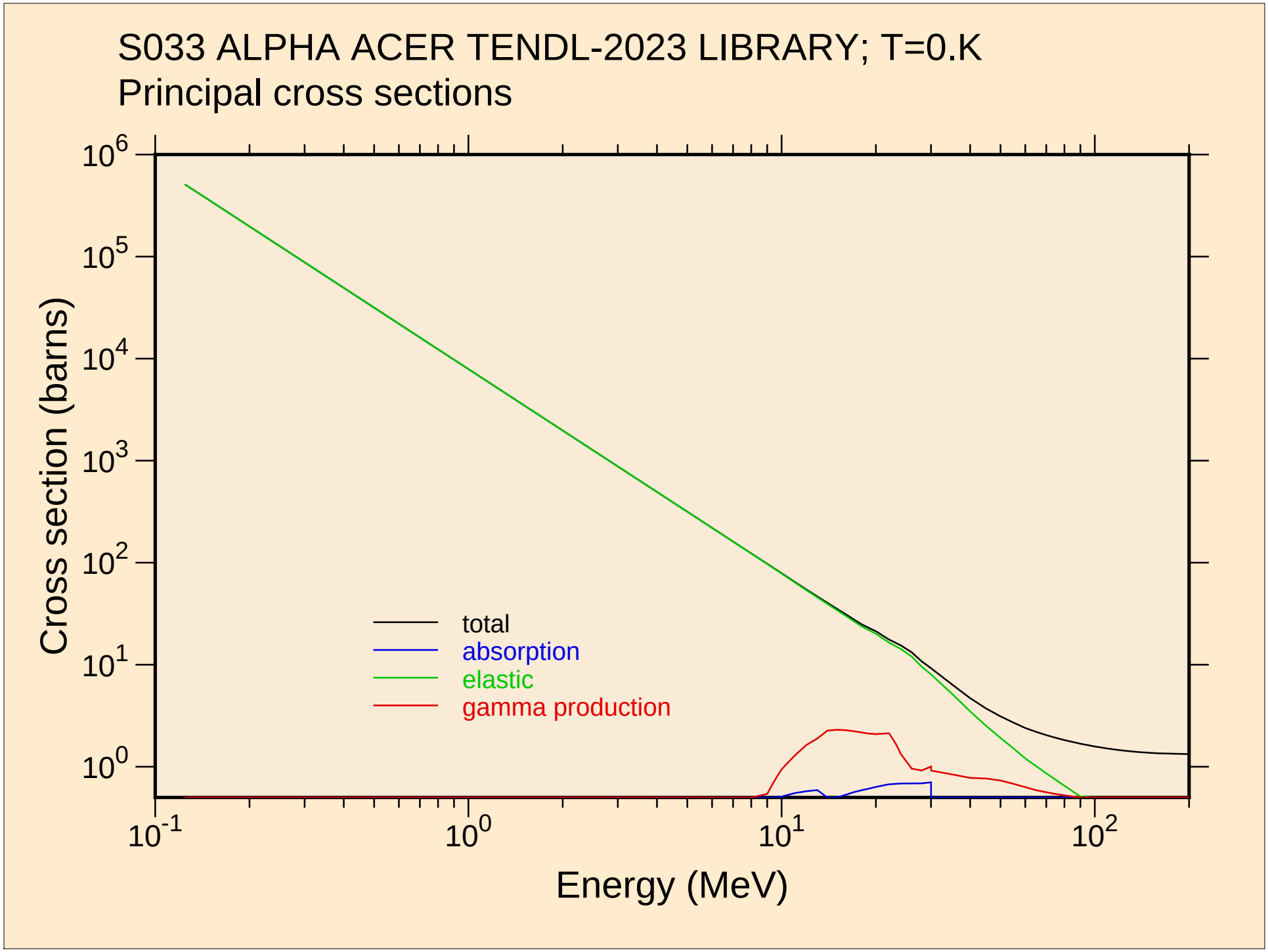
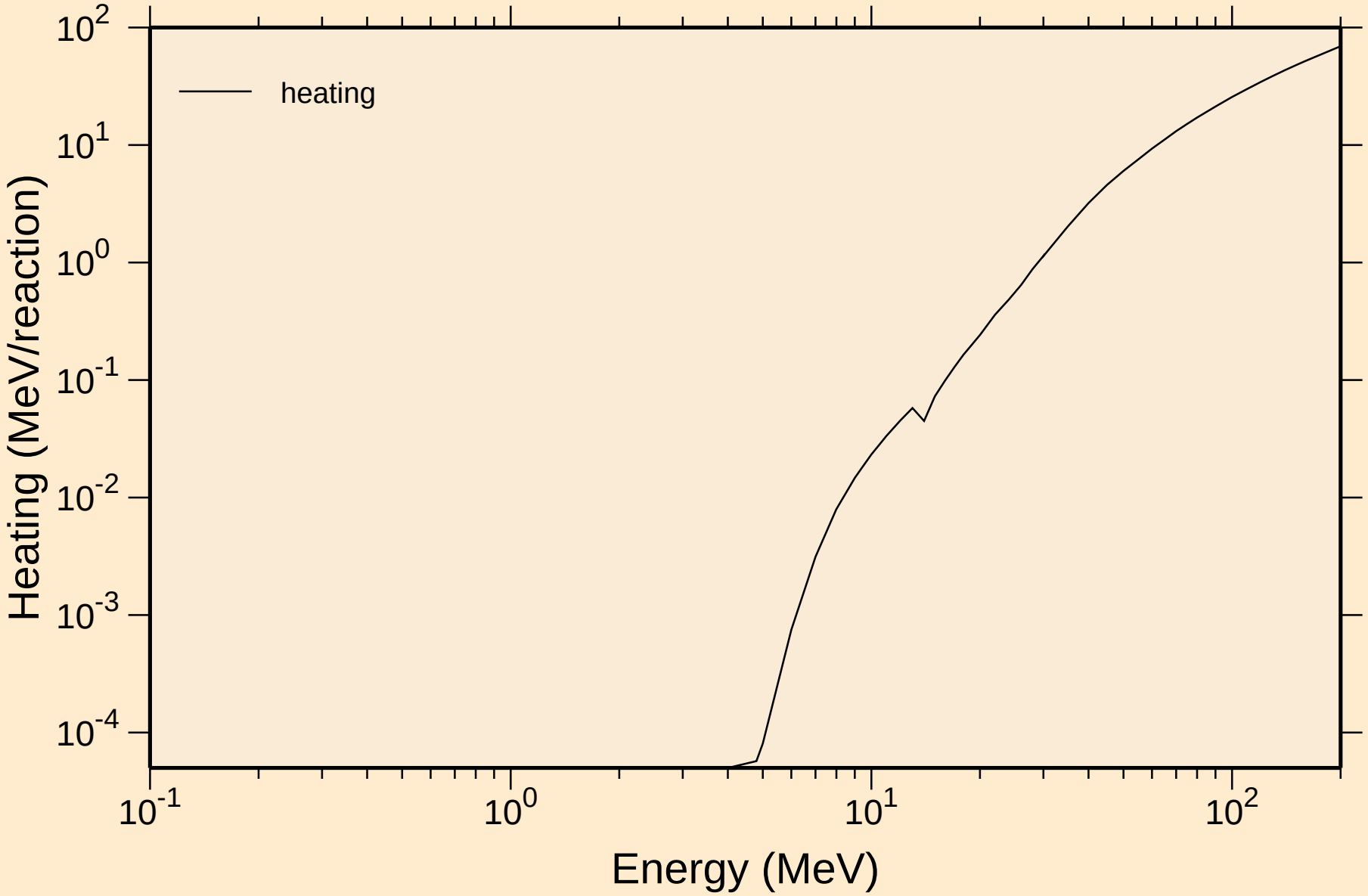
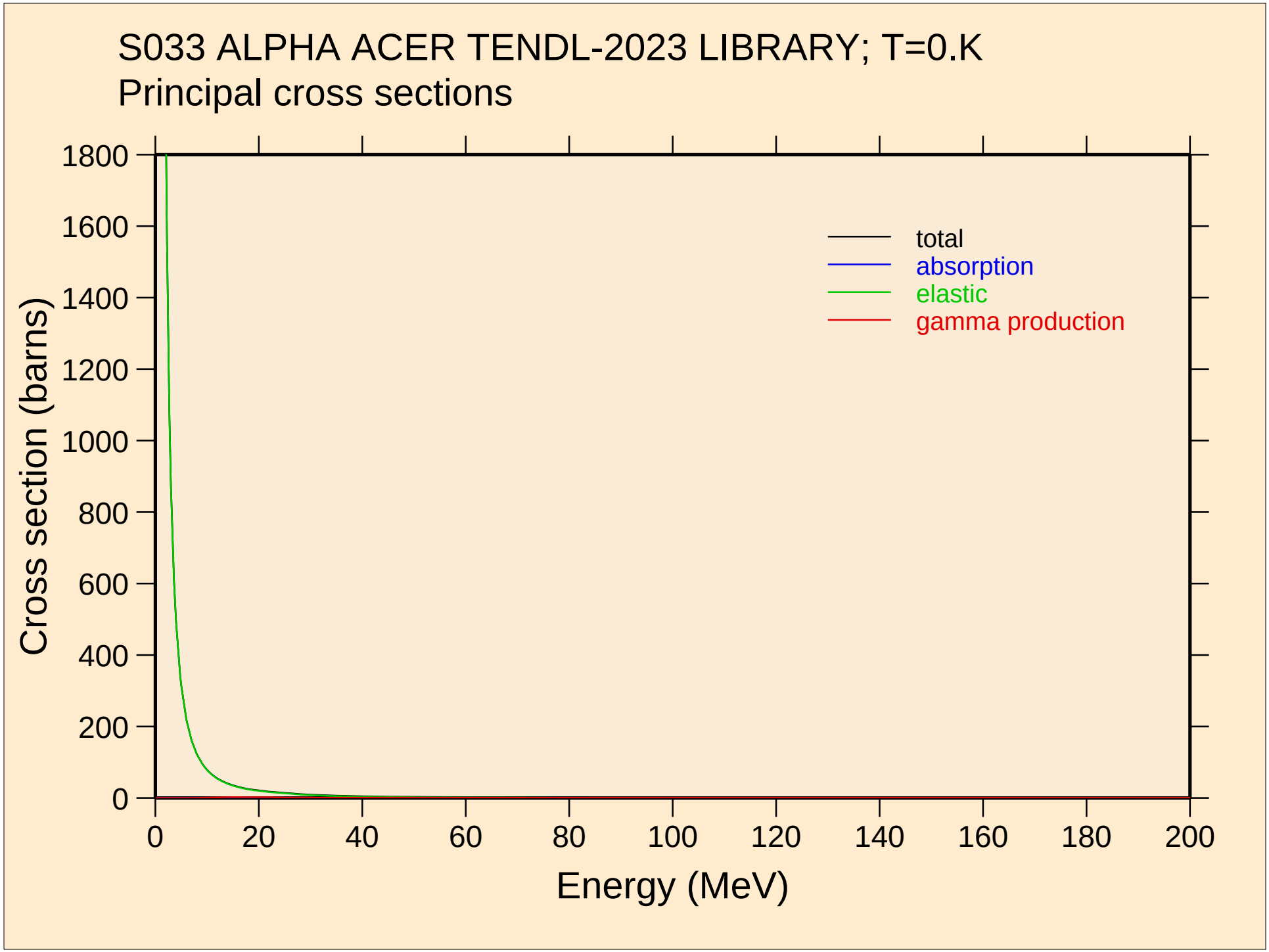
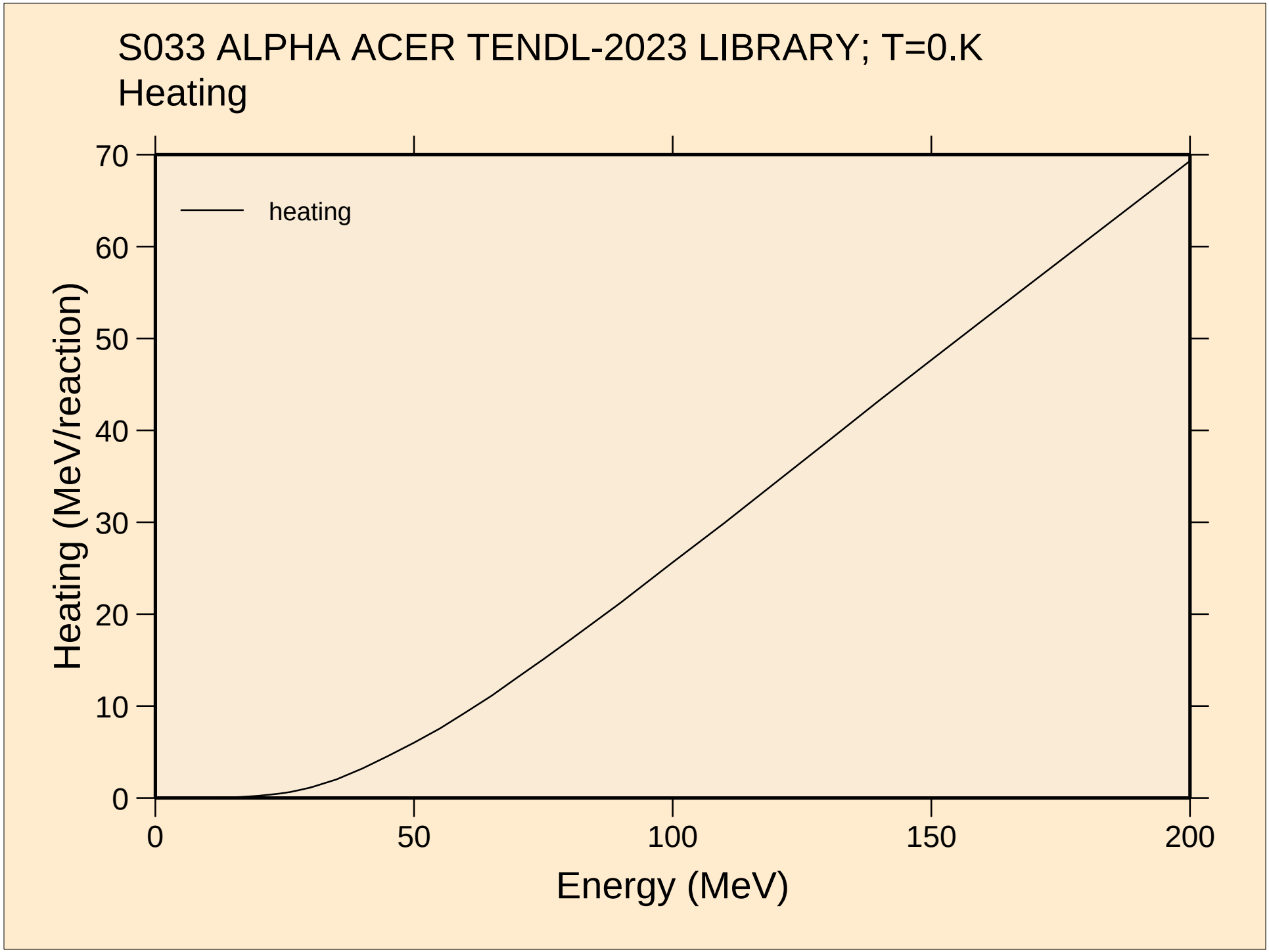
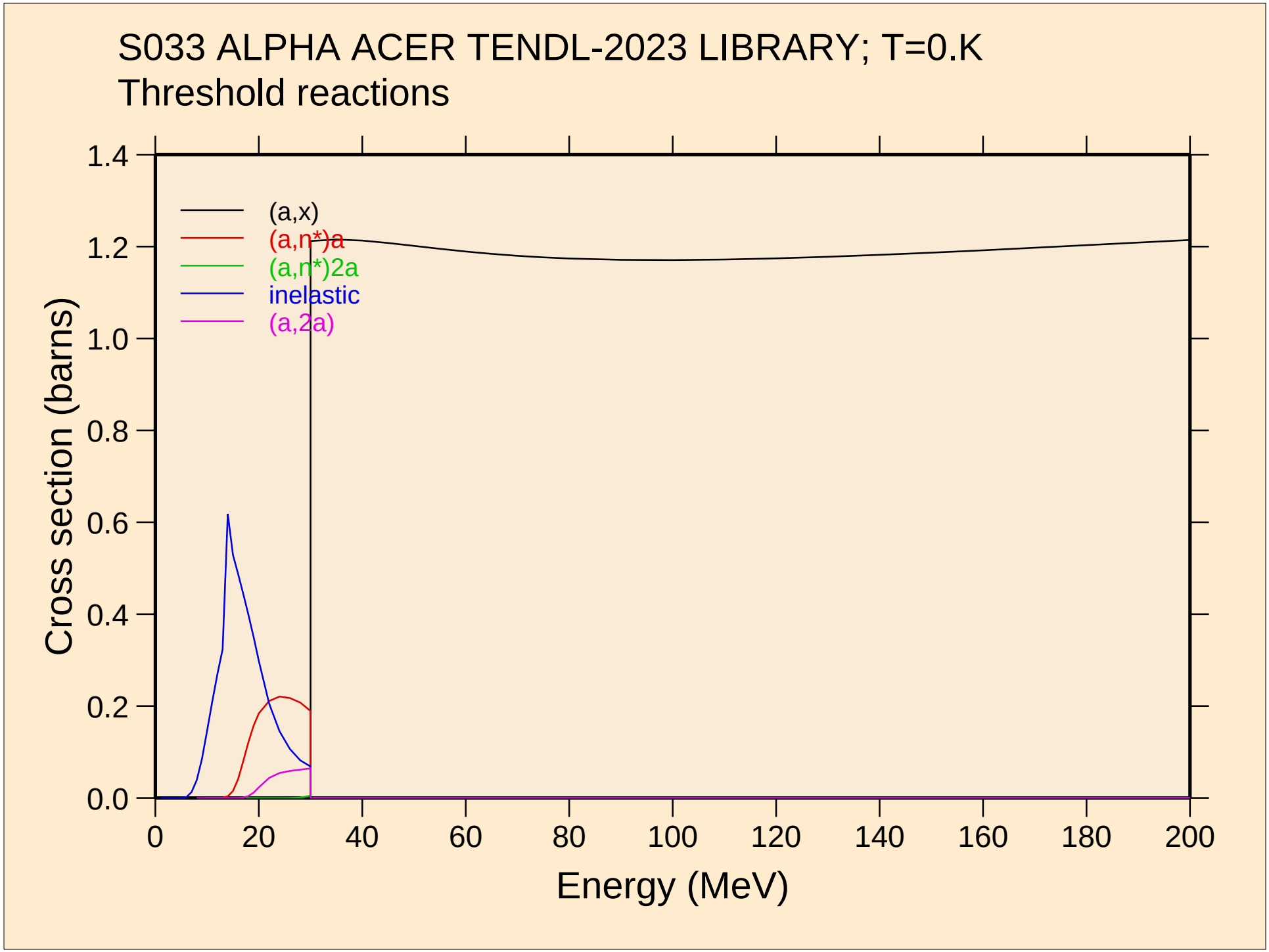

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production

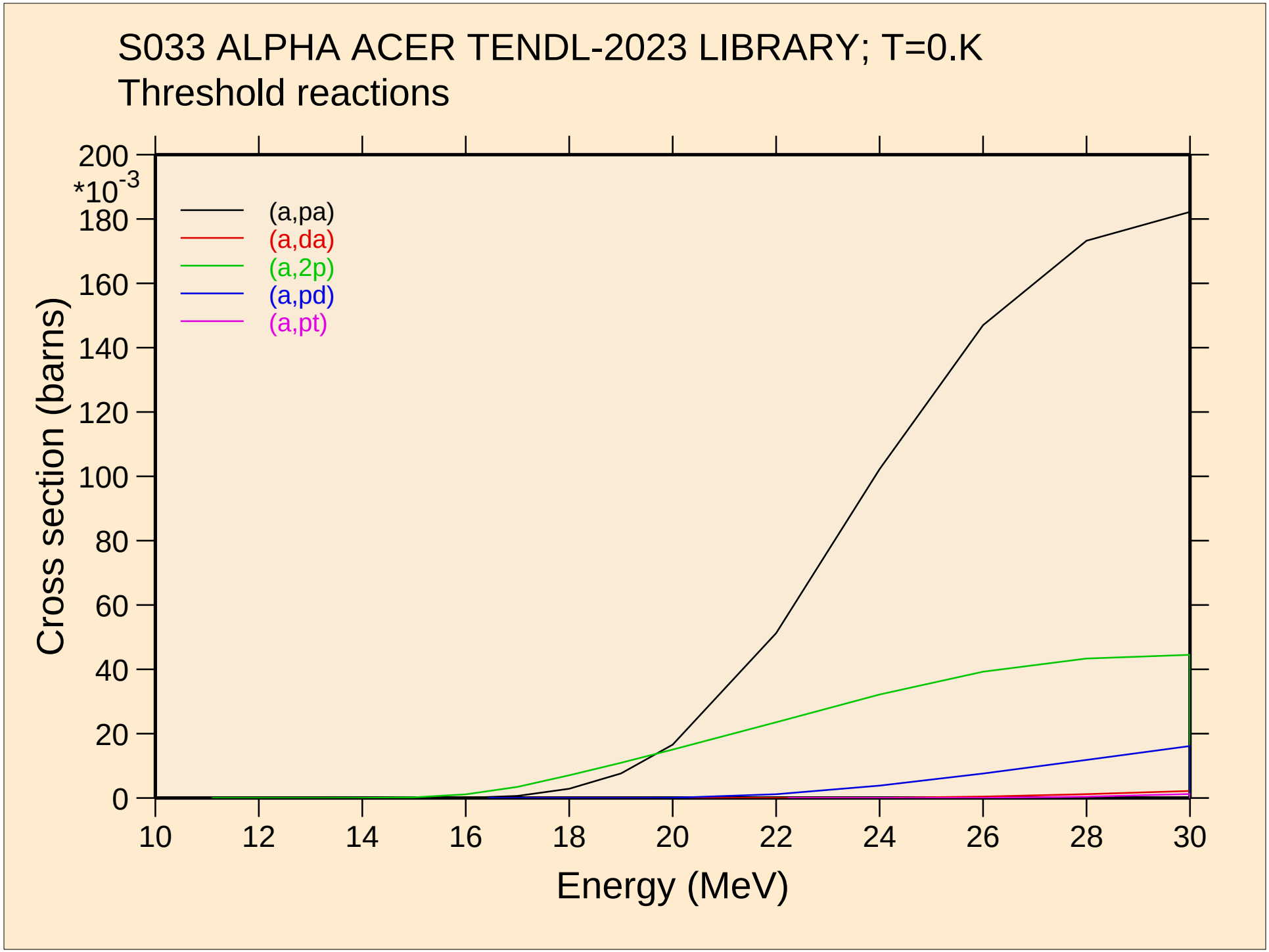
S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Heating

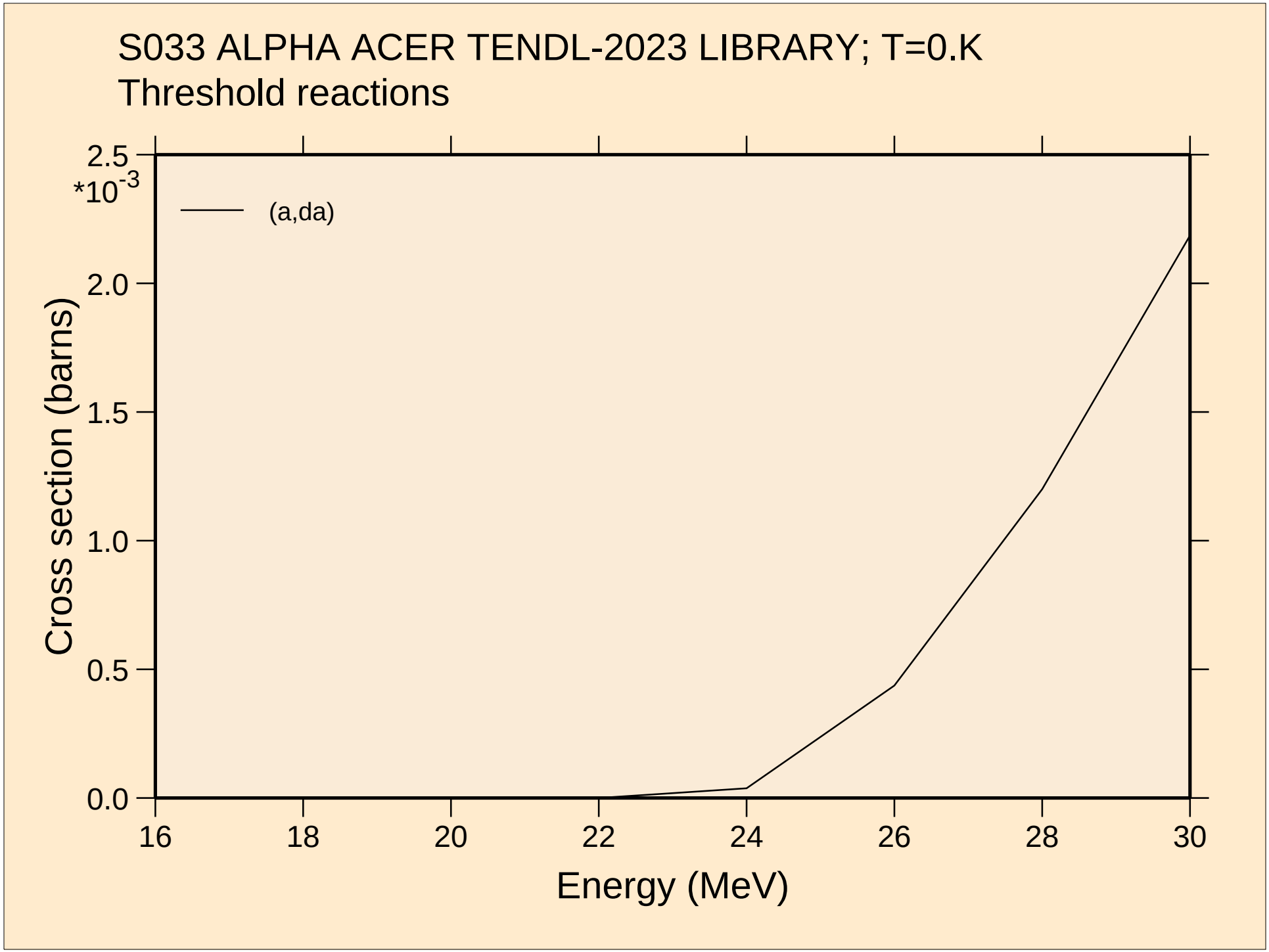


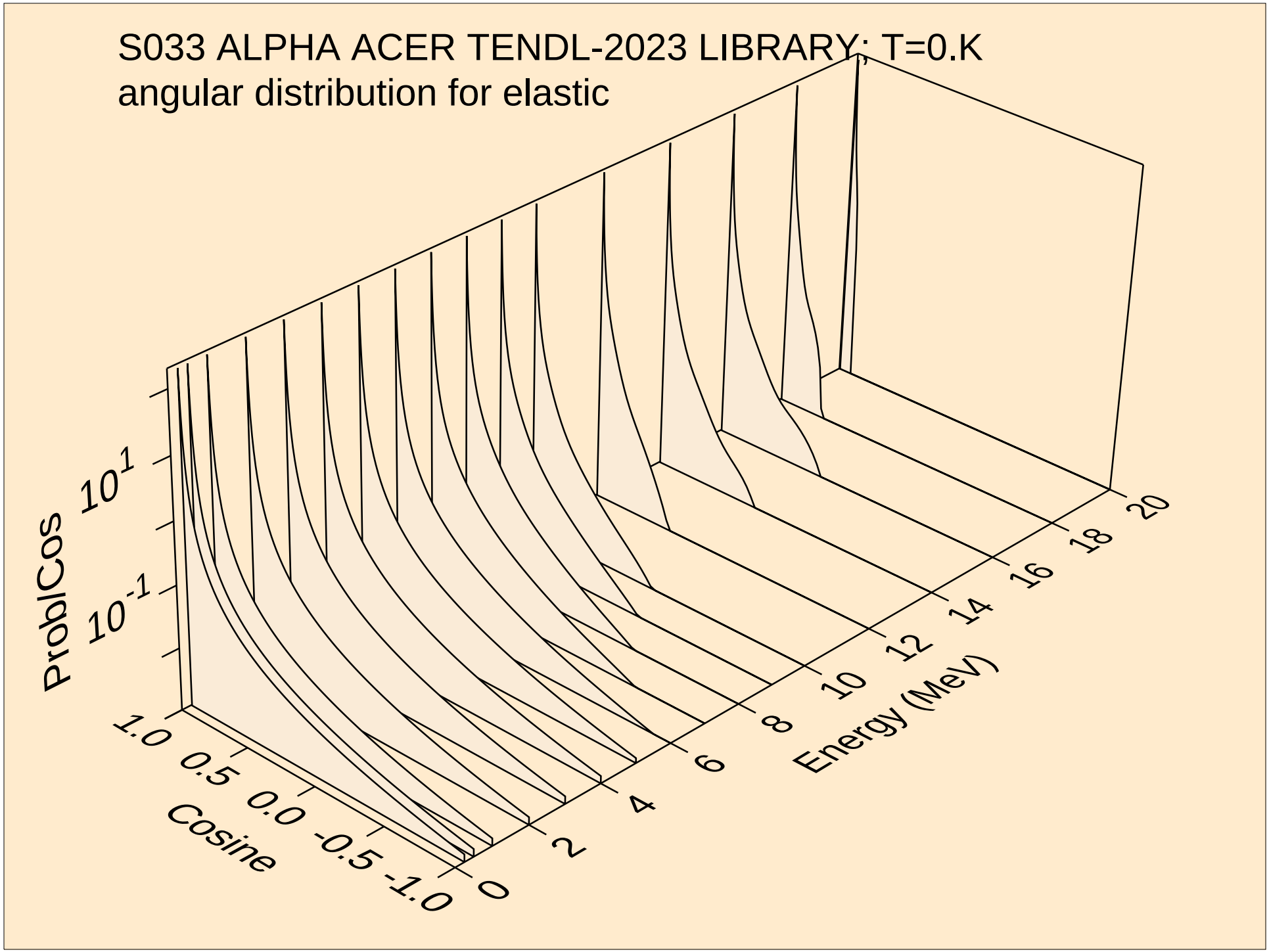

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production
0
200
400
600
800
1000
1200
1400
1600
1800
0
20
40
60
80
100
120
140
160
180
200

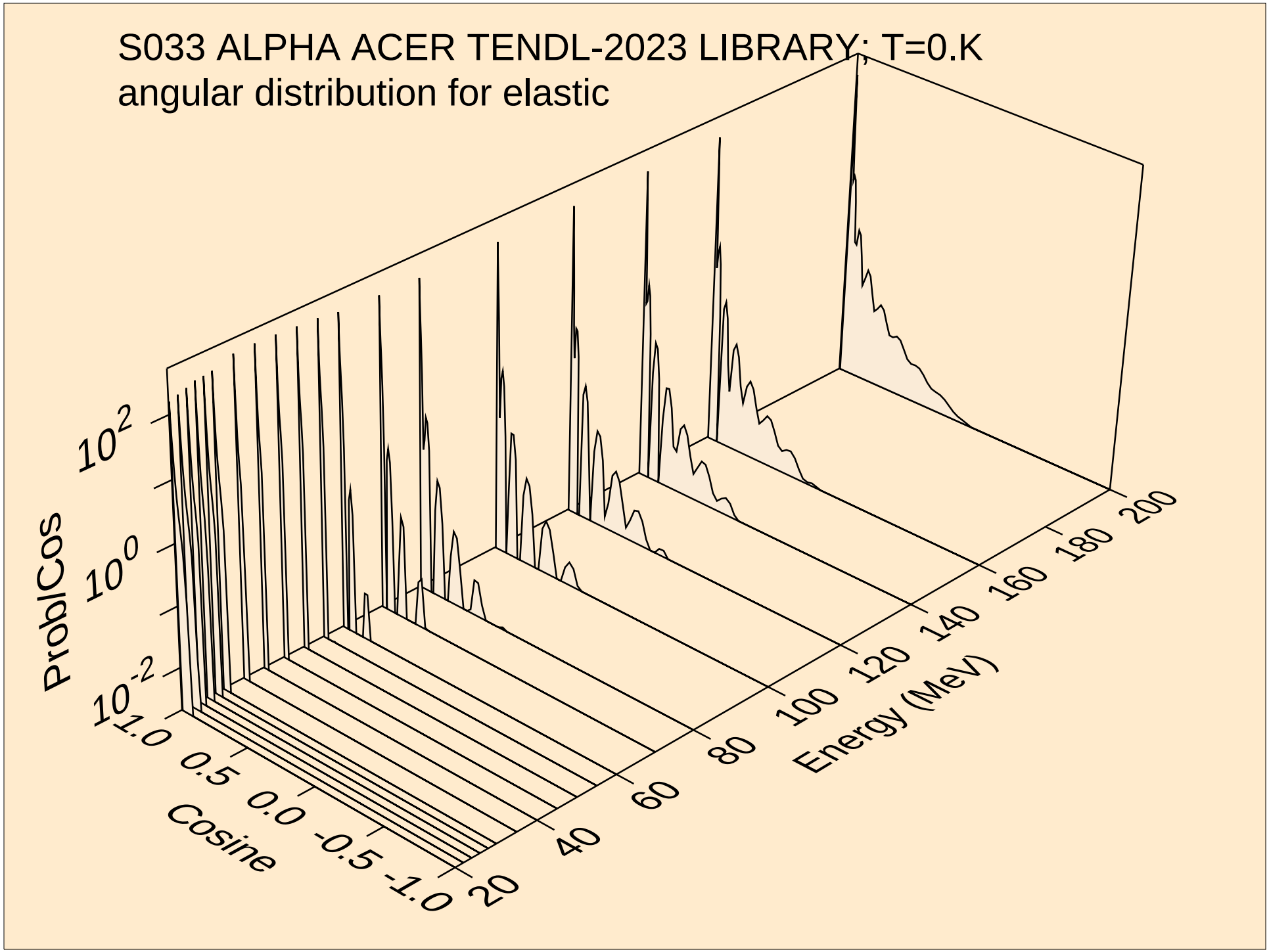

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
0
10
20
30
40
50
60
70
0
50
100
150
200

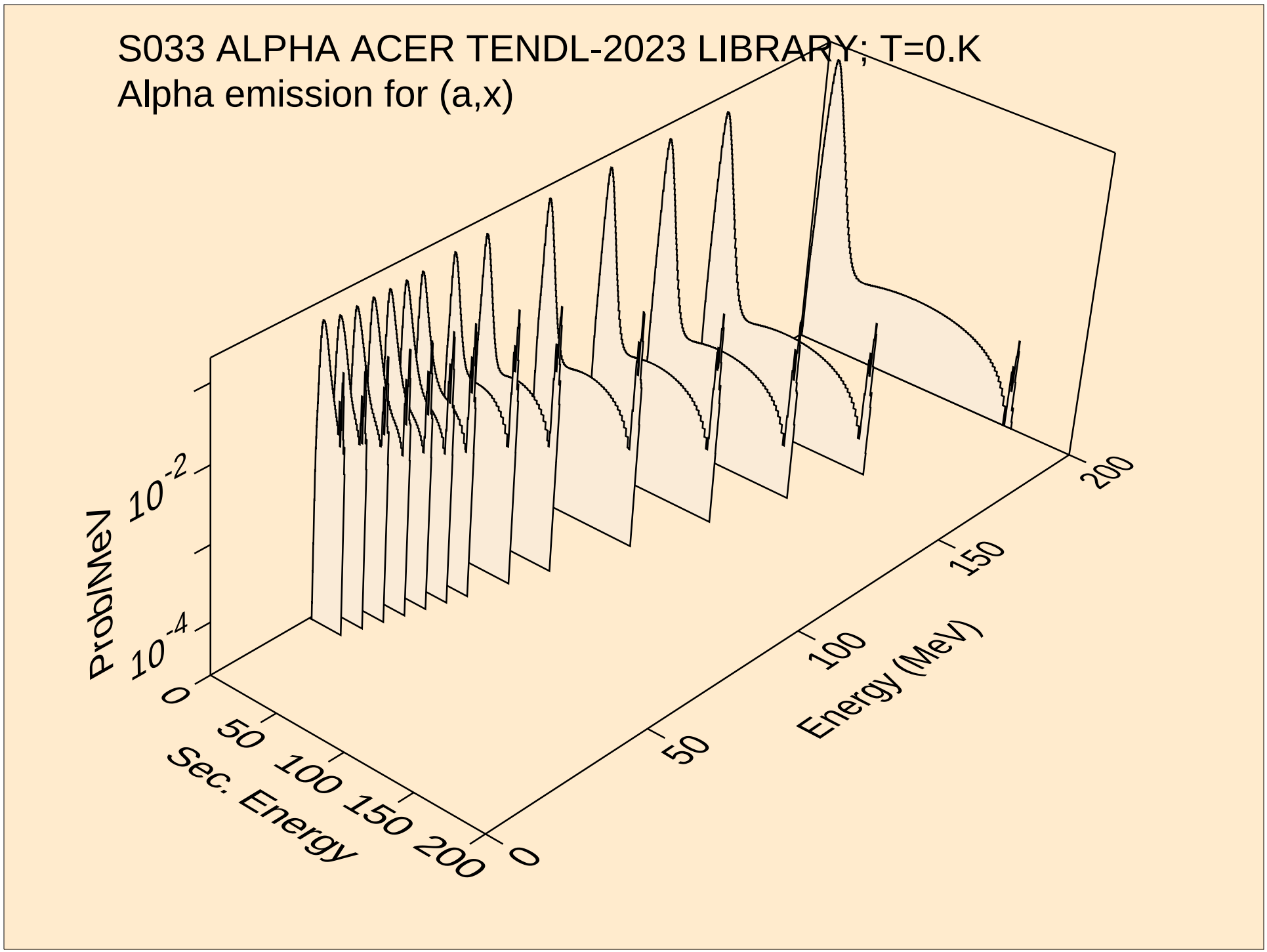

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Threshold reactions
(a,x)
(a,n*)a
(a,n*)2a
inelastic
(a,2a)
Cross section (barns)
Energy (MeV)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
0
20
40
60
80
100
120
140
160
180
200

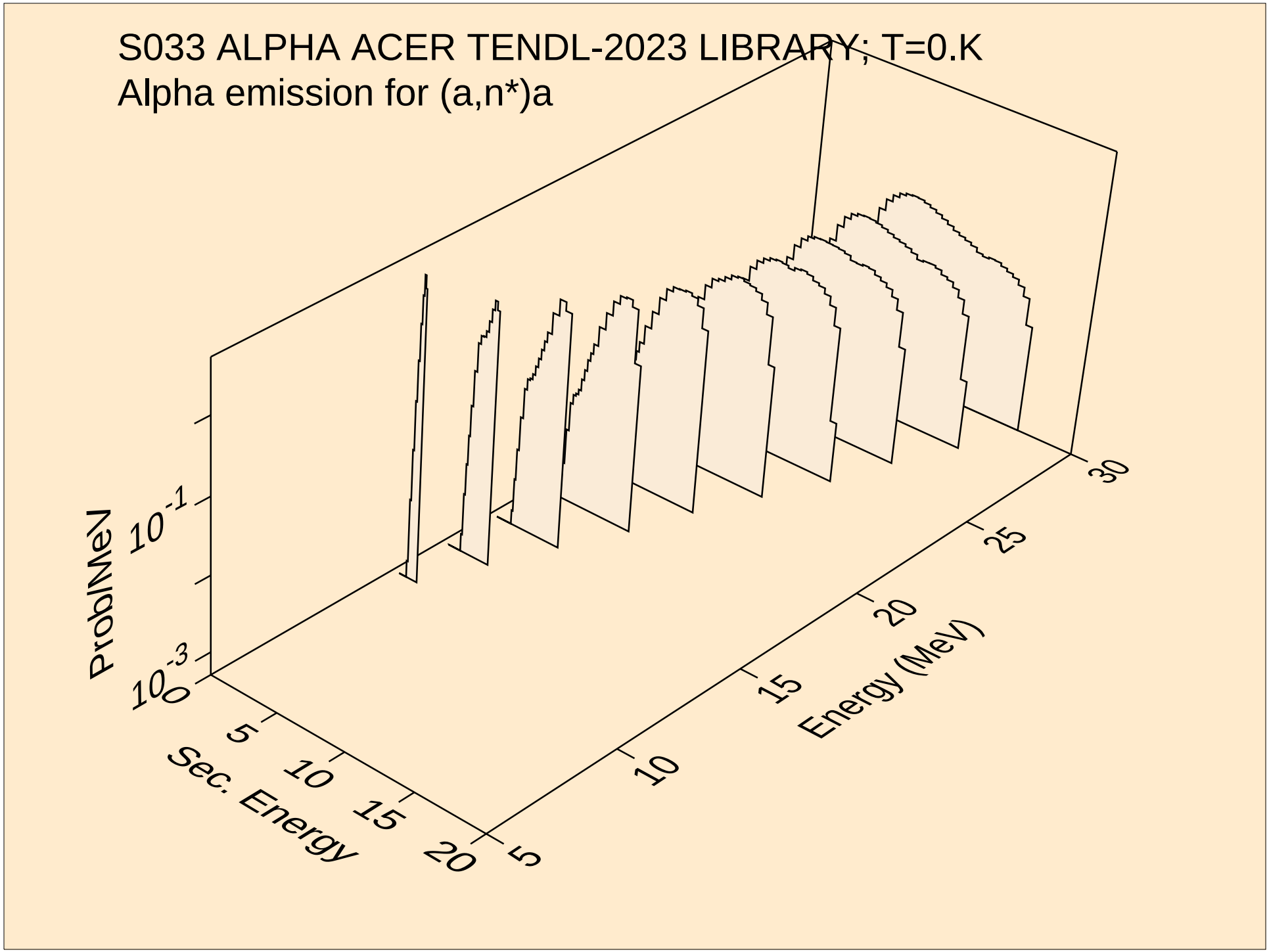

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Threshold reactions
Cross section (barns)
*10-3
200
180
160
140
120
100
80
60
40
20
0
10
12
14
16
18
20
22
24
26
28
30
Energy (MeV)
(a,pa)
(a,da)
(a,2p)
(a,pd)
(a,pt)

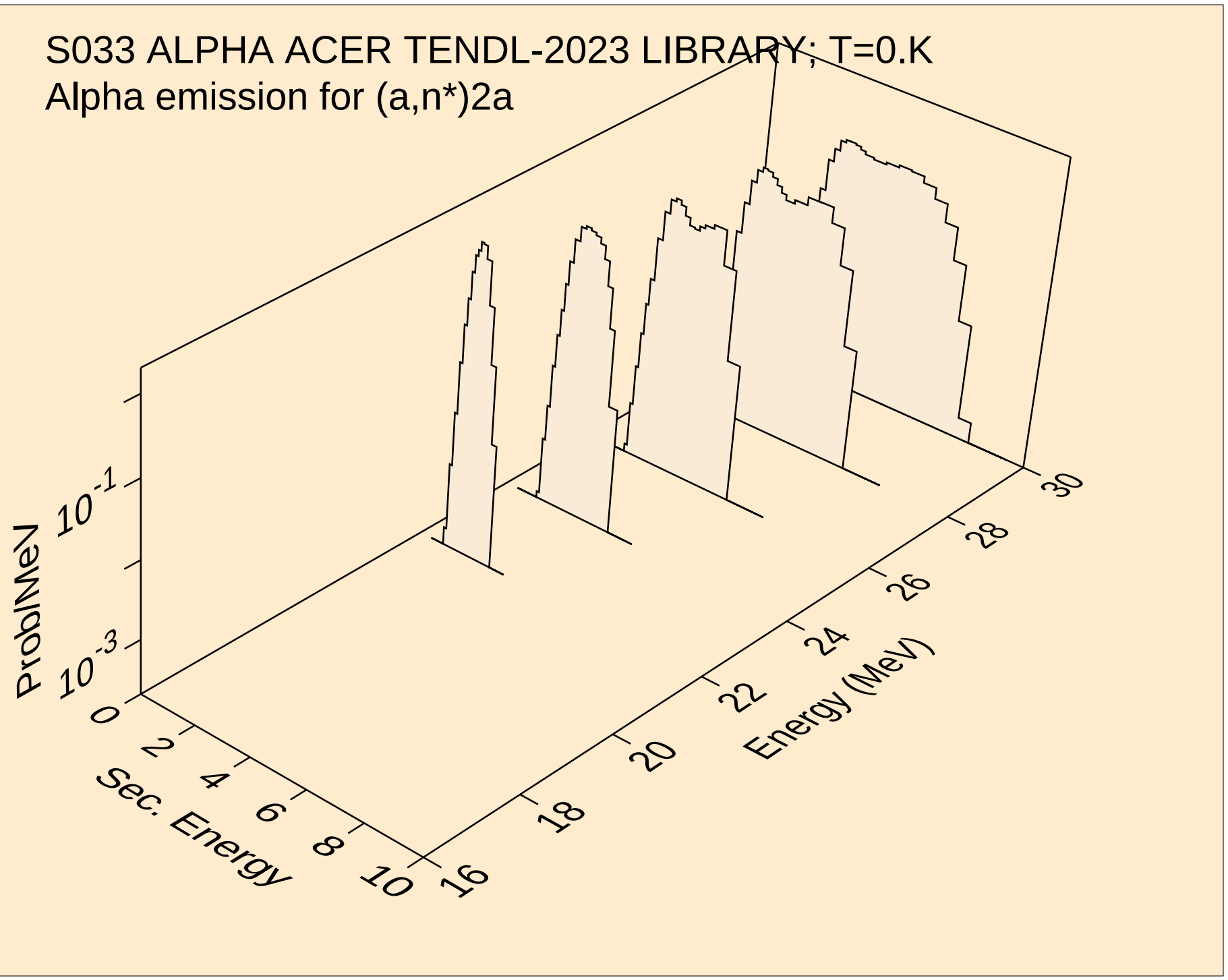

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Threshold reactions
2.5
*10-3
2.0
1.5
1.0
0.5
0.0
(a,da)
Cross section (barns)
16
18
20
22
24
26
28
30
Energy (MeV)

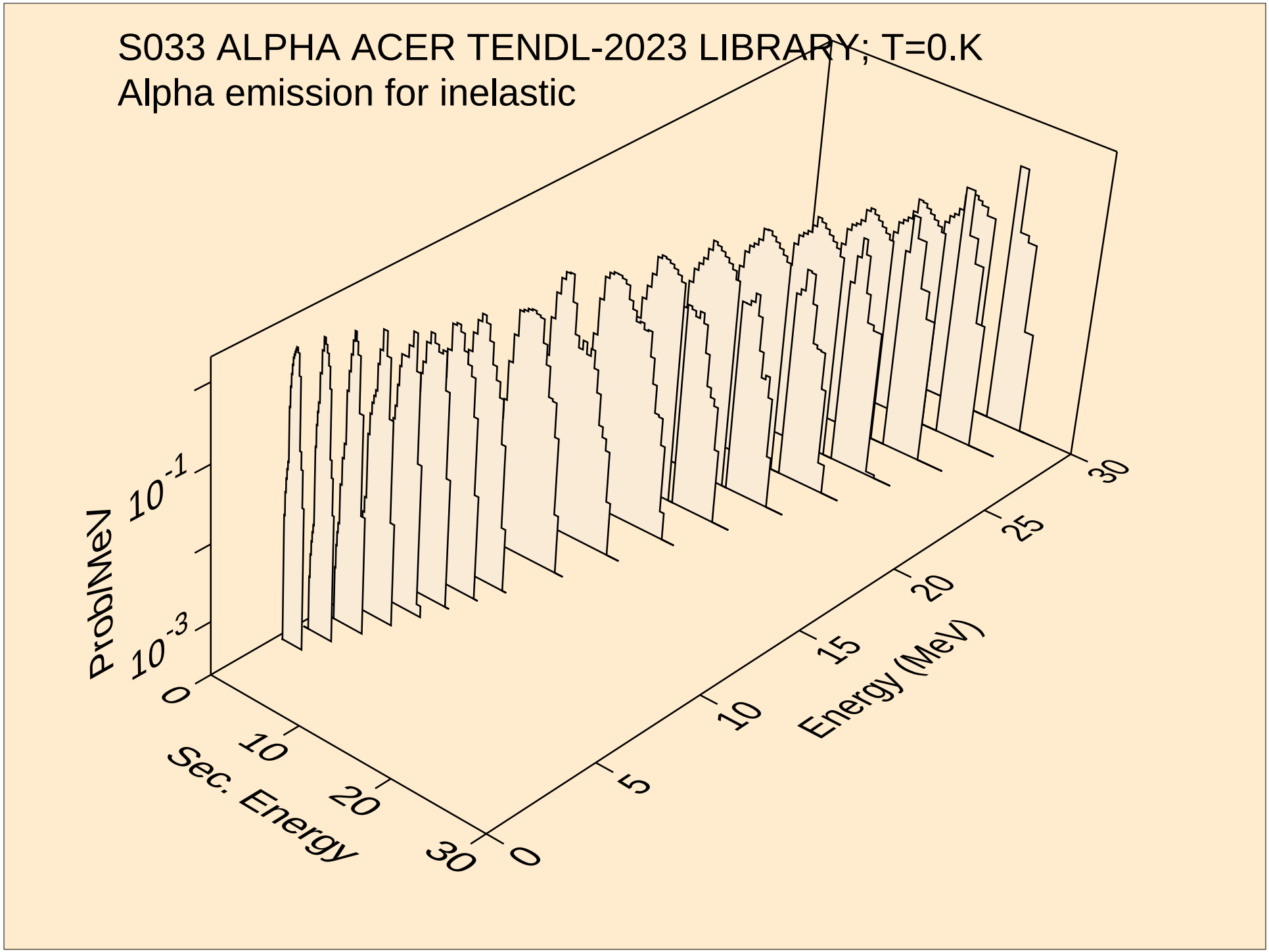

S033 ALPHA ACER TENDL-2023 LIBRARY: T=0.K
angular distribution for elastic
ProbICos
10^1
10^-1
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

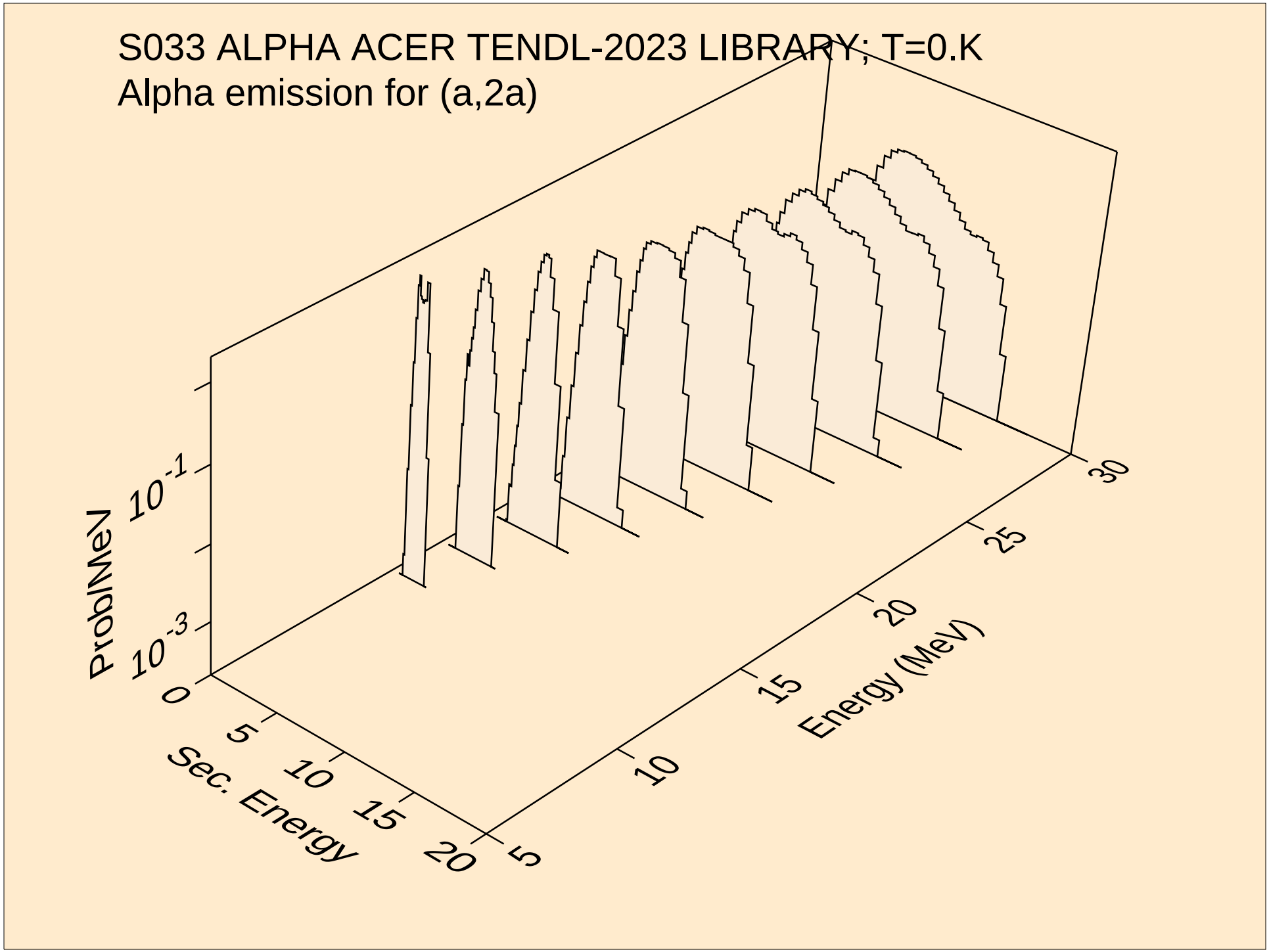

S033 ALPHA ACER TENDL-2023 LIBRARY: T=0.K
angular distribution for elastic
ProbICos
$10^{2}$
$10^{0}$
$10^{-2}$
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
180
200
Energy (MeV)

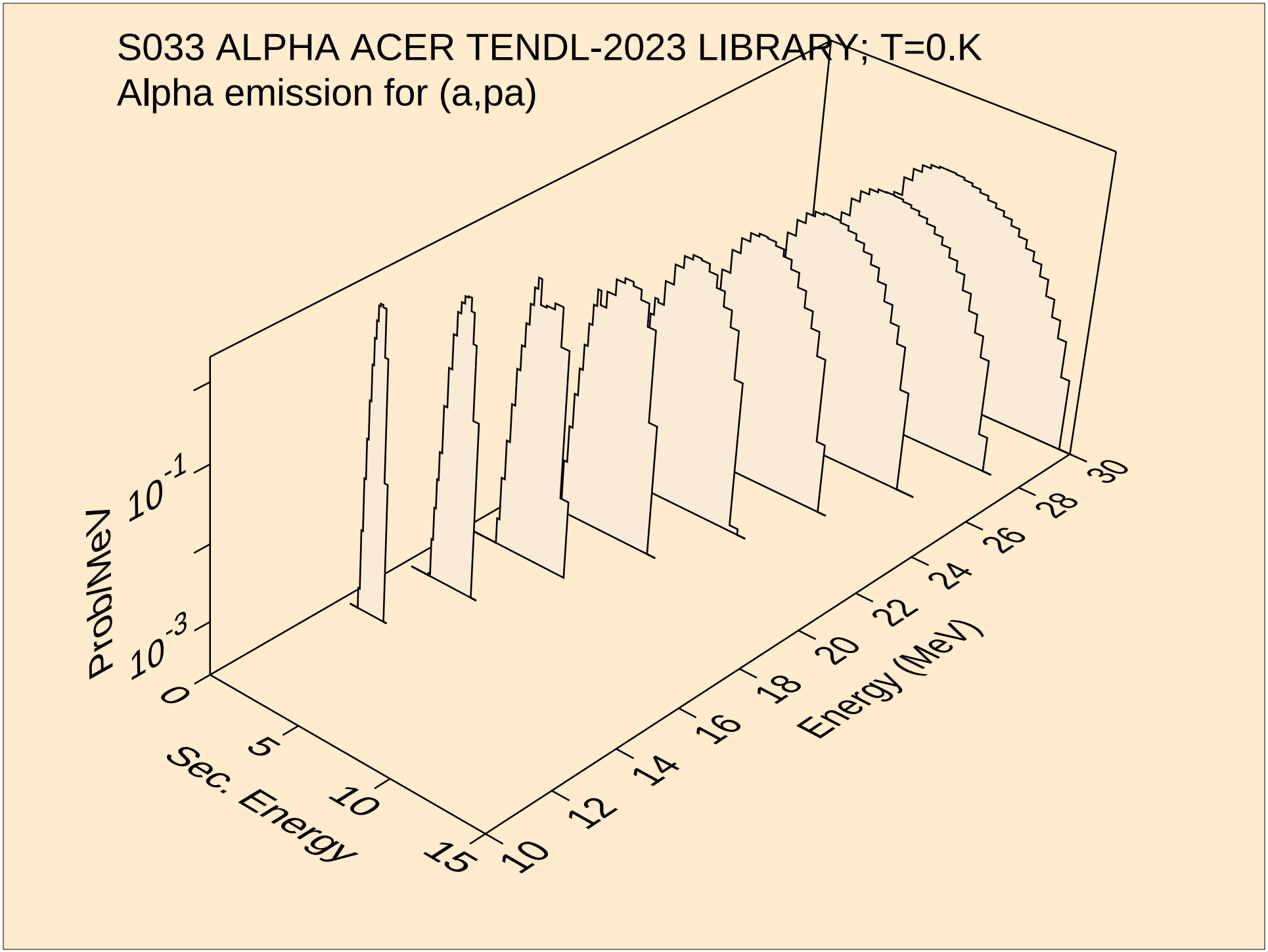

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Alpha emission for (a,x)
Prob/MeV
10-2
10-4
0
50
100
150
200
Sec. Energy
0
50
100
150
200
Energy (MeV)

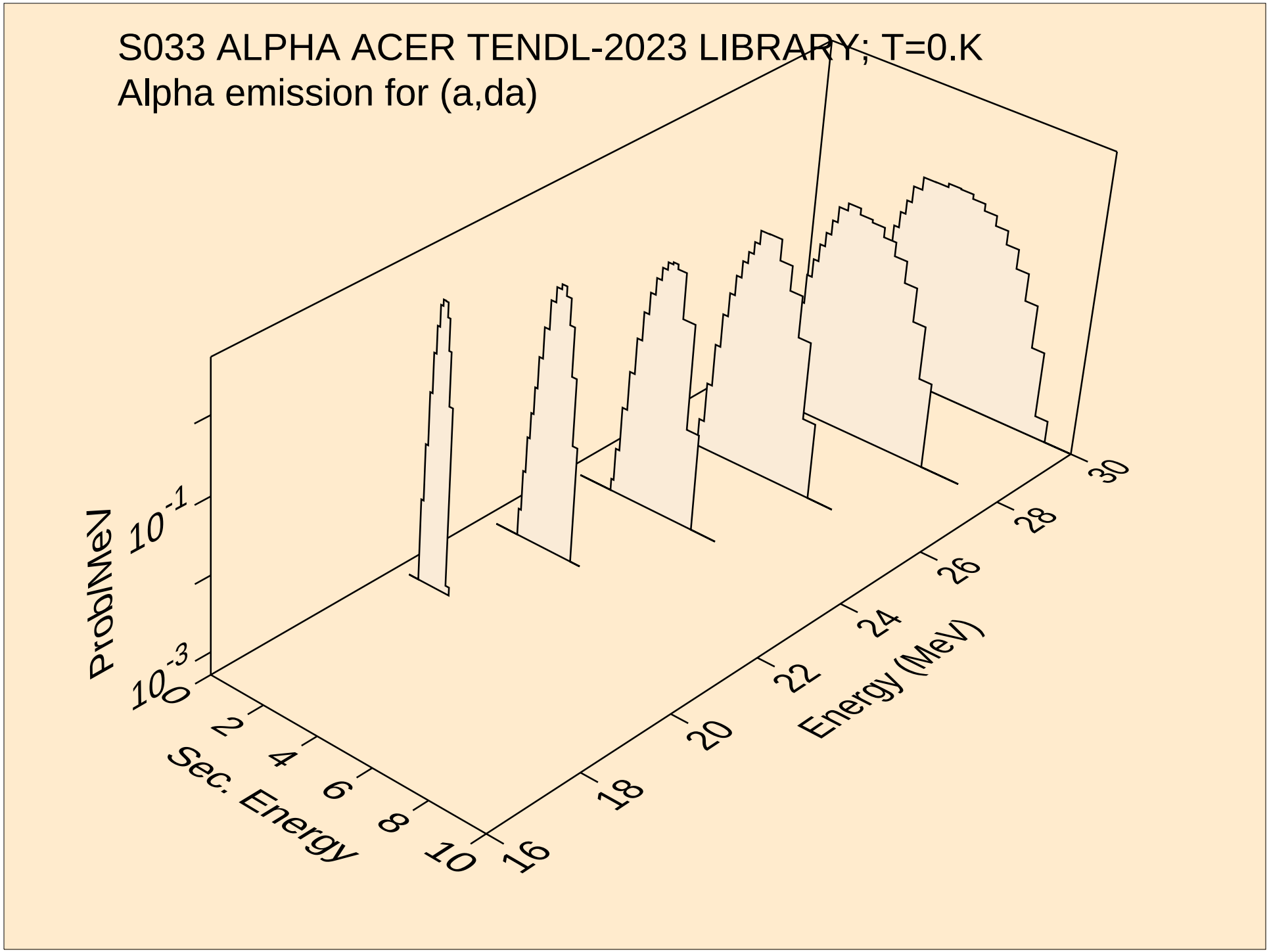

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Alpha emission for (a,n*)a
Prob/MeV
10-1
10-3
0
5
10
15
20
Sec. Energy
5
10
15
20
25
30
Energy (MeV)

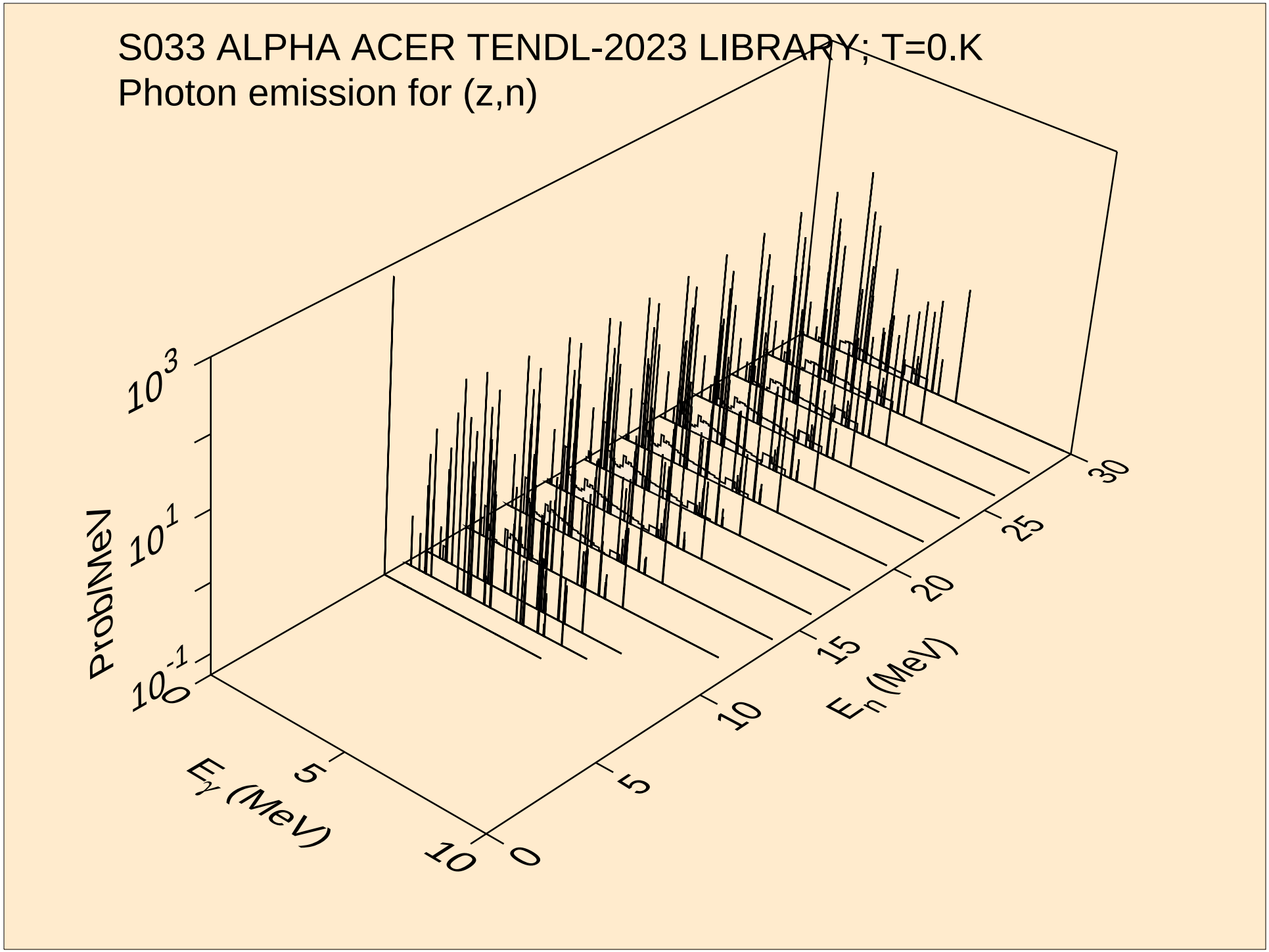

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Alpha emission for (a,n*)2a
Prob/MeV
10-1
10-3
0
2
4
6
8
10
Sec. Energy
16
18
20
22
24
26
28
30
Energy (MeV)

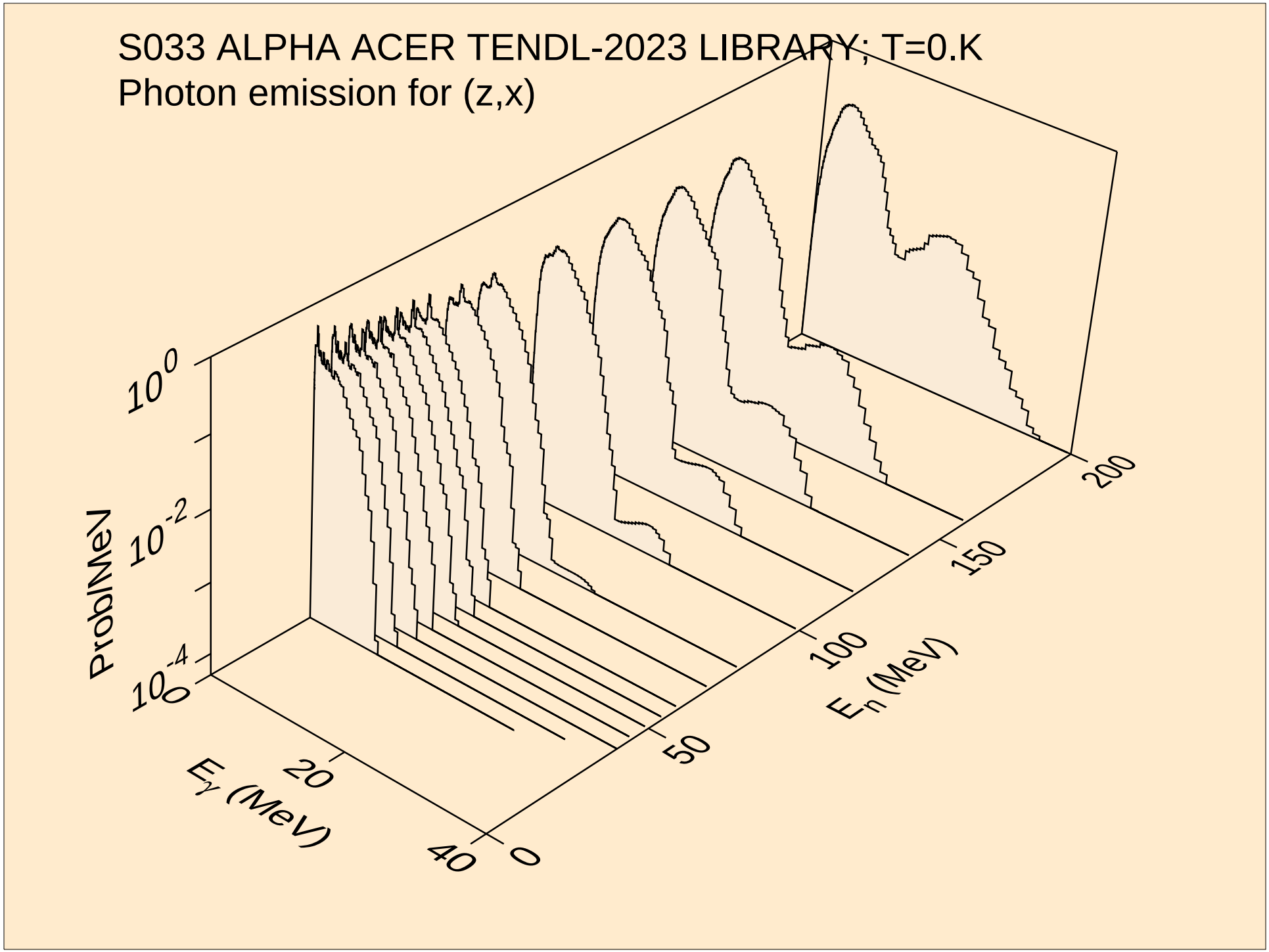

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Alpha emission for inelastic
Prob/MeV
10-1
10-3
0
10
20
30
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

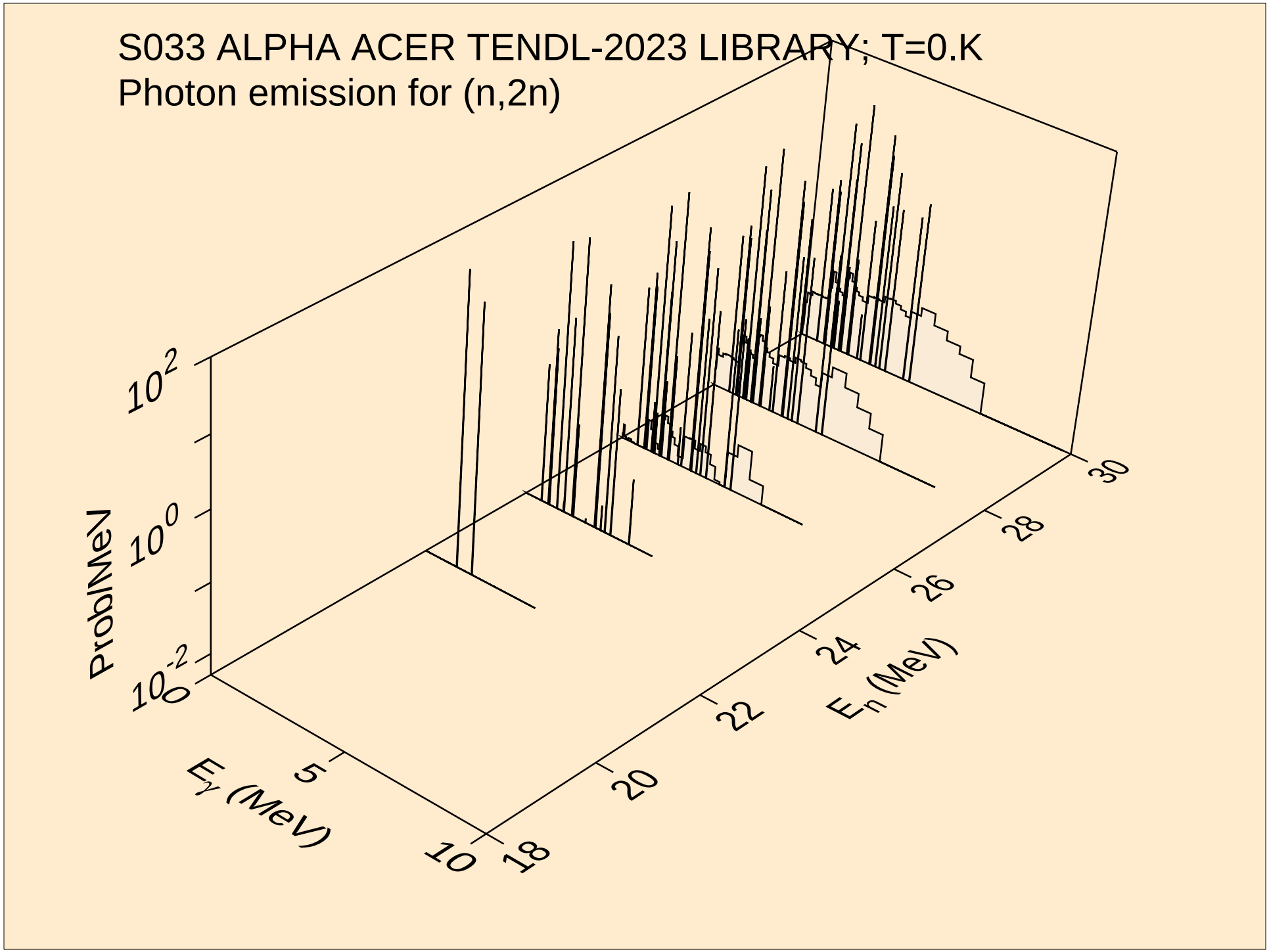

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Alpha emission for (a,2a)
Prob/MeV
10-1
10-3
0
5
10
15
20
Sec. Energy
5
10
15
20
25
30
Energy (MeV)

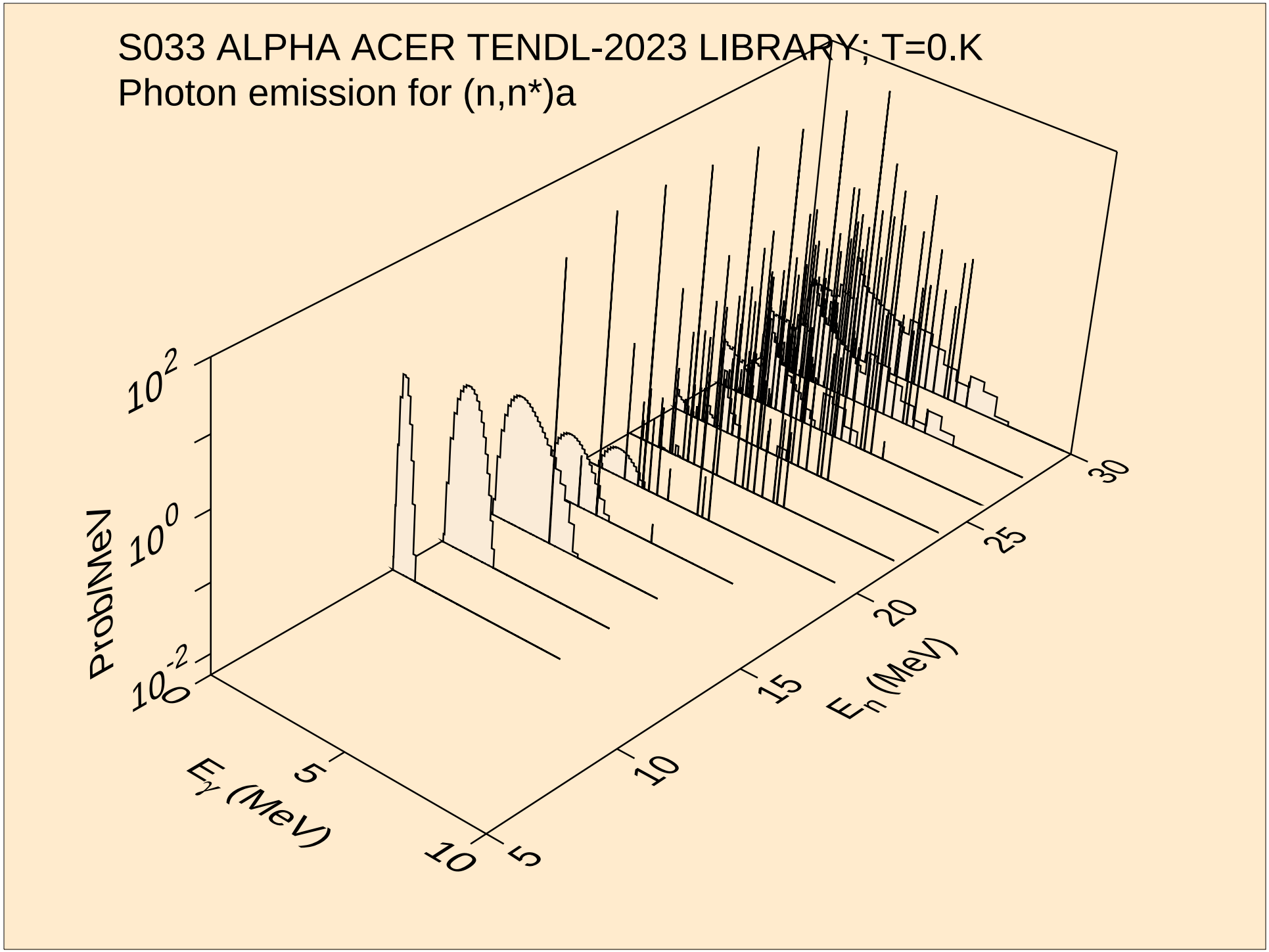

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Alpha emission for (a,pa)
Prob/MeV
10-1
10-3
0
Sec. Energy
5
10
15
10
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

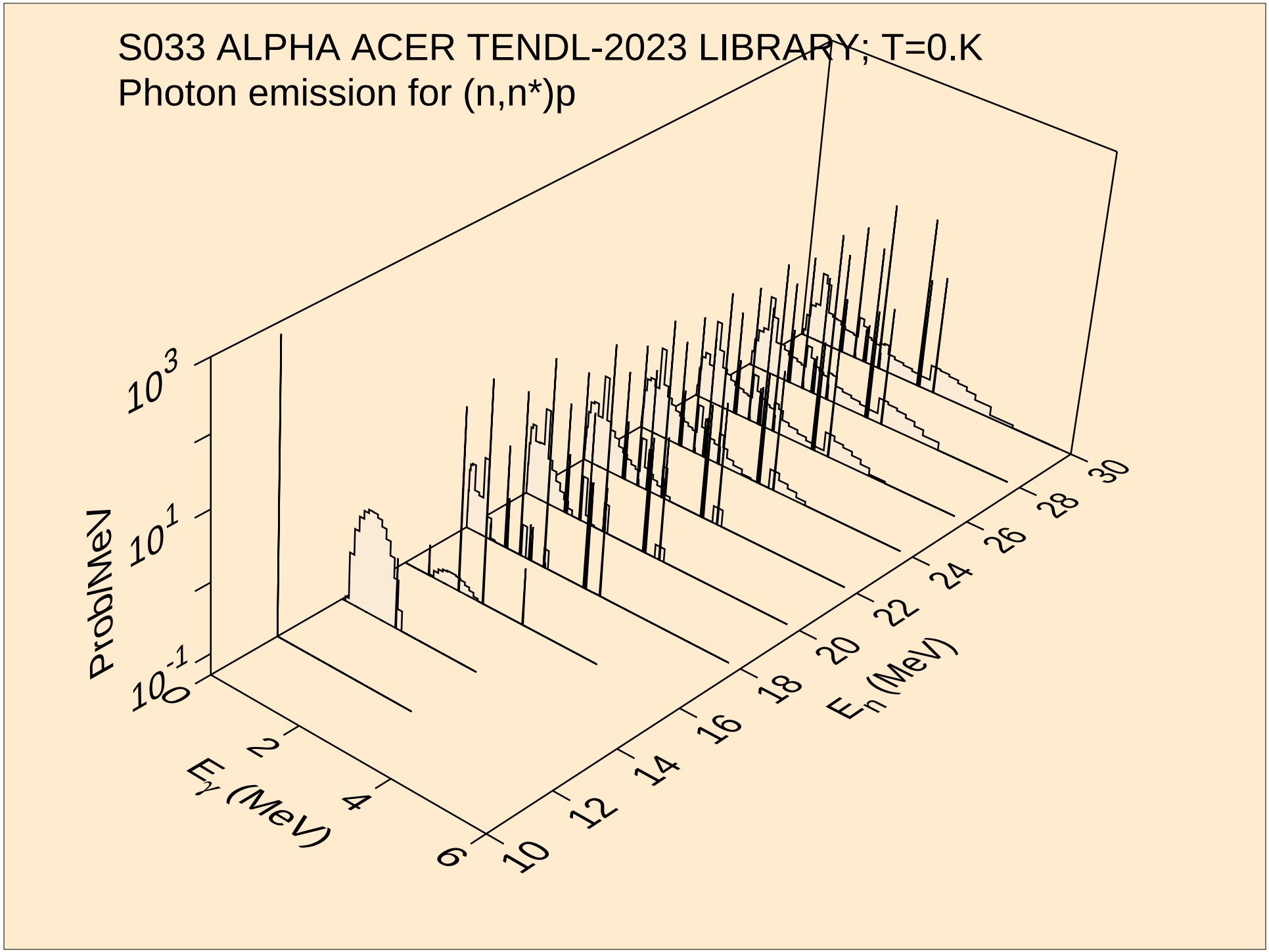

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Alpha emission for (a,da)
Prob/MeV
10-1
10-3
0
2
4
6
8
10
Sec. Energy
16
18
20
22
24
26
28
30
Energy (MeV)

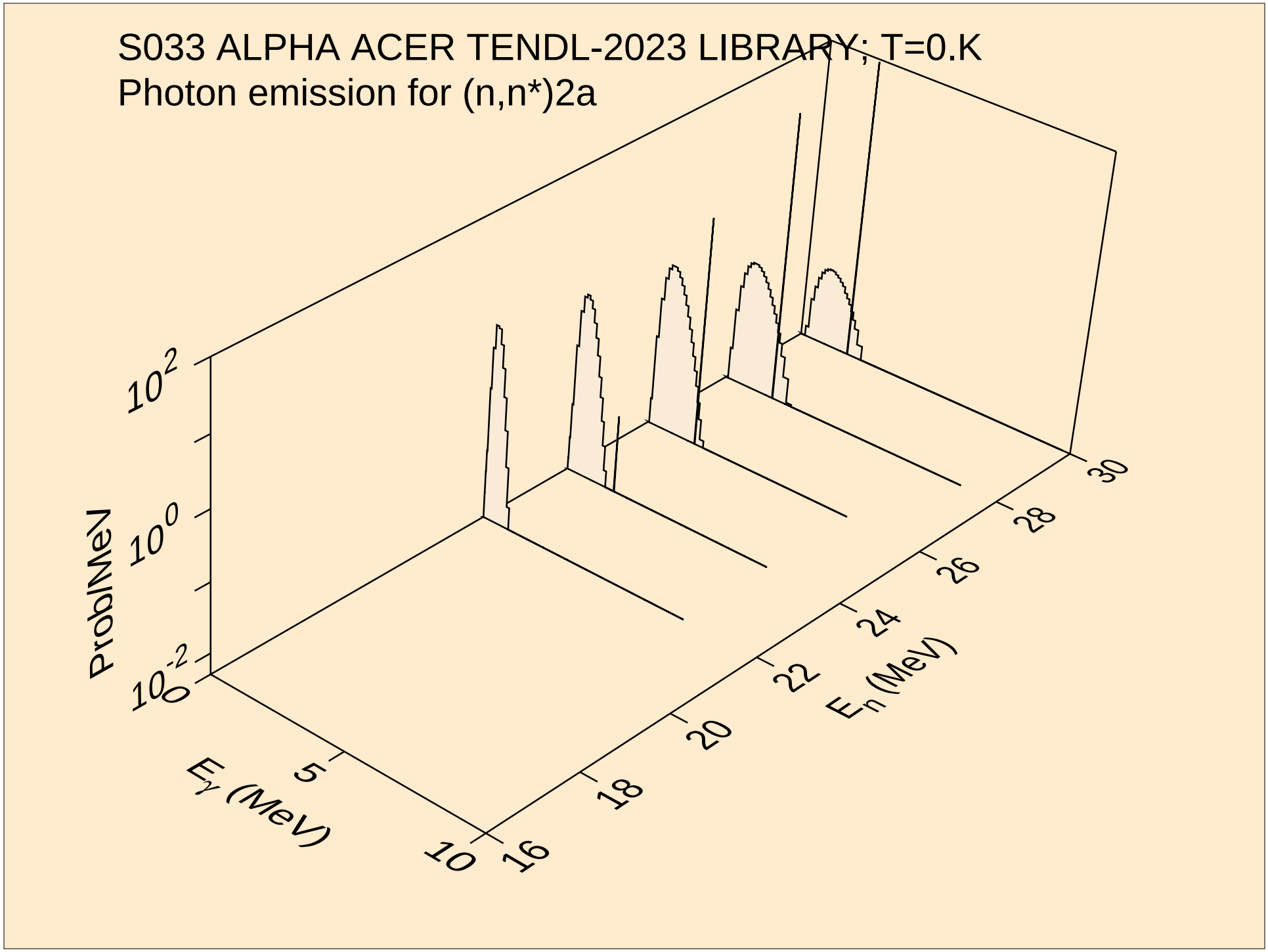

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (z,n)
Prob/MeV
$10^{3}$
$10^{1}$
$10^{-1}$
0
5
10
$E_\gamma$ (MeV)
0
5
10
15
20
25
30
$E_n$ (MeV)

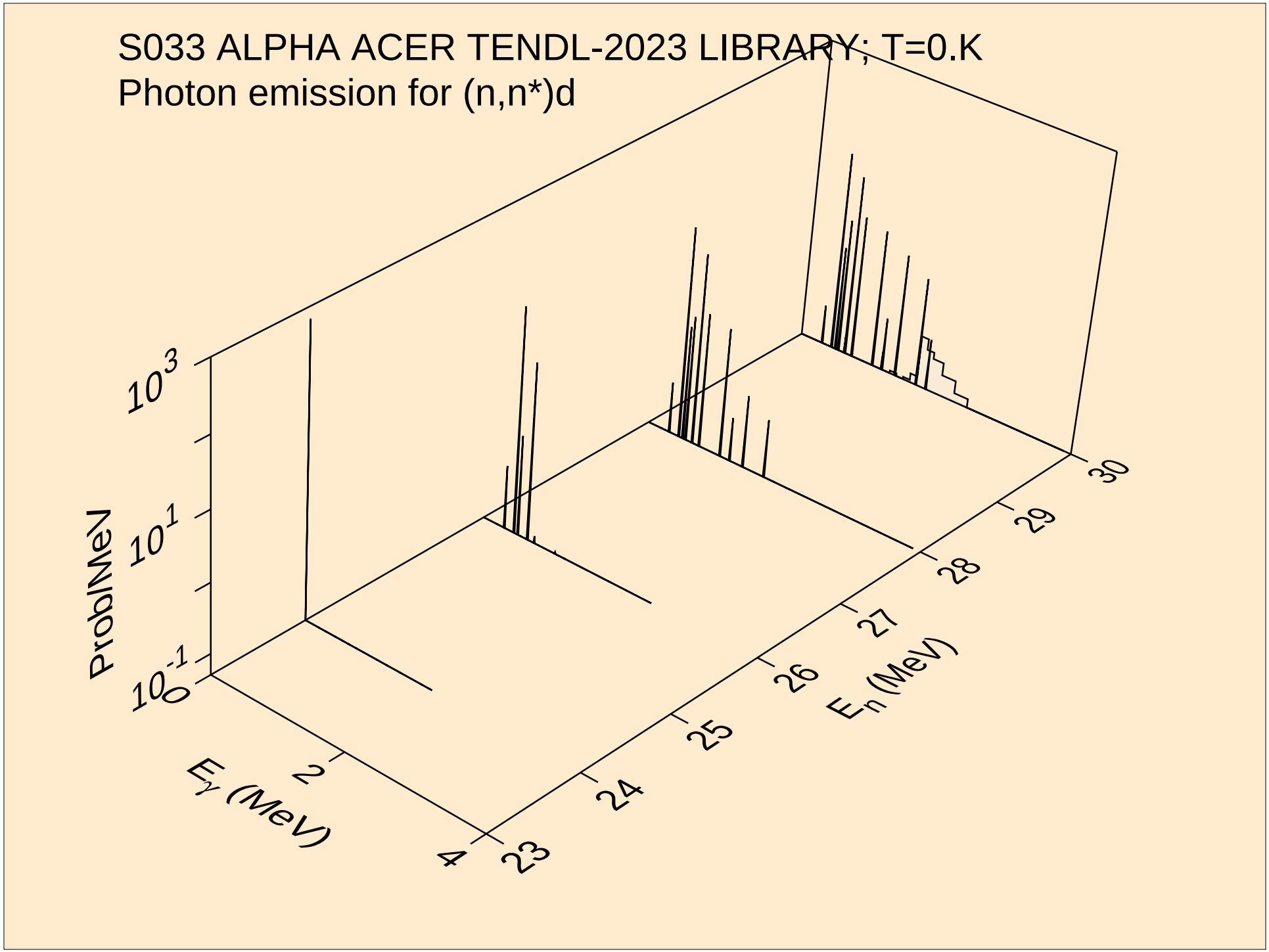

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (z,x)
Prob/MeV
$10^{0}$
$10^{-2}$
$10^{-4}$
0
20
40
$E_\gamma$ (MeV)
0
50
100
150
200
$E_n$ (MeV)

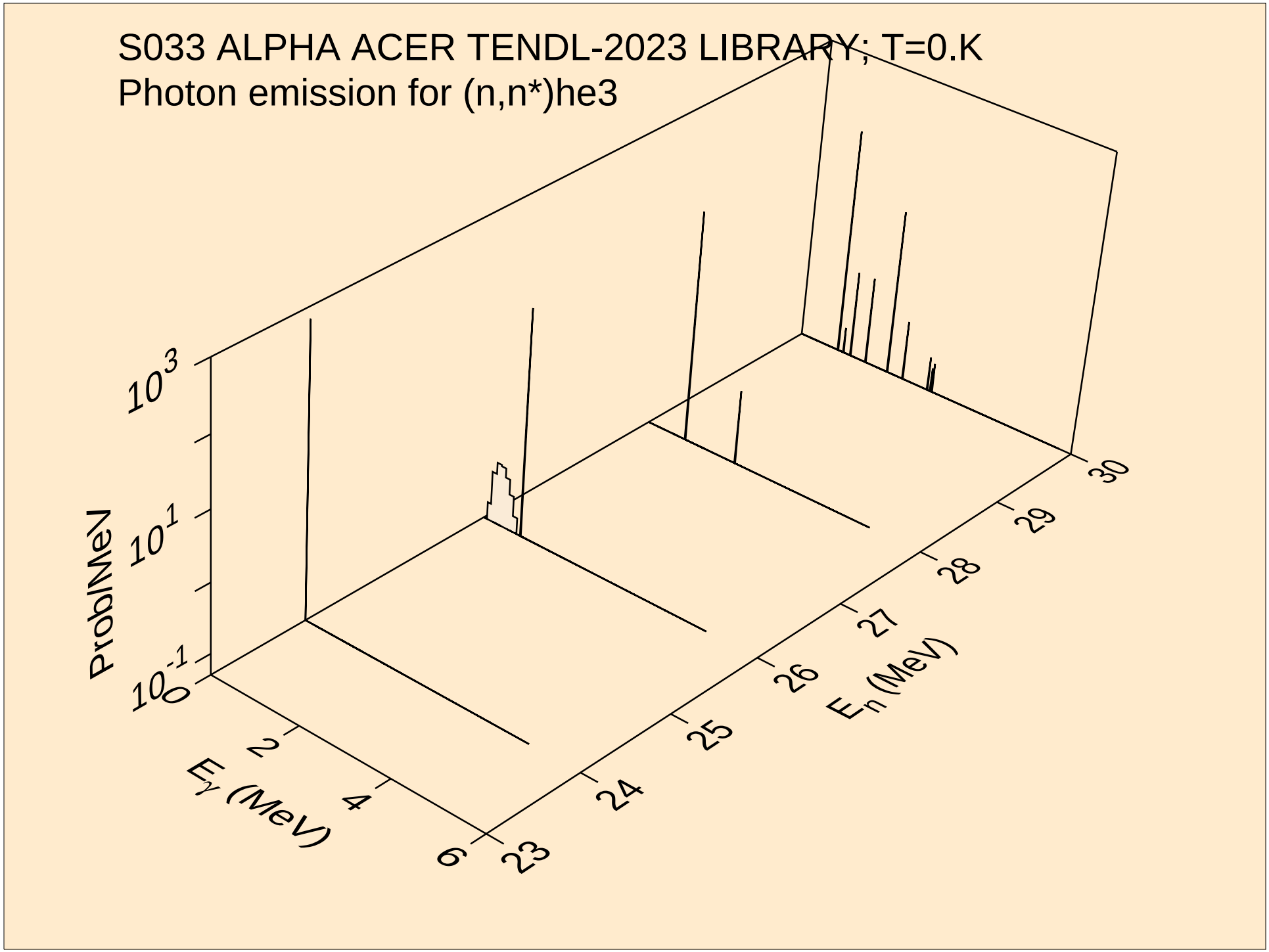

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,2n)
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
0
5
10
$E_\gamma$ (MeV)
18
20
22
24
26
28
30
$E_n$ (MeV)

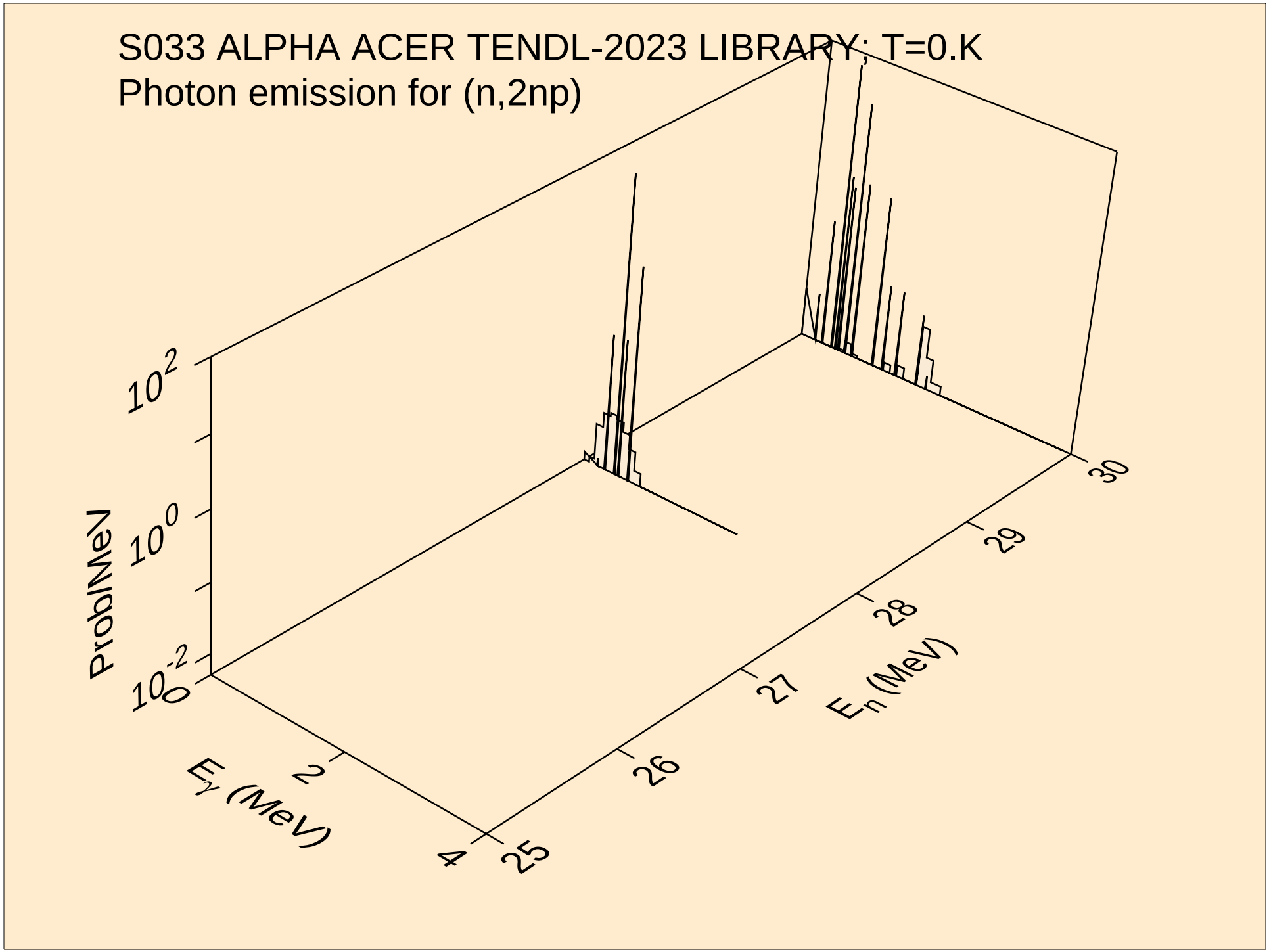

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,n*)a
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
0
5
10
$E_\gamma$ (MeV)
5
10
15
20
25
30
$E_n$ (MeV)

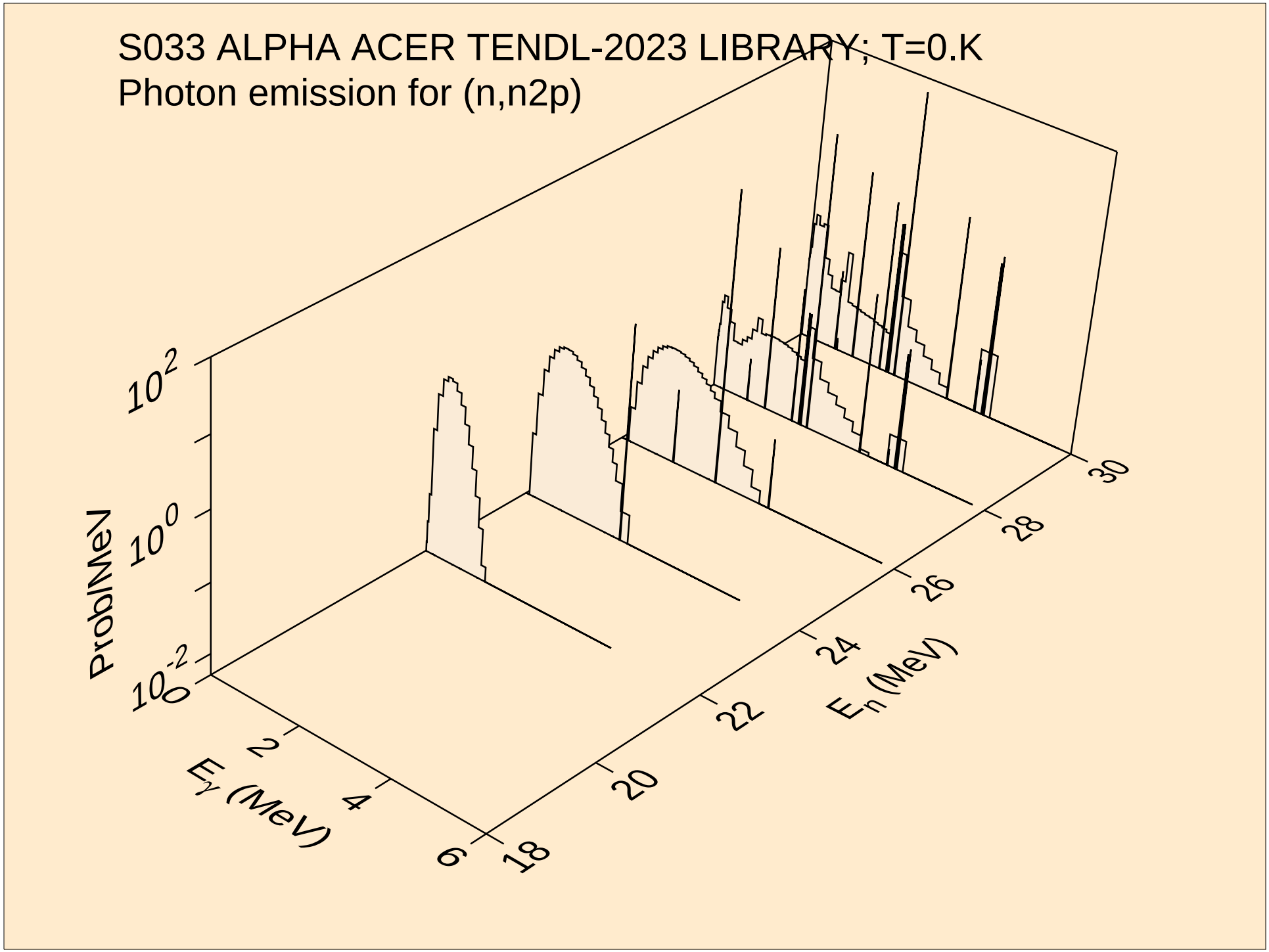

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,n*)p
Prob/MeV
$10^{3}$
$10^{1}$
$10^{-1}$
0
2
4
6
$E_\gamma$ (MeV)
10
12
14
16
18
20
22
24
26
28
30
$E_n$ (MeV)

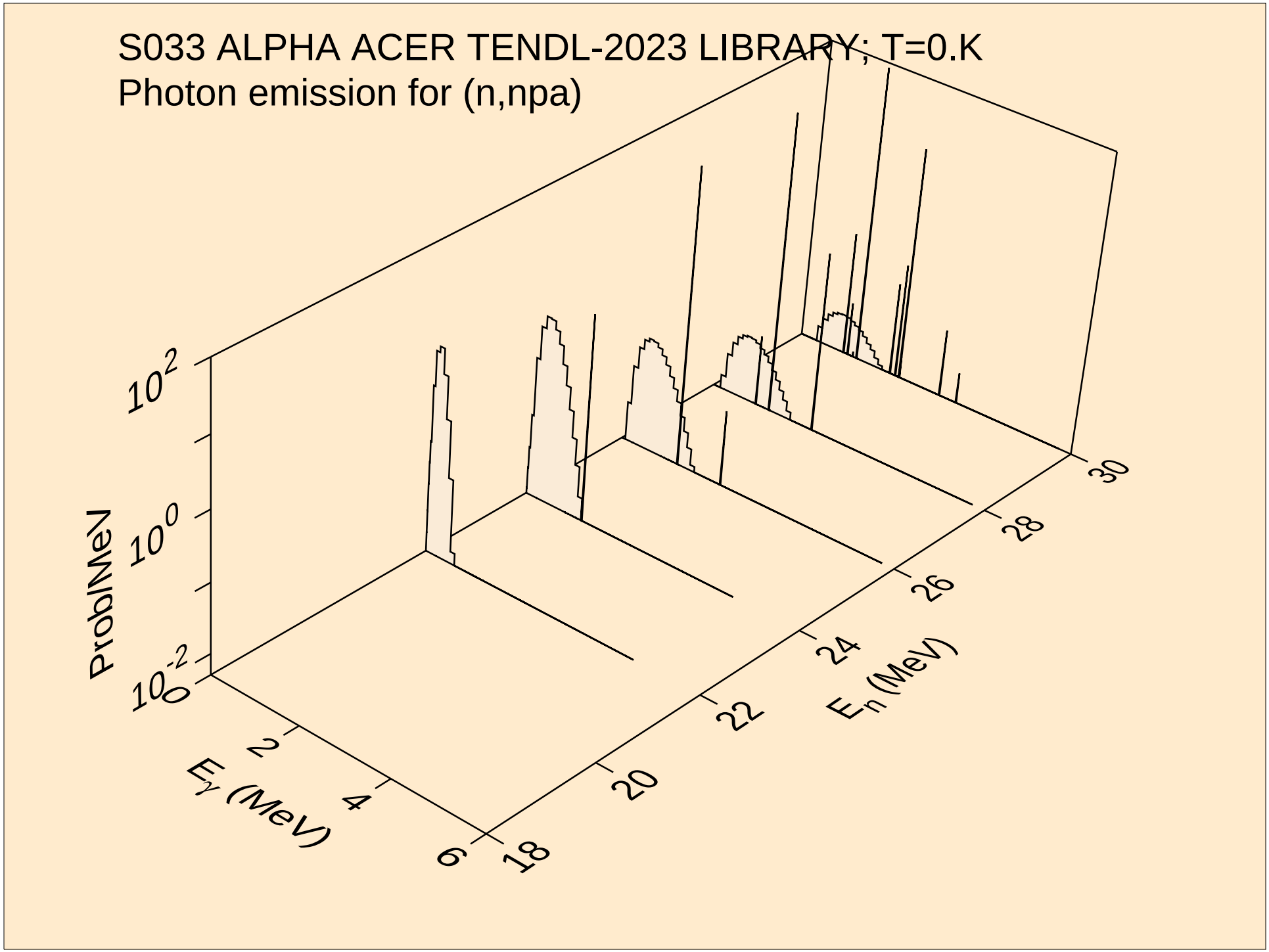

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,n*)2a
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
$E_\gamma$ (MeV)
0
5
10
16
18
20
22
24
26
28
30
$E_n$ (MeV)

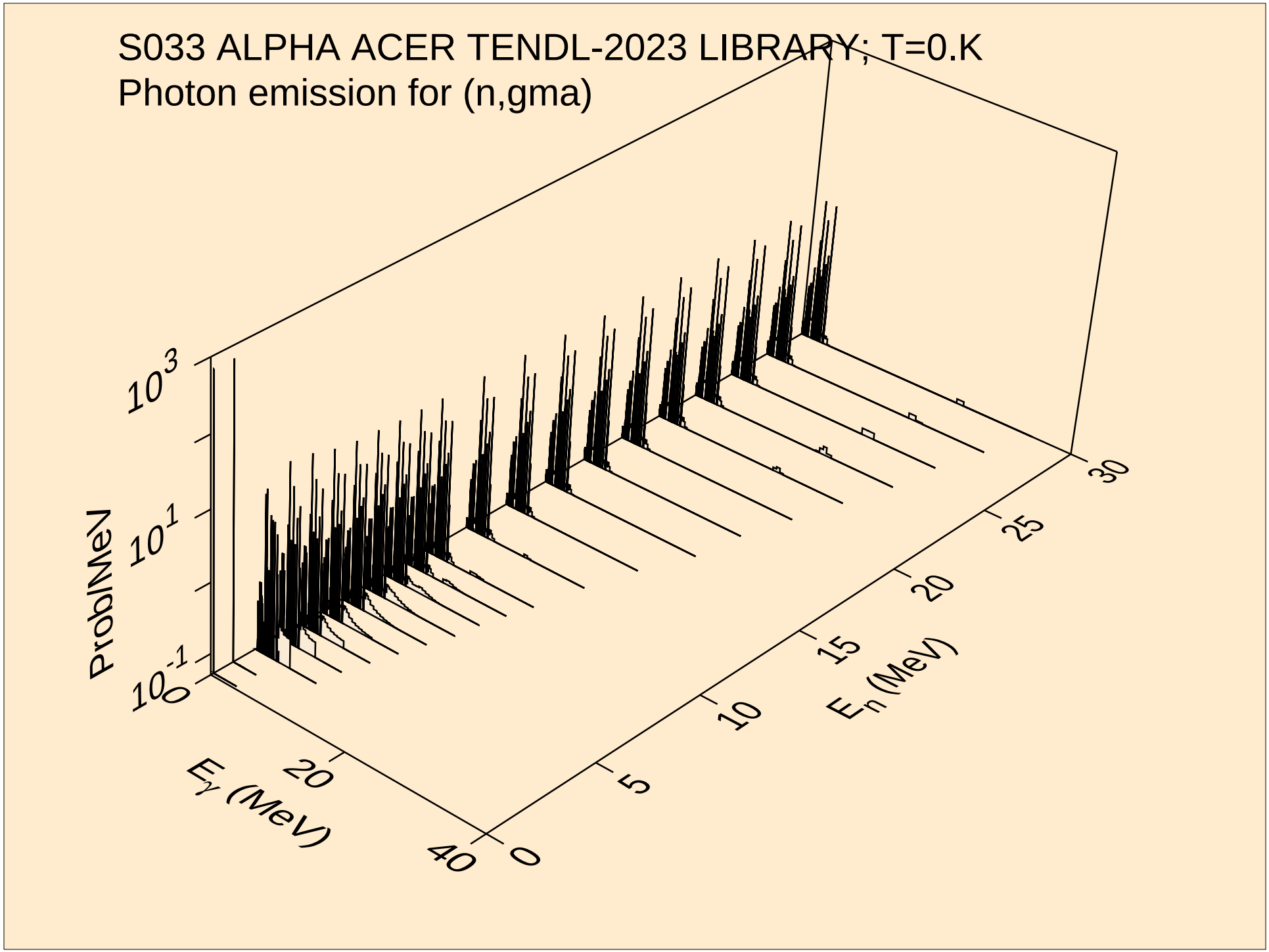

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,n*)d
Prob/MeV
$10^{3}$
$10^{1}$
$10^{-1}$
0
2
4
$E_\gamma$ (MeV)
23
24
25
26
27
28
29
30
$E_n$ (MeV)

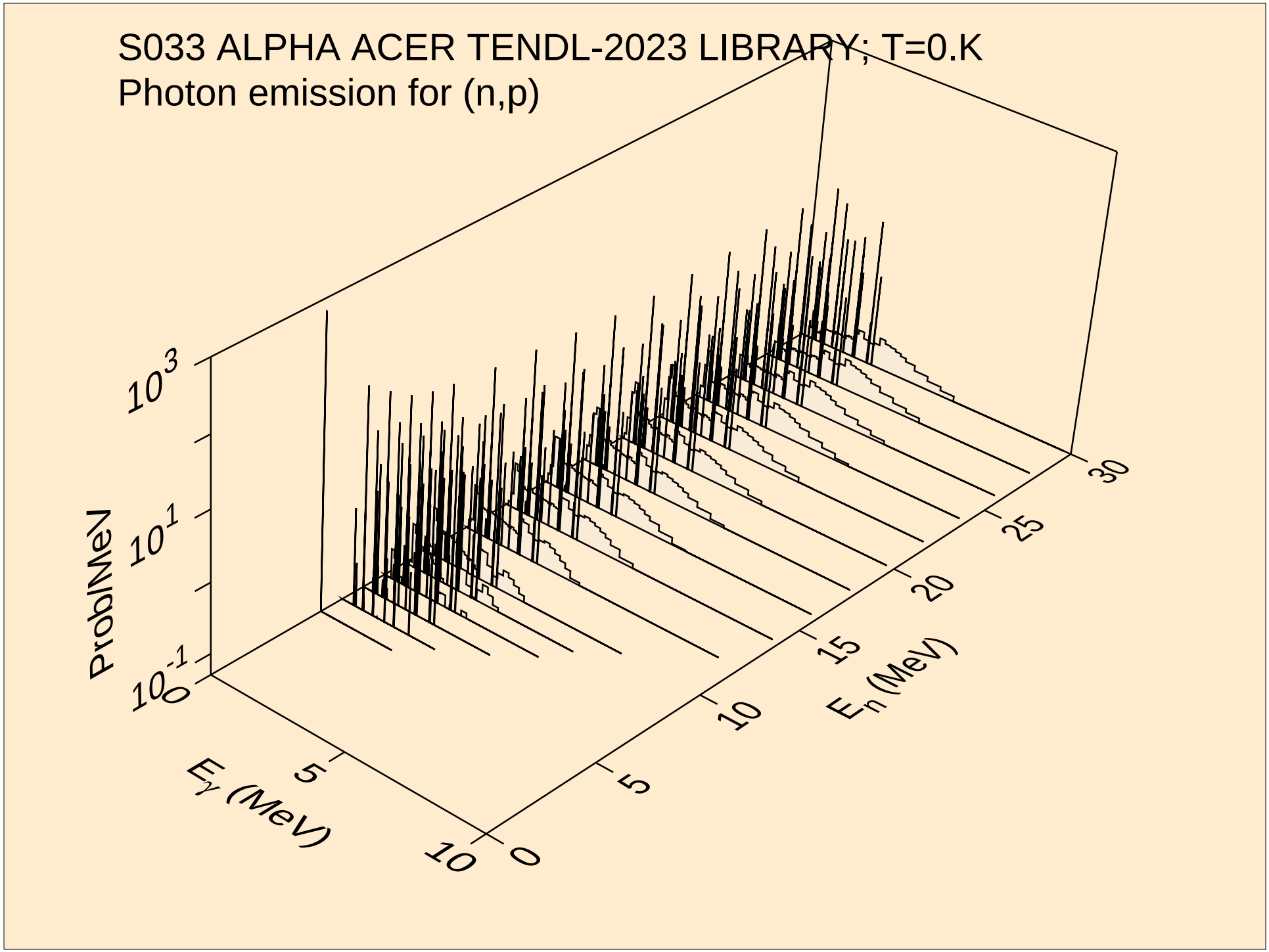

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,n*)he3
Prob/MeV
$10^{3}$
$10^{1}$
$10^{-1}$
0
2
4
6
$E_\gamma$ (MeV)
23
24
25
26
27
28
29
30
$E_n$ (MeV)

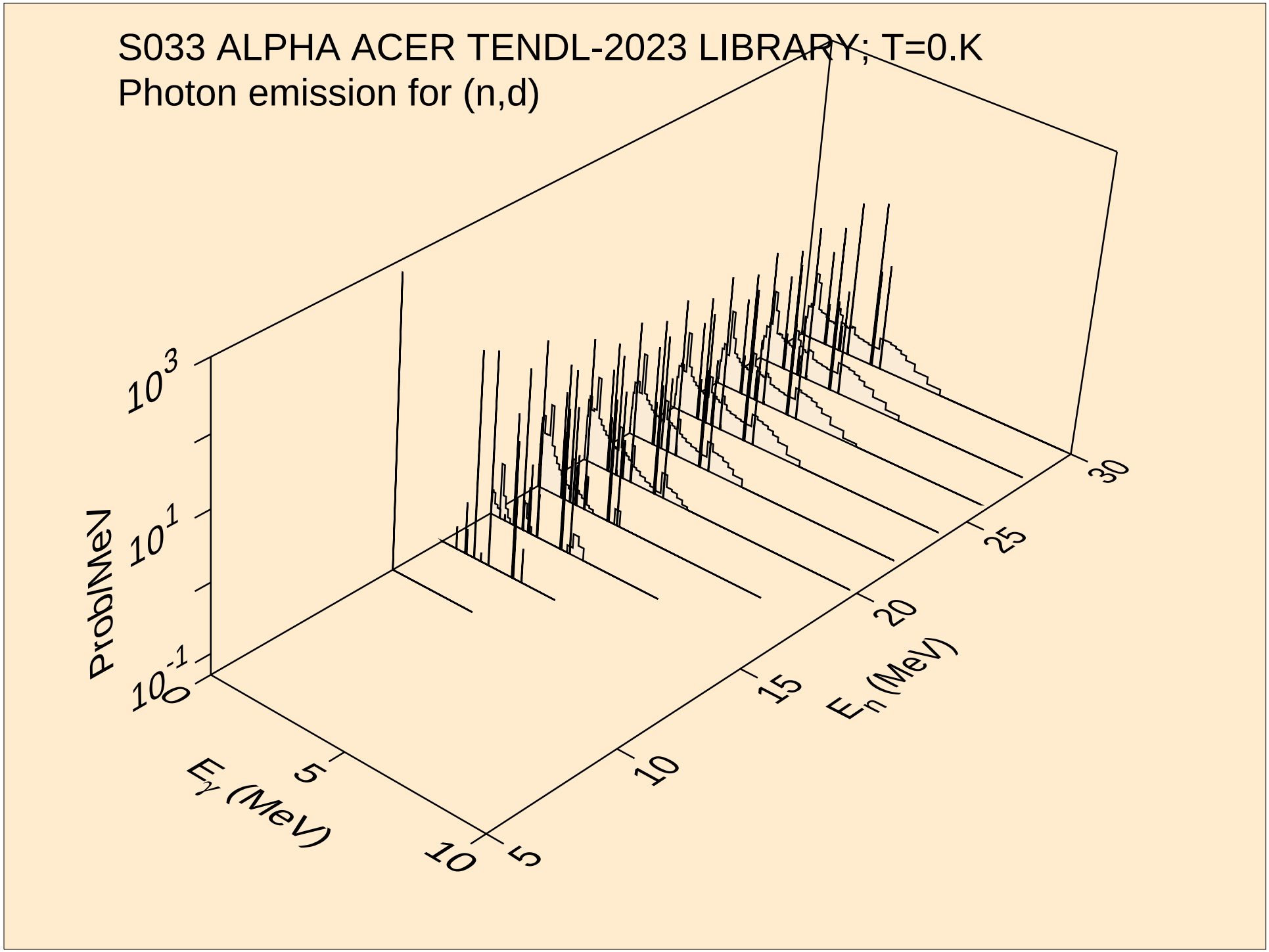

S033 ALPHA ACER TENDL-2023 LIBRARY: T=0.K
Photon emission for (n,2np)
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
$E_\gamma$ (MeV)
0
2
4
$E_n$ (MeV)
25
26
27
28
29
30

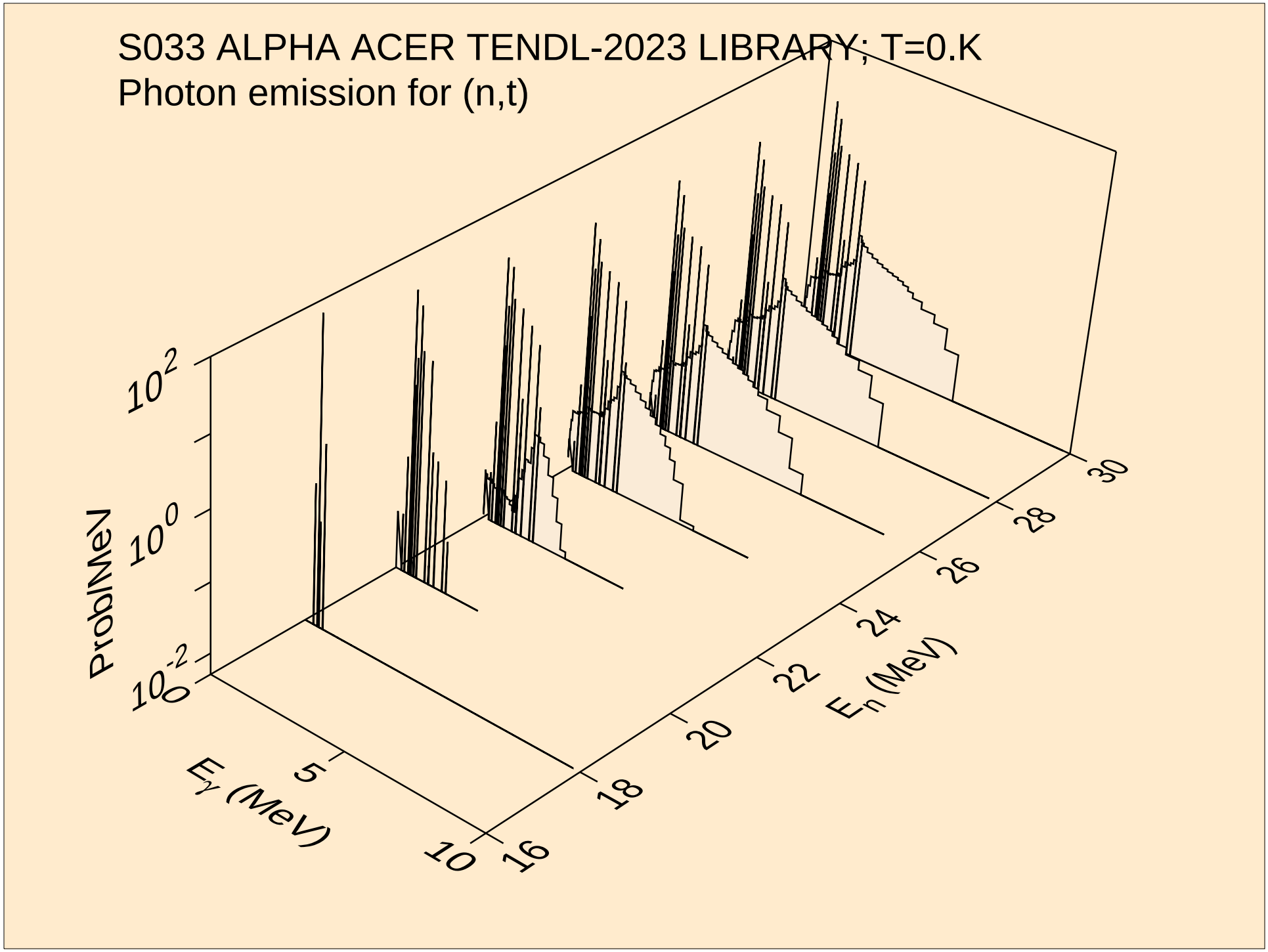

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,n2p)
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
$E_\gamma$ (MeV)
0
2
4
6
$E_n$ (MeV)
18
20
22
24
26
28
30

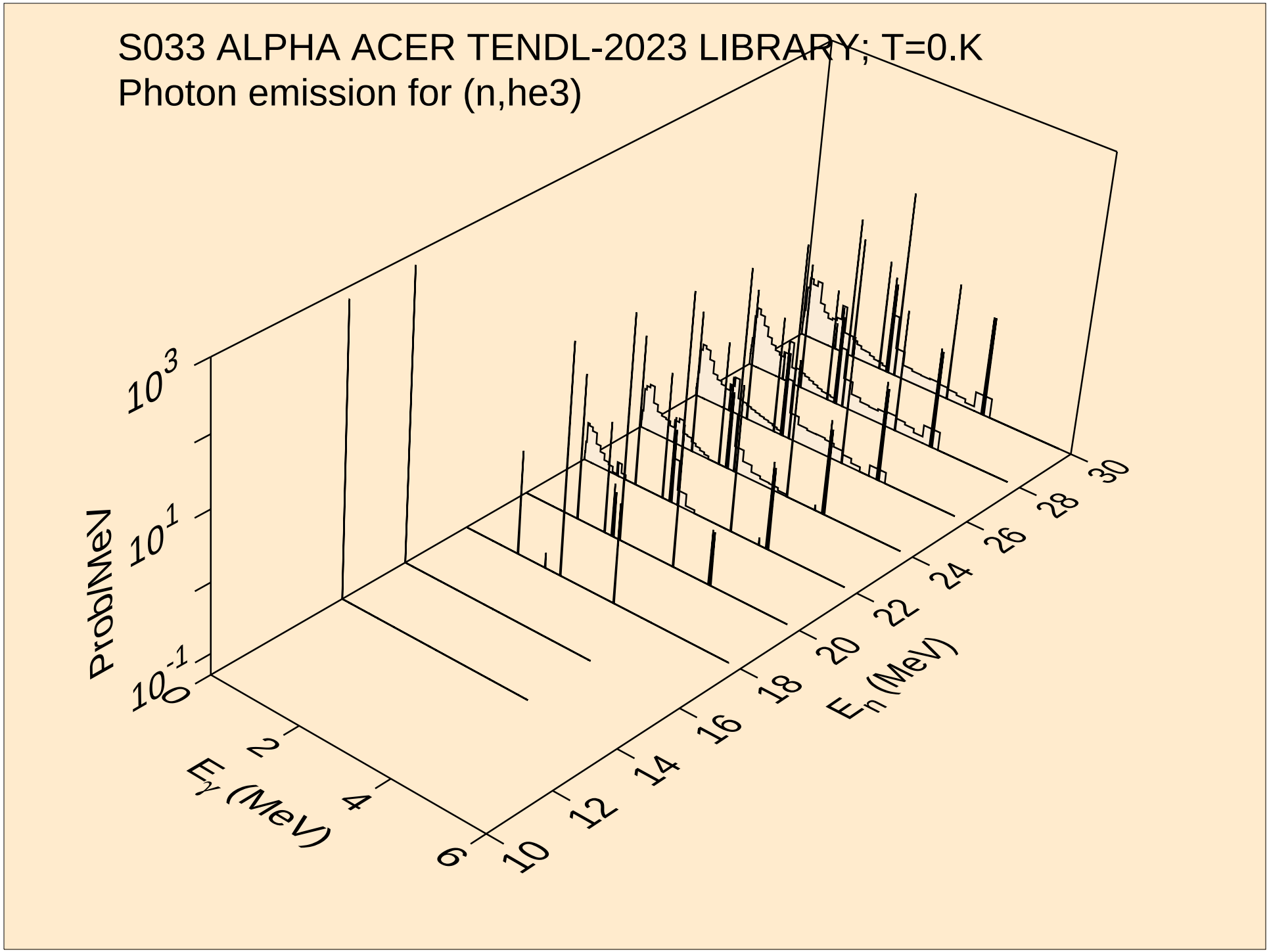

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,npa)
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
$E_\gamma$ (MeV)
0
2
4
6
$E_n$ (MeV)
18
20
22
24
26
28
30

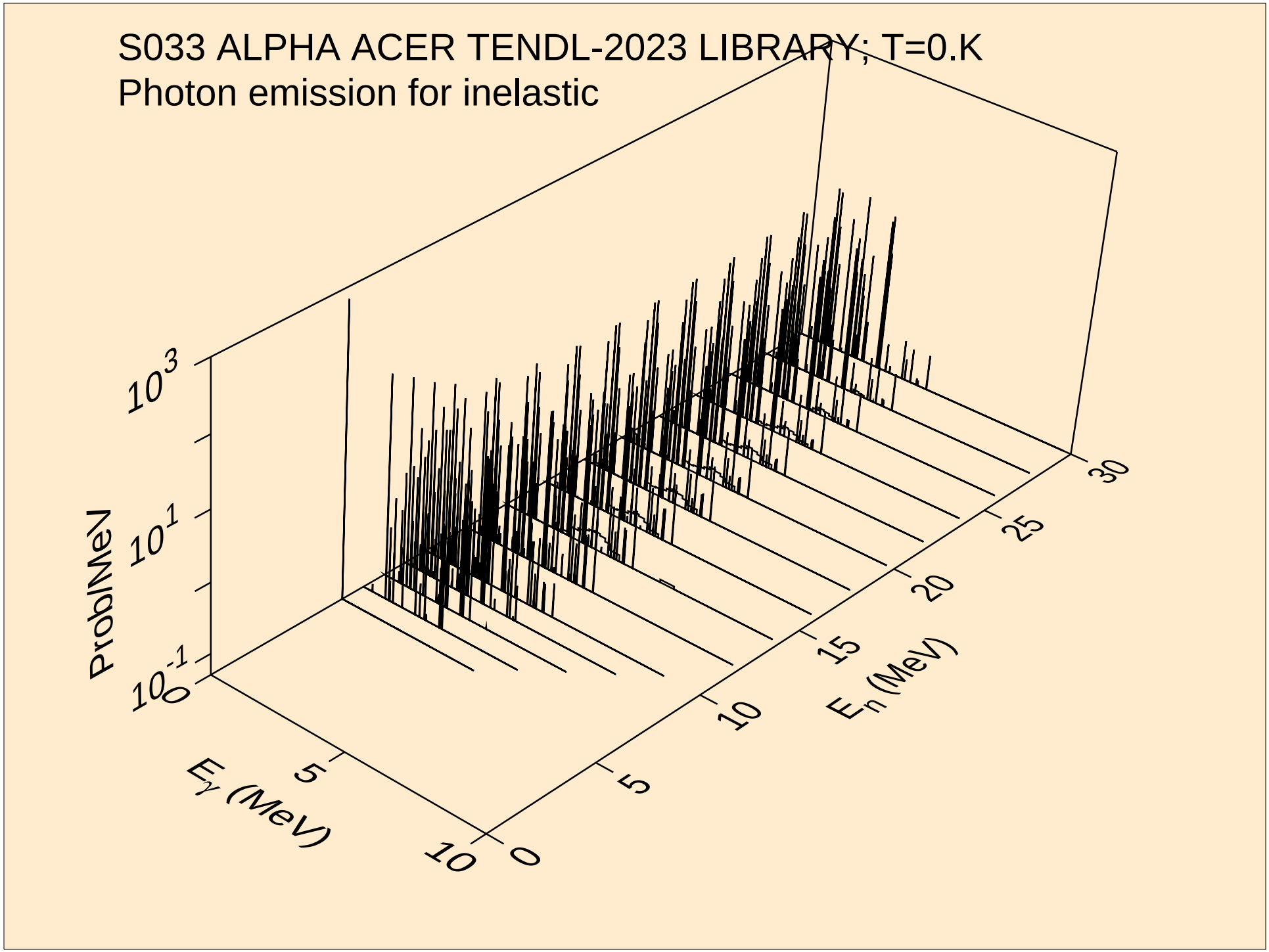

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,gma)
Prob/MeV
$10^{3}$
$10^{1}$
$10^{-1}$
0
20
40
$E_\gamma$ (MeV)
0
5
10
15
20
25
30
$E_n$ (MeV)

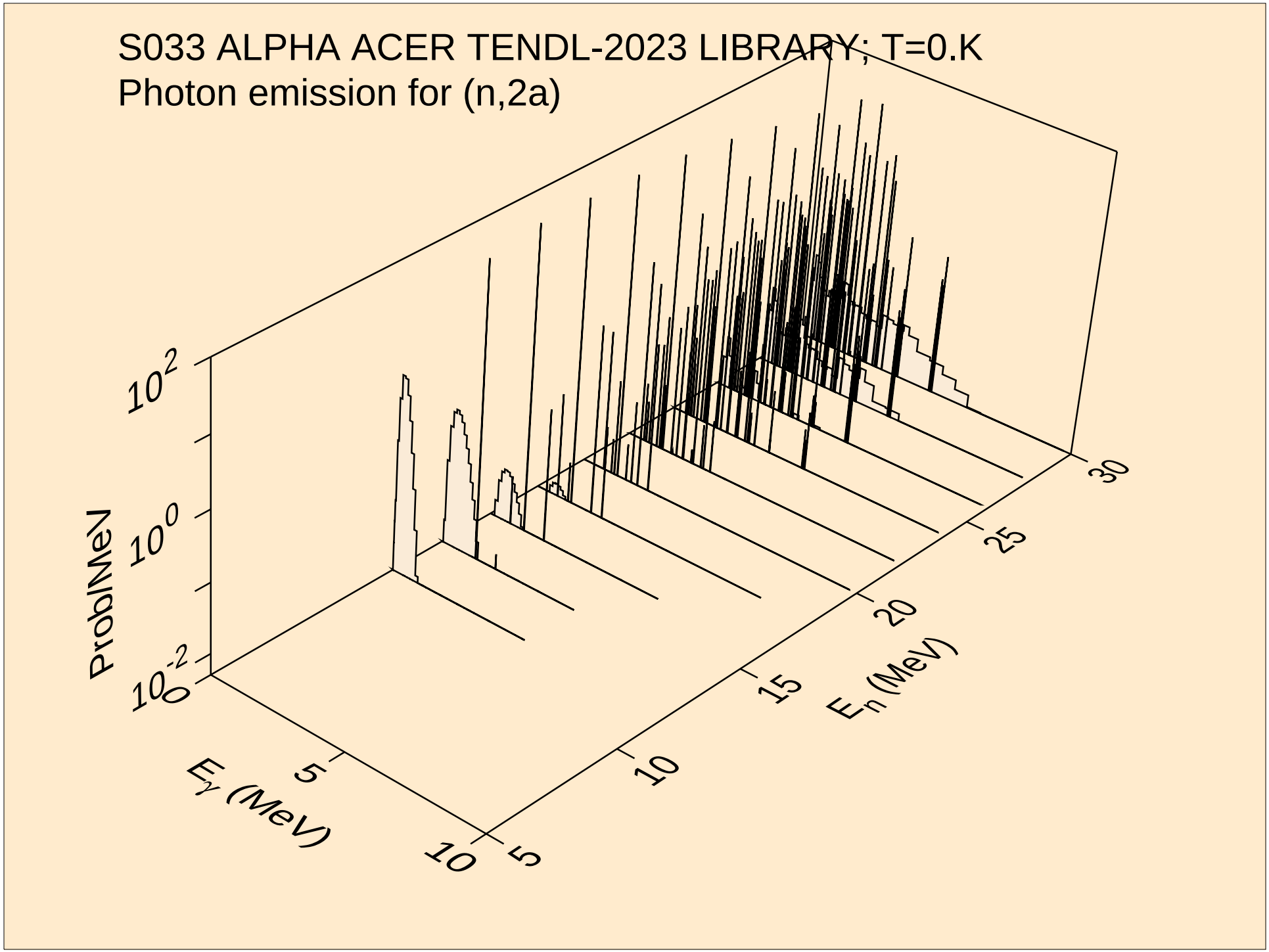

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,p)
Prob/MeV
$10^{3}$
$10^{1}$
$10^{-1}$
0
5
10
$E_\gamma$ (MeV)
0
5
10
15
20
25
30
$E_n$ (MeV)

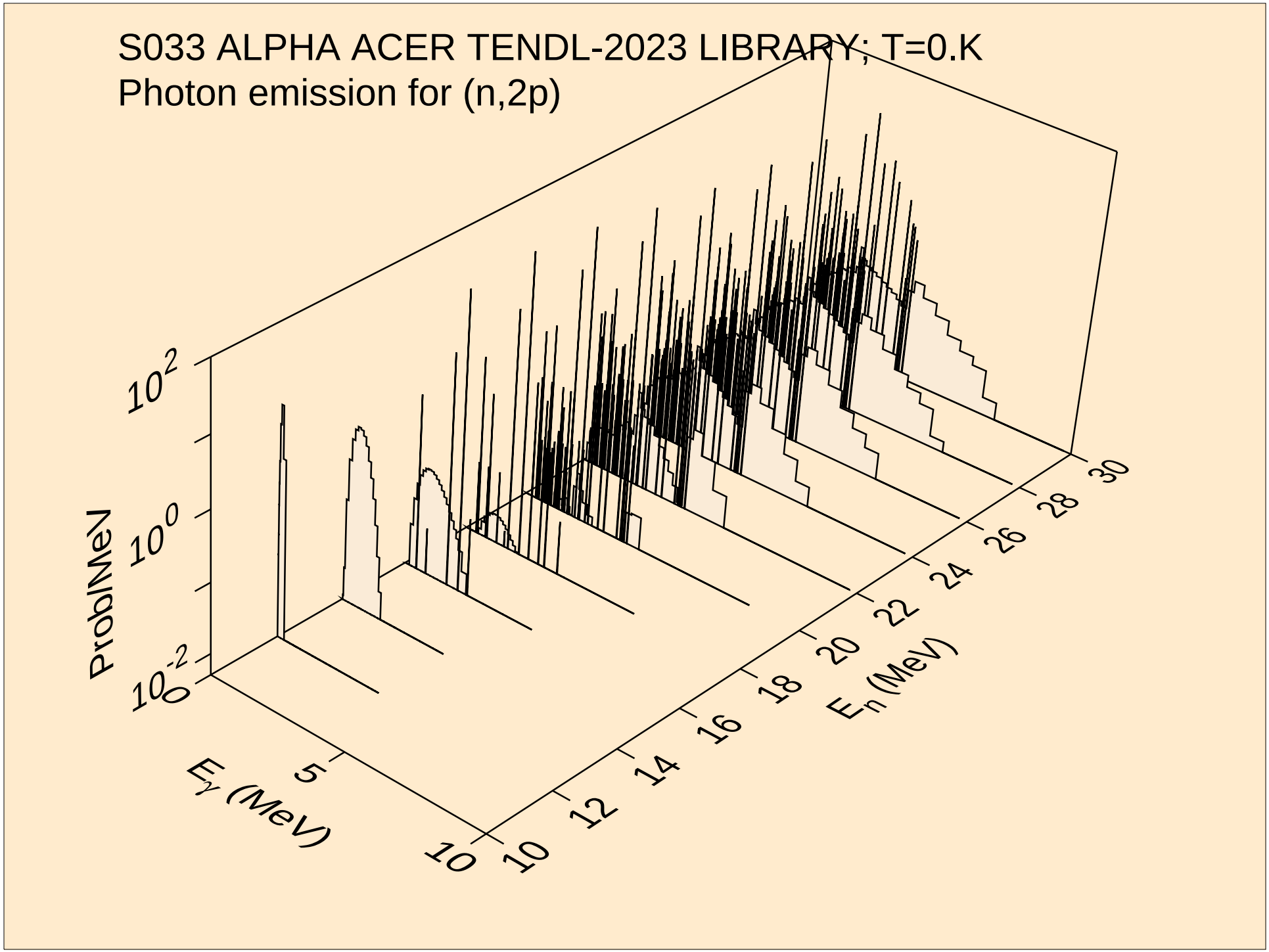

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,d)
Prob/MeV
$10^{3}$
$10^{1}$
$10^{-1}$
0
5
10
$E_\gamma$ (MeV)
5
10
15
20
25
30
$E_n$ (MeV)

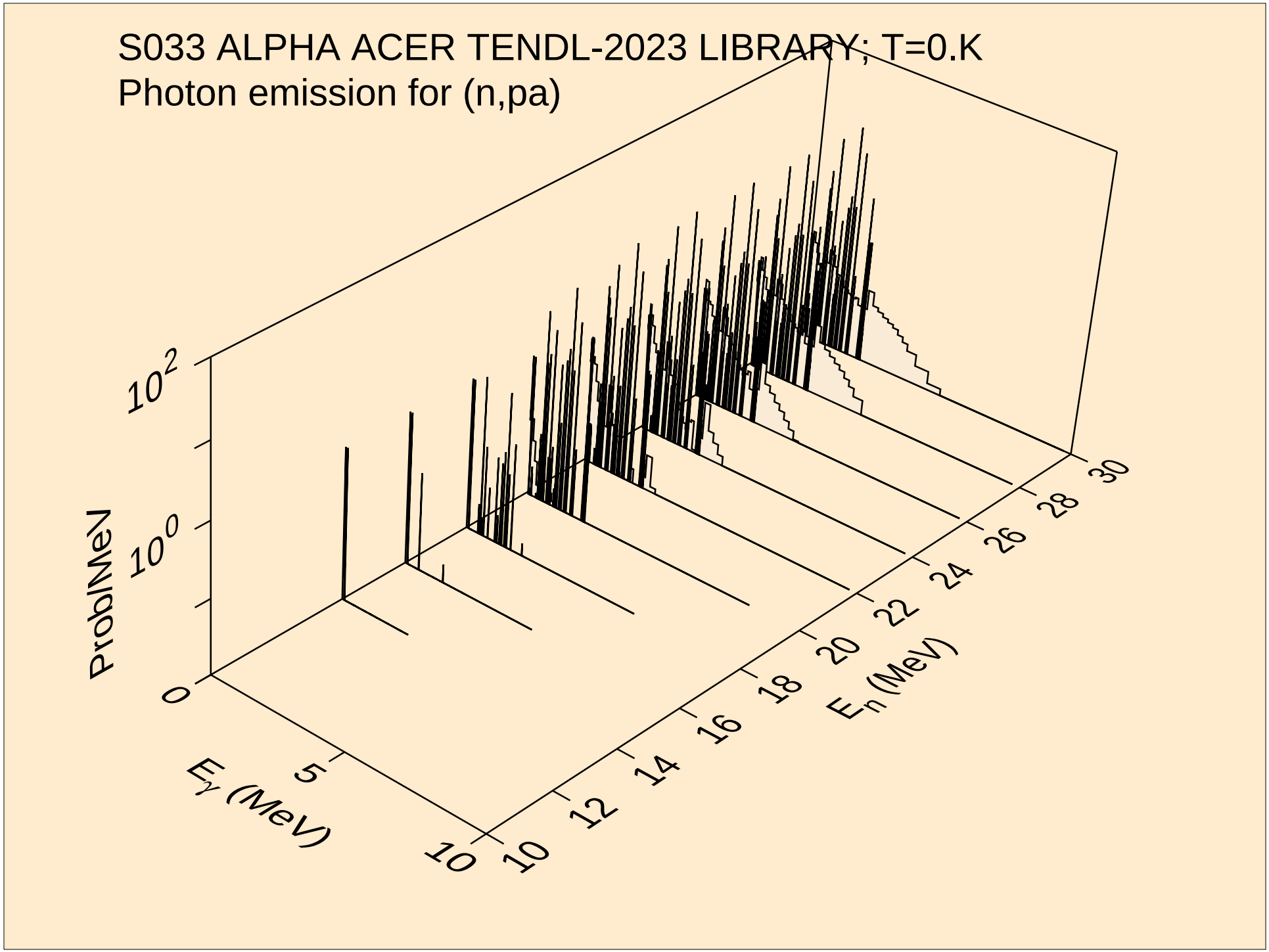

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,t)
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
0
5
10
$E_\gamma$ (MeV)
16
18
20
22
24
26
28
30
$E_n$ (MeV)

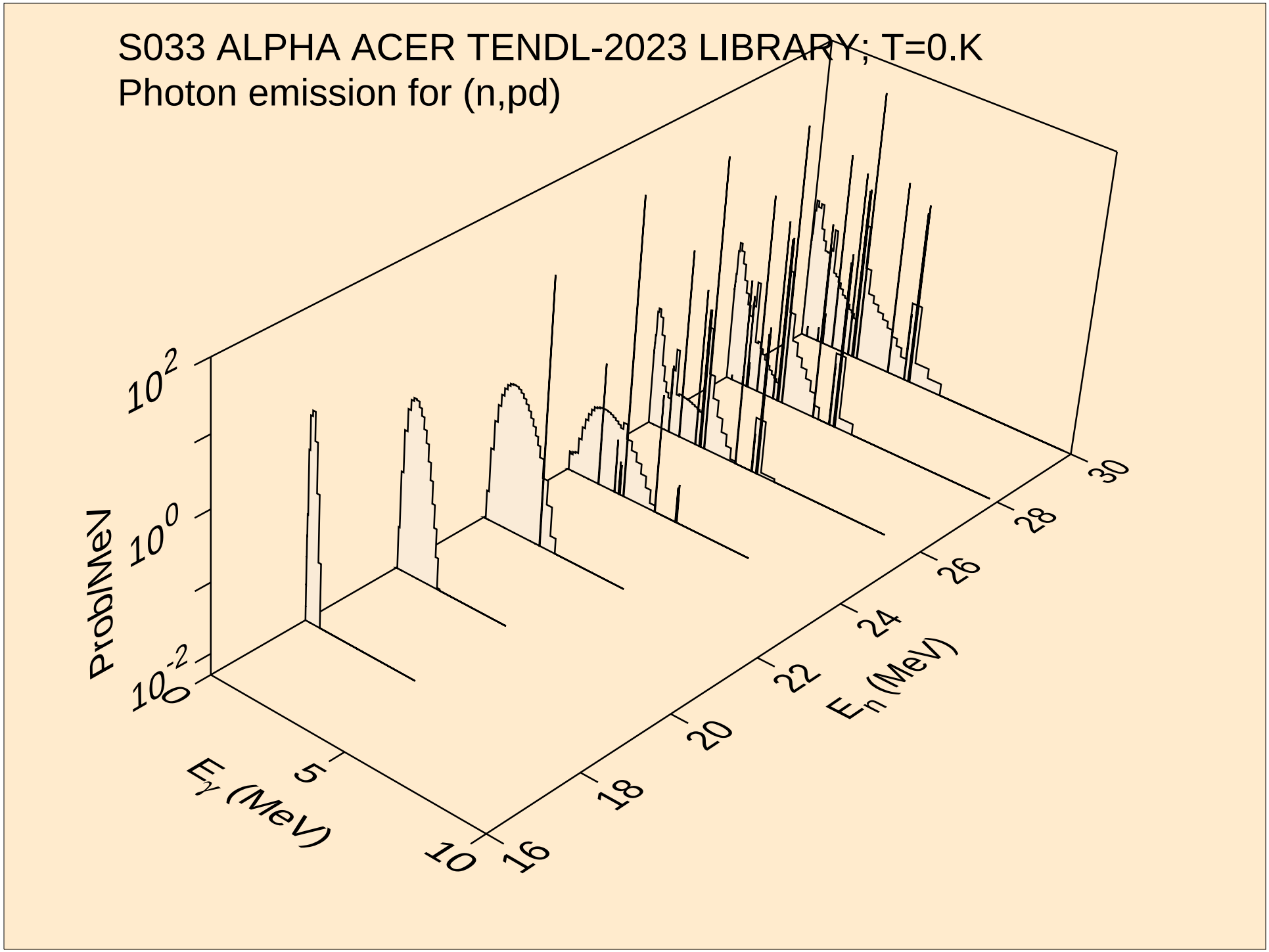

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,he3)
Prob/MeV
$10^{3}$
$10^{1}$
$10^{-1}$
$E_\gamma$ (MeV)
0
2
4
6
$E_n$ (MeV)
10
12
14
16
18
20
22
24
26
28
30

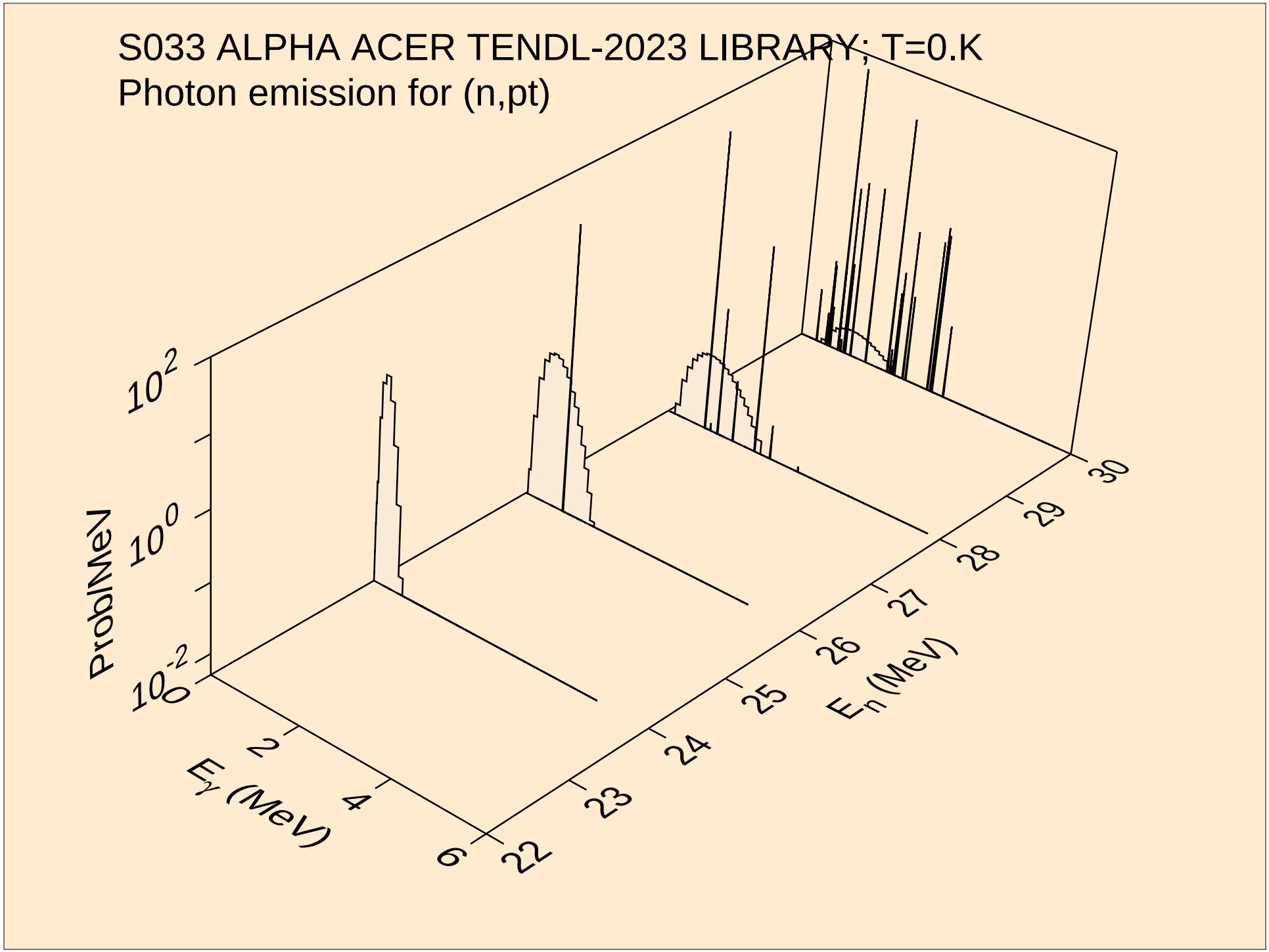

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for inelastic
Prob/MeV
$10^{3}$
$10^{1}$
$10^{-1}$
0
5
10
$E_\gamma$ (MeV)
0
5
10
15
20
25
30
$E_n$ (MeV)

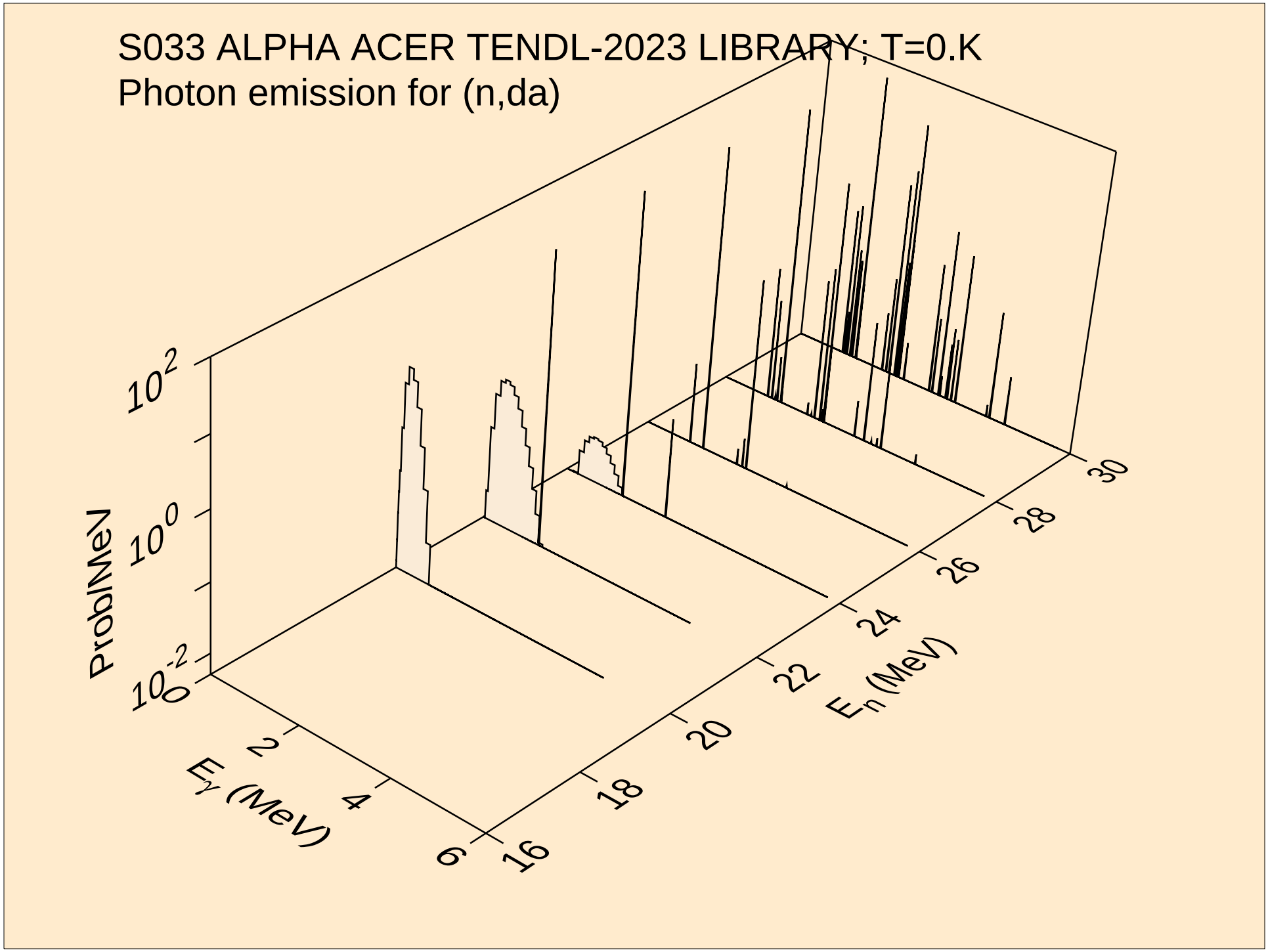

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,2a)
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
0
5
10
$E_\gamma$ (MeV)
5
10
15
20
25
30
$E_n$ (MeV)

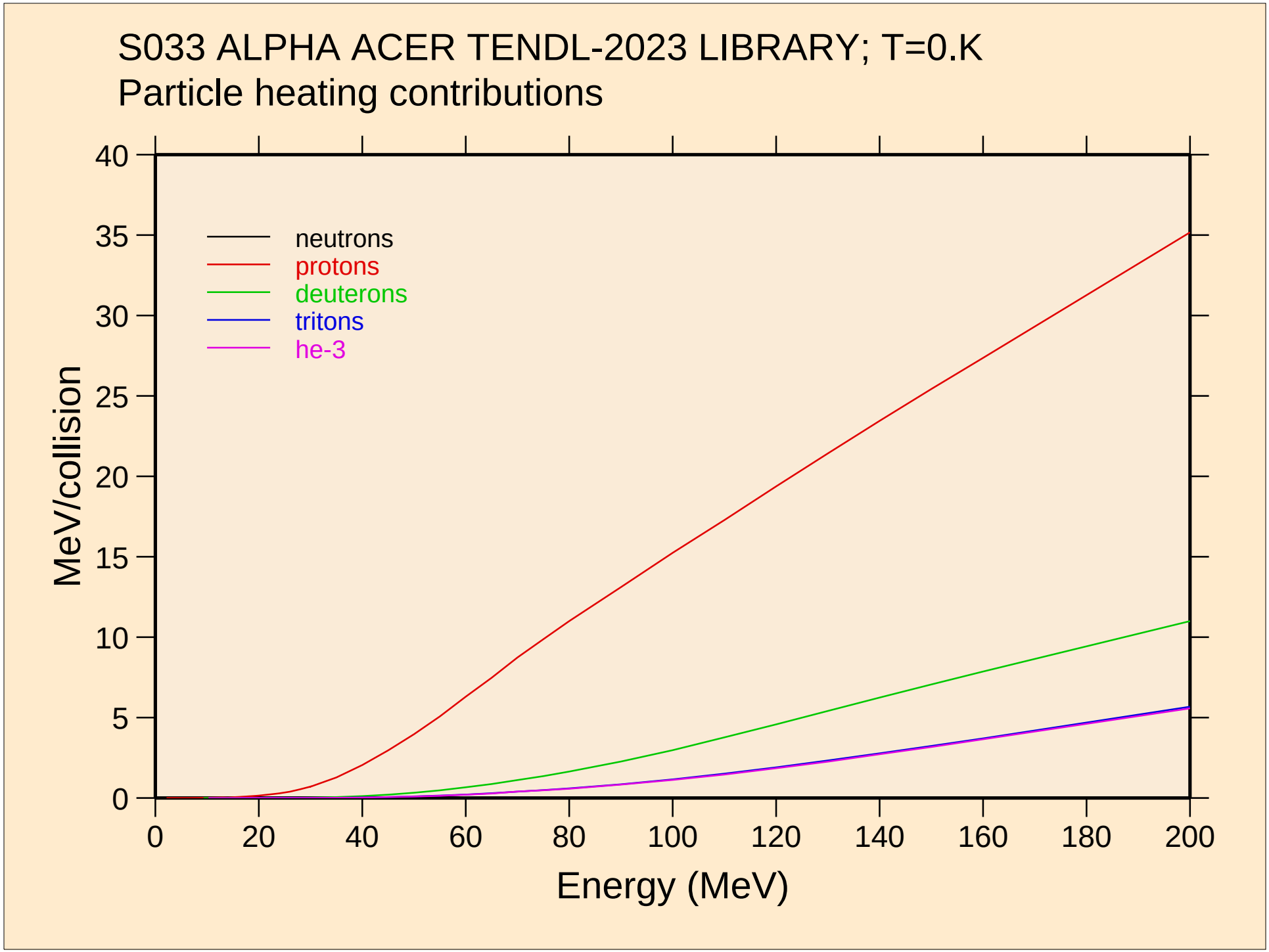

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,2p)
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
0
5
10
$E_\gamma$ (MeV)
10
12
14
16
18
20
22
24
26
28
30
$E_n$ (MeV)

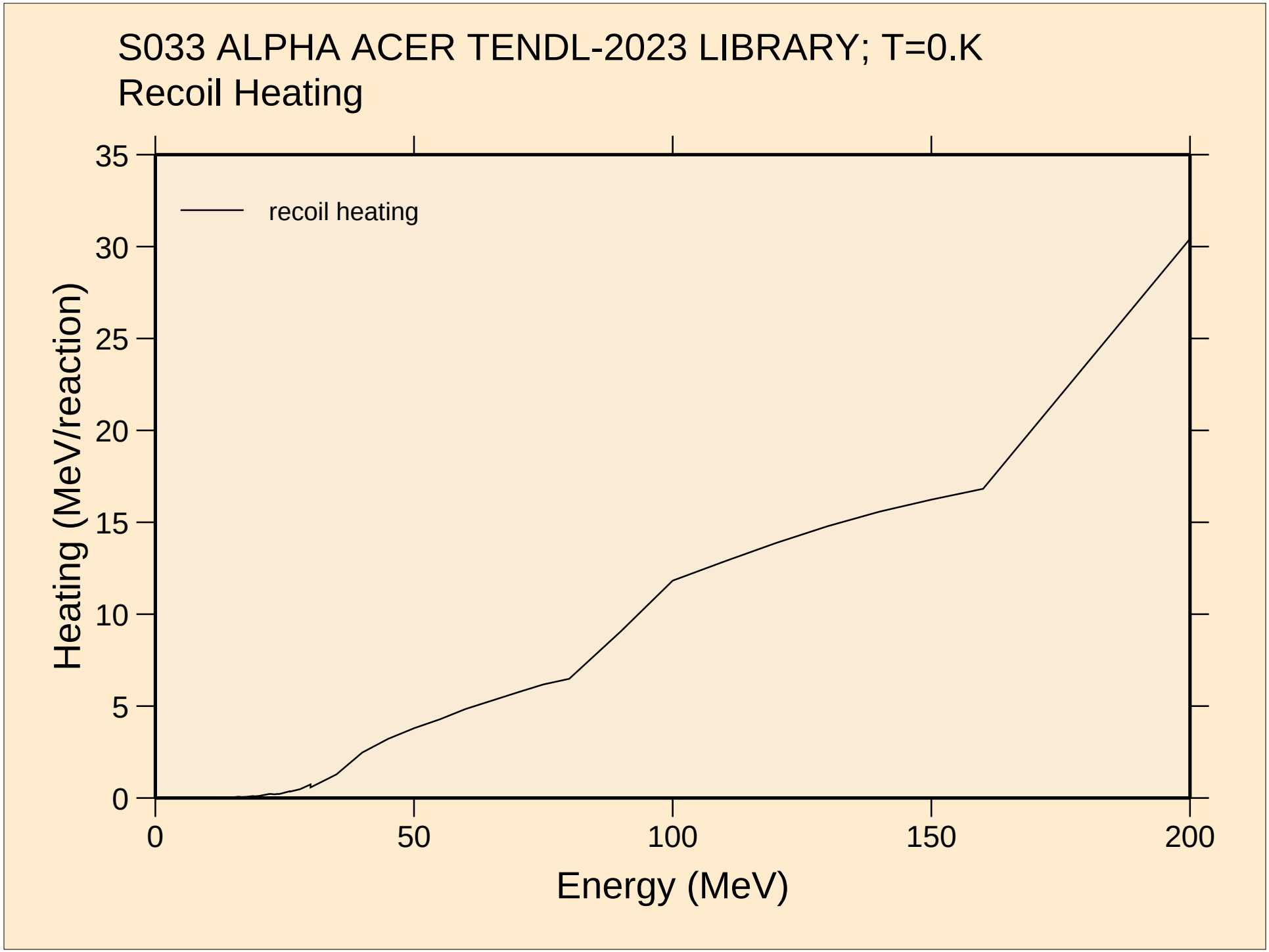

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,pa)
Prob/MeV
$10^2$
$10^0$
0
5
10
$E_\gamma$ (MeV)
10
12
14
16
18
20
22
24
26
28
30
$E_n$ (MeV)

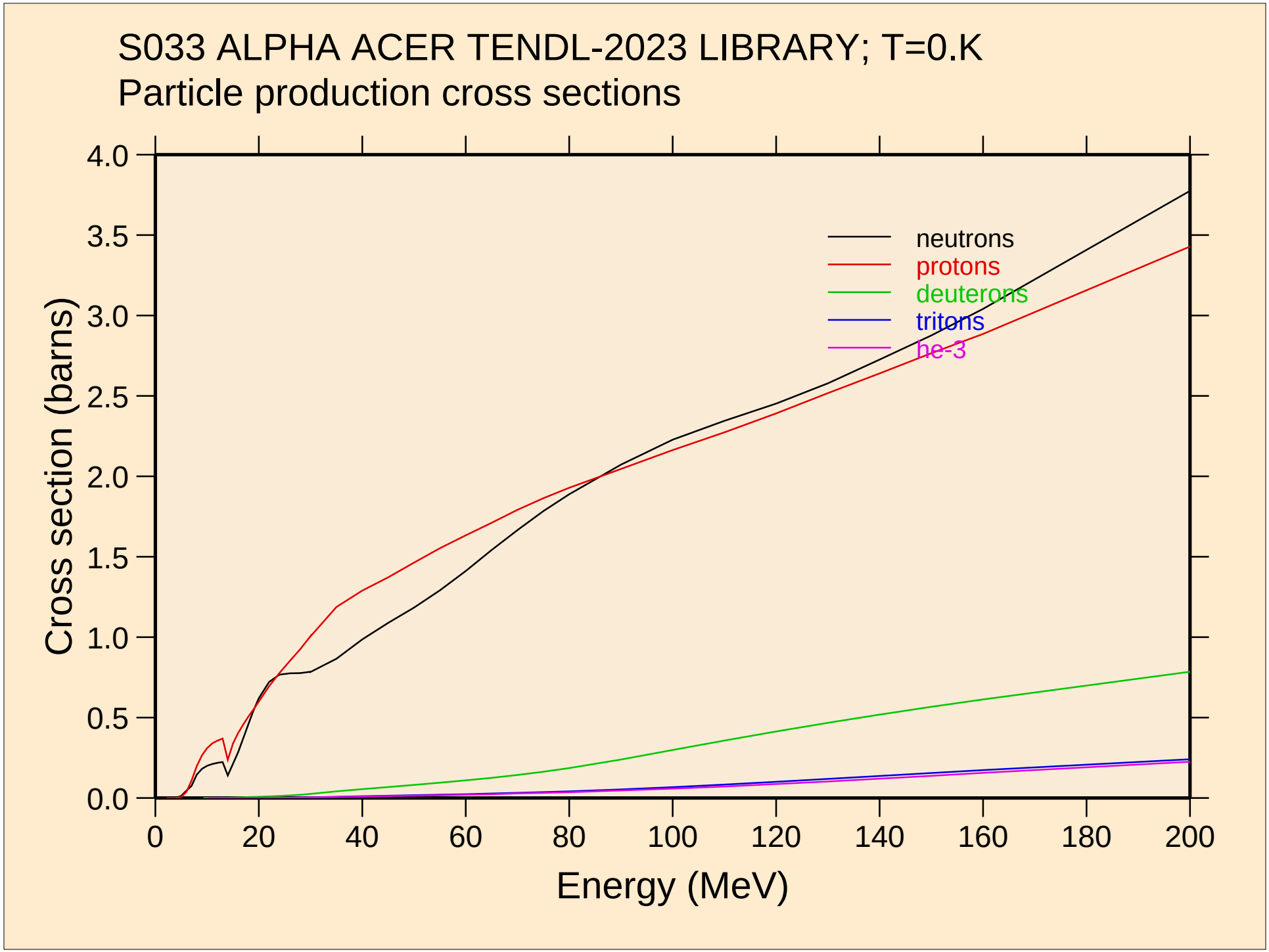

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,pd)
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
0
5
10
$E_\gamma$ (MeV)
16
18
20
22
24
26
28
30
$E_n$ (MeV)

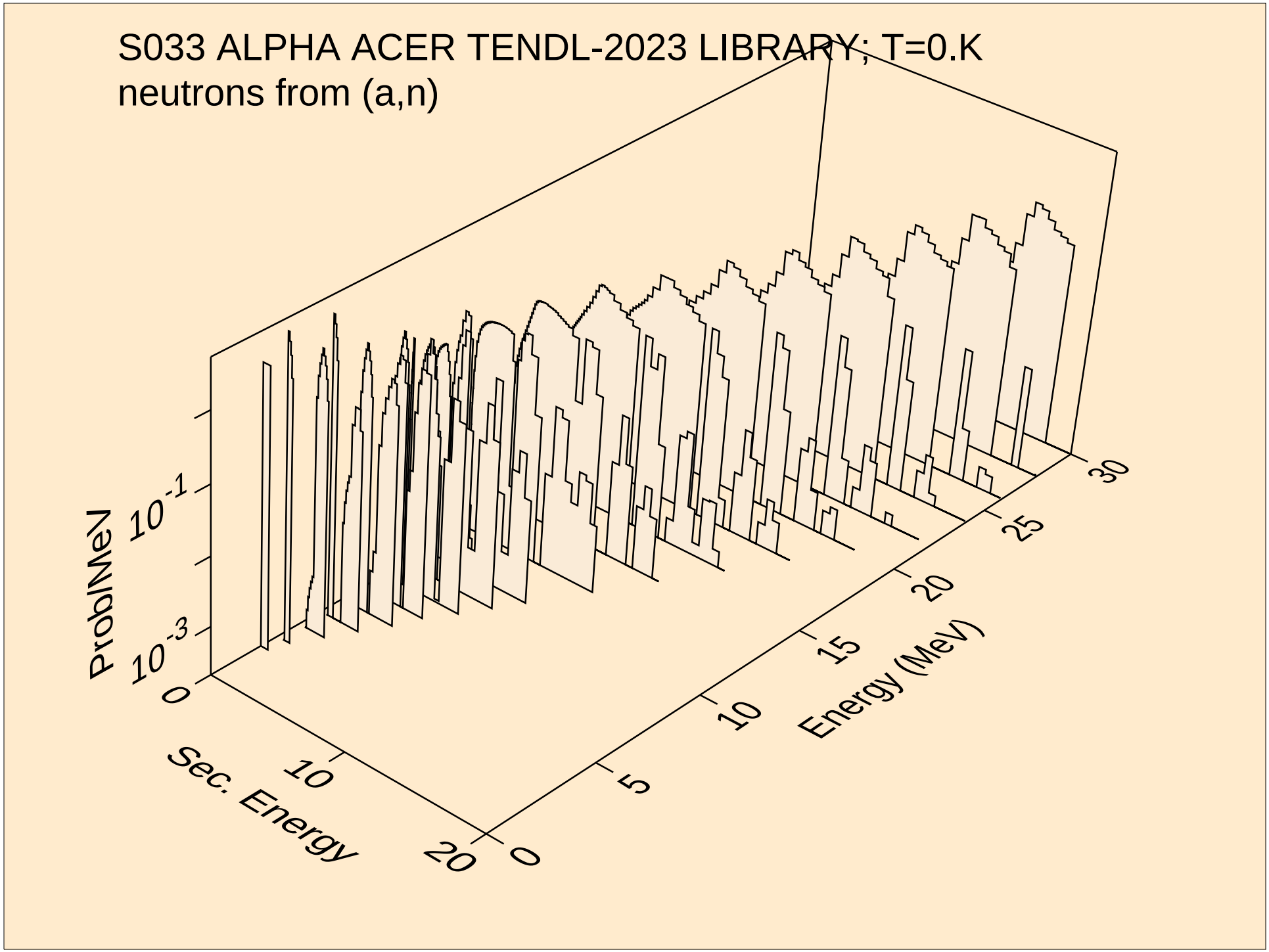

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,pt)
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
$E_\gamma$ (MeV)
0
2
4
6
$E_n$ (MeV)
22
23
24
25
26
27
28
29
30

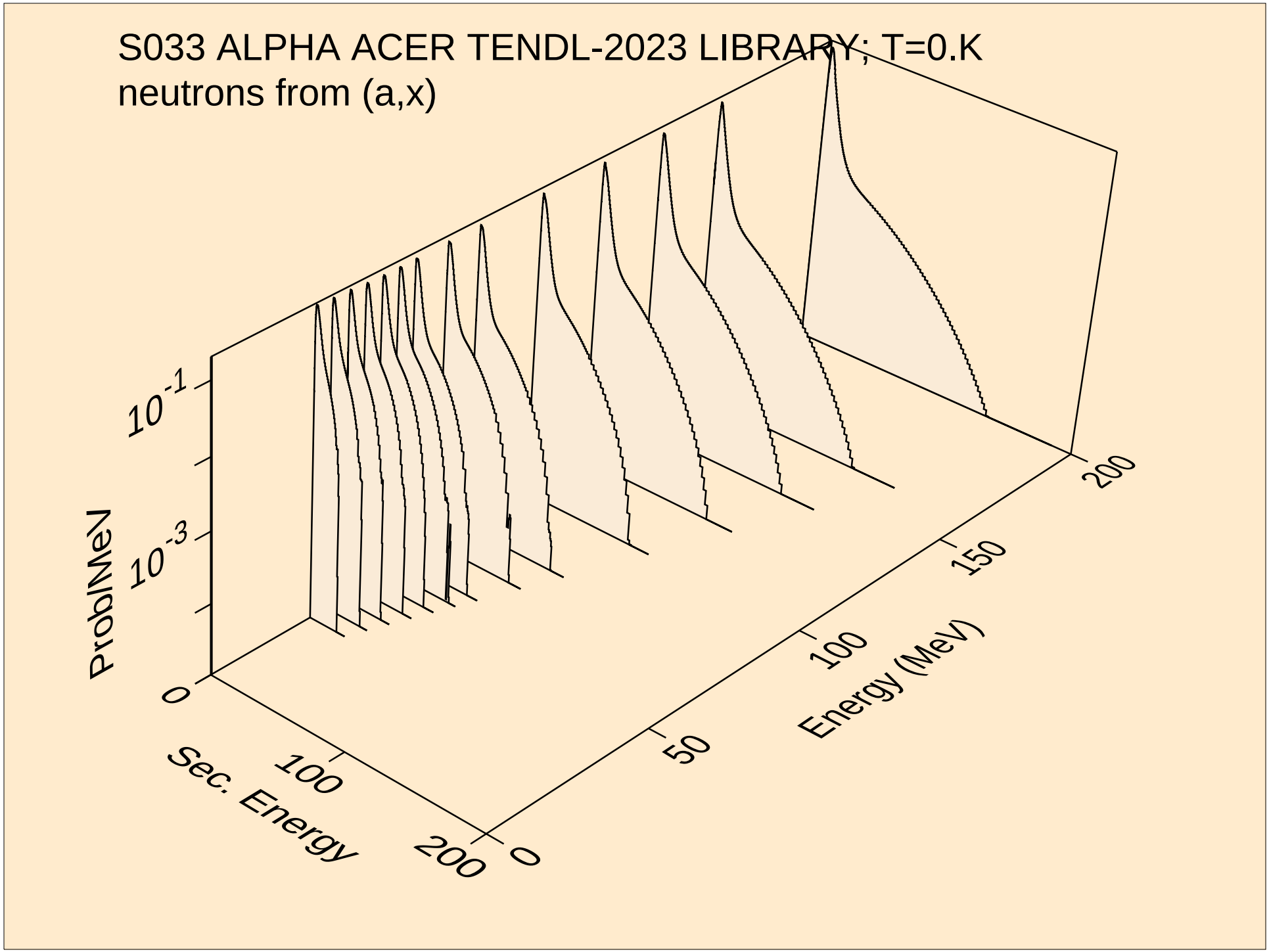

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Photon emission for (n,da)
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
$E_\gamma$ (MeV)
0
2
4
6
$E_n$ (MeV)
16
18
20
22
24
26
28
30

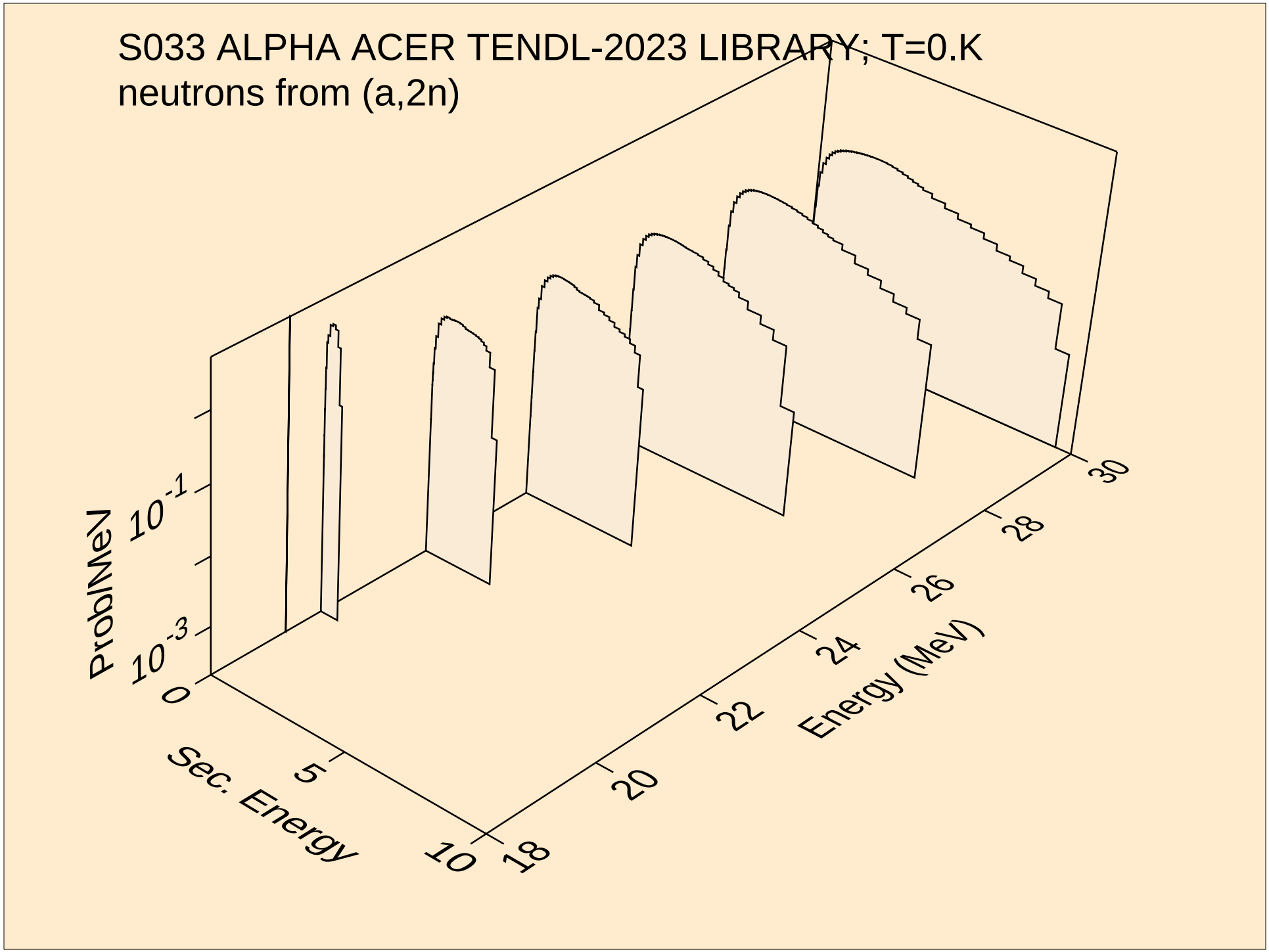

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Particle heating contributions
neutrons
protons
deuterons
tritons
he-3
MeV/collision
Energy (MeV)
0
5
10
15
20
25
30
35
40
0
20
40
60
80
100
120
140
160
180
200

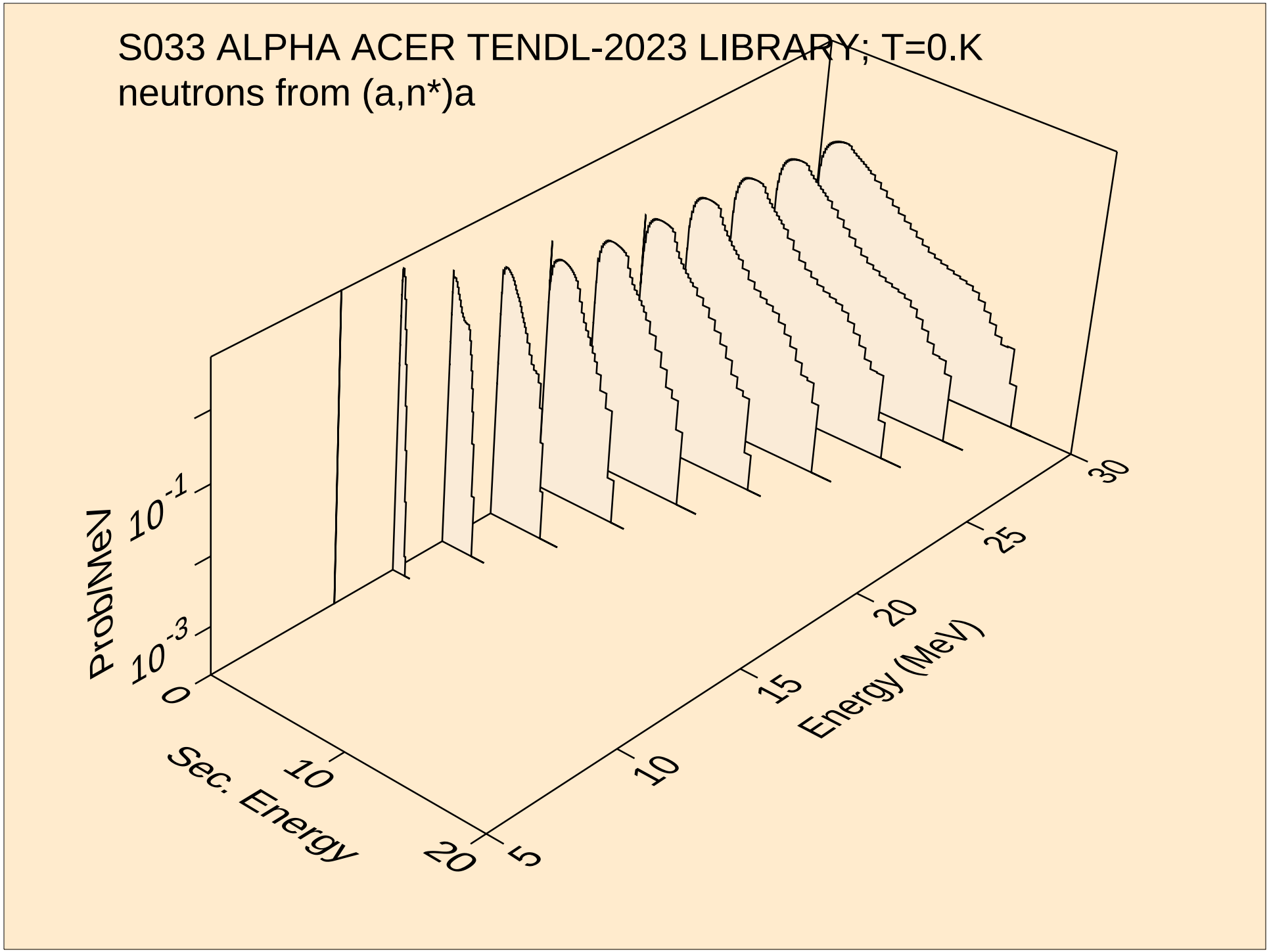

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Recoil Heating
recoil heating
Heating (MeV/reaction)
Energy (MeV)
0
5
10
15
20
25
30
35
0
50
100
150
200

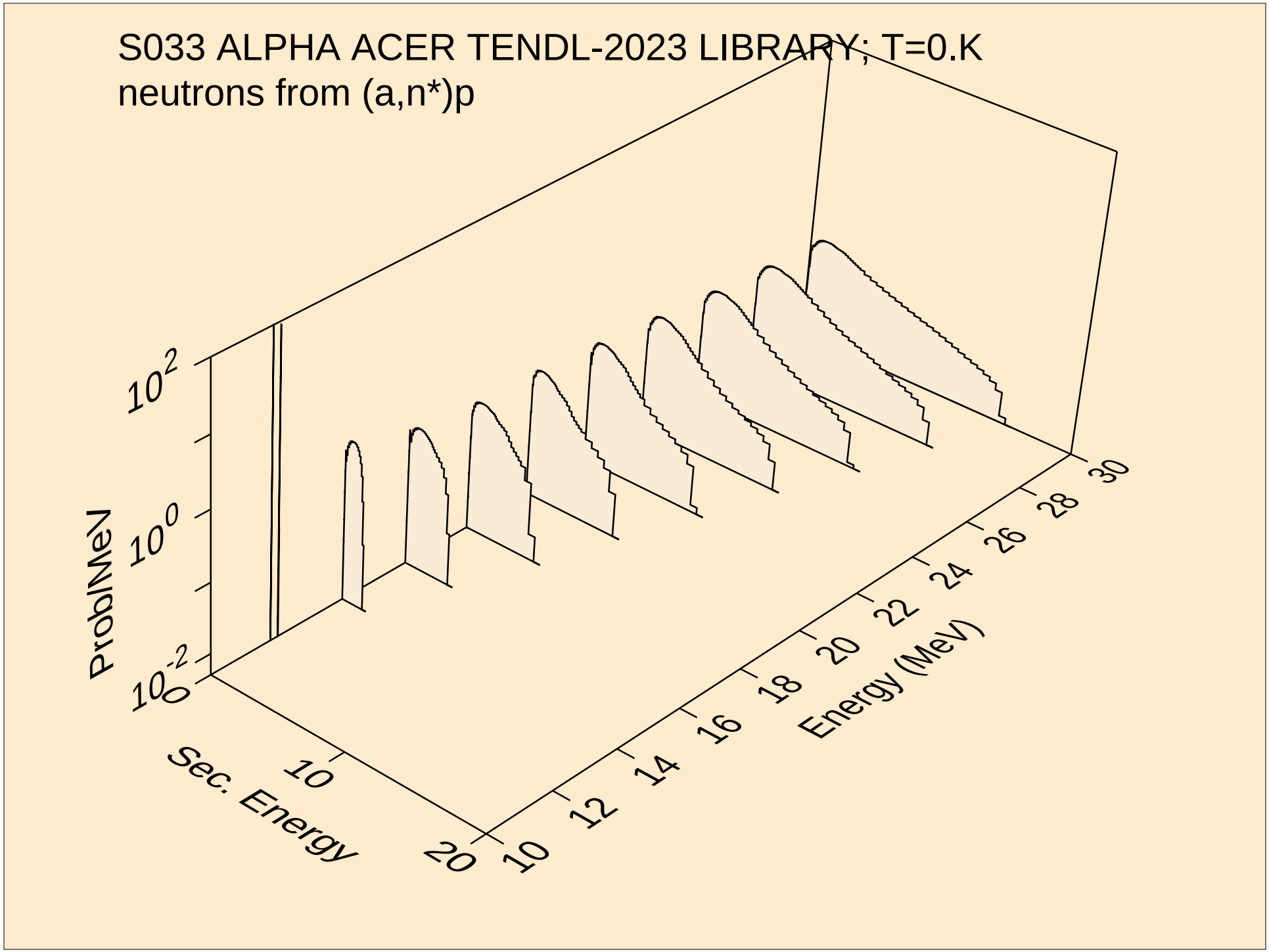

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
Particle production cross sections
Cross section (barns)
Energy (MeV)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
20
40
60
80
100
120
140
160
180
200
neutrons
protons
deuterons
tritons
he-3

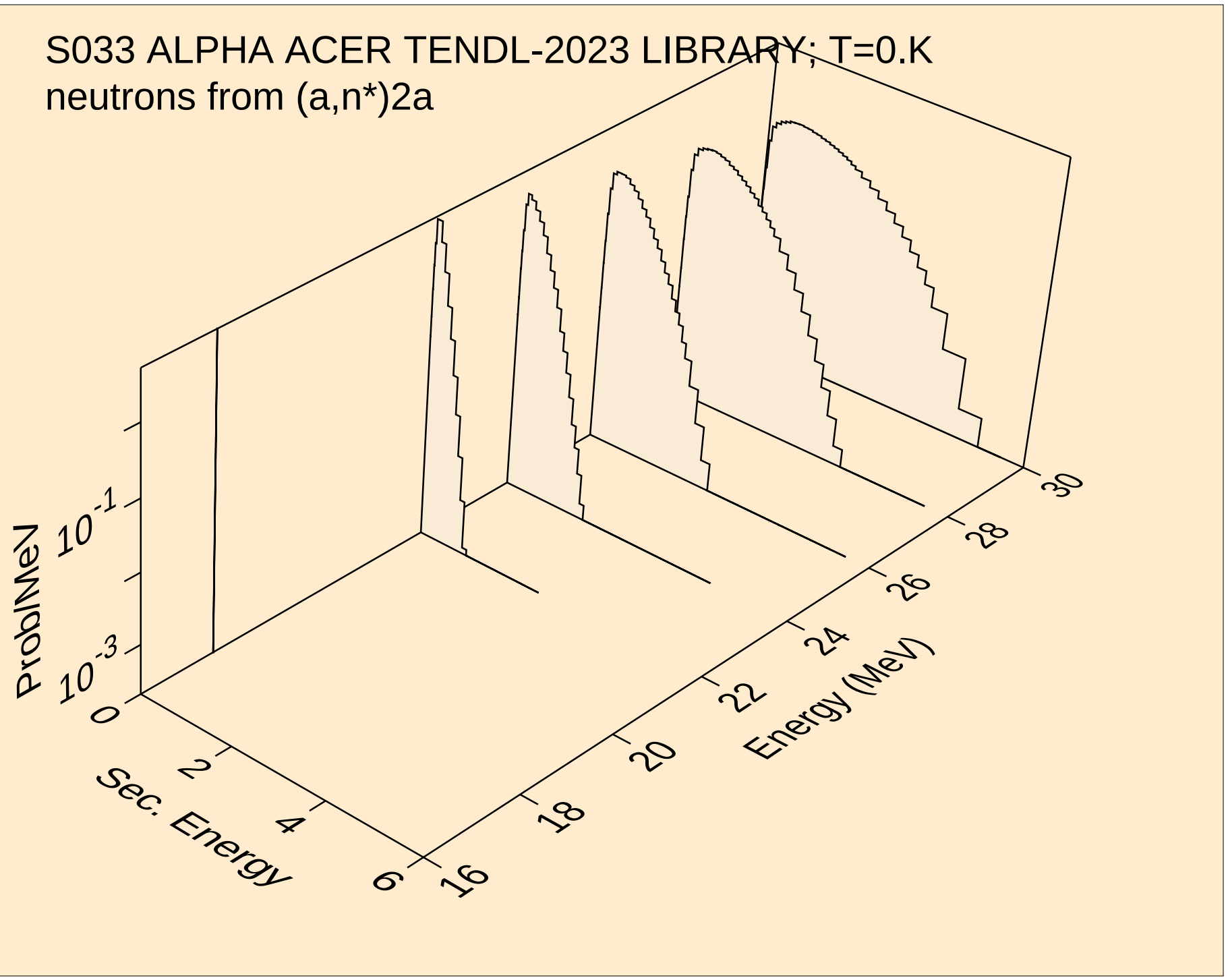

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
neutrons from (a,n)
Prob/MeV
10-1
10-3
0
Sec. Energy
10
20
0
5
10
15
20
25
30
Energy (MeV)

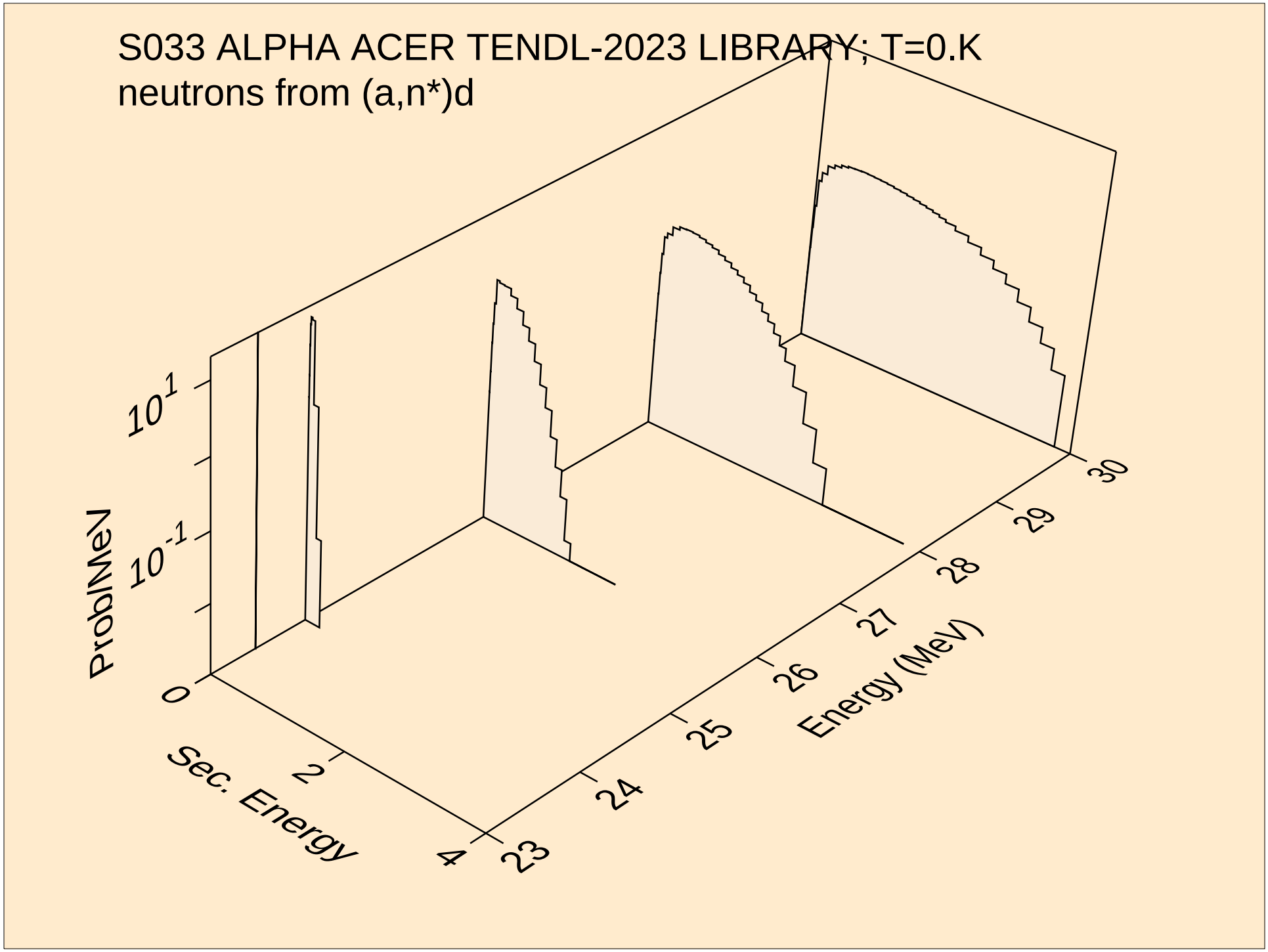

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
neutrons from (a,x)
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)

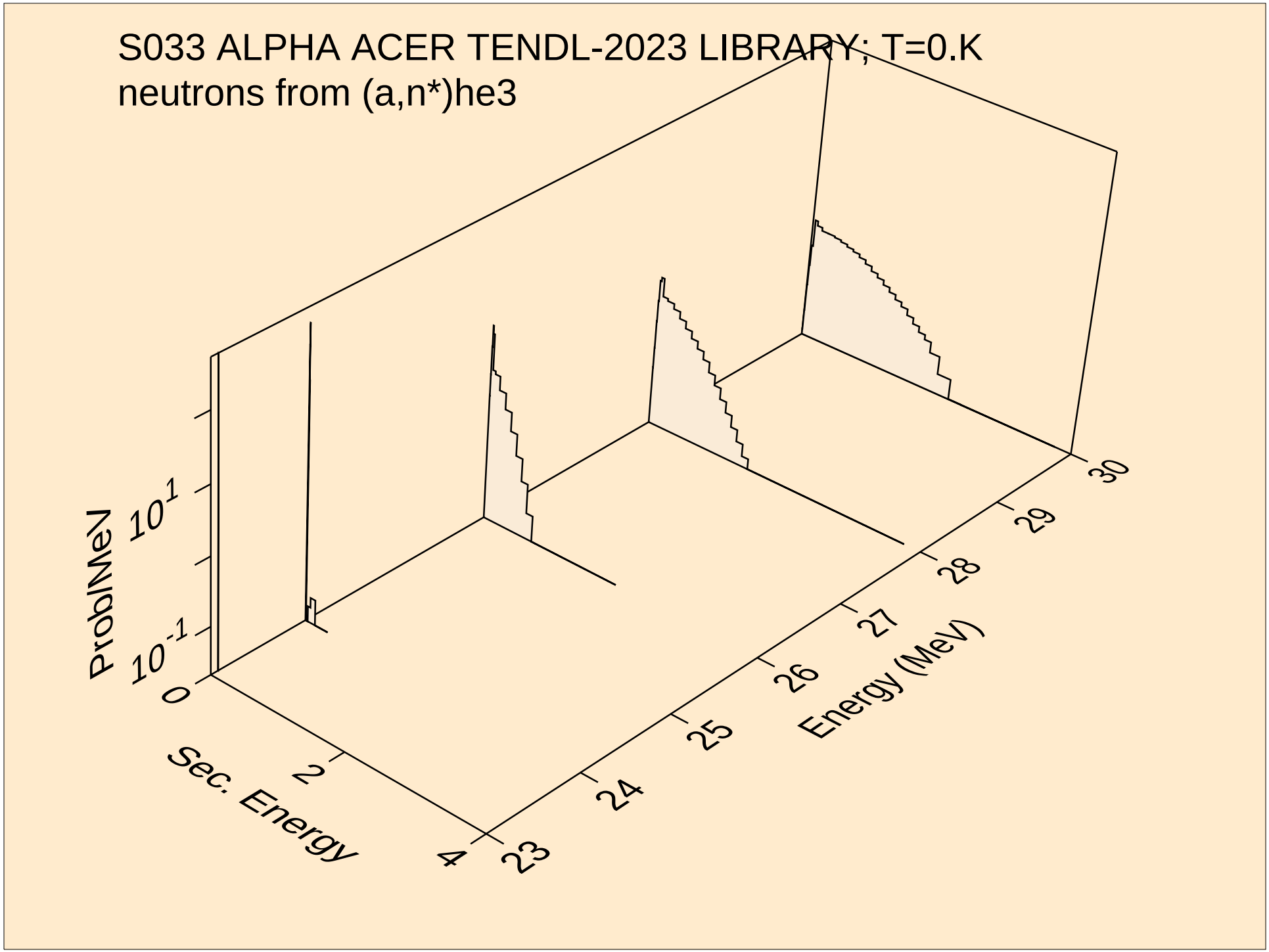

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
neutrons from (a,2n)
Prob/MeV
10-1
10-3
0
Sec. Energy
5
10
18
20
22
24
26
28
30
Energy (MeV)

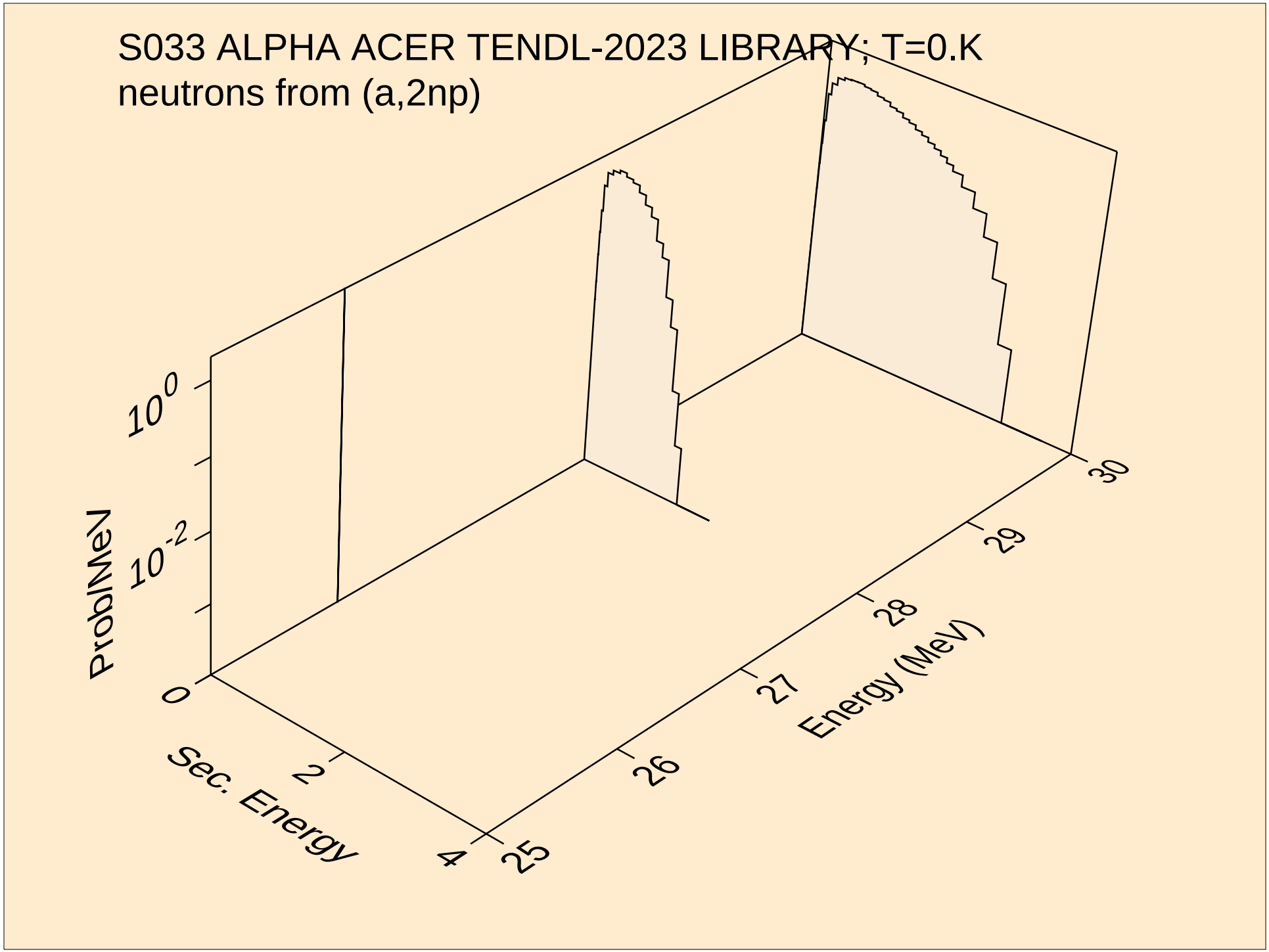

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
neutrons from (a,n*)a
Prob/MeV
10-1
10-3
0
Sec. Energy
10
20
5
10
15
20
25
30
Energy (MeV)

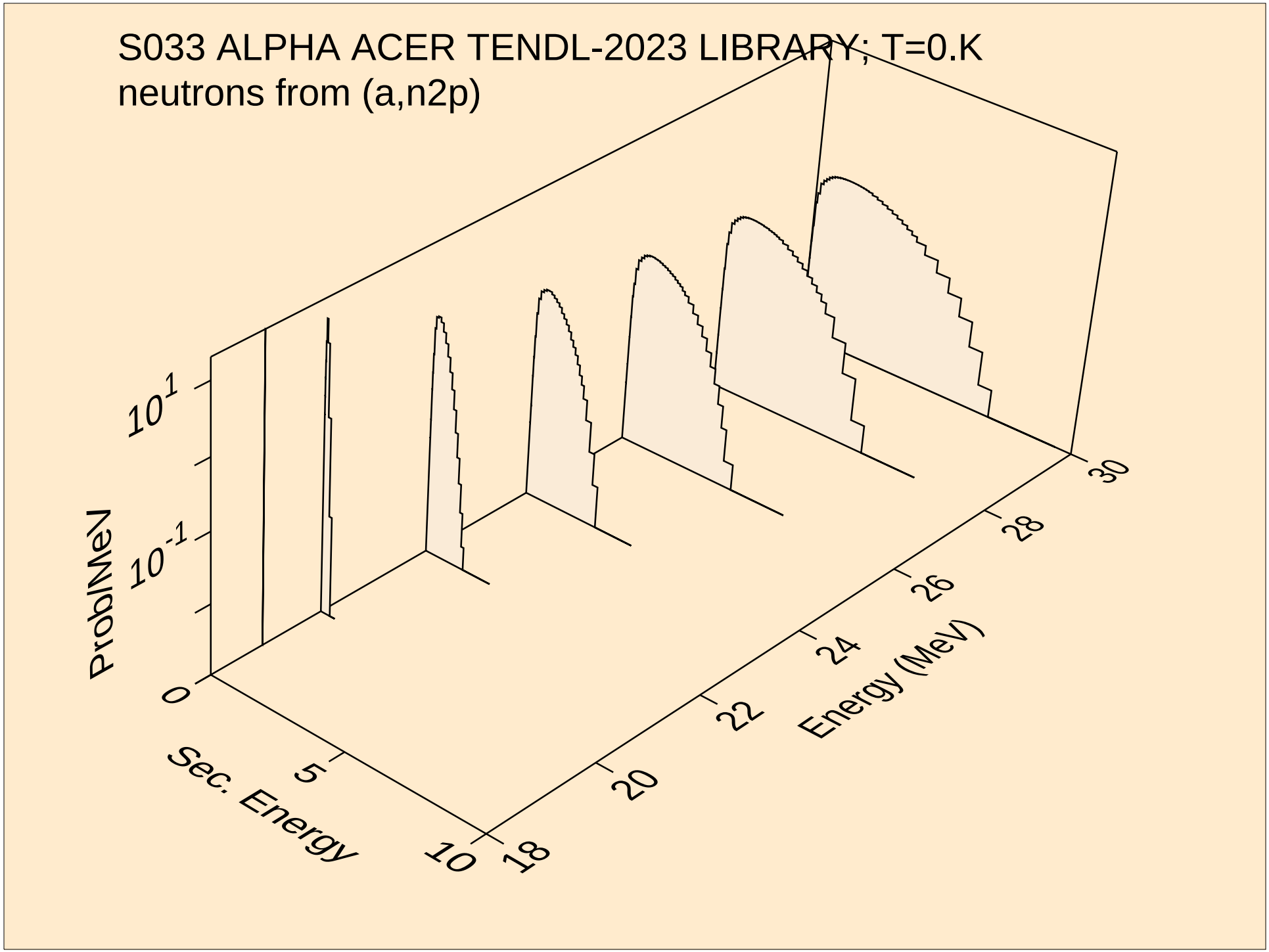

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
neutrons from (a,n*)p
Prob/MeV
$10^{2}$
$10^{0}$
$10^{-2}$
Sec. Energy
0
10
20
Energy (MeV)
10
12
14
16
18
20
22
24
26
28
30

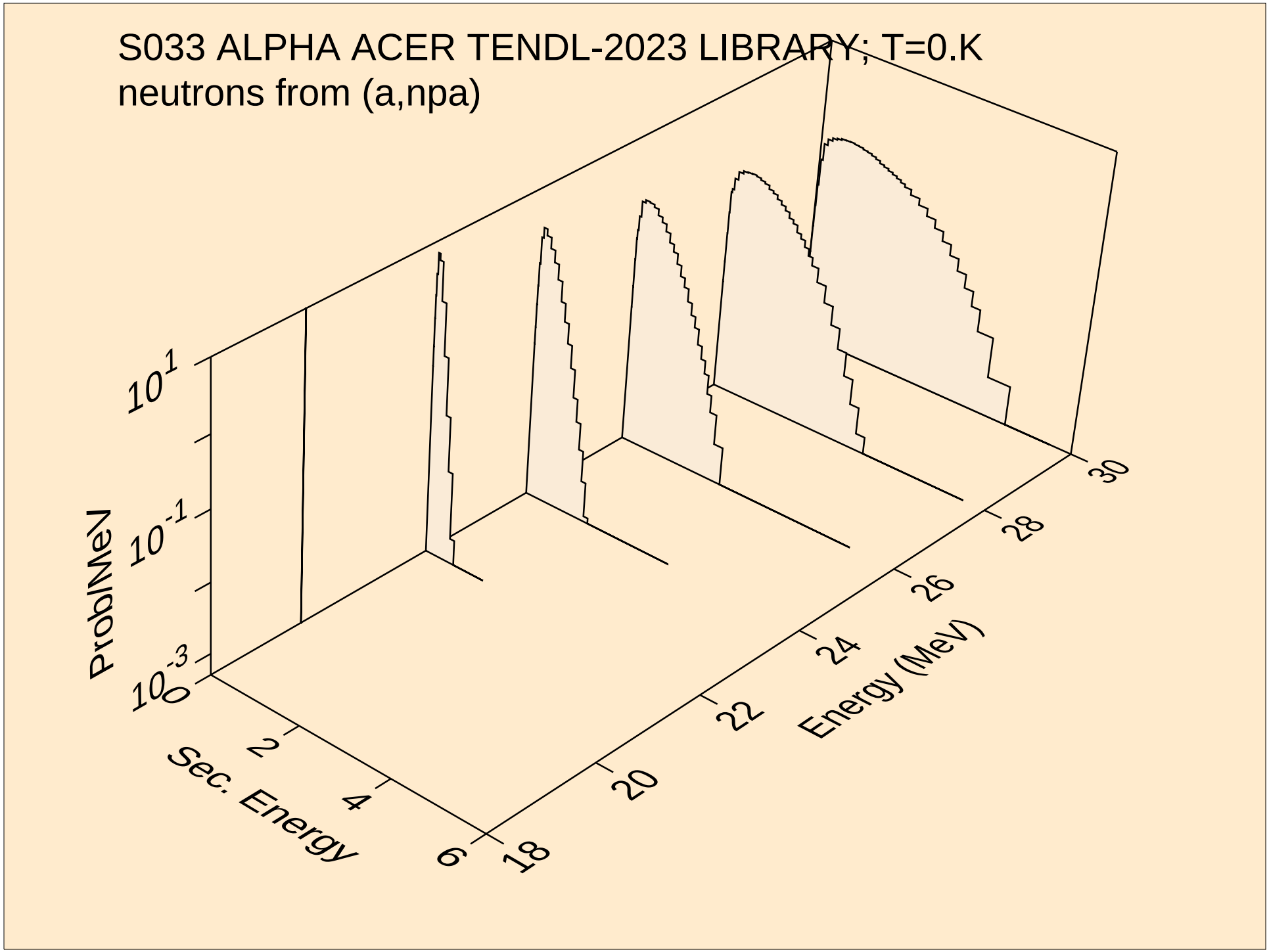

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
neutrons from (a,n*)2a
Prob/MeV
10-1
10-3
0
2
4
6
Sec. Energy
16
18
20
22
24
26
28
30
Energy (MeV)

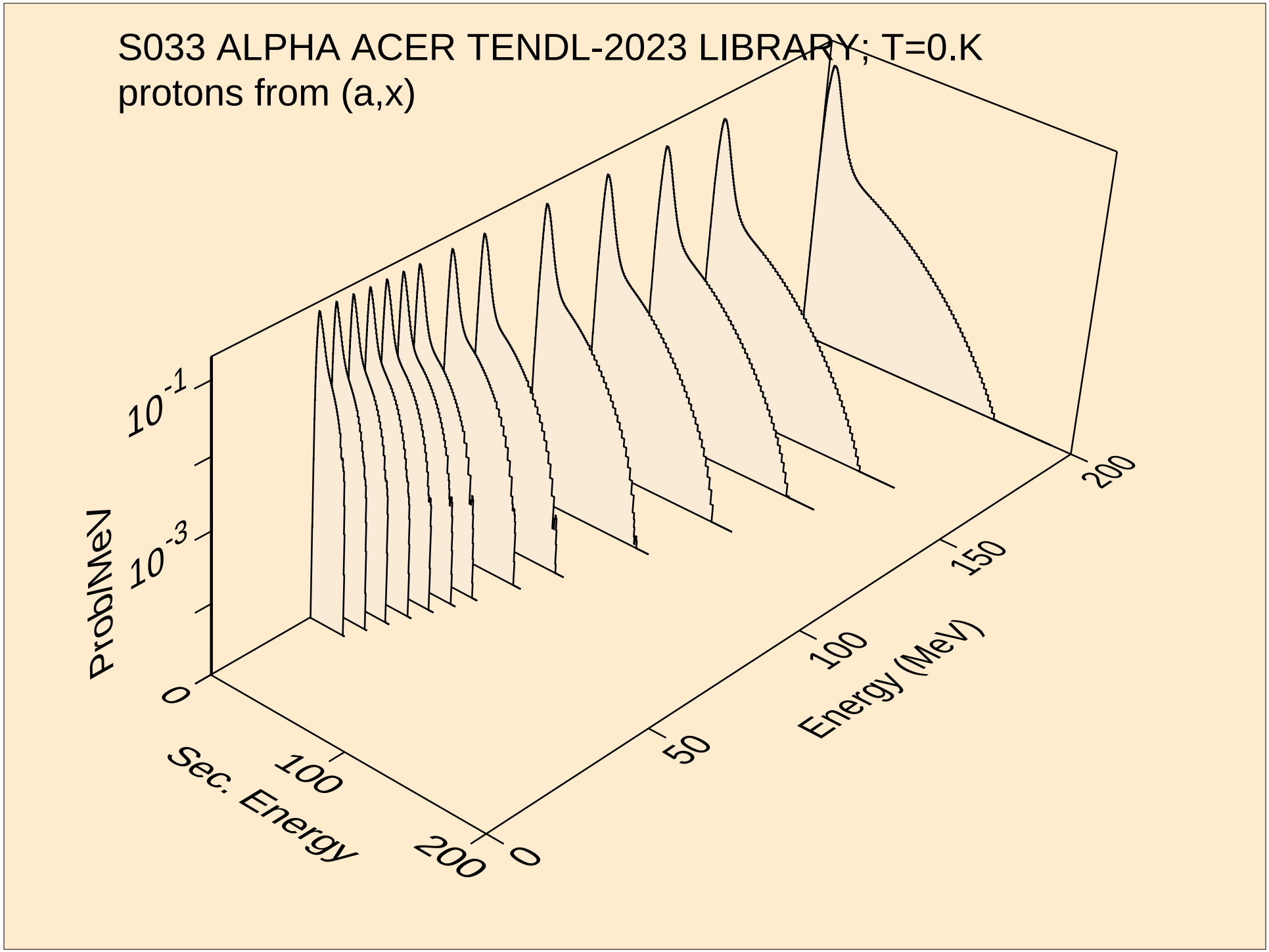

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
neutrons from (a,n*)d
Prob/MeV
10^1
10^-1
0
Sec. Energy
2
4
23
24
25
26
27
28
29
30
Energy (MeV)

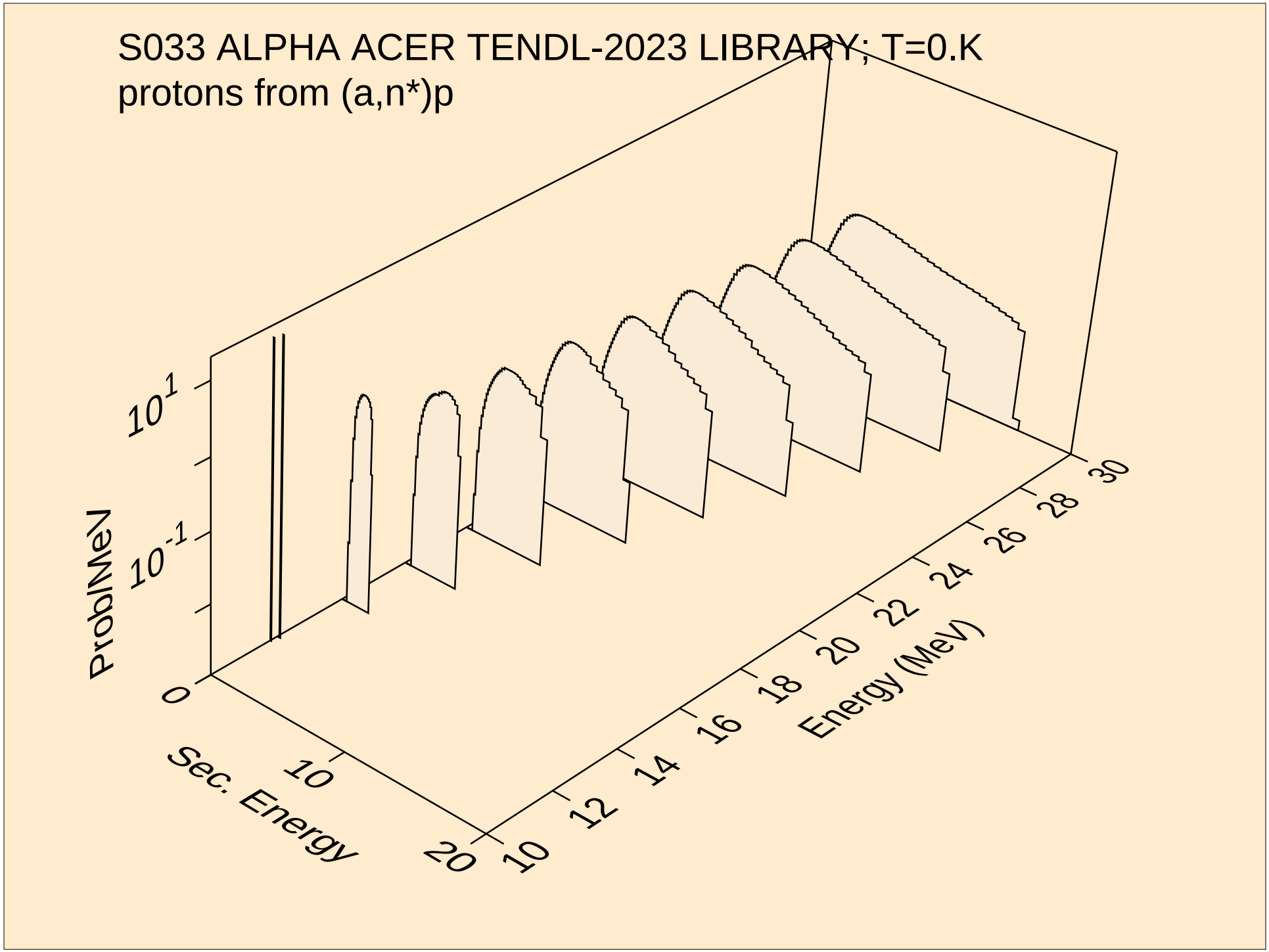

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
neutrons from (a,n*)he3
Prob/MeV
10^1
10^-1
0
2
4
Sec. Energy
23
24
25
26
27
28
29
30
Energy (MeV)

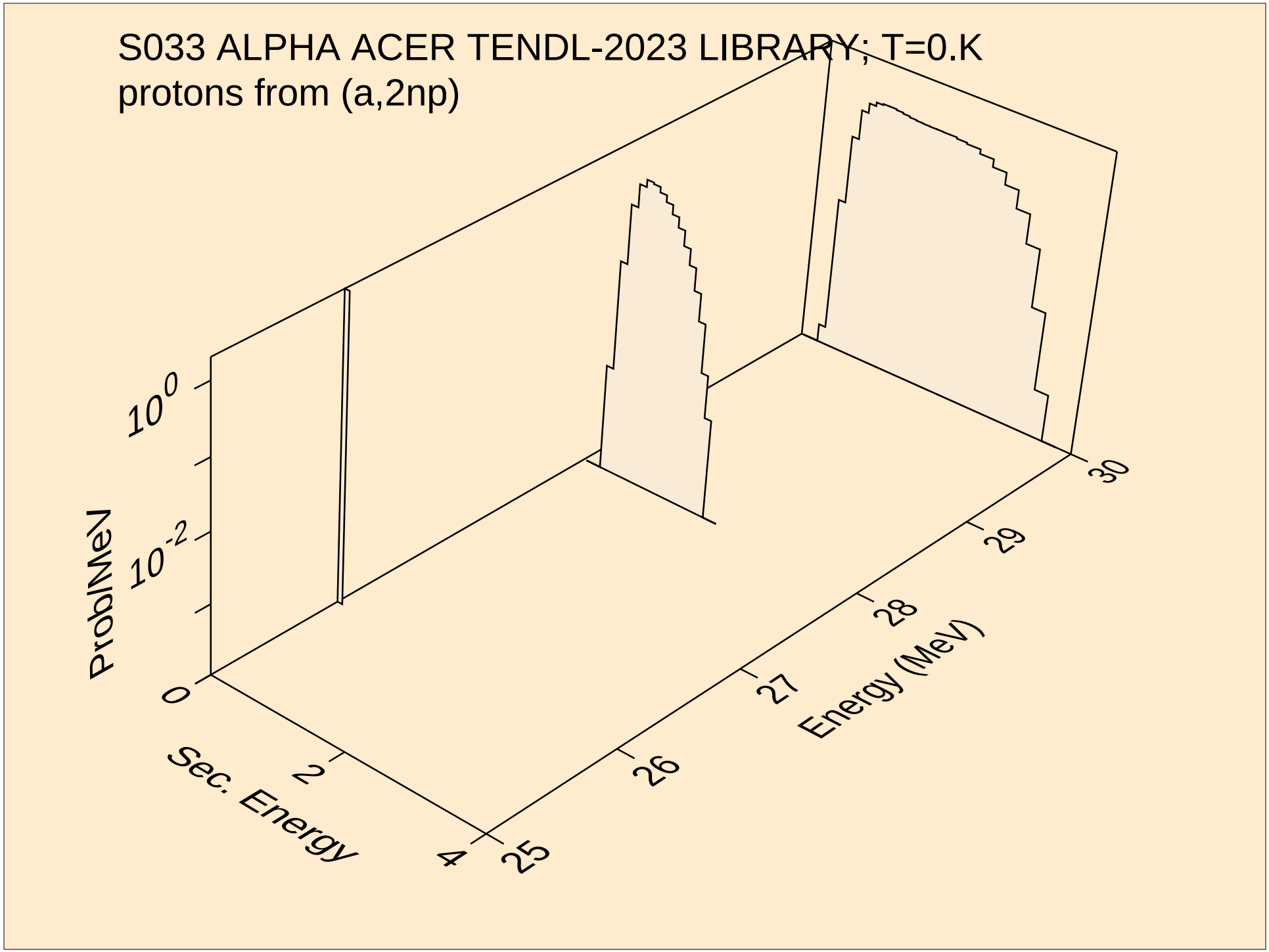

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
neutrons from (a,2np)
Prob/MeV
$10^{0}$
$10^{-2}$
0
Sec. Energy
2
4
25
26
27
28
29
30
Energy (MeV)

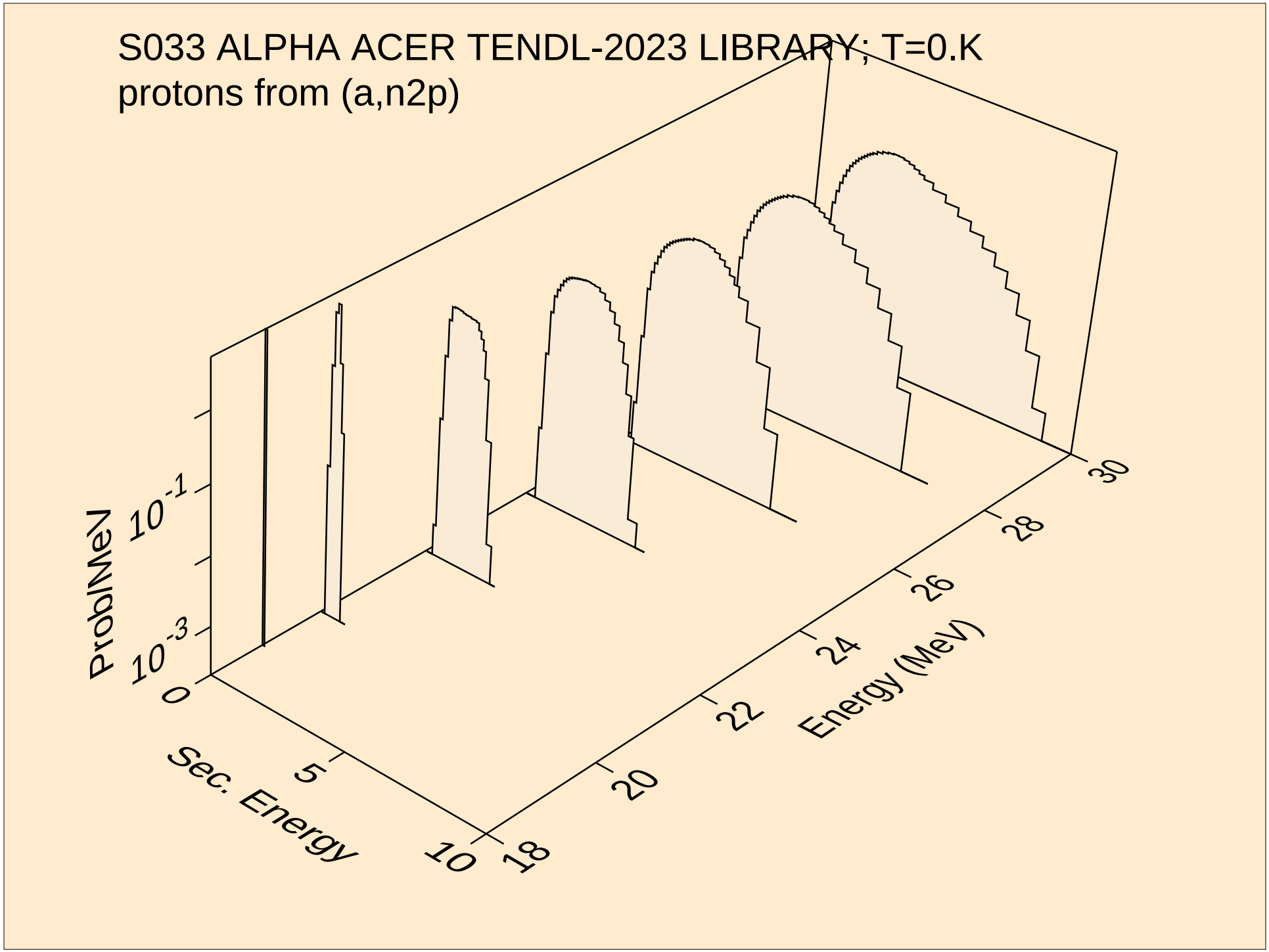

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
neutrons from (a,n2p)
Prob/MeV
$10^{1}$
$10^{-1}$
0
Sec. Energy
5
10
18
20
22
24
26
28
30
Energy (MeV)

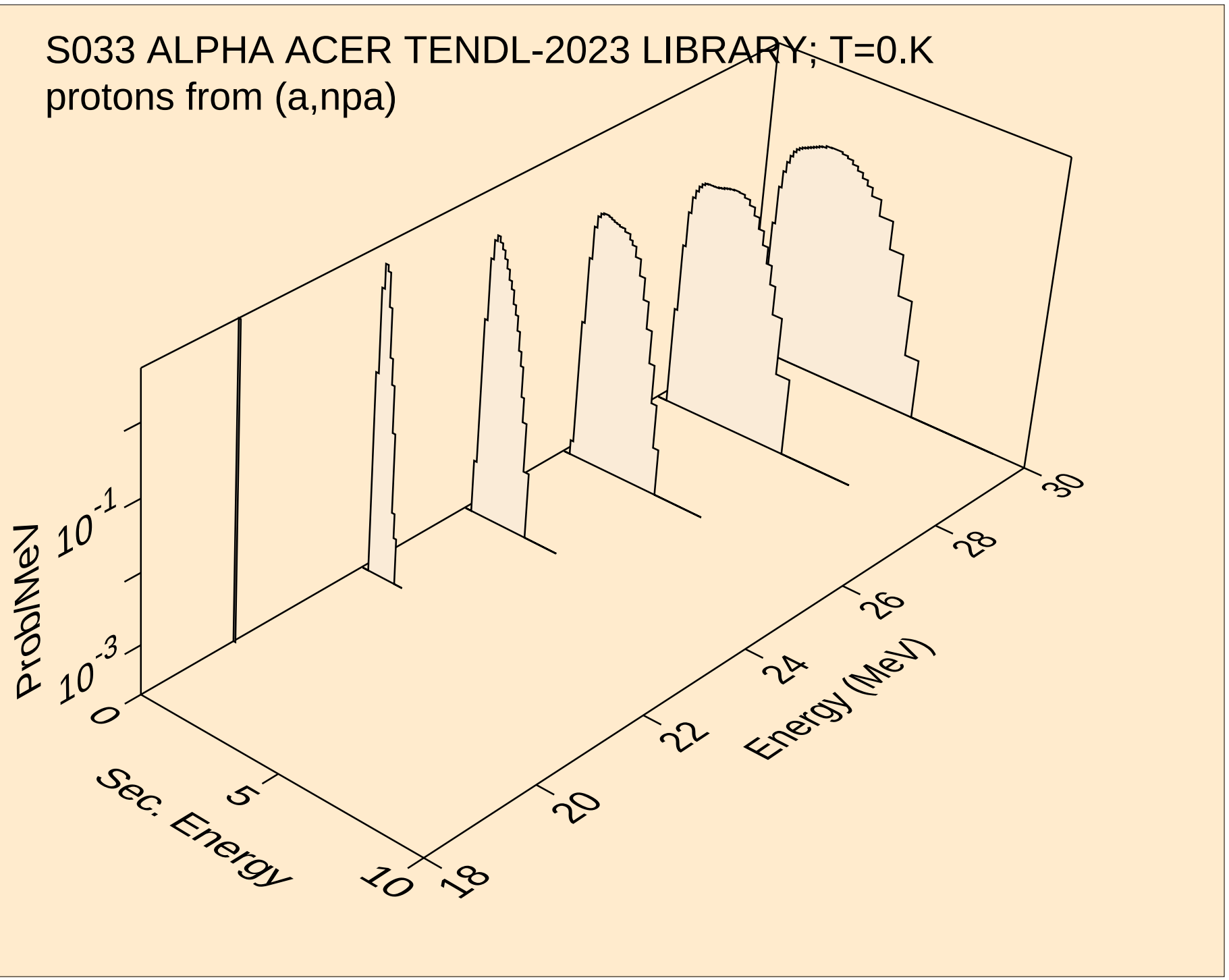

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
neutrons from (a,npa)
Prob/MeV
10^1
10^-1
10^-3
0
2
4
6
Sec. Energy
18
20
22
24
26
28
30
Energy (MeV)

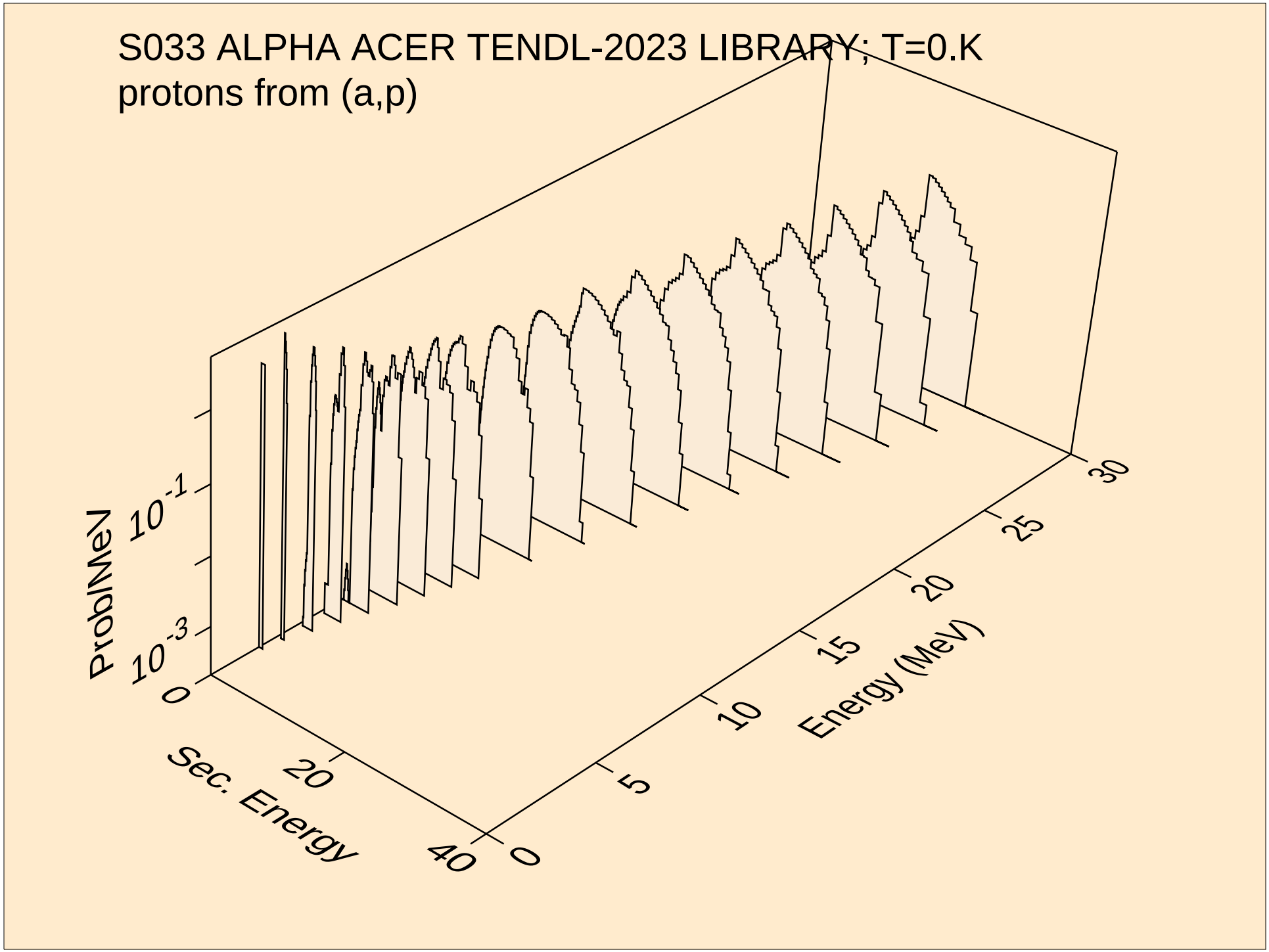

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
protons from (a,x)
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)

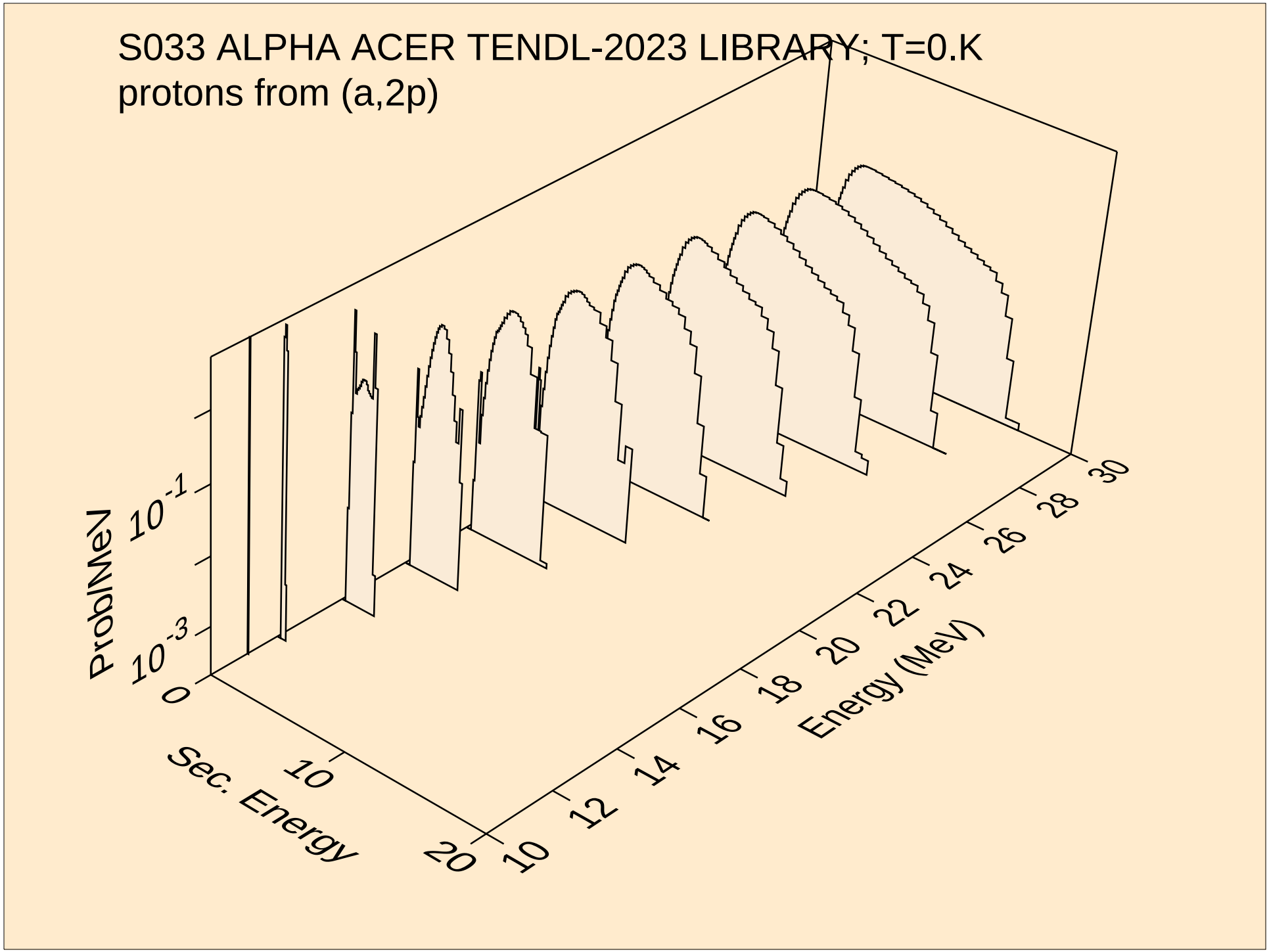

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
protons from (a,n*)p
Prob/MeV
$10^{1}$
$10^{-1}$
0
Sec. Energy
10
20
Energy (MeV)
10
12
14
16
18
20
22
24
26
28
30

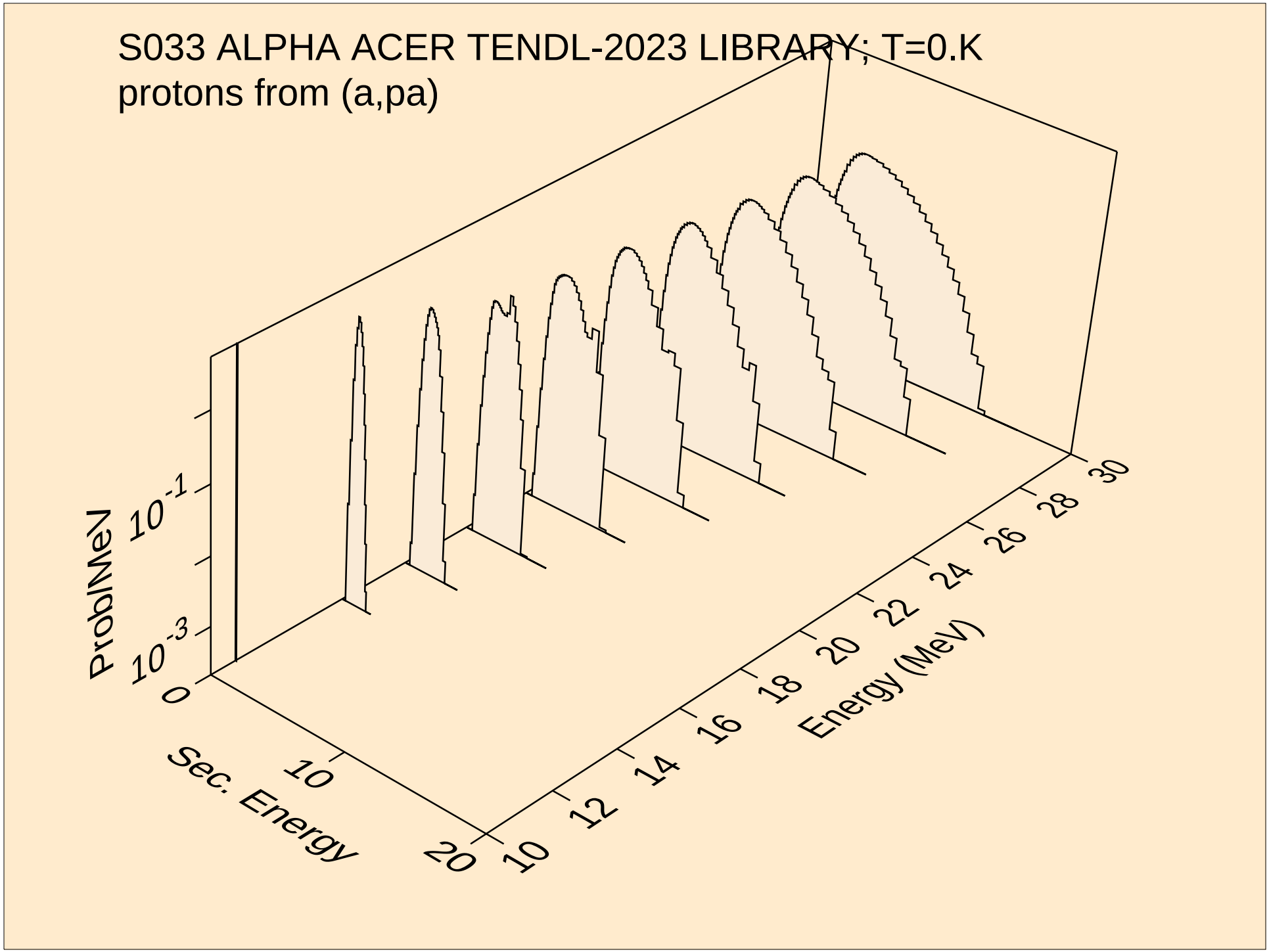

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
protons from (a,2np)
Prob/MeV
$10^{0}$
$10^{-2}$
0
2
4
Sec. Energy
25
26
27
28
29
30
Energy (MeV)

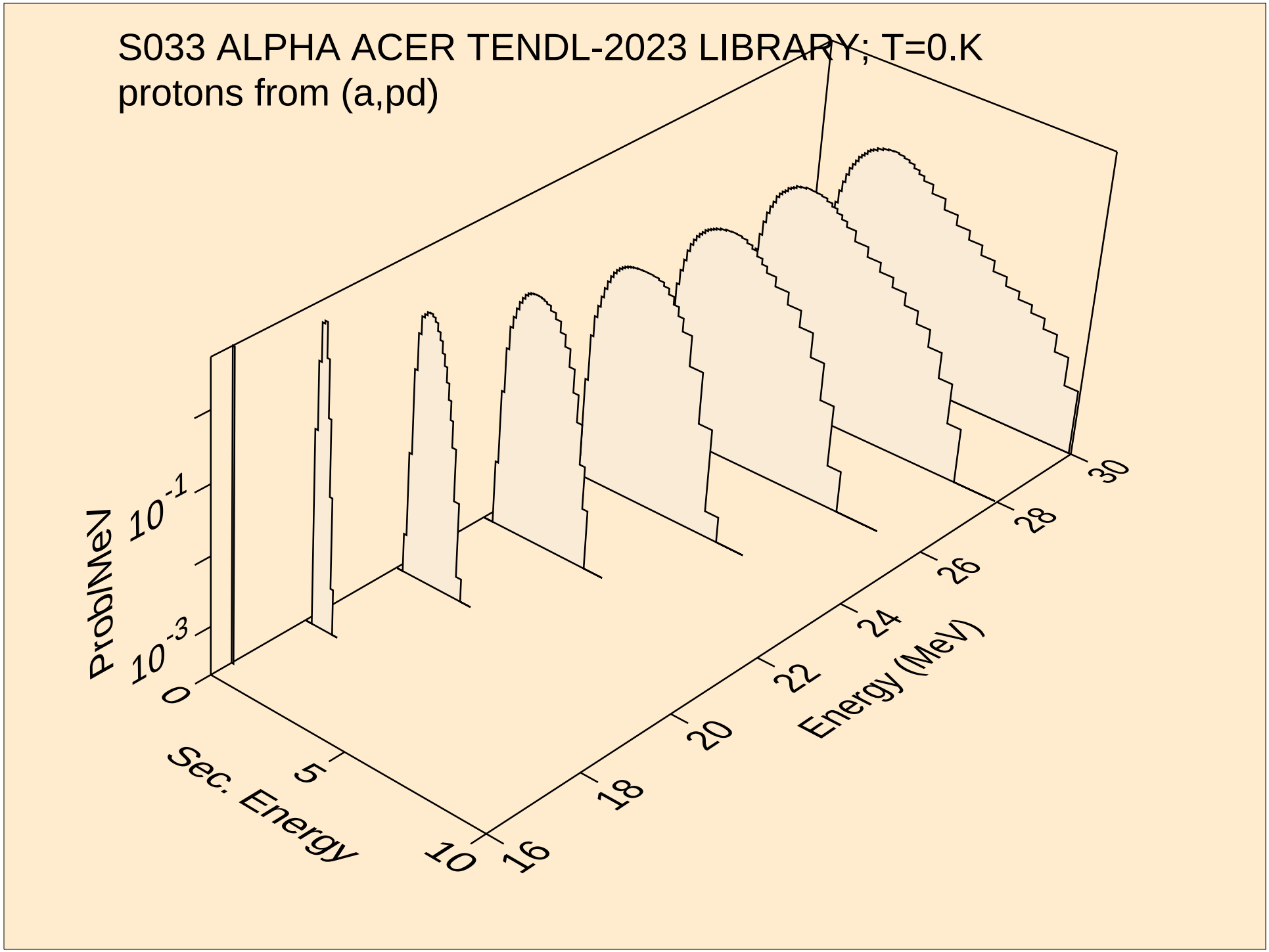

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
protons from (a,n2p)
Prob/MeV
10-1
10-3
0
Sec. Energy
5
10
18
20
22
24
26
28
30
Energy (MeV)

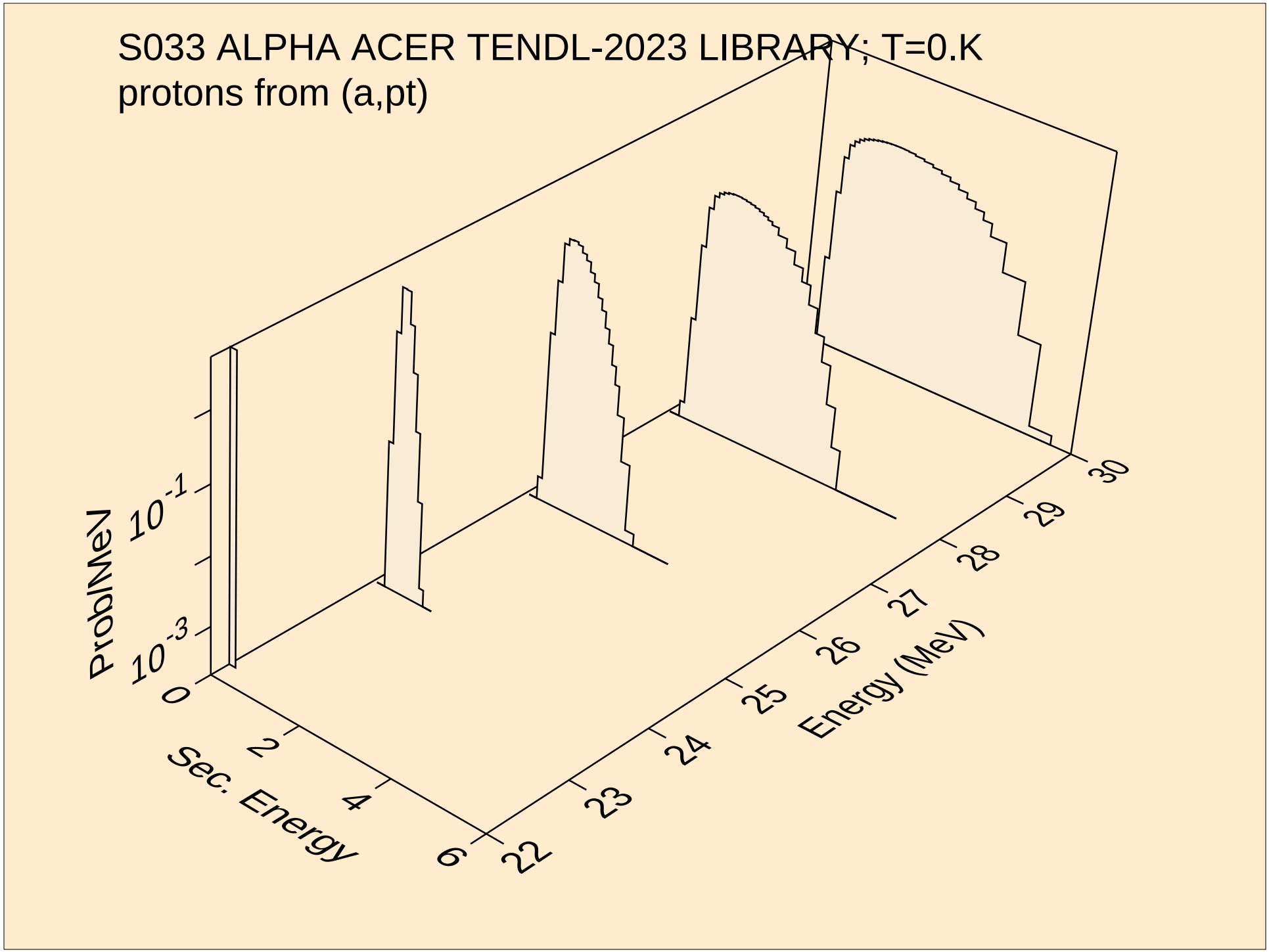

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
protons from (a,npa)
Prob/MeV
10-1
10-3
0
Sec. Energy
5
10
18
20
22
24
26
28
30
Energy (MeV)

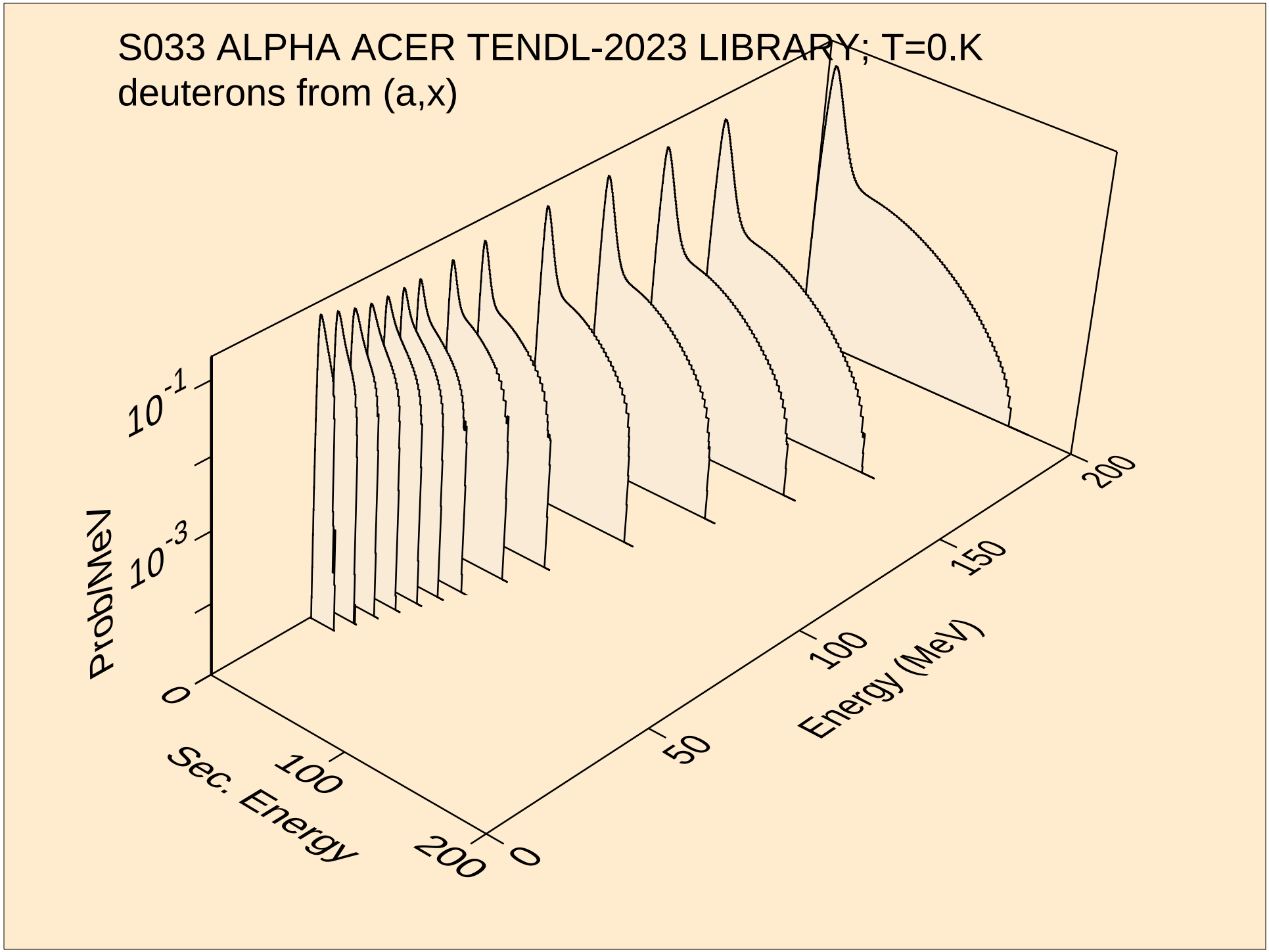

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
protons from (a,p)
Prob/MeV
10-1
10-3
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

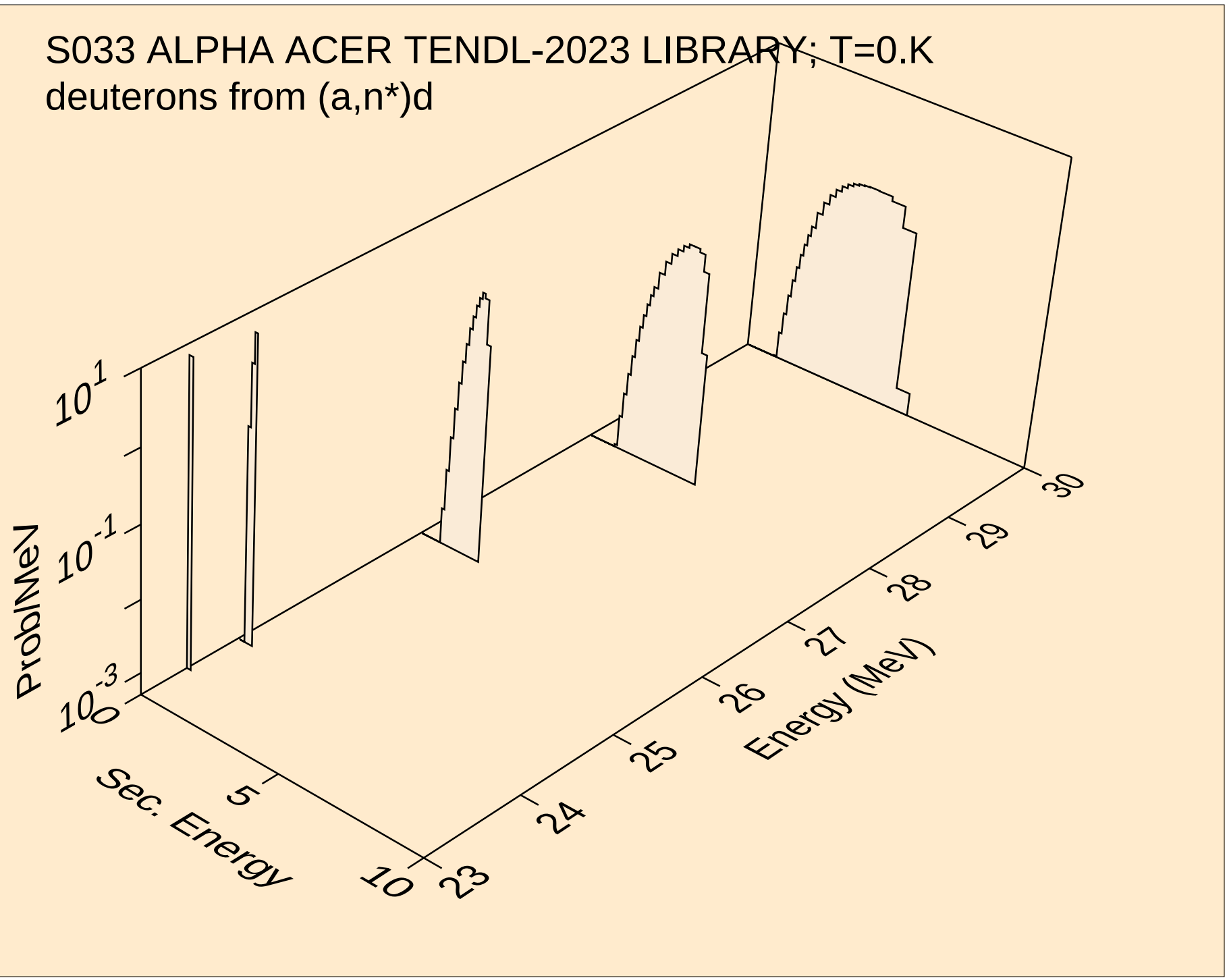

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
protons from (a,2p)
Prob/MeV
10-1
10-3
0
Sec. Energy
10
20
10
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

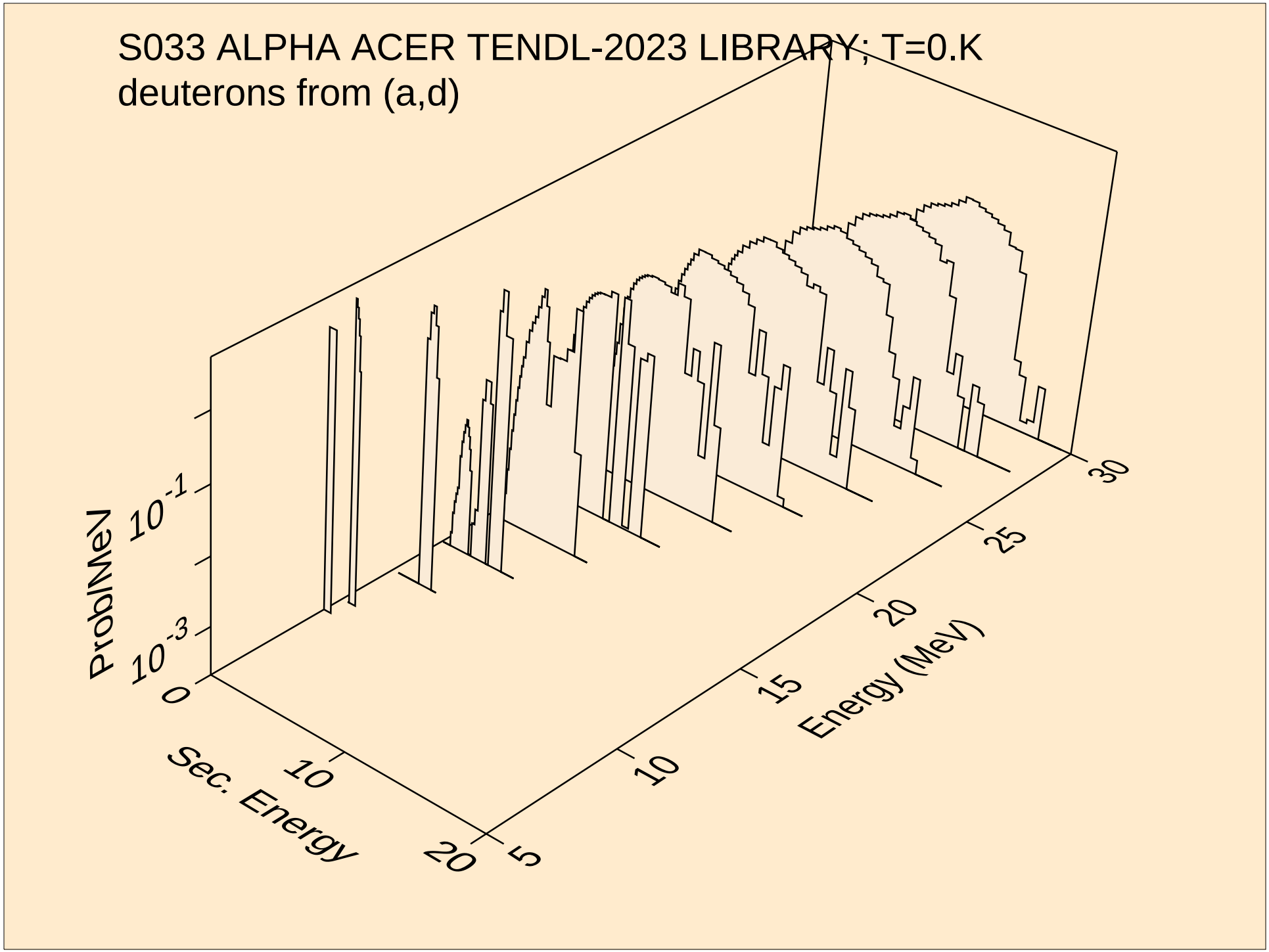

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
protons from (a,pa)
Prob/MeV
10^-1
10^-3
0
Sec. Energy
10
20
Energy (MeV)
10
12
14
16
18
20
22
24
26
28
30

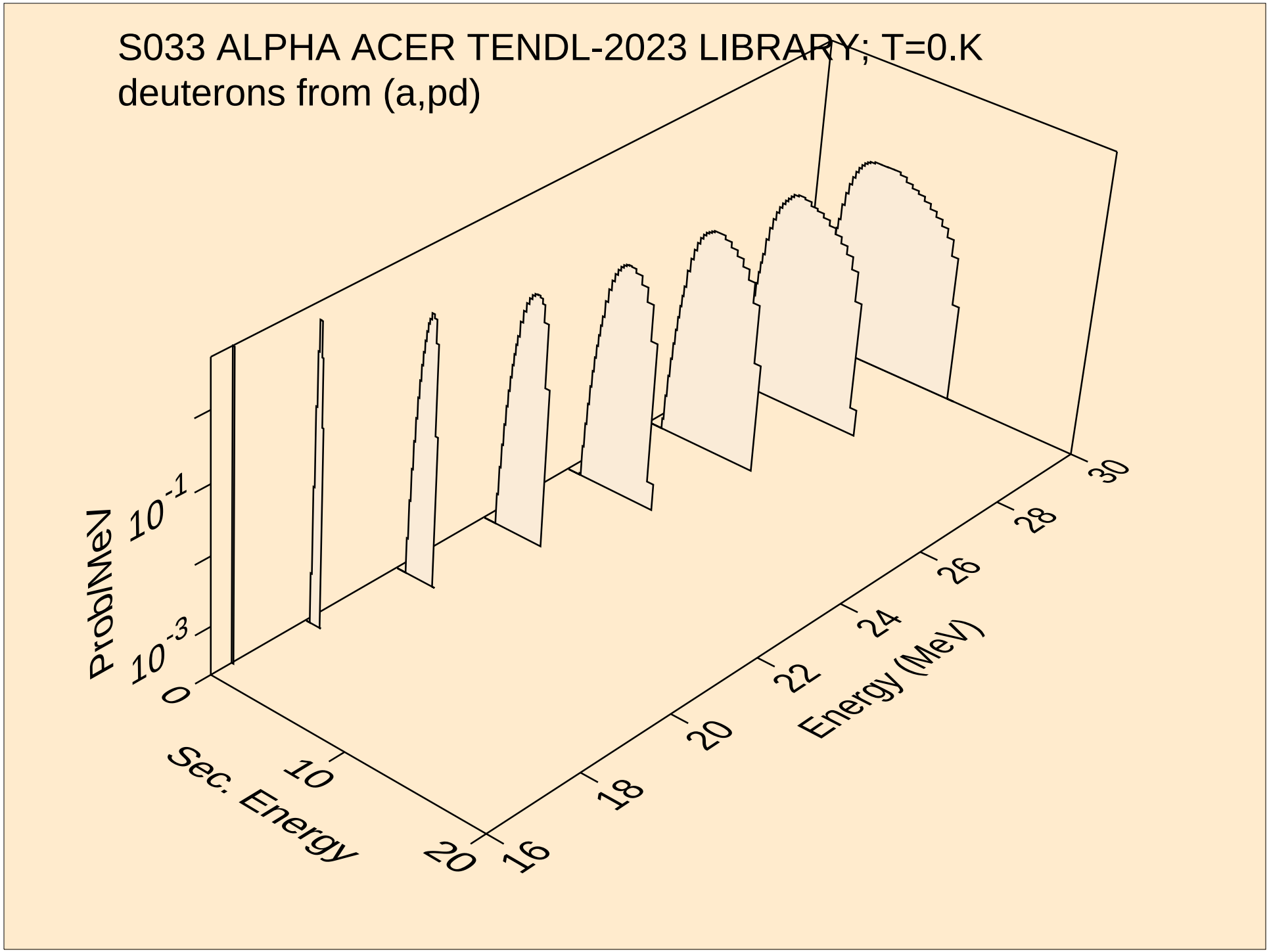

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
protons from (a,pd)
Prob/MeV
10-1
10-3
0
Sec. Energy
5
10
16
18
20
22
24
26
28
30
Energy (MeV)

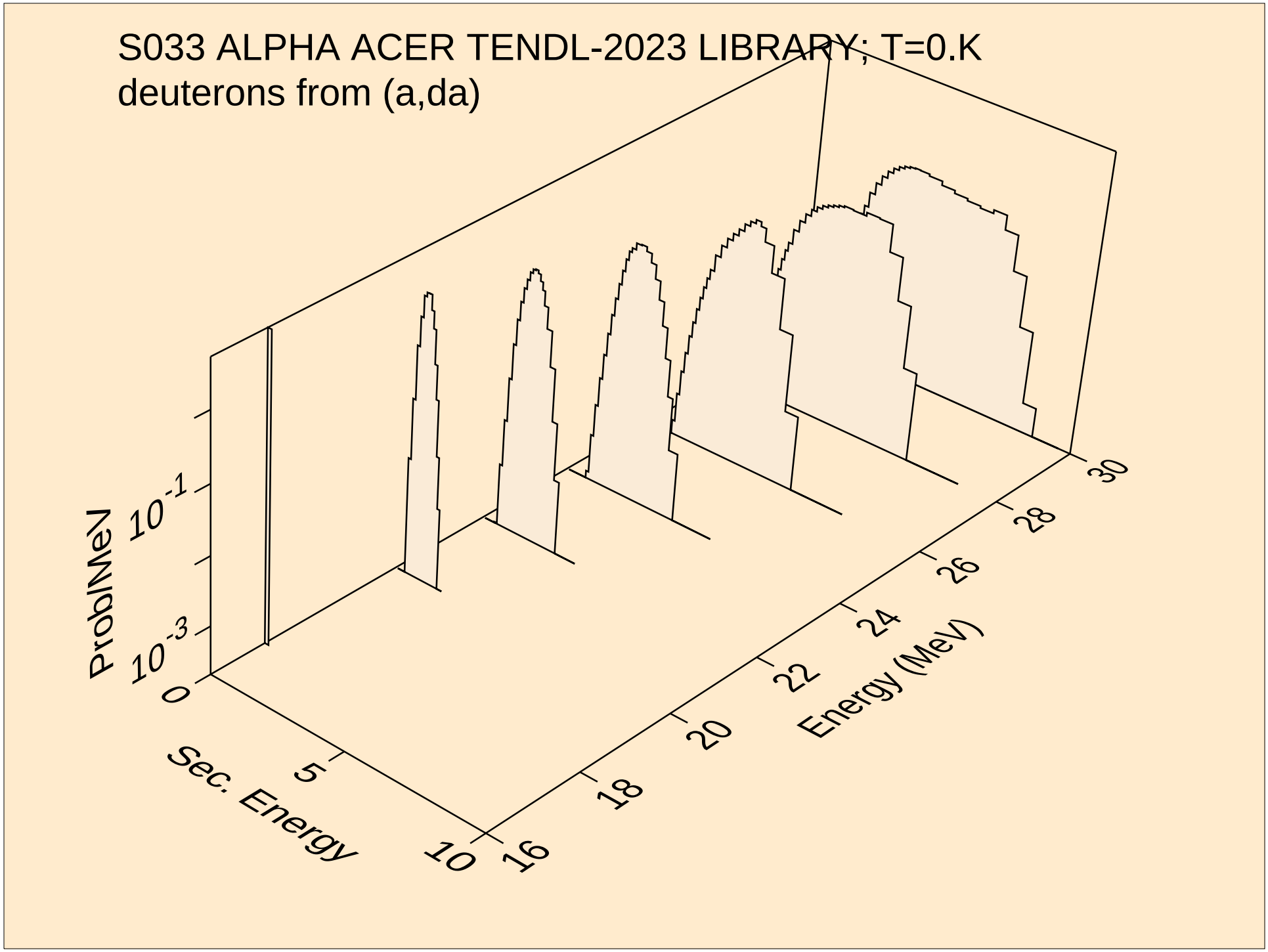

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
protons from (a,pt)
Prob/MeV
10-1
10-3
0
2
4
6
Sec. Energy
22
23
24
25
26
27
28
29
30
Energy (MeV)

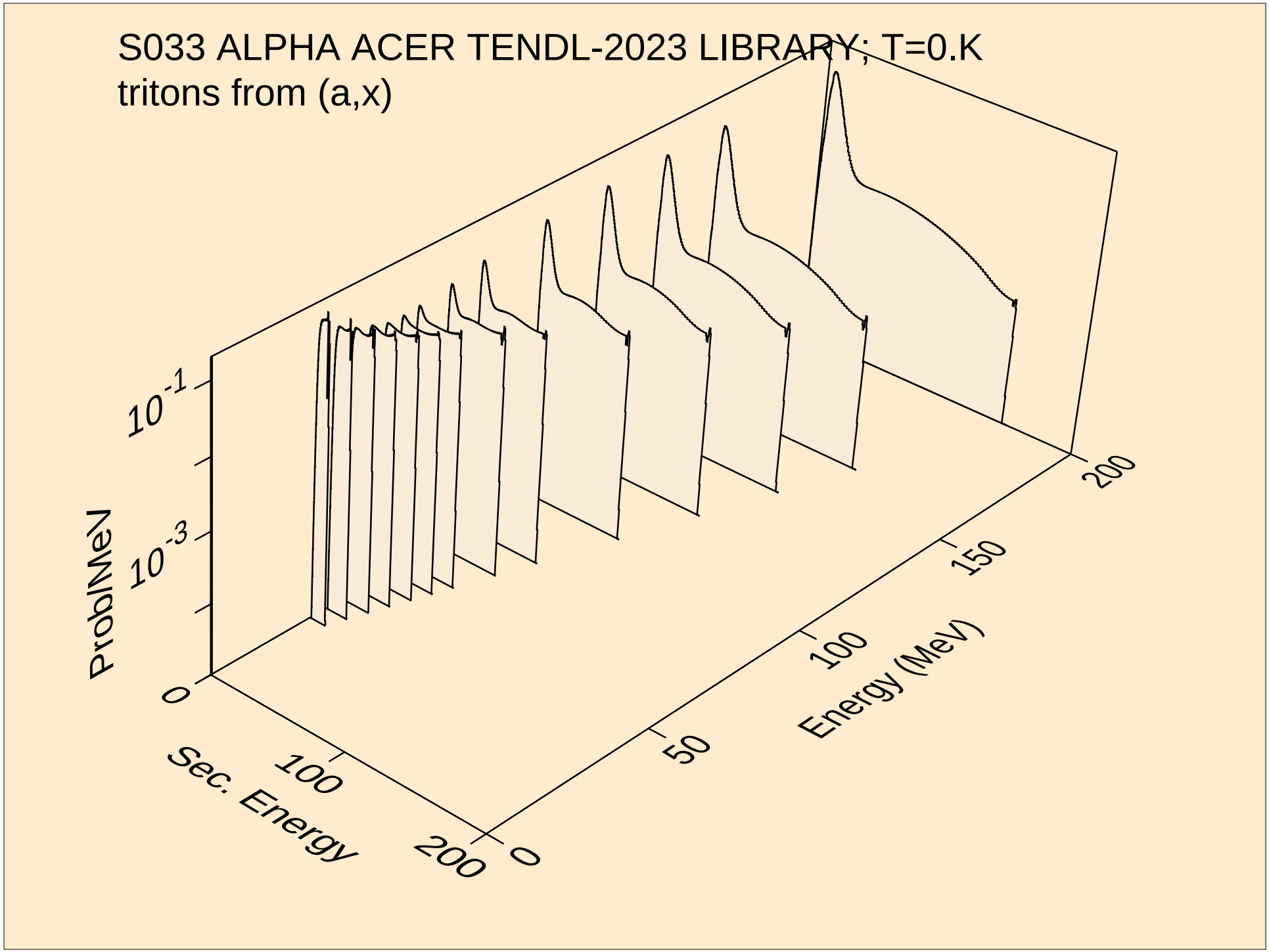

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
deuterons from (a,x)
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)

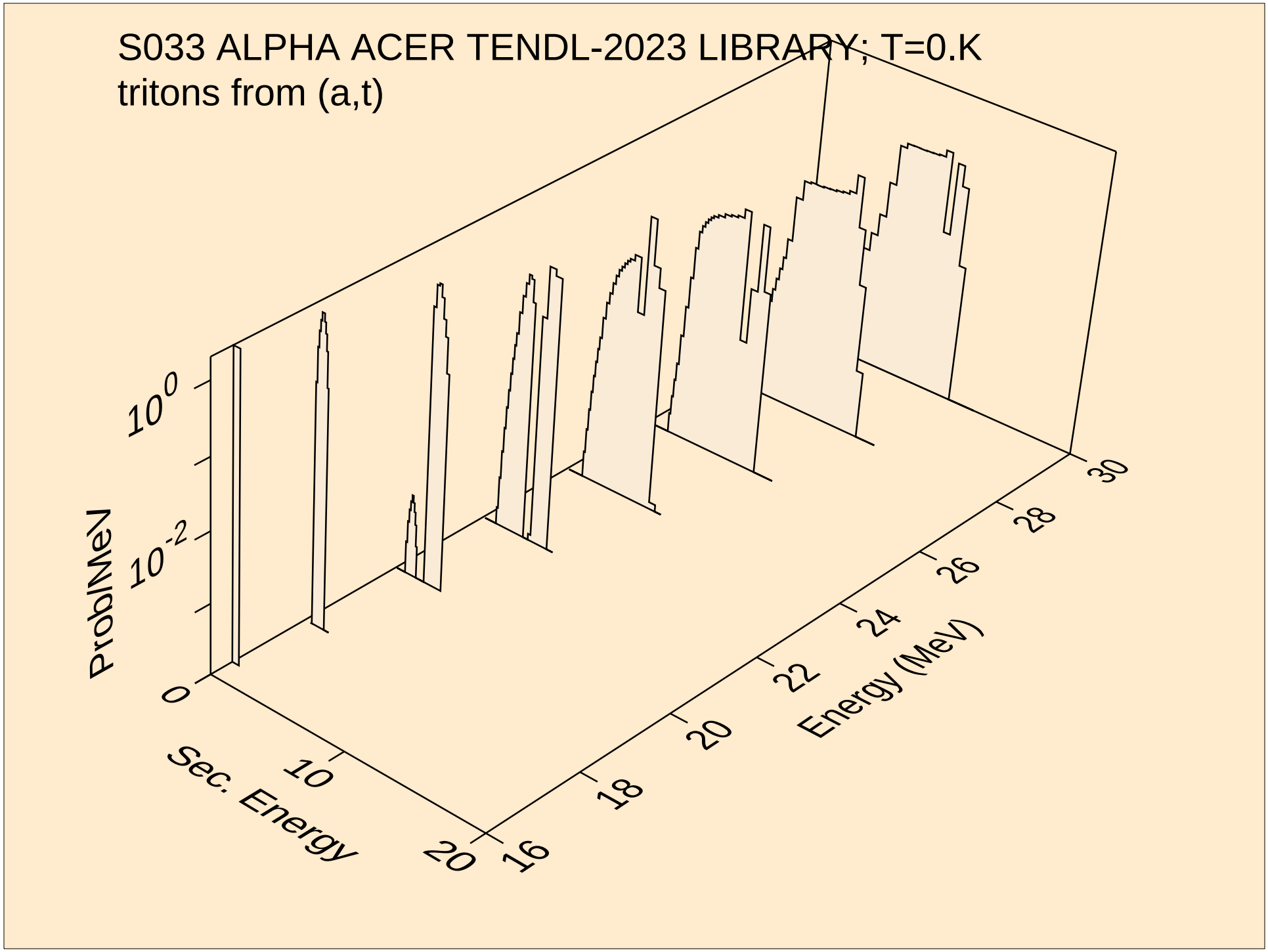

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
deuterons from (a,n*)d
Prob/MeV
10^1
10^-1
10^-3
0
Sec. Energy
5
10
23
24
25
26
27
28
29
30
Energy (MeV)

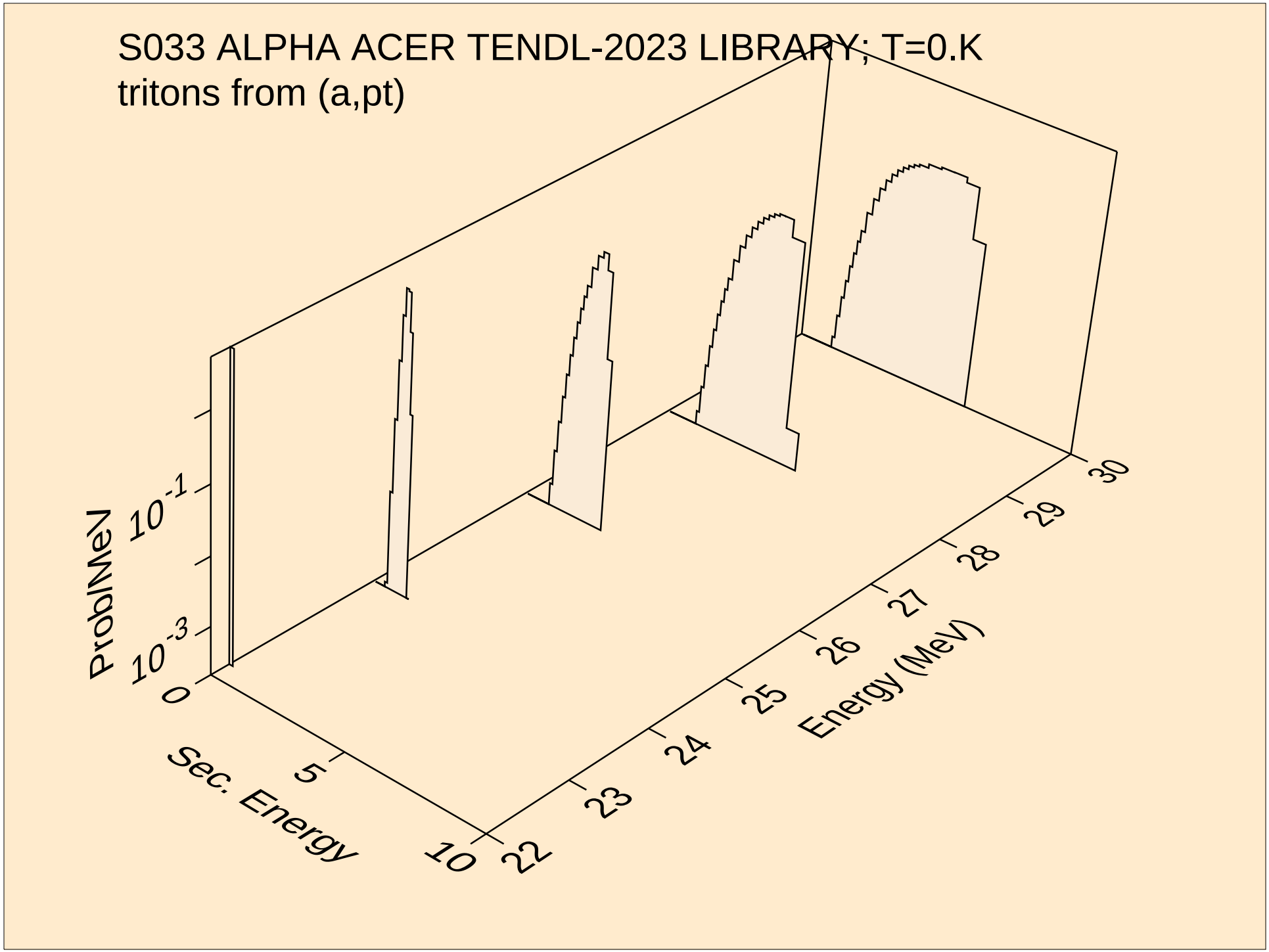

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
deuterons from (a,d)
Prob/MeV
10^-1
10^-3
0
Sec. Energy
10
20
5
10
15
20
25
30
Energy (MeV)

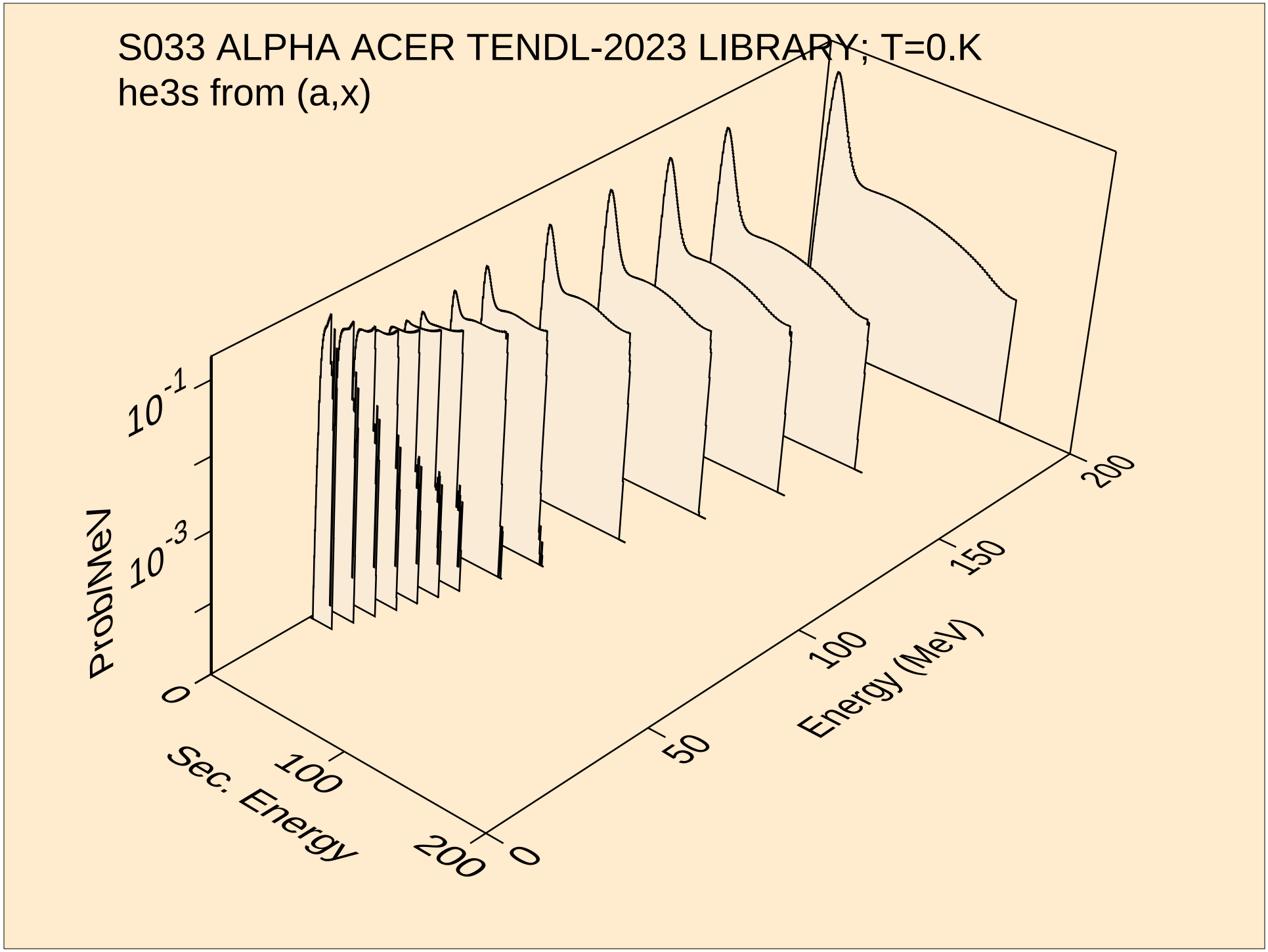

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
deuterons from (a,pd)
Prob/MeV
10^-1
10^-3
0
Sec. Energy
10
20
16
18
20
22
24
26
28
30
Energy (MeV)

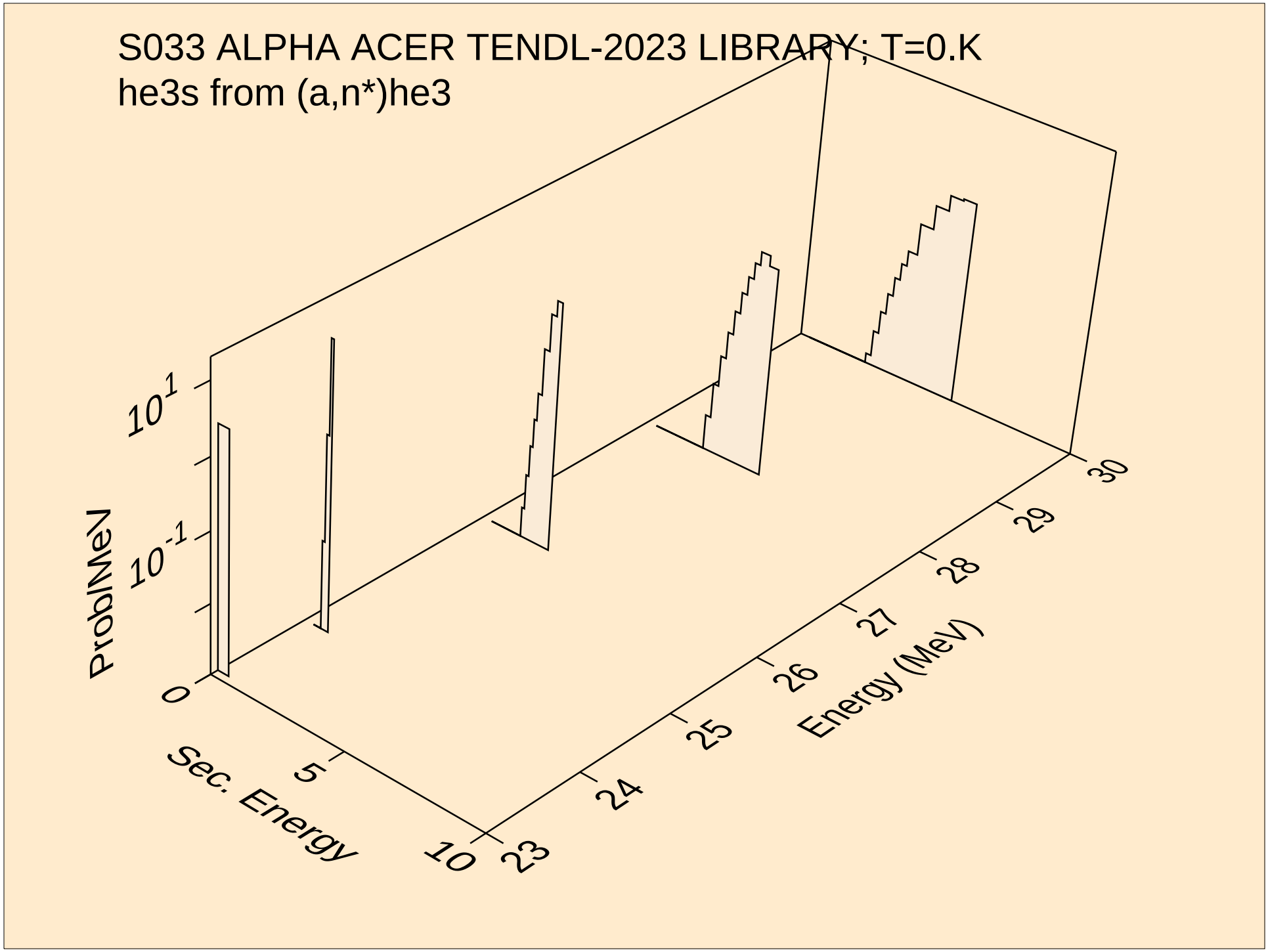

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
deuterons from (a,da)
Prob/MeV
10-1
10-3
0
Sec. Energy
5
10
16
18
20
22
24
26
28
30
Energy (MeV)

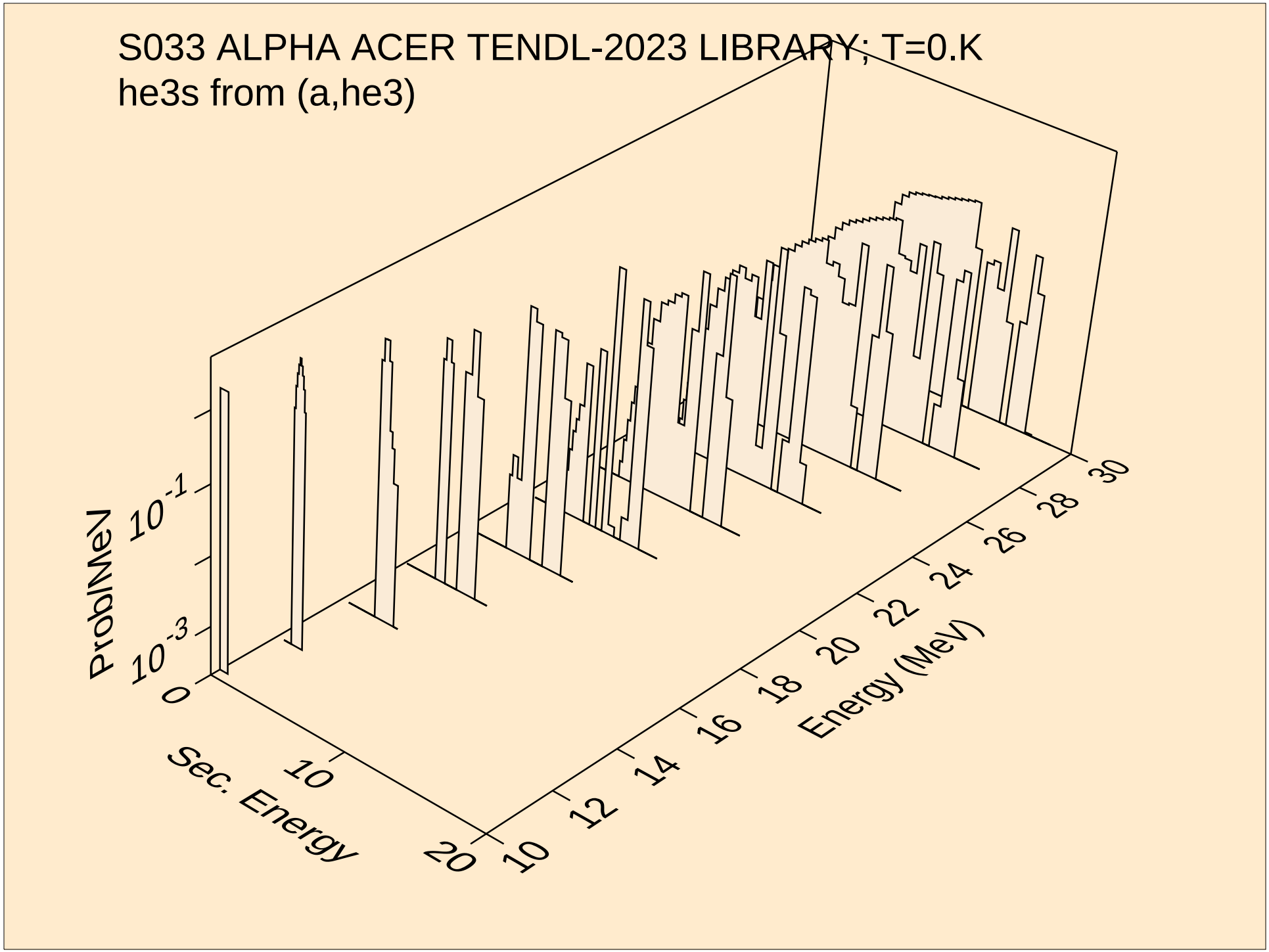

S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
tritons from (a,x)
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)


S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
tritons from (a,t)
Prob/MeV
$10^{0}$
$10^{-2}$
0
Sec. Energy
10
20
16
18
20
22
24
26
28
30
Energy (MeV)


S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
tritons from (a,pt)
Prob/MeV
10-1
10-3
0
Sec. Energy
5
10
Energy (MeV)
22
23
24
25
26
27
28
29
30


S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
he3s from (a,x)
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)


S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
he3s from (a,n*)he3
Prob/MeV
10^1
10^-1
0
Sec. Energy
5
10
23
24
25
26
27
28
29
30
Energy (MeV)


S033 ALPHA ACER TENDL-2023 LIBRARY; T=0.K
he3s from (a,he3)
Prob/MeV
10^-1
10^-3
0
Sec. Energy
10
20
Energy (MeV)
10
12
14
16
18
20
22
24
26
28
30