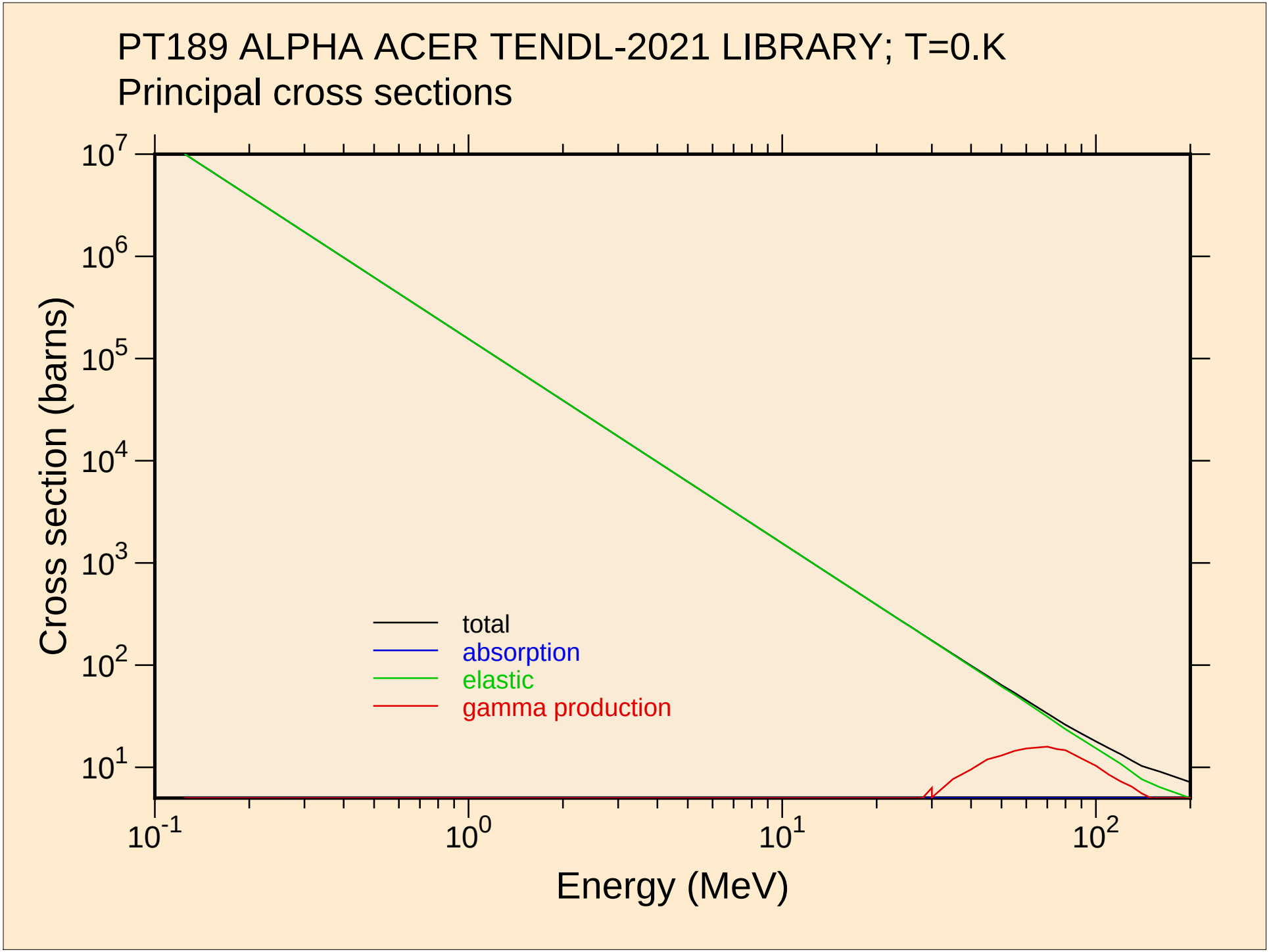
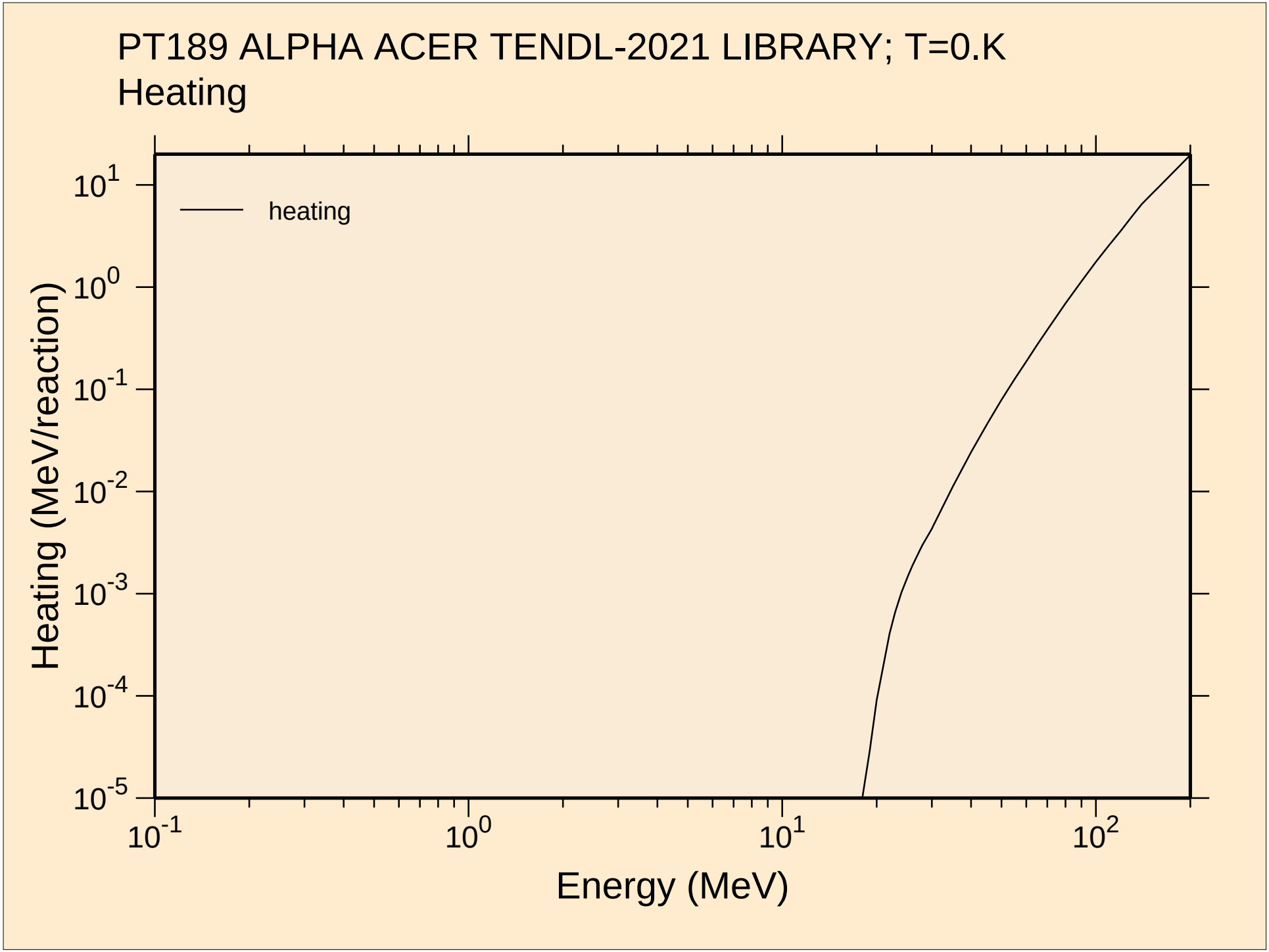
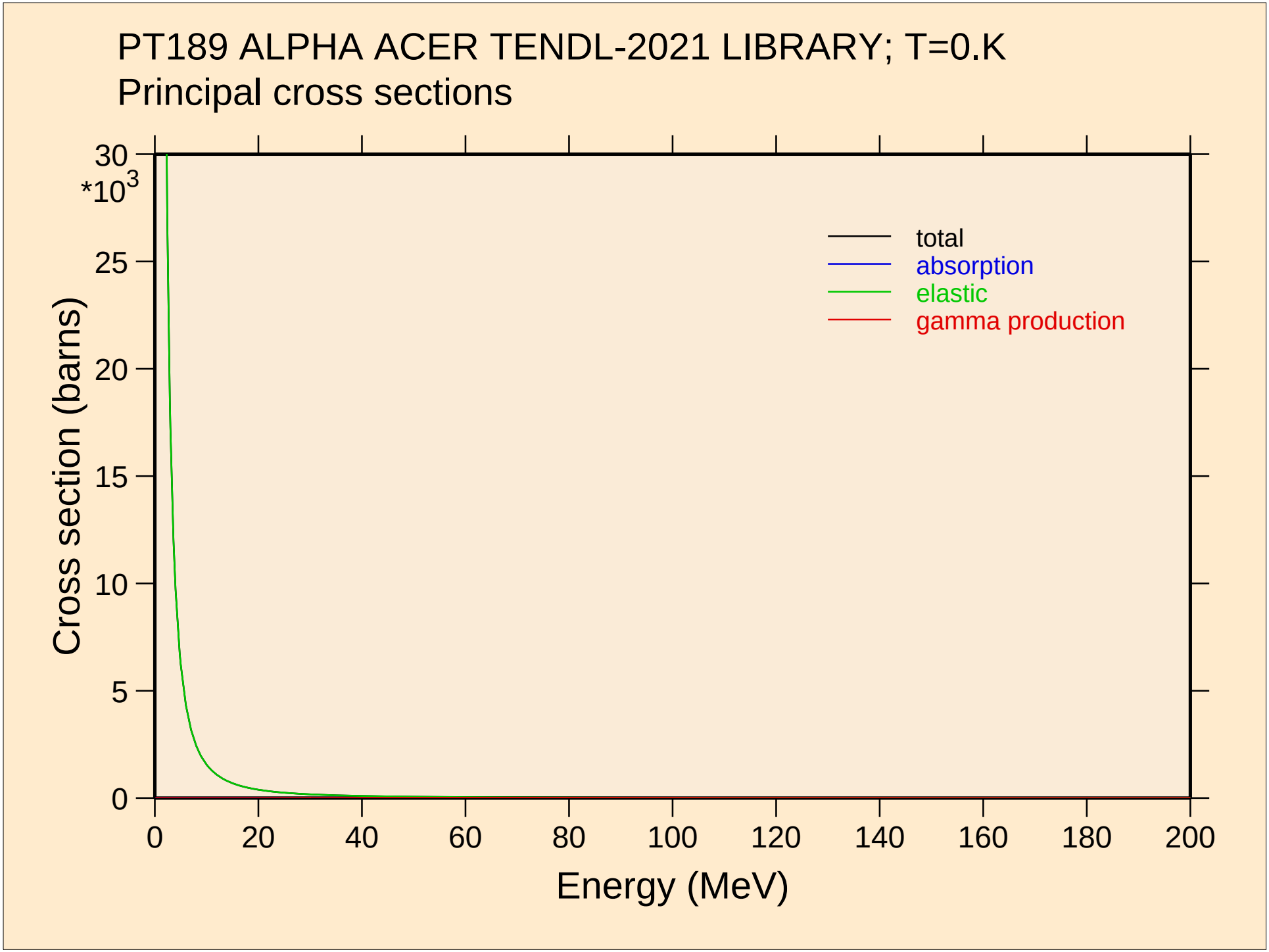
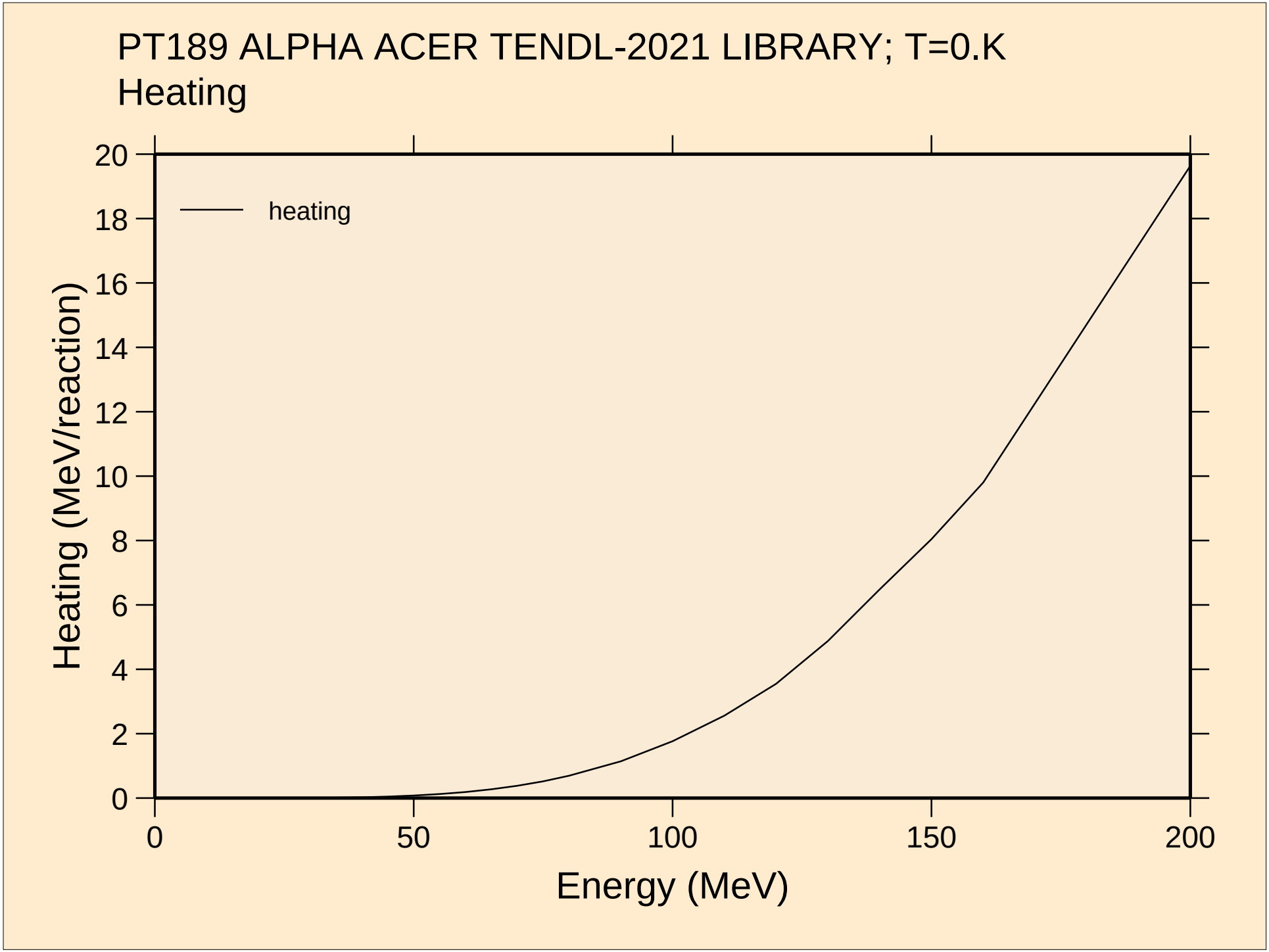
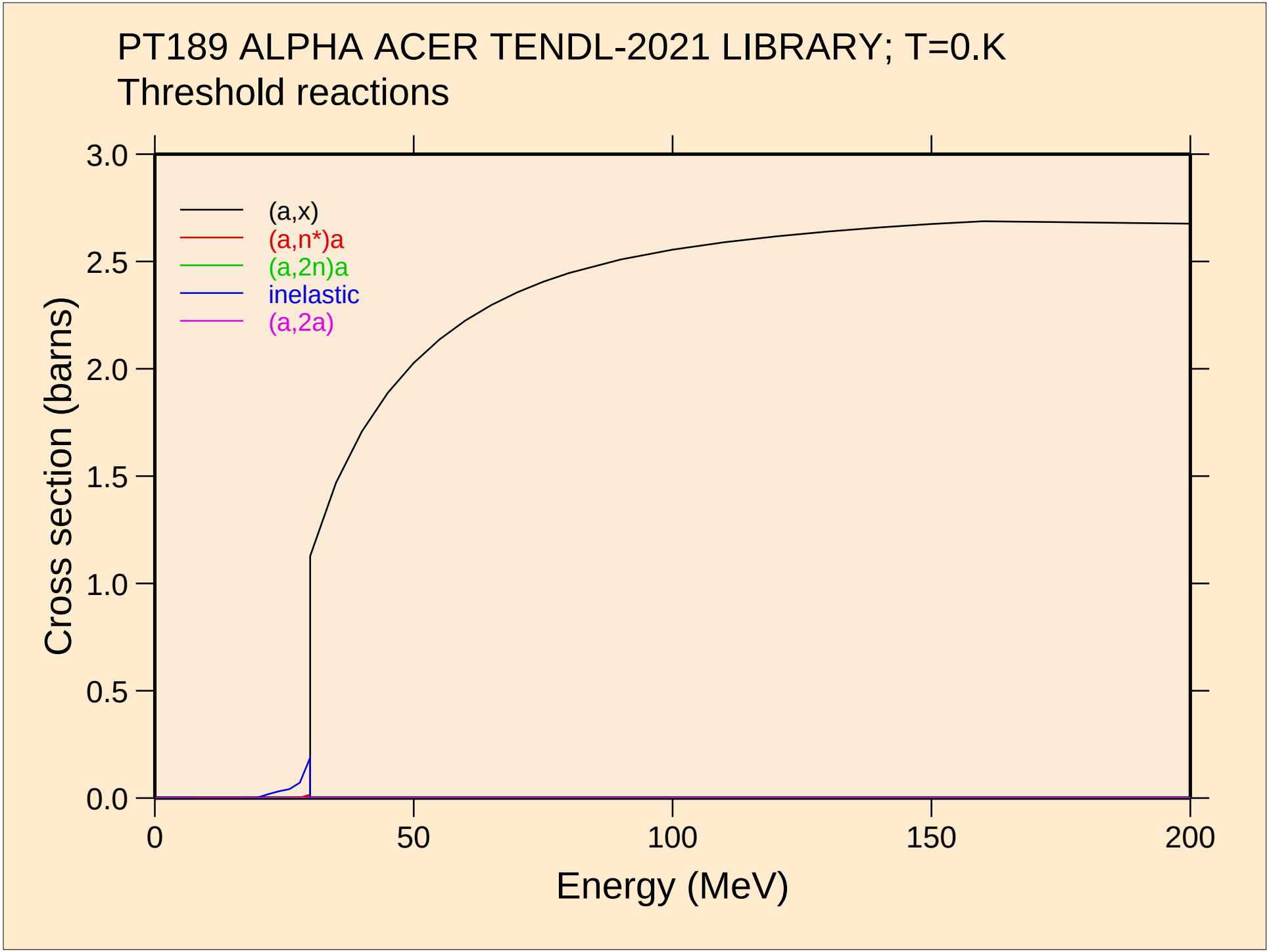
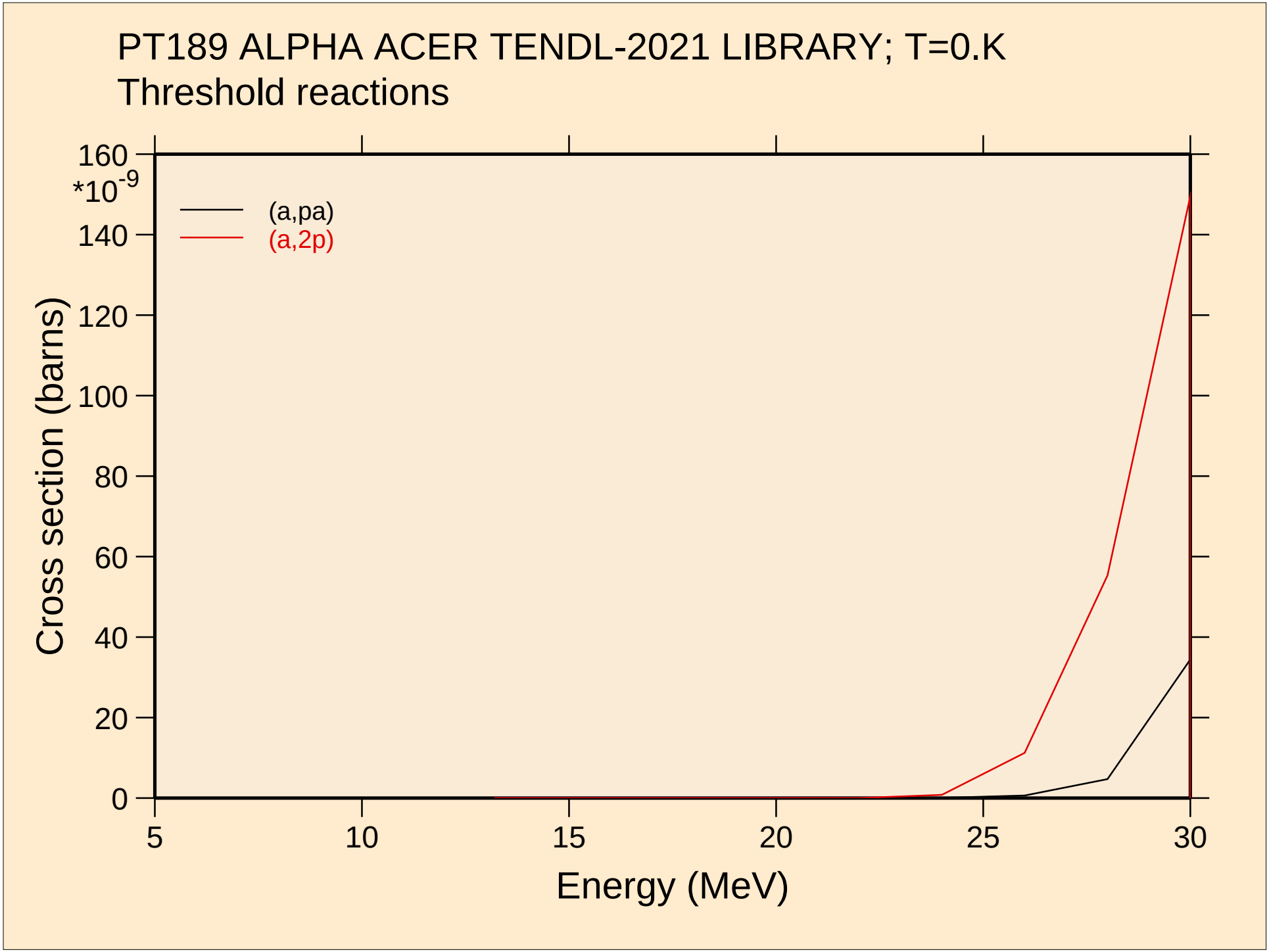

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production

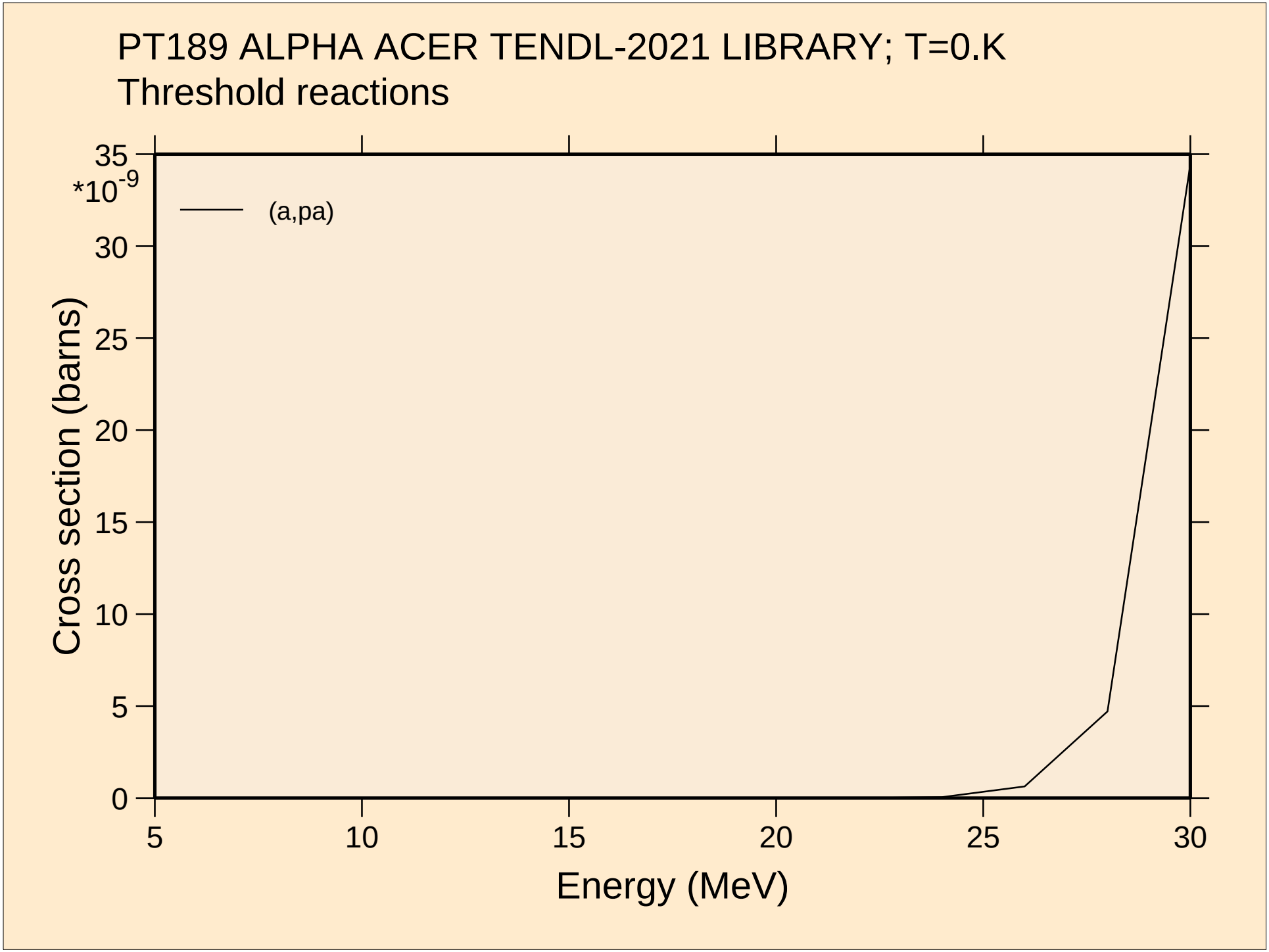

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
10^1
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
10^-1
10^0
10^1
10^2

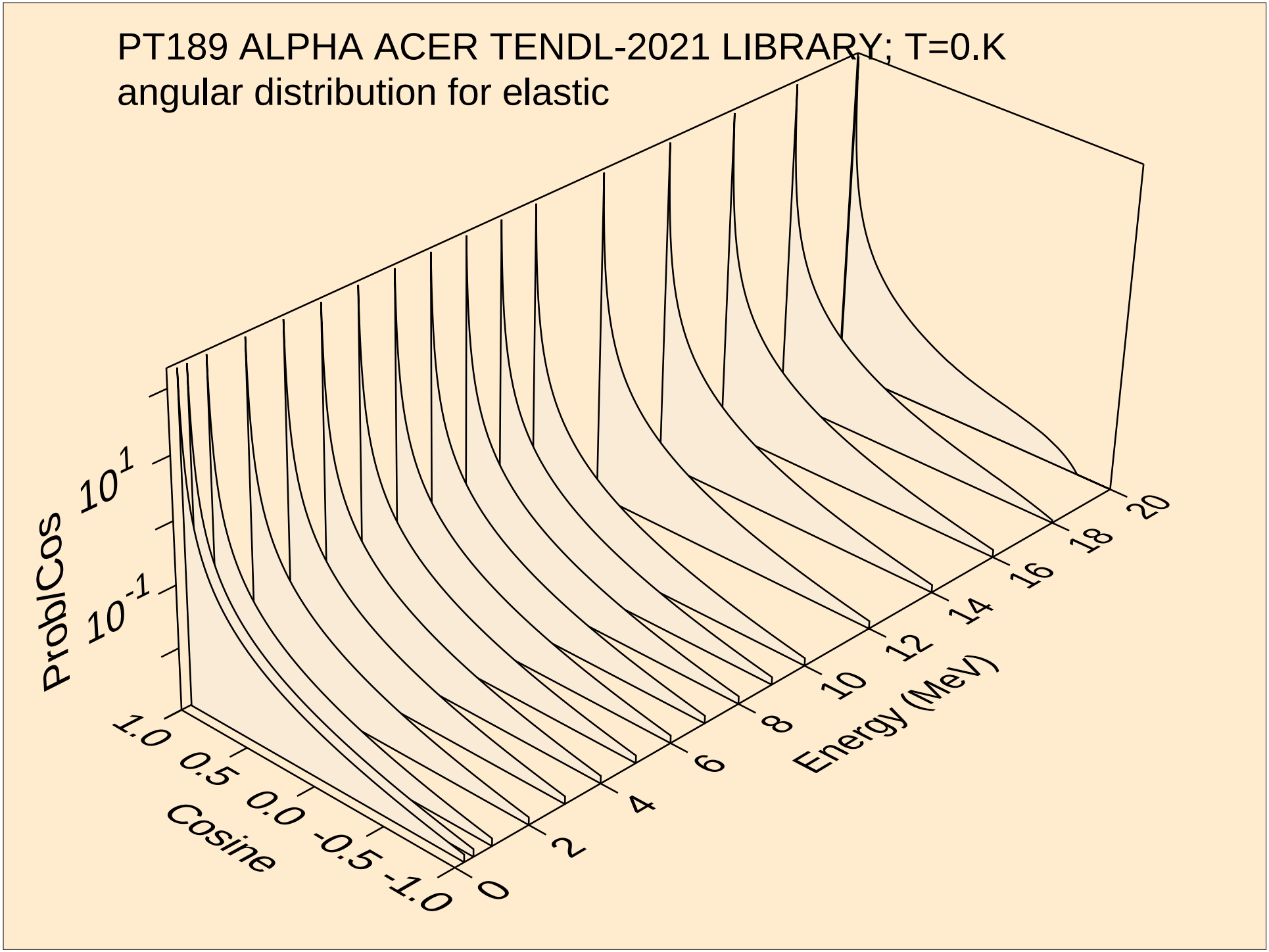

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Principal cross sections
Cross section (barns)
*10^3
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
Energy (MeV)
total
absorption
elastic
gamma production

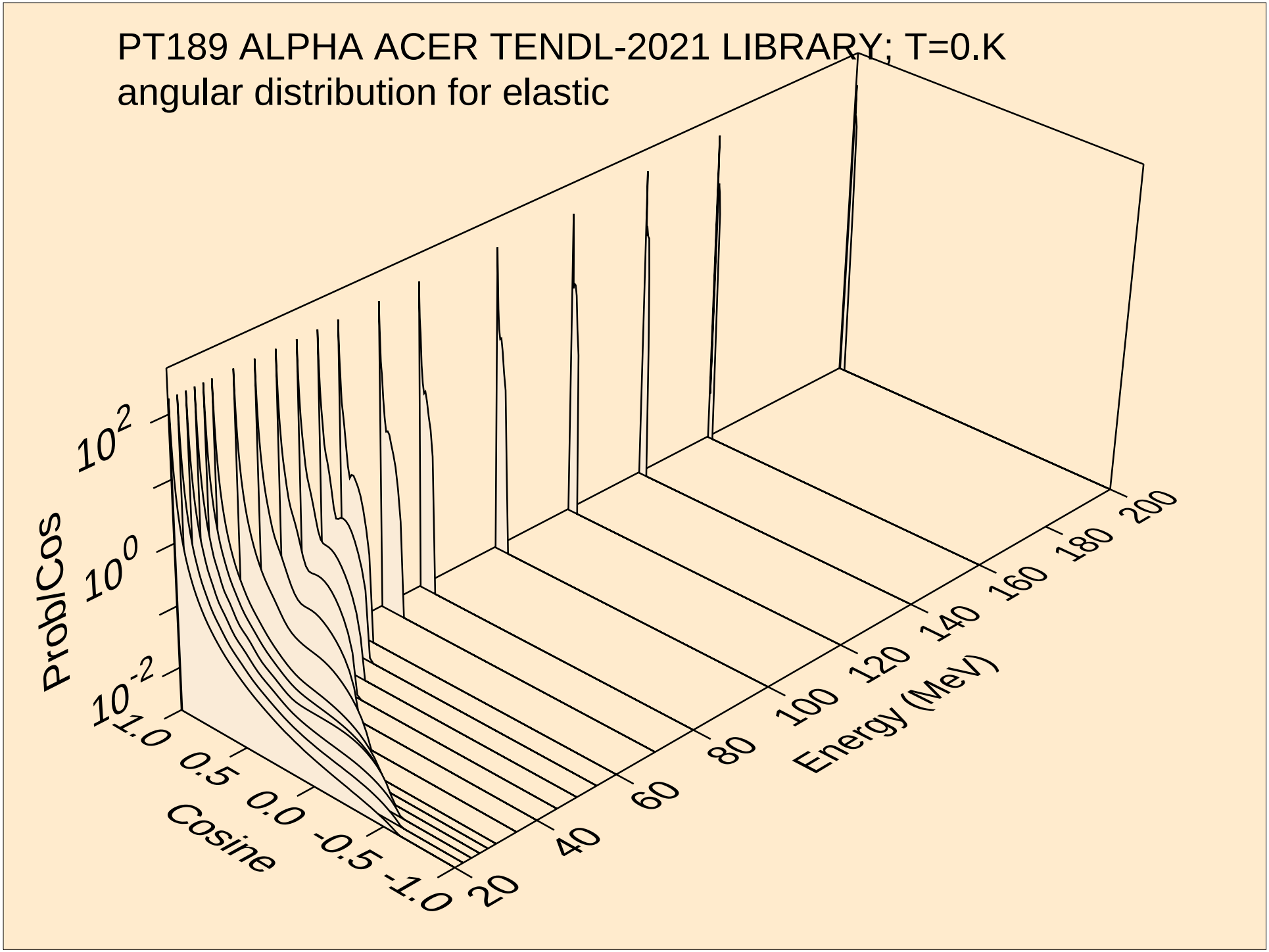

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20
0
50
100
150
200

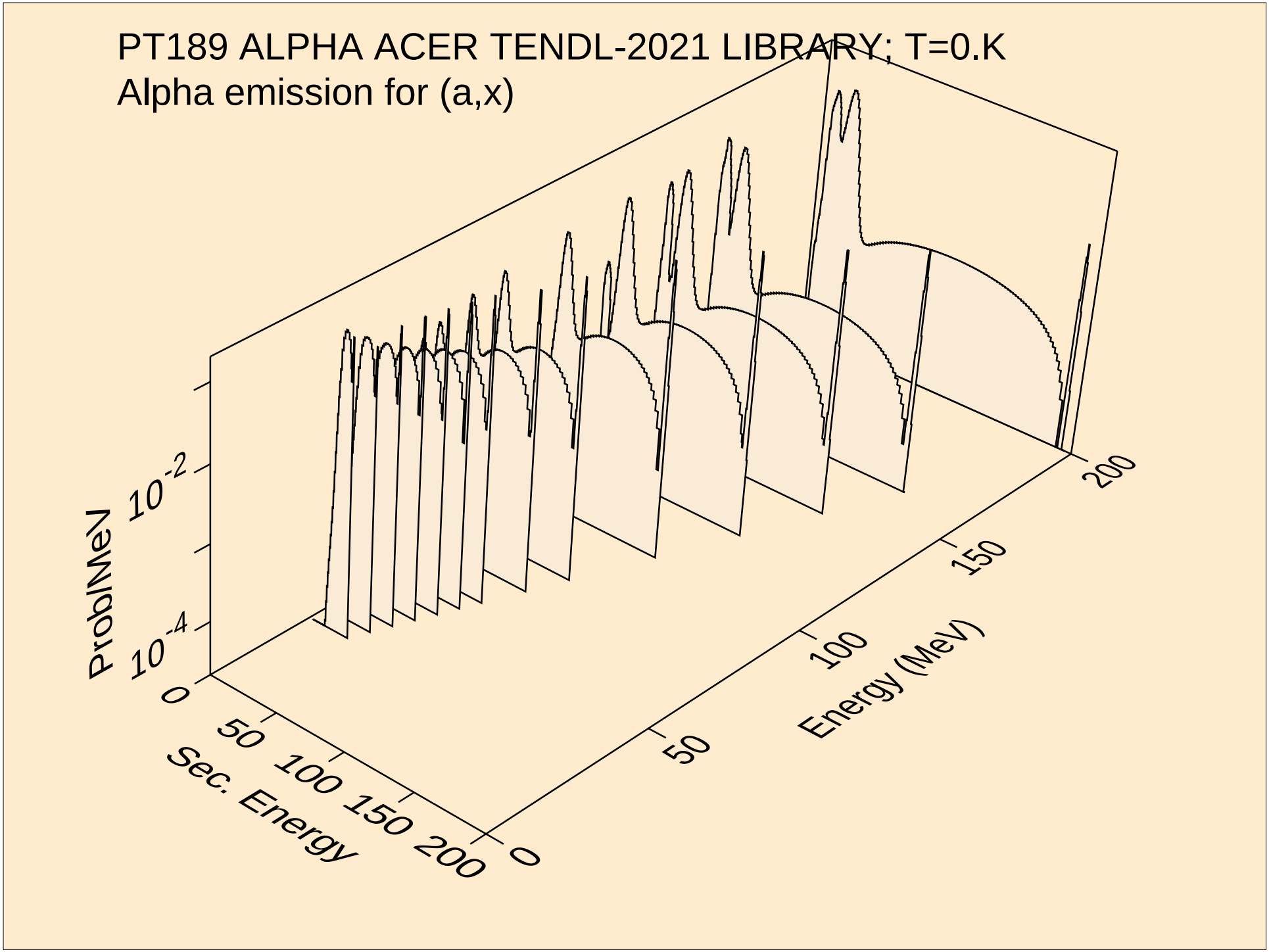

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Threshold reactions
(a,x)
(a,n*)a
(a,2n)a
inelastic
(a,2a)
Cross section (barns)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
50
100
150
200
Energy (MeV)

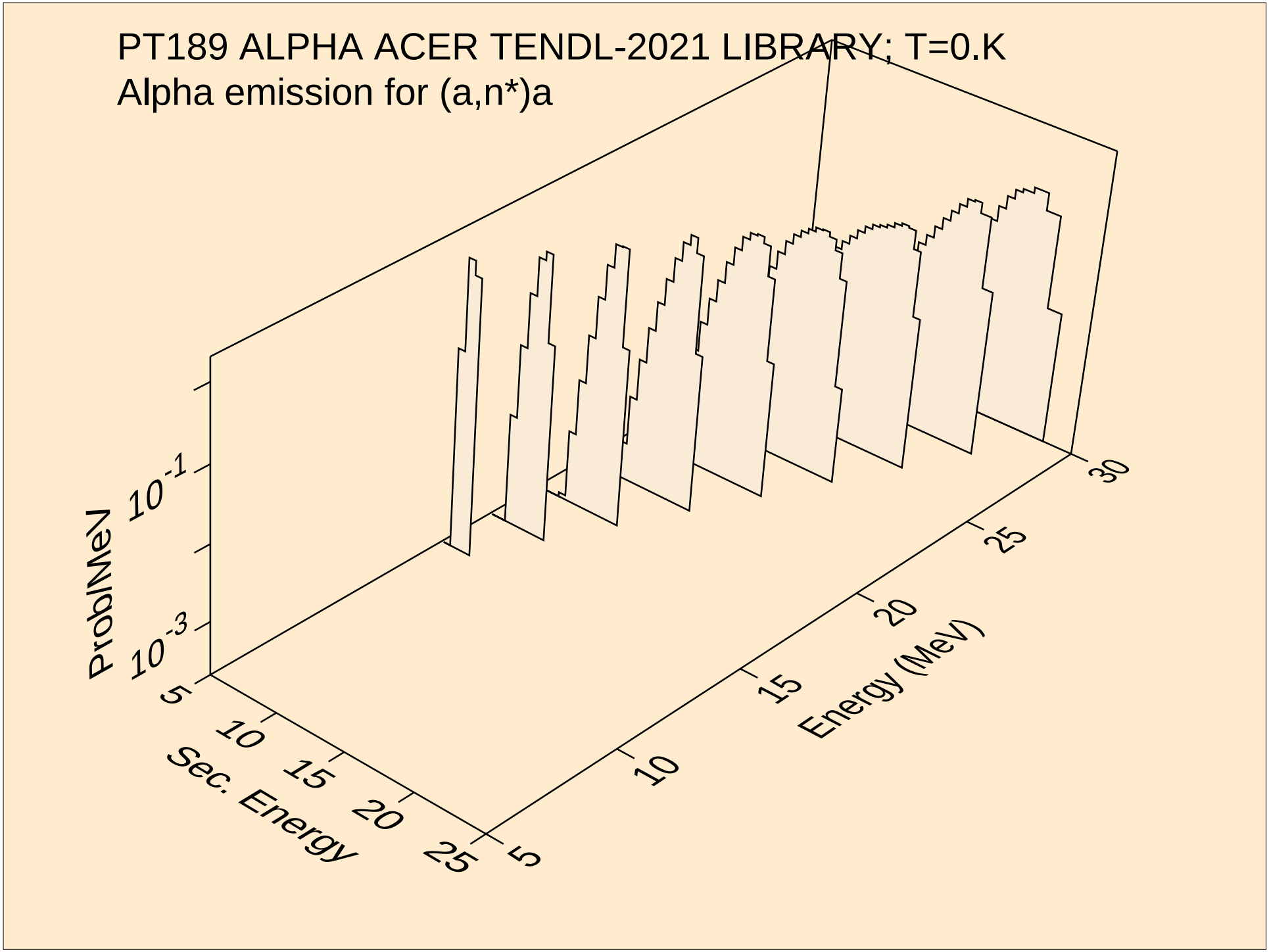

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Threshold reactions
160
*10-9
140
120
100
80
60
40
20
0
(a,pa)
(a,2p)
Cross section (barns)
5
10
15
20
25
30
Energy (MeV)

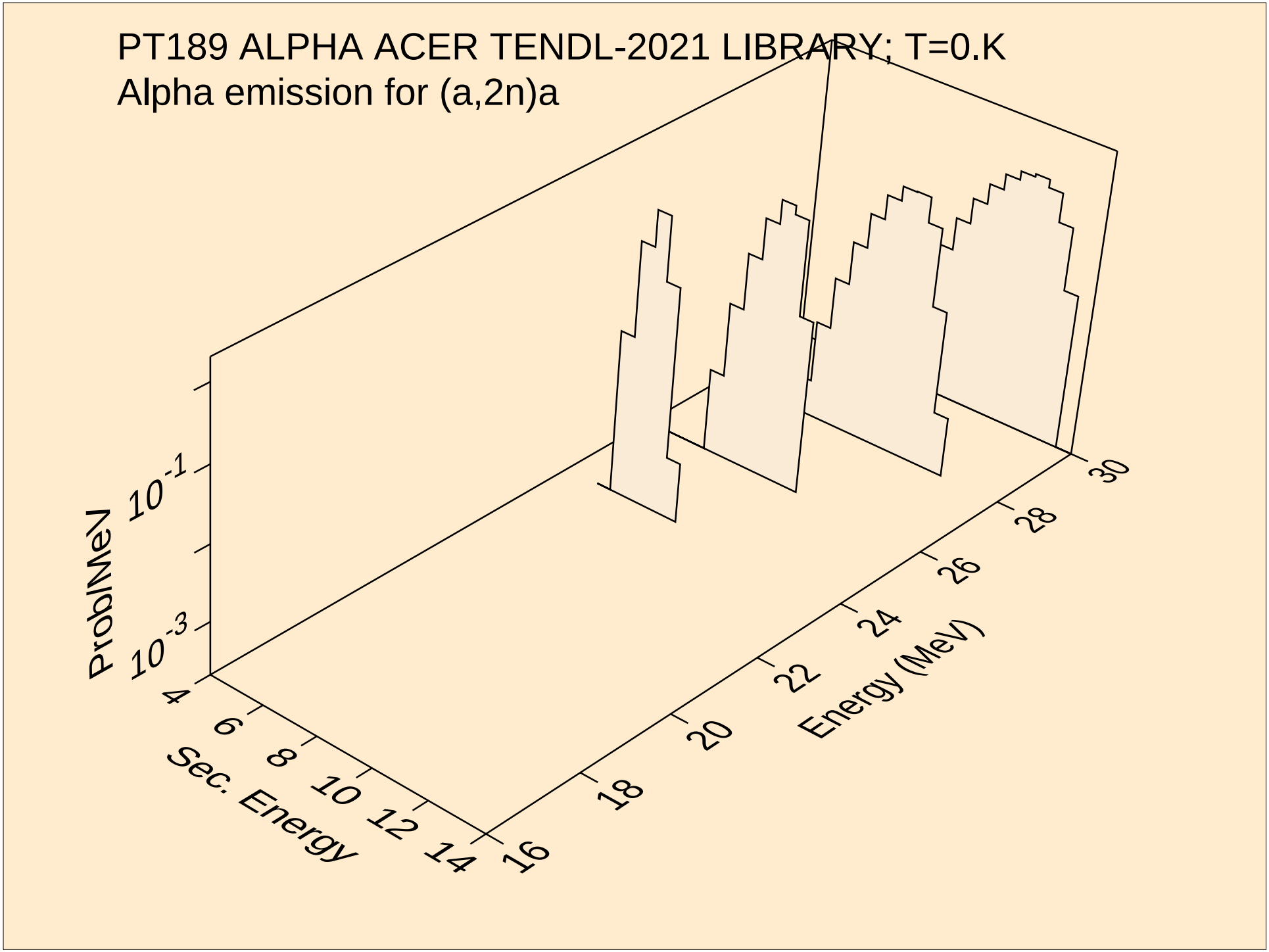

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Threshold reactions
*10-9
(a,pa)
Cross section (barns)
35
30
25
20
15
10
5
0
5
10
15
20
25
30
Energy (MeV)

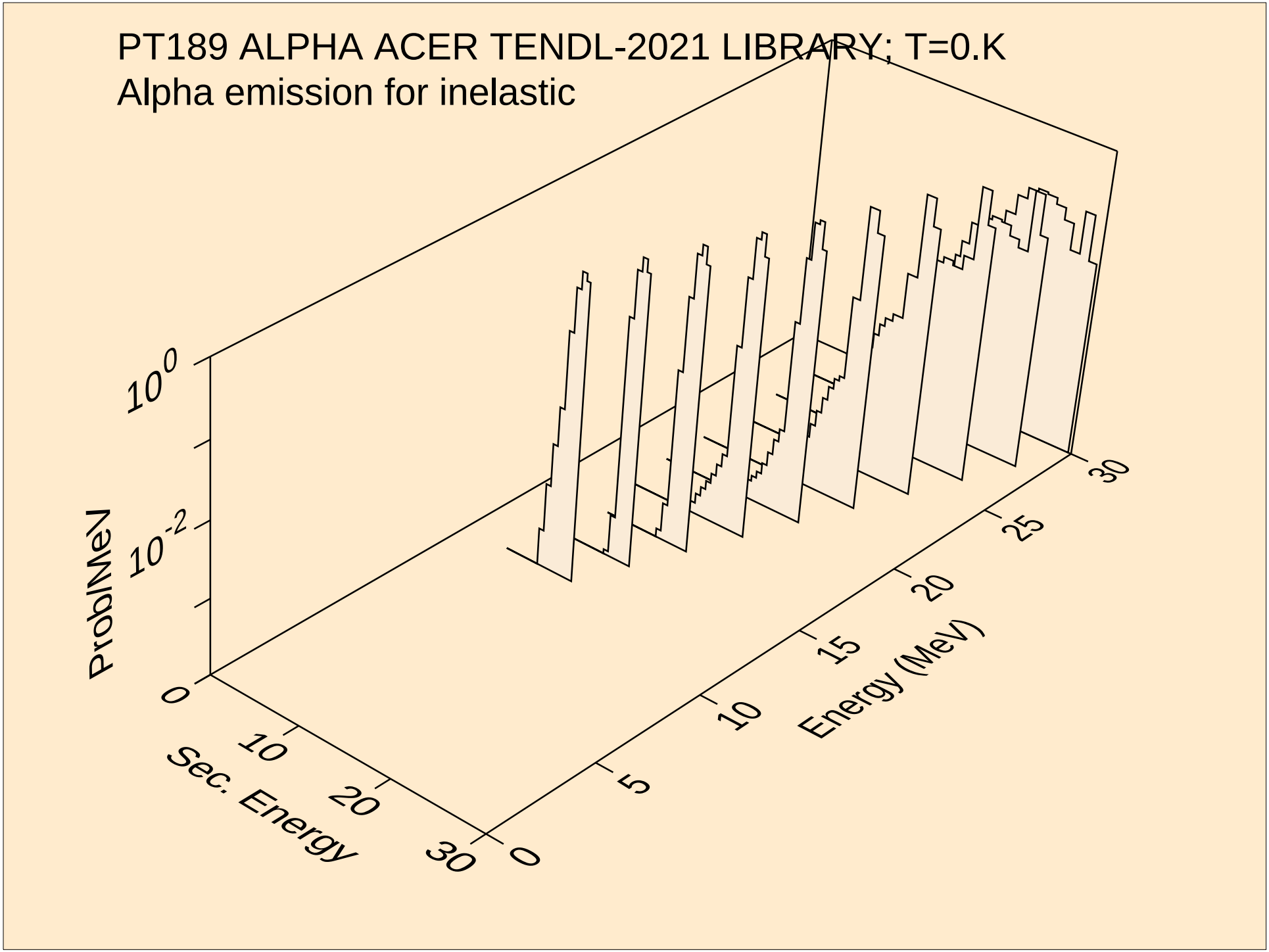

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
angular distribution for elastic
ProbICos
$10^{1}$
$10^{-1}$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

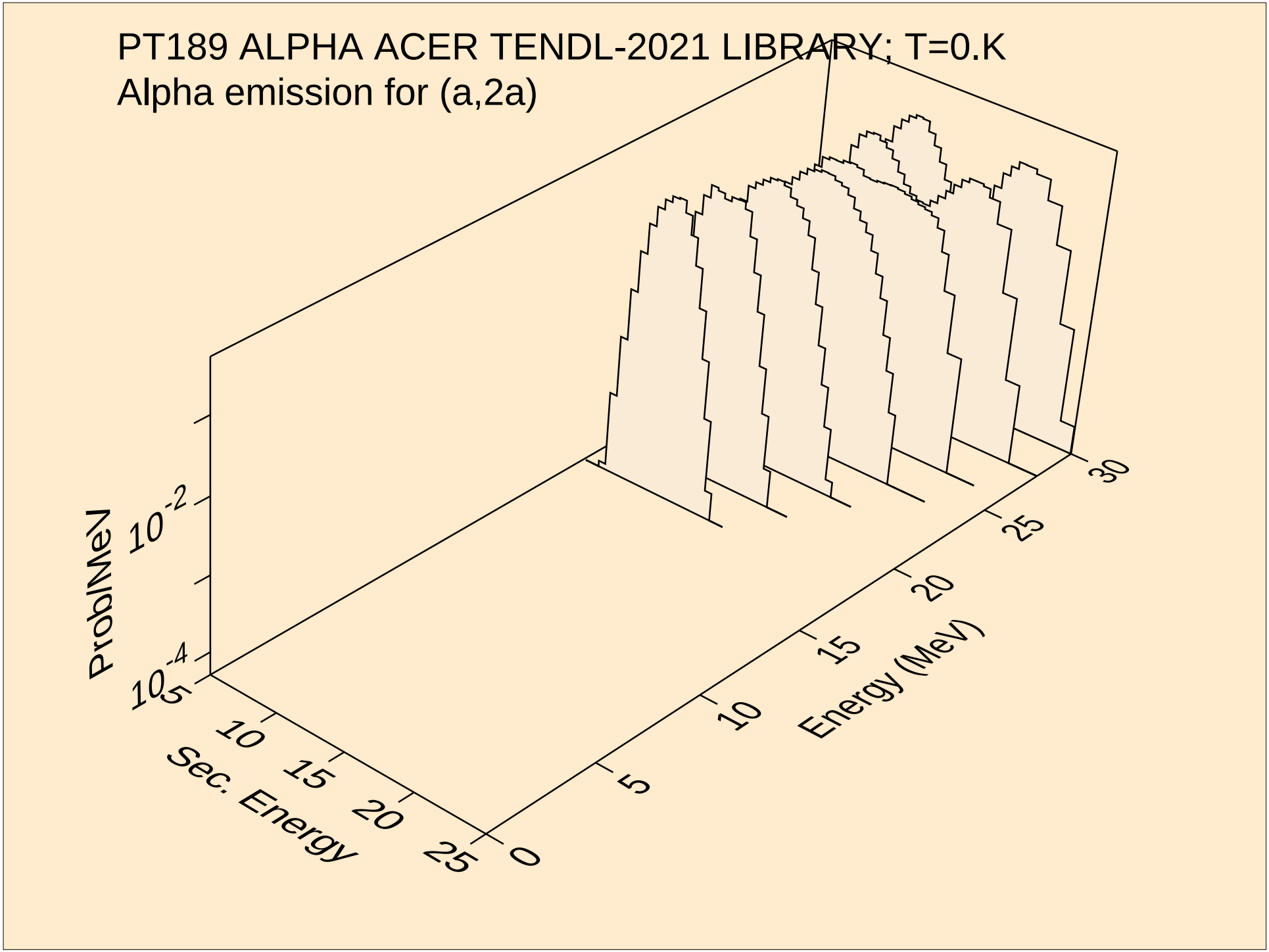

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
angular distribution for elastic
ProbICos
$10^{2}$
$10^{0}$
$10^{-2}$
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
180
200
Energy (MeV)

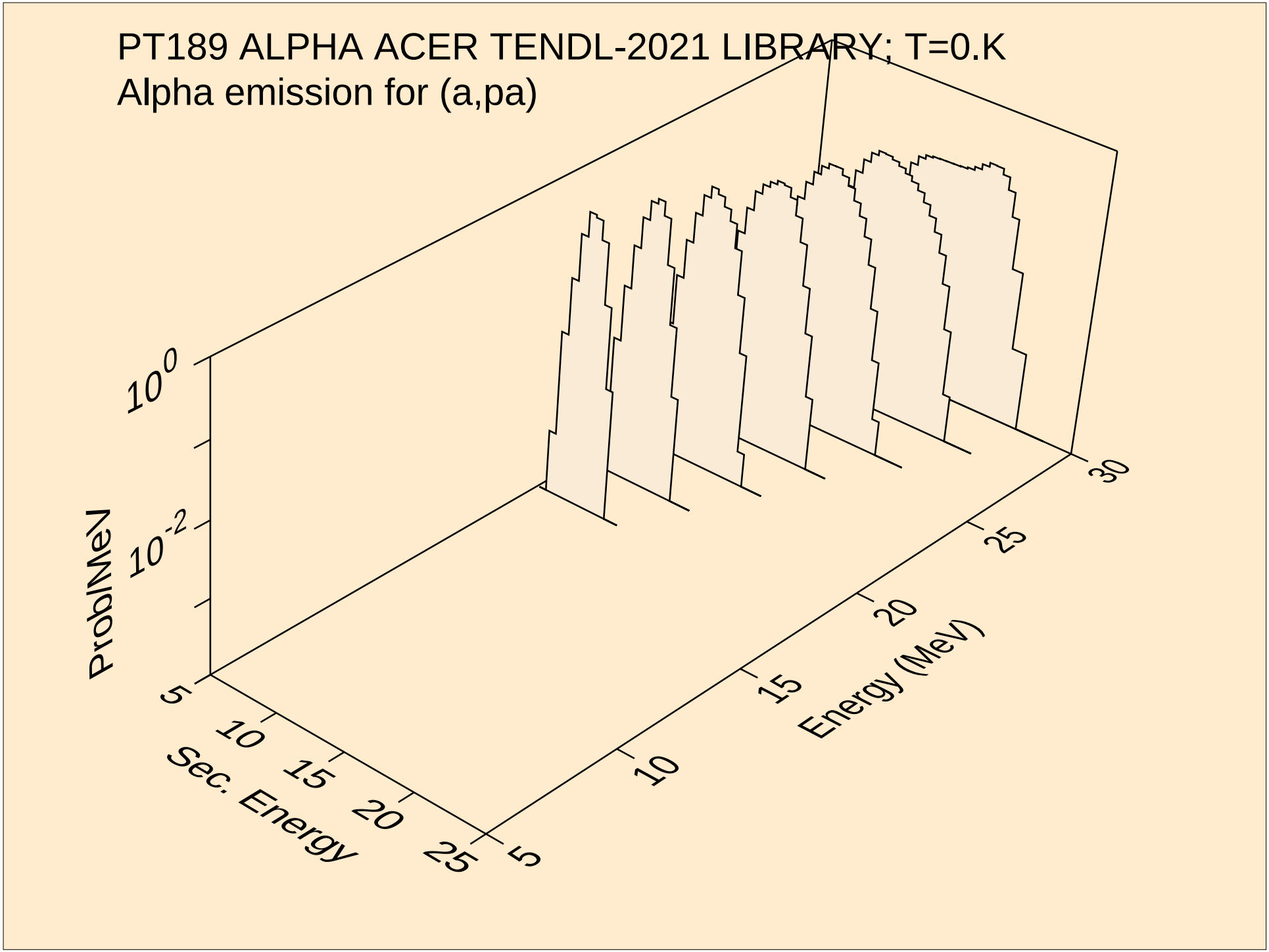

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Alpha emission for (a,x)
Prob/MeV
10-2
10-4
0
50
100
150
200
Sec. Energy
0
50
100
150
200
Energy (MeV)

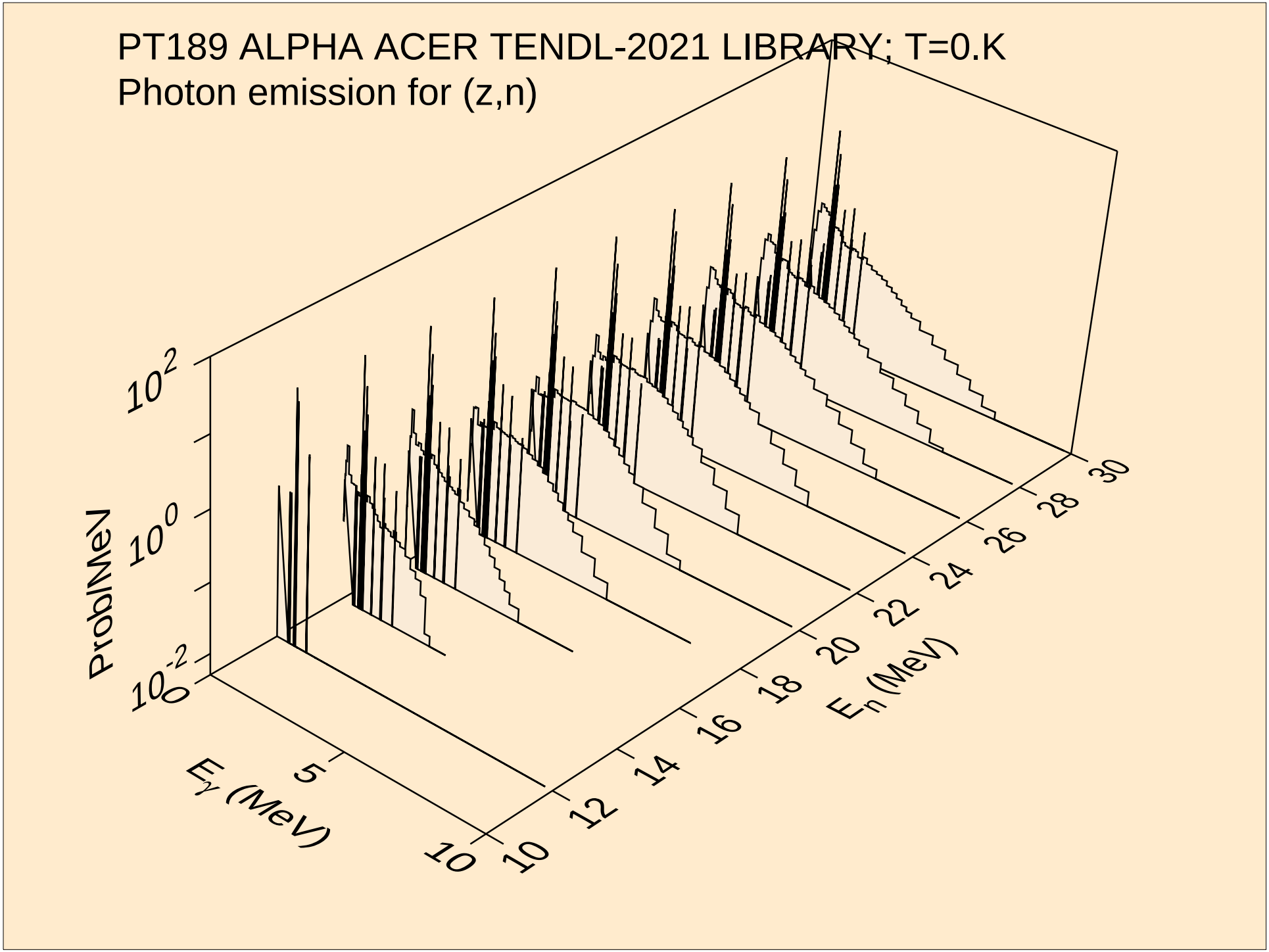

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Alpha emission for (a,n*)a
Prob/MeV
10-1
10-3
5
10
15
20
25
Sec. Energy
5
10
15
20
25
30
Energy (MeV)

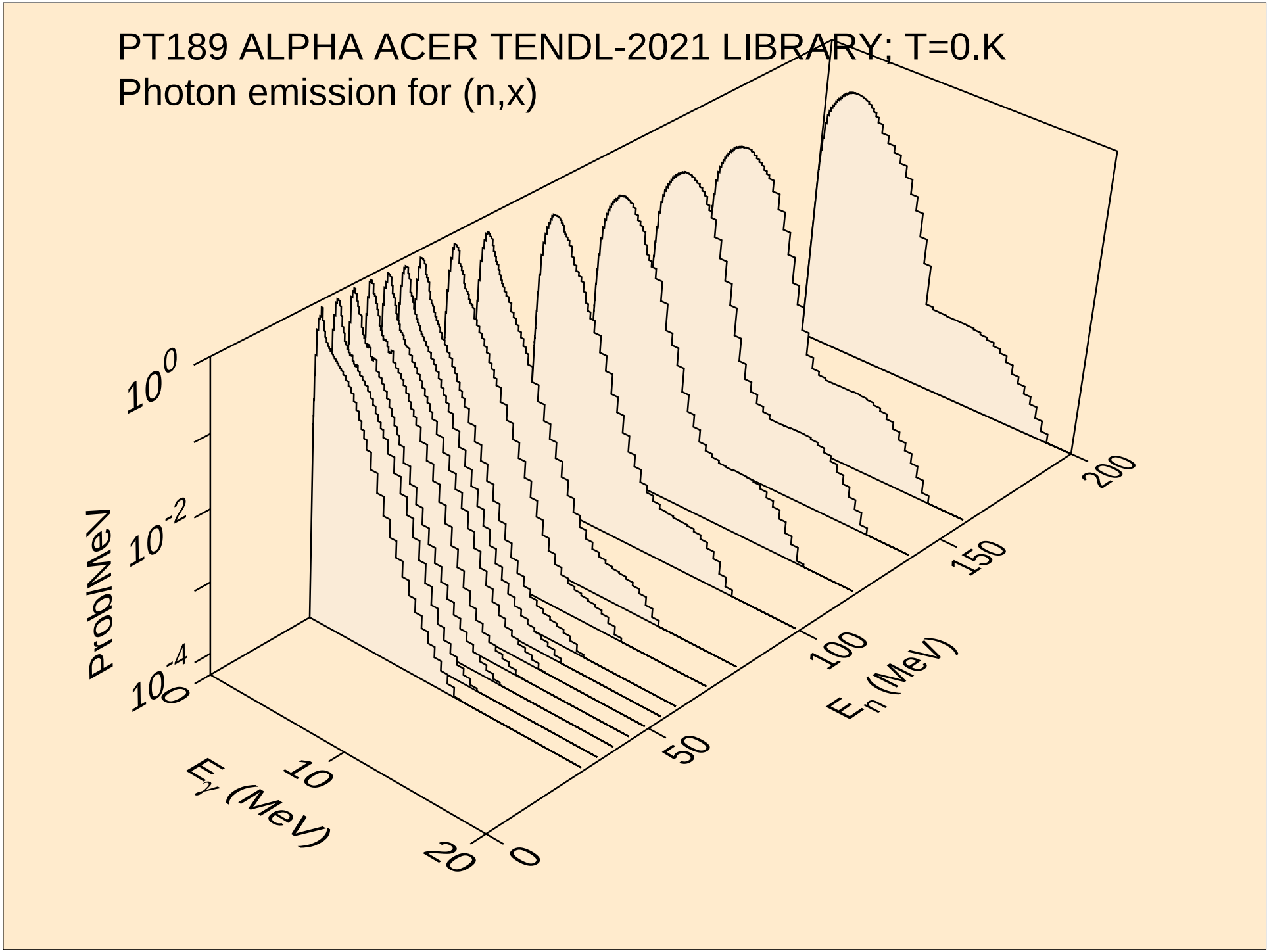

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Alpha emission for (a,2n)a
Prob/MeV
10-1
10-3
4
6
8
10
12
14
16
Sec. Energy
18
20
22
24
26
28
30
Energy (MeV)

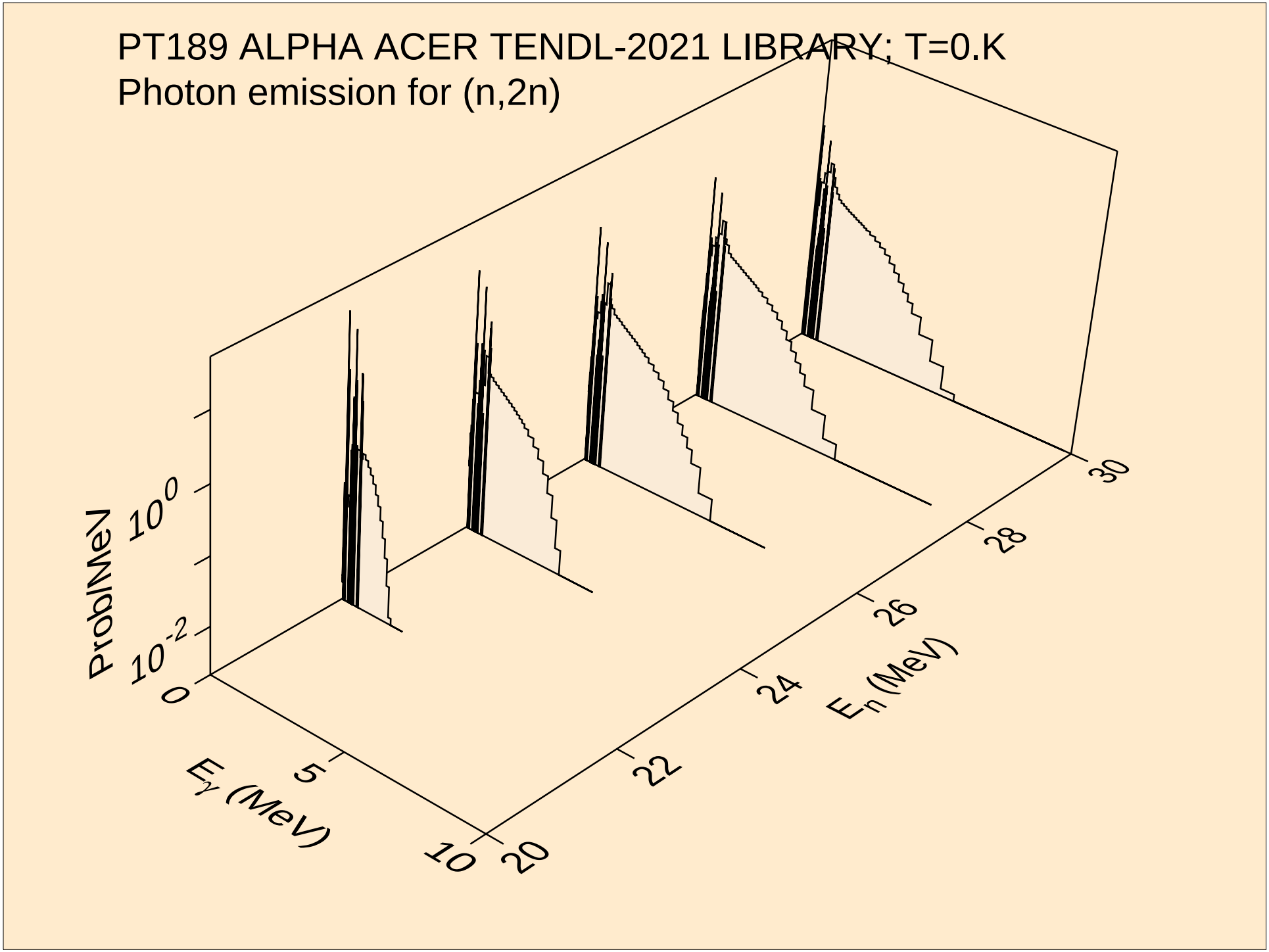

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Alpha emission for inelastic
Prob/MeV
$10^{0}$
$10^{-2}$
0
10
20
30
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

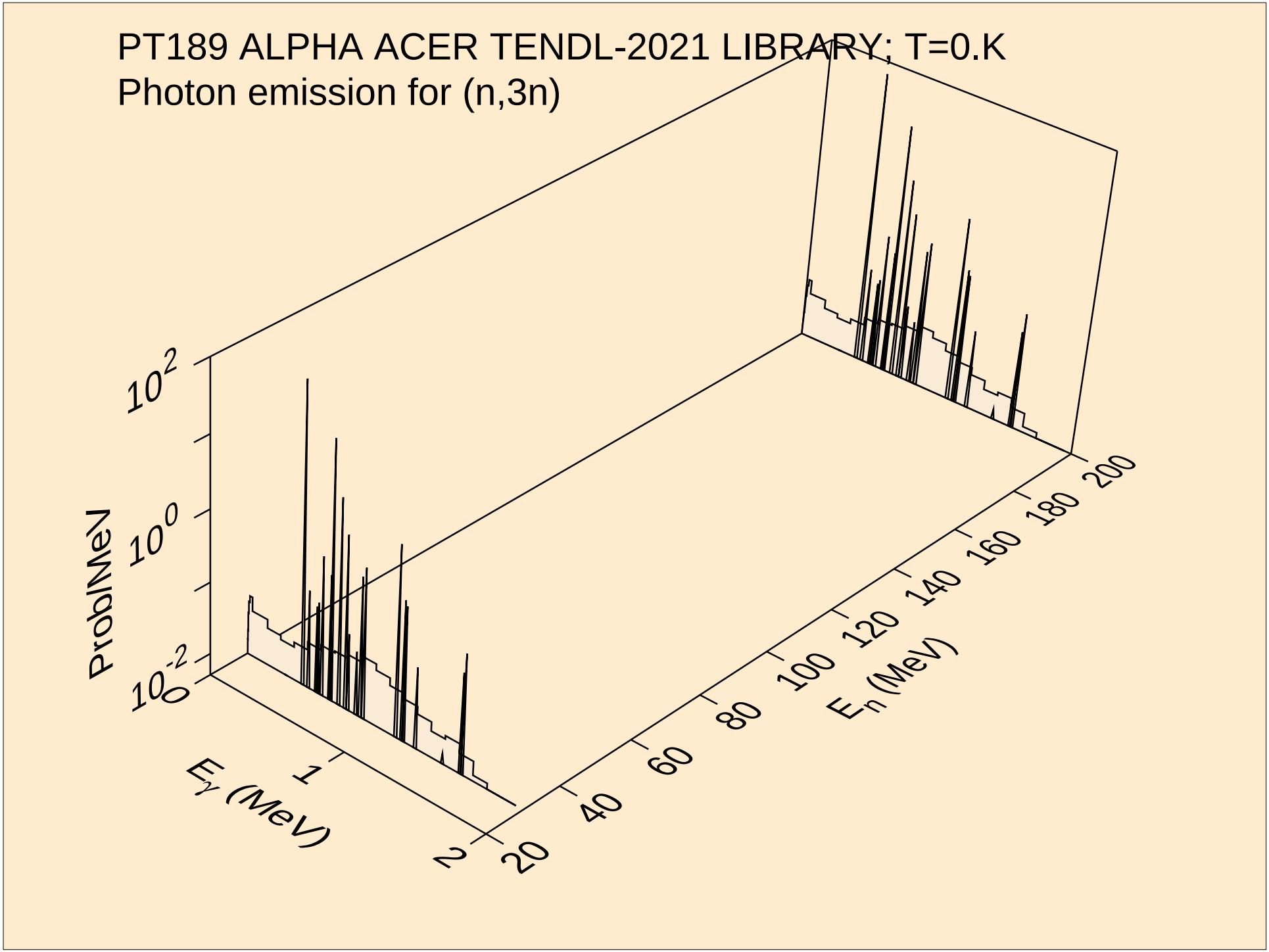

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Alpha emission for (a,2a)
Prob/MeV
10-2
10-4
5
10
15
20
25
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

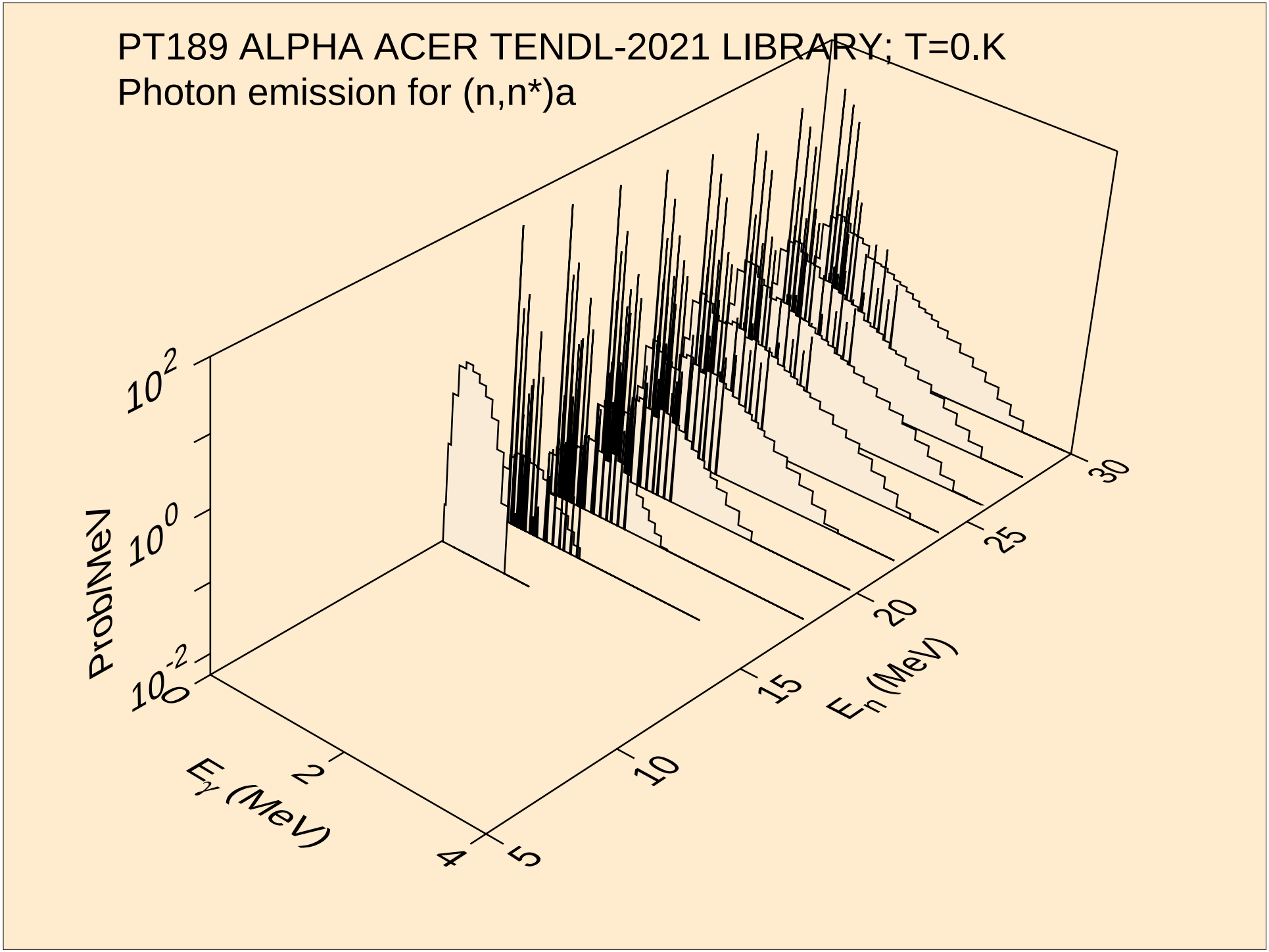

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Alpha emission for (a,pa)
Prob/MeV
10^0
10^-2
5
10
15
20
25
Sec. Energy
5
10
15
20
25
30
Energy (MeV)

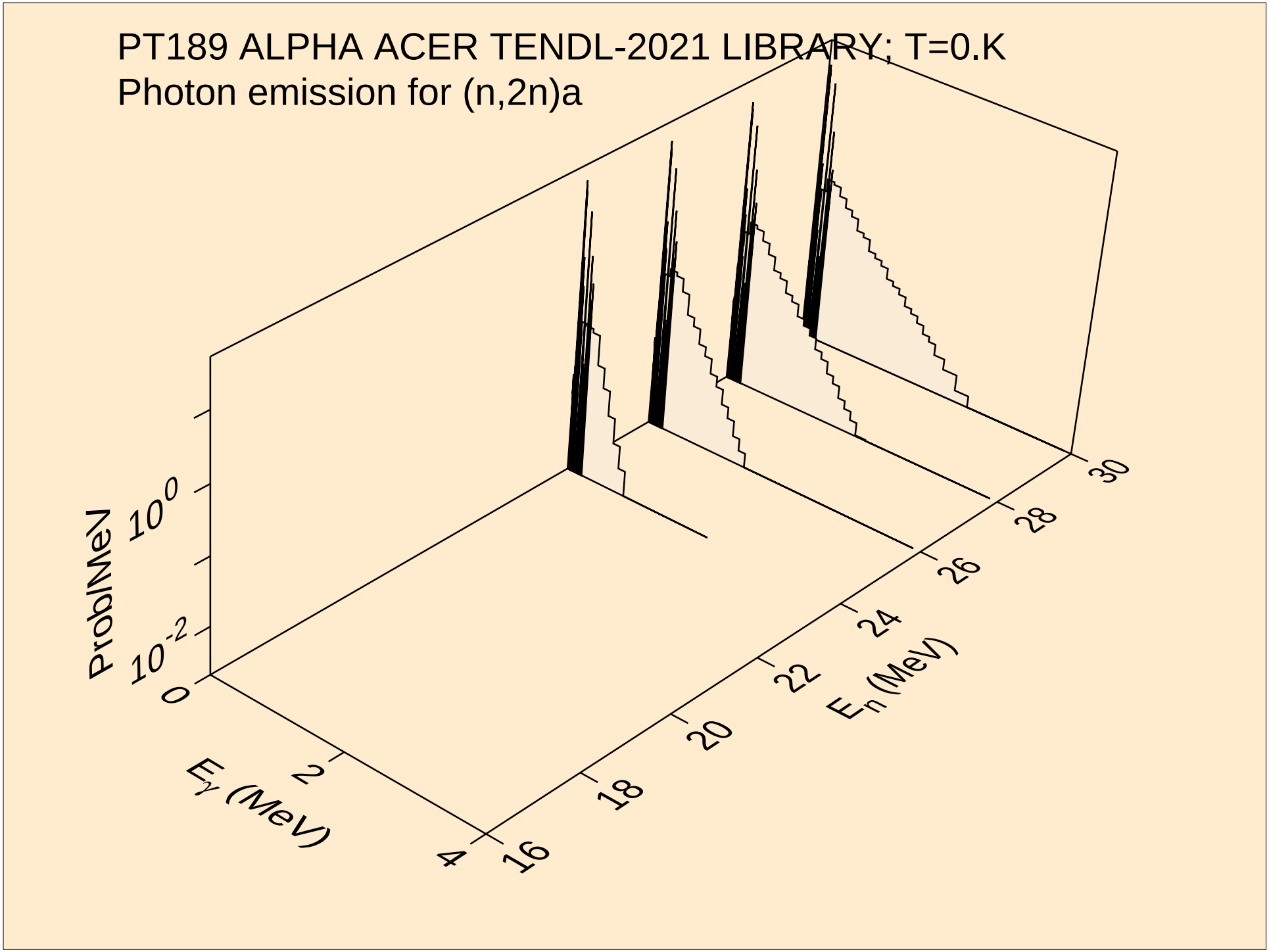

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (z,n)
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
0
5
10
$E_\gamma$ (MeV)
10
12
14
16
18
20
22
24
26
28
30
$E_n$ (MeV)

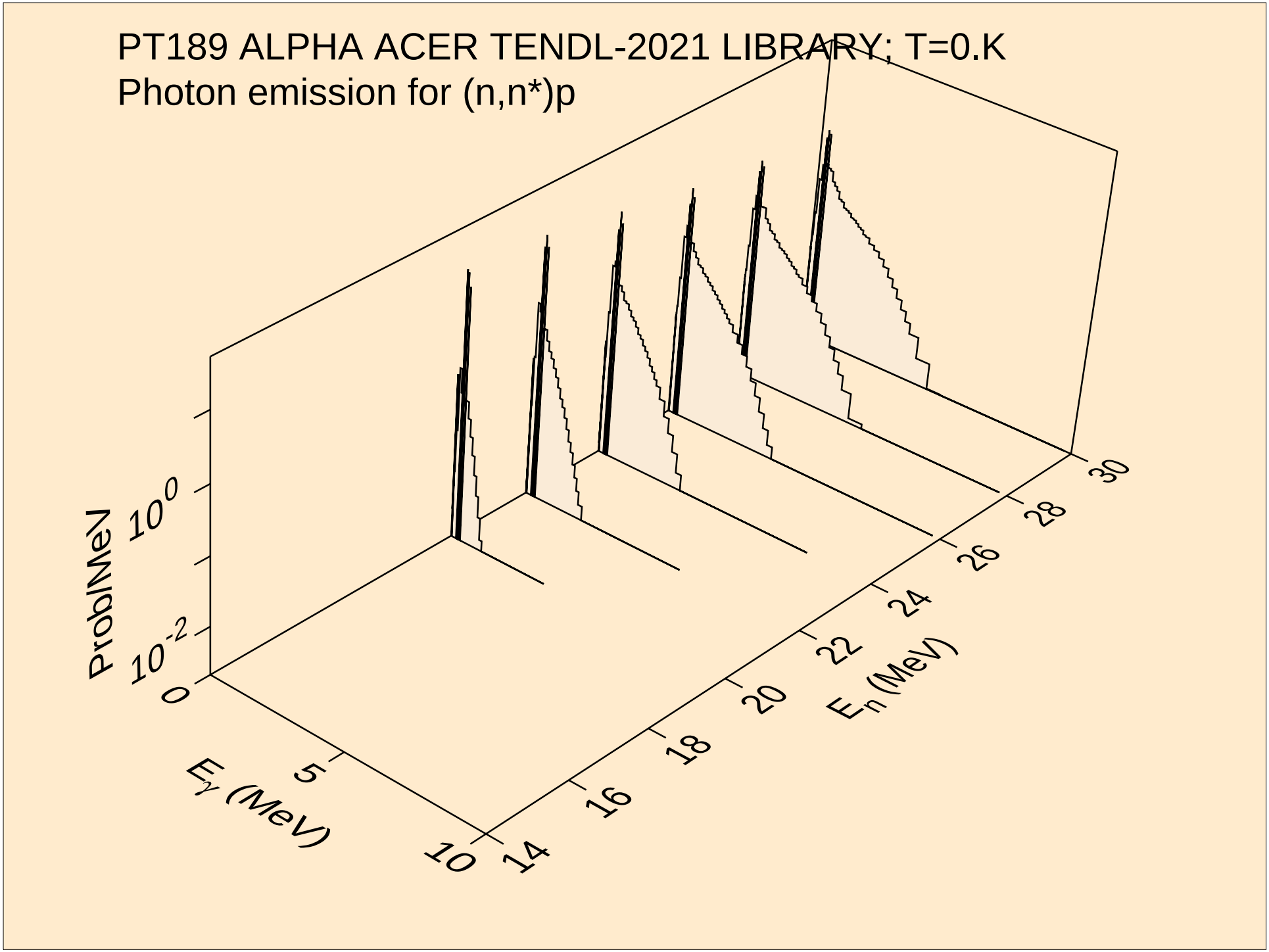

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,x)
Prob/MeV
$10^{0}$
$10^{-2}$
$10^{-4}$
0
10
20
$E_\gamma$ (MeV)
0
50
100
150
200
$E_n$ (MeV)

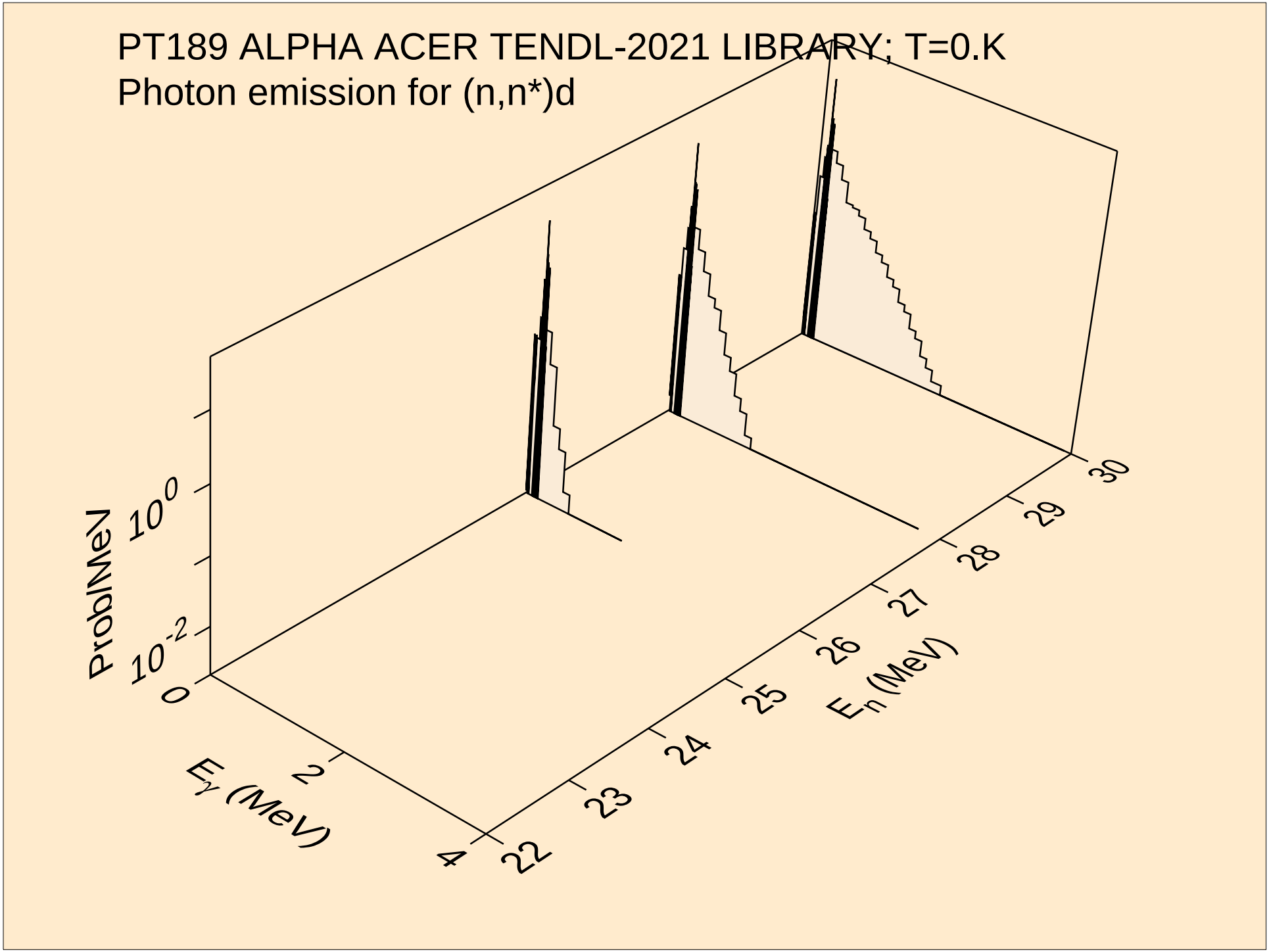

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,2n)
Prob/MeV
10^0
10^-2
0
5
10
20
22
24
26
28
30
E_γ (MeV)
E_n (MeV)

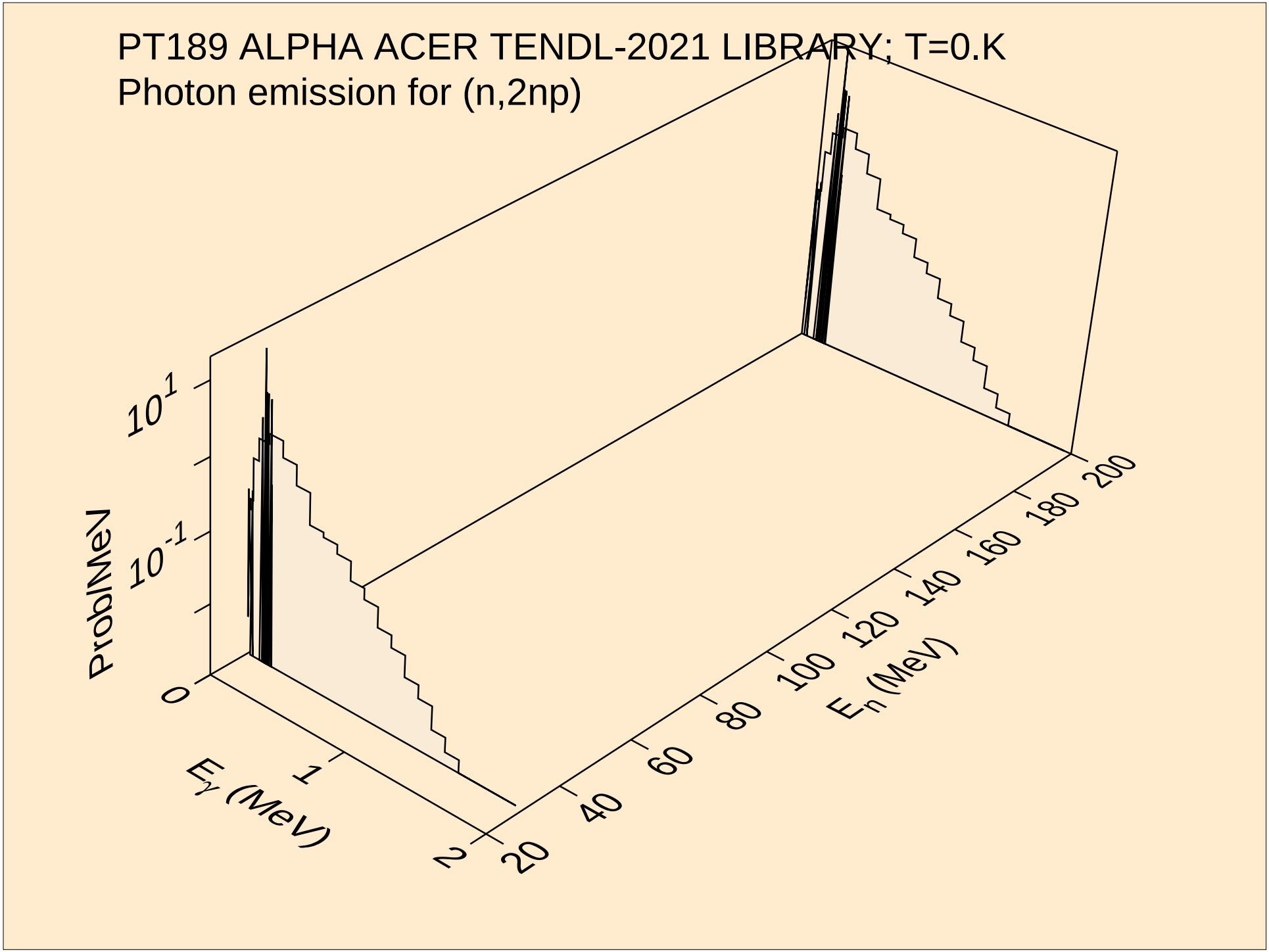

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,3n)
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
0
1
2
$E_\gamma$ (MeV)
20
40
60
80
100
120
140
160
180
200
$E_n$ (MeV)

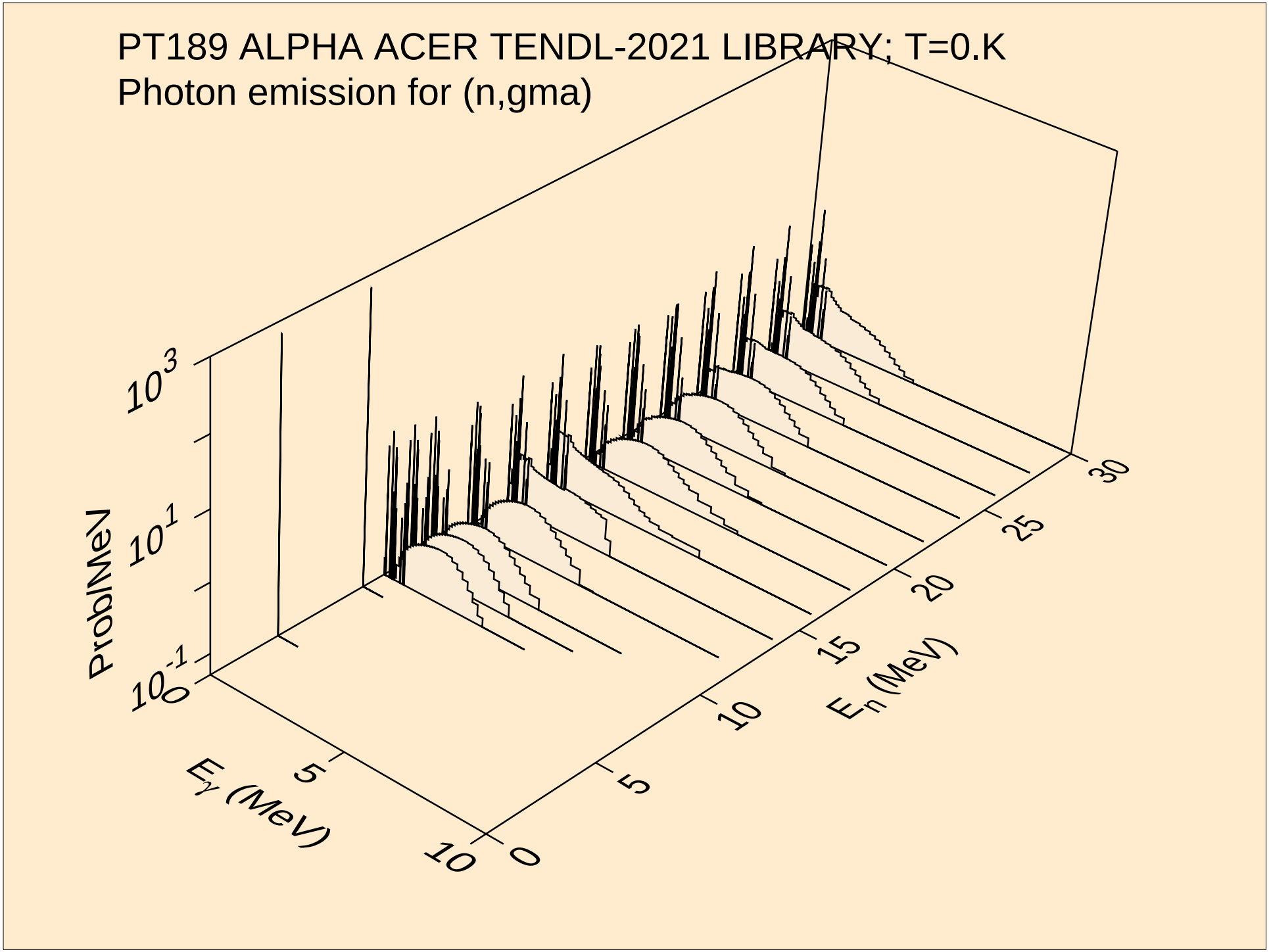

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,n*)a
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
0
2
4
$E_\gamma$ (MeV)
5
10
15
20
25
30
$E_n$ (MeV)

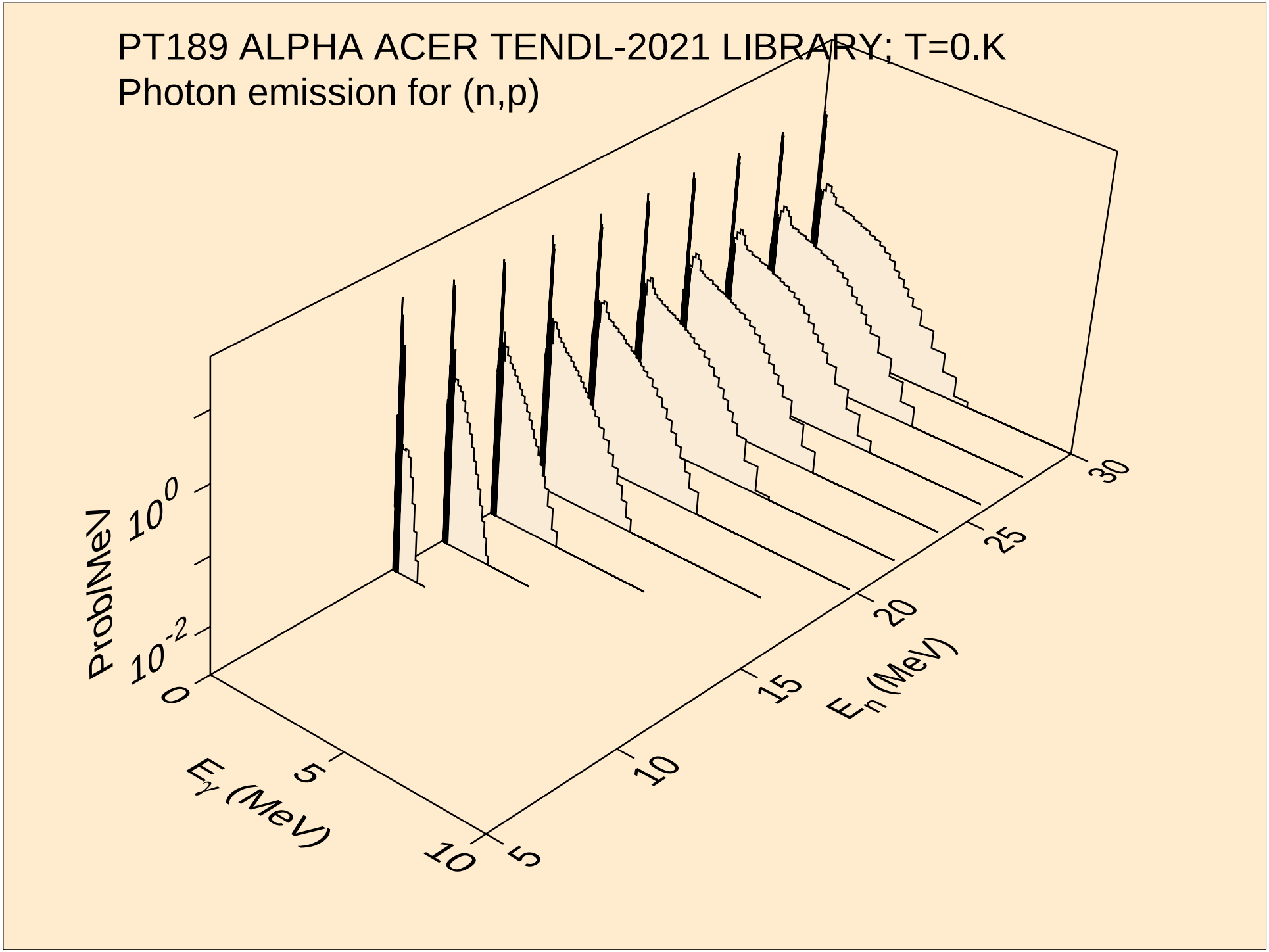

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,2n)a
Prob/MeV
10^0
10^-2
0
2
4
E_γ (MeV)
16
18
20
22
24
26
28
30
E_n (MeV)

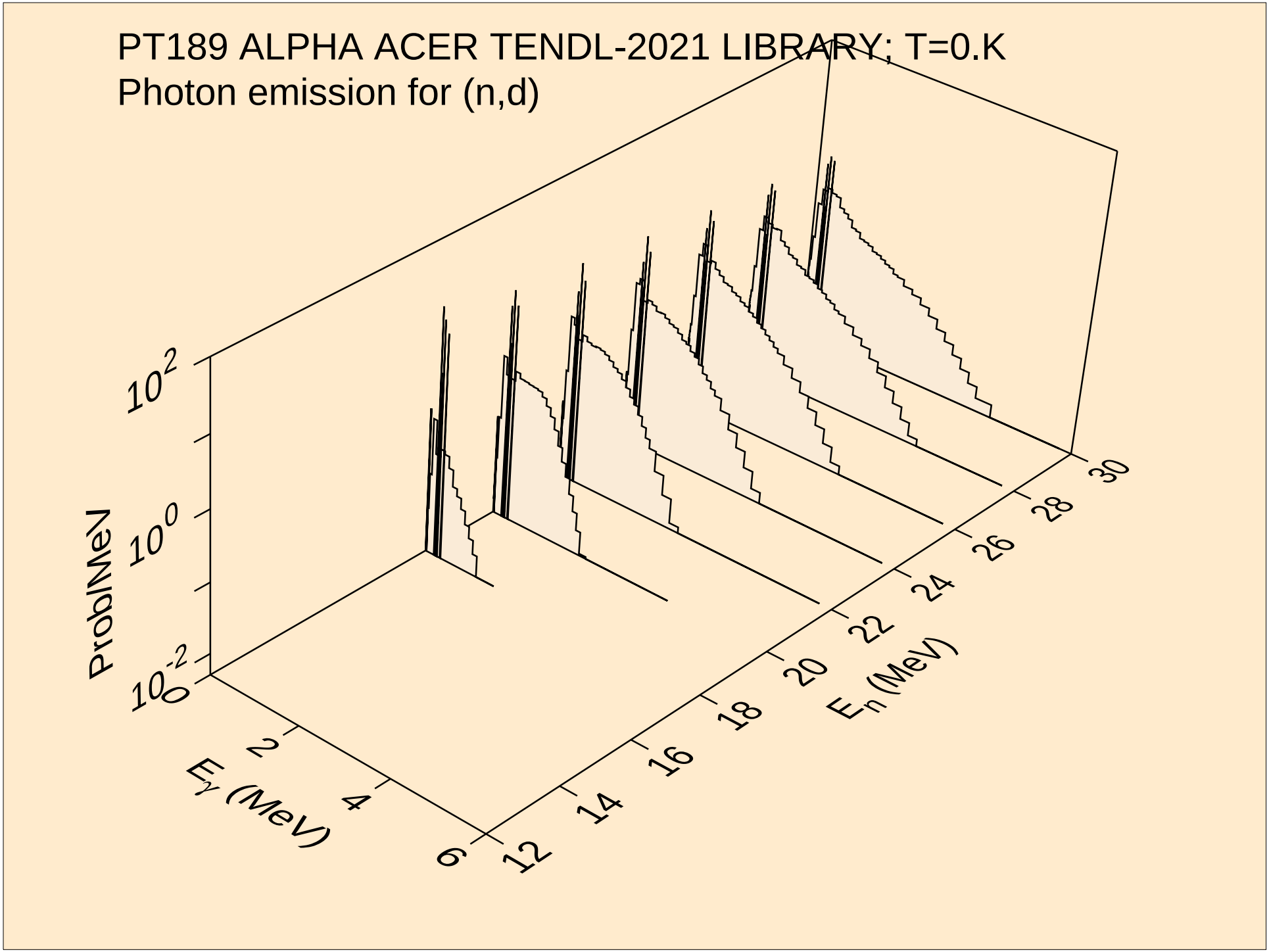

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,n*)p
Prob/MeV
10^0
10^-2
0
5
10
Eγ (MeV)
14
16
18
20
22
24
26
28
30
En (MeV)

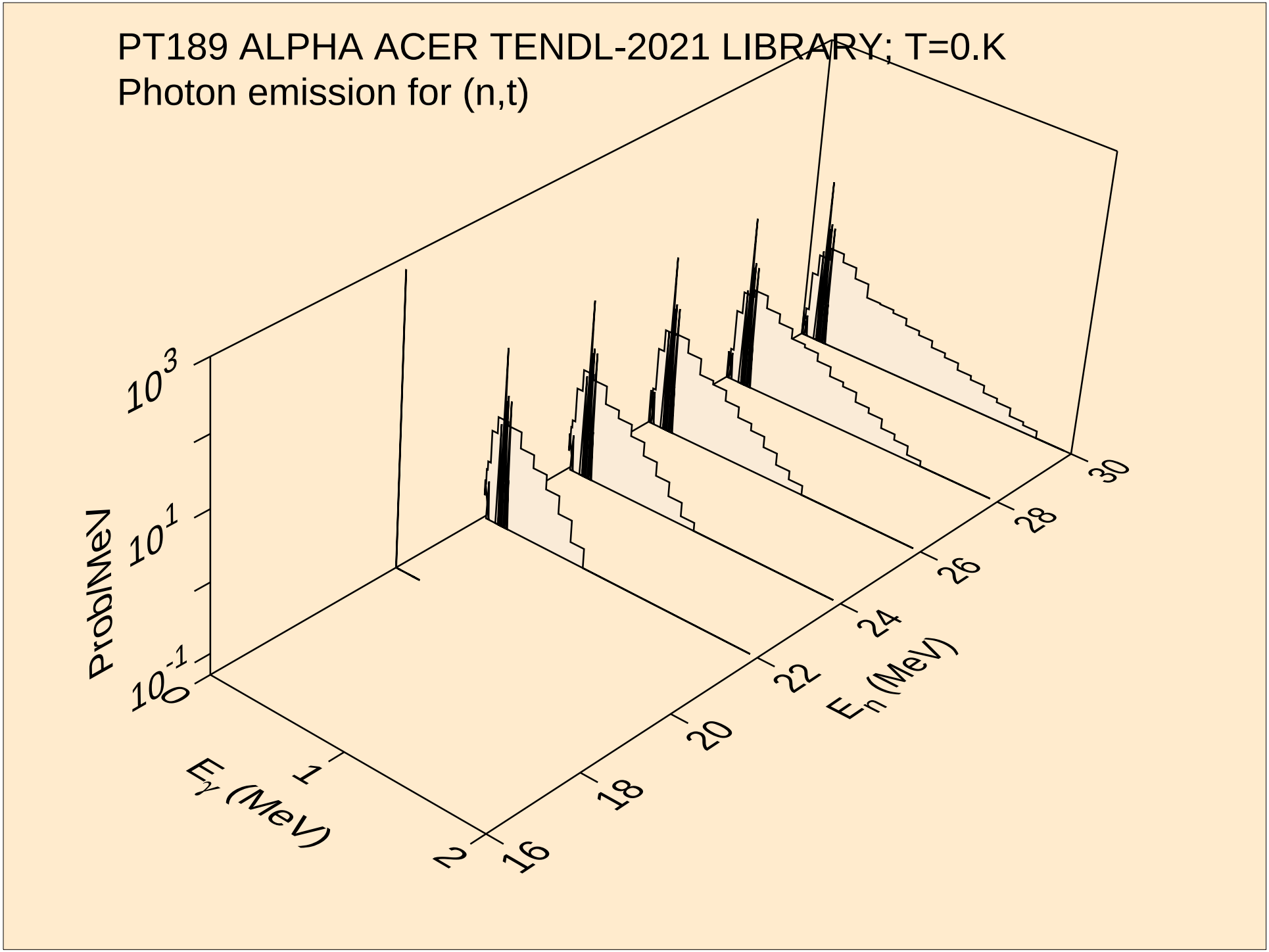

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,n*)d
Prob/MeV
$10^{0}$
$10^{-2}$
0
$E_\gamma$ (MeV)
2
4
22
23
24
25
26
27
28
29
30
$E_n$ (MeV)

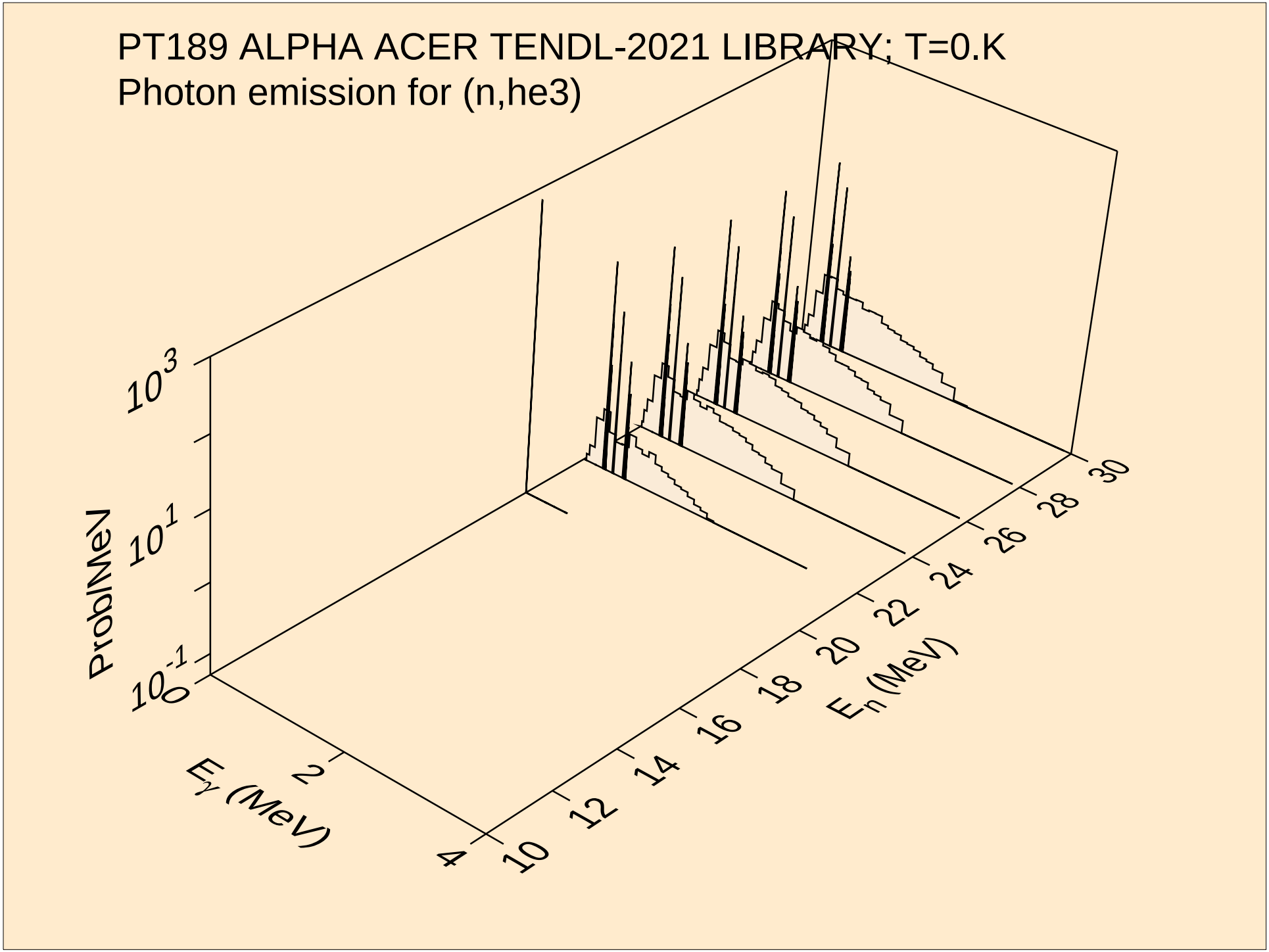

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,2np)
Prob/MeV
$10^{1}$
$10^{-1}$
0
1
2
$E_\gamma$ (MeV)
20
40
60
80
100
120
140
160
180
200
$E_n$ (MeV)

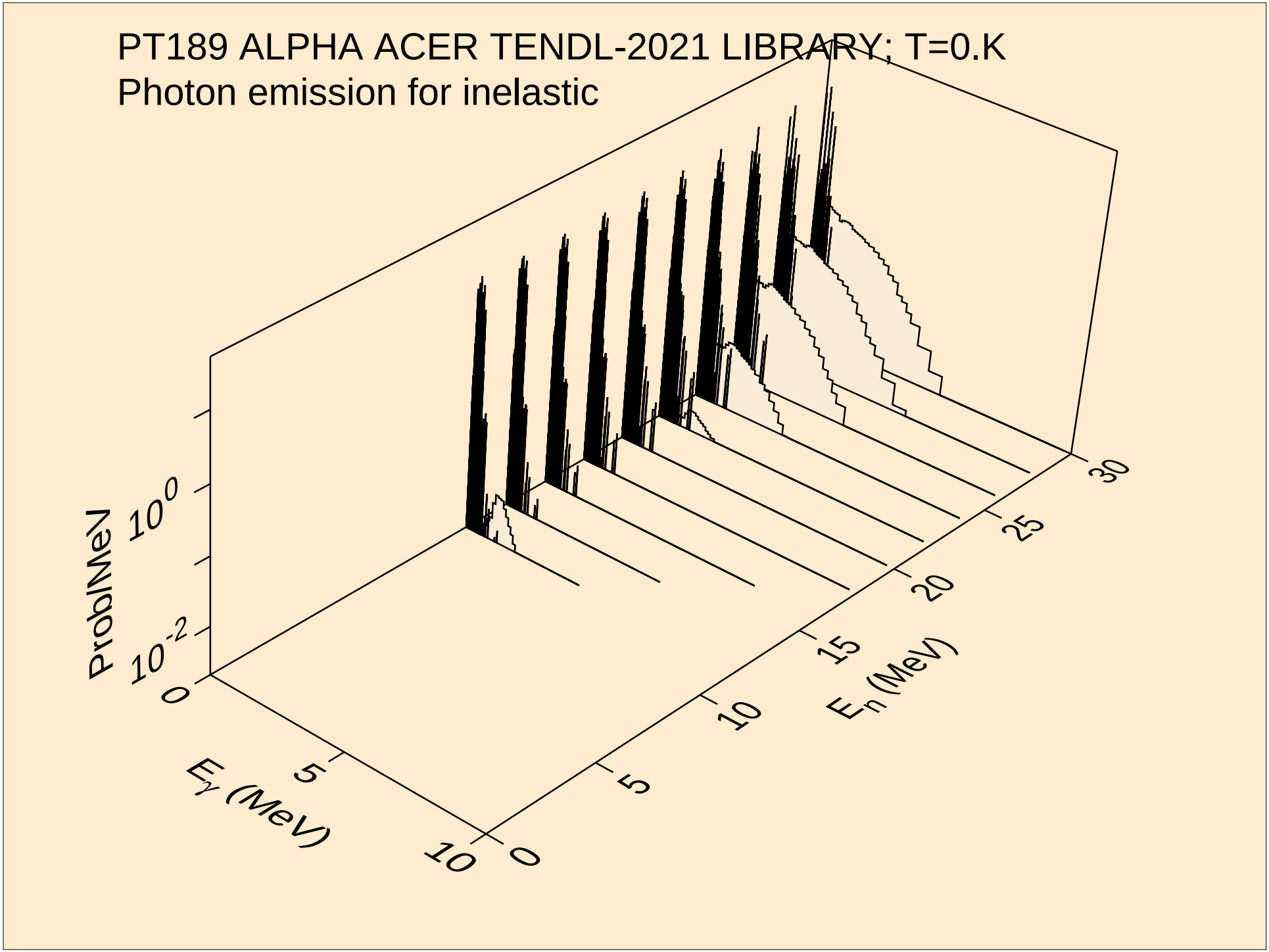

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,gma)
Prob/MeV
$10^{3}$
$10^{1}$
$10^{-1}$
0
5
10
$E_\gamma$ (MeV)
0
5
10
15
20
25
30
$E_n$ (MeV)

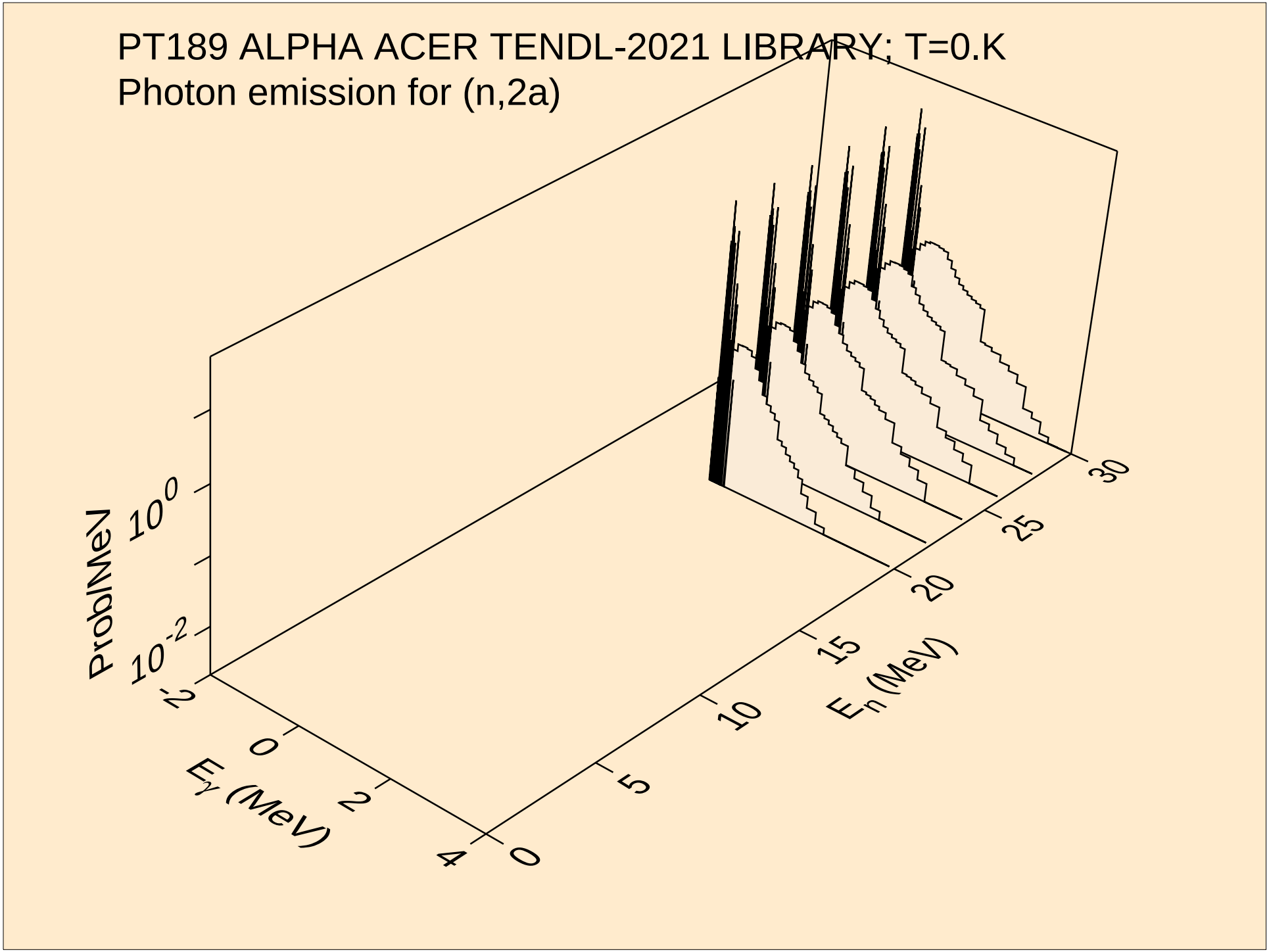

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,p)
Prob/MeV
$10^{0}$
$10^{-2}$
0
$E_\gamma$ (MeV)
5
10
5
10
15
20
25
30
$E_n$ (MeV)

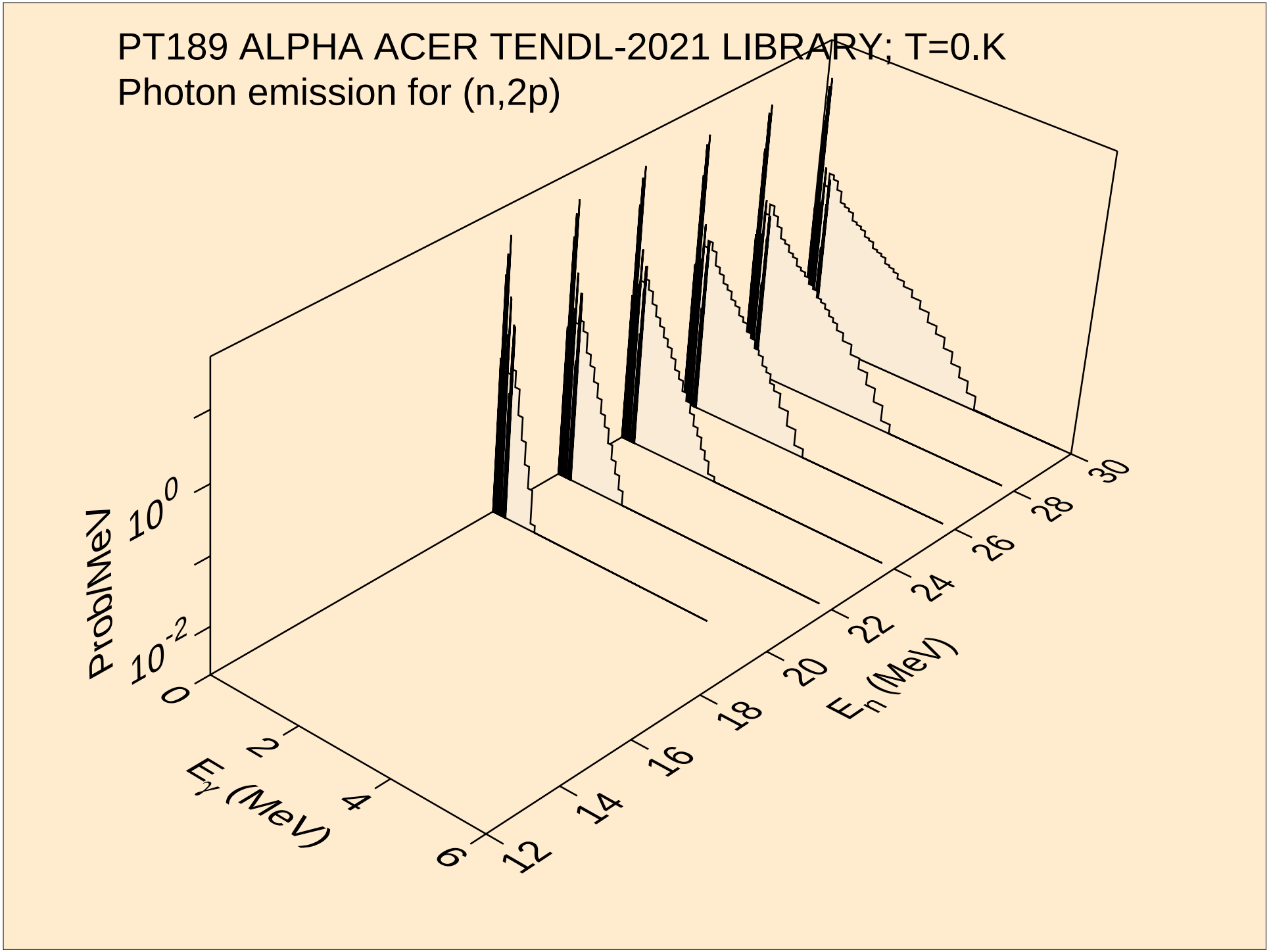

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,d)
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
0
2
4
6
$E_\gamma$ (MeV)
12
14
16
18
20
22
24
26
28
30
$E_n$ (MeV)

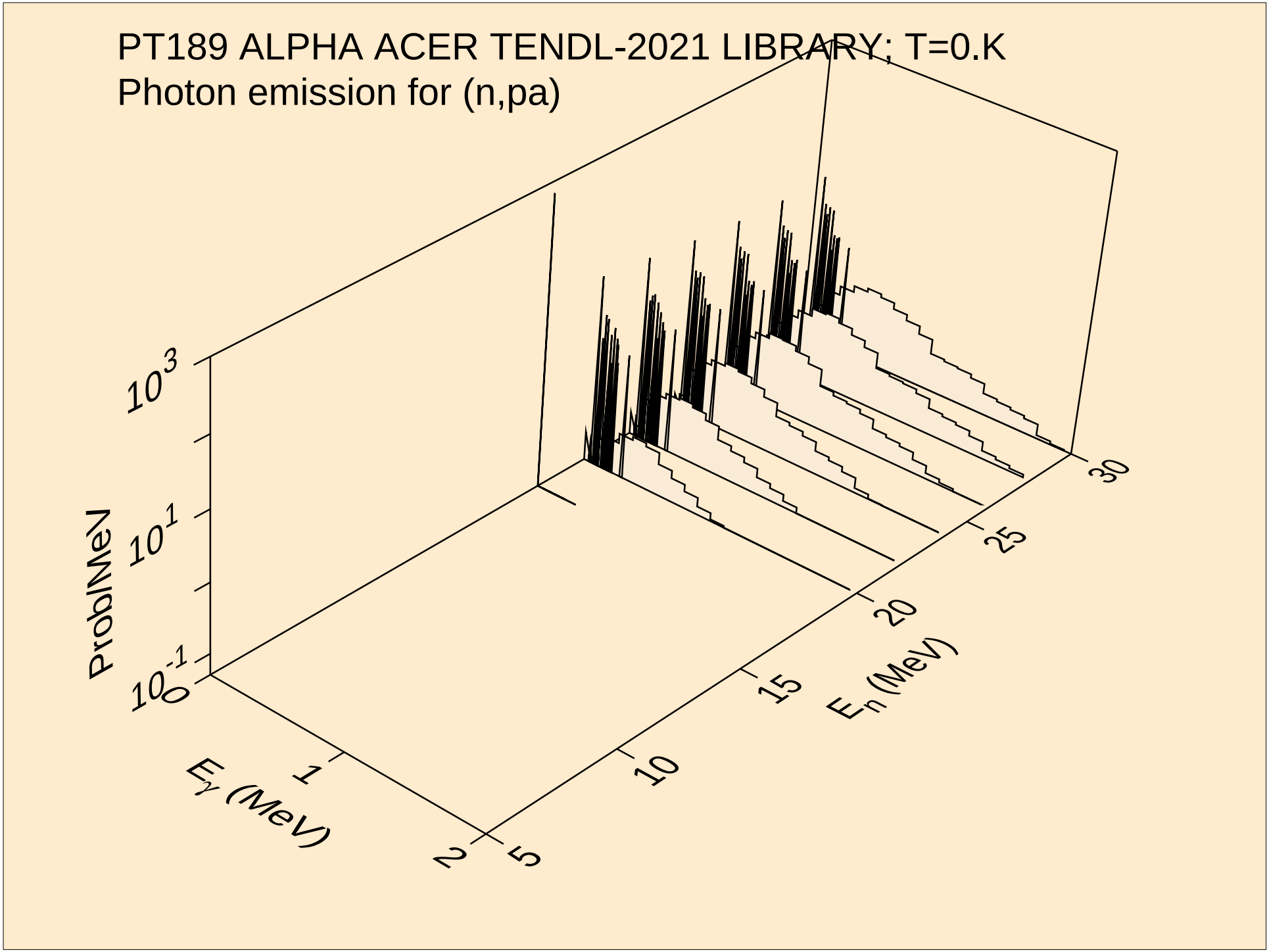

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,t)
Prob/MeV
$10^{3}$
$10^{1}$
$10^{-1}$
0
1
2
$E_\gamma$ (MeV)
16
18
20
22
24
26
28
30
$E_n$ (MeV)

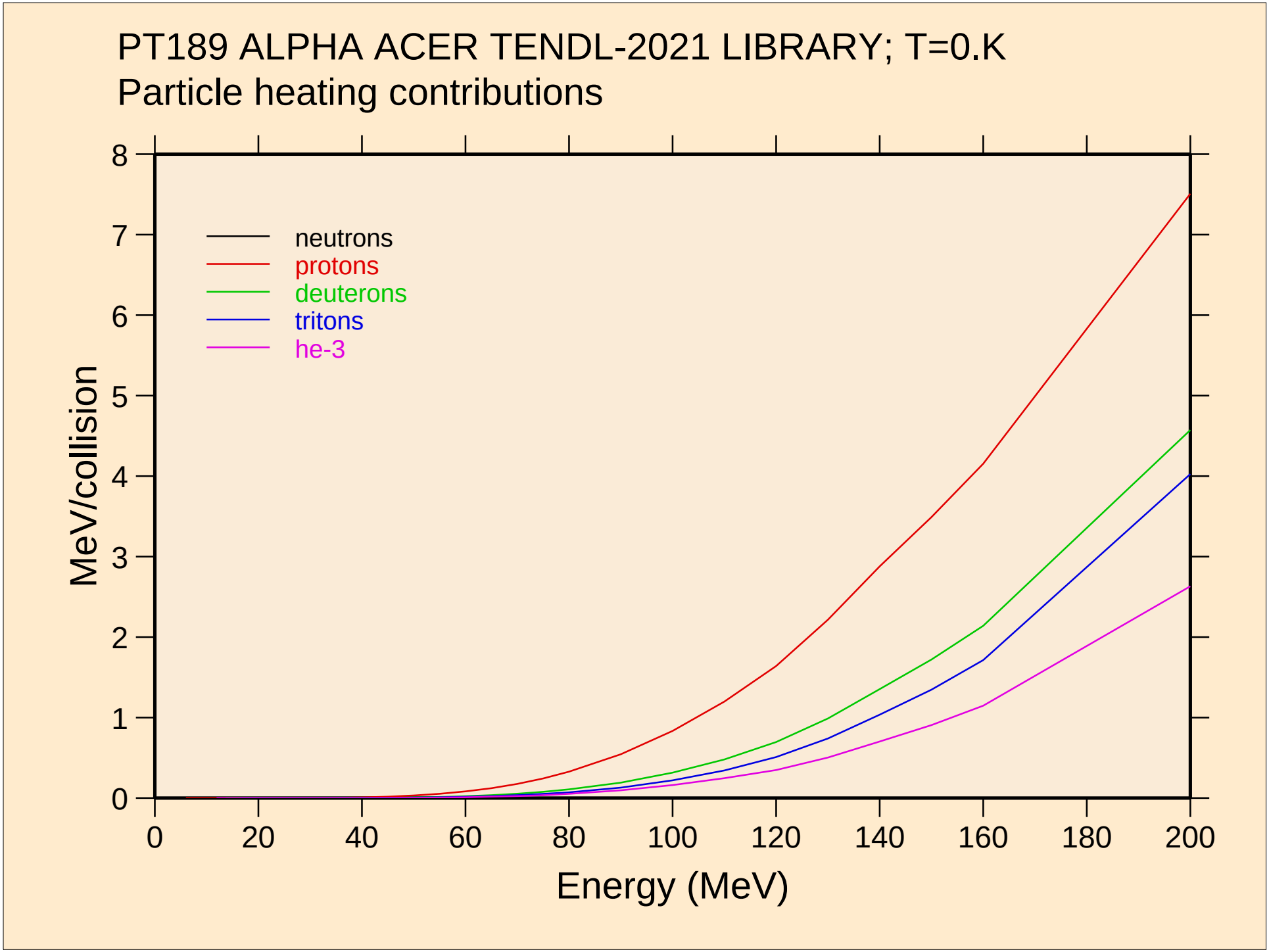

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,he3)
Prob/MeV
$10^{3}$
$10^{1}$
$10^{-1}$
0
2
4
$E_\gamma$ (MeV)
10
12
14
16
18
20
22
24
26
28
30
$E_n$ (MeV)

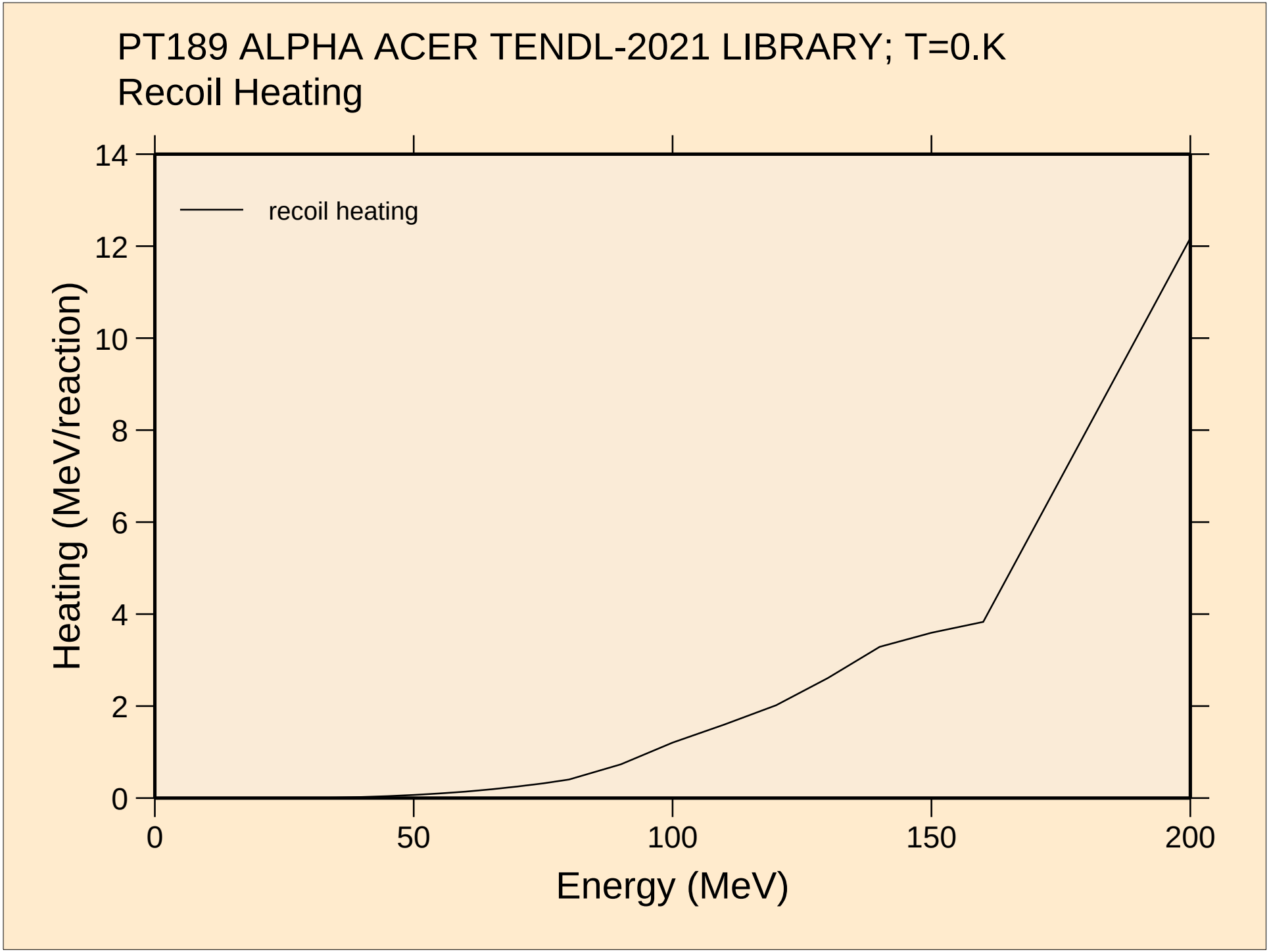

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for inelastic
Prob/MeV
$10^{0}$
$10^{-2}$
0
$E_\gamma$ (MeV)
5
10
0
5
10
15
20
25
30
$E_n$ (MeV)

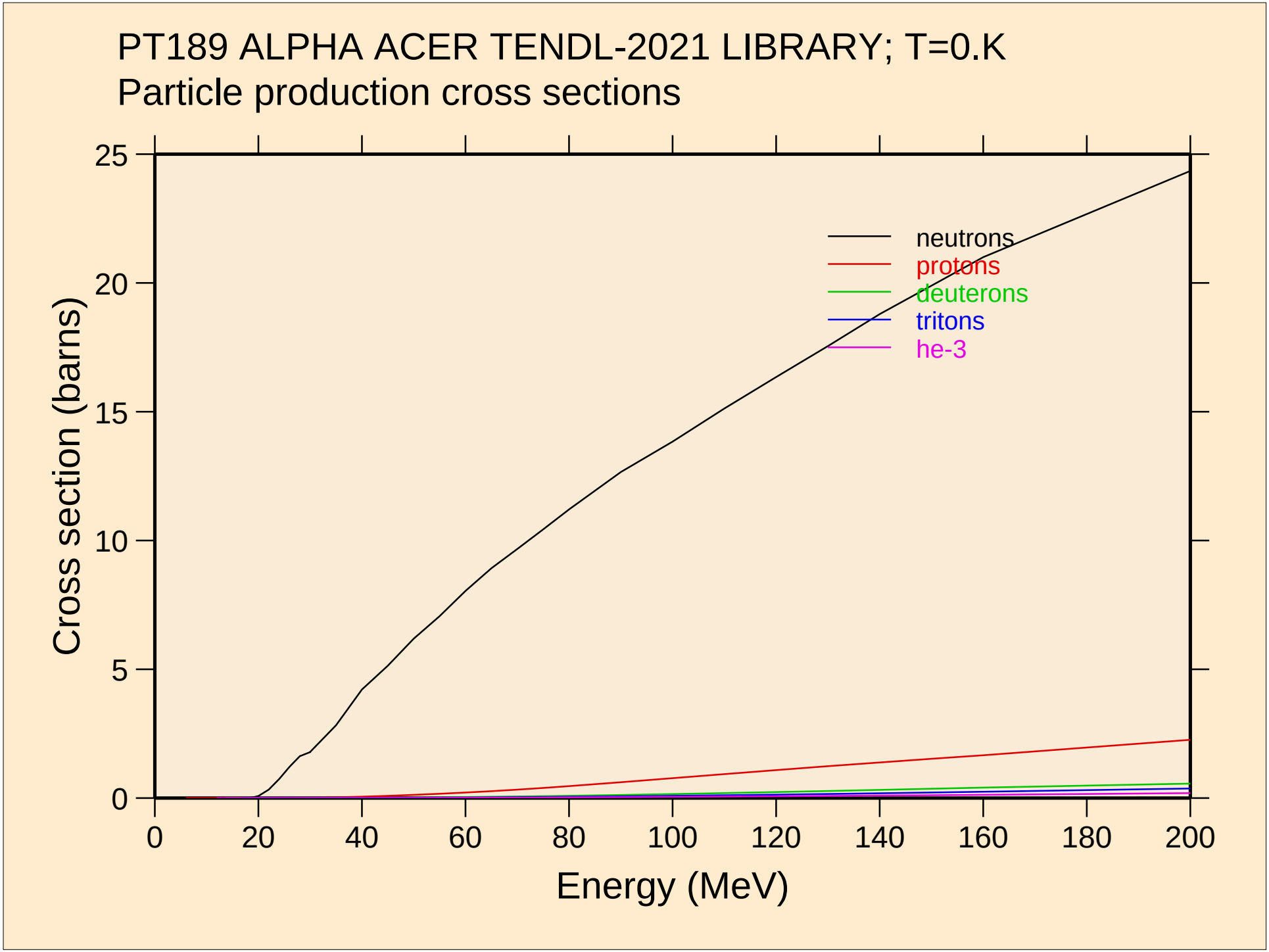

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,2a)
Prob/MeV
$10^{0}$
$10^{-2}$
$E_\gamma$ (MeV)
-2
0
2
4
$E_n$ (MeV)
0
5
10
15
20
25
30

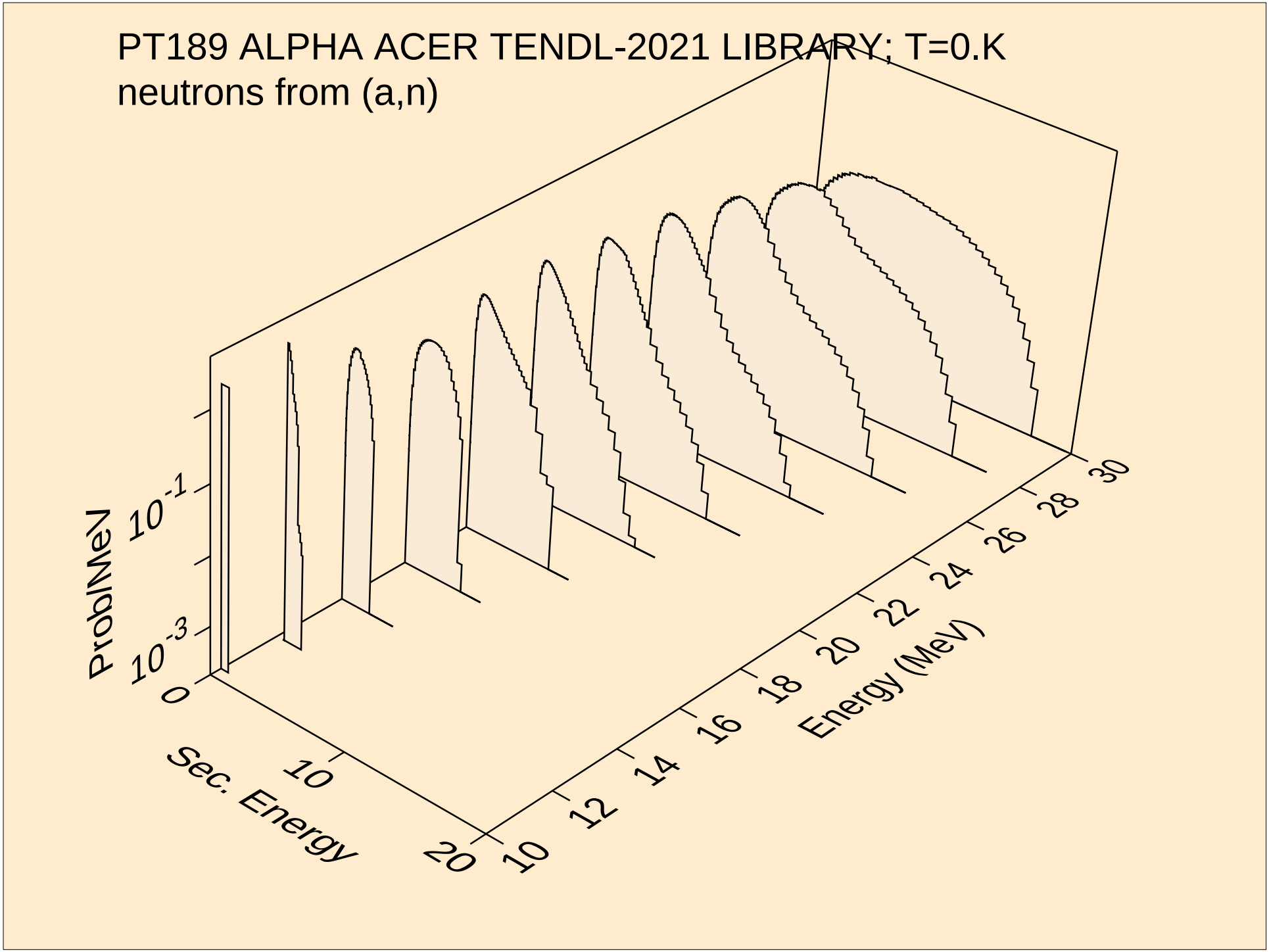

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,2p)
Prob/MeV
$10^{0}$
$10^{-2}$
0
2
4
6
$E_\gamma$ (MeV)
12
14
16
18
20
22
24
26
28
30
$E_n$ (MeV)

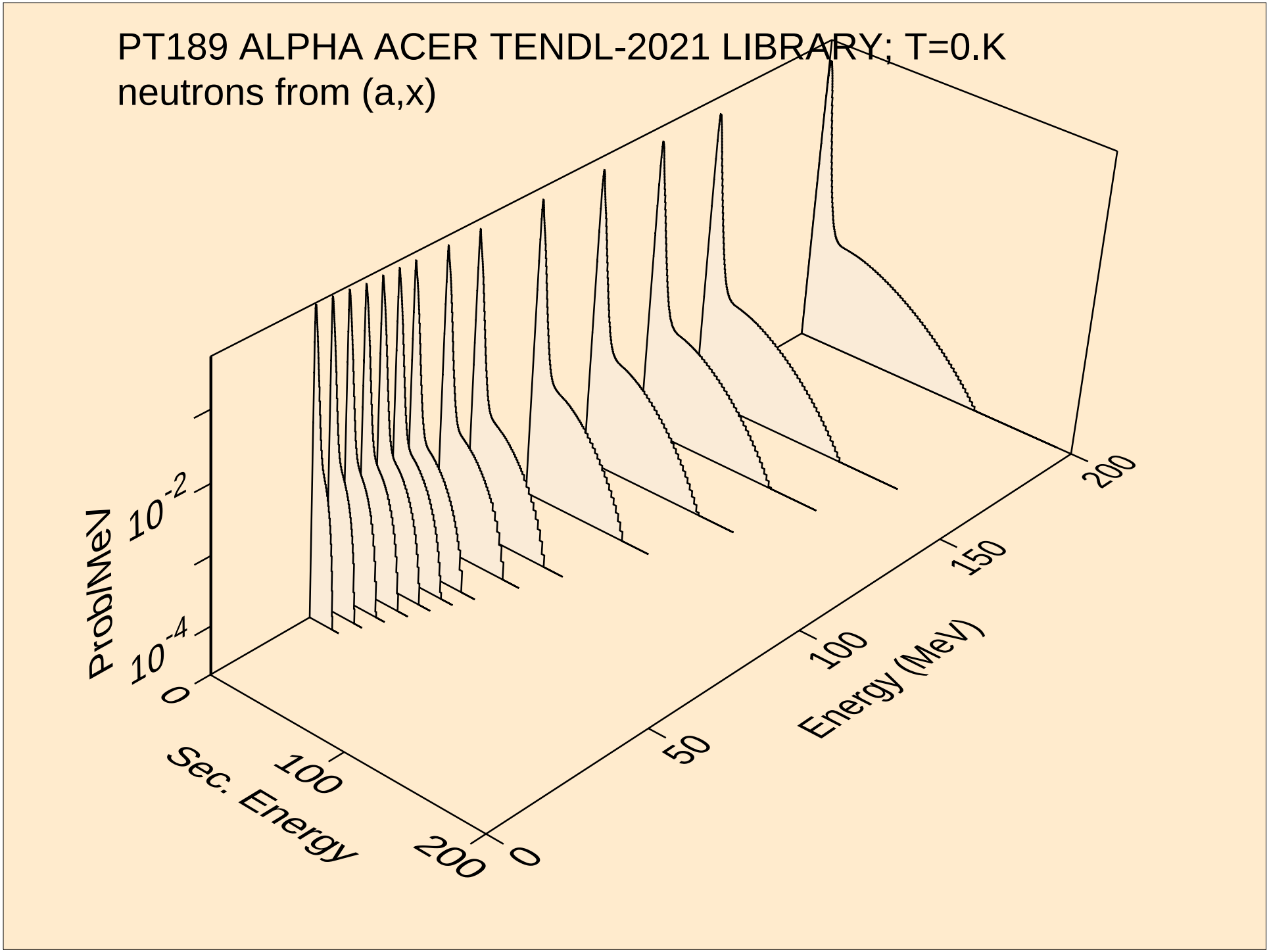

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Photon emission for (n,pa)
Prob/MeV
$10^{3}$
$10^{1}$
$10^{-1}$
0
1
2
5
10
15
20
25
30
$E_\gamma$ (MeV)
$E_n$ (MeV)

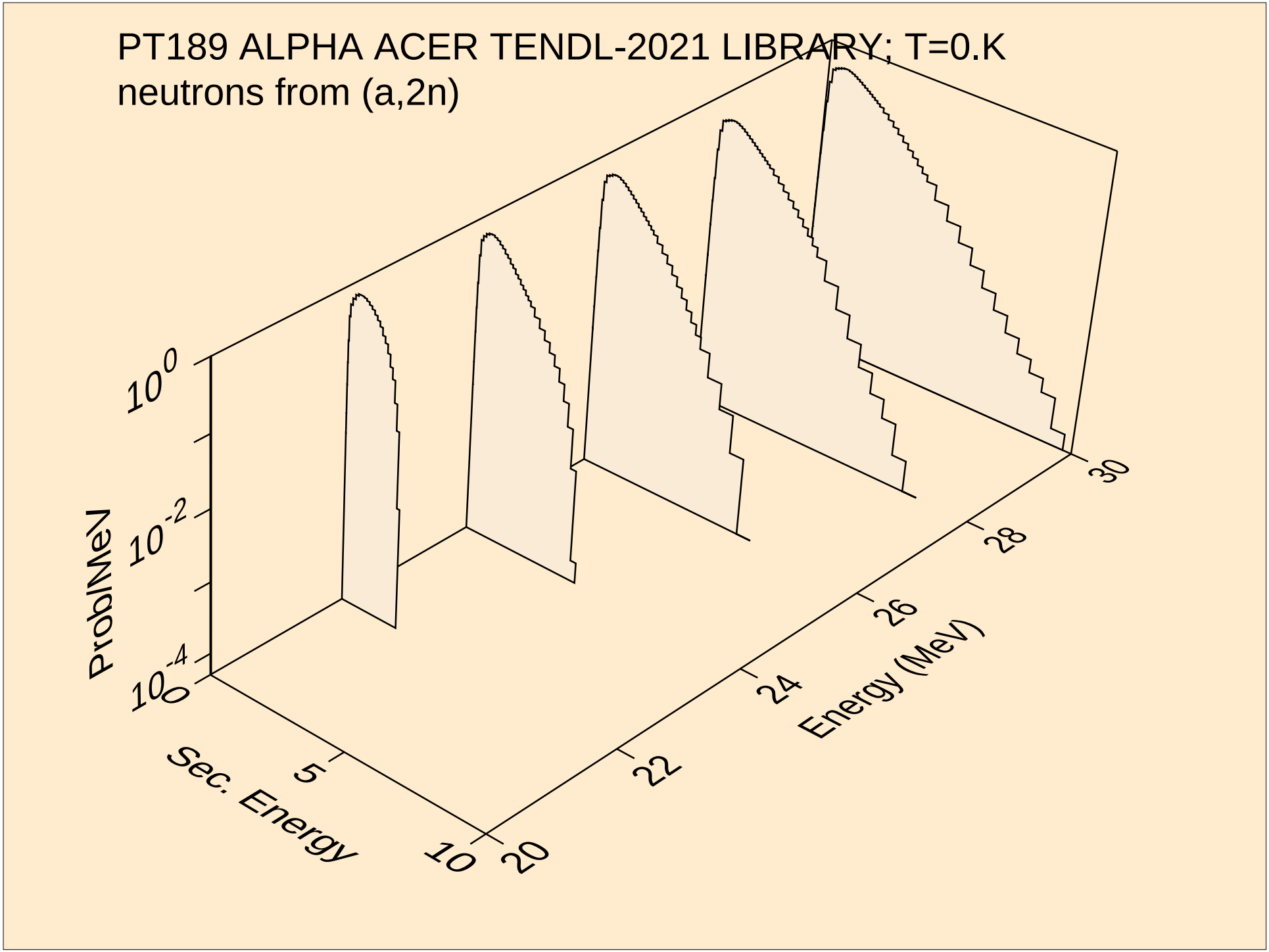

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Particle heating contributions
neutrons
protons
deuterons
tritons
he-3
MeV/collision
Energy (MeV)
0
1
2
3
4
5
6
7
8
0
20
40
60
80
100
120
140
160
180
200

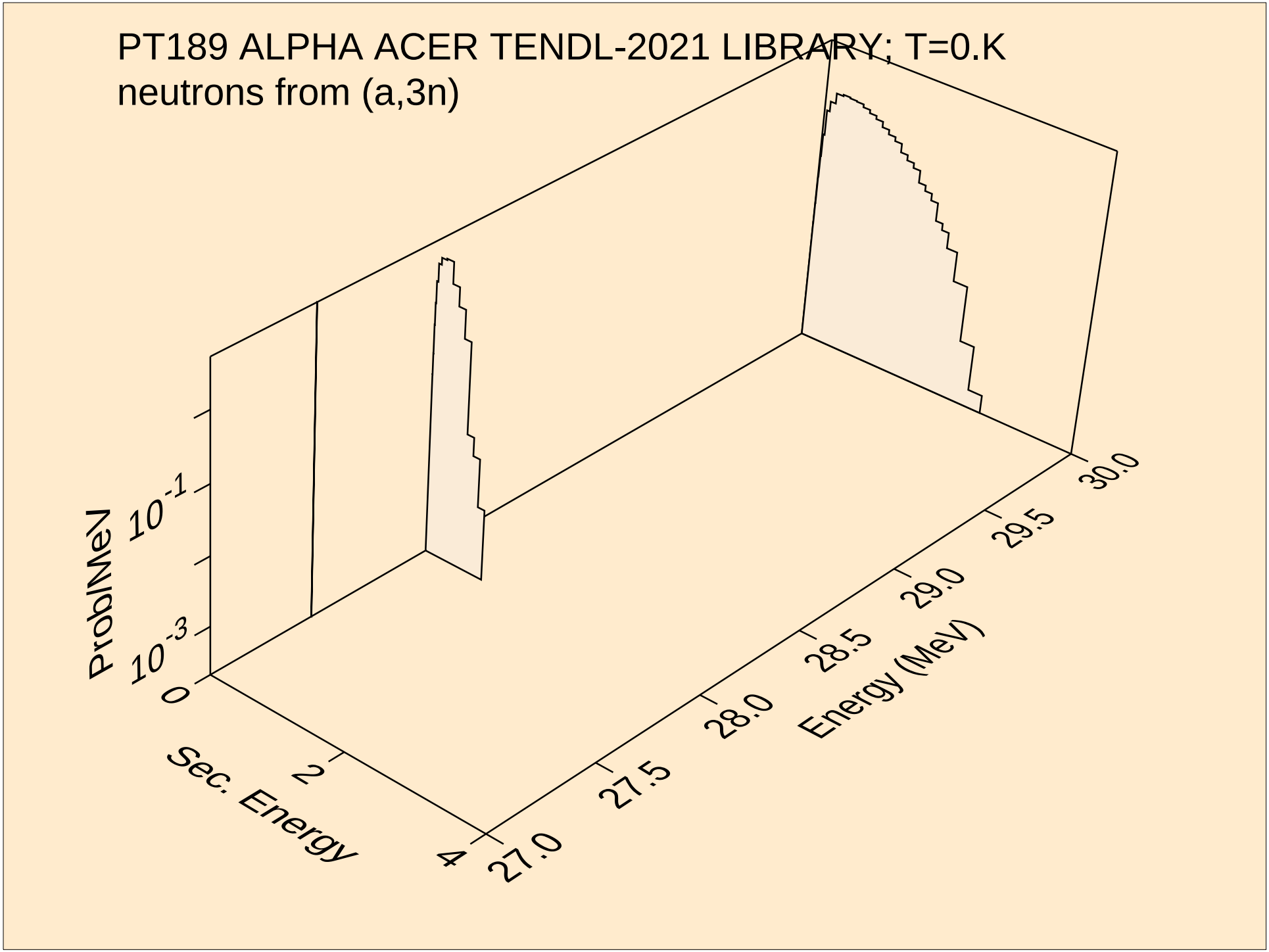

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Recoil Heating
recoil heating
Heating (MeV/reaction)
Energy (MeV)
0
2
4
6
8
10
12
14
0
50
100
150
200

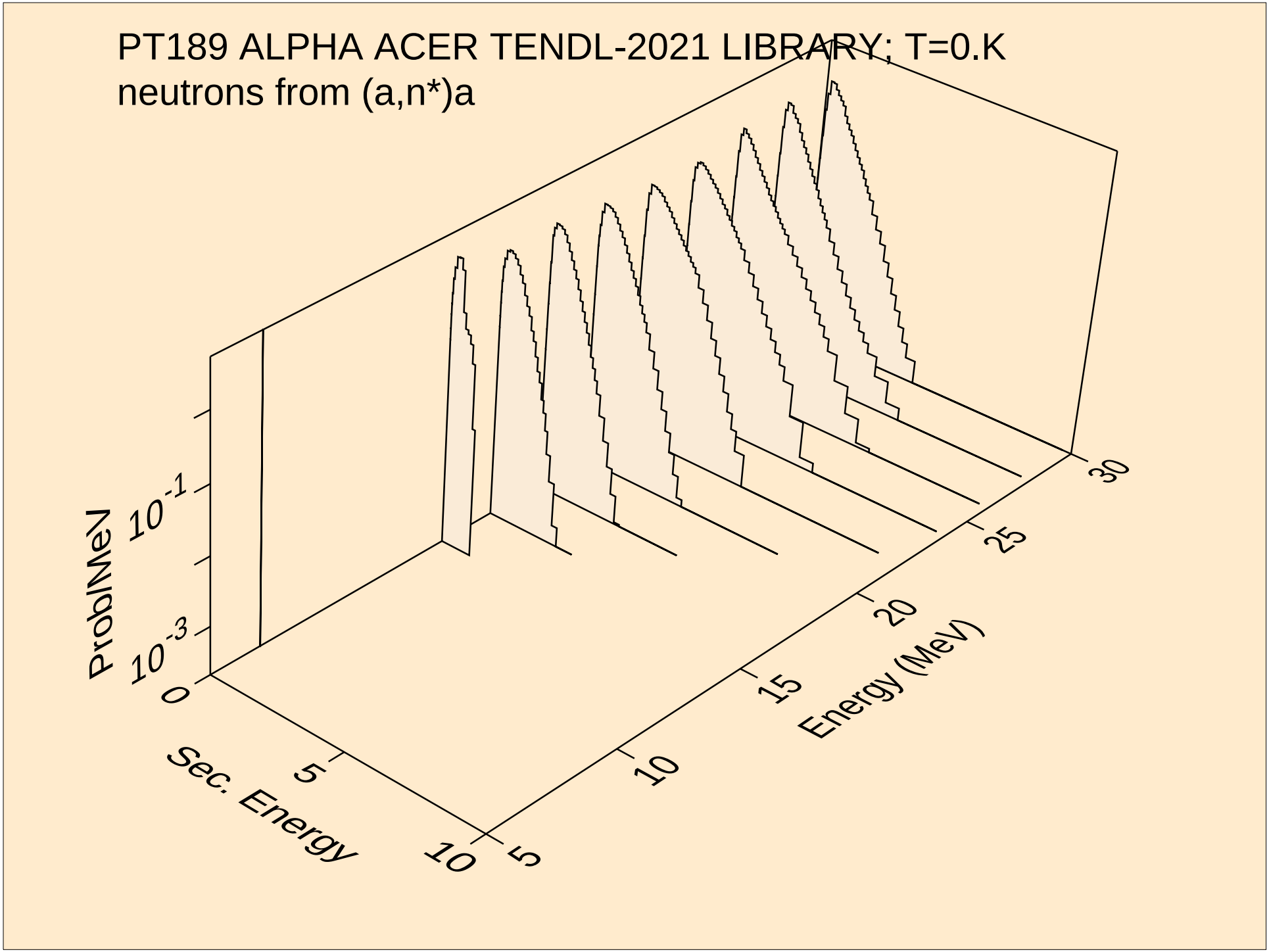

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
Particle production cross sections
Cross section (barns)
Energy (MeV)
0
5
10
15
20
25
0
20
40
60
80
100
120
140
160
180
200
neutrons
protons
deuterons
tritons
he-3

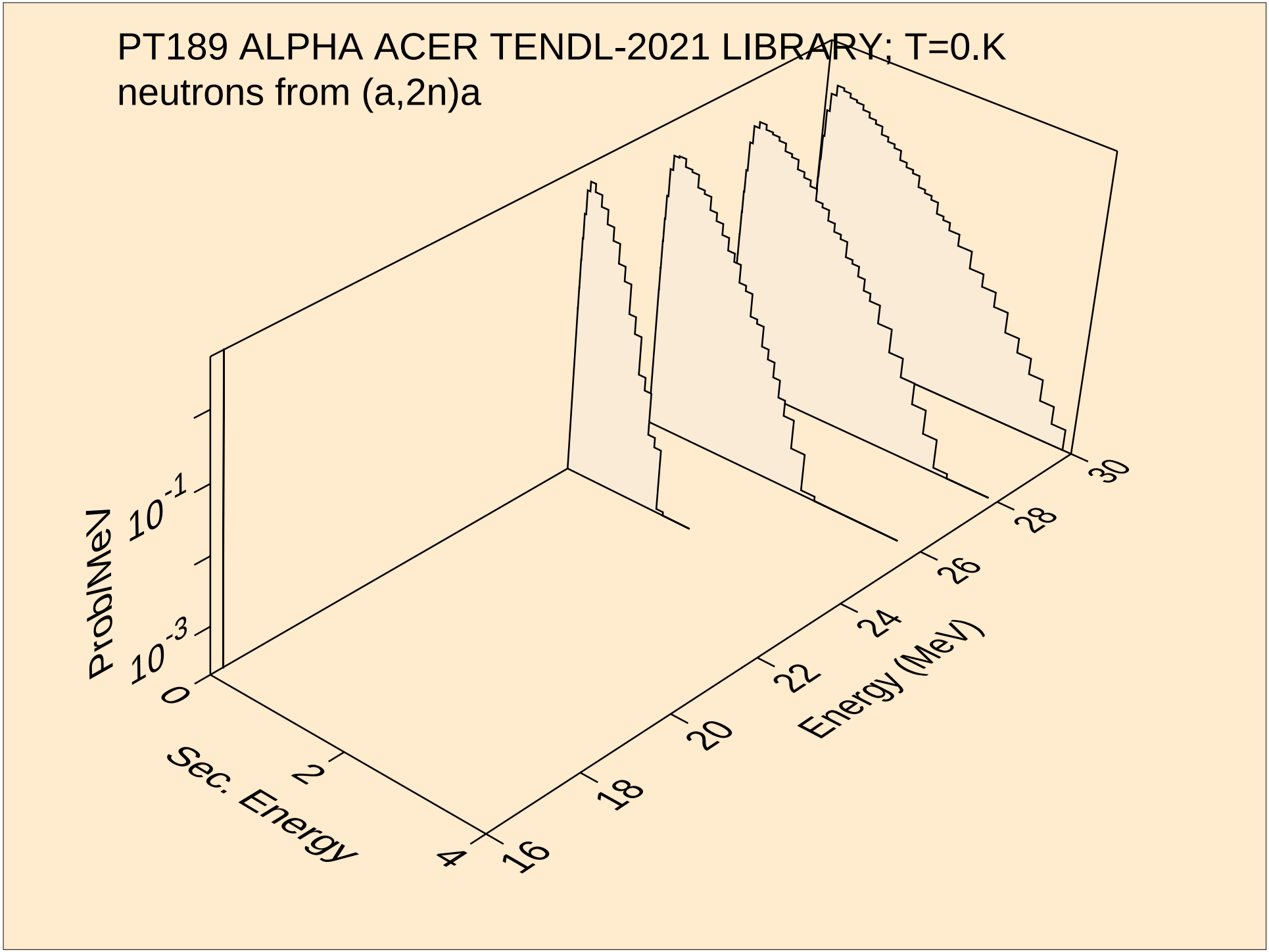

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
neutrons from (a,n)
Prob/MeV
10^-1
10^-3
0
Sec. Energy
10
20
Energy (MeV)
10
12
14
16
18
20
22
24
26
28
30

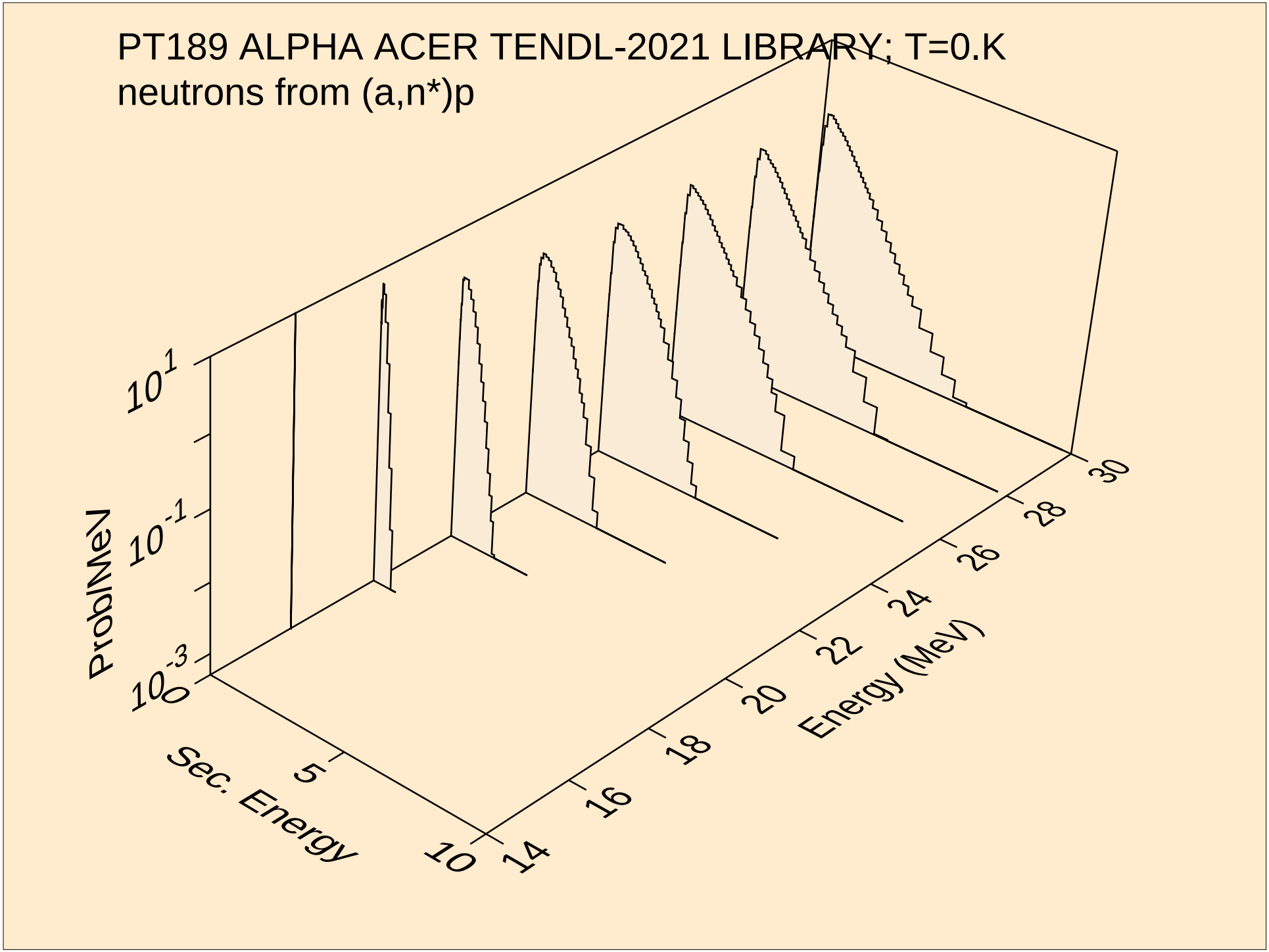

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
neutrons from (a,x)
Prob/MeV
10-2
10-4
0
100
200
Sec. Energy
0
50
100
150
200
Energy (MeV)

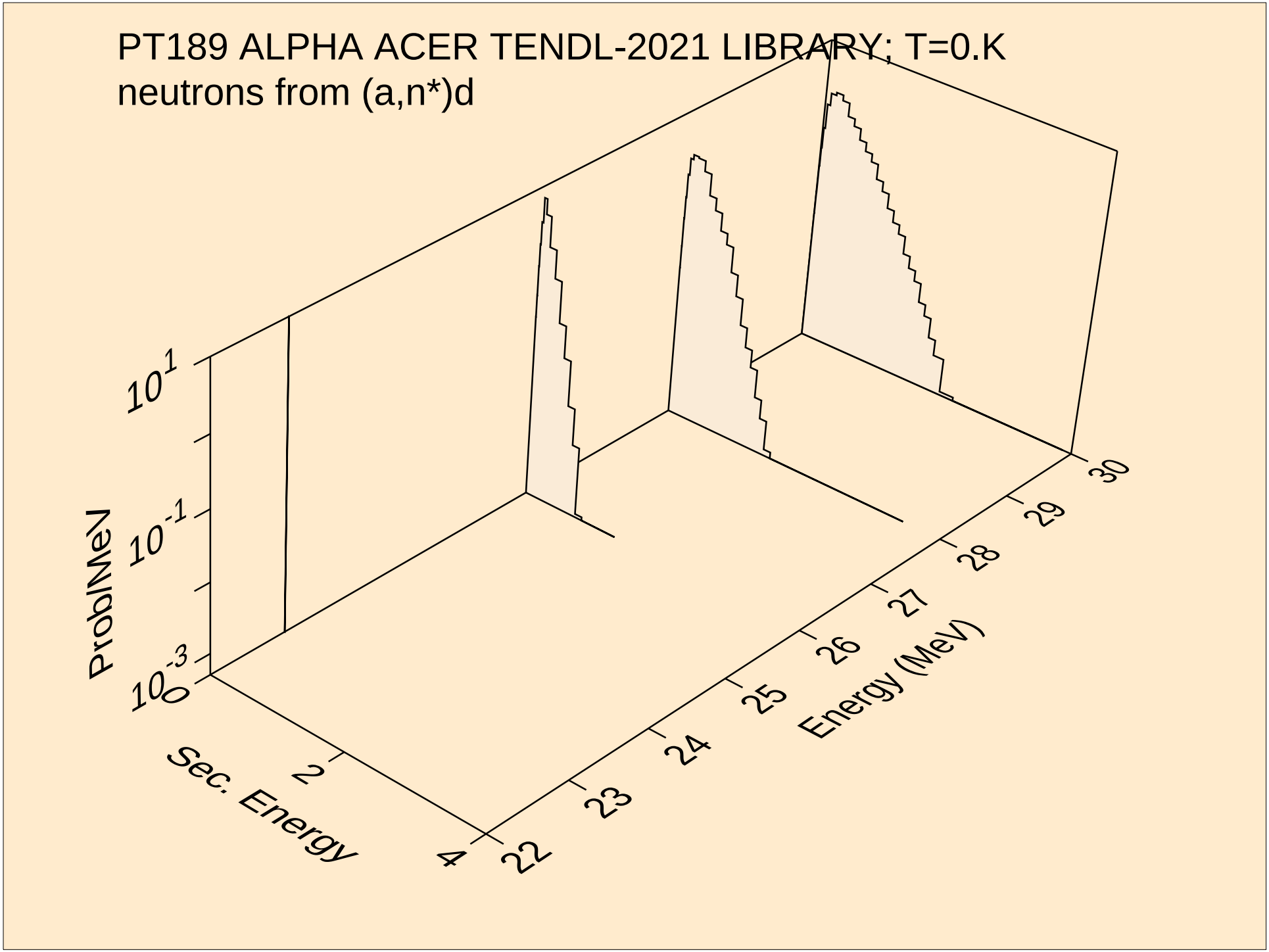

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
neutrons from (a,2n)
Prob/MeV
10^0
10^-2
10^-4
0
Sec. Energy
5
10
20
22
24
Energy (MeV)
26
28
30

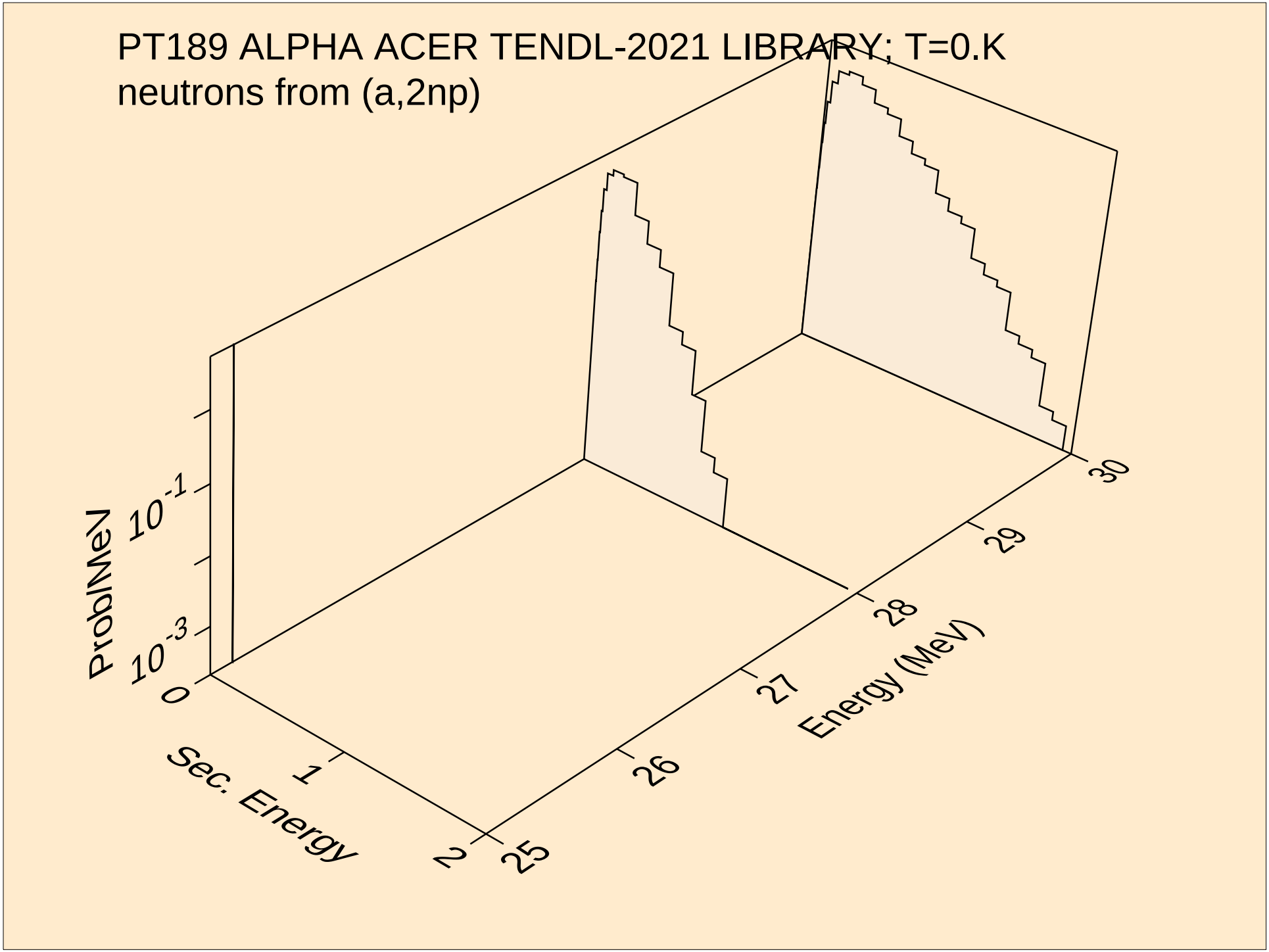

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
neutrons from (a,3n)
Prob/MeV
10-1
10-3
0
2
4
Sec. Energy
27.0
27.5
28.0
28.5
29.0
29.5
30.0
Energy (MeV)

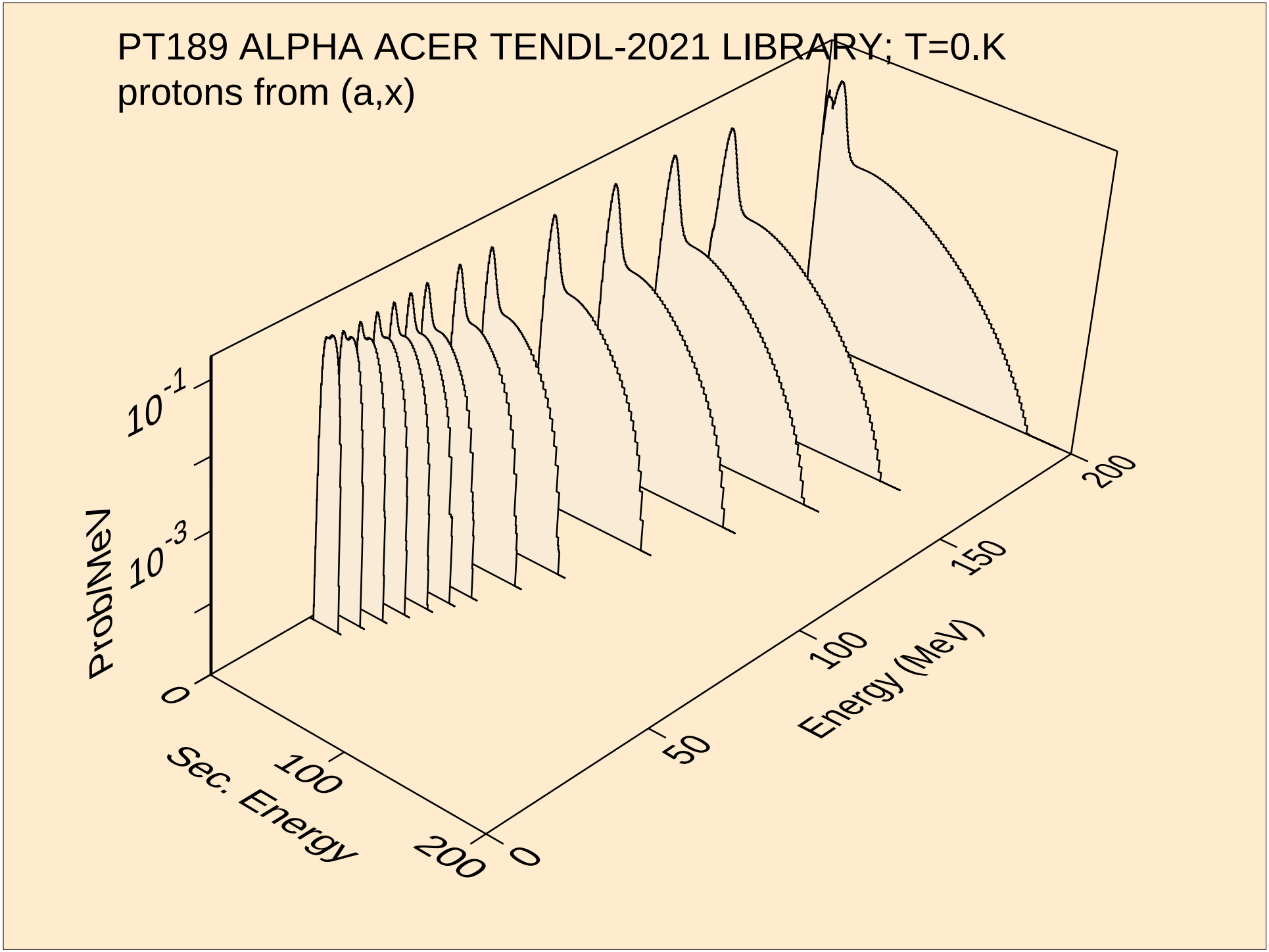

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
neutrons from (a,n*)a
Prob/MeV
10-1
10-3
0
Sec. Energy
5
10
5
10
15
20
25
30
Energy (MeV)

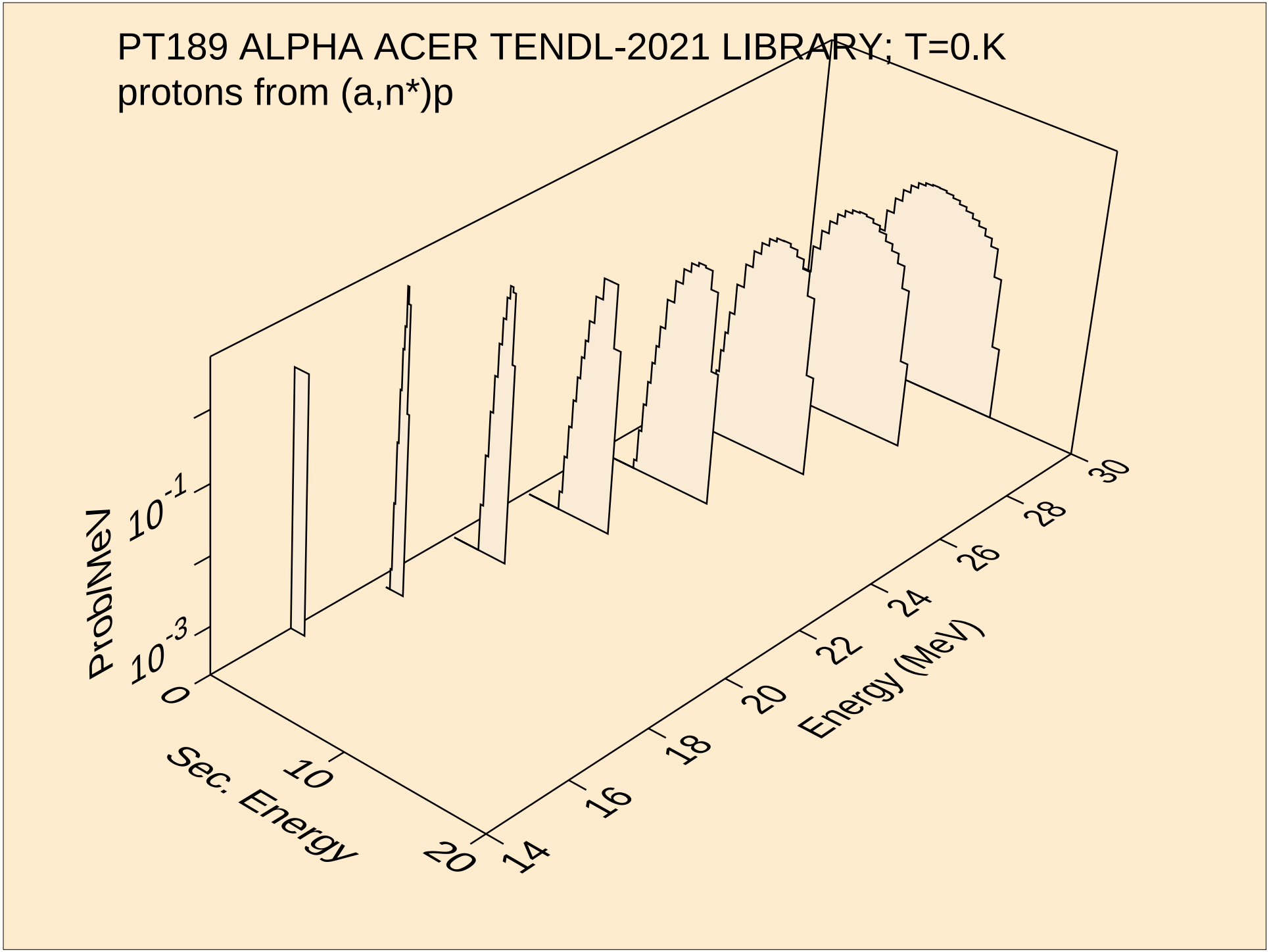

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
neutrons from (a,2n)a
Prob/MeV
10-1
10-3
0
Sec. Energy
2
4
16
18
20
22
24
26
28
30
Energy (MeV)

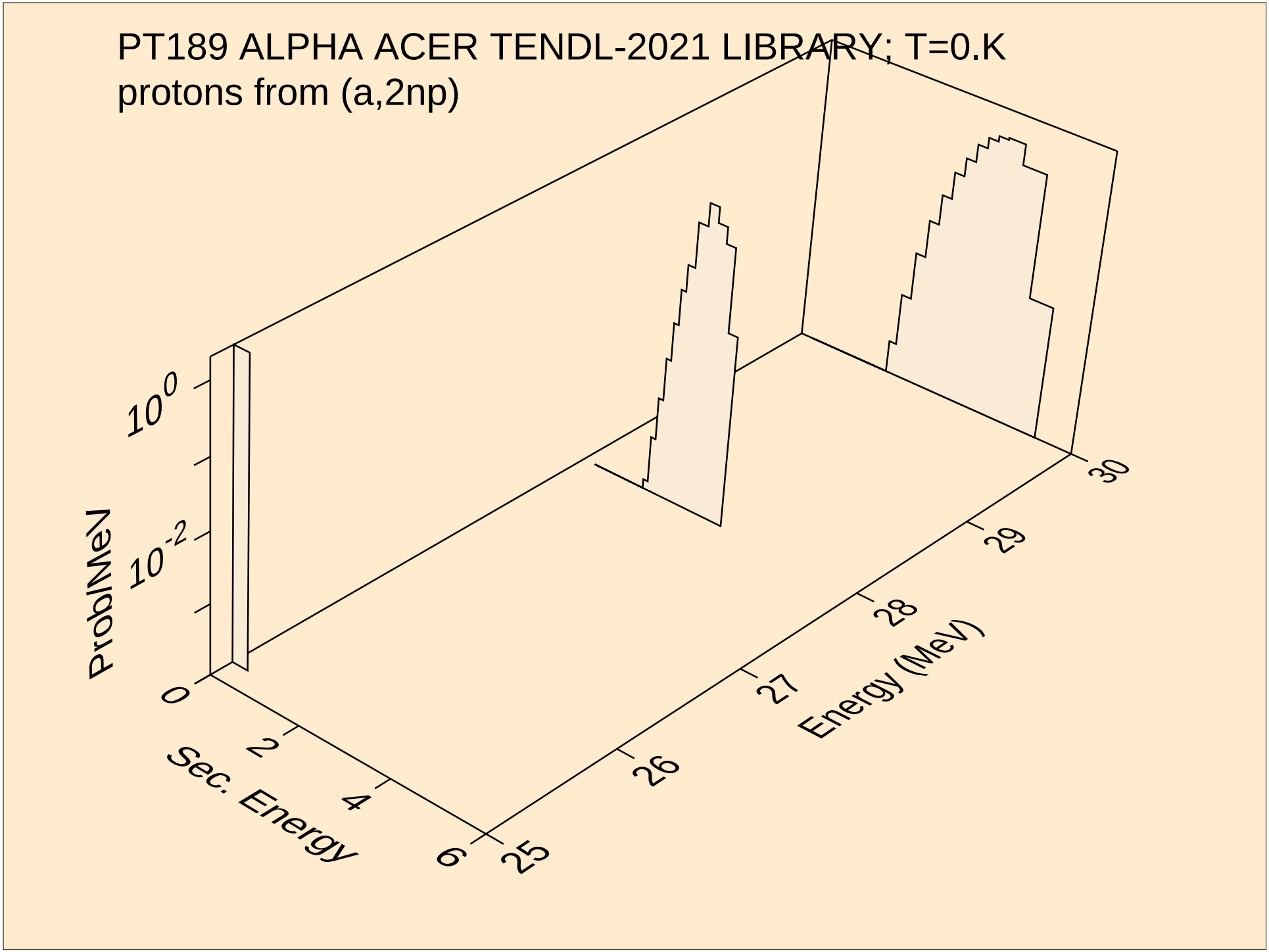

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
neutrons from (a,n*)p
Prob/MeV
10^1
10^-1
10^-3
0
5
10
Sec. Energy
14
16
18
20
22
24
26
28
30
Energy (MeV)

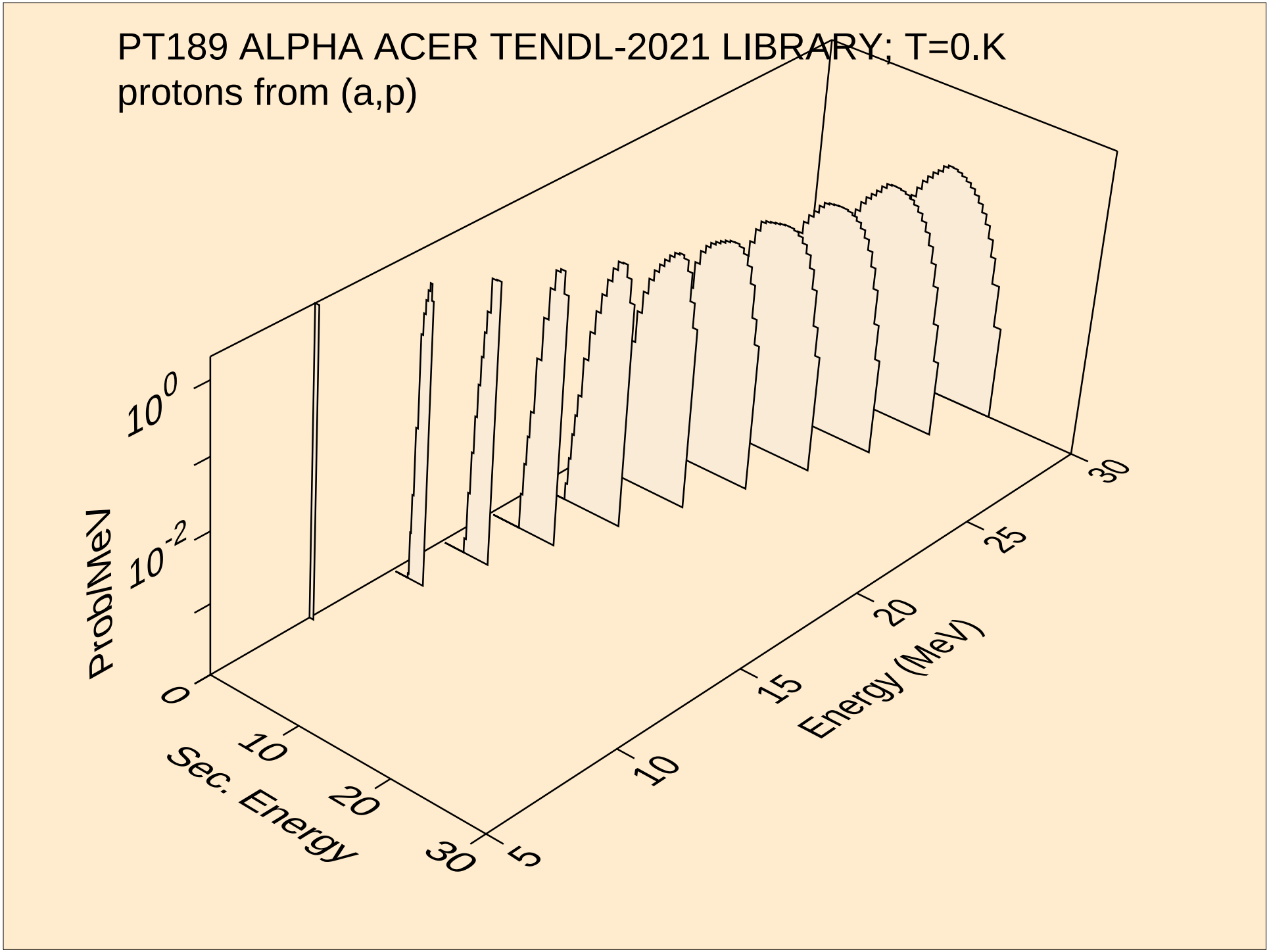

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
neutrons from (a,n*)d
Prob/MeV
10^1
10^-1
10^-3
0
Sec. Energy
2
4
Energy (MeV)
22
23
24
25
26
27
28
29
30

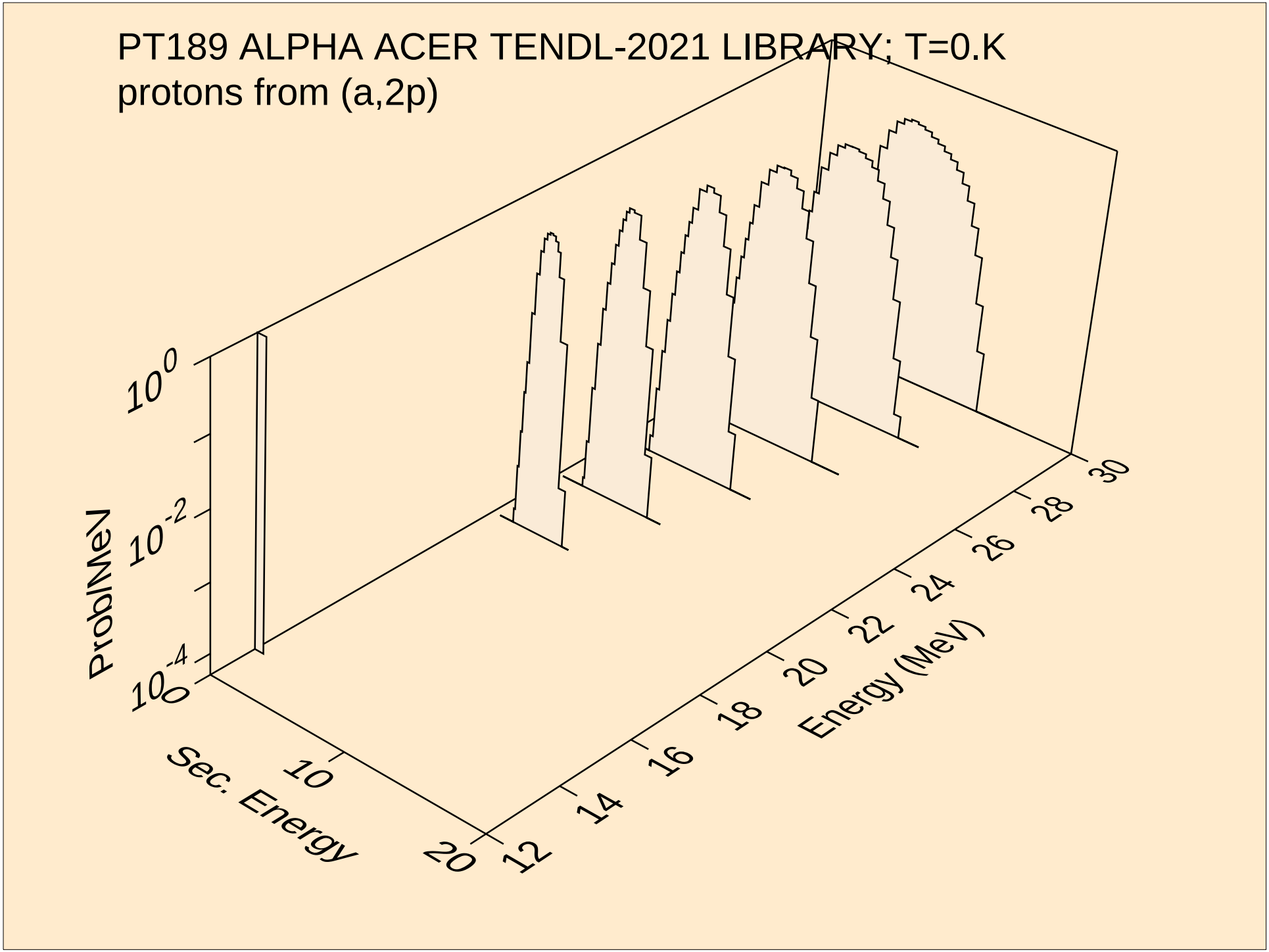

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
neutrons from (a,2np)
Prob/MeV
10-1
10-3
0
Sec. Energy
1
2
25
26
27
28
29
30
Energy (MeV)

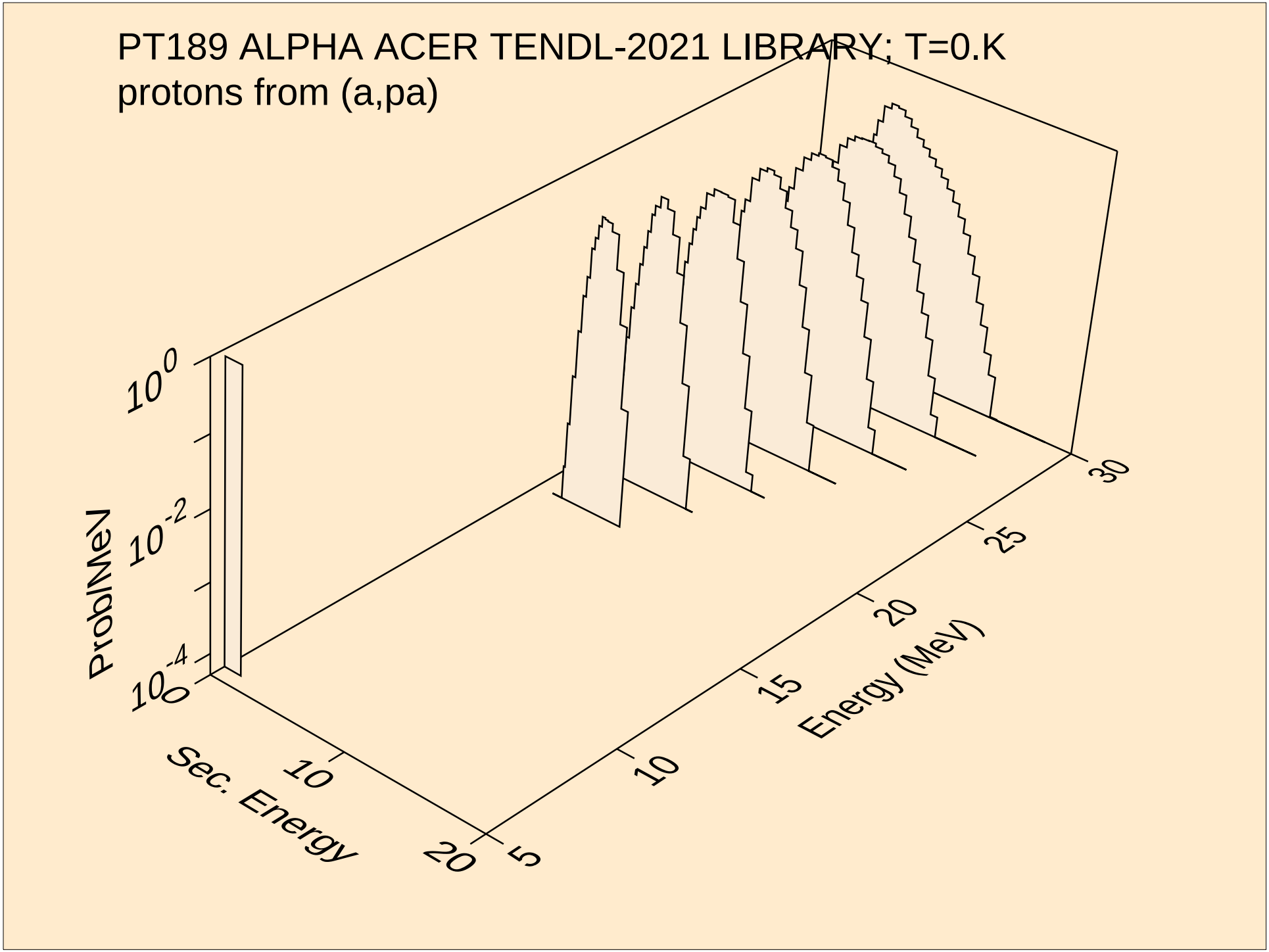

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
protons from (a,x)
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)

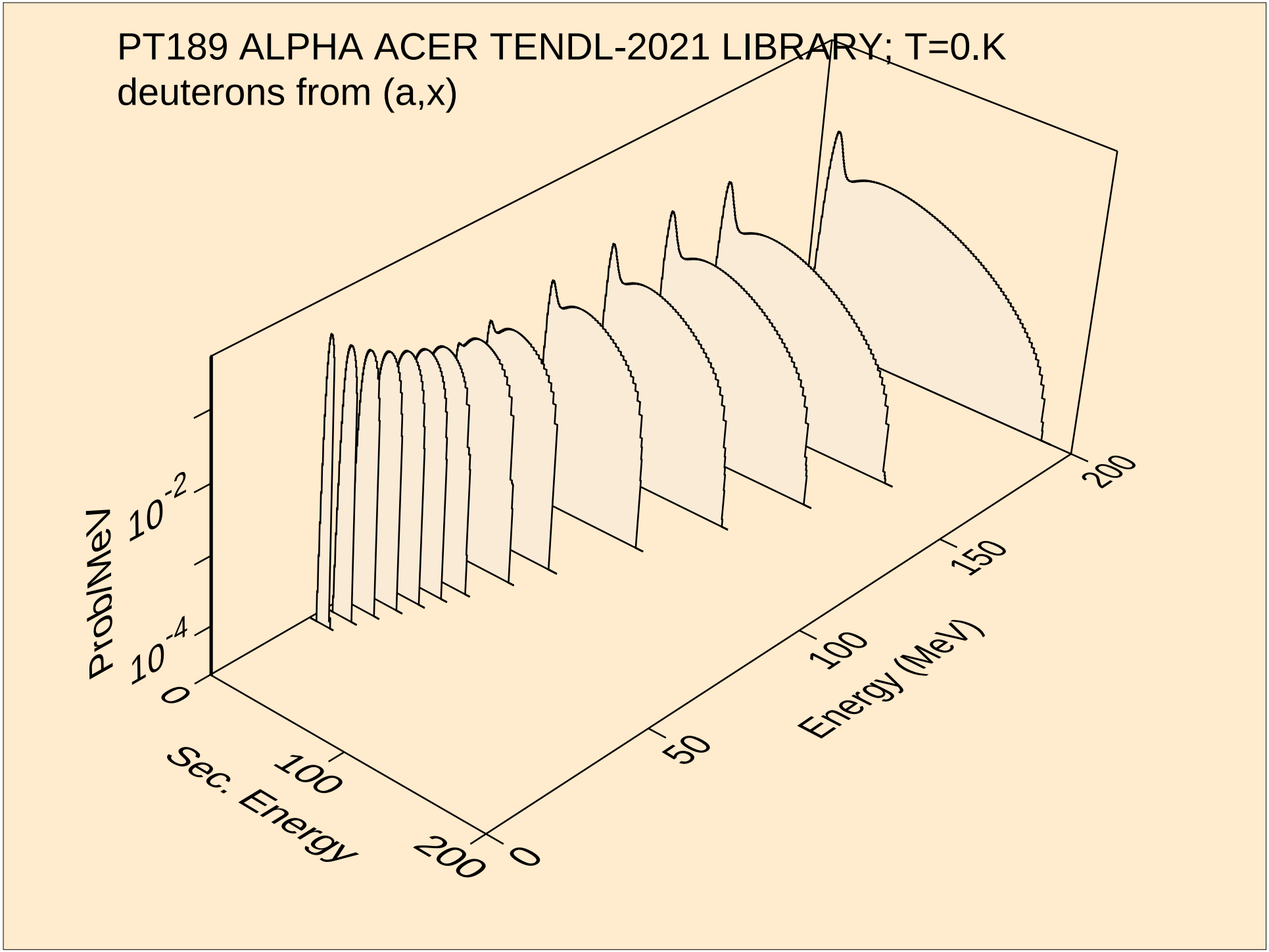

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
protons from (a,n*)p
Prob/MeV
10-1
10-3
0
Sec. Energy
10
20
14
16
18
20
22
24
26
28
30
Energy (MeV)

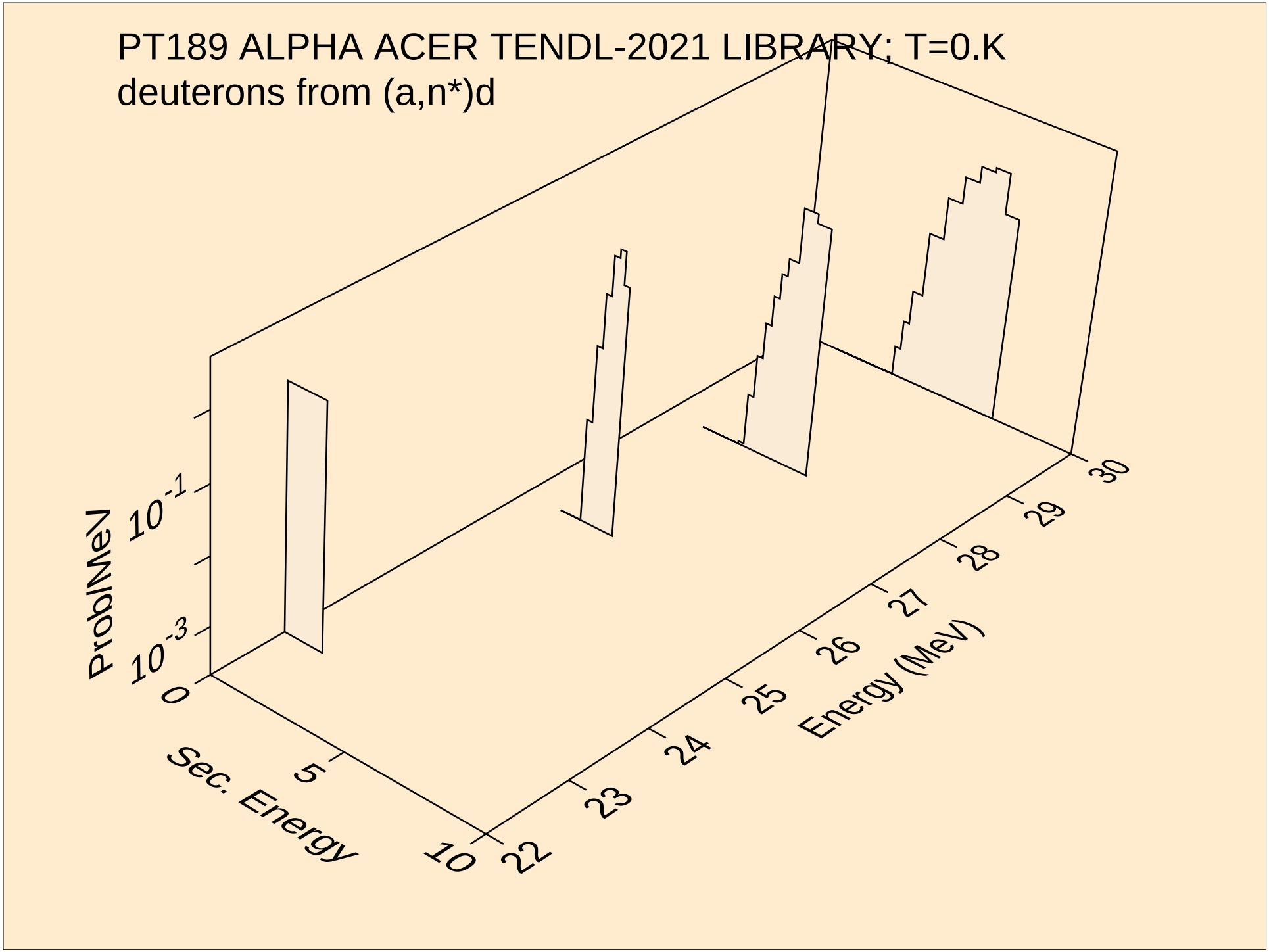

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
protons from (a,2np)
Prob/MeV
$10^{0}$
$10^{-2}$
0
2
4
6
Sec. Energy
25
26
27
28
29
30
Energy (MeV)

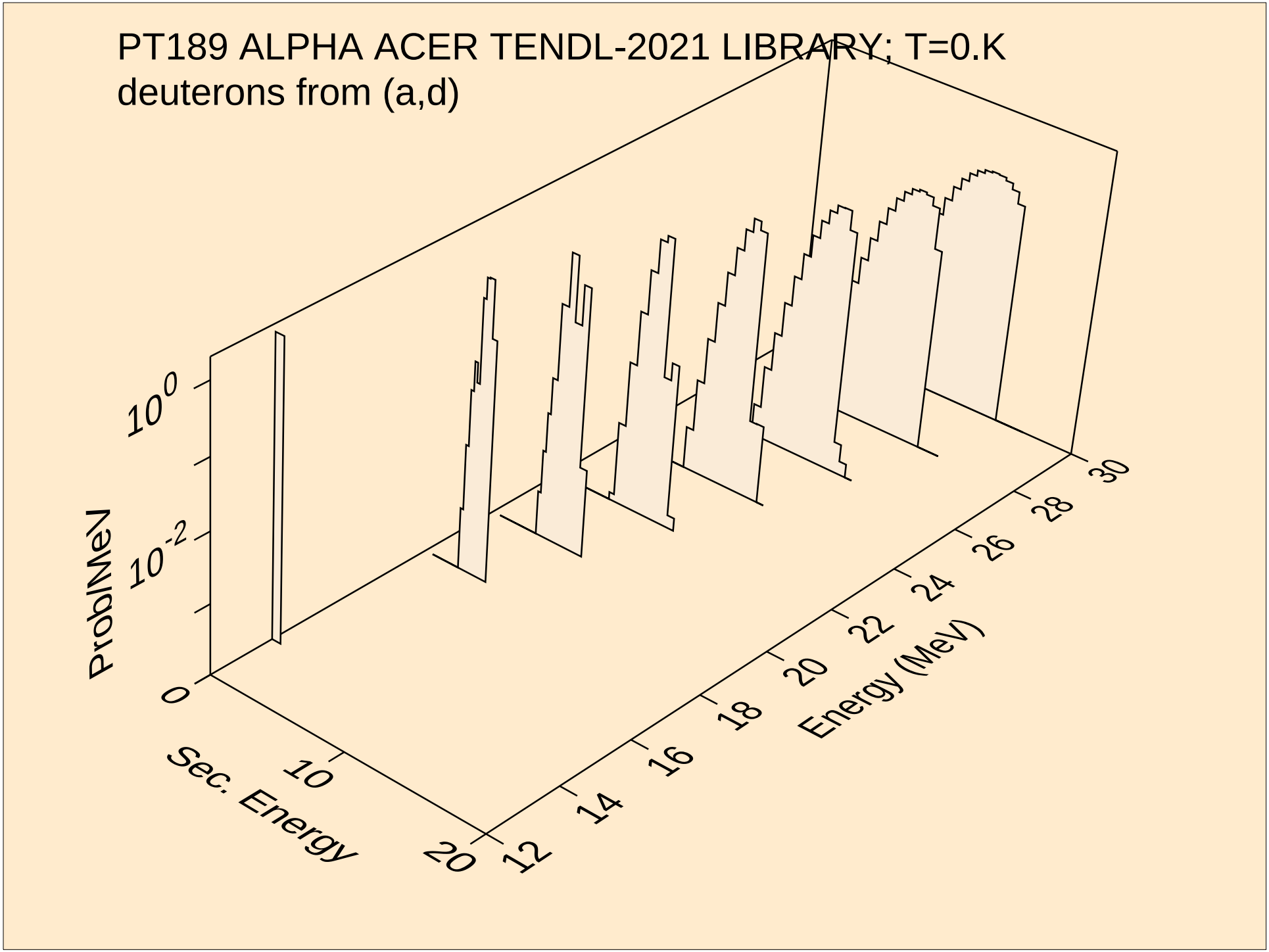

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
protons from (a,p)
Prob/MeV
10^0
10^-2
0
Sec. Energy
10
20
30
5
10
15
20
25
30
Energy (MeV)

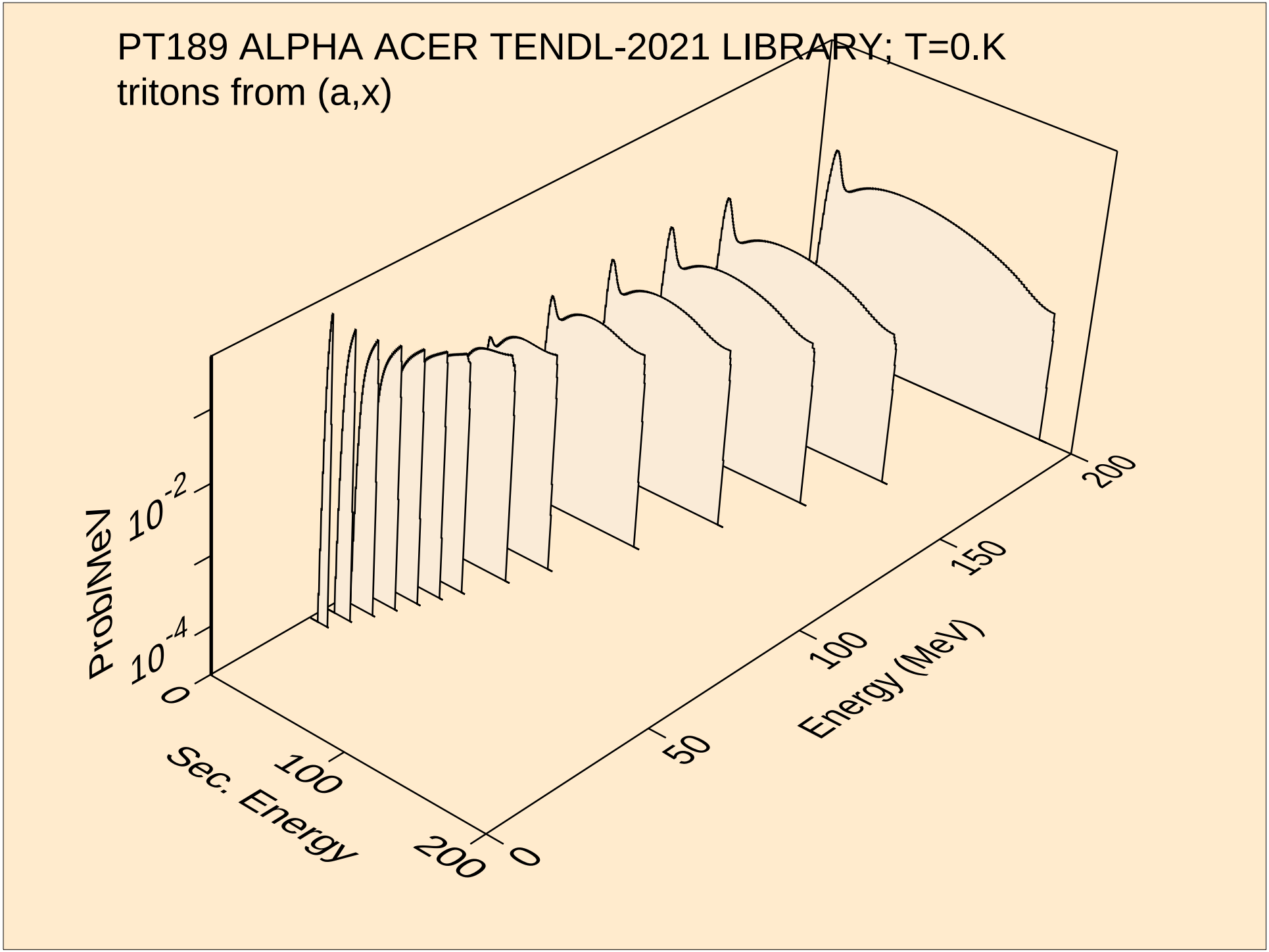

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
protons from (a,2p)
Prob/MeV
$10^{0}$
$10^{-2}$
$10^{-4}$
0
10
20
Sec. Energy
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

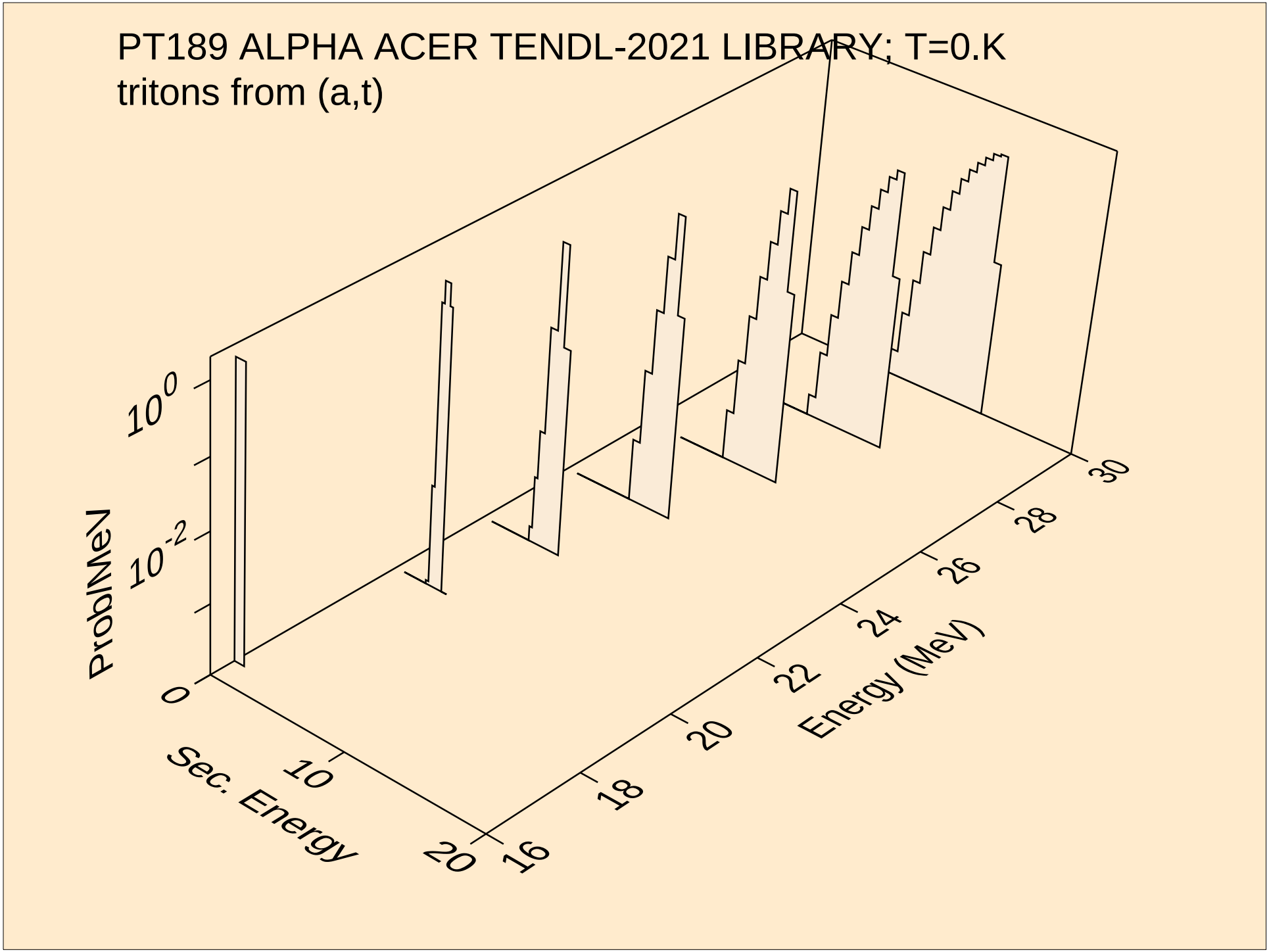

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
protons from (a,pa)
Prob/MeV
10^0
10^-2
10^-4
0
Sec. Energy
10
20
5
10
15
20
25
30
Energy (MeV)

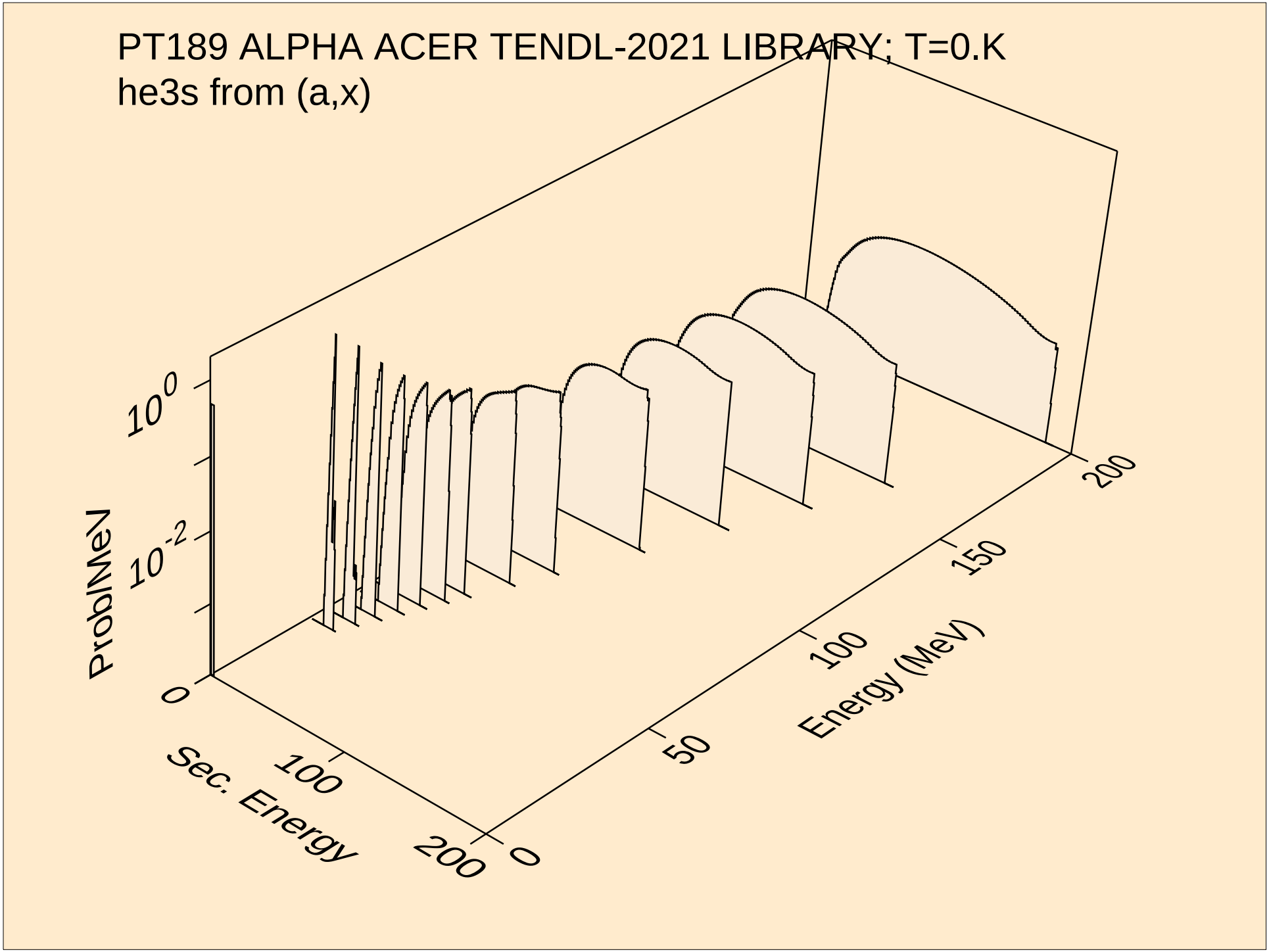

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
deuterons from (a,x)
Prob/MeV
10-2
10-4
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)

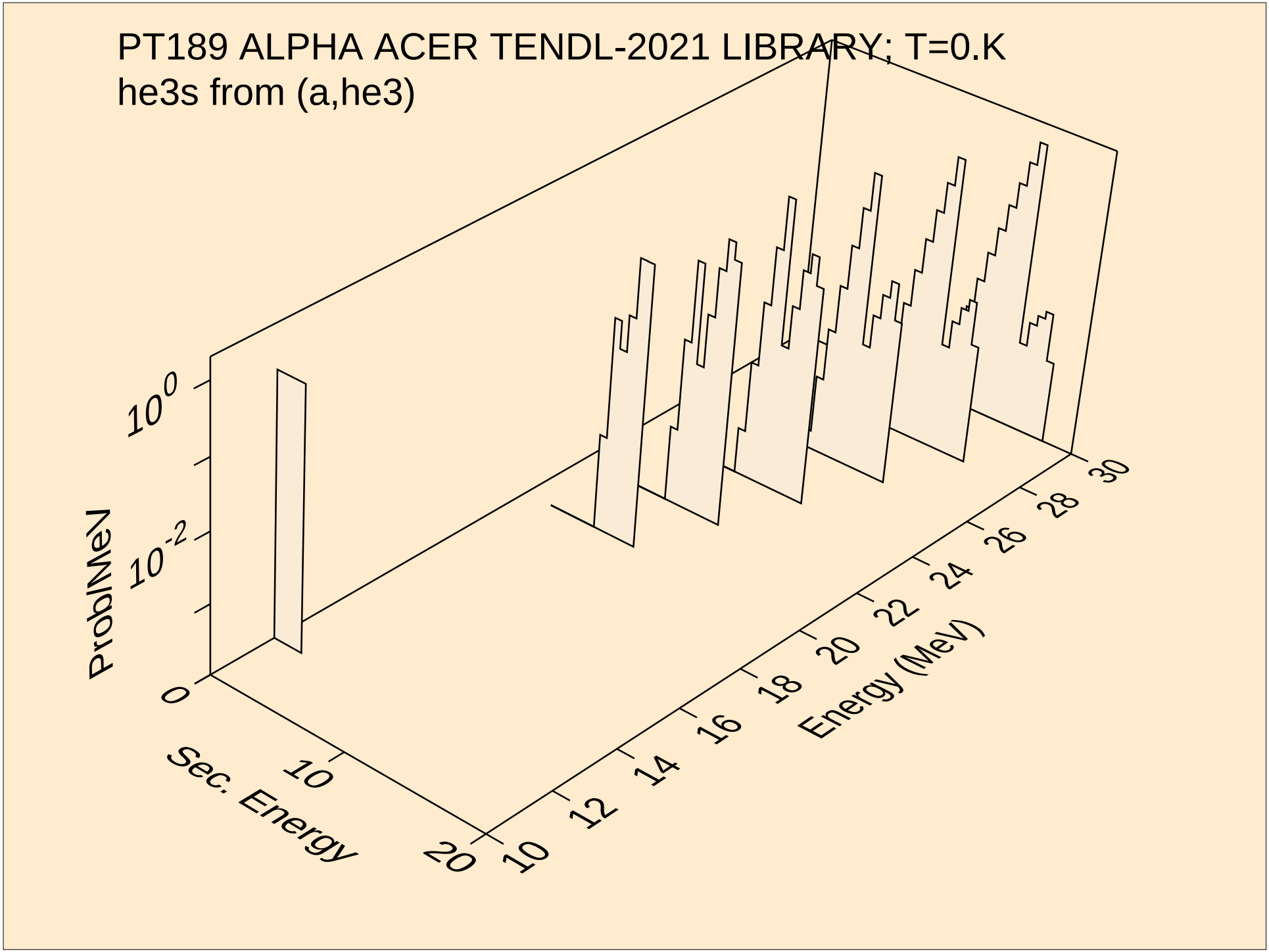

PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
deuterons from (a,n*)d
Prob/MeV
10-1
10-3
0
Sec. Energy
5
10
22
23
24
25
26
27
28
29
30
Energy (MeV)


PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
deuterons from (a,d)
Prob/MeV
$10^{0}$
$10^{-2}$
0
Sec. Energy
10
20
Energy (MeV)
12
14
16
18
20
22
24
26
28
30


PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
tritons from (a,x)
Prob/MeV
10-2
10-4
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)


PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
tritons from (a,t)
Prob/MeV
$10^{0}$
$10^{-2}$
0
10
20
Sec. Energy
16
18
20
22
24
26
28
30
Energy (MeV)


PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
he3s from (a,x)
Prob/MeV
10^0
10^-2
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)


PT189 ALPHA ACER TENDL-2021 LIBRARY; T=0.K
he3s from (a,he3)
Prob/MeV
$10^{0}$
$10^{-2}$
0
Sec. Energy
10
20
Energy (MeV)
10
12
14
16
18
20
22
24
26
28
30