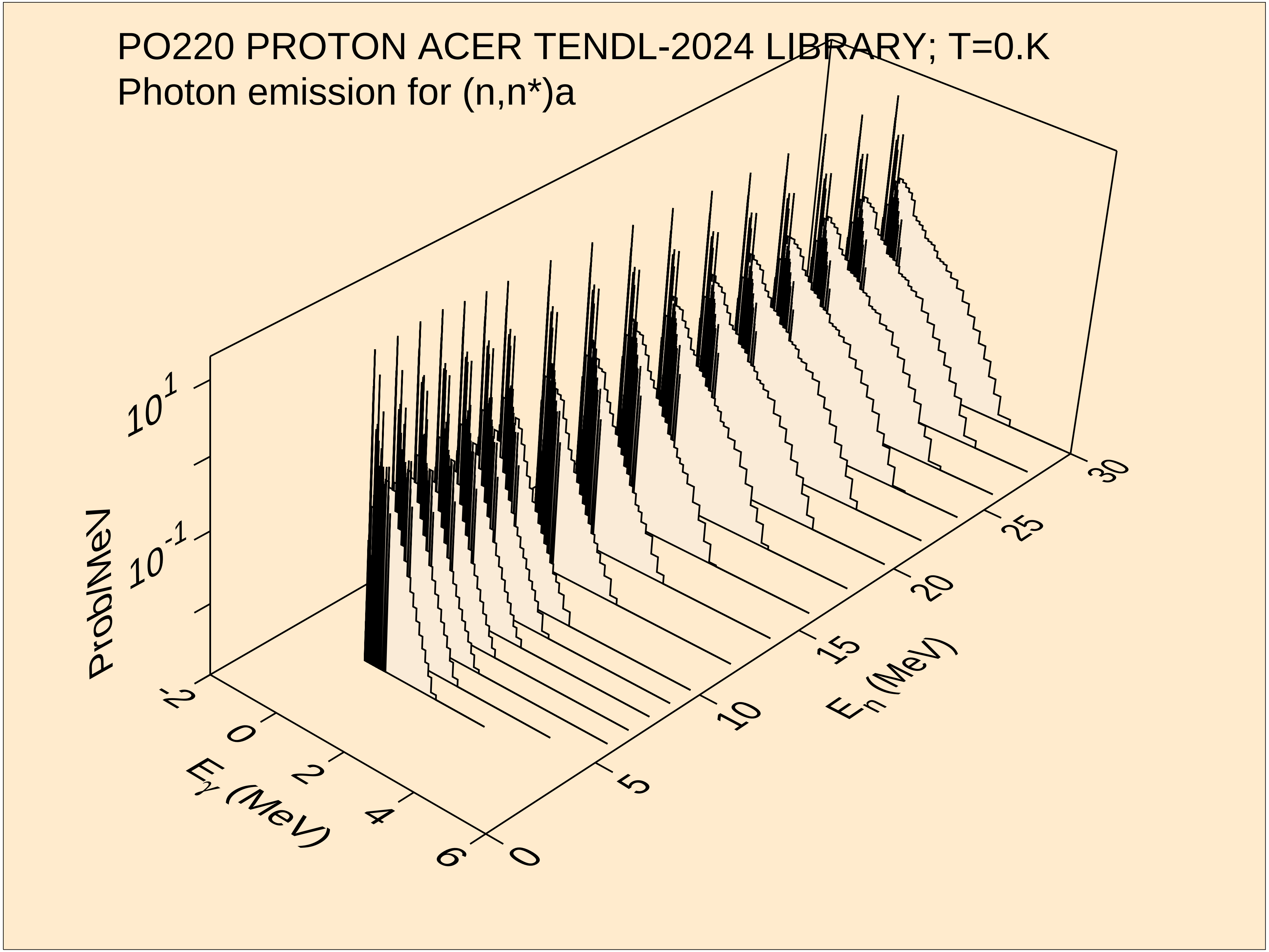
PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,2nd)



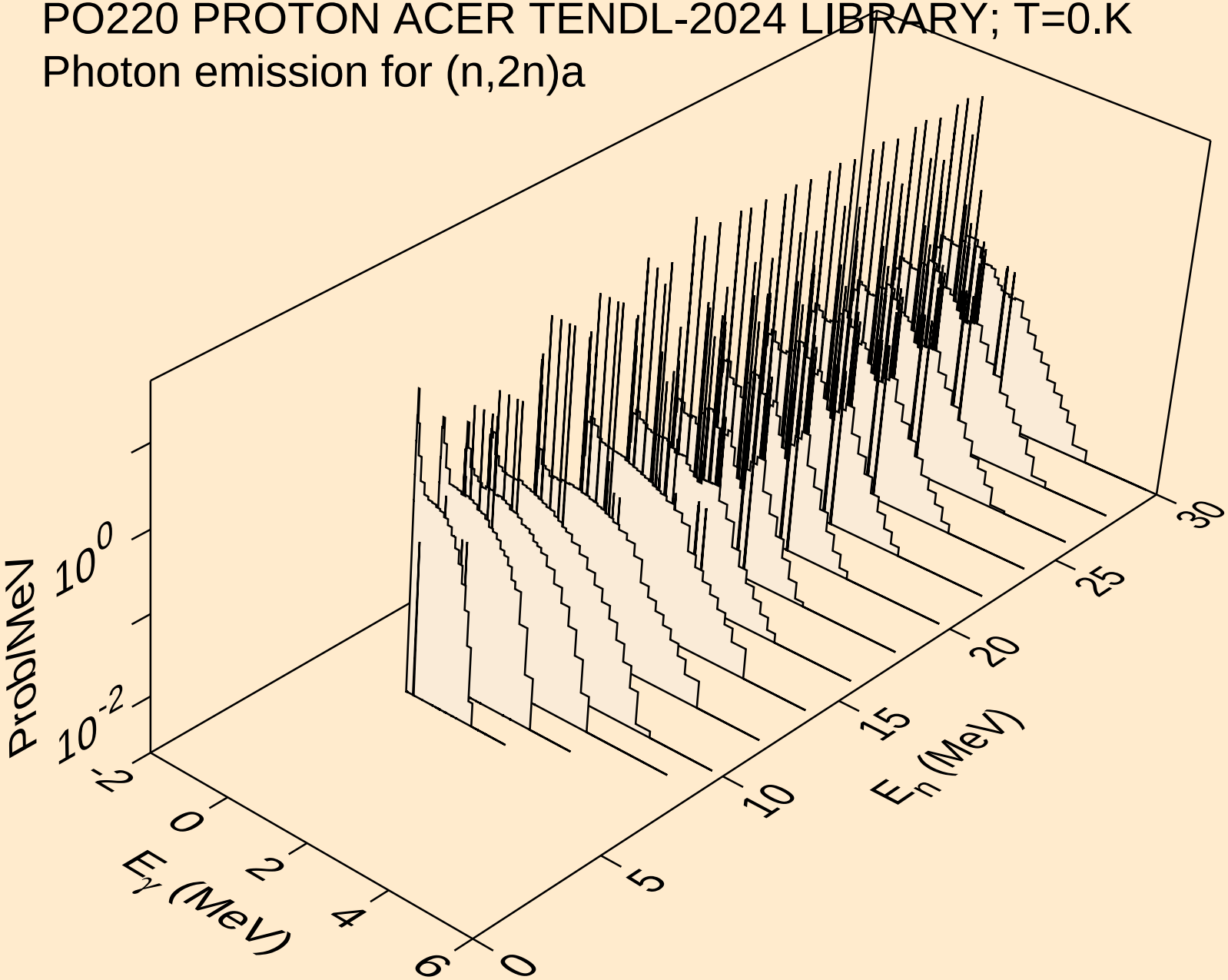

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,2n)
Prob/MeV
10^0
10^{-2}
0
5
10
E_γ (MeV)
0
5
10
15
20
25
30
E_n (MeV)

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,3n)

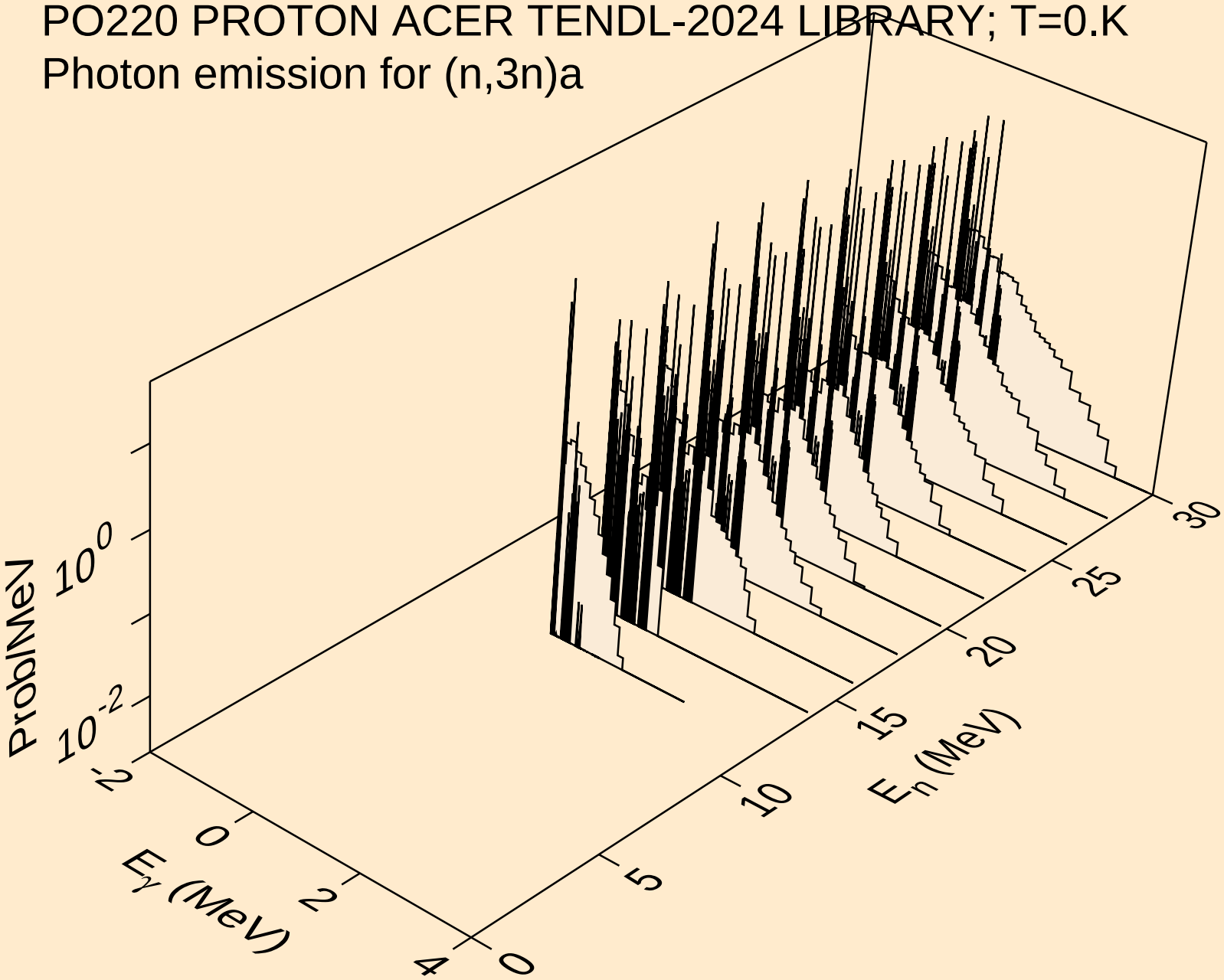



PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,n*)a
ProblMeV
10^{1}
10^{-1}
E_γ (MeV)
-2
0
2
4
6
E_n (MeV)
0
5
10
15
20
25
30

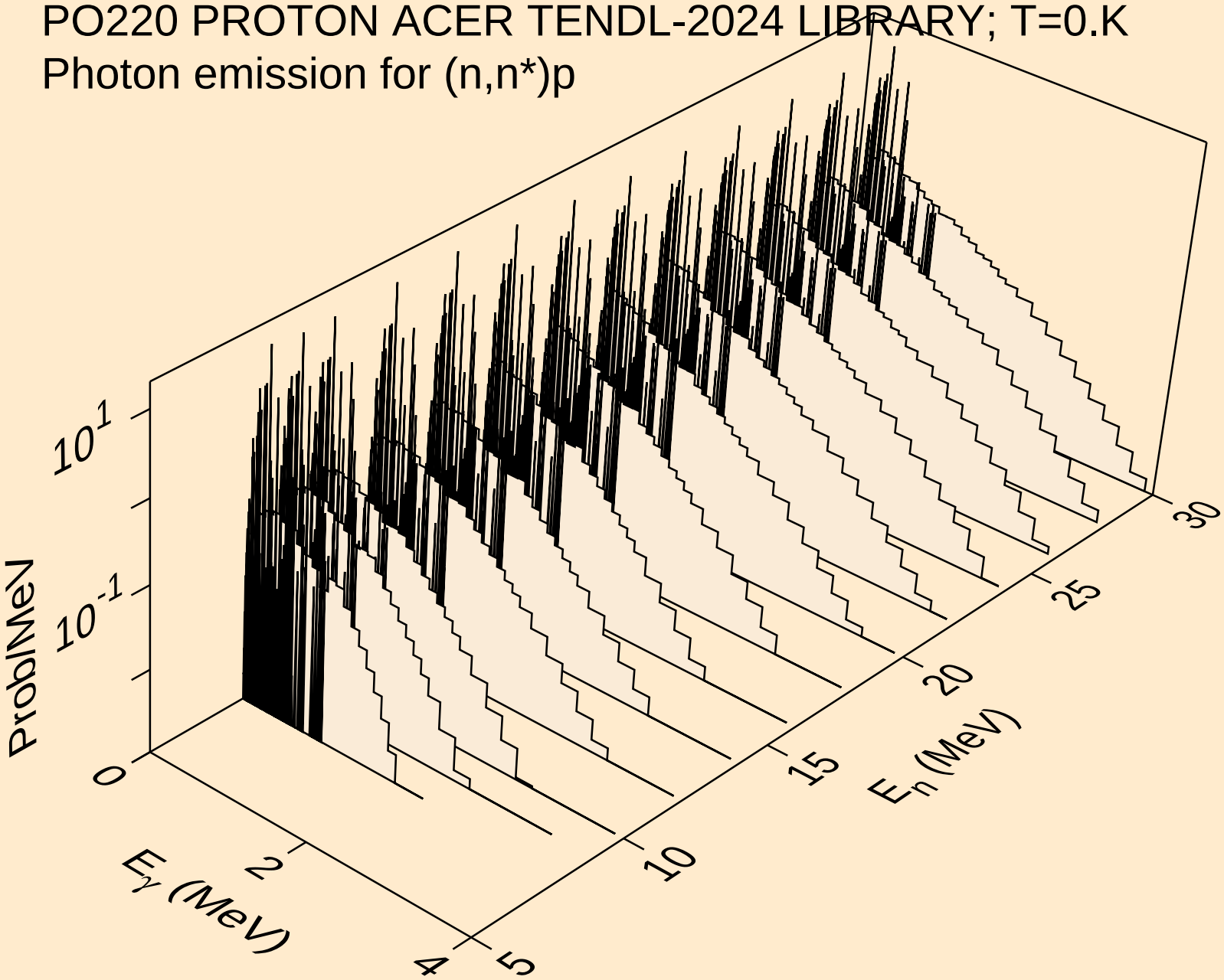
PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,2n)a



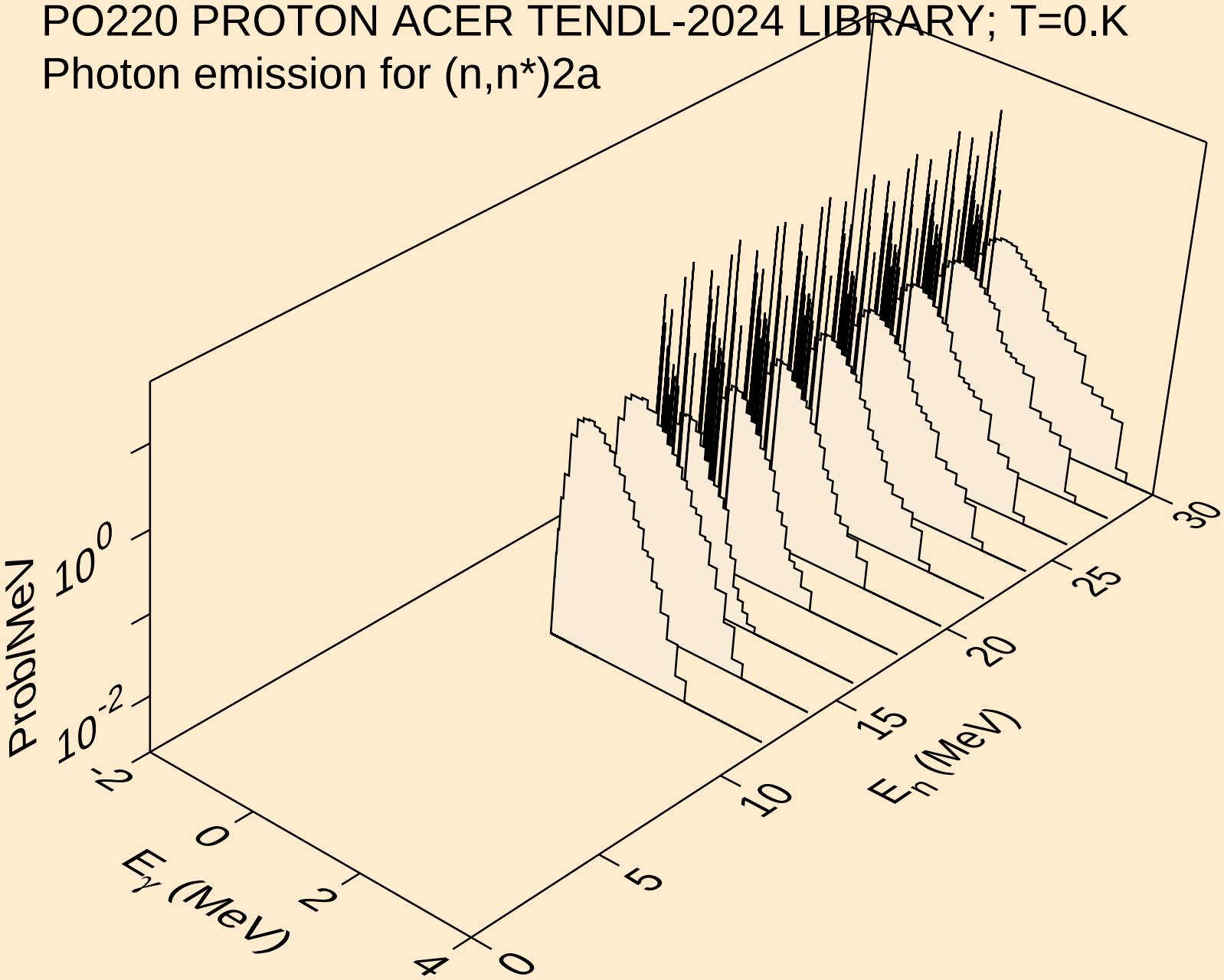
PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,3n)a



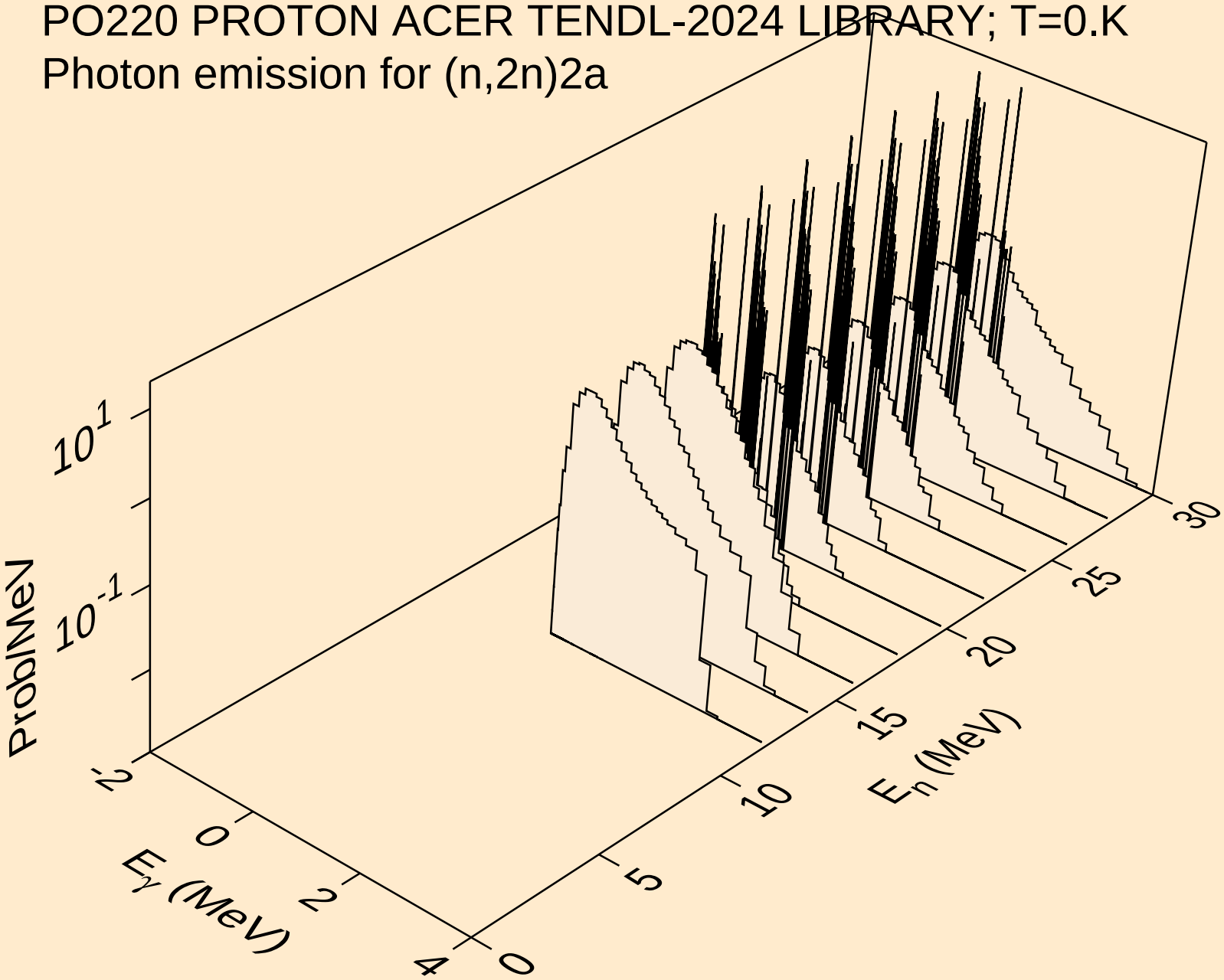
PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,n*)p

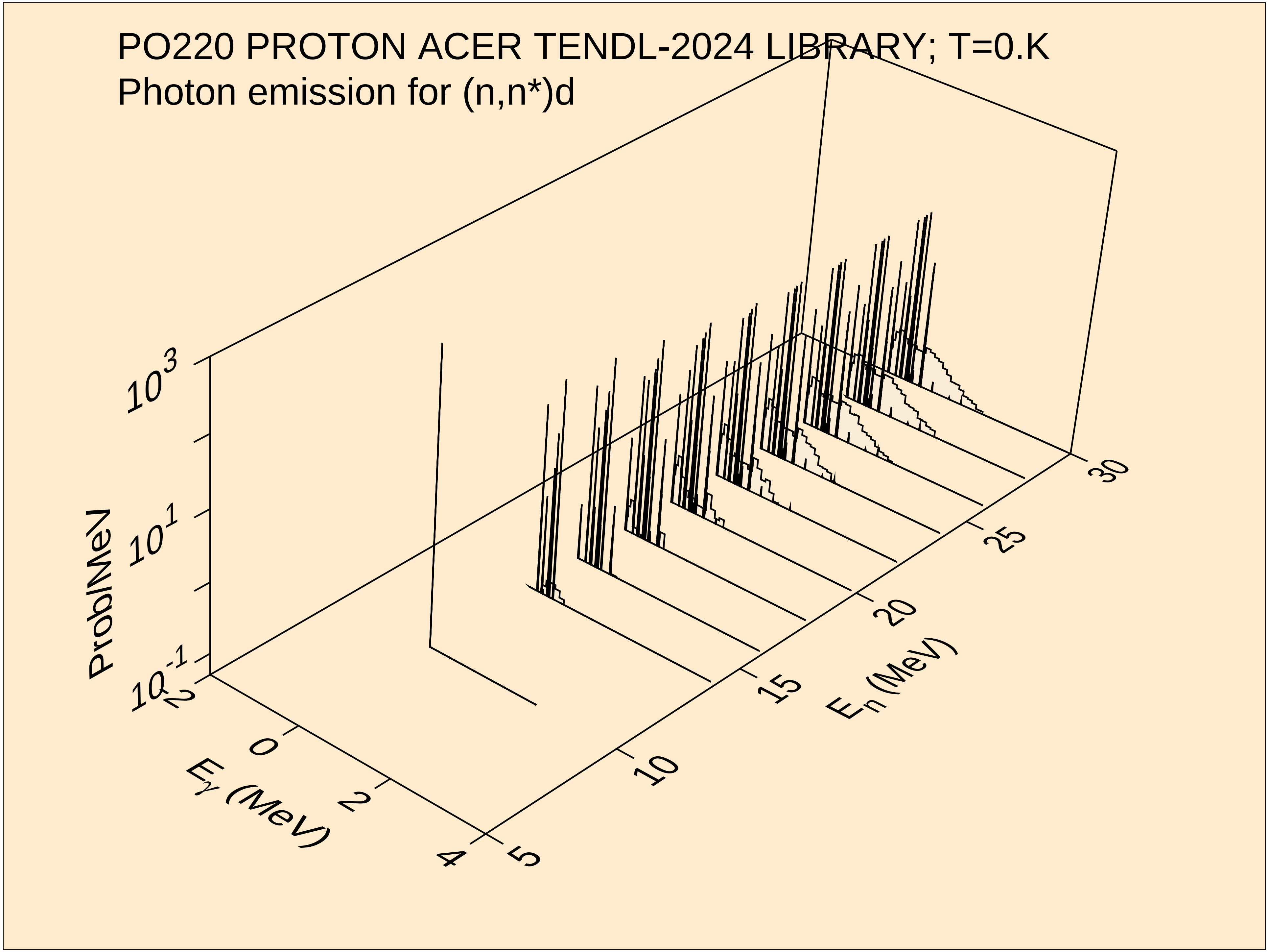


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,n*)2a

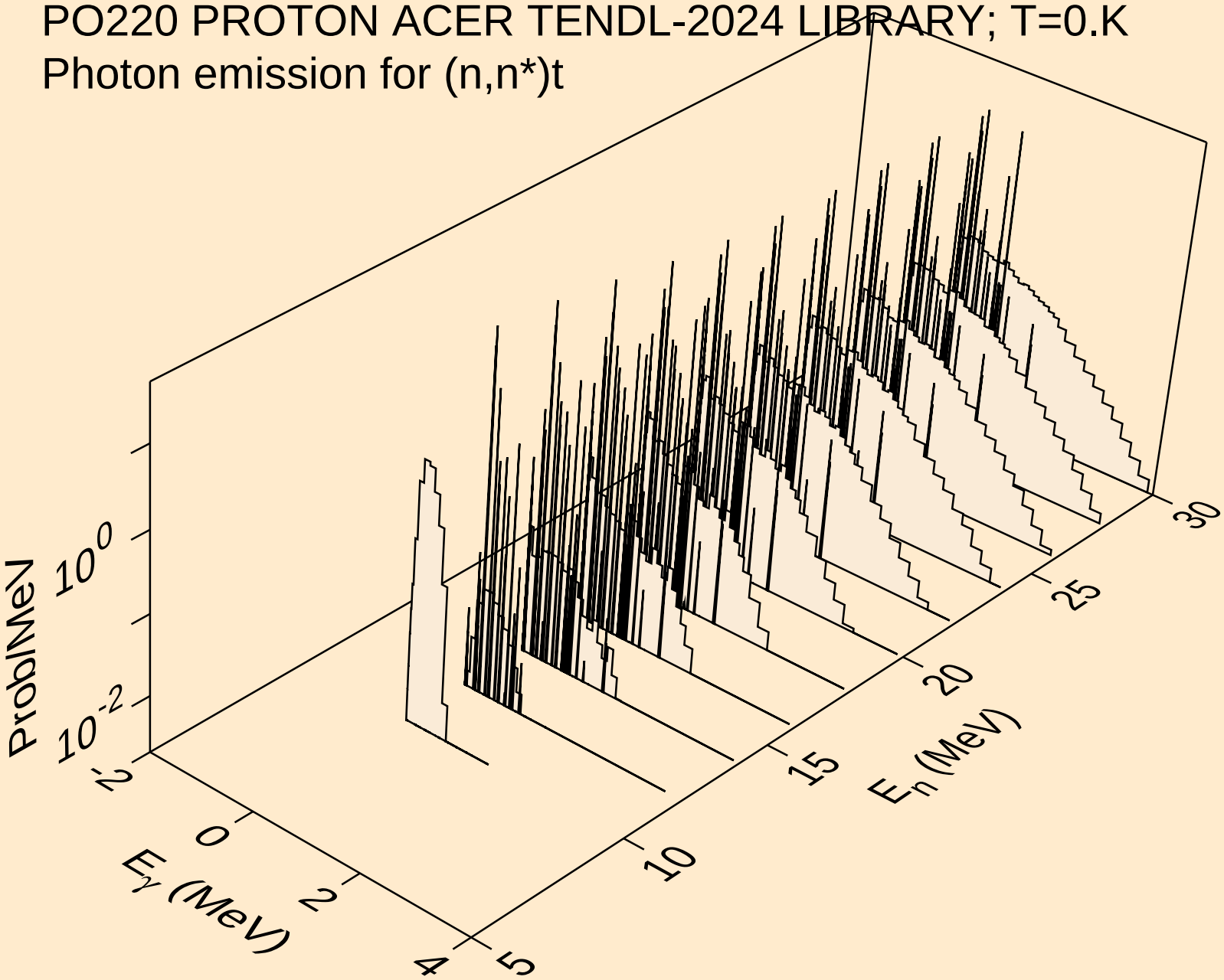


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,2n)2a

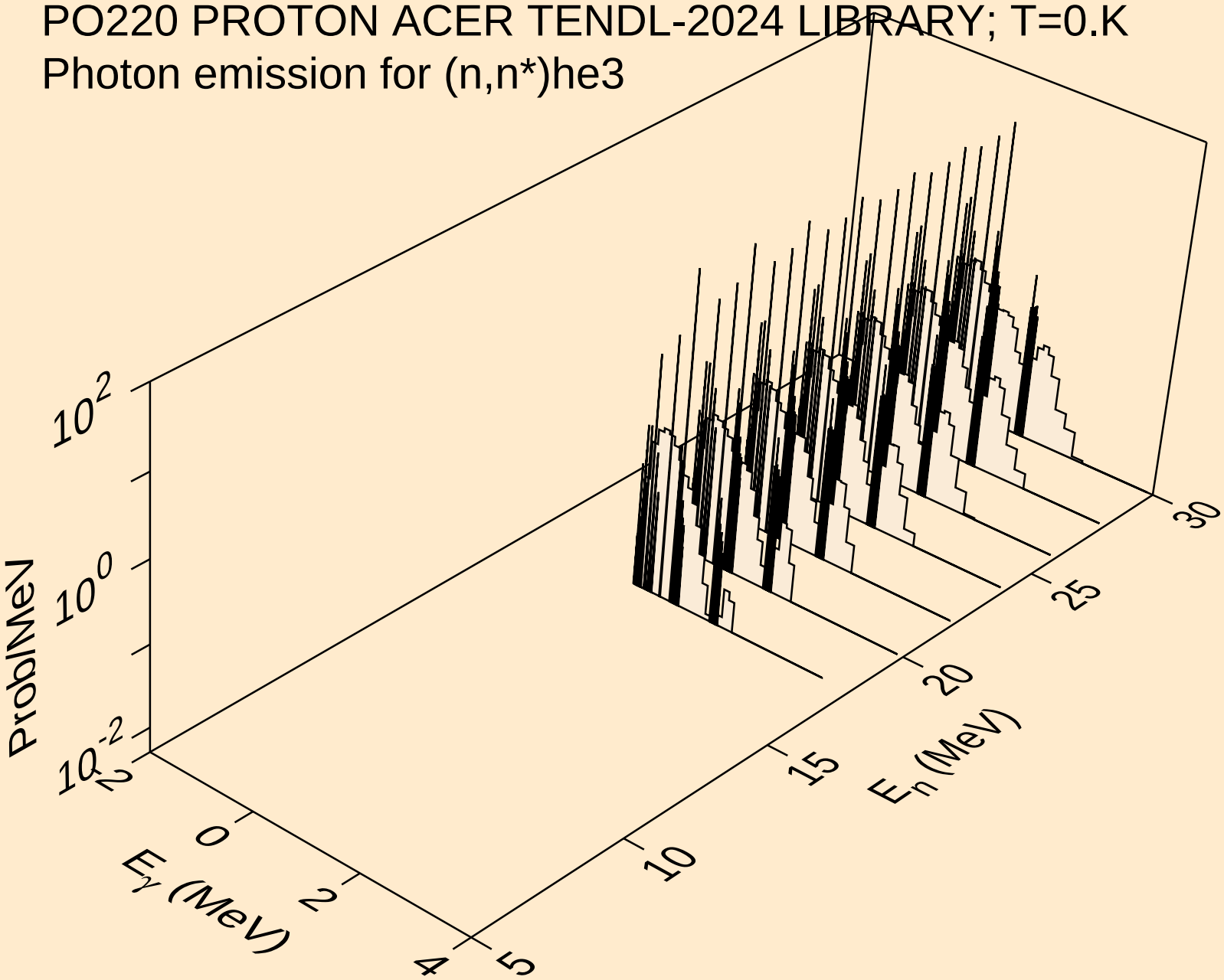


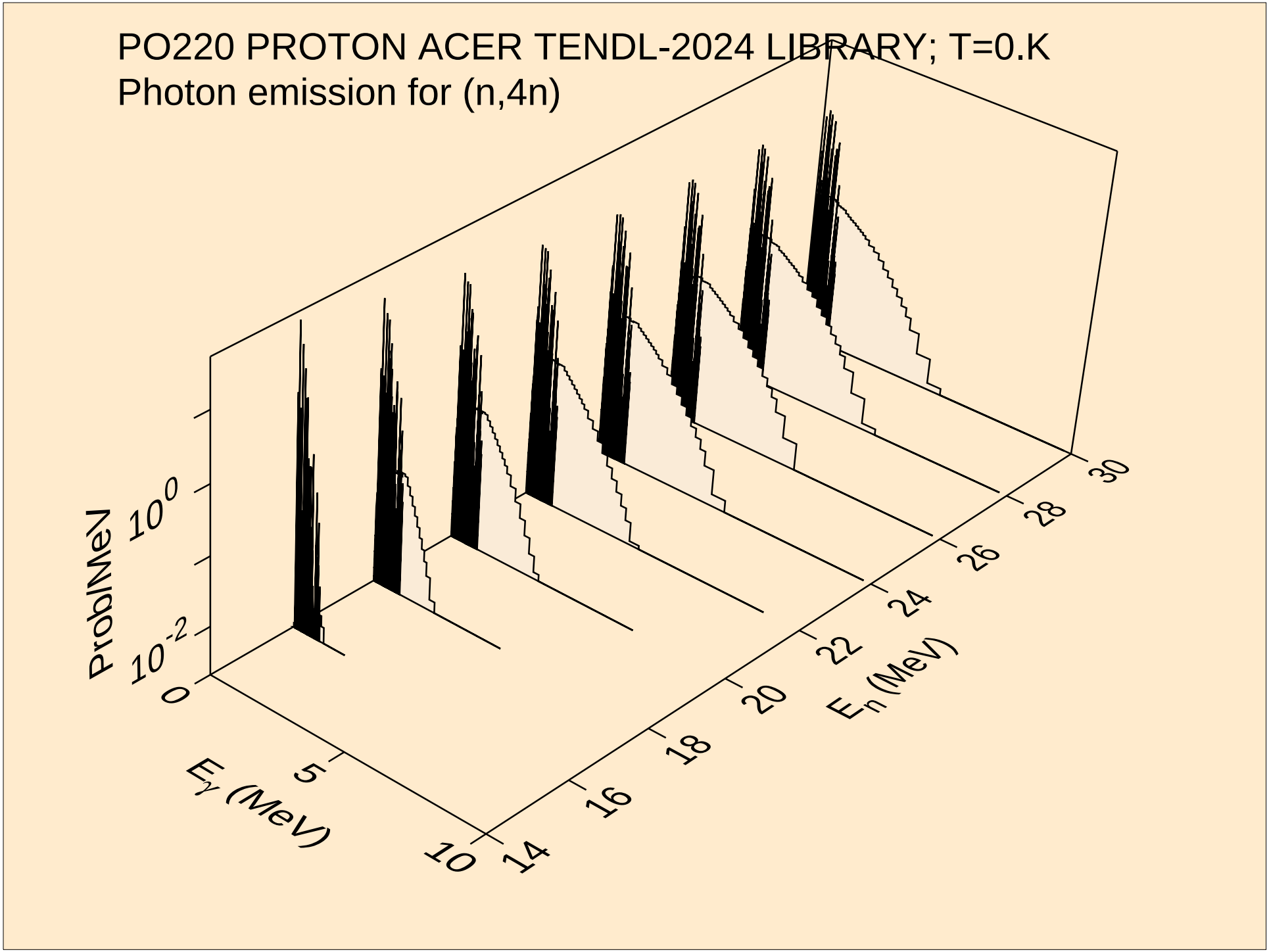

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,n*)d
ProbMeV
10^{3}
10^{1}
10^{-1}
E_γ (MeV)
-2
0
2
4
E_n (MeV)
5
10
15
20
25
30

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,n*)t

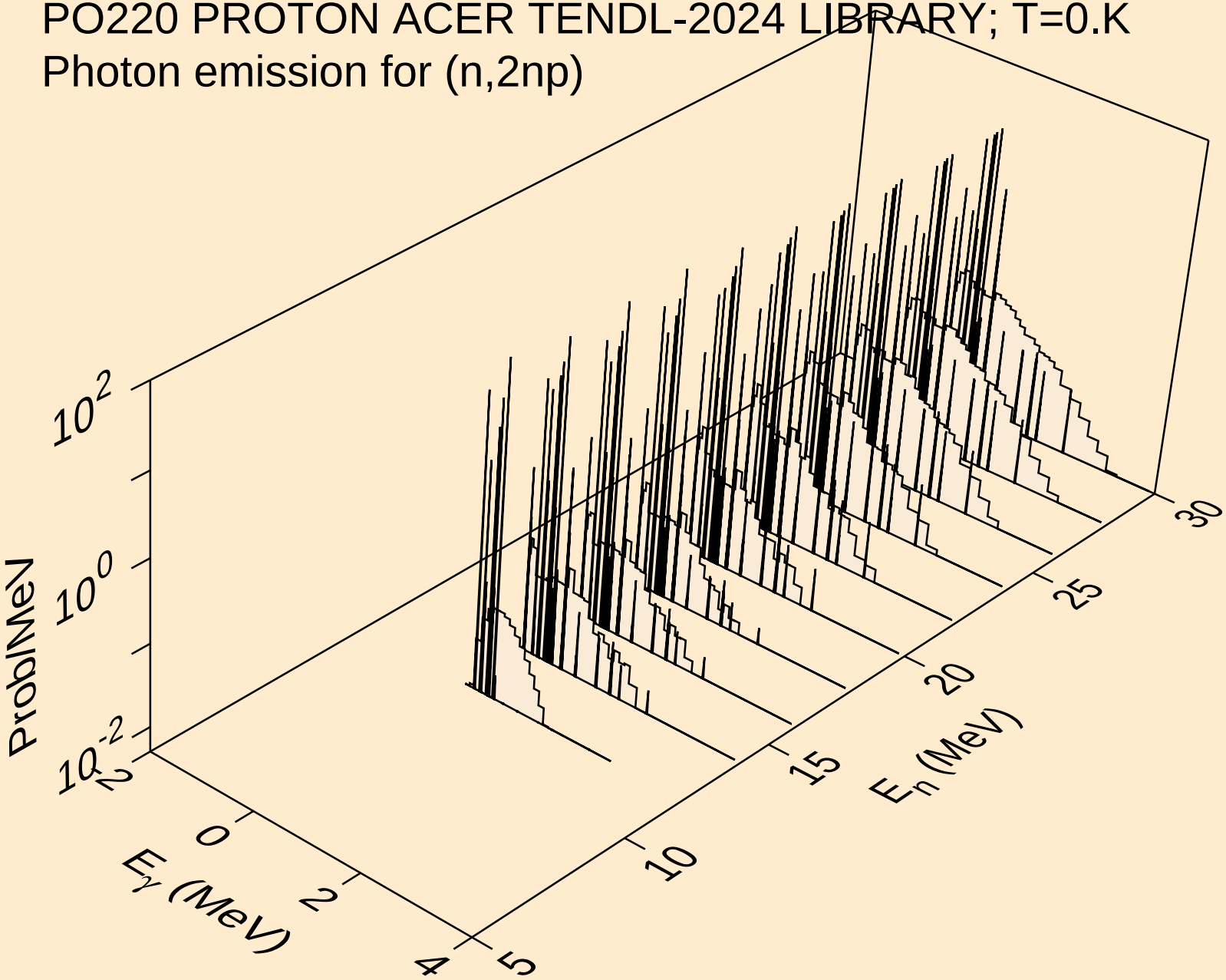


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,n*)he3

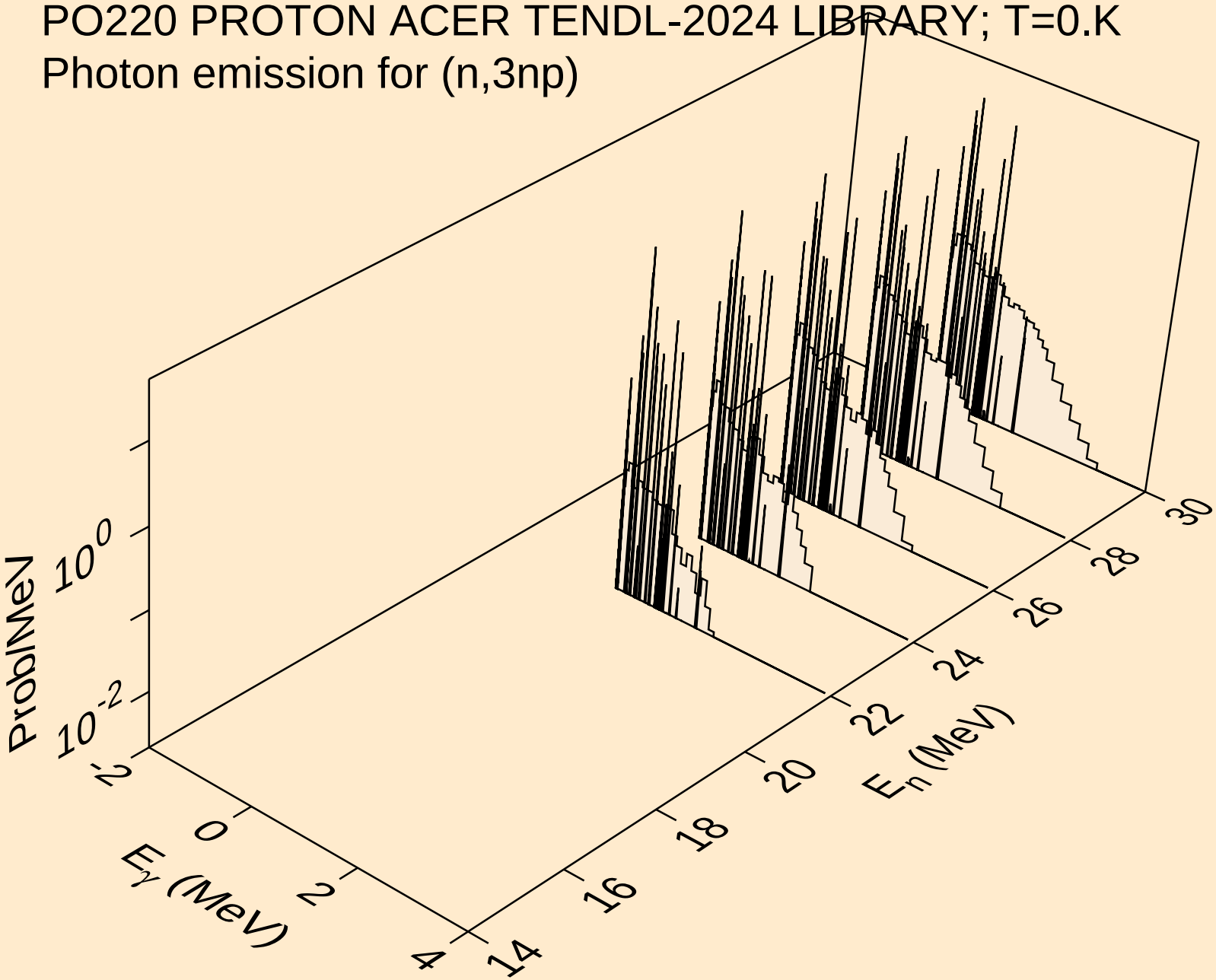



PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,4n)
Prob/MeV
10^0
10^{-2}
0
5
10
E_γ (MeV)
14
16
18
20
22
24
26
28
30
E_n (MeV)

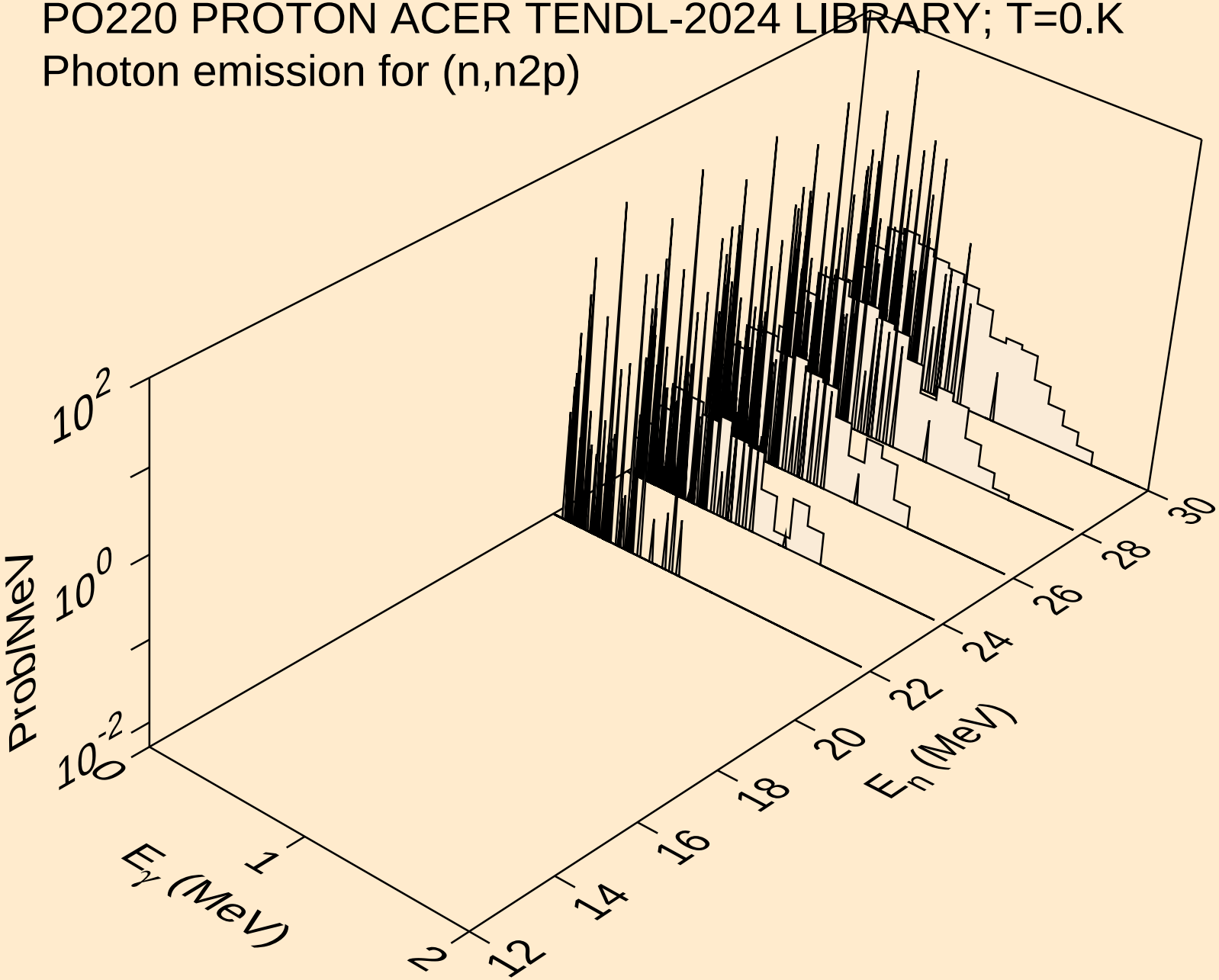
PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,2np)

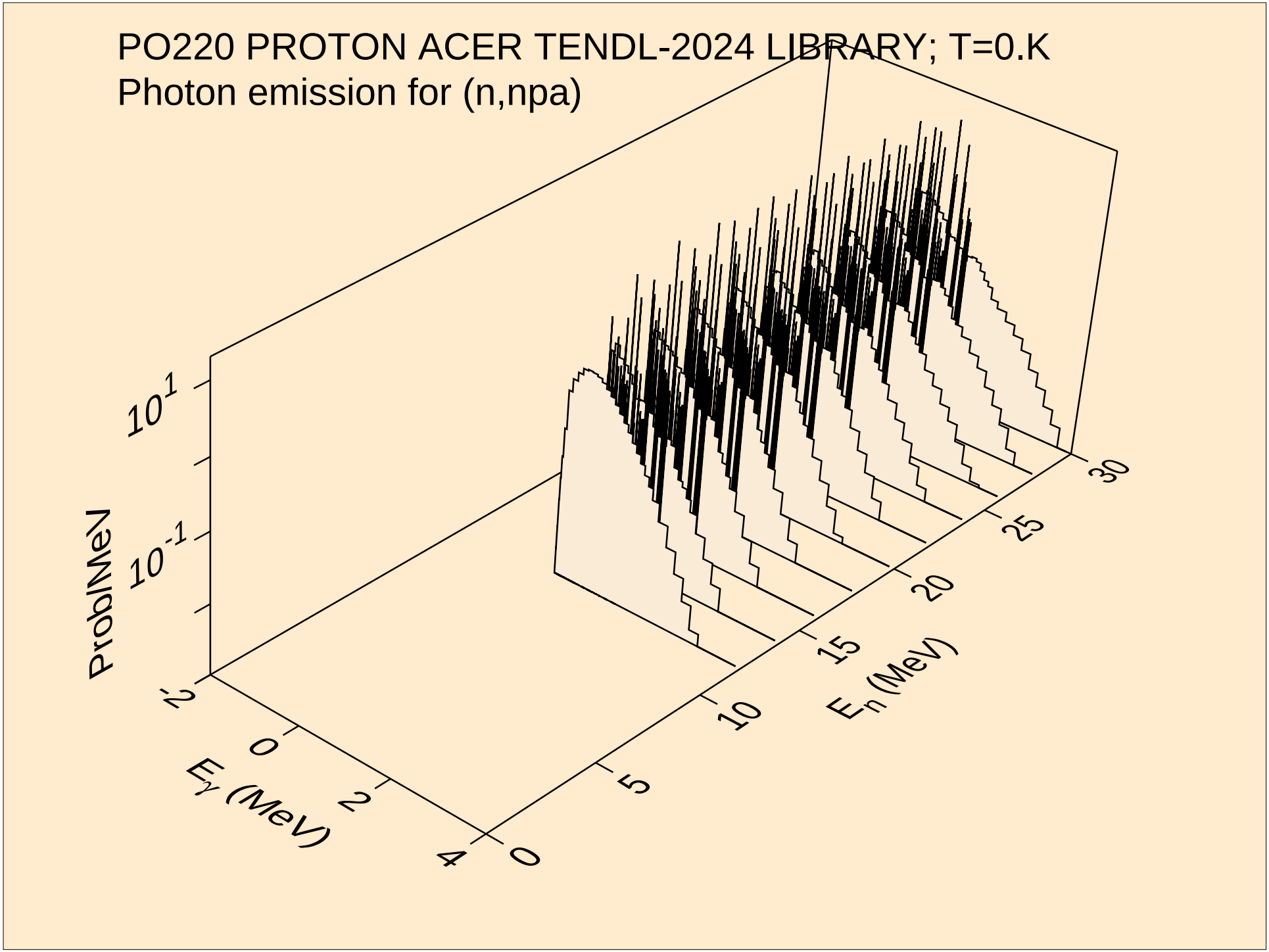


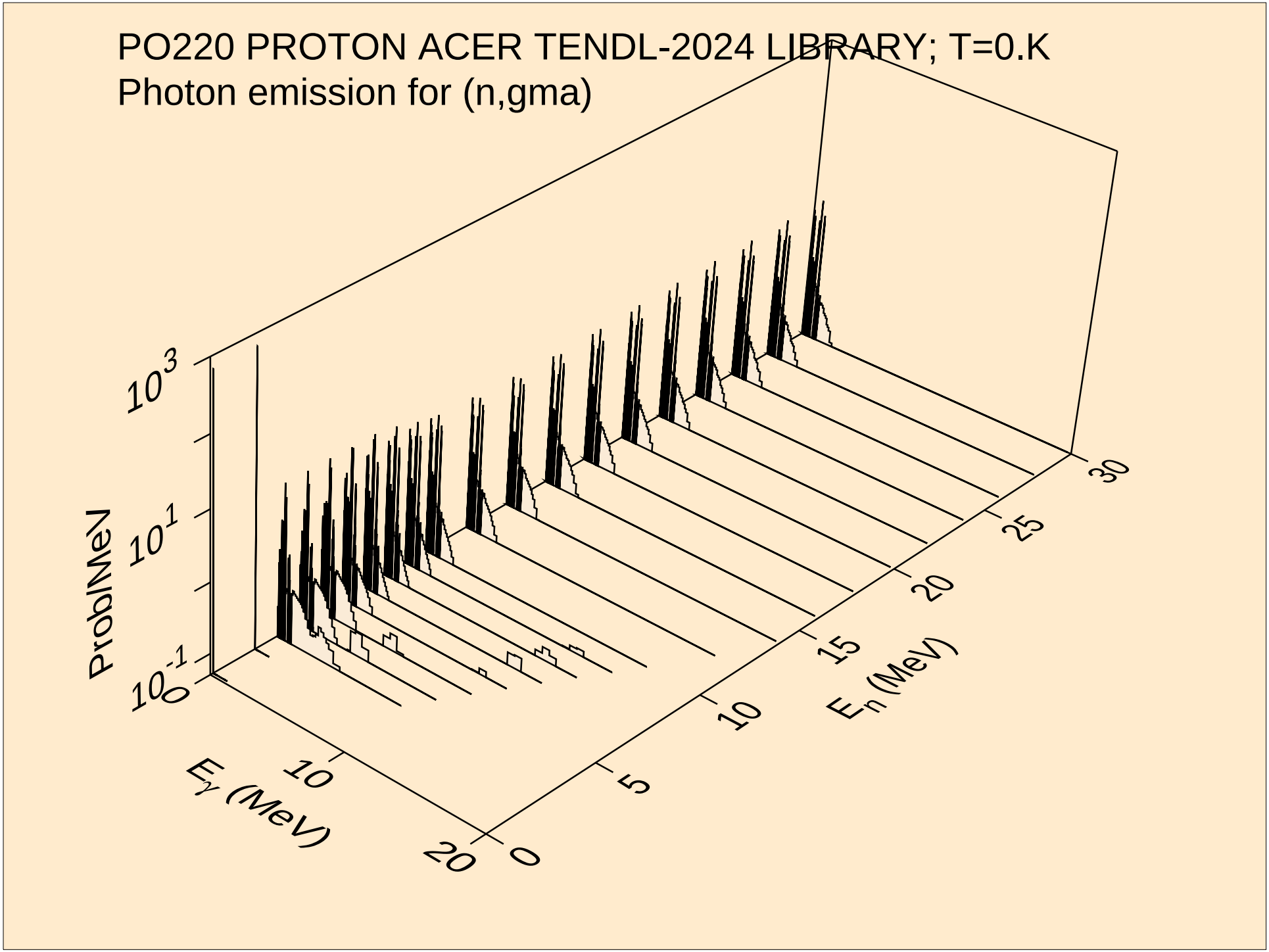
PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,3np)



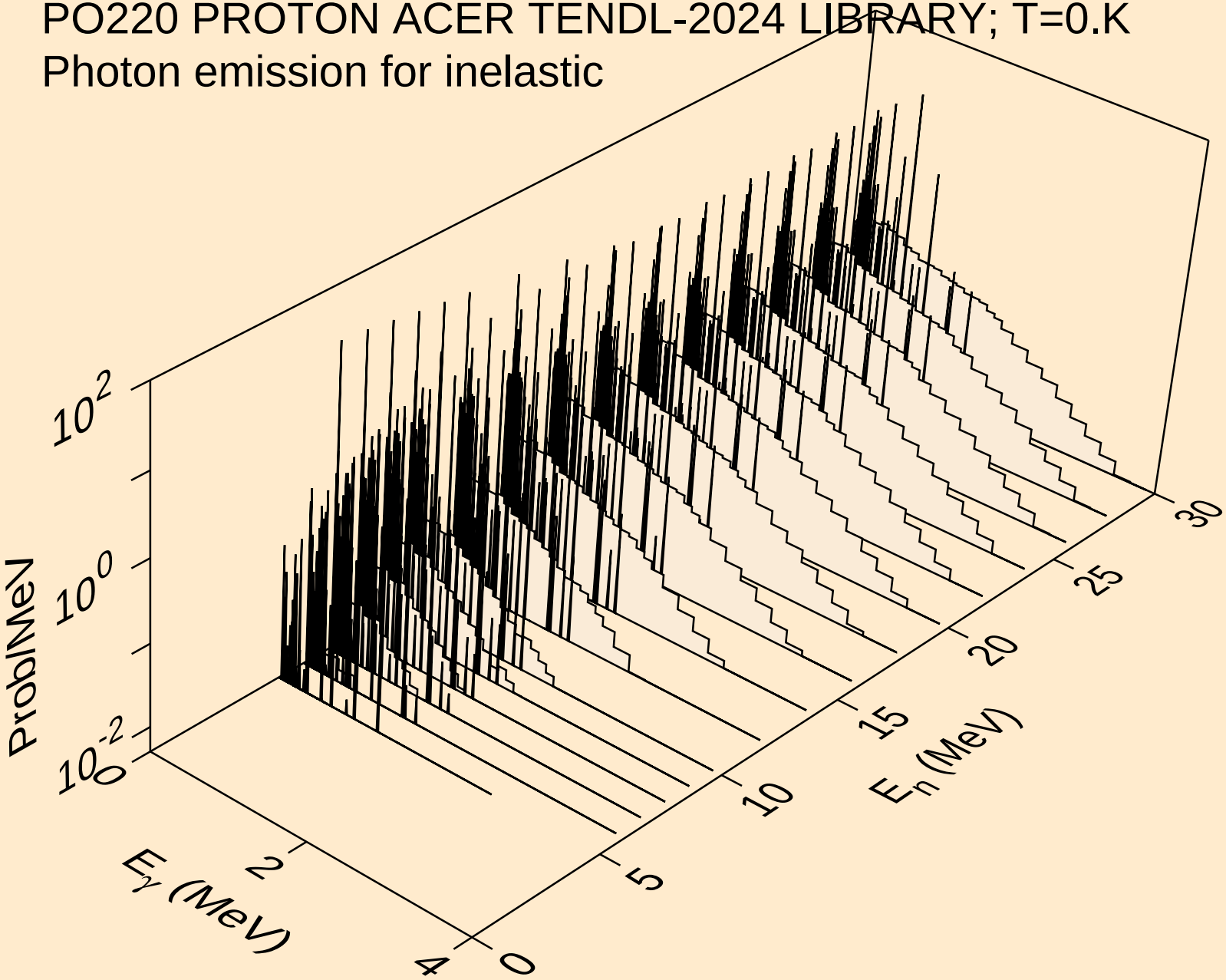
PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,n2p)

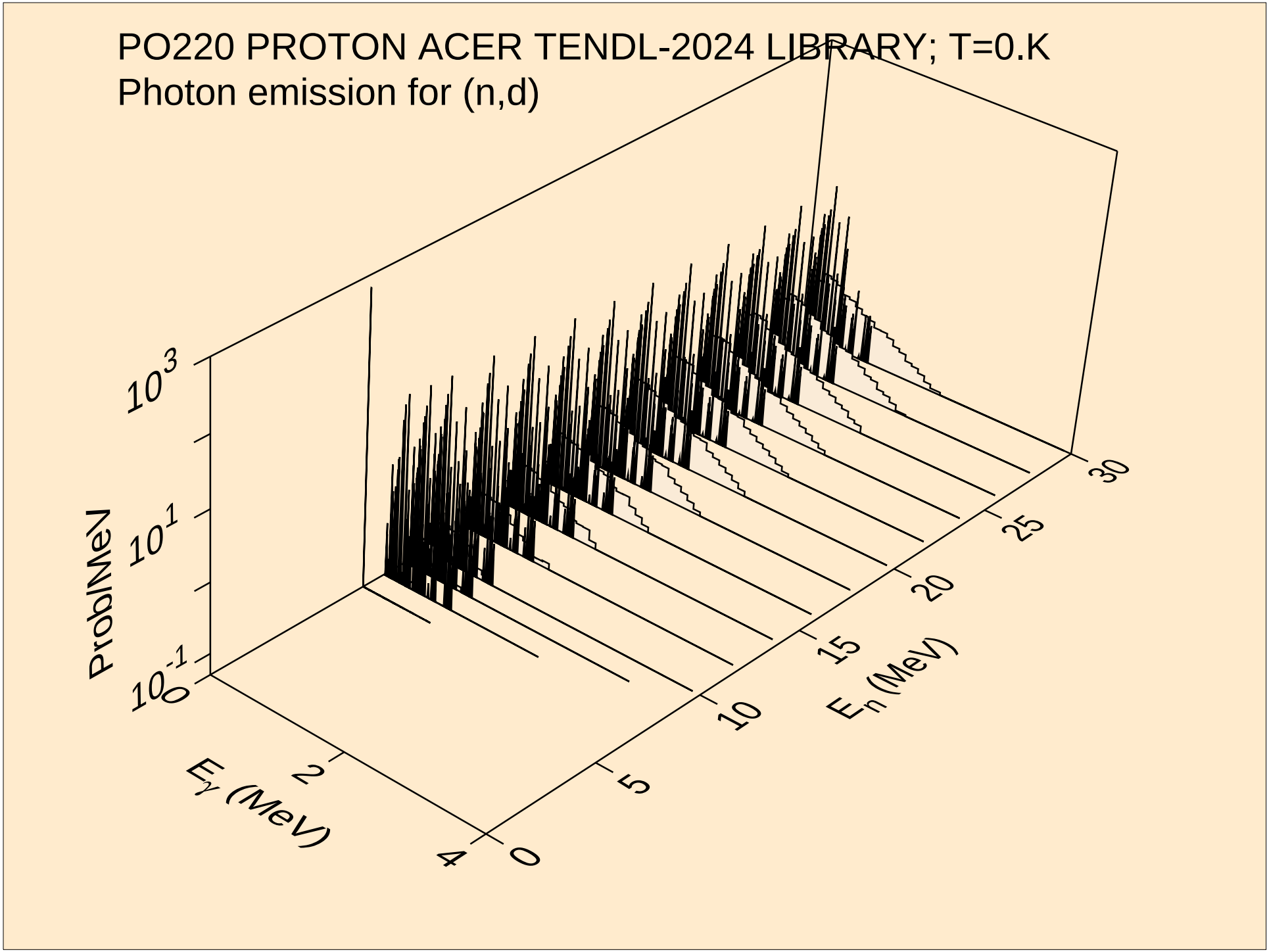


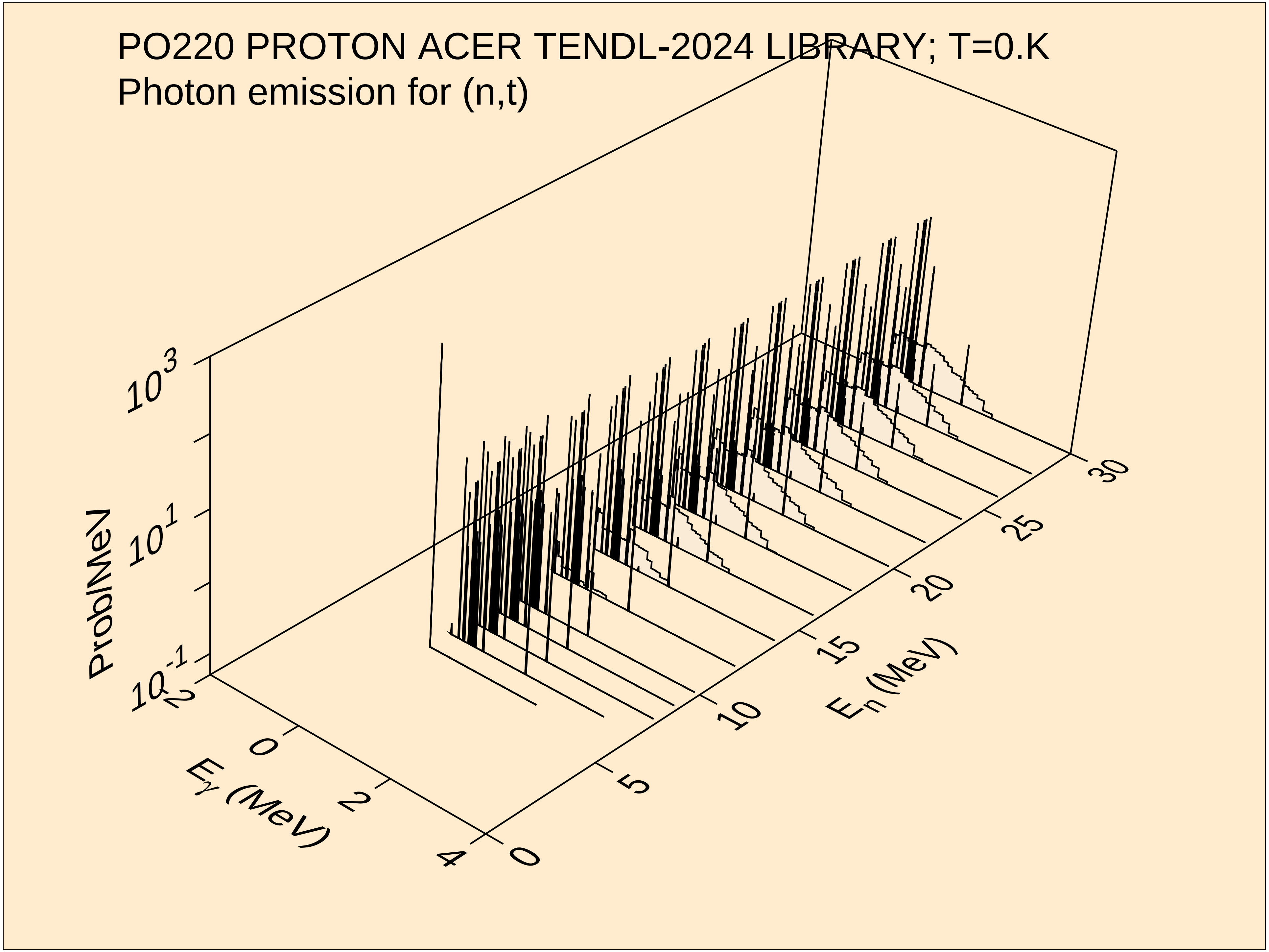

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,npa)
Prob/MeV
10^1
10^-1
E_γ (MeV)
-2
0
2
4
E_n (MeV)
0
5
10
15
20
25
30


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,gma)
Prob/MeV
10^3
10^1
10^{-1}
0
10
20
E_γ (MeV)
0
5
10
15
20
25
30
E_n (MeV)

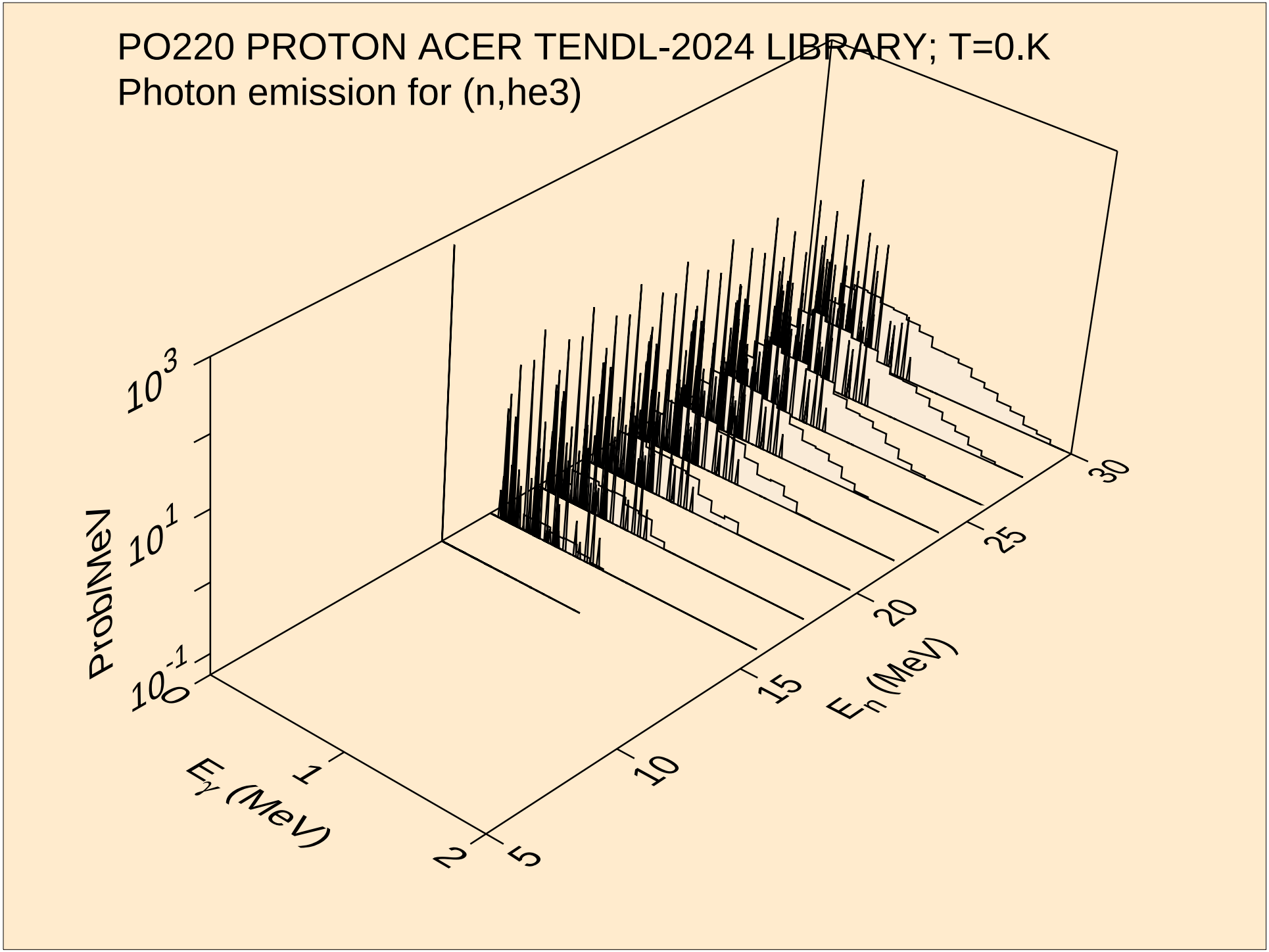
PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for inelastic



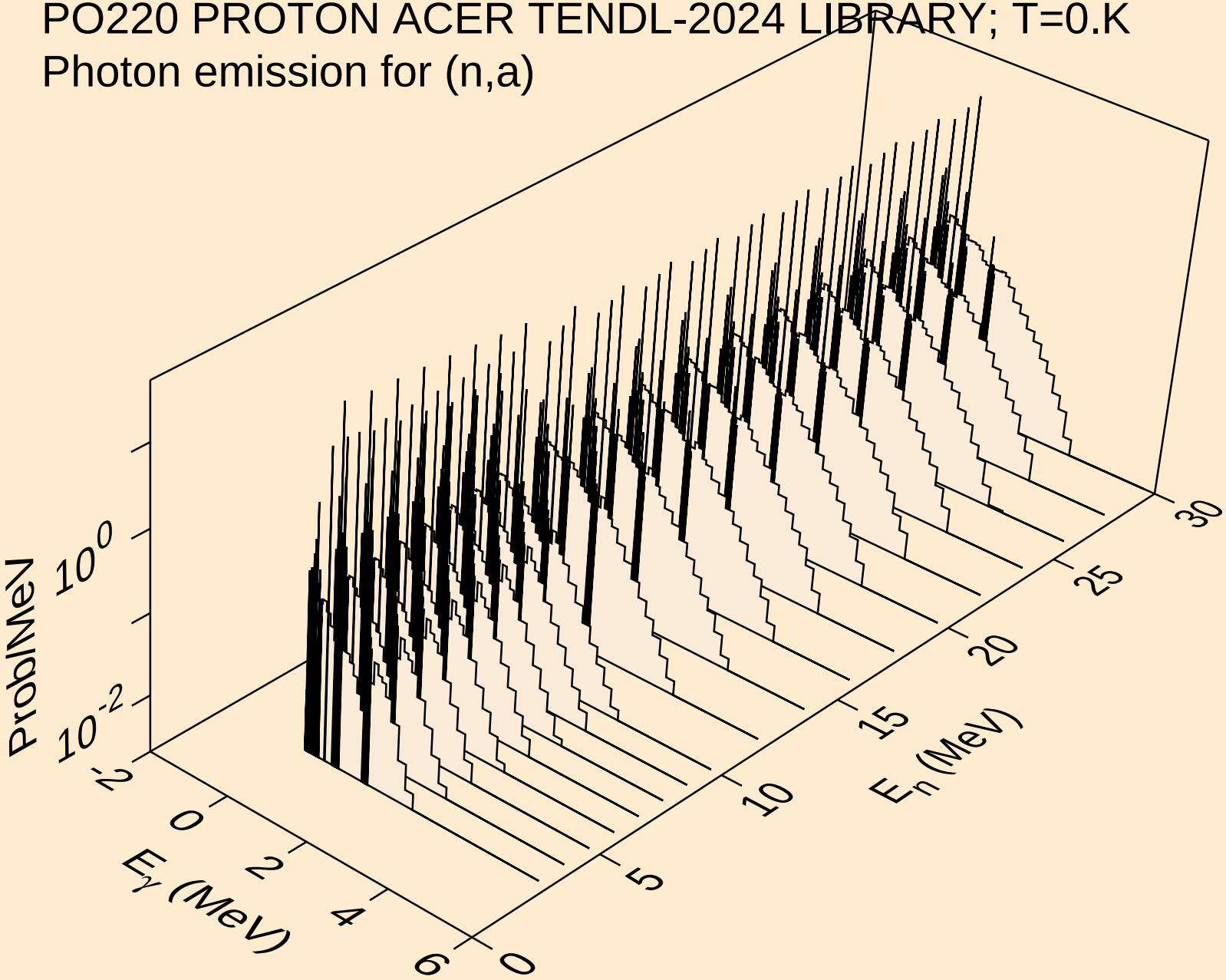

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,d)
Prob/MeV
10^{3}
10^{1}
10^{-1}
E_γ (MeV)
0
2
4
E_n (MeV)
0
5
10
15
20
25
30



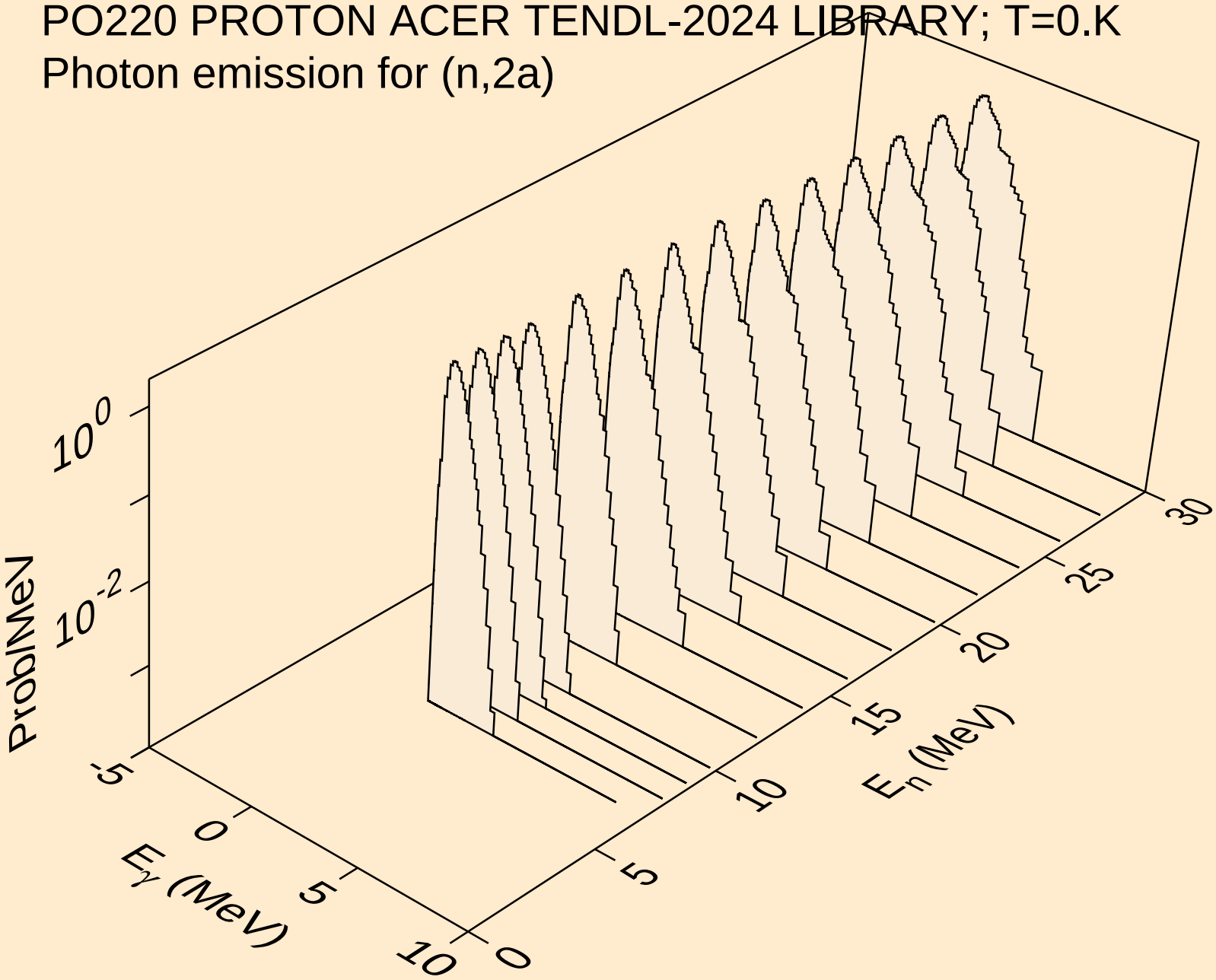
PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,t)
ProbMeV
10^3
10^1
10^{-1}
E_γ (MeV)
-2
0
2
4
E_n (MeV)
0
5
10
15
20
25
30

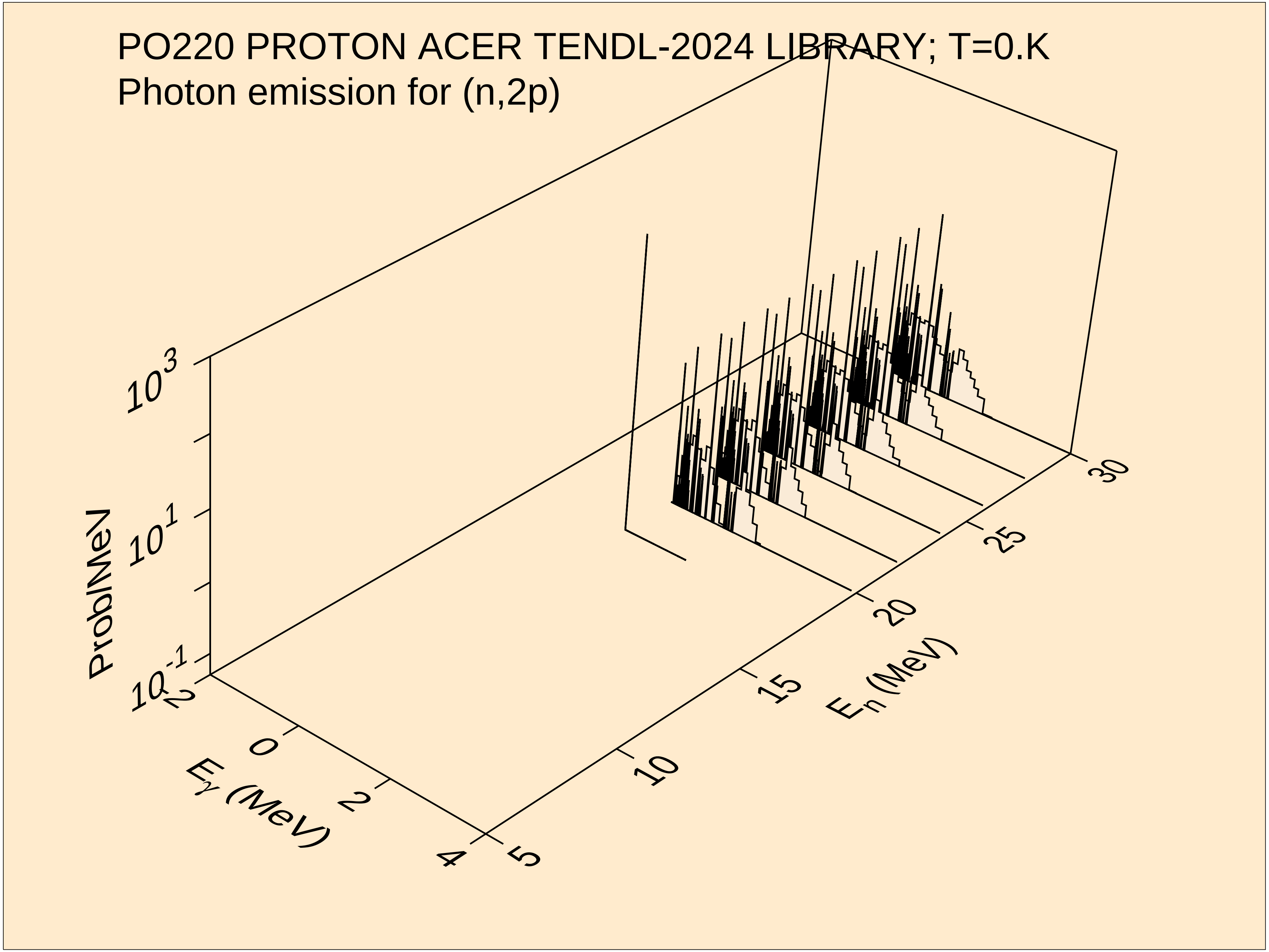

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,he3)
Prob/MeV
10^{3}
10^{1}
10^{-1}
0
1
2
E_γ (MeV)
5
10
15
20
25
30
E_n (MeV)

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,a)

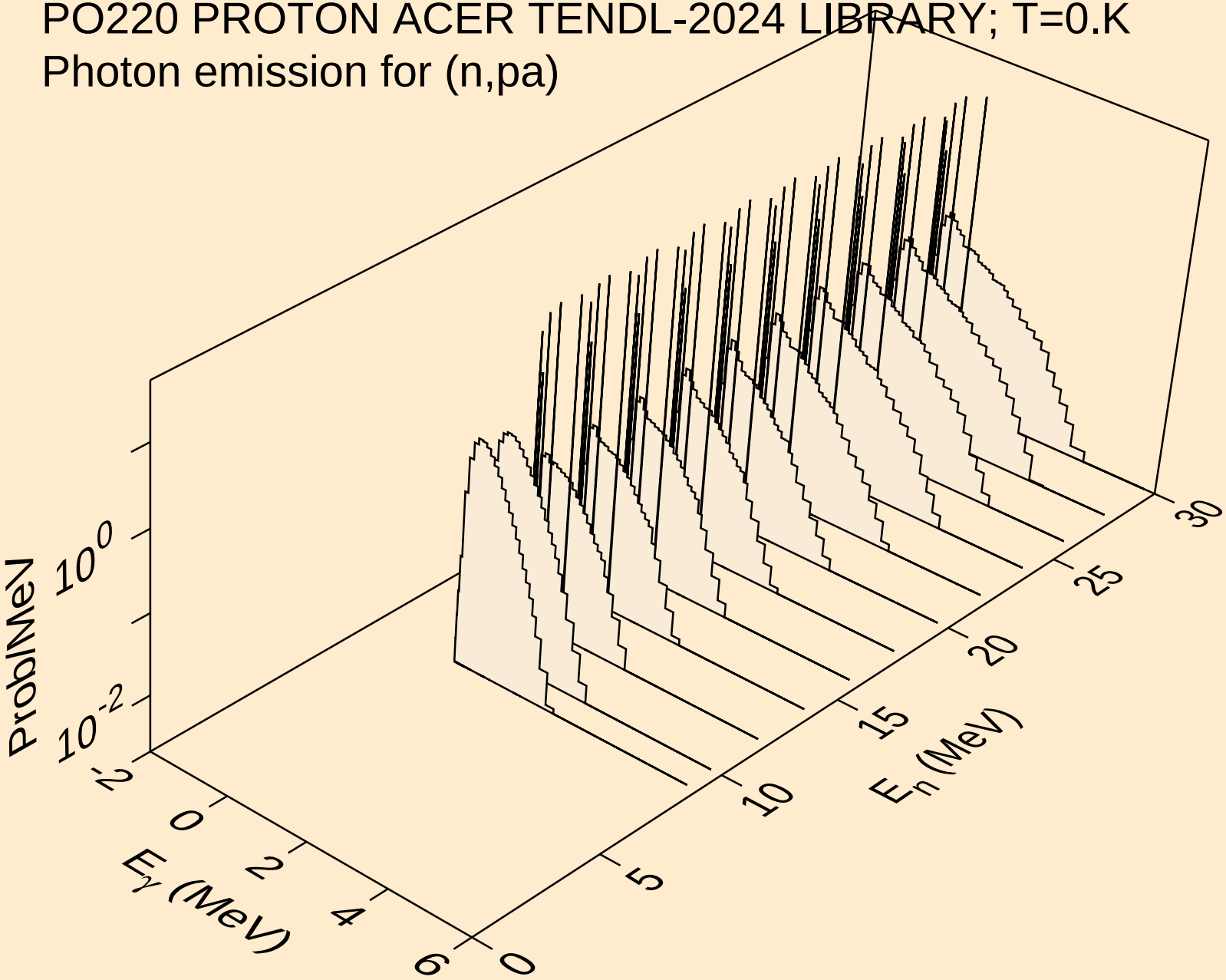


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,2a)

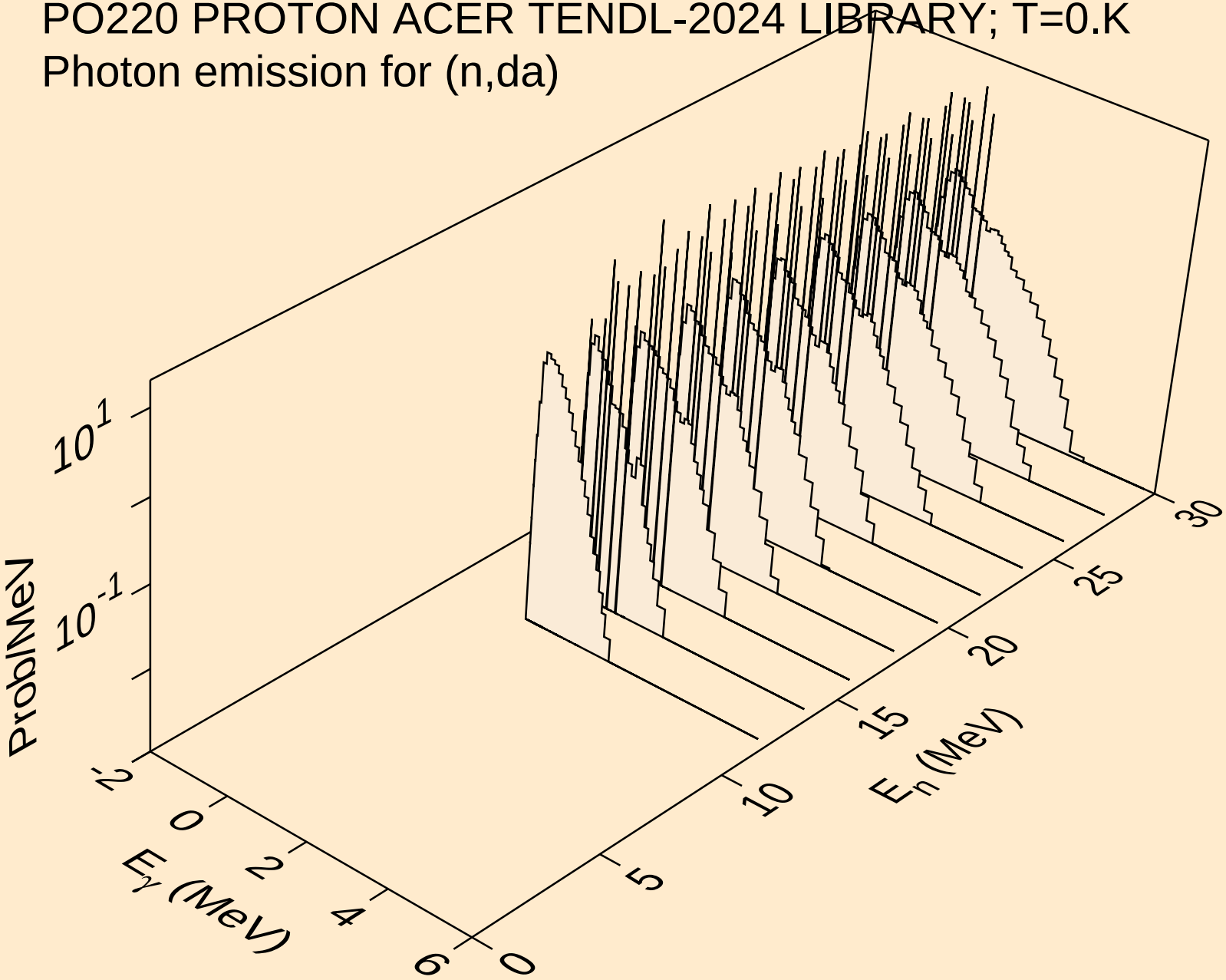


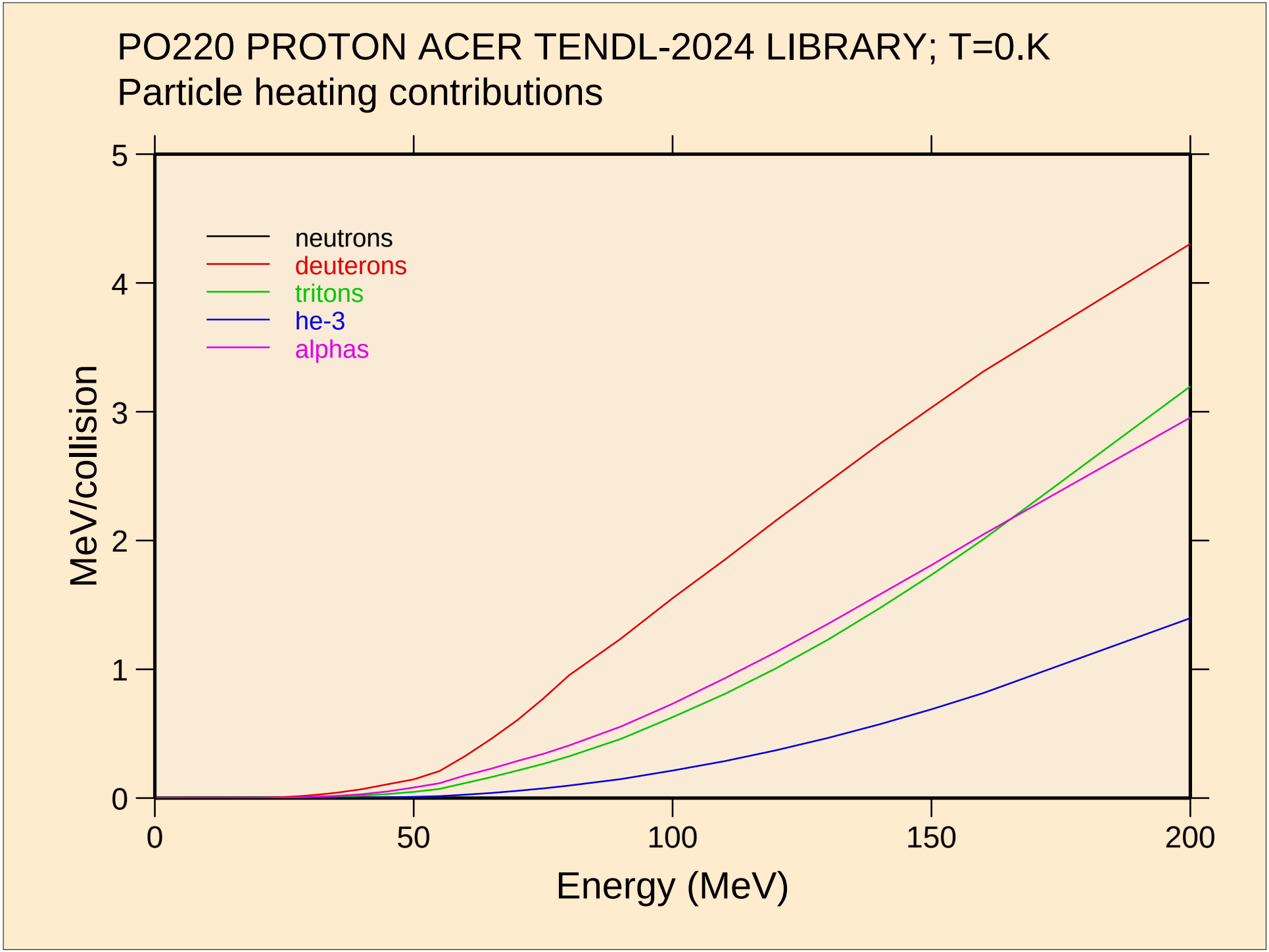

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,2p)
ProblMeV
10^3
10^1
10^{-1}
-2
0
2
4
E_γ (MeV)
5
10
15
20
25
30
E_n (MeV)

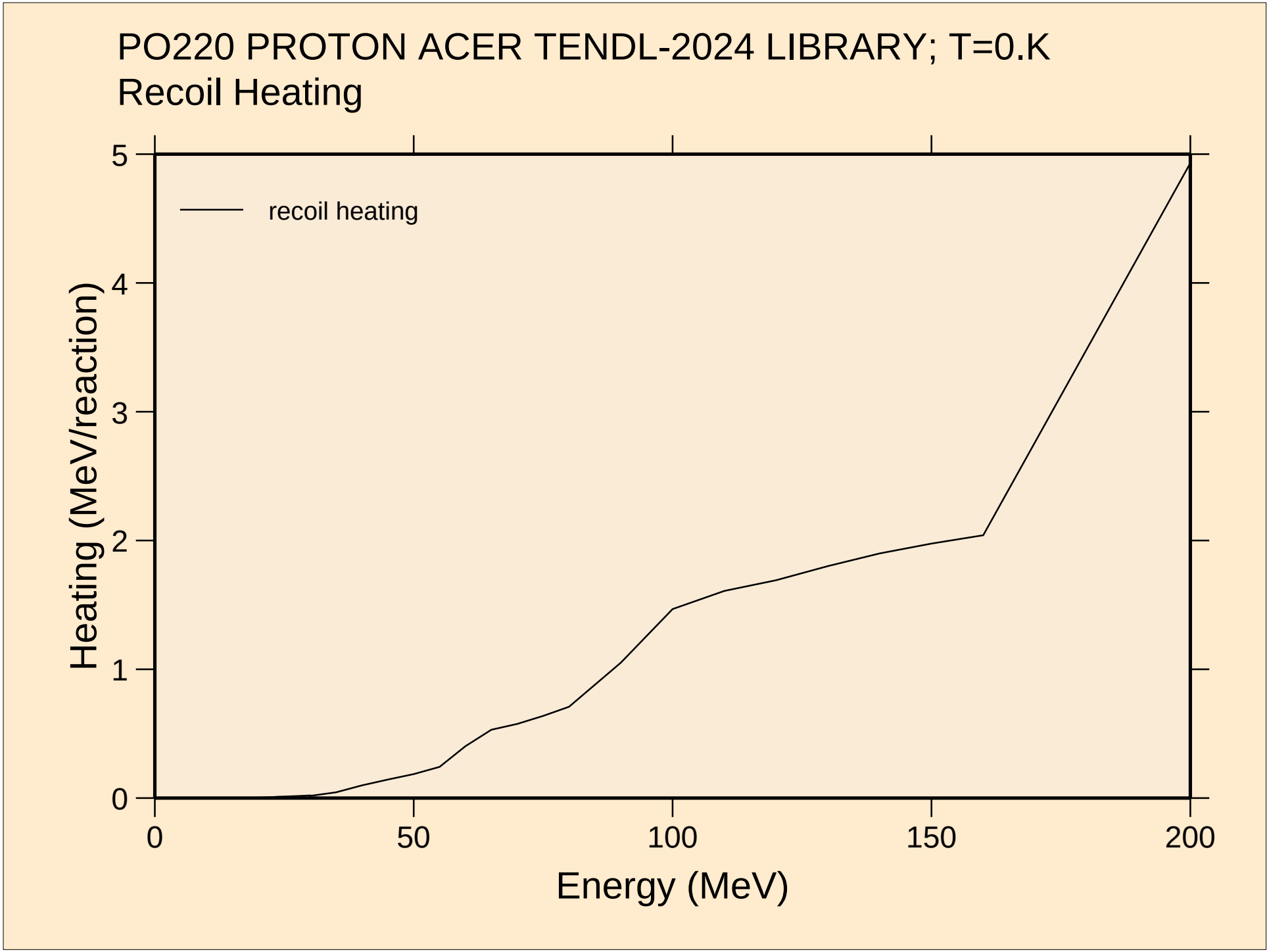
PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,pa)

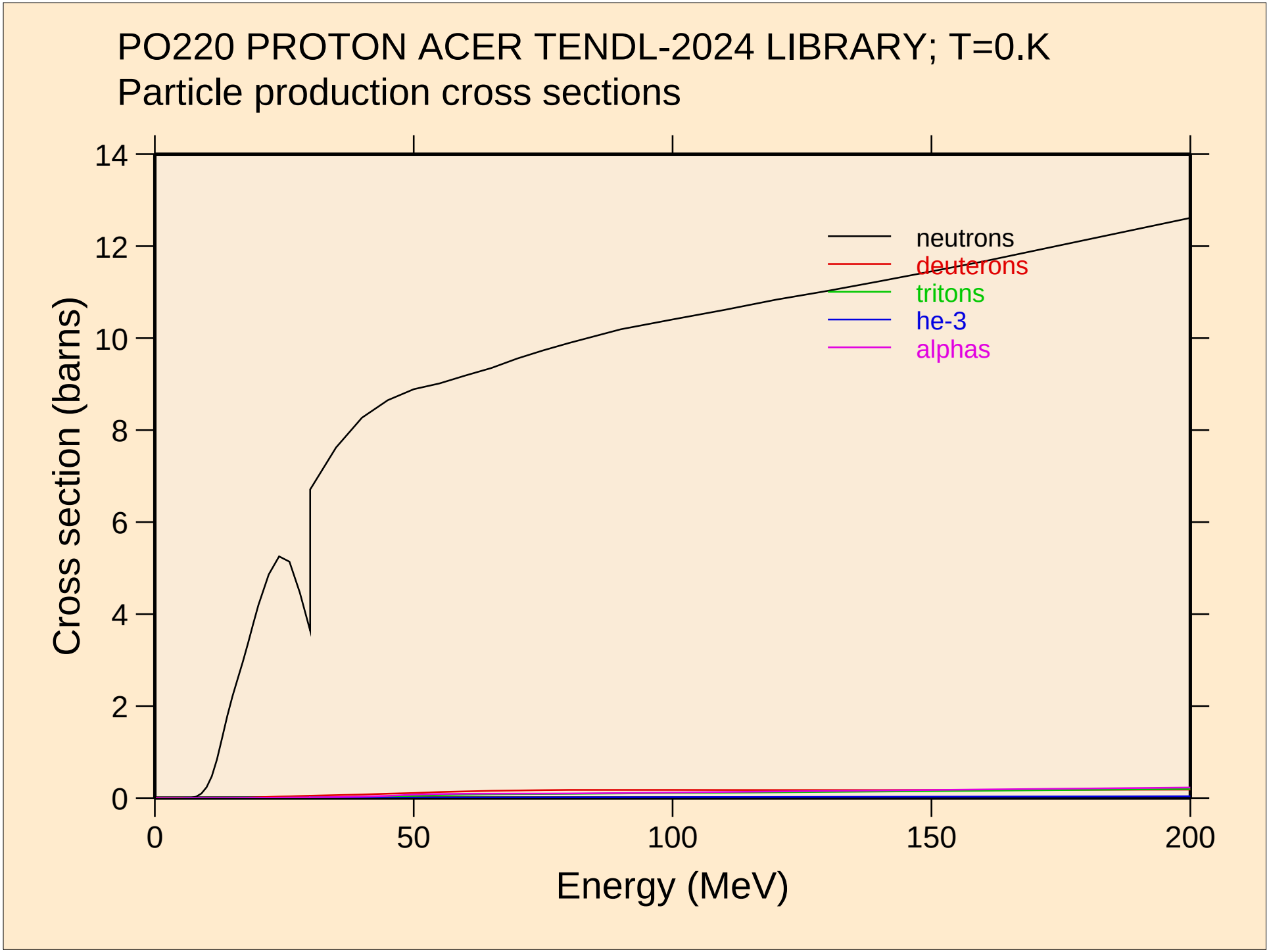


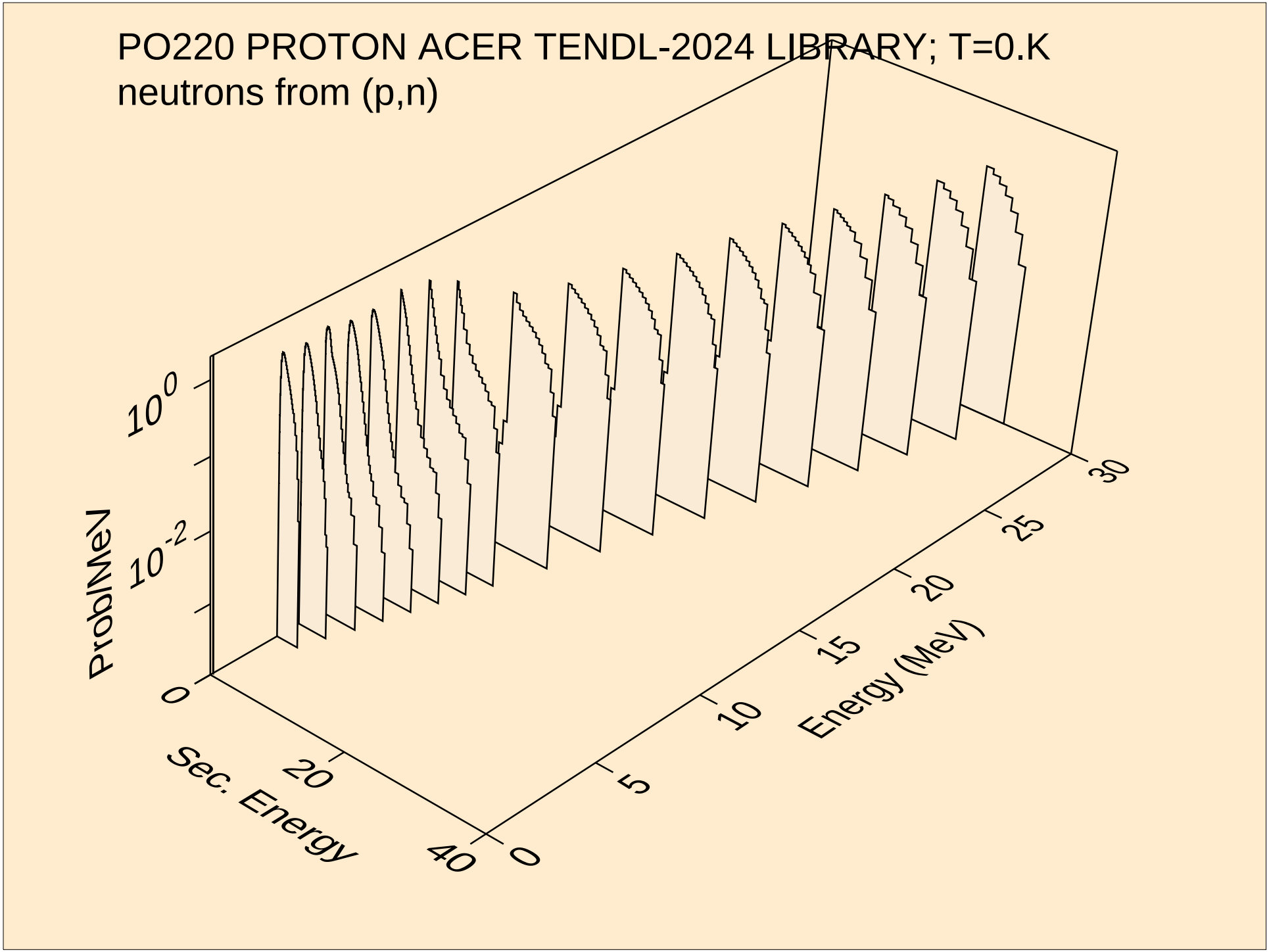
PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Photon emission for (n,da)

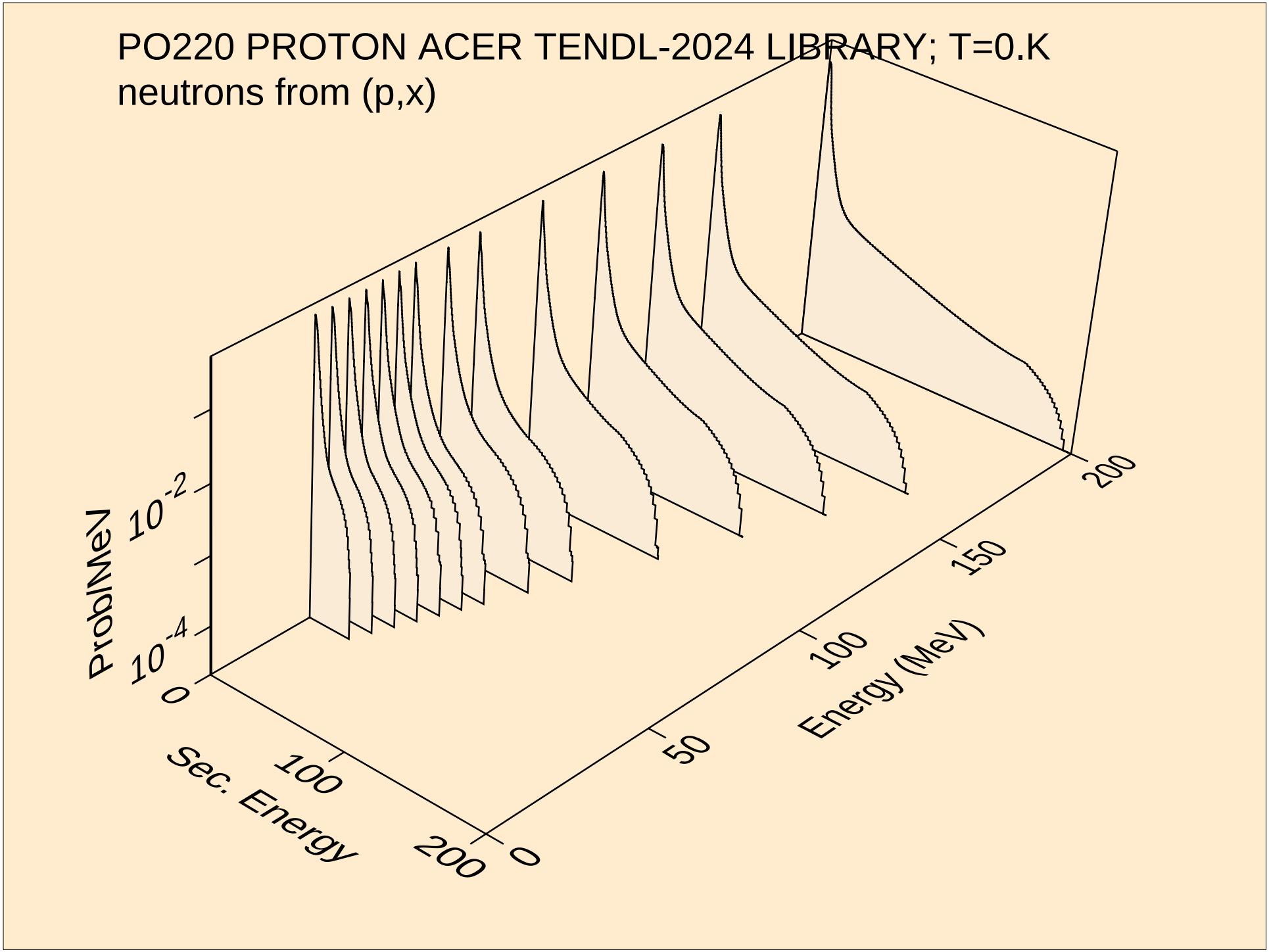


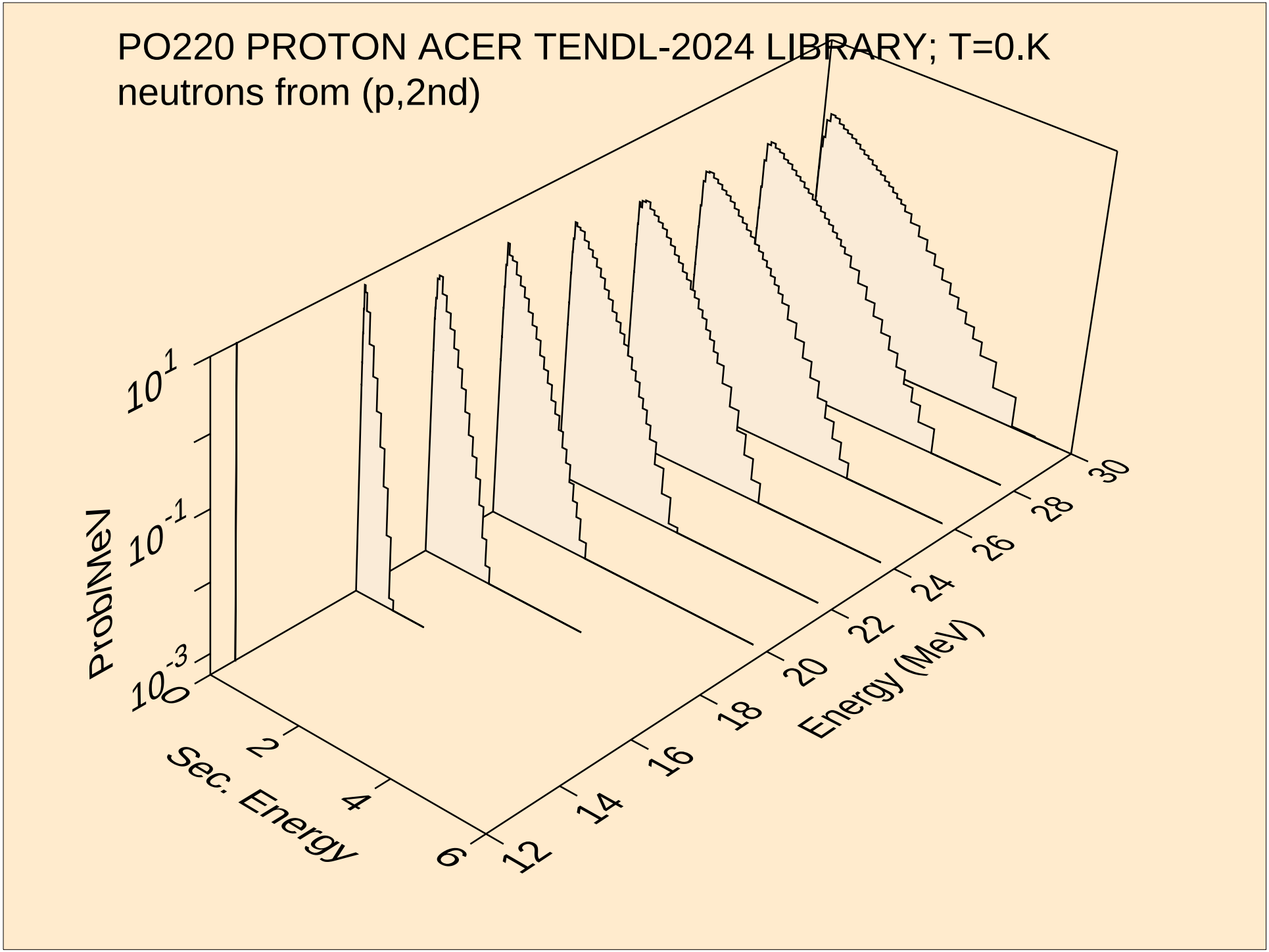

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Particle heating contributions
neutrons
deuterons
tritons
he-3
alphas
MeV/collision
Energy (MeV)
0
1
2
3
4
5
0
50
100
150
200


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Recoil Heating
recoil heating
Heating (MeV/reaction)
Energy (MeV)
0
1
2
3
4
5
0
50
100
150
200

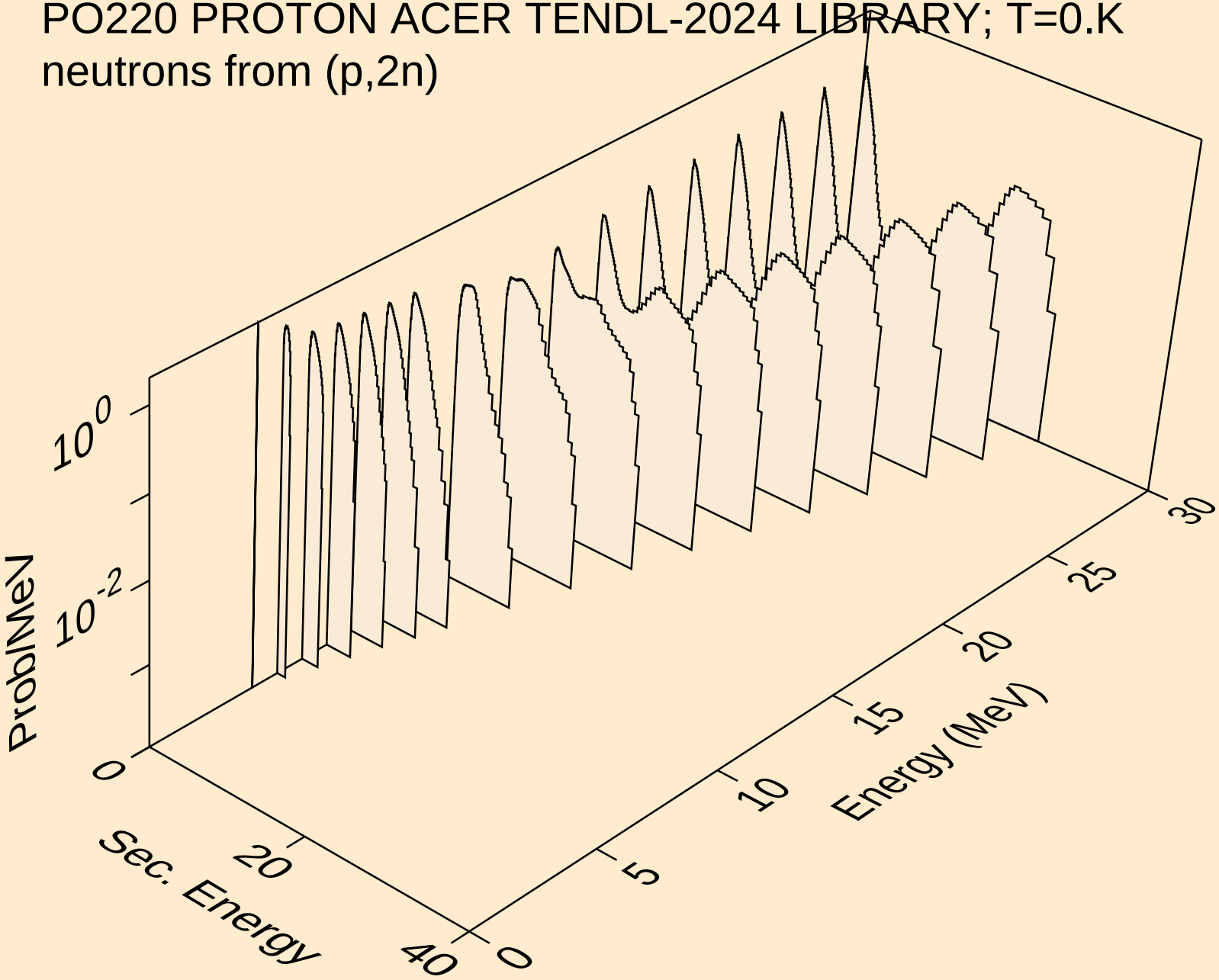

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
Particle production cross sections
neutrons
deuterons
tritons
he-3
alphas
Cross section (barns)
Energy (MeV)
0
2
4
6
8
10
12
14
0
50
100
150
200

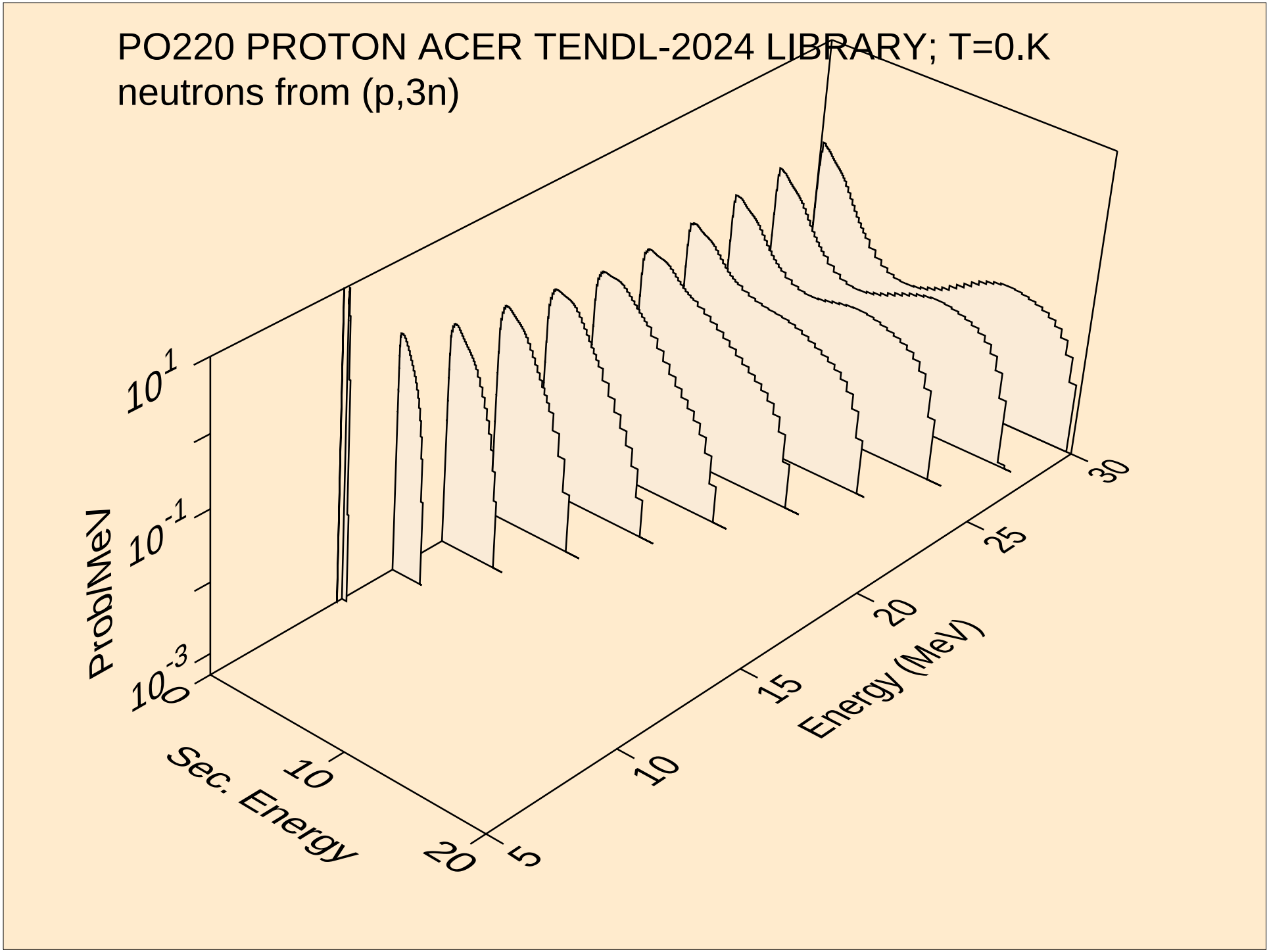

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,n)
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

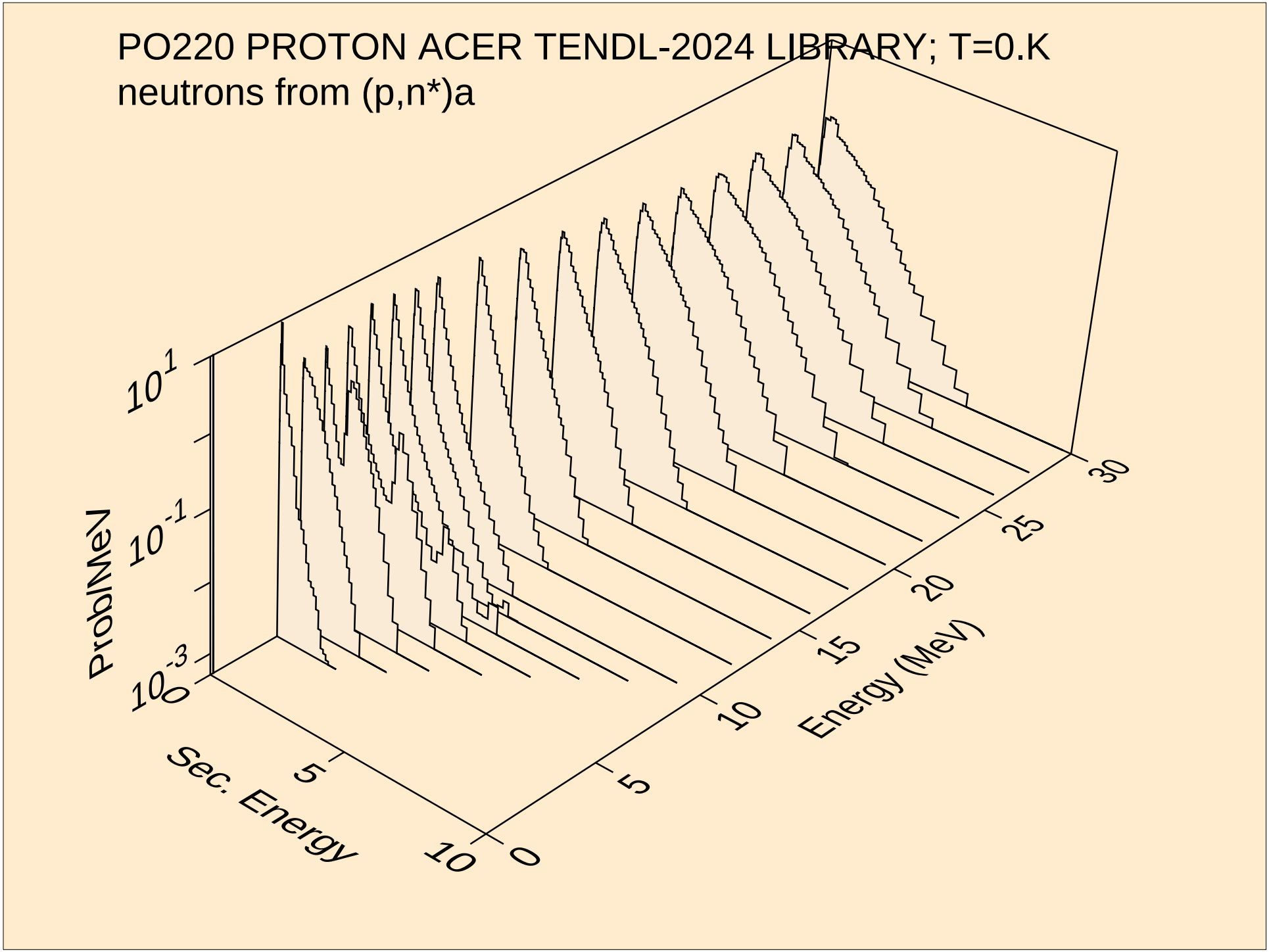

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,x)
Prob/MeV
10-2
10-4
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)

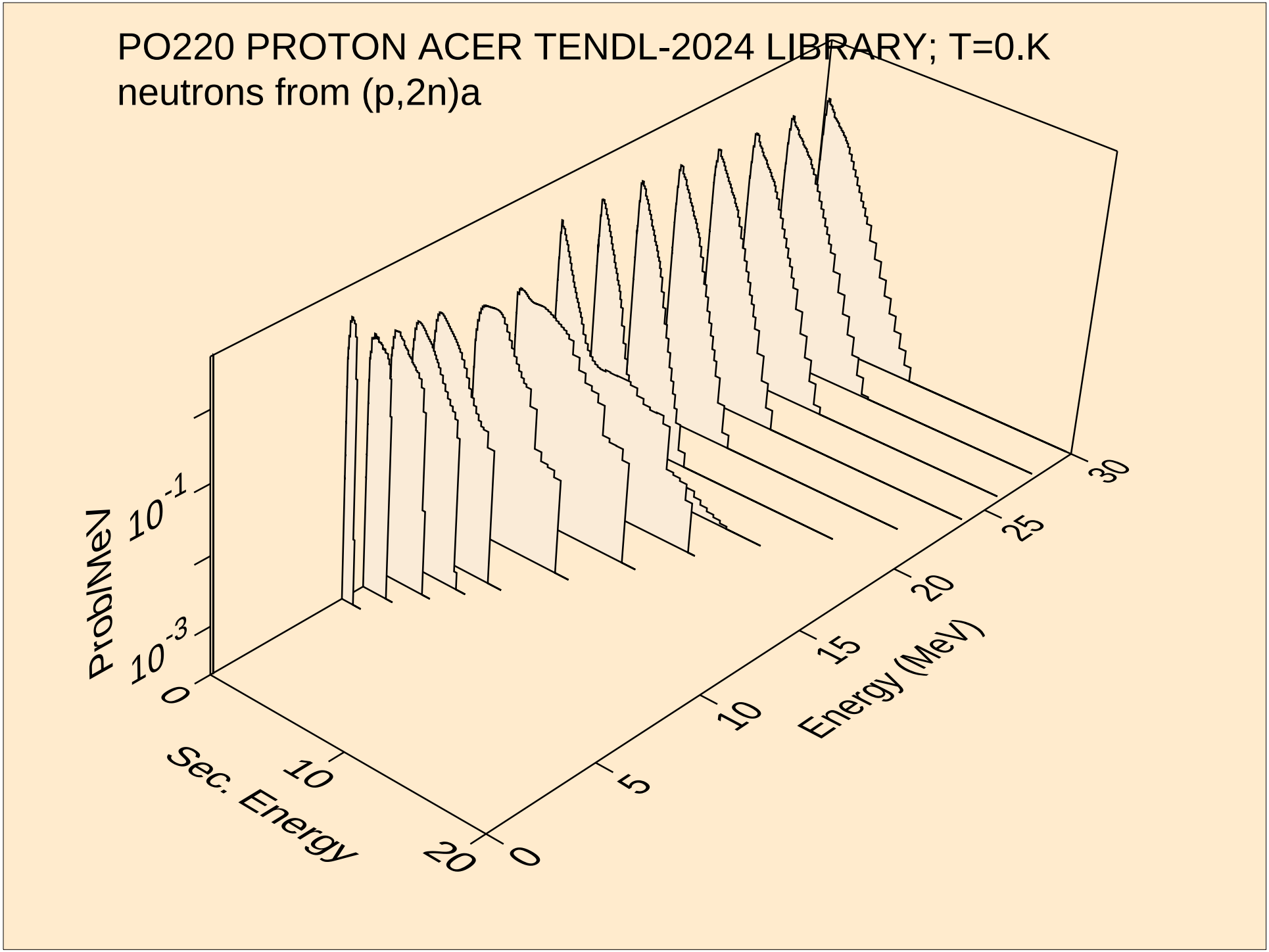

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,2nd)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
Sec. Energy
0
2
4
6
Energy (MeV)
12
14
16
18
20
22
24
26
28
30

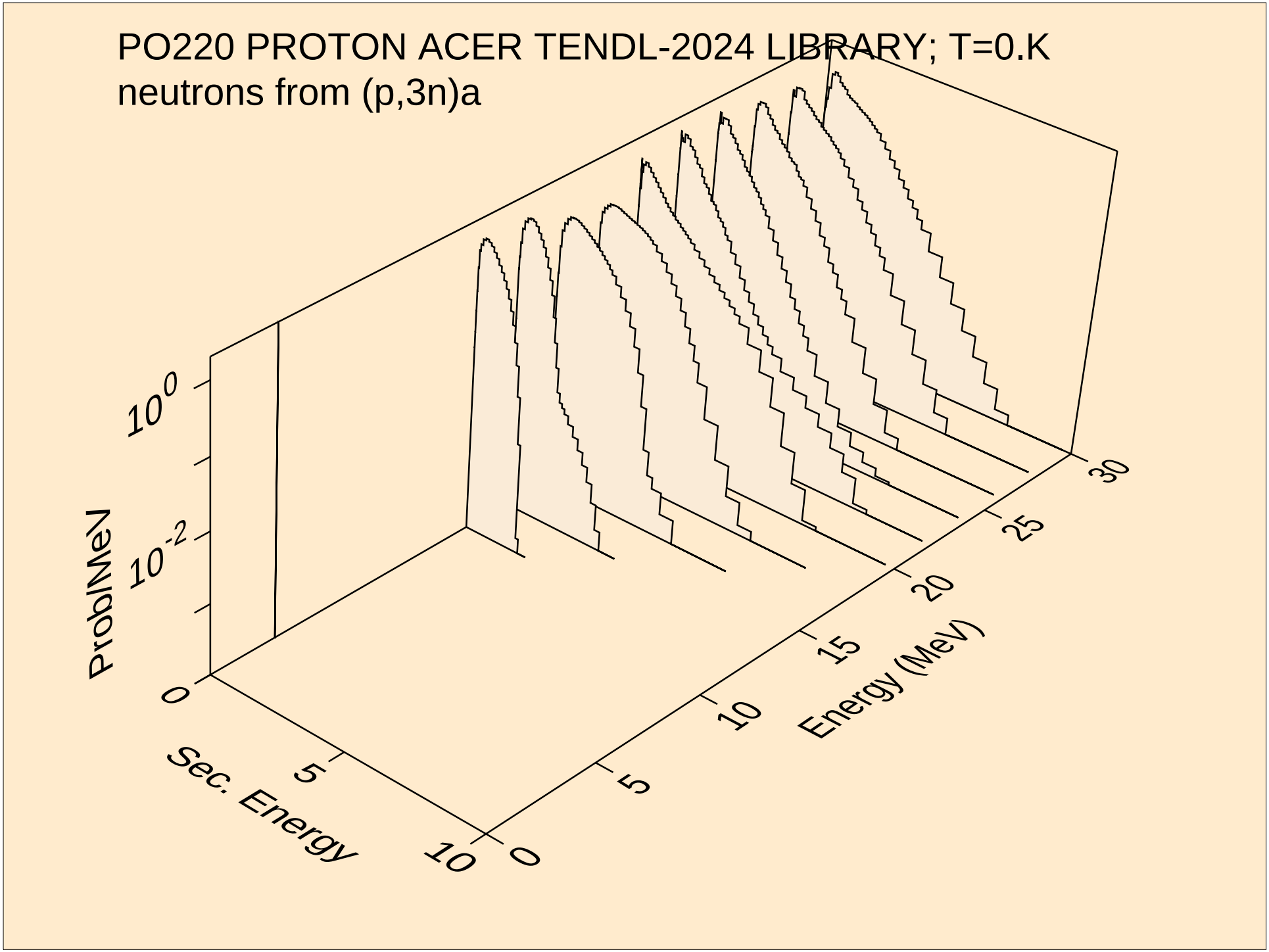
PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,2n)

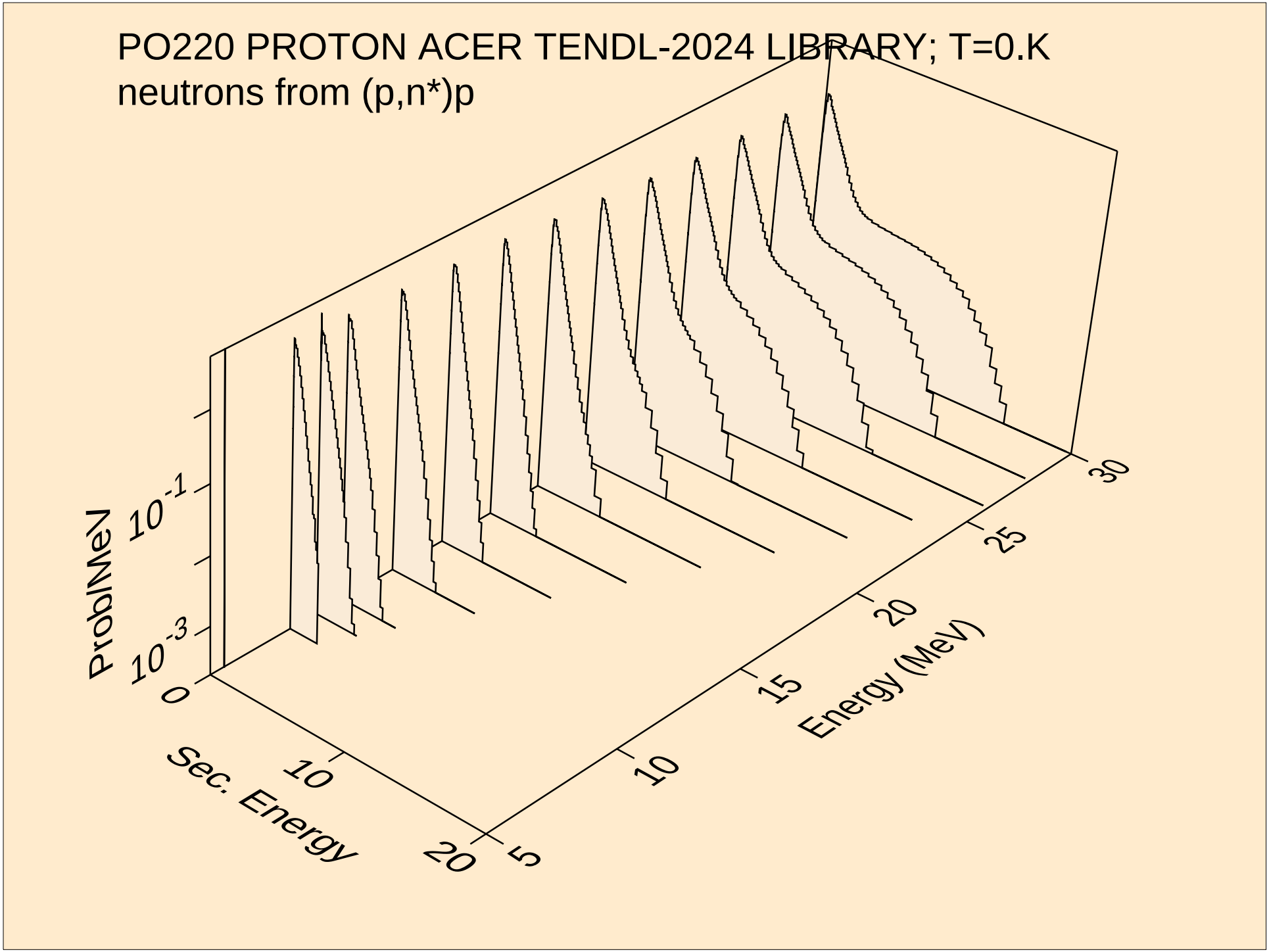


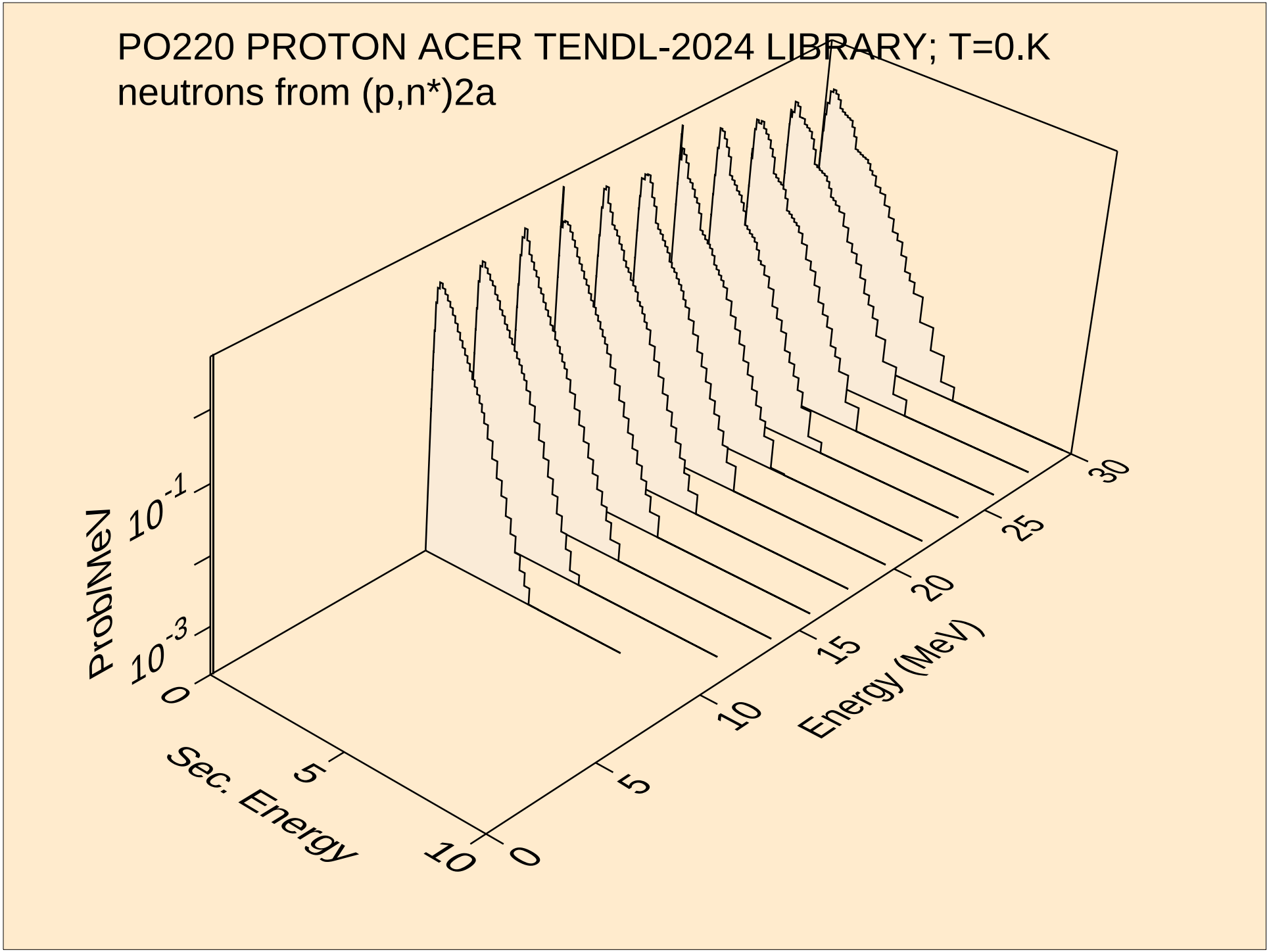

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,3n)
Prob/MeV
10^1
10^-1
10^-3
0
10
20
Sec. Energy
5
10
15
20
25
30
Energy (MeV)

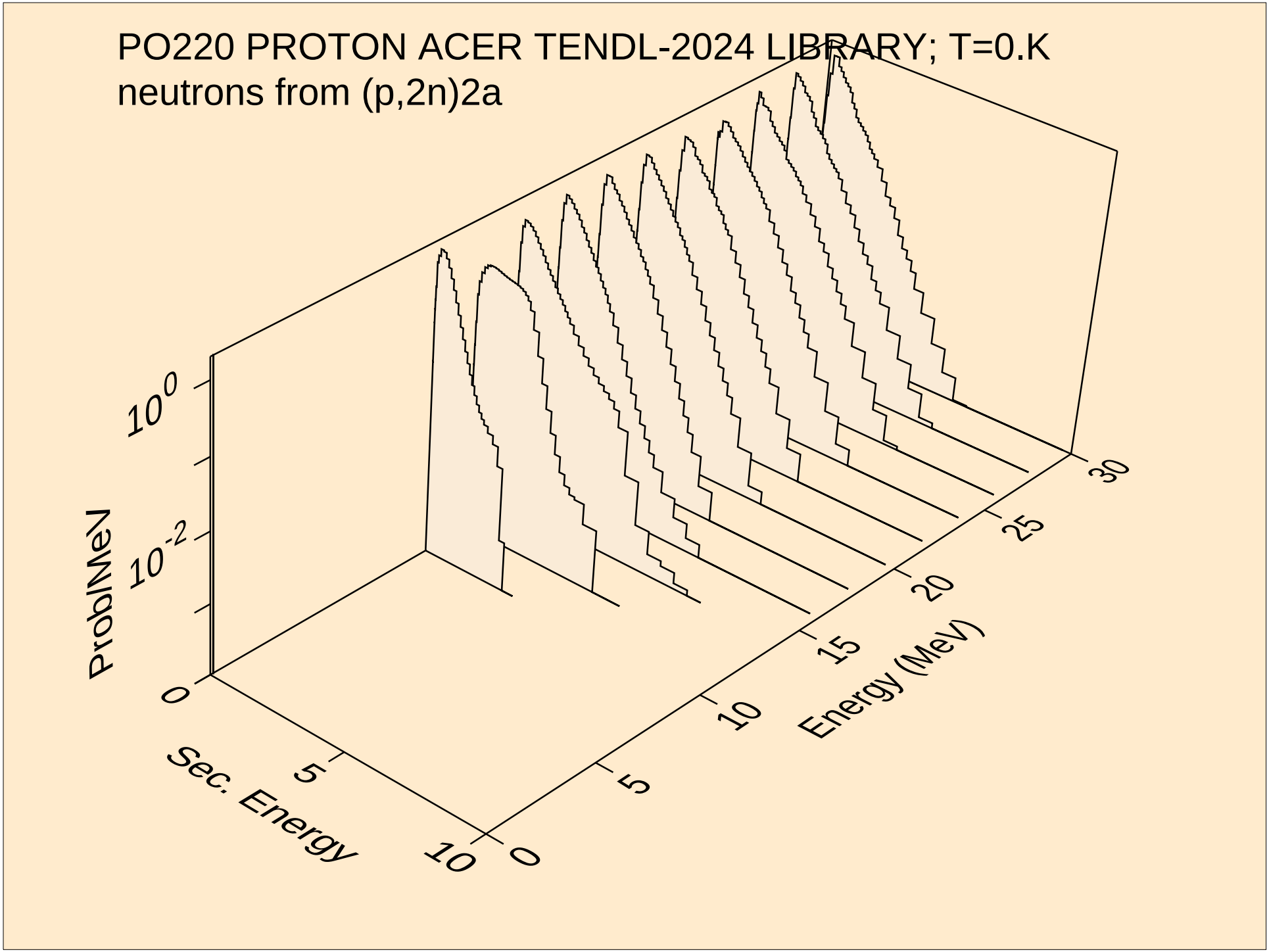

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,n*)a
Prob/MeV
10^1
10^-1
10^-3
Sec. Energy
0
5
10
Energy (MeV)
0
5
10
15
20
25
30

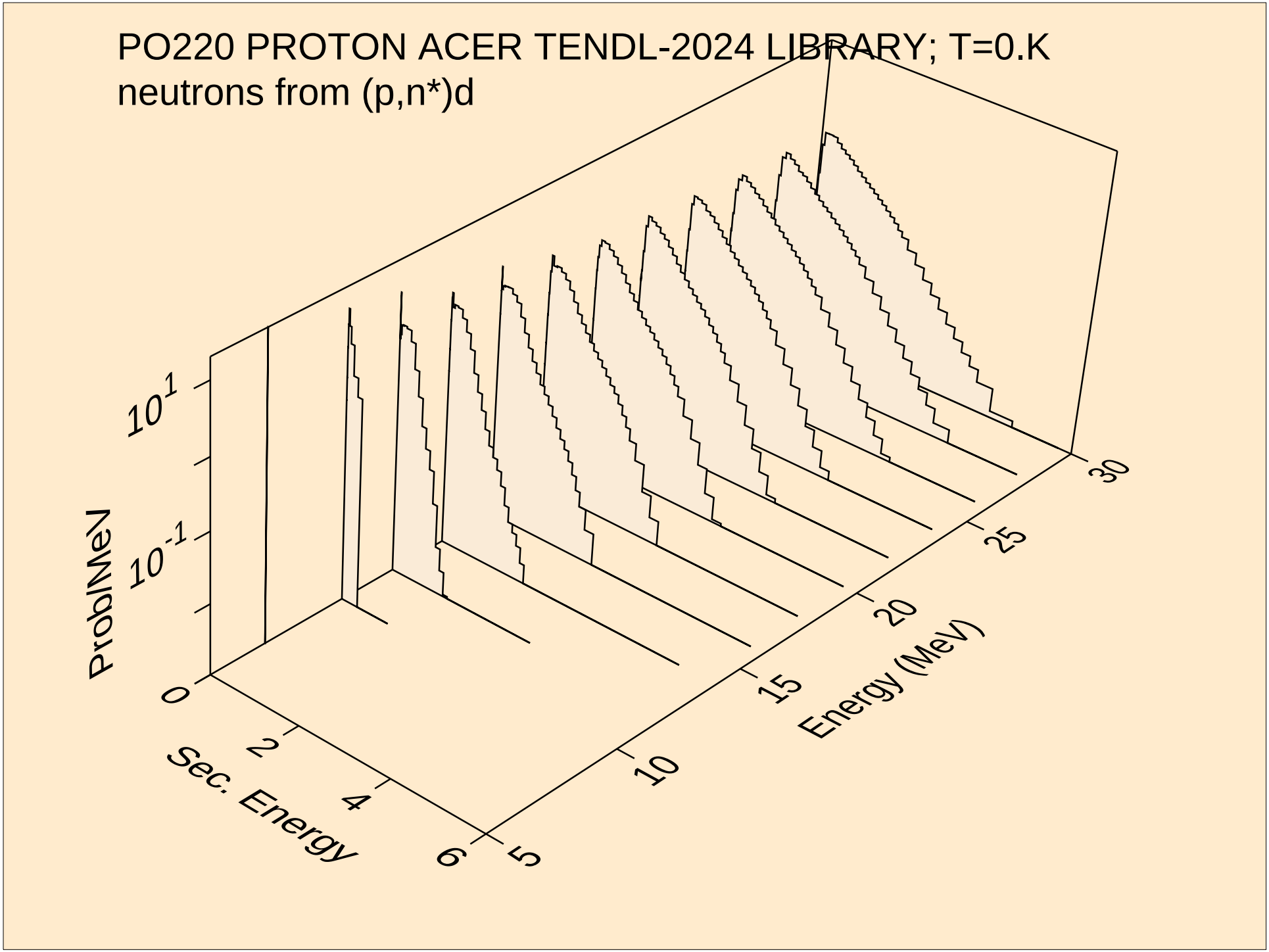

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,2n)a
Prob/MeV
10-1
10-3
0
Sec. Energy
10
20
0
5
10
15
20
25
30
Energy (MeV)

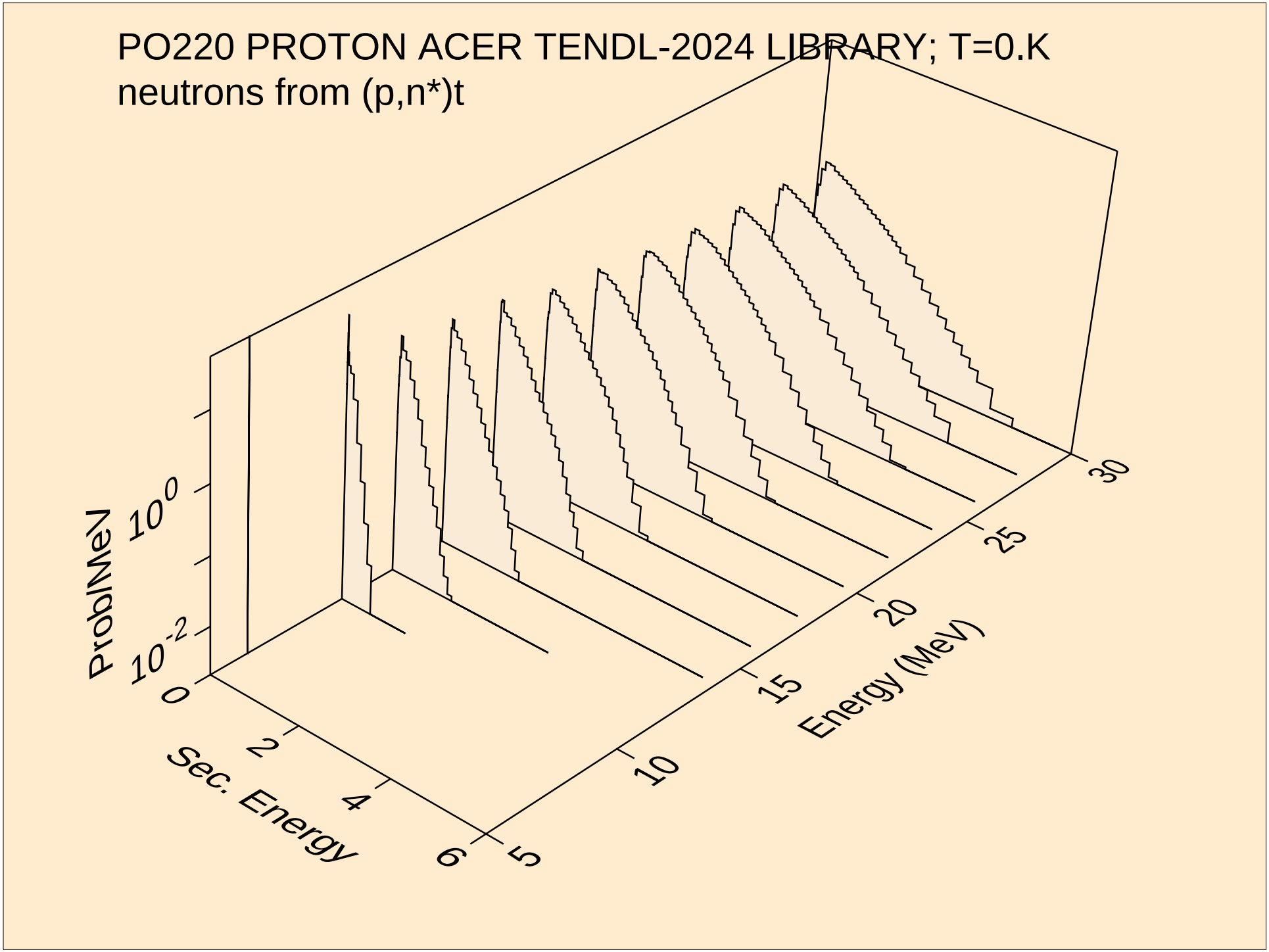

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,3n)a
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
5
10
0
5
10
15
20
25
30
Energy (MeV)

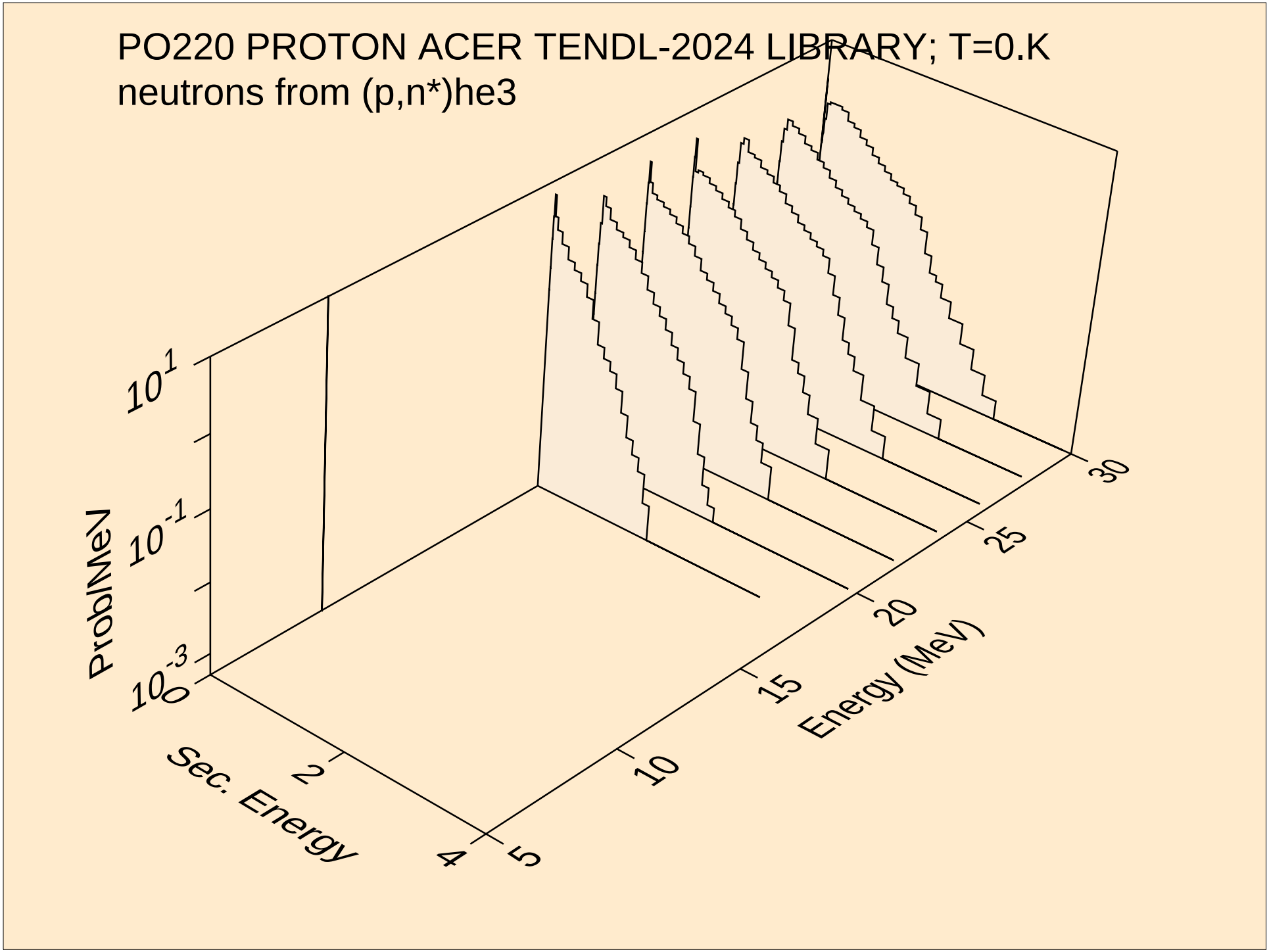

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,n*)p
Prob/MeV
10^-1
10^-3
0
10
20
Sec. Energy
5
10
15
20
25
30
Energy (MeV)

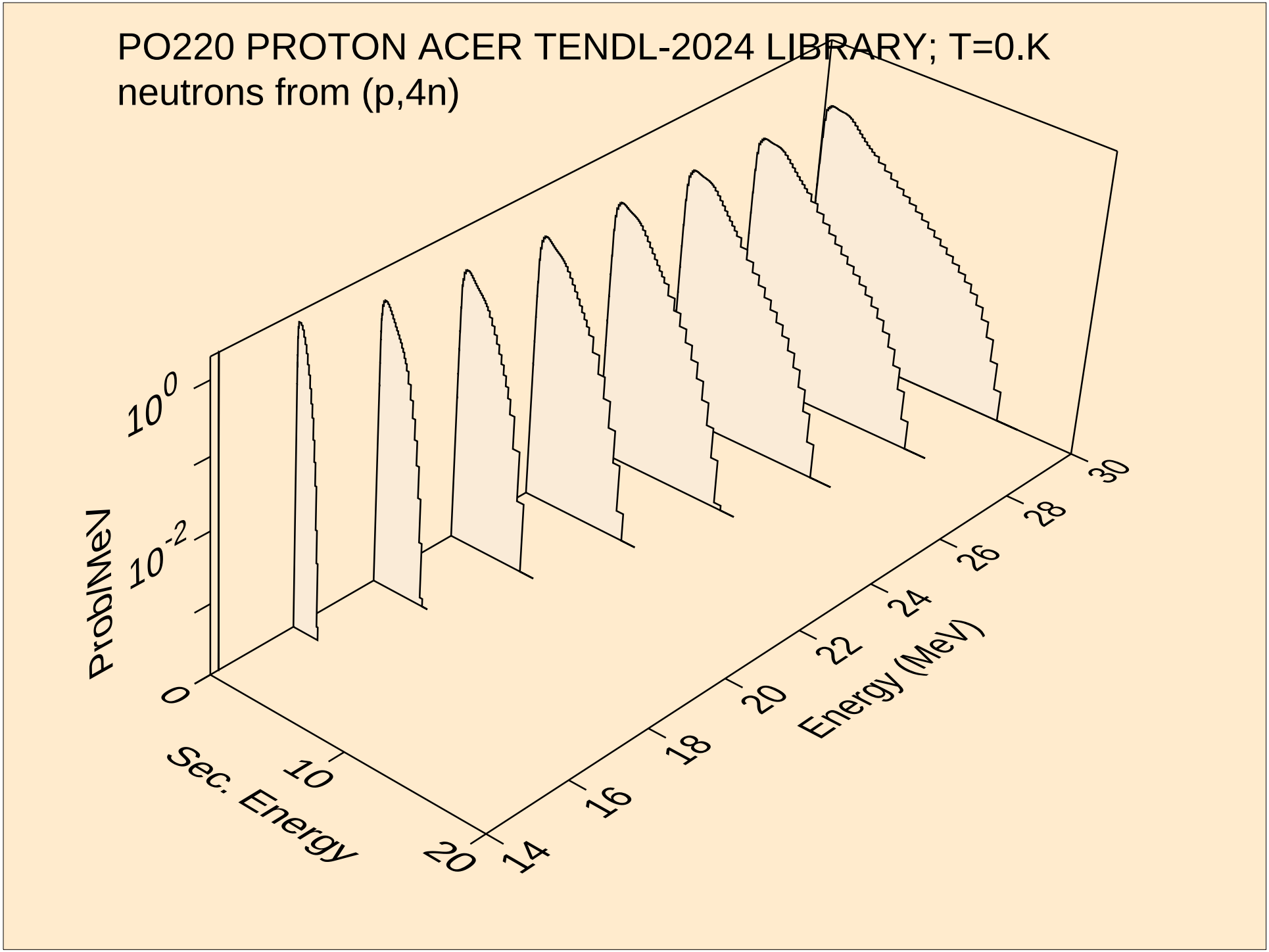

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,n*)2a
Prob/MeV
10-1
10-3
0
Sec. Energy
5
10
0
5
10
15
20
25
30
Energy (MeV)

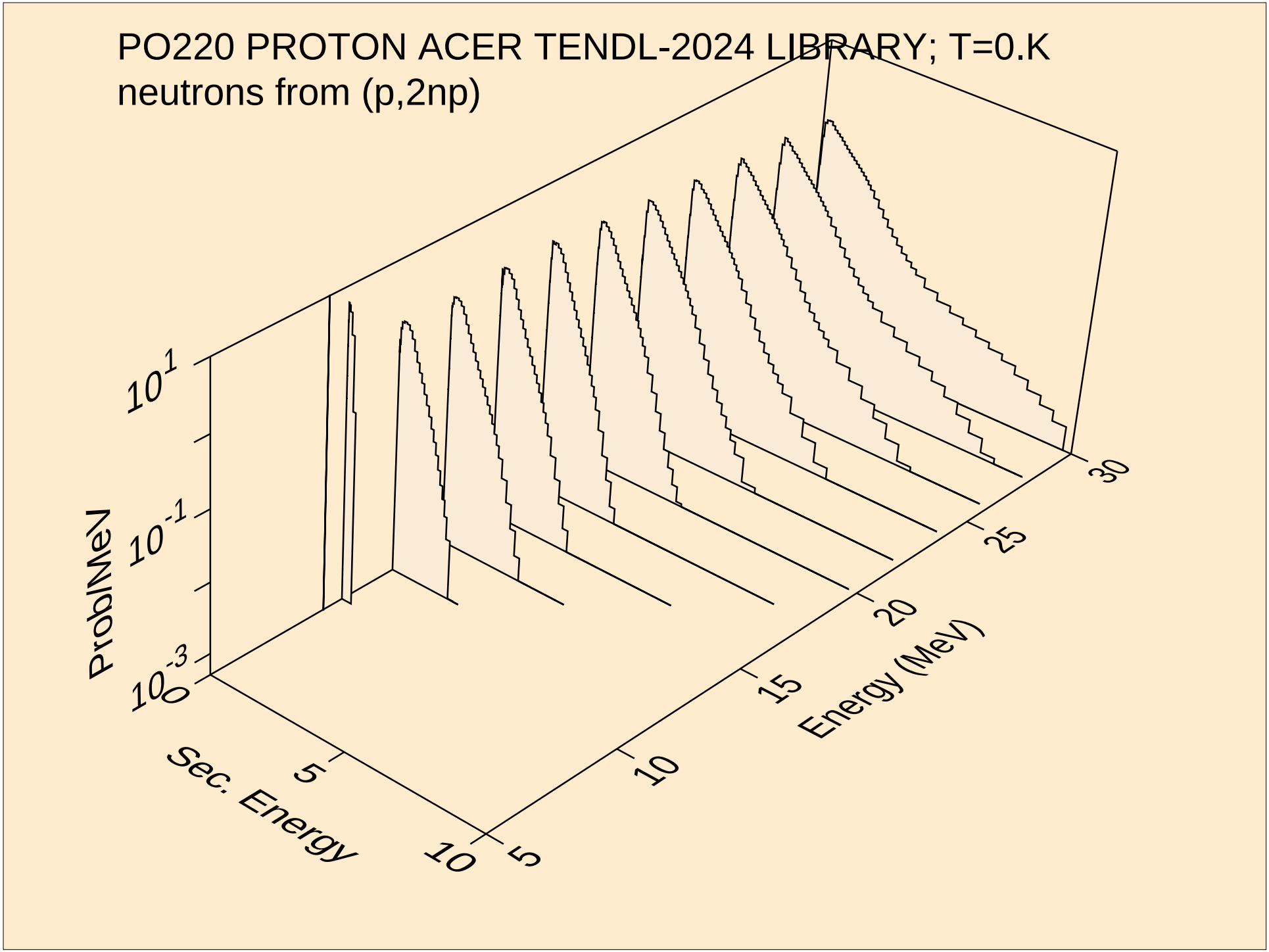

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,2n)2a
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
5
10
0
5
10
15
20
25
30
Energy (MeV)

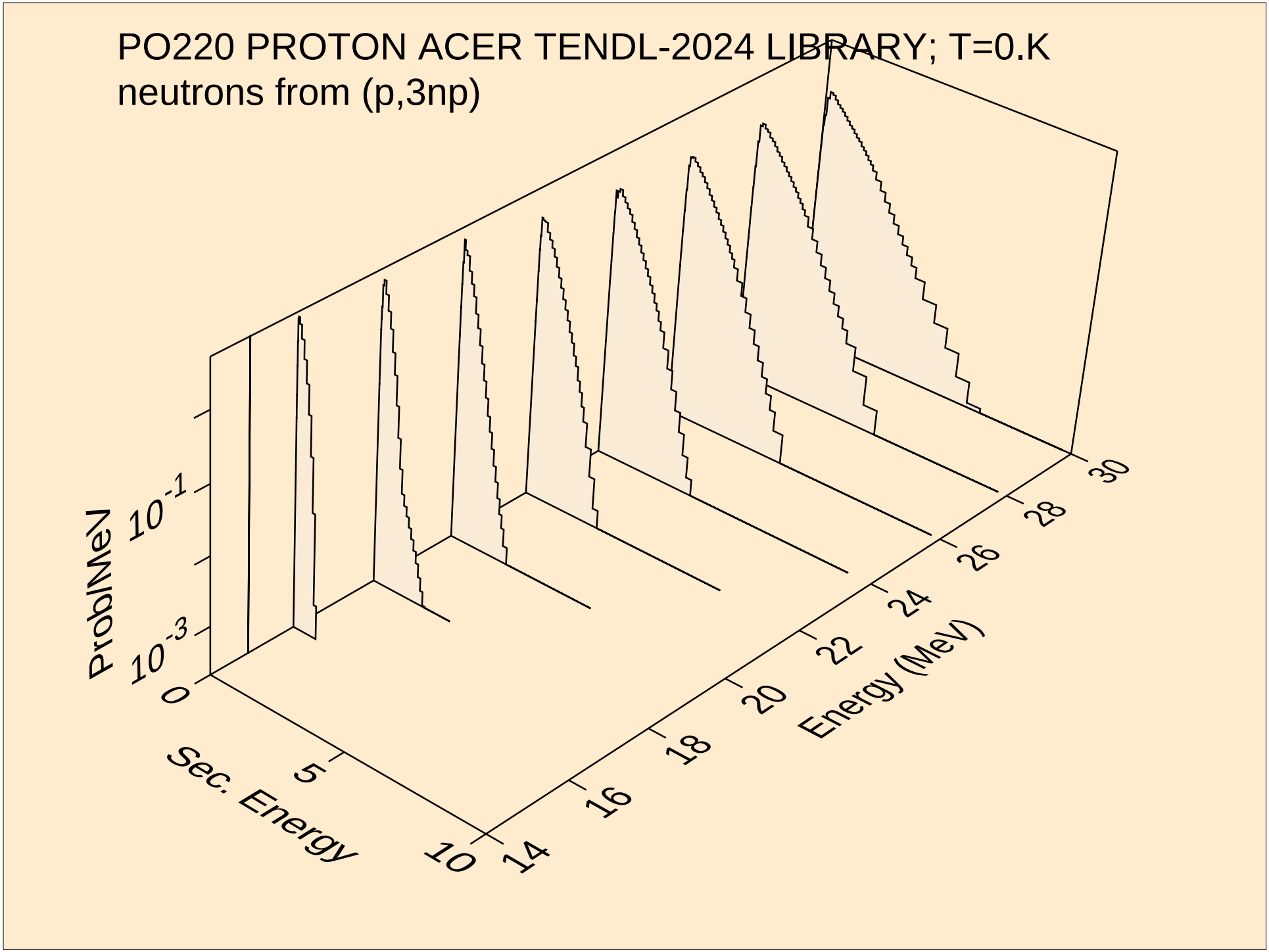

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,n*)d
Prob/MeV
10^1
10^-1
0
2
4
6
Sec. Energy
5
10
15
20
25
30
Energy (MeV)

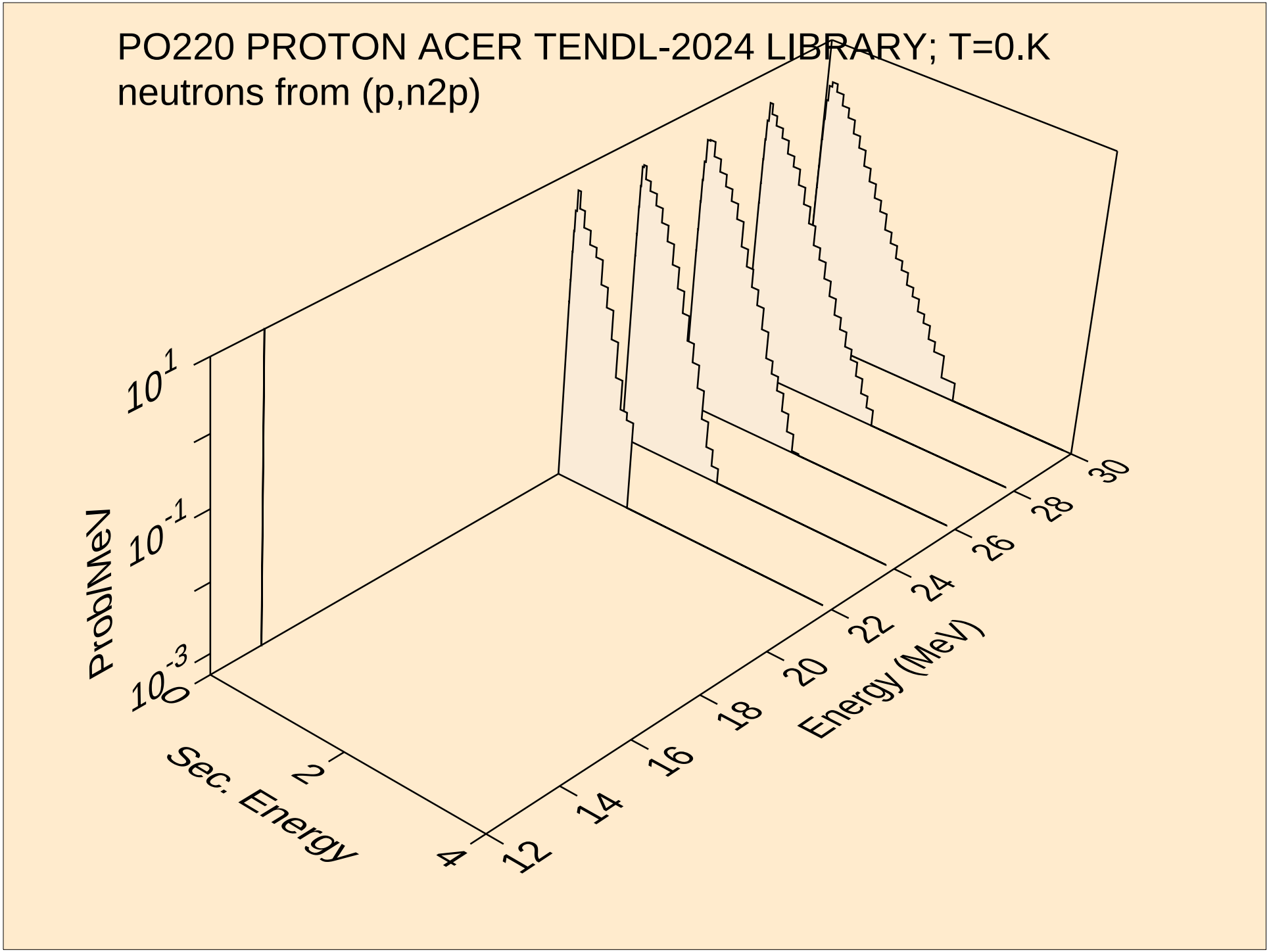

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,n*)t
Prob/MeV
10^{0}
10^{-2}
0
2
4
6
Sec. Energy
5
10
15
20
25
30
Energy (MeV)

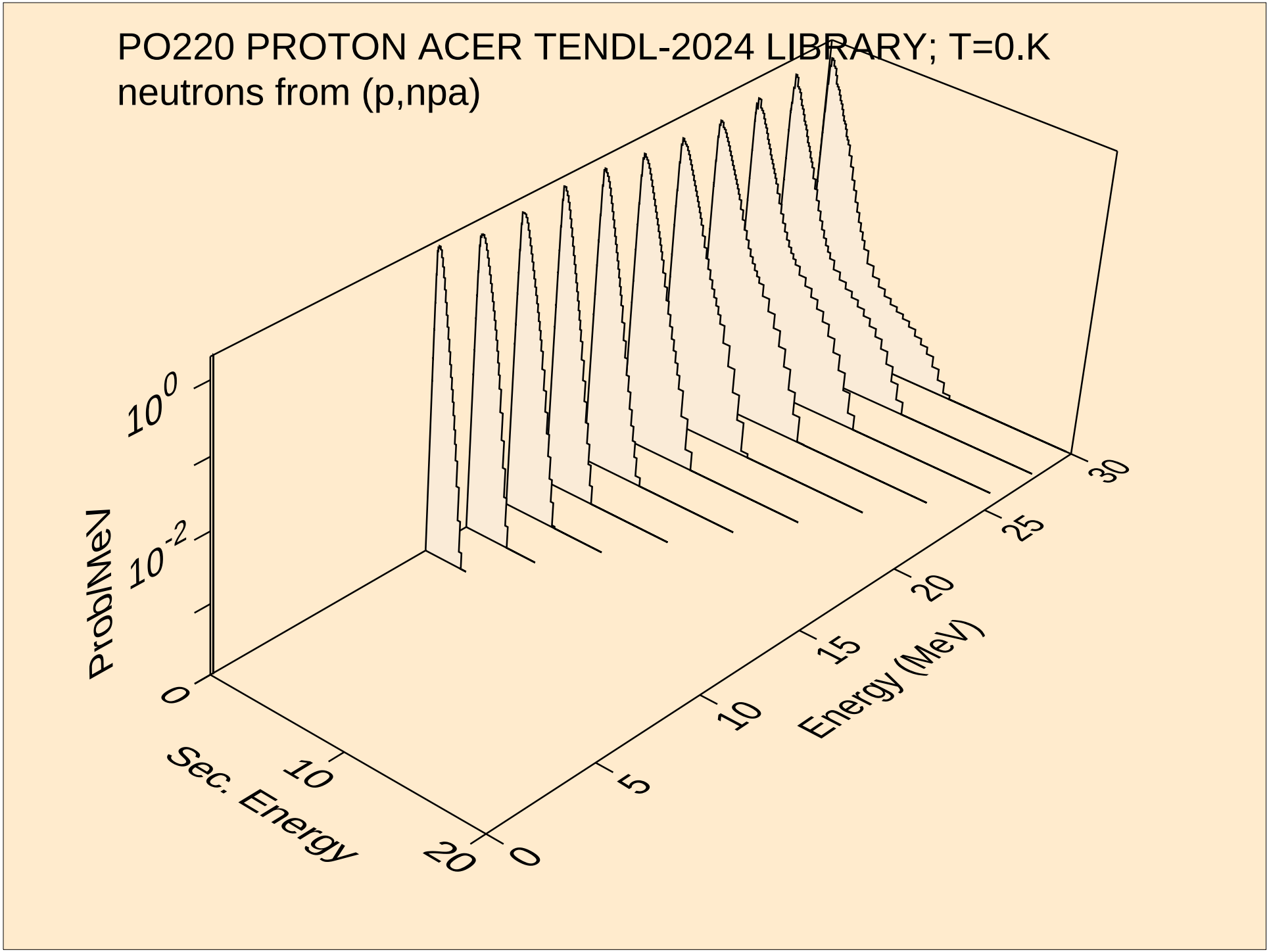

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,n*)he3
Prob/MeV
10^1
10^-1
10^-3
Sec. Energy
0
2
4
5
10
15
20
25
30
Energy (MeV)


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,4n)
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
10
20
14
16
18
20
22
24
26
28
30
Energy (MeV)

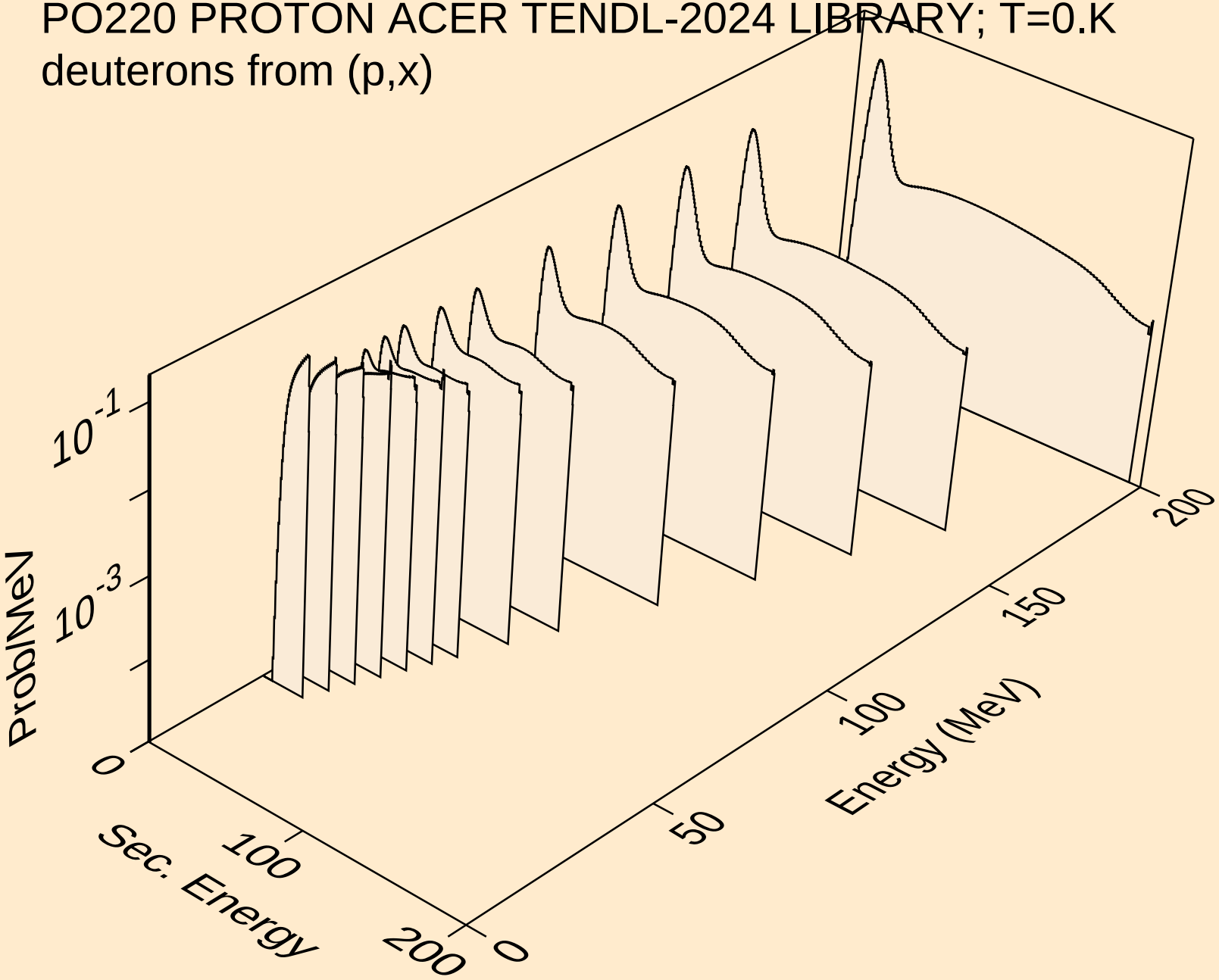

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,2np)
Prob/MeV
10^1
10^-1
10^-3
Sec. Energy
0
5
10
Energy (MeV)
5
10
15
20
25
30

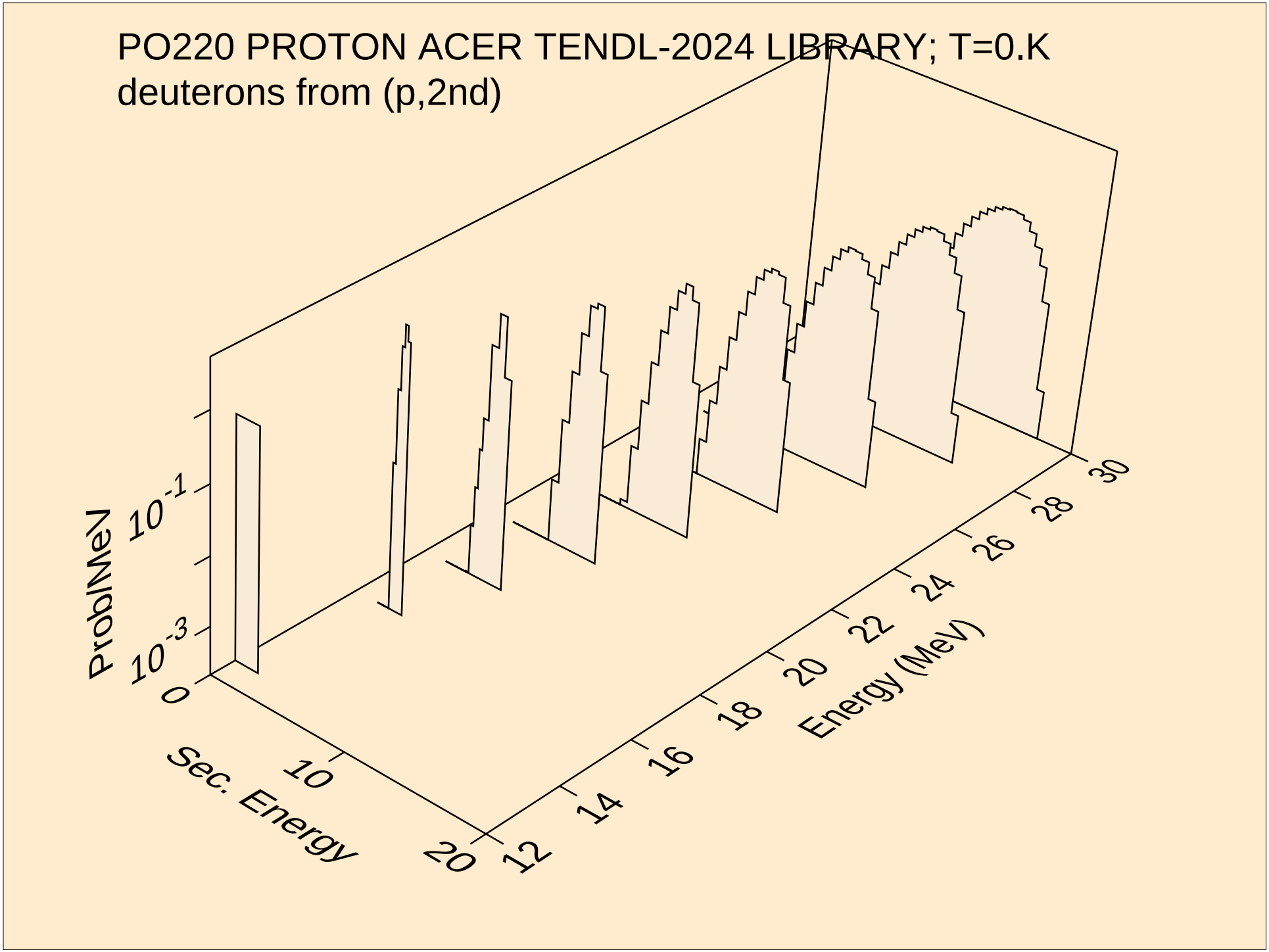

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,3np)
Prob/MeV
10^-1
10^-3
0
Sec. Energy
5
10
14
16
18
20
22
24
26
28
30
Energy (MeV)

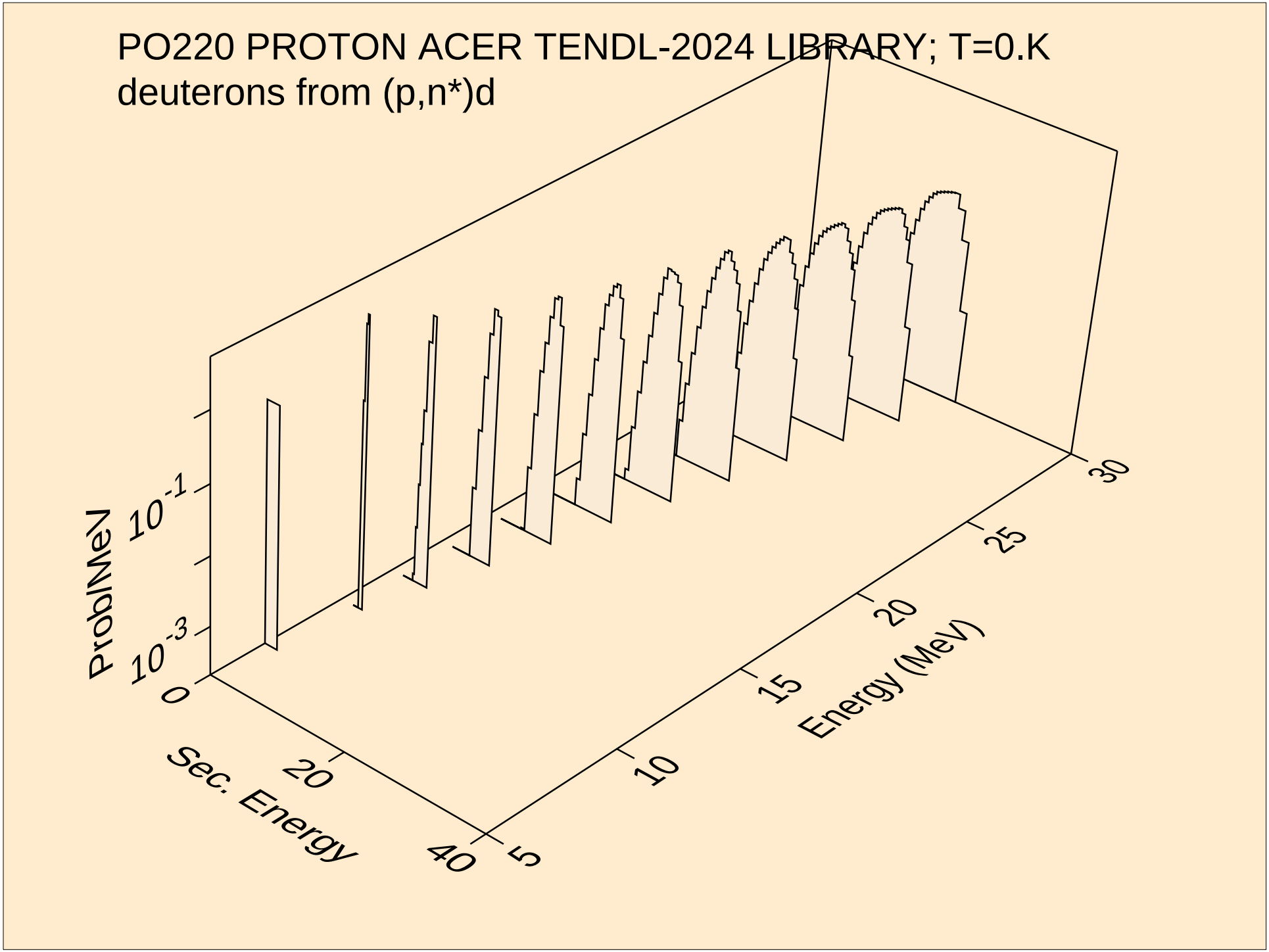

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,n2p)
Prob/MeV
10^1
10^-1
10^-3
0
2
4
Sec. Energy
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

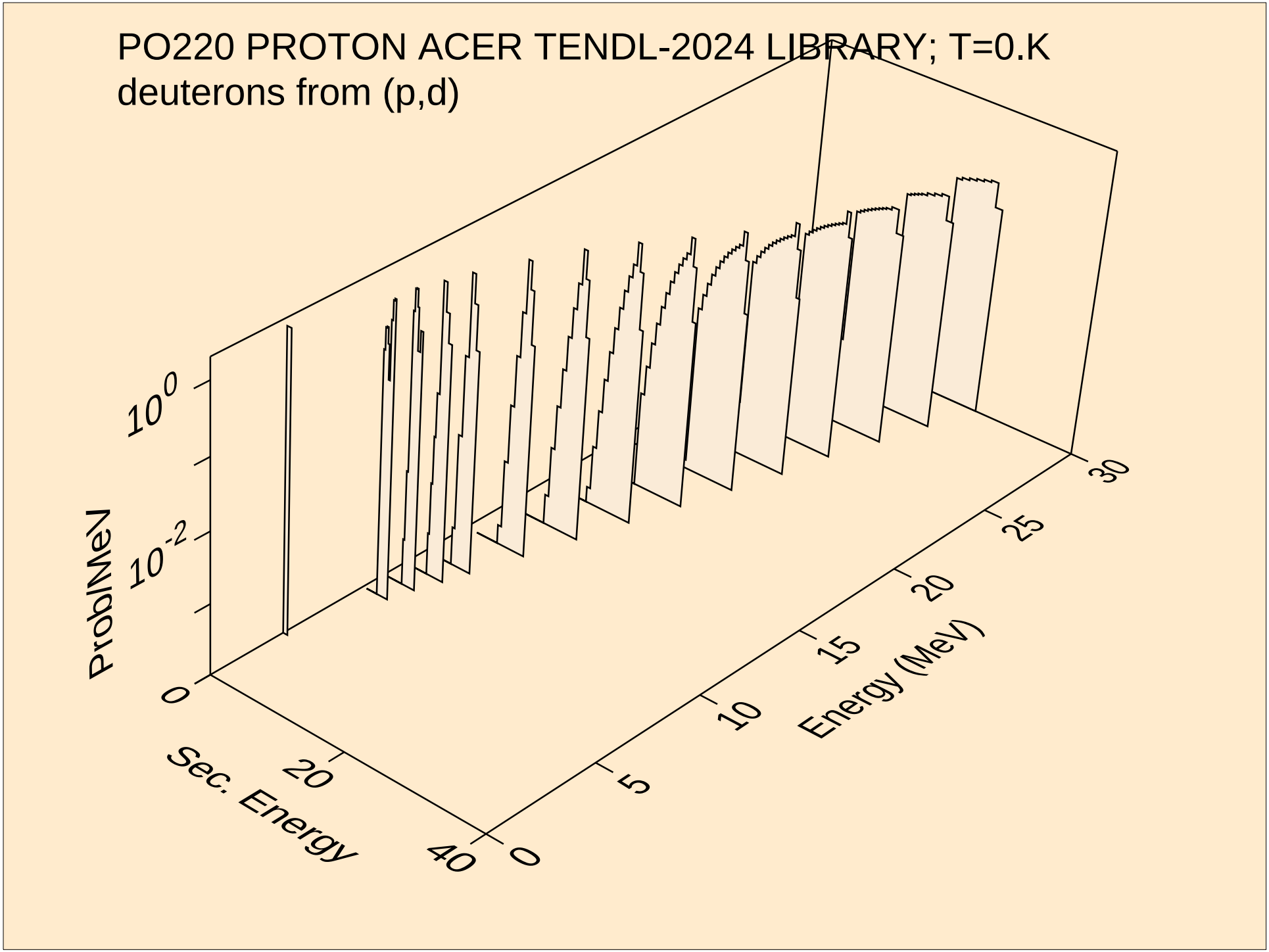

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
neutrons from (p,npa)
Prob/MeV
10^0
10^{-2}
0
10
20
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

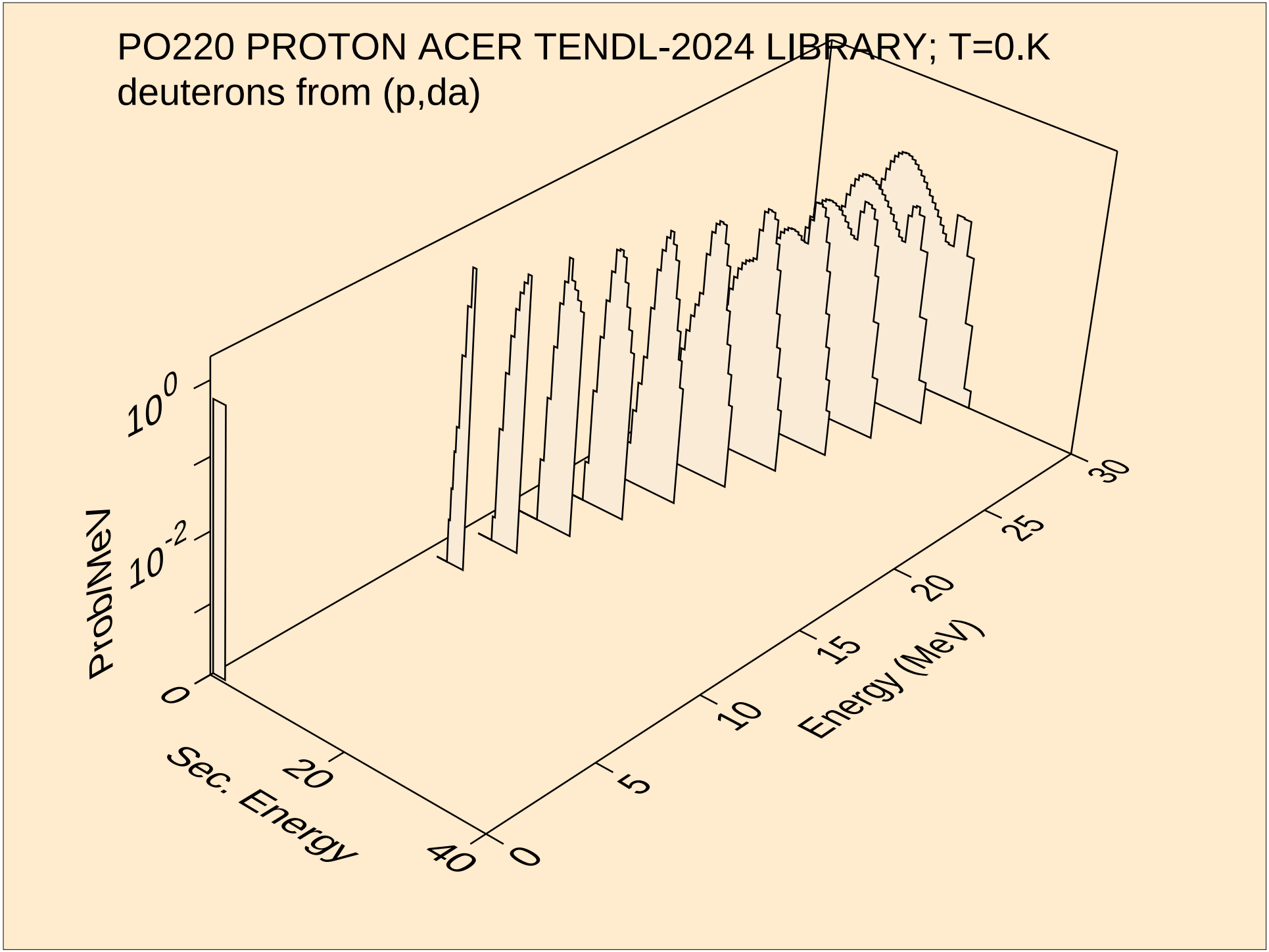
PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
deuterons from (p,x)

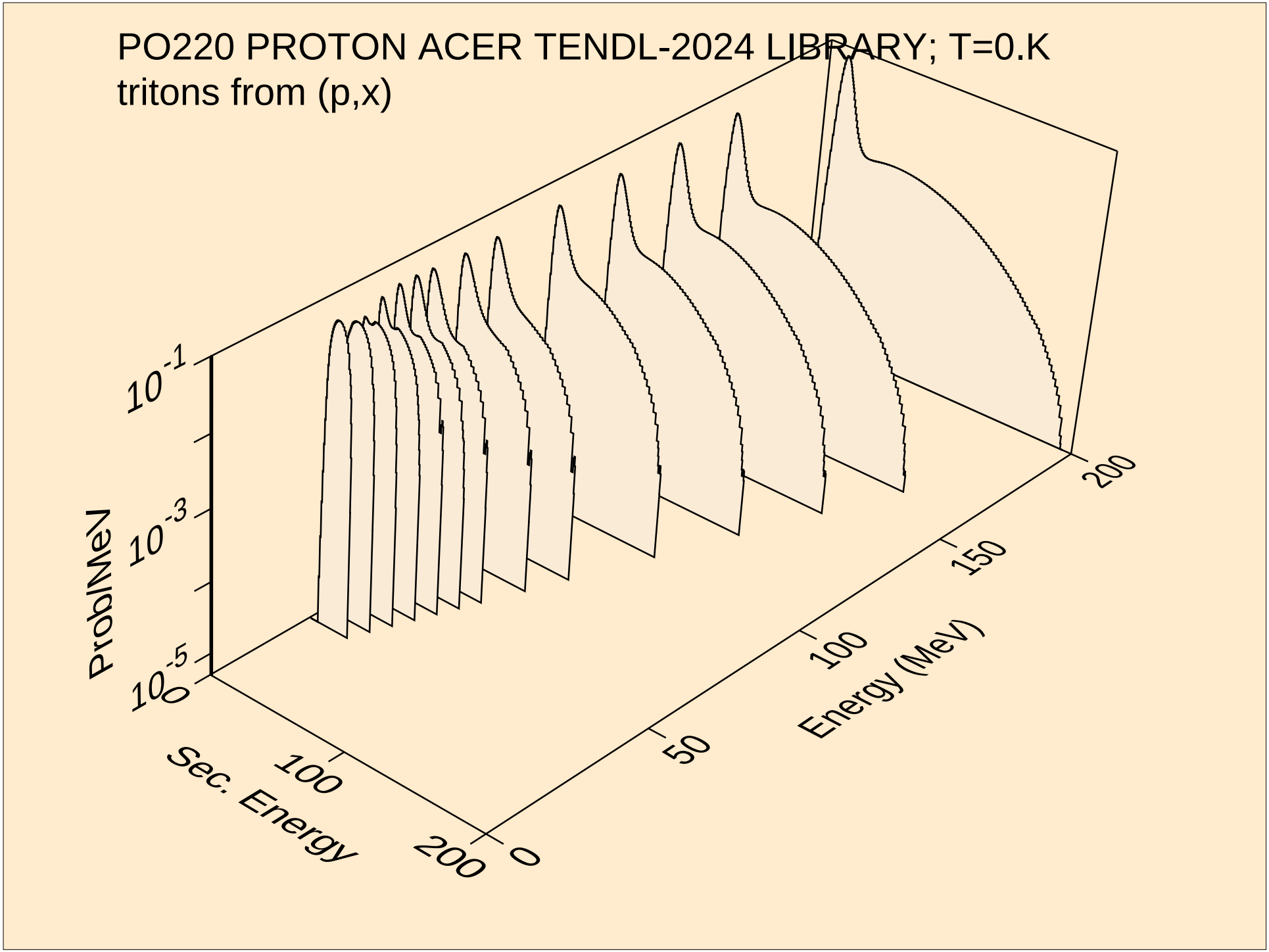


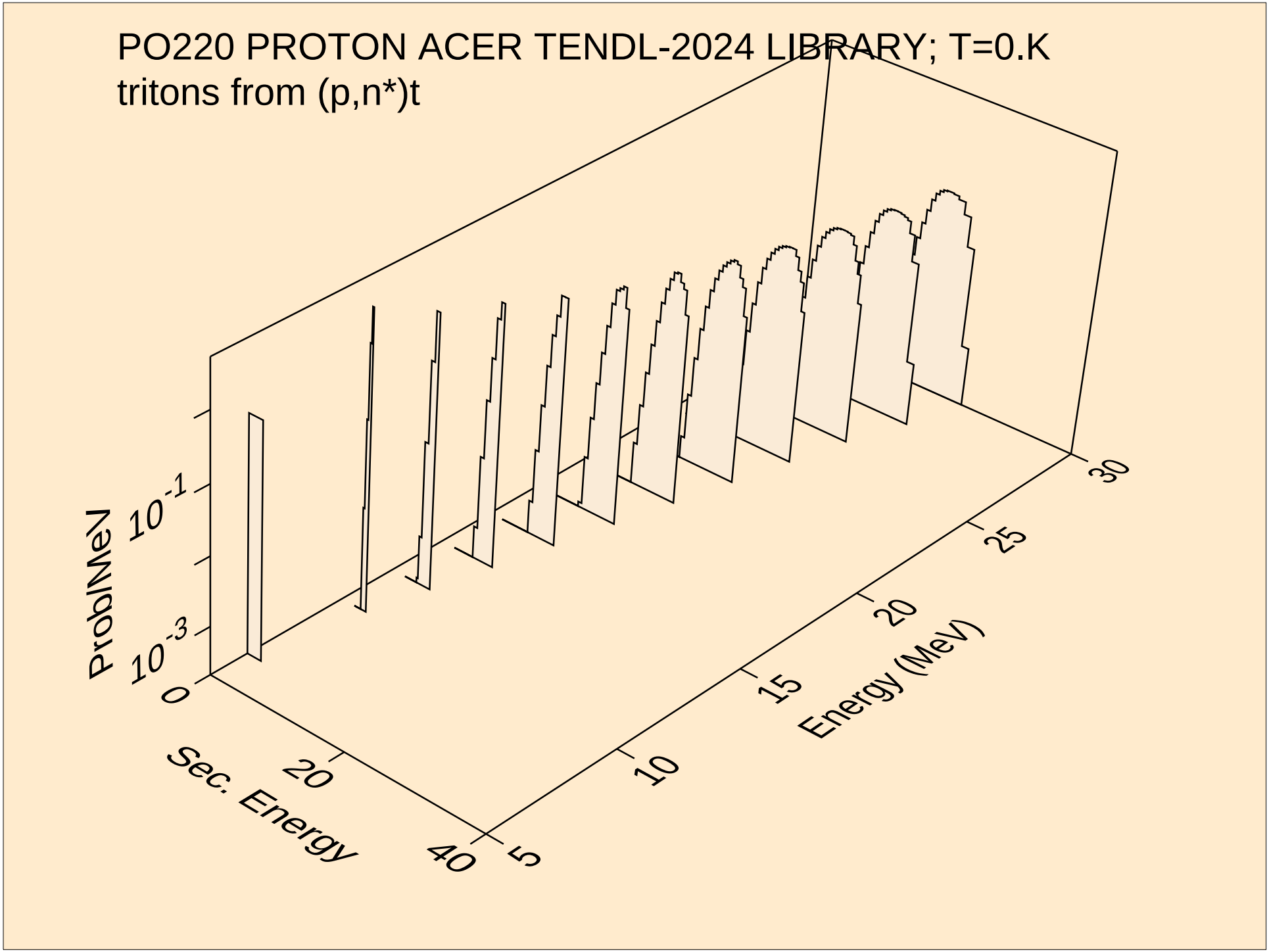

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
deuterons from (p,2nd)
Prob/MeV
10^-1
10^-3
0
Sec. Energy
10
20
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

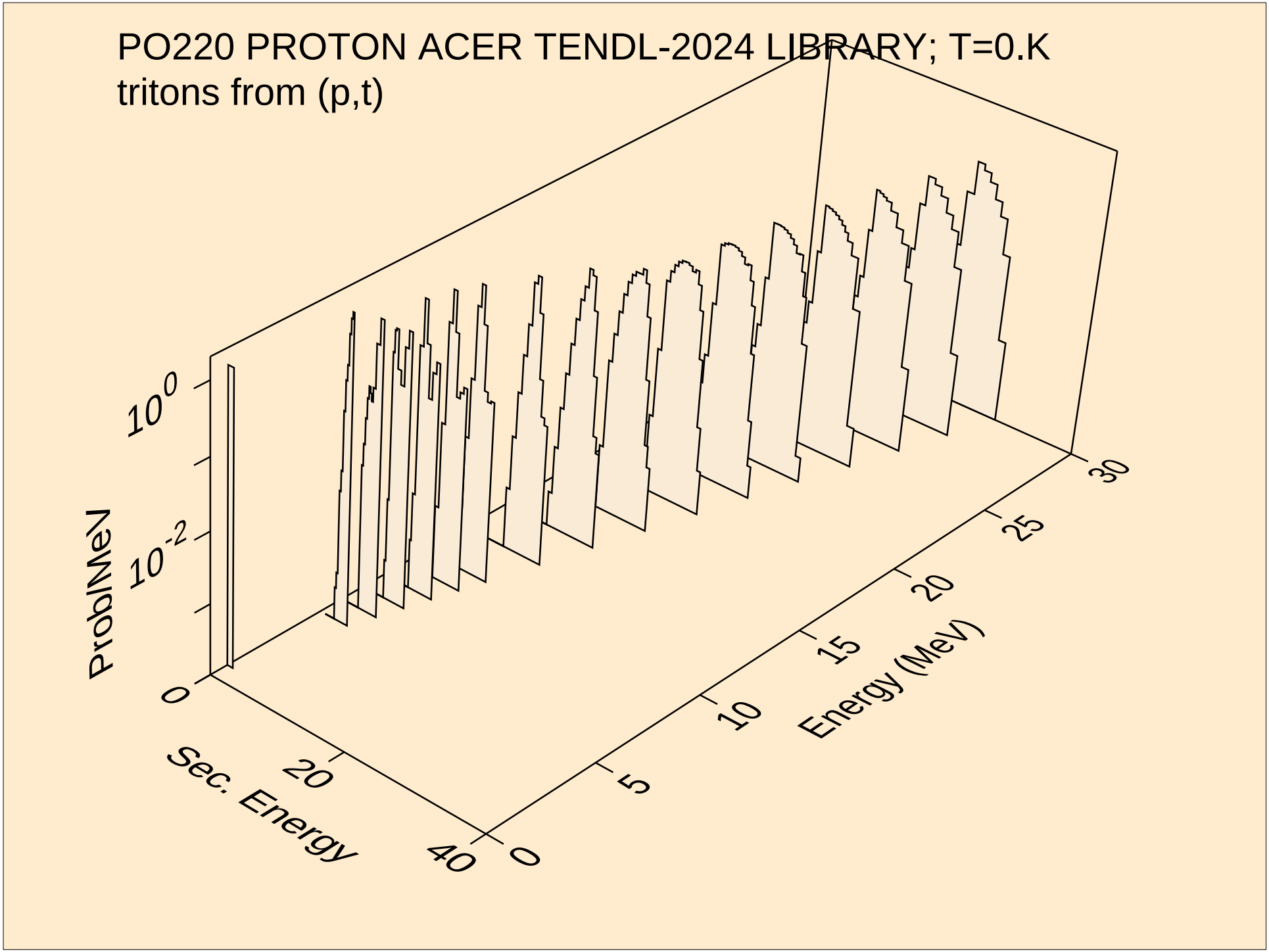

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
deuterons from (p,n*)d
Prob/MeV
10-1
10-3
0
Sec. Energy
20
40
Energy (MeV)
5
10
15
20
25
30

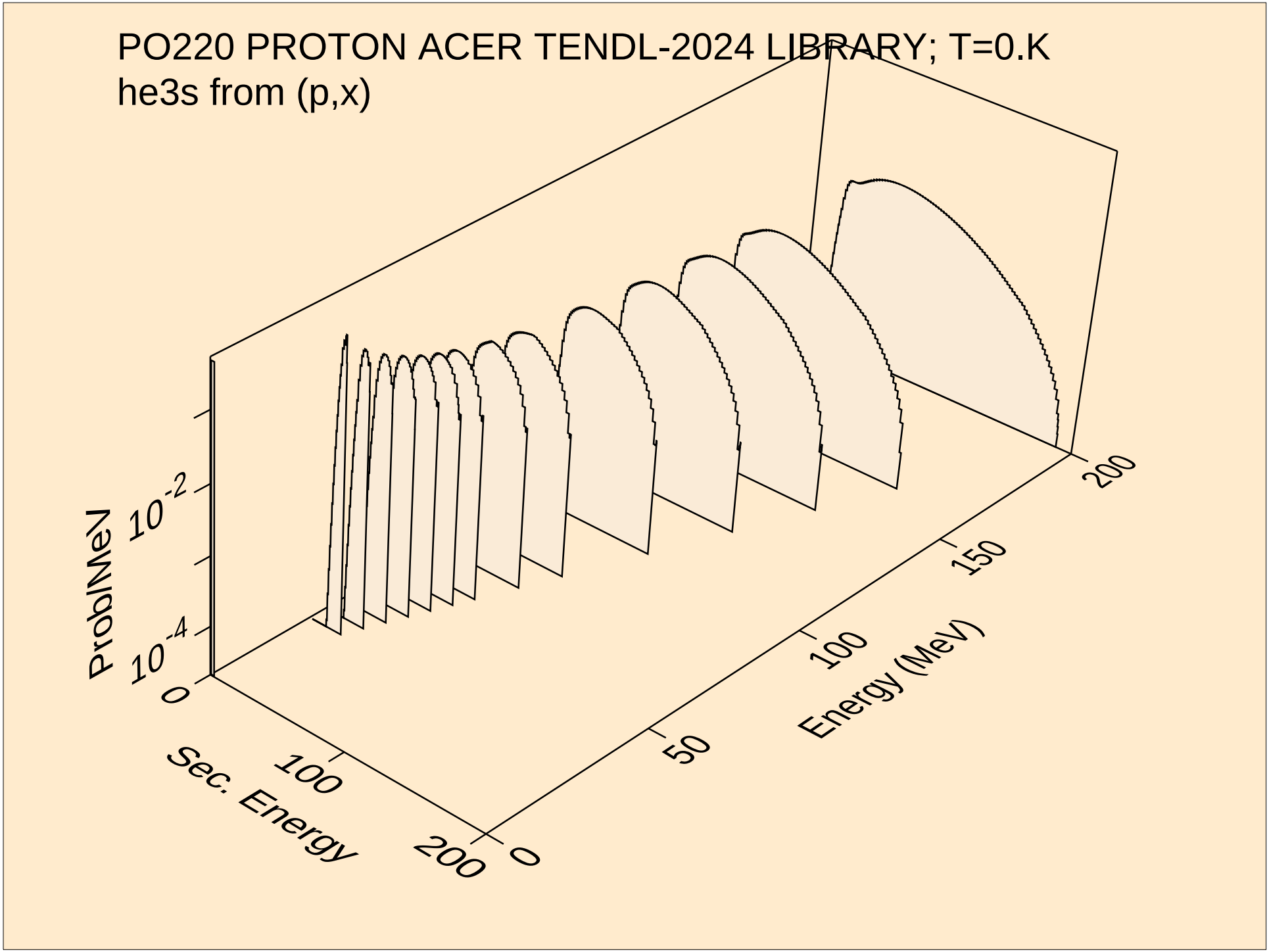

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
deuterons from (p,d)
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

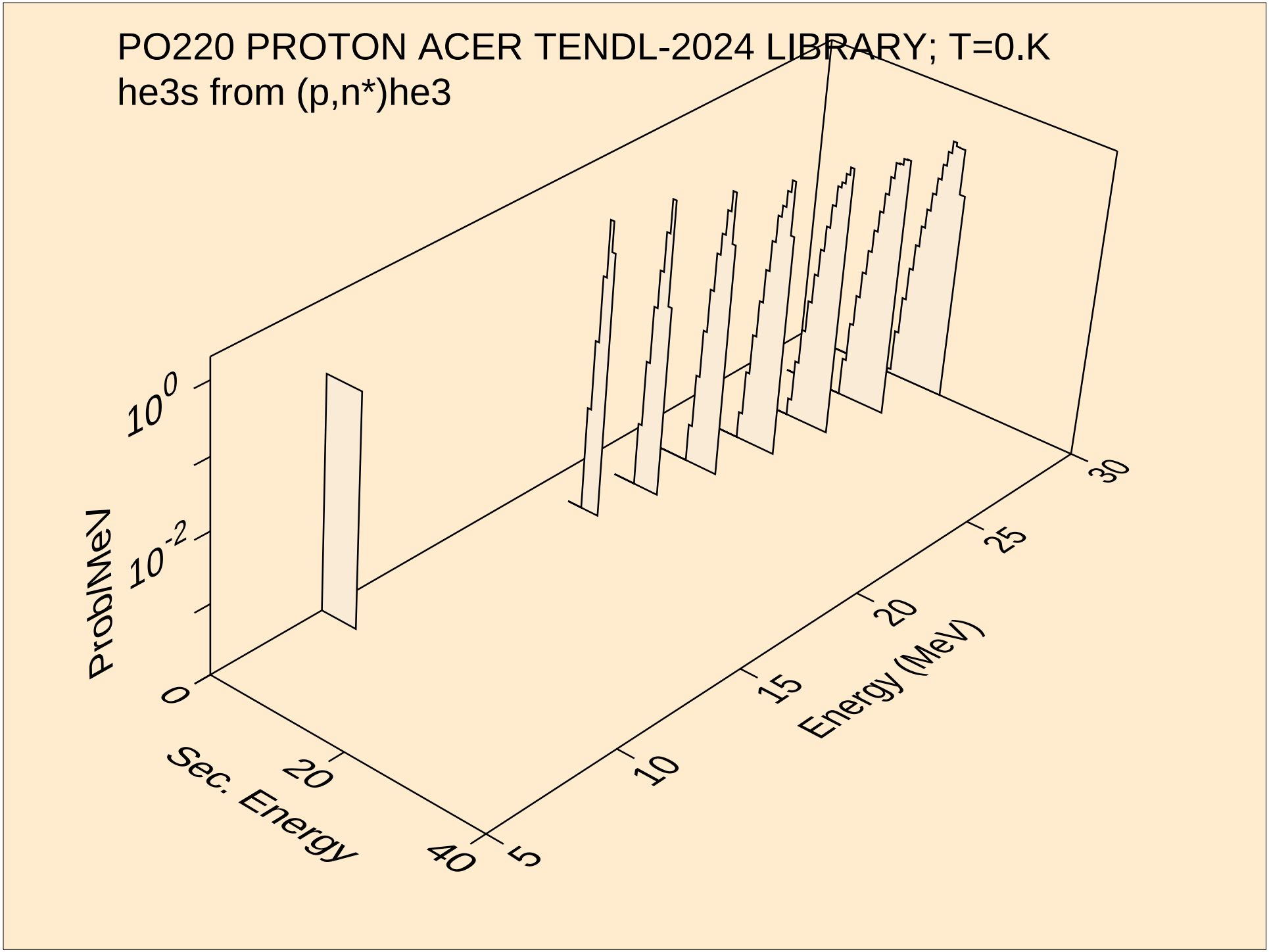

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
deuterons from (p,da)
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

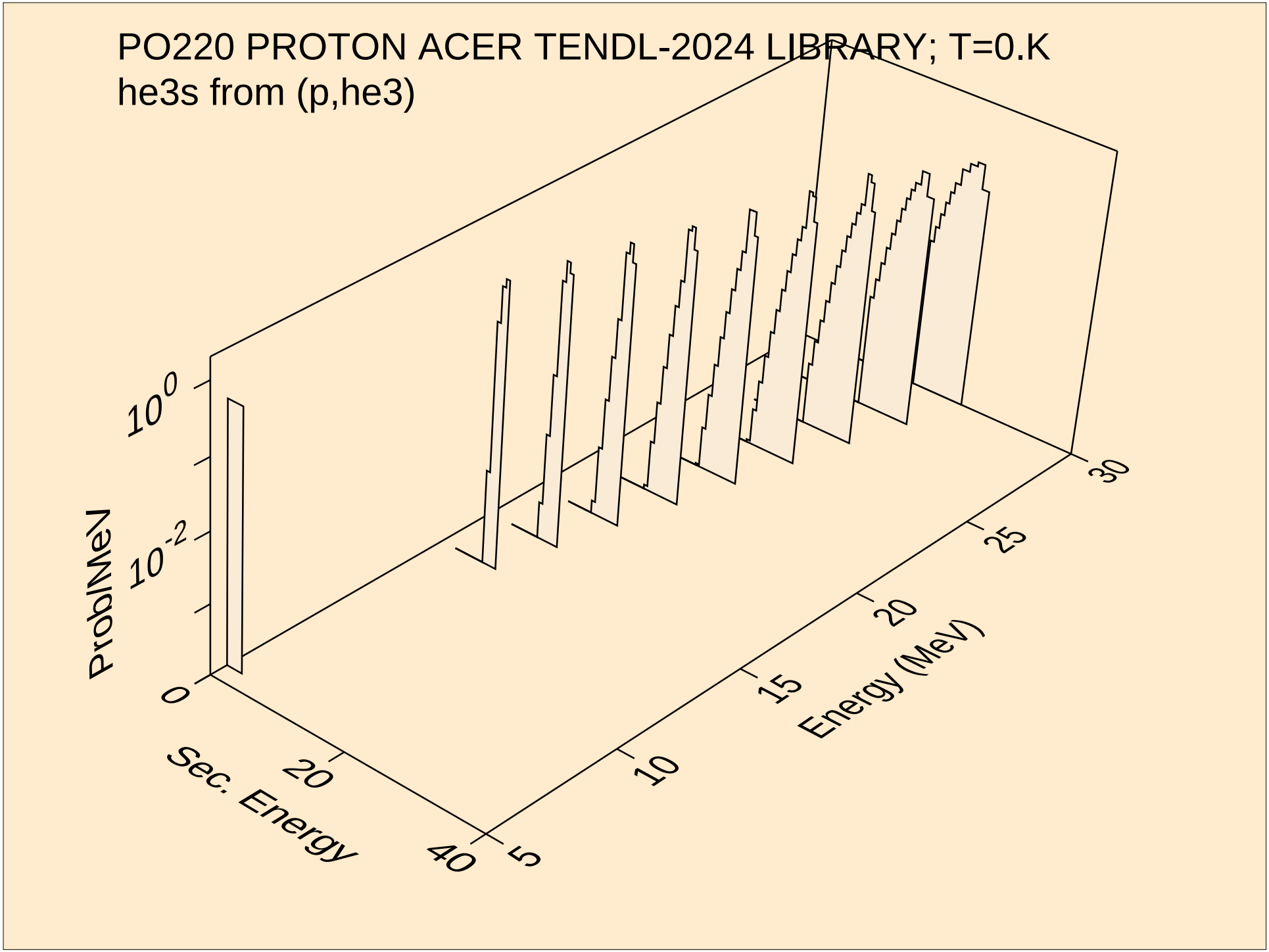

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
tritons from (p,x)
Prob/MeV
10-1
10-3
10-5
0
100
200
Sec. Energy
0
50
100
150
200
Energy (MeV)

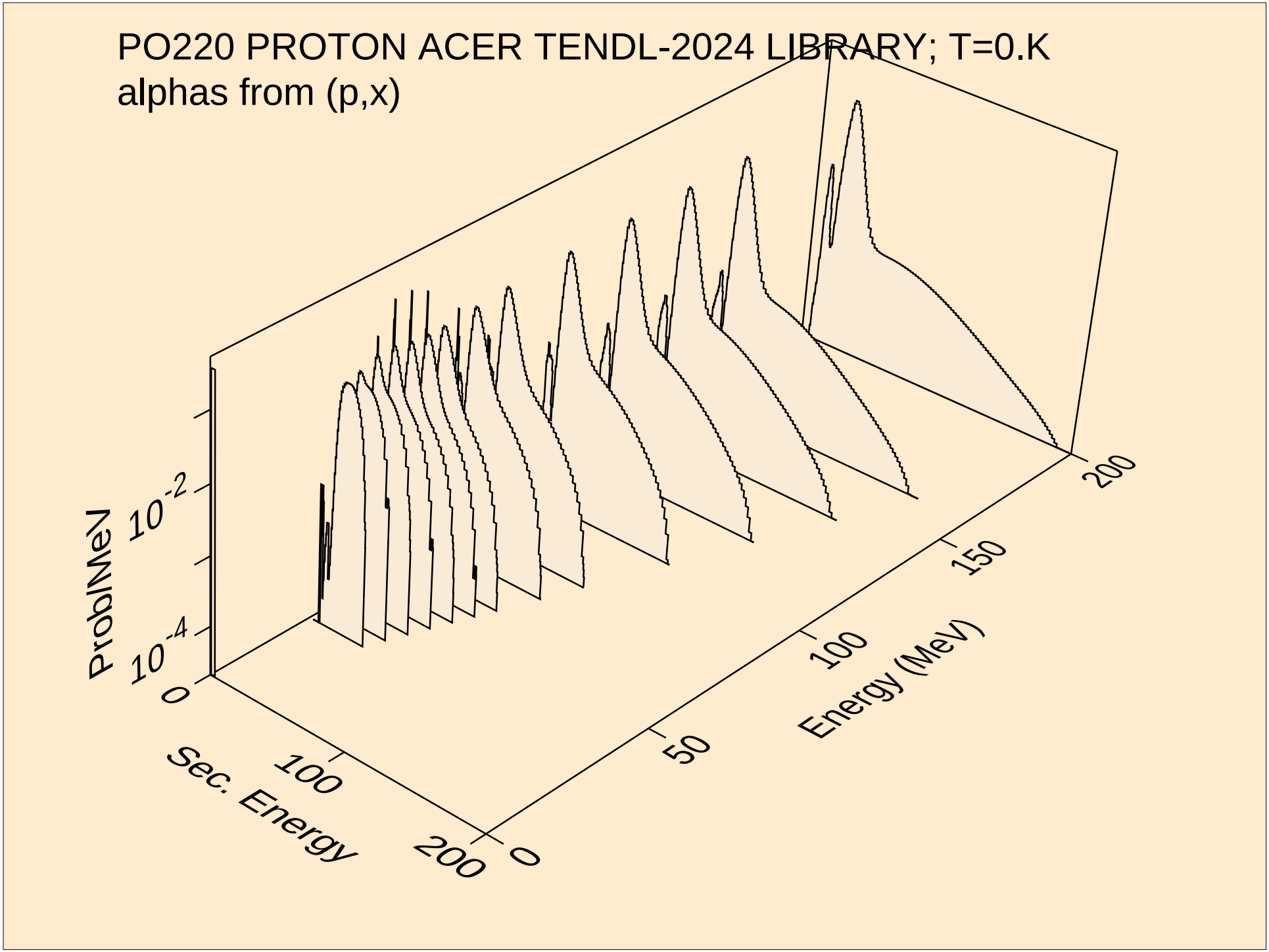

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
tritons from (p,n*)t
Prob/MeV
10^-1
10^-3
0
Sec. Energy
20
40
Energy (MeV)
5
10
15
20
25
30

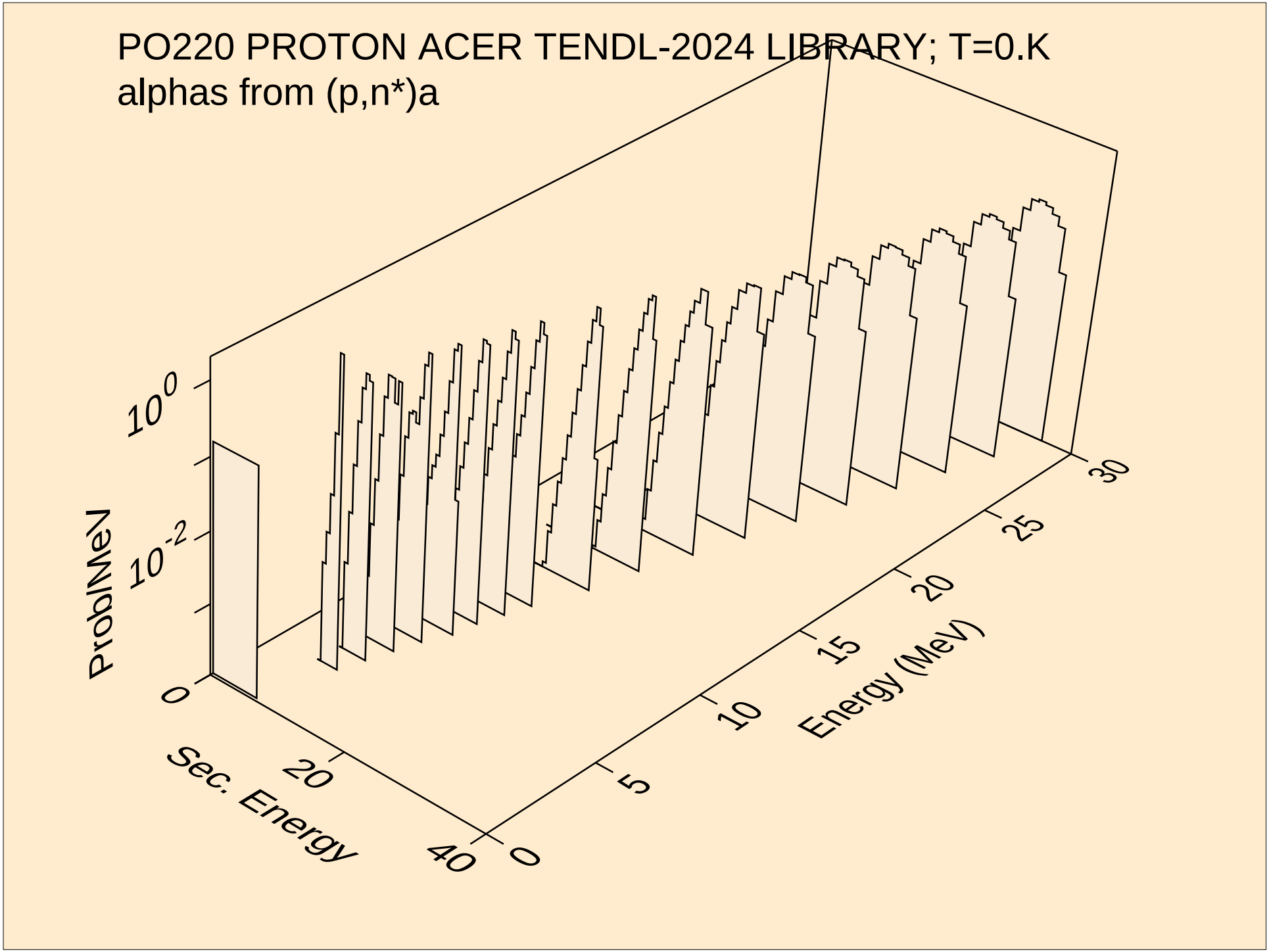

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
tritons from (p,t)
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

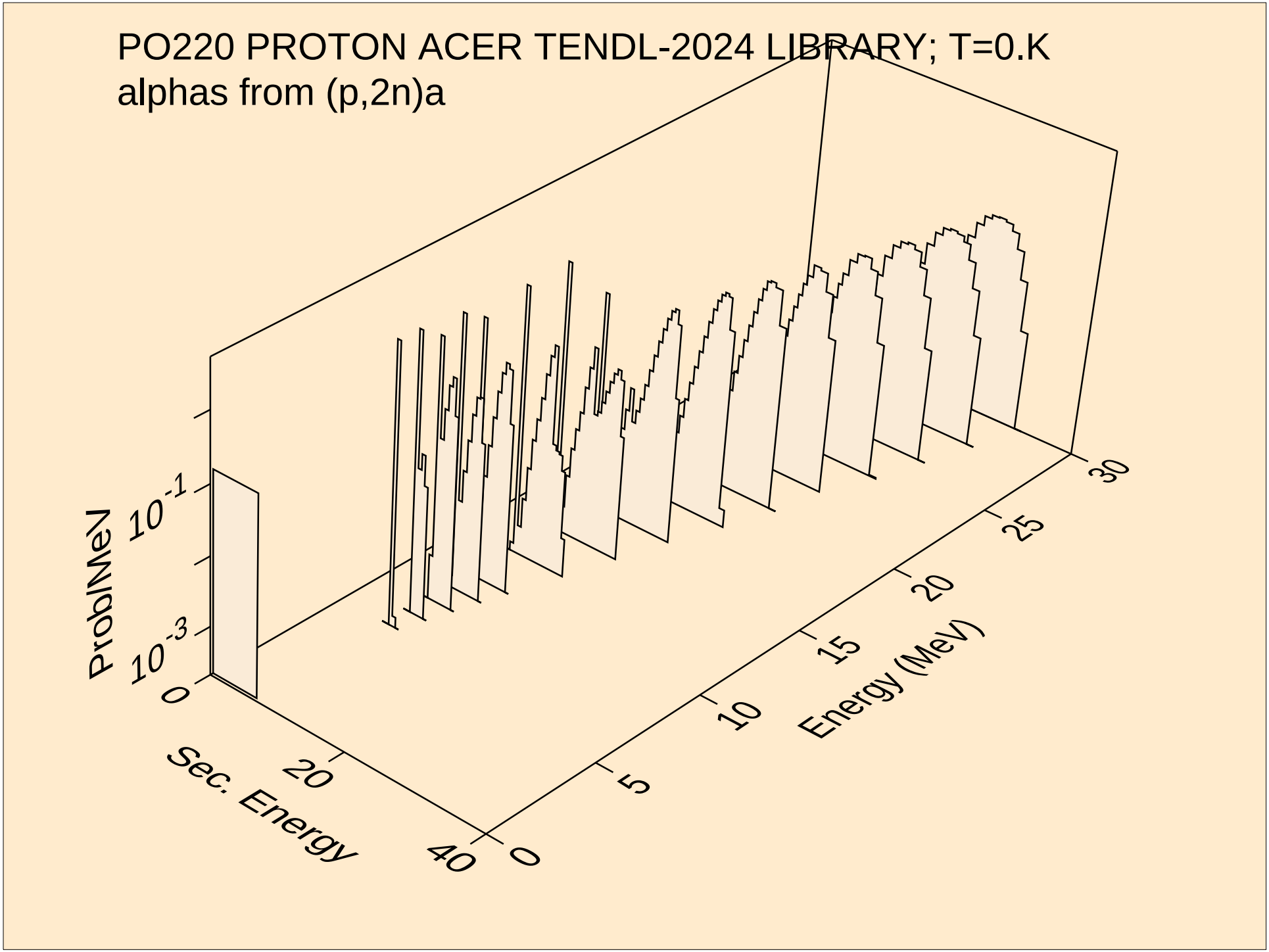

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
he3s from (p,x)
Prob/MeV
10-2
10-4
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)

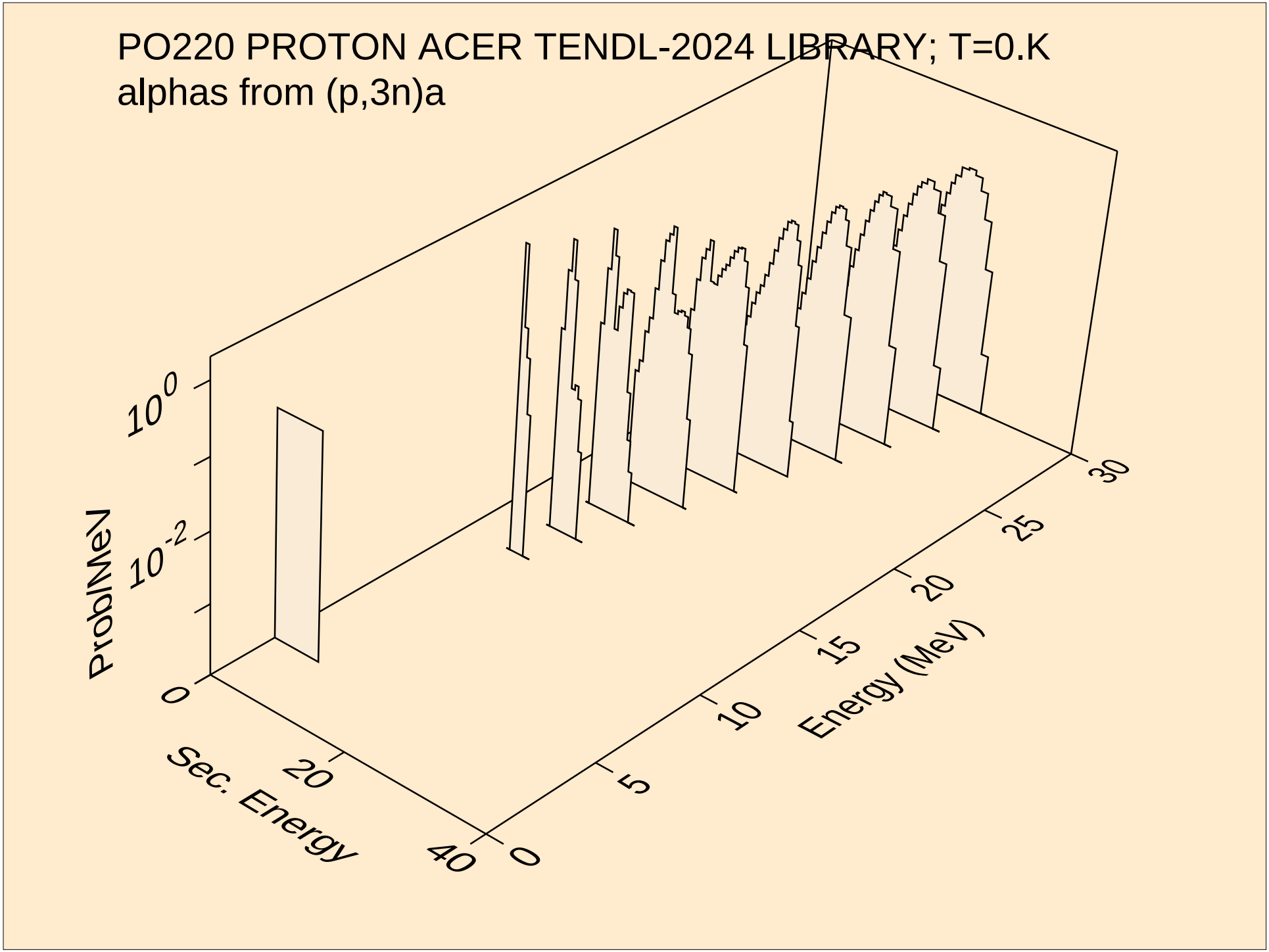

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
he3s from (p,n*)he3
Prob/MeV
10^0
10^-2
0
Sec. Energy
20
40
Energy (MeV)
5
10
15
20
25
30

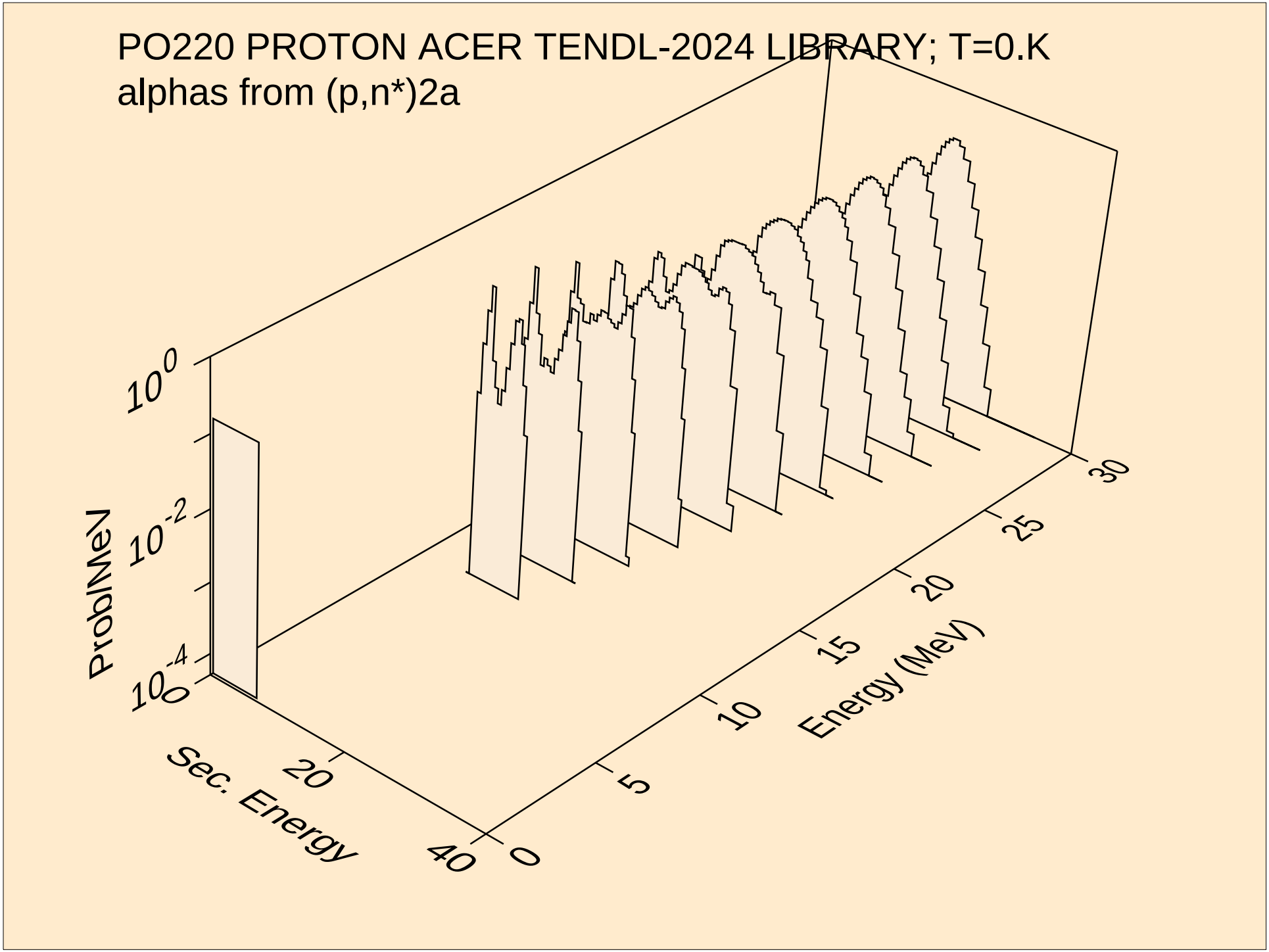

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
he3s from (p,he3)
Prob/MeV
10^{0}
10^{-2}
0
Sec. Energy
20
40
Energy (MeV)
5
10
15
20
25
30

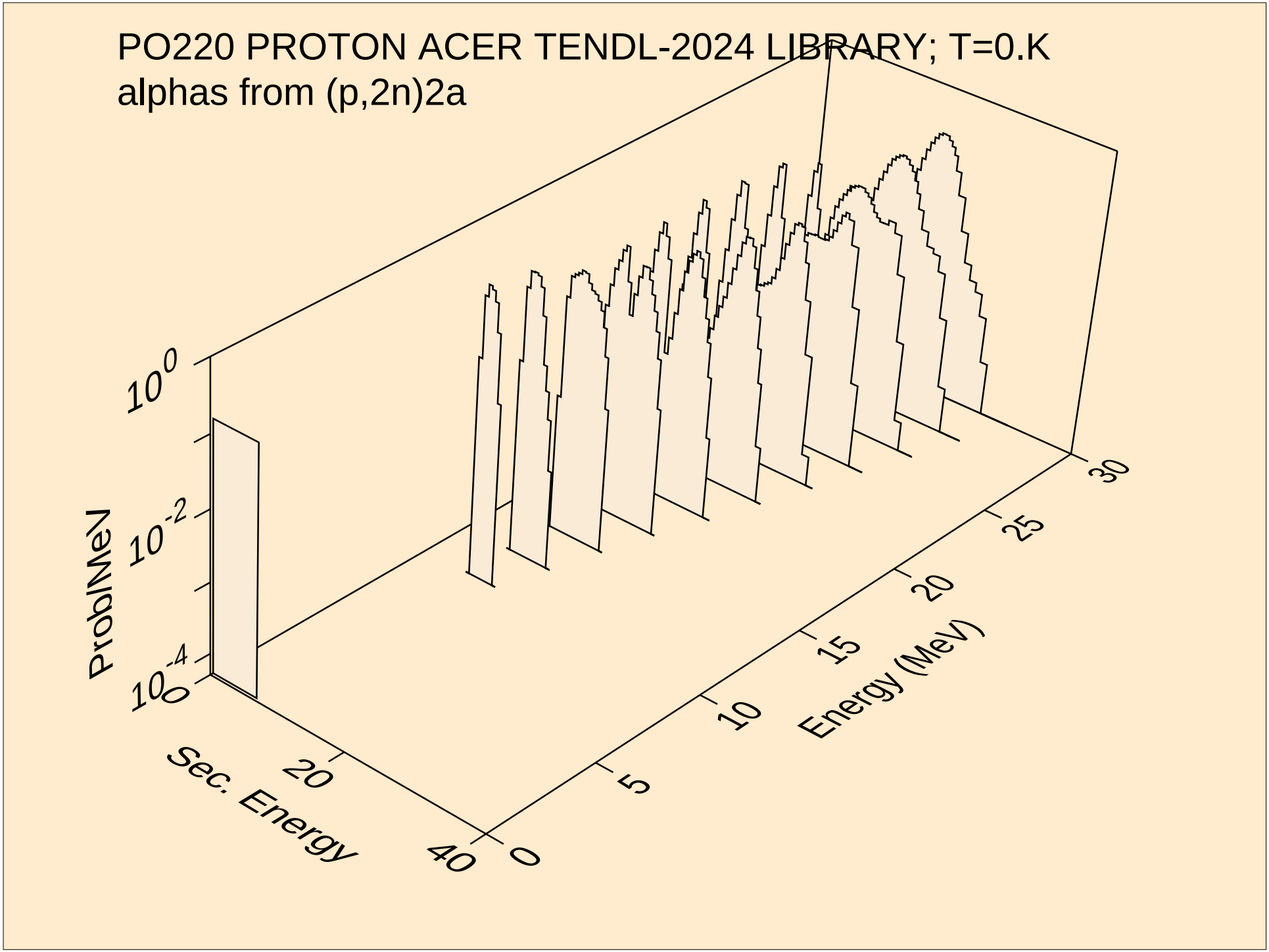

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
alphas from (p,x)
Prob/MeV
10-2
10-4
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)

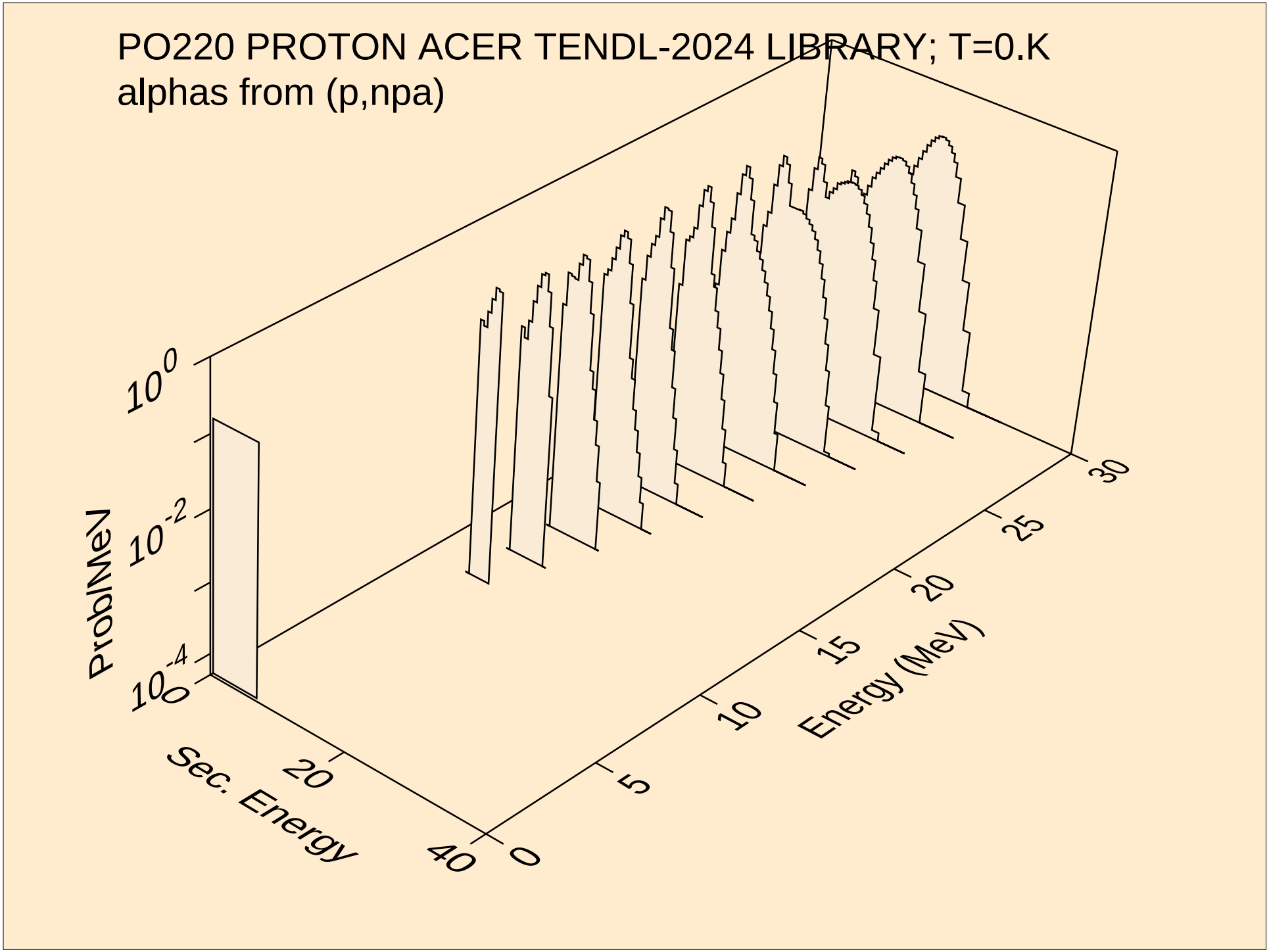

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
alphas from (p,n*)a
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

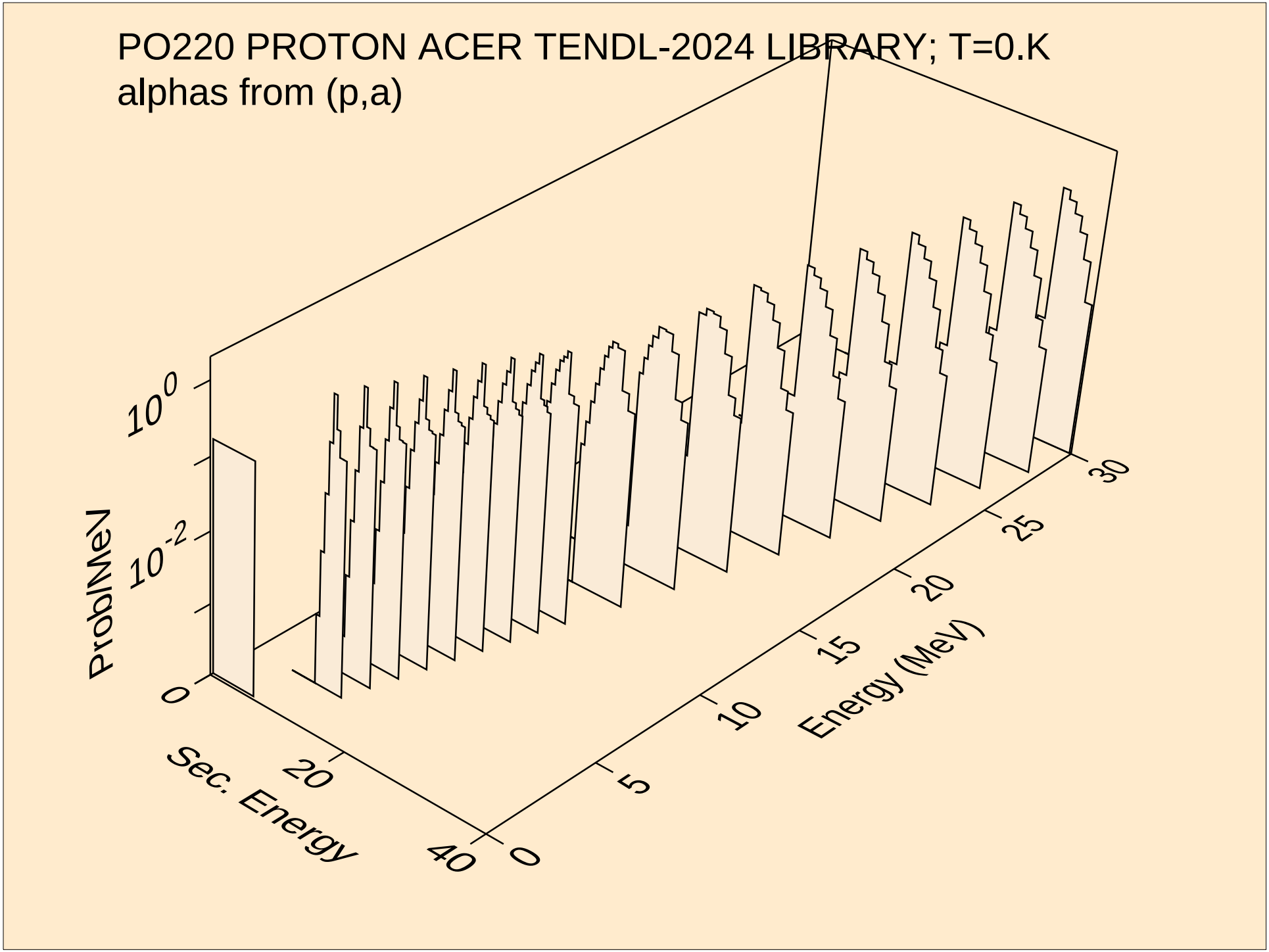

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
alphas from (p,2n)a
Prob/MeV
10^-1
10^-3
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

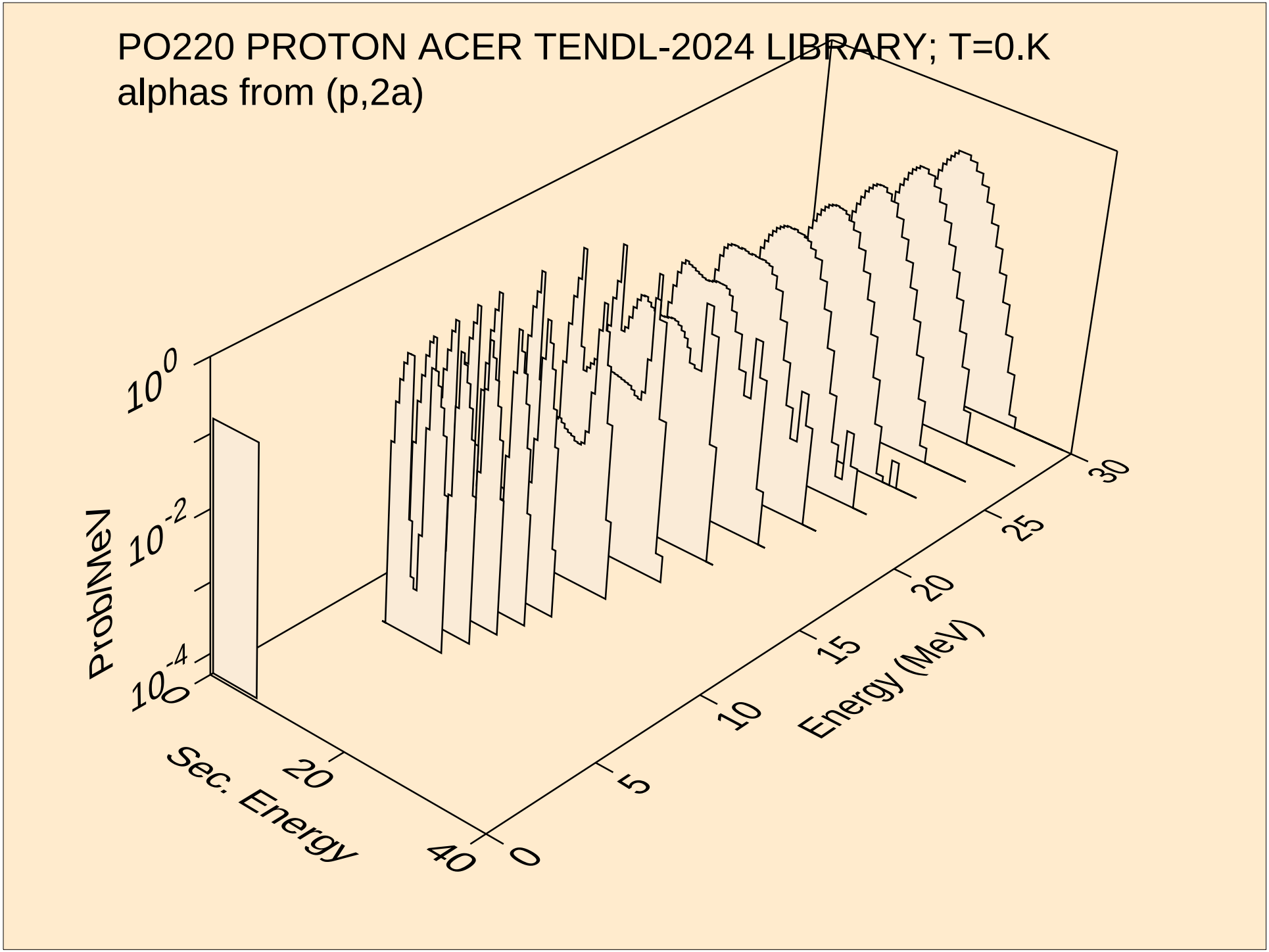

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
alphas from (p,3n)a
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

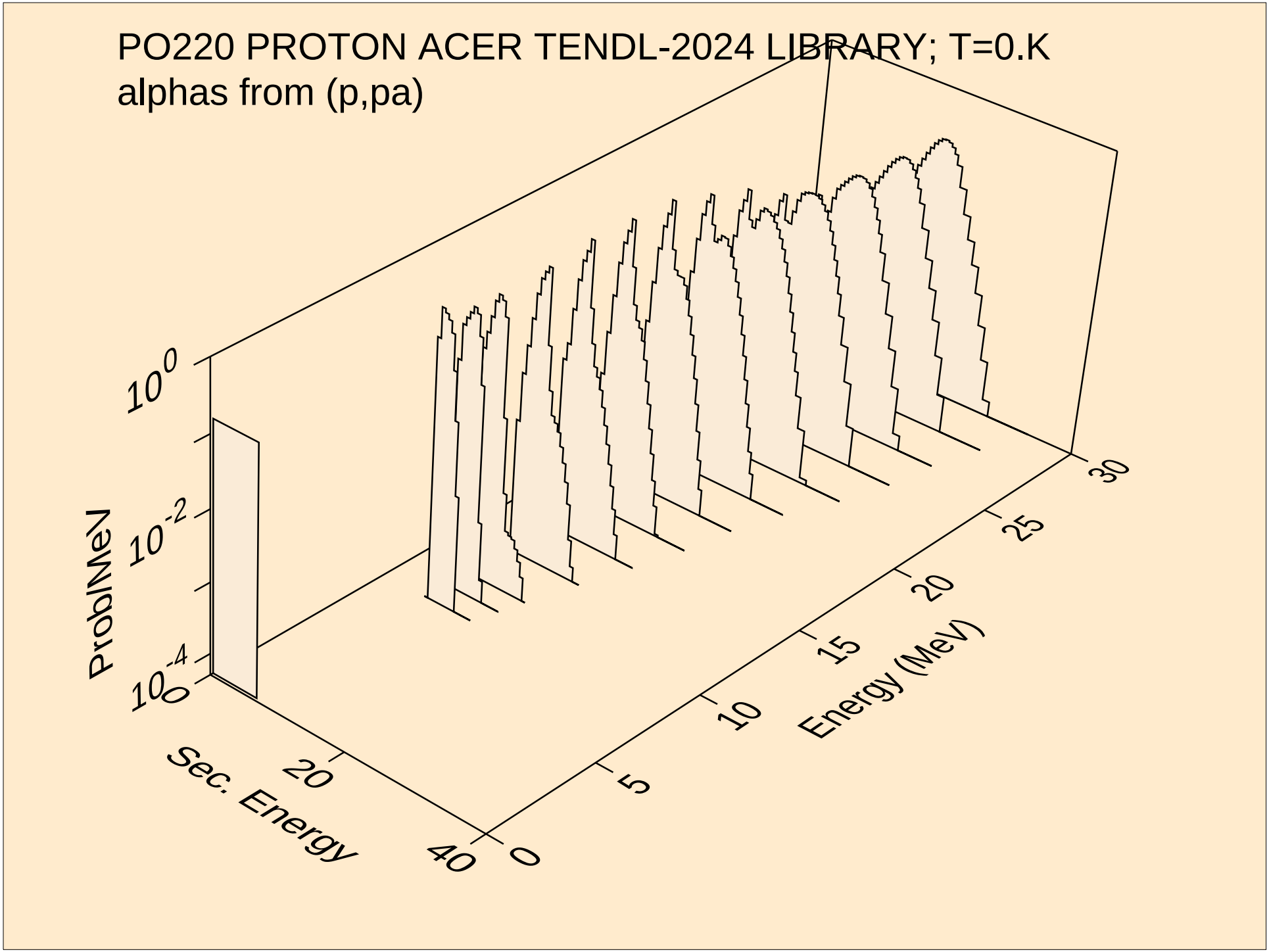

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
alphas from (p,n*)2a
Prob/MeV
10^{0}
10^{-2}
10^{-4}
Sec. Energy
0
20
40
Energy (MeV)
0
5
10
15
20
25
30

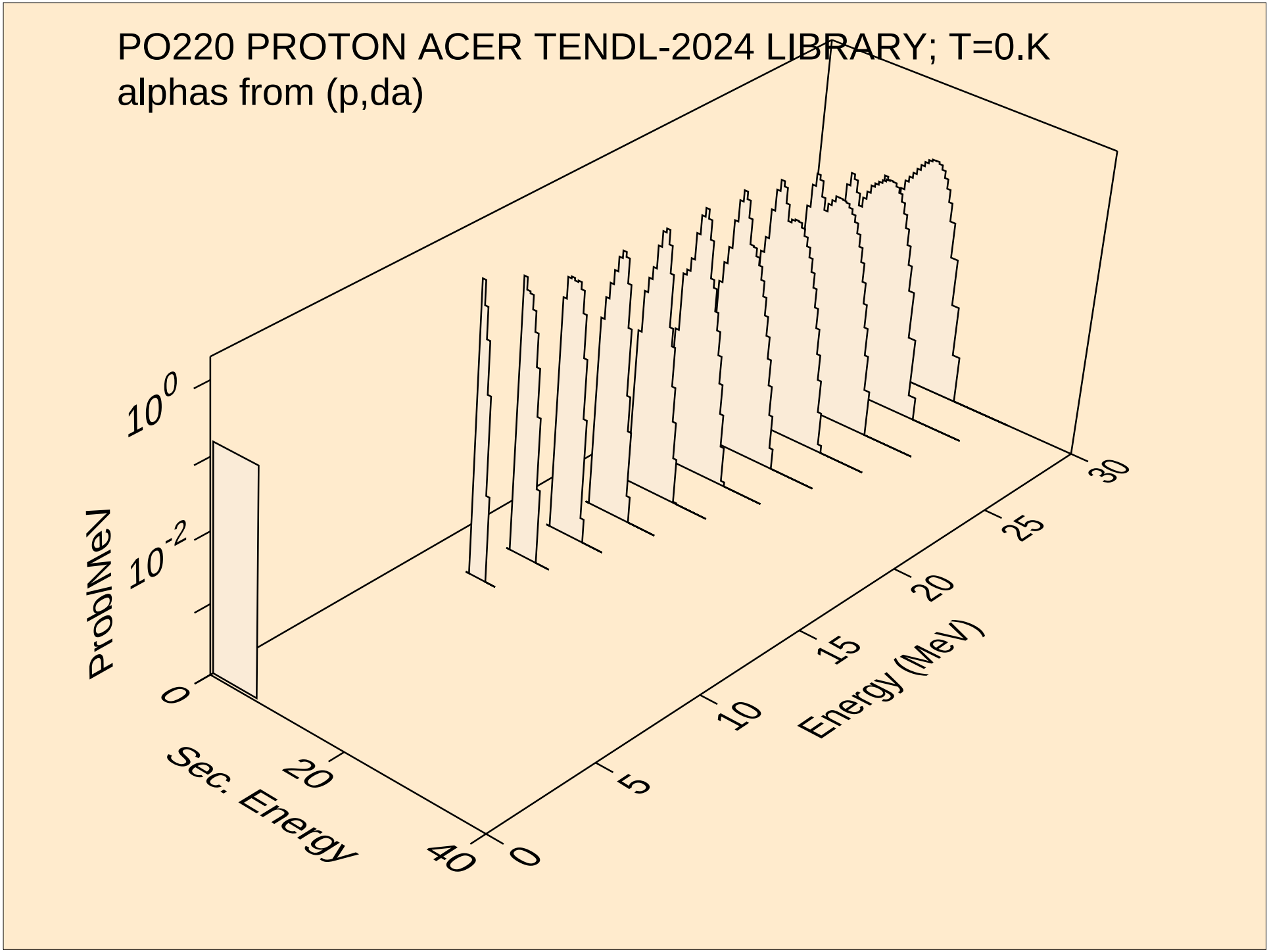

PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
alphas from (p,2n)2a
Prob/MeV
10^{0}
10^{-2}
10^{-4}
Sec. Energy
0
20
40
Energy (MeV)
0
5
10
15
20
25
30


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
alphas from (p,npa)
Prob/MeV
10^{0}
10^{-2}
10^{-4}
Sec. Energy
0
20
40
Energy (MeV)
0
5
10
15
20
25
30


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
alphas from (p,a)
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
alphas from (p,2a)
Prob/MeV
10^{0}
10^{-2}
10^{-4}
Sec. Energy
0
20
40
Energy (MeV)
0
5
10
15
20
25
30


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
alphas from (p,pa)
Prob/MeV
10^{0}
10^{-2}
10^{-4}
Sec. Energy
0
20
40
Energy (MeV)
0
5
10
15
20
25
30


PO220 PROTON ACER TENDL-2024 LIBRARY; T=0.K
alphas from (p,da)
Prob/MeV
10^0
10^{-2}
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)