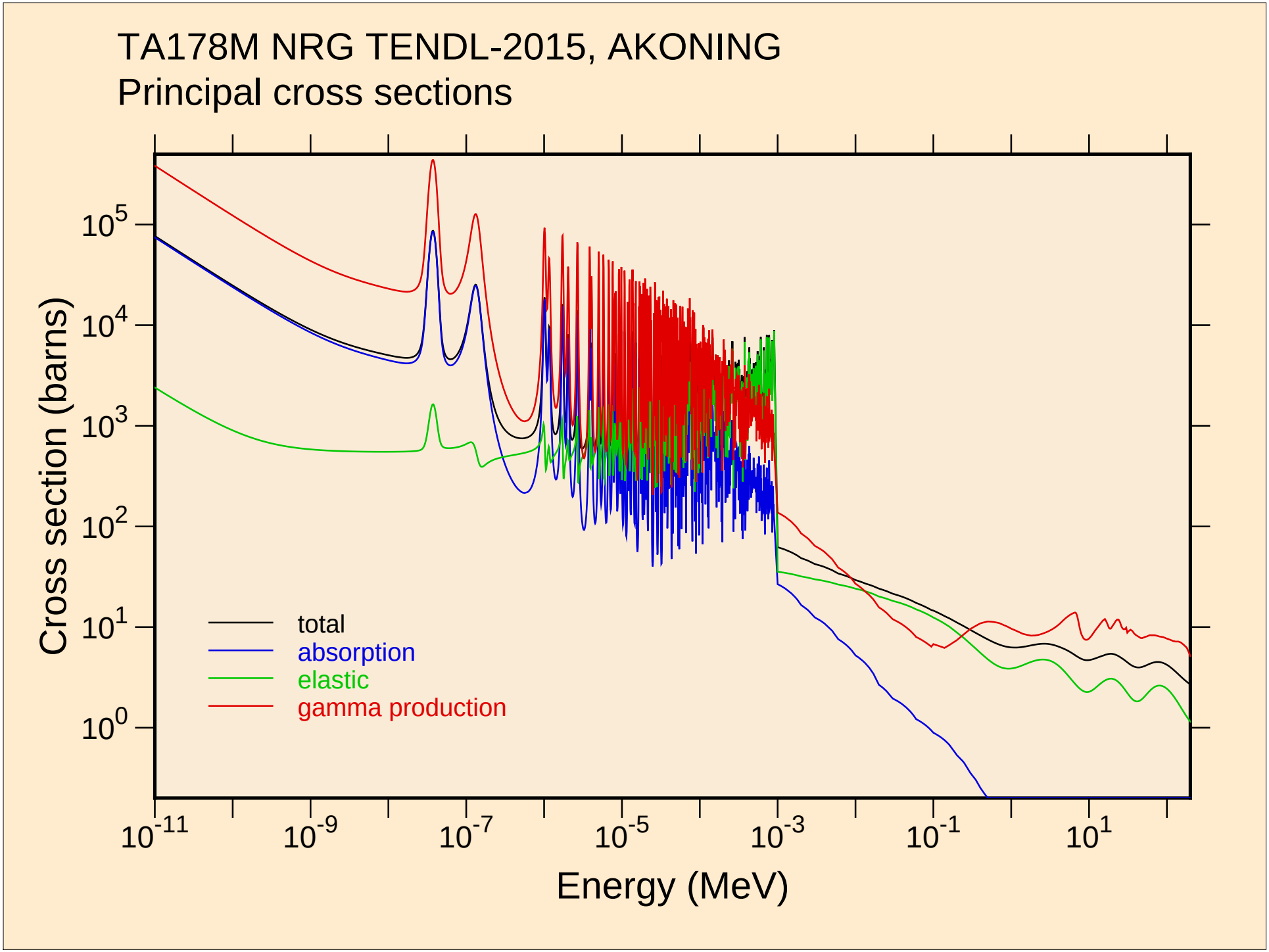
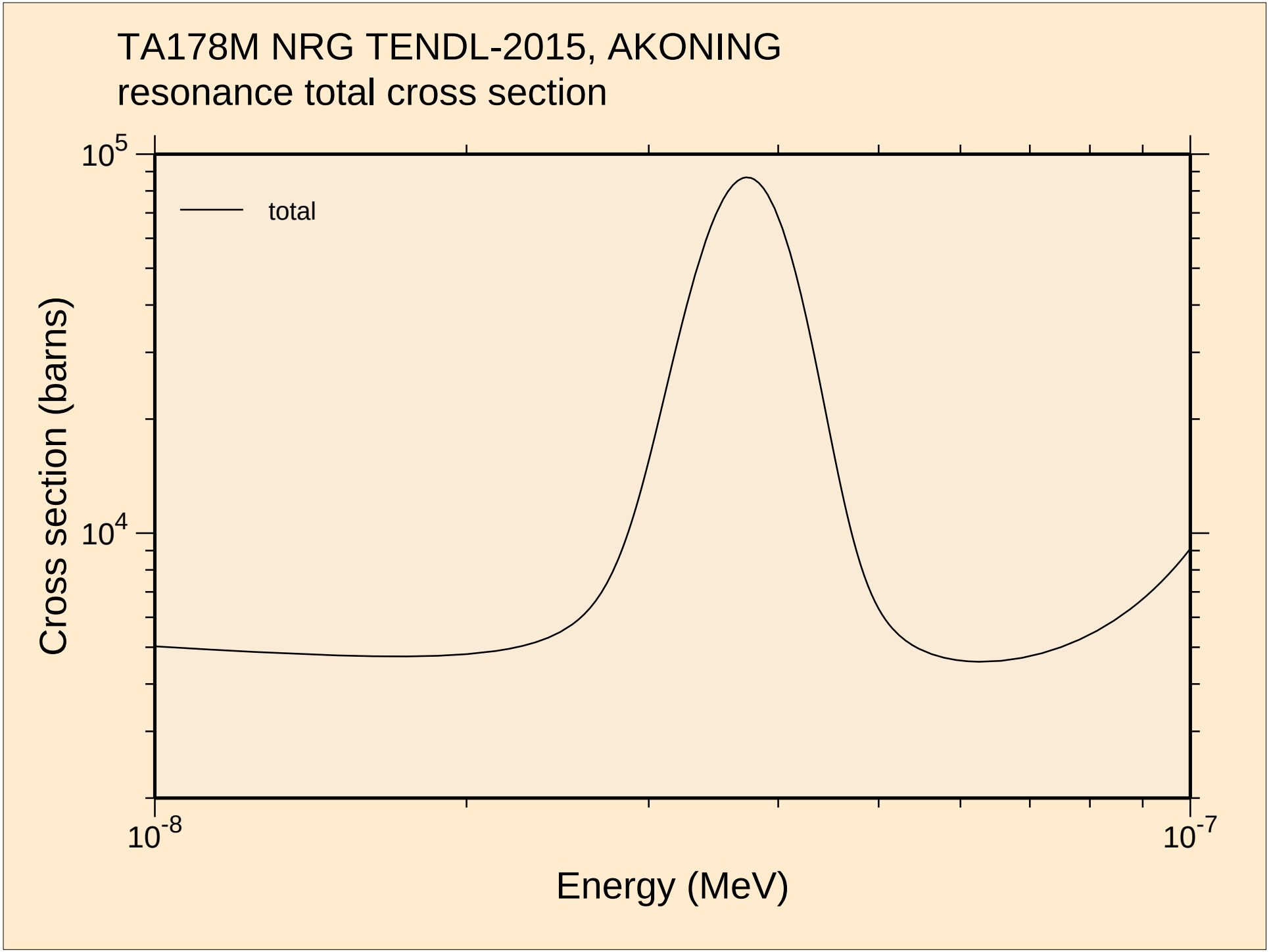
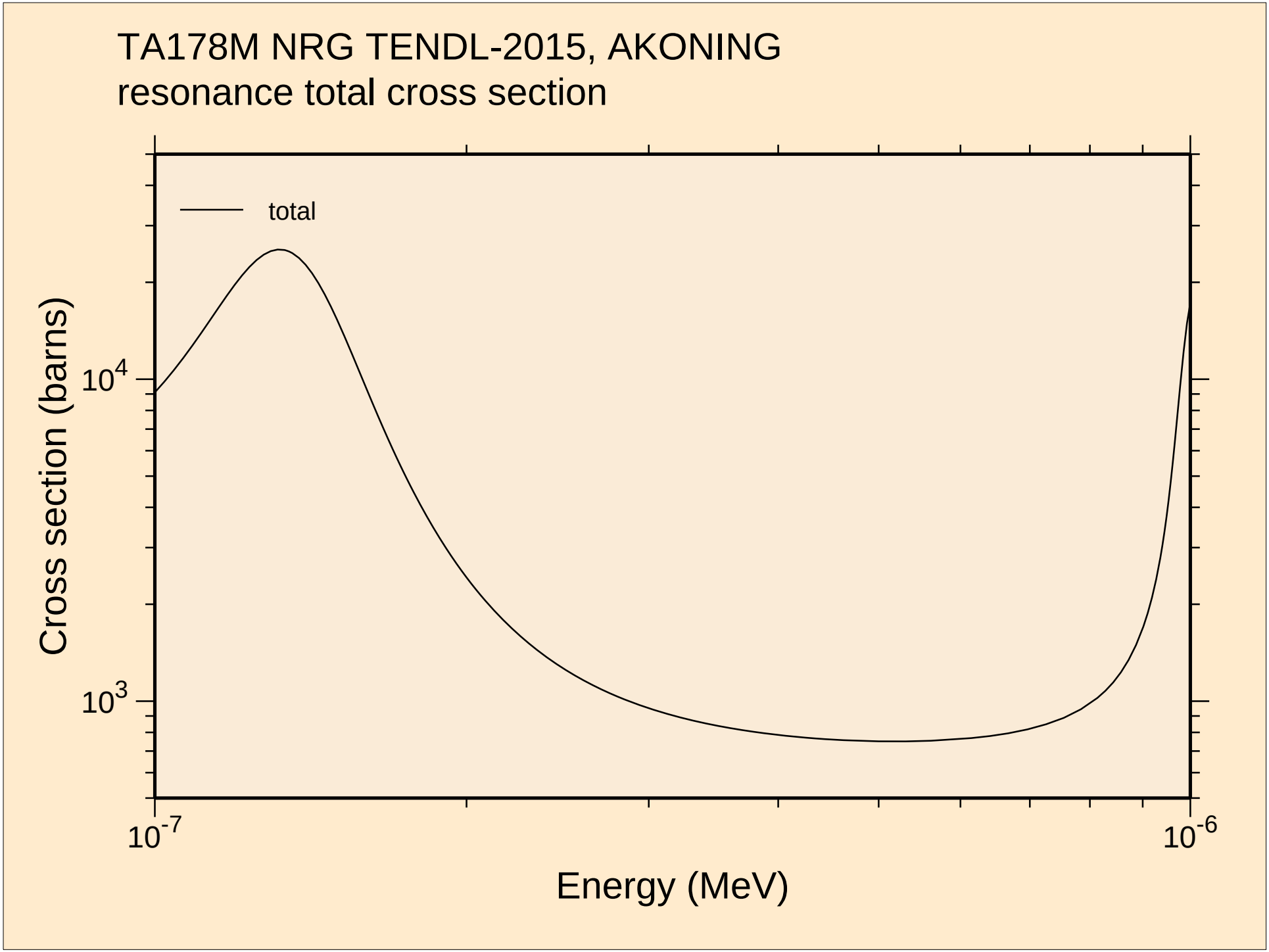
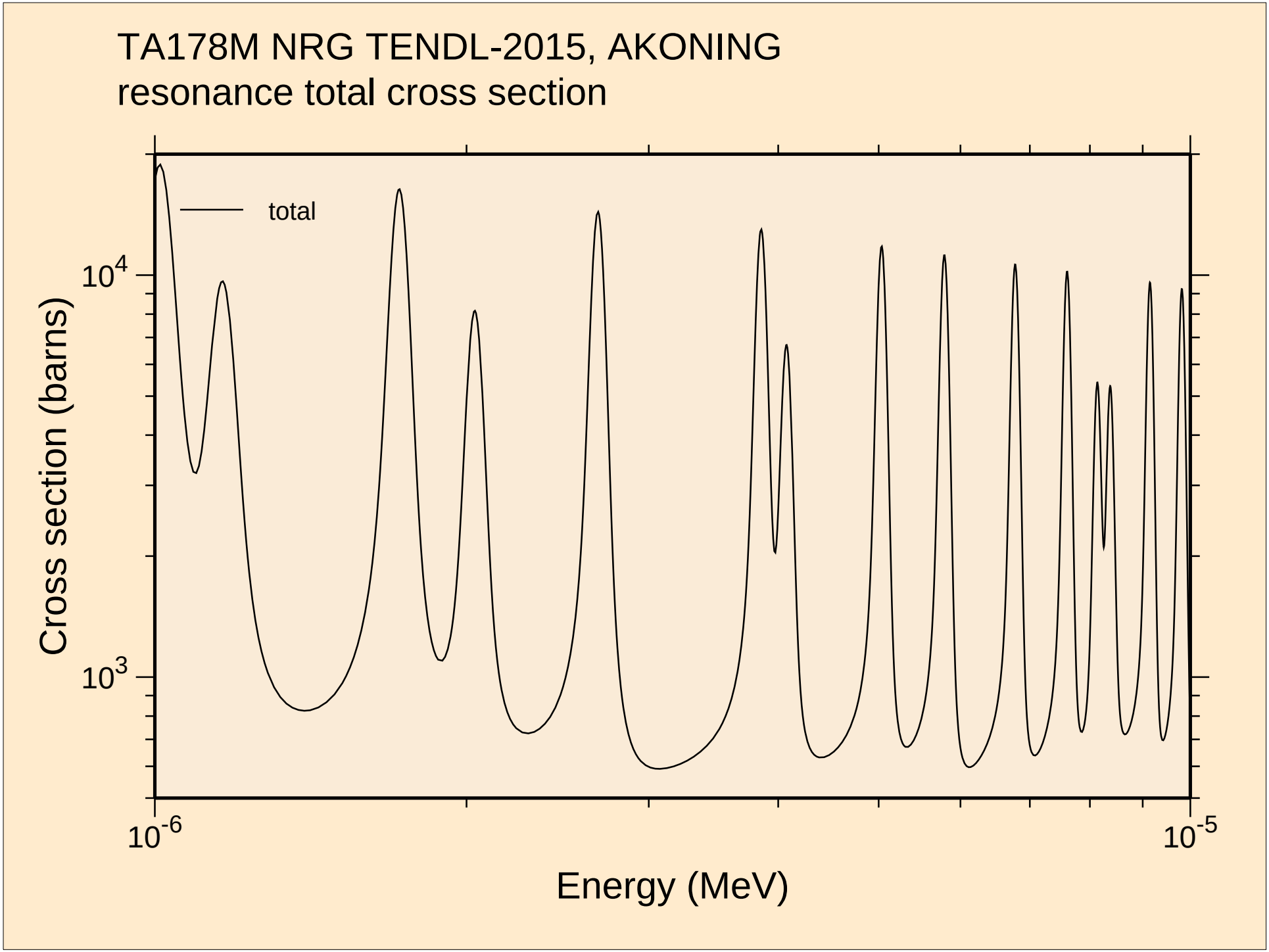
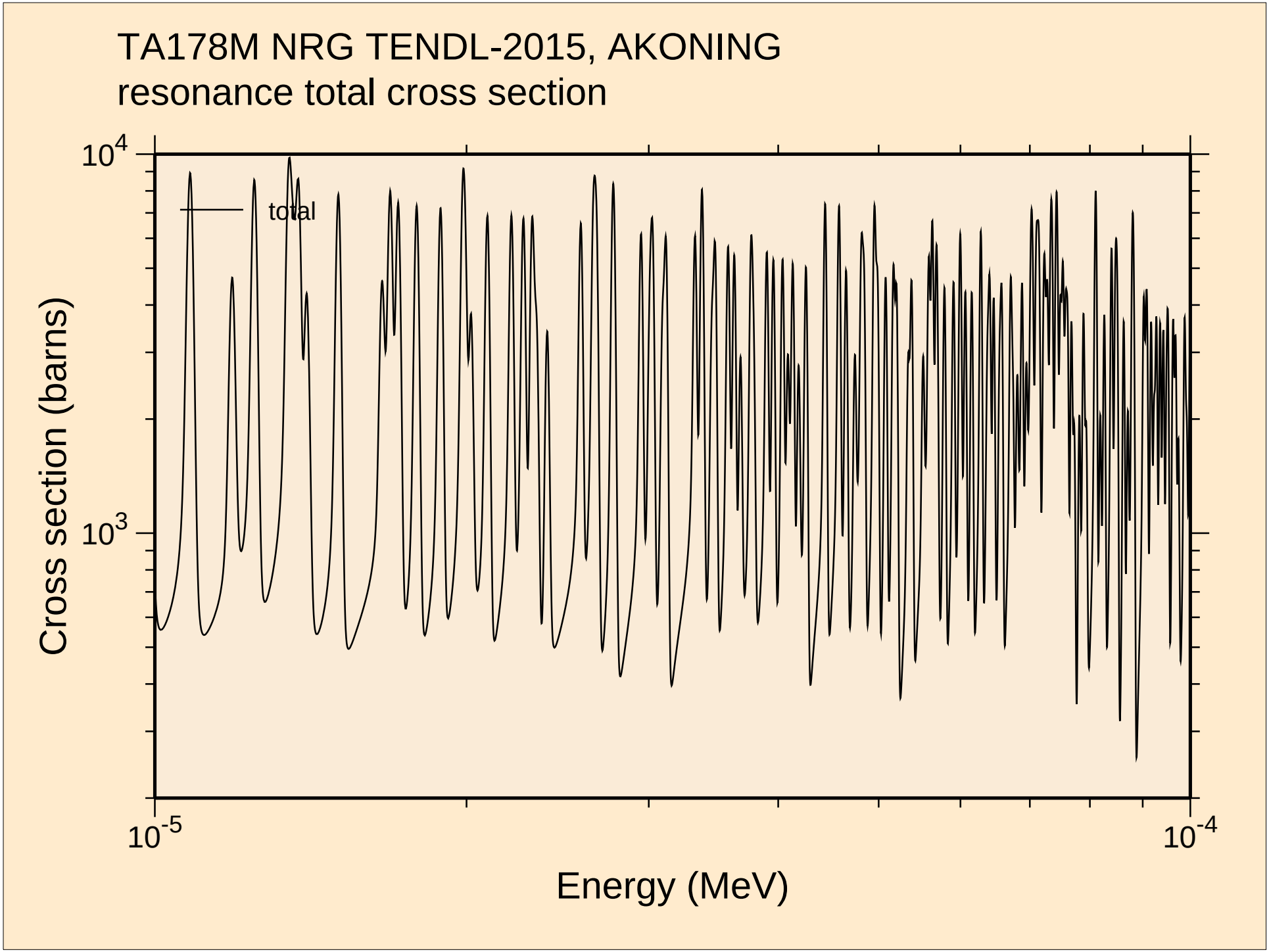
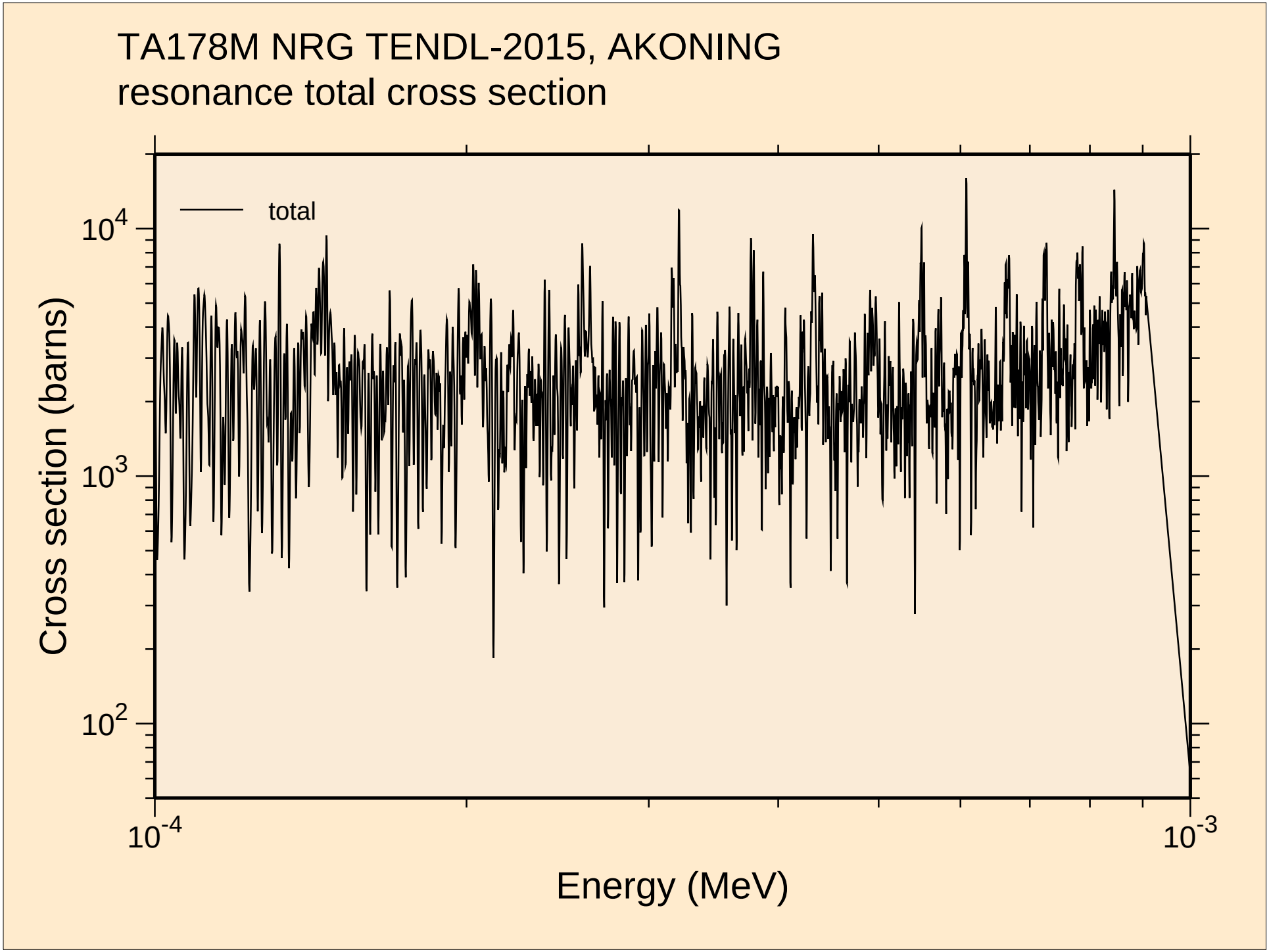

TA178M NRG TENDL-2015, AKONING
Principal cross sections
Cross section (barns)
10^5
10^4
10^3
10^2
10^1
10^0
total
absorption
elastic
gamma production
10^{-11}
10^{-9}
10^{-7}
10^{-5}
10^{-3}
10^{-1}
10^1
Energy (MeV)

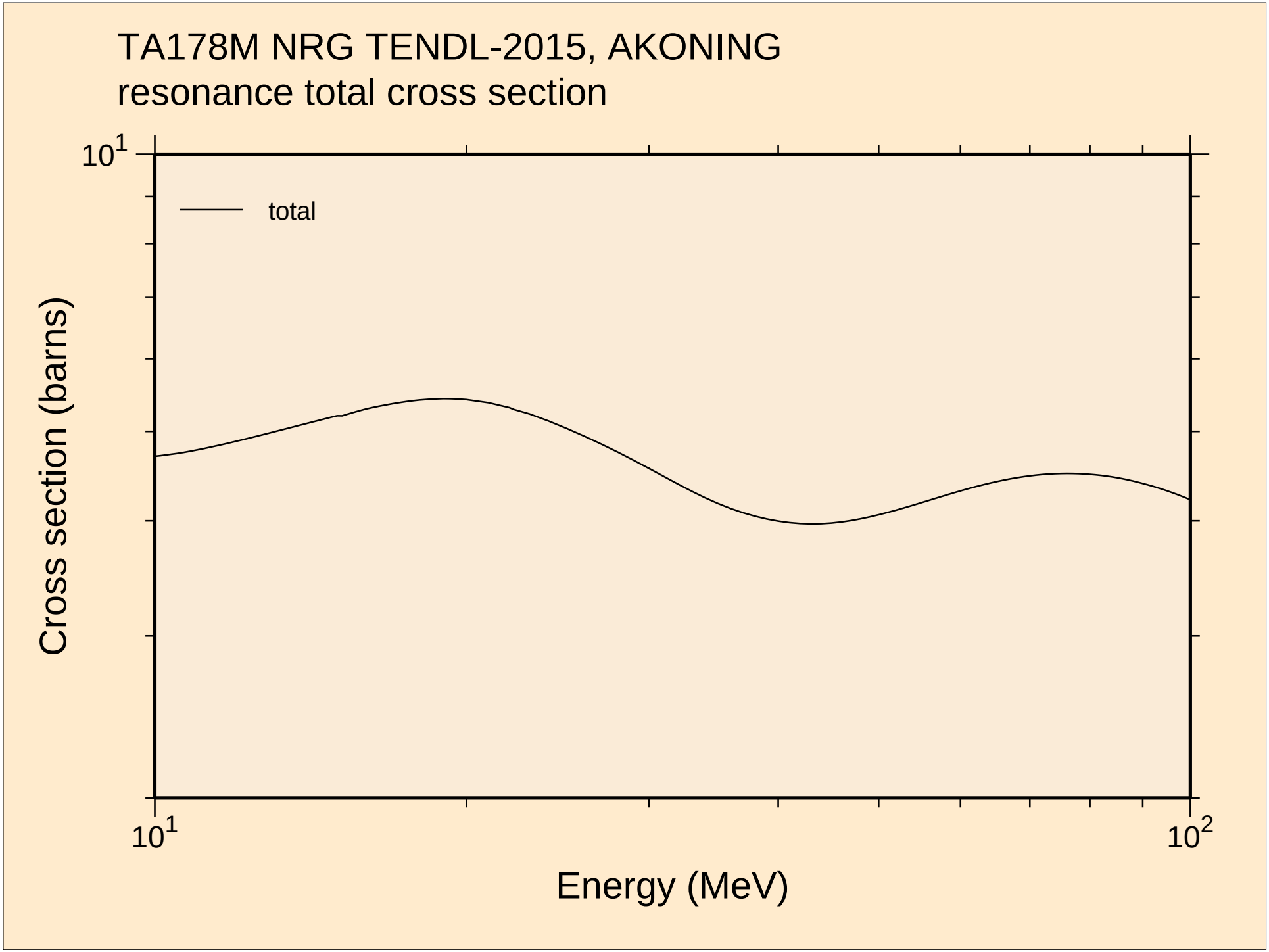

TA178M NRG TENDL-2015, AKONING
resonance total cross section
total
Cross section (barns)
10^5
10^4
10^-8
10^-7
Energy (MeV)

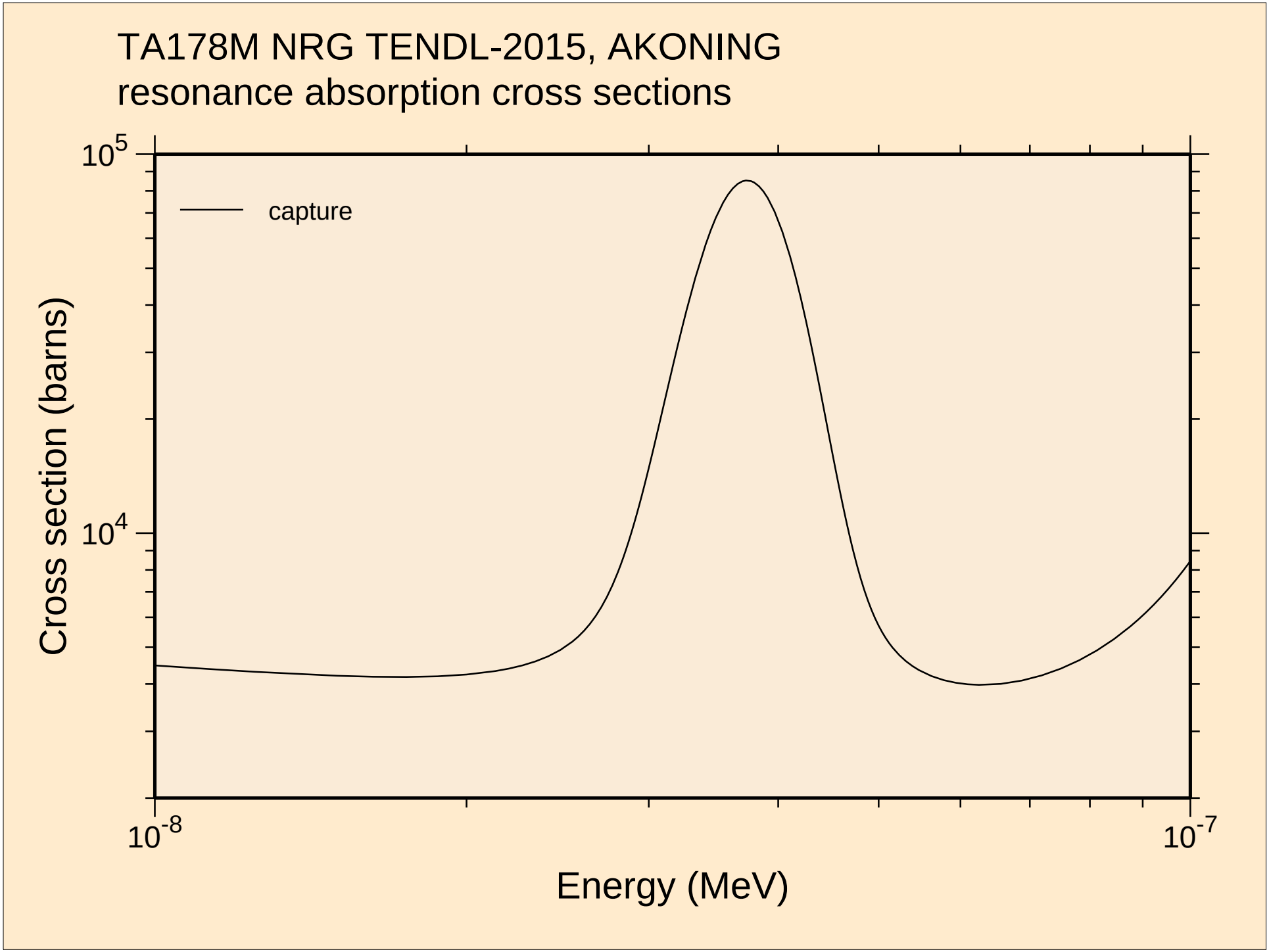

TA178M NRG TENDL-2015, AKONING
resonance total cross section
total
Cross section (barns)
10^4
10^3
10^-7
10^-6
Energy (MeV)

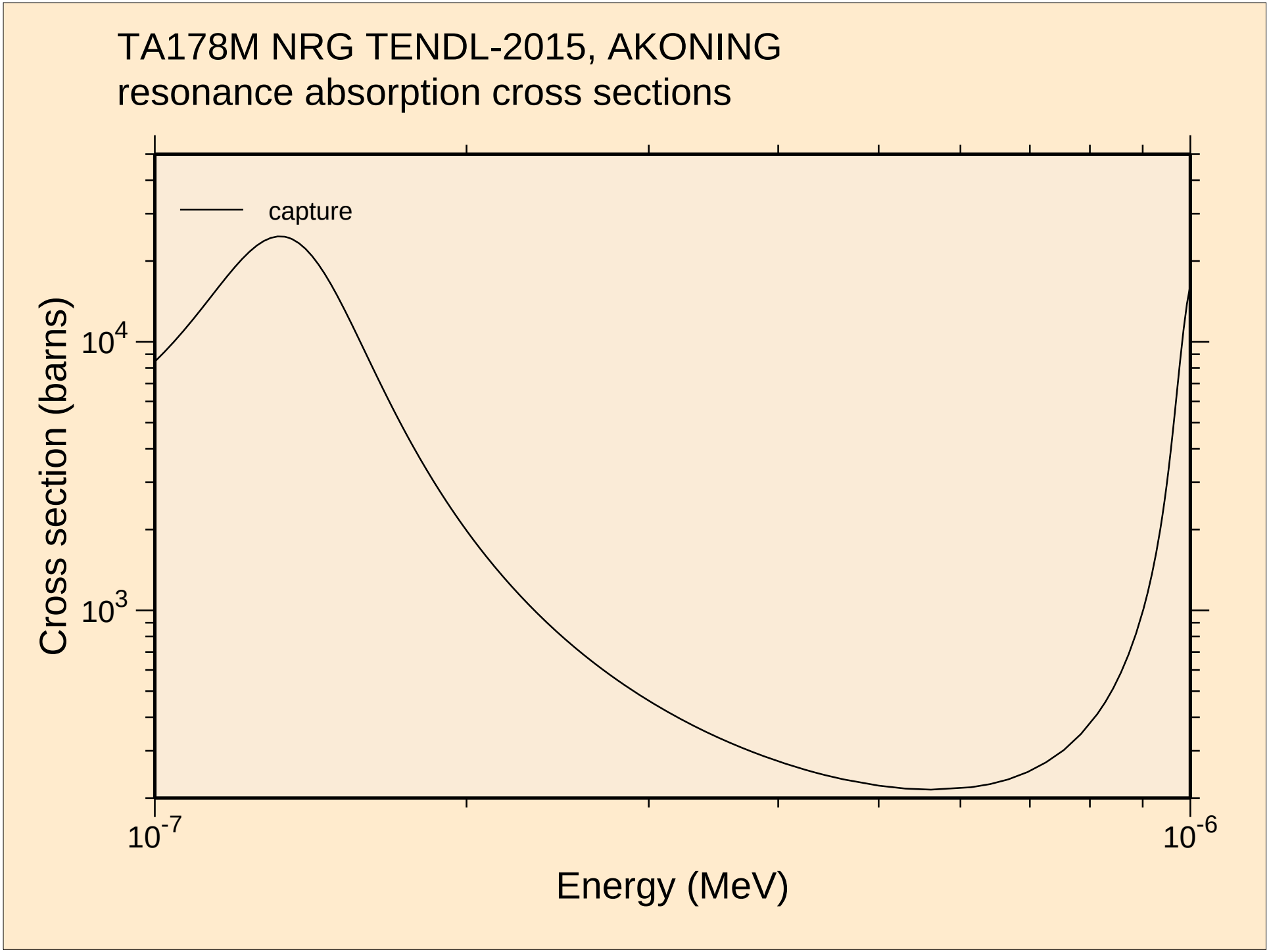

TA178M NRG TENDL-2015, AKONING
resonance total cross section
total
Cross section (barns)
10^4
10^3
10^-6
10^-5
Energy (MeV)

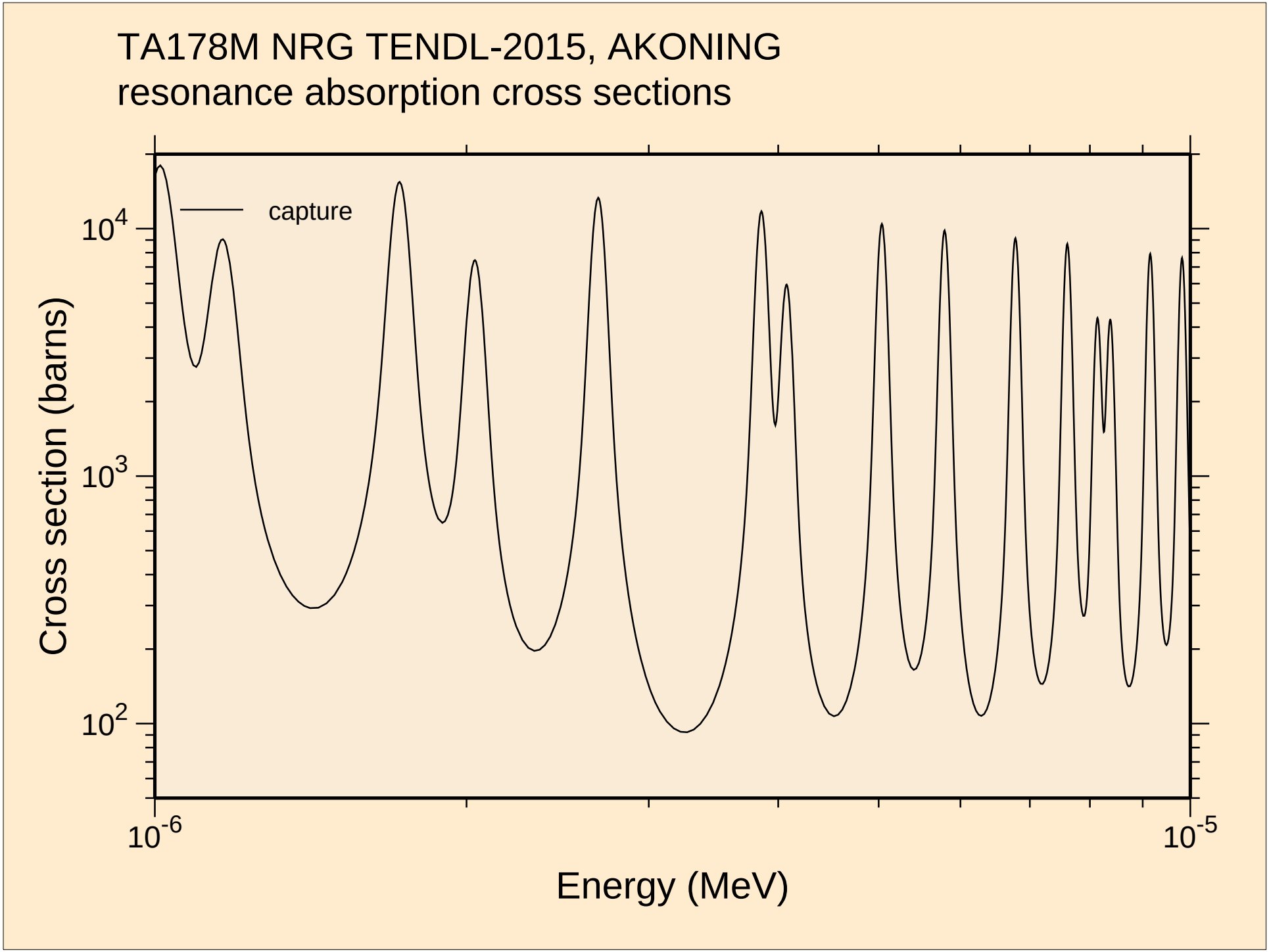

TA178M NRG TENDL-2015, AKONING
resonance total cross section
total
Cross section (barns)
10^4
10^3
10^-5
10^-4
Energy (MeV)

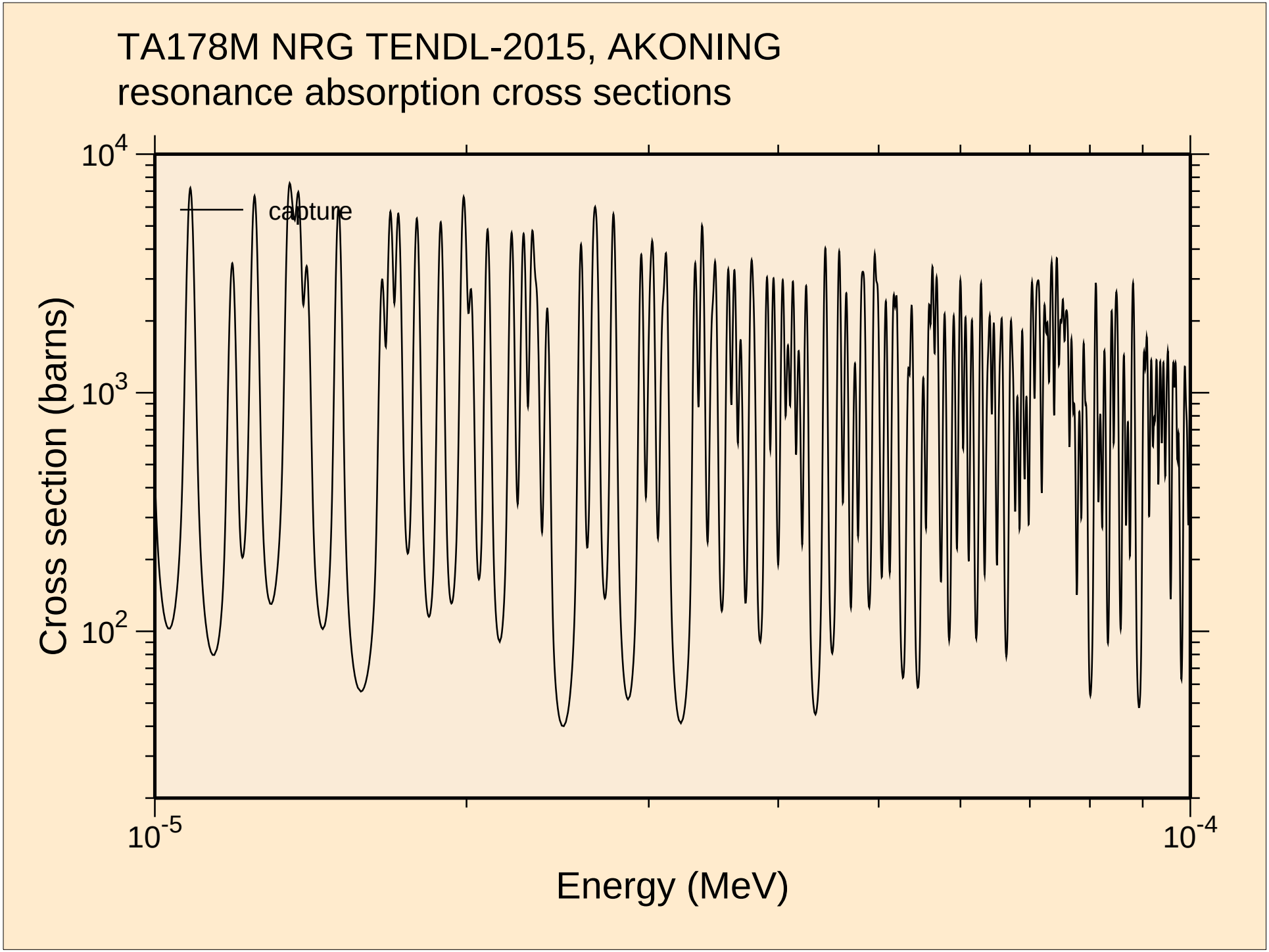

TA178M NRG TENDL-2015, AKONING
resonance total cross section
total
Cross section (barns)
10^4
10^3
10^2
10^-4
10^-3
Energy (MeV)

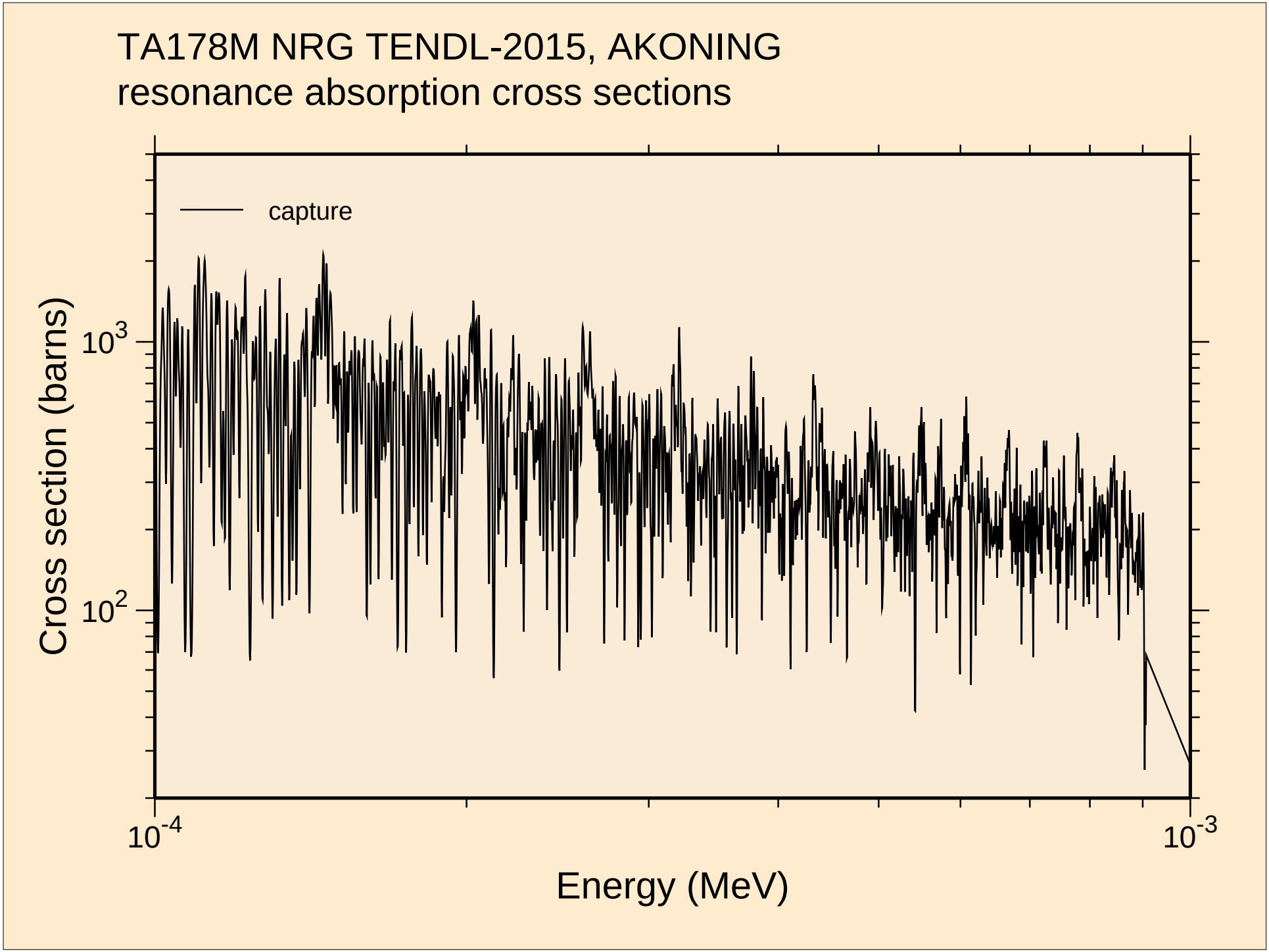

TA178M NRG TENDL-2015, AKONING
resonance total cross section
10^1
total
Cross section (barns)
10^1
10^2
Energy (MeV)

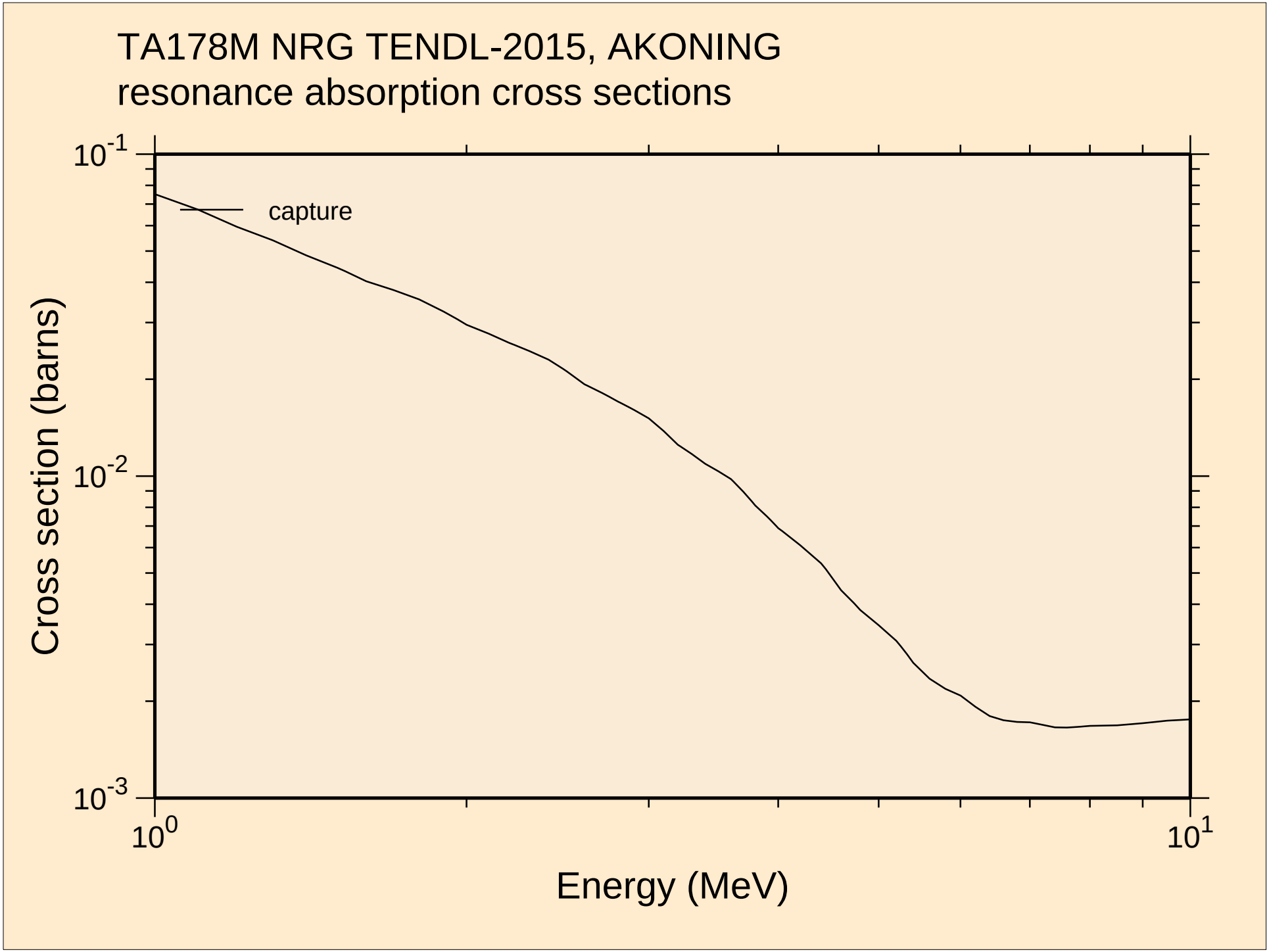

TA178M NRG TENDL-2015, AKONING
resonance absorption cross sections
capture
Cross section (barns)
10^5
10^4
10^-8
10^-7
Energy (MeV)

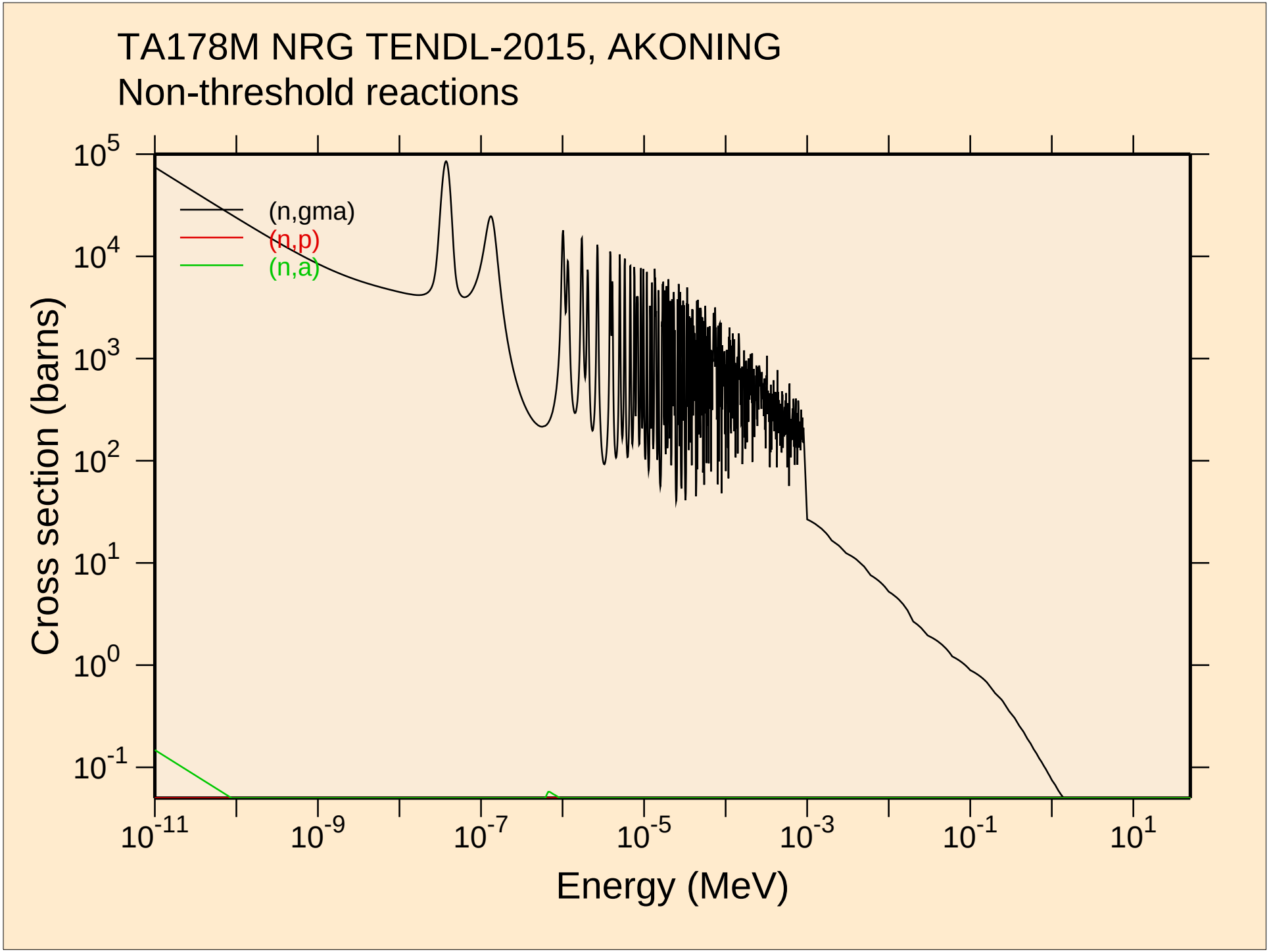

TA178M NRG TENDL-2015, AKONING
resonance absorption cross sections
capture
Cross section (barns)
10^4
10^3
10^-7
10^-6
Energy (MeV)

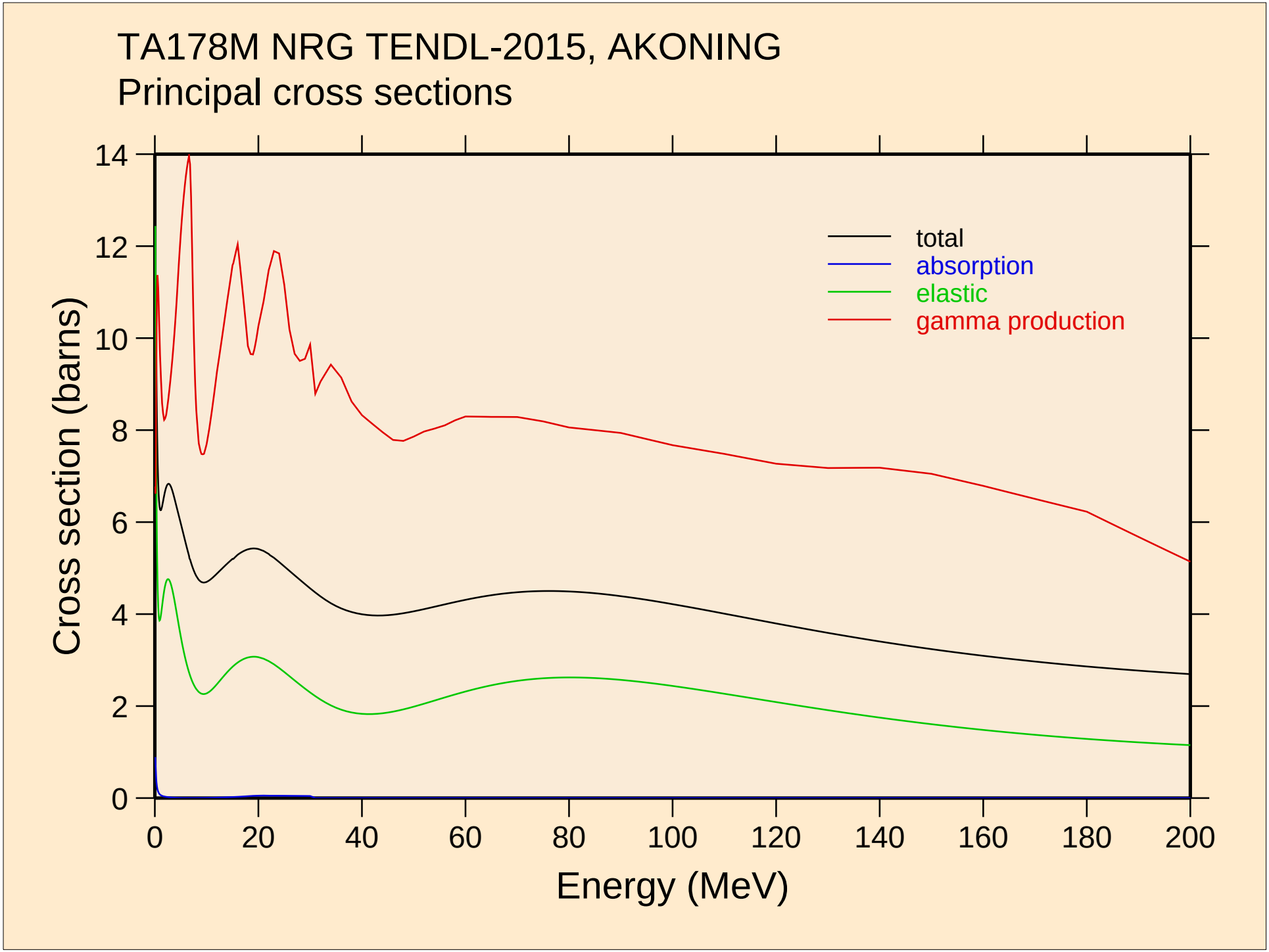

TA178M NRG TENDL-2015, AKONING
resonance absorption cross sections
capture
Cross section (barns)
10^4
10^3
10^2
10^-6
10^-5
Energy (MeV)

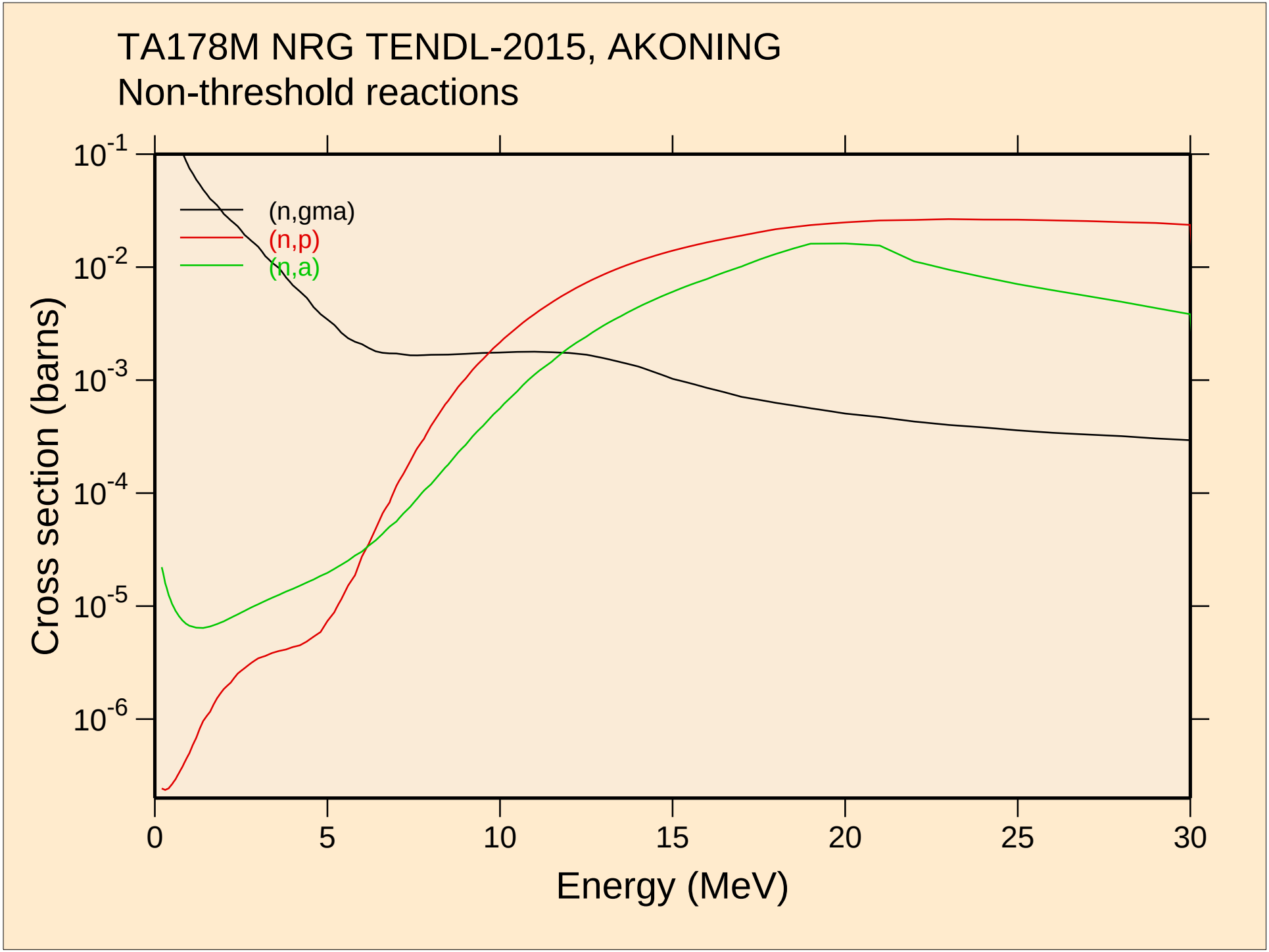

TA178M NRG TENDL-2015, AKONING
resonance absorption cross sections
capture
Cross section (barns)
10^4
10^3
10^2
10^-5
10^-4
Energy (MeV)

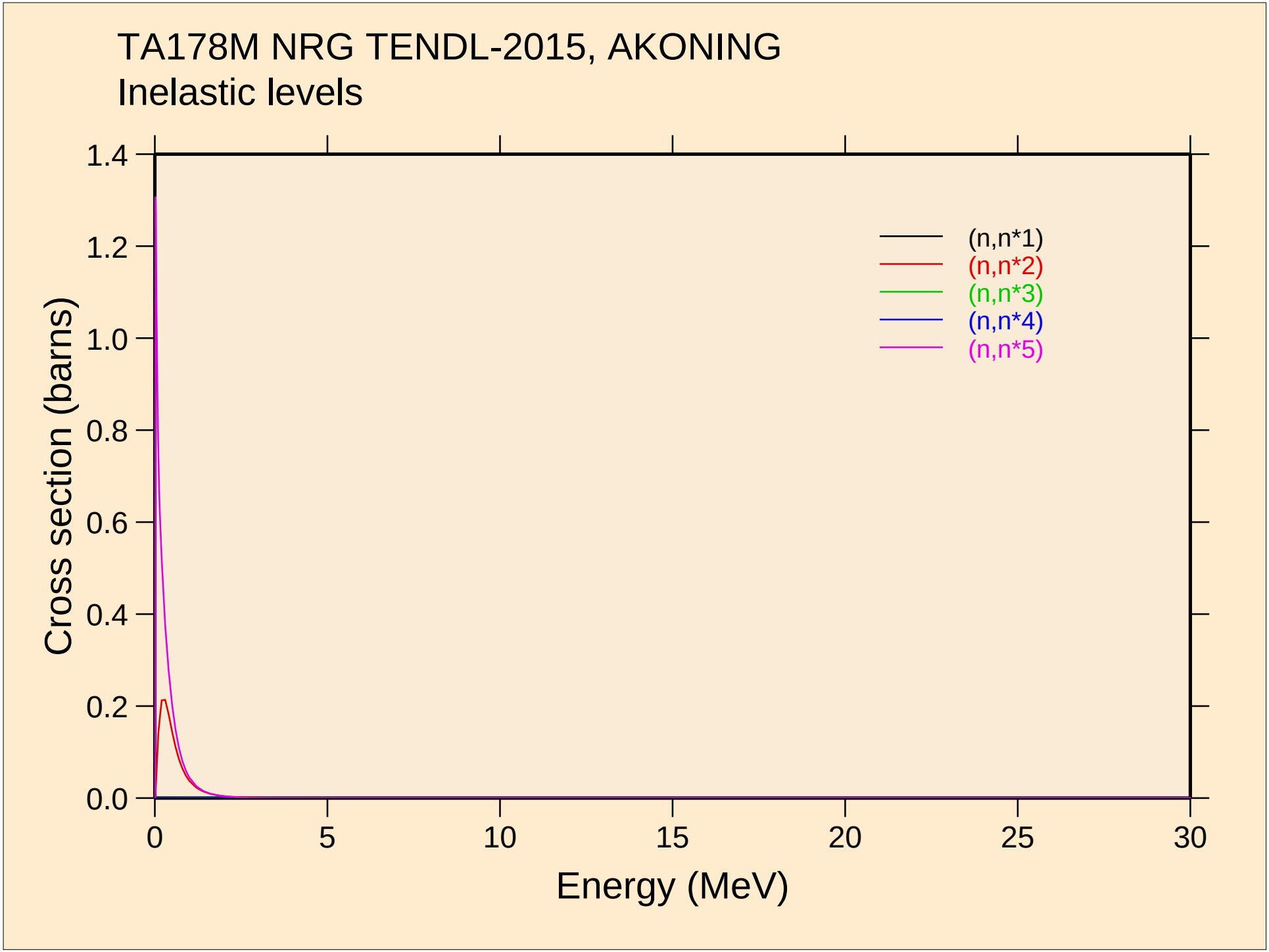

TA178M NRG TENDL-2015, AKONING
resonance absorption cross sections
capture
Cross section (barns)
10^3
10^2
10^-4
10^-3
Energy (MeV)

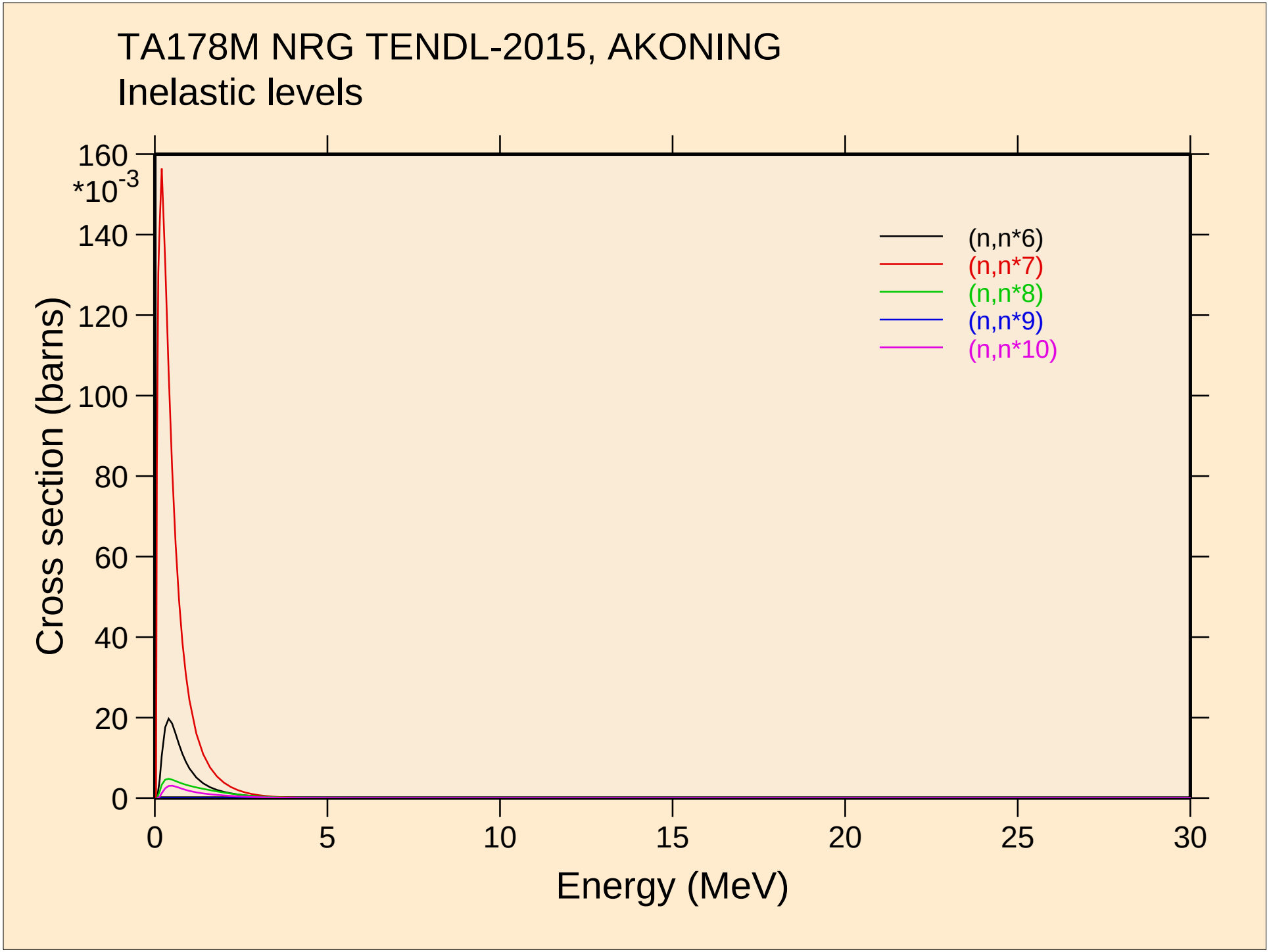

TA178M NRG TENDL-2015, AKONING
resonance absorption cross sections
capture
Cross section (barns)
10-1
10-2
10-3
100
101
Energy (MeV)

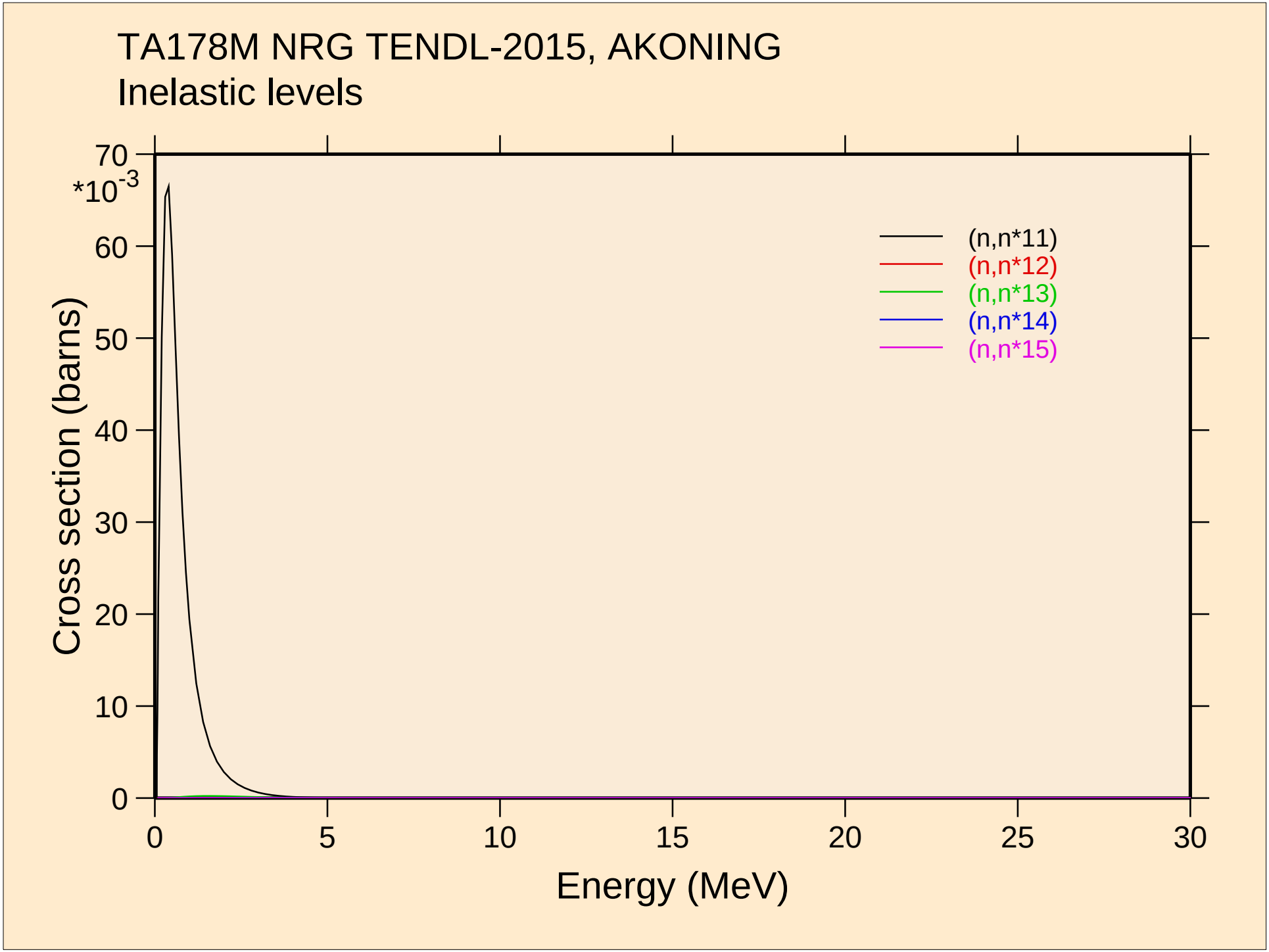

TA178M NRG TENDL-2015, AKONING
Non-threshold reactions
(n,gma)
(n,p)
(n,a)
Cross section (barns)
10^{5}
10^{4}
10^{3}
10^{2}
10^{1}
10^{0}
10^{-1}
10^{-11}
10^{-9}
10^{-7}
10^{-5}
10^{-3}
10^{-1}
10^{1}
Energy (MeV)

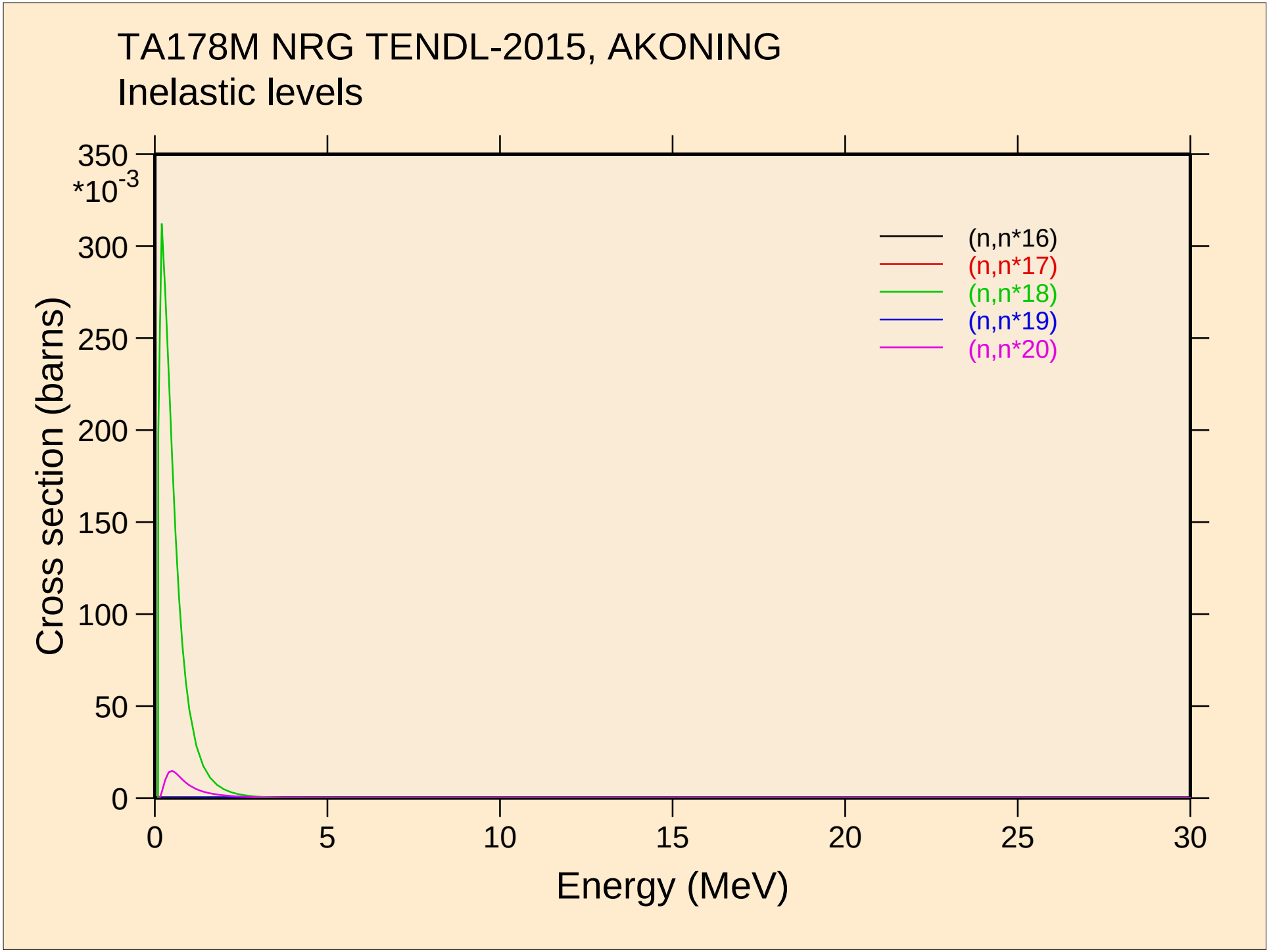

TA178M NRG TENDL-2015, AKONING
Principal cross sections
Cross section (barns)
Energy (MeV)
0
2
4
6
8
10
12
14
0
20
40
60
80
100
120
140
160
180
200
total
absorption
elastic
gamma production

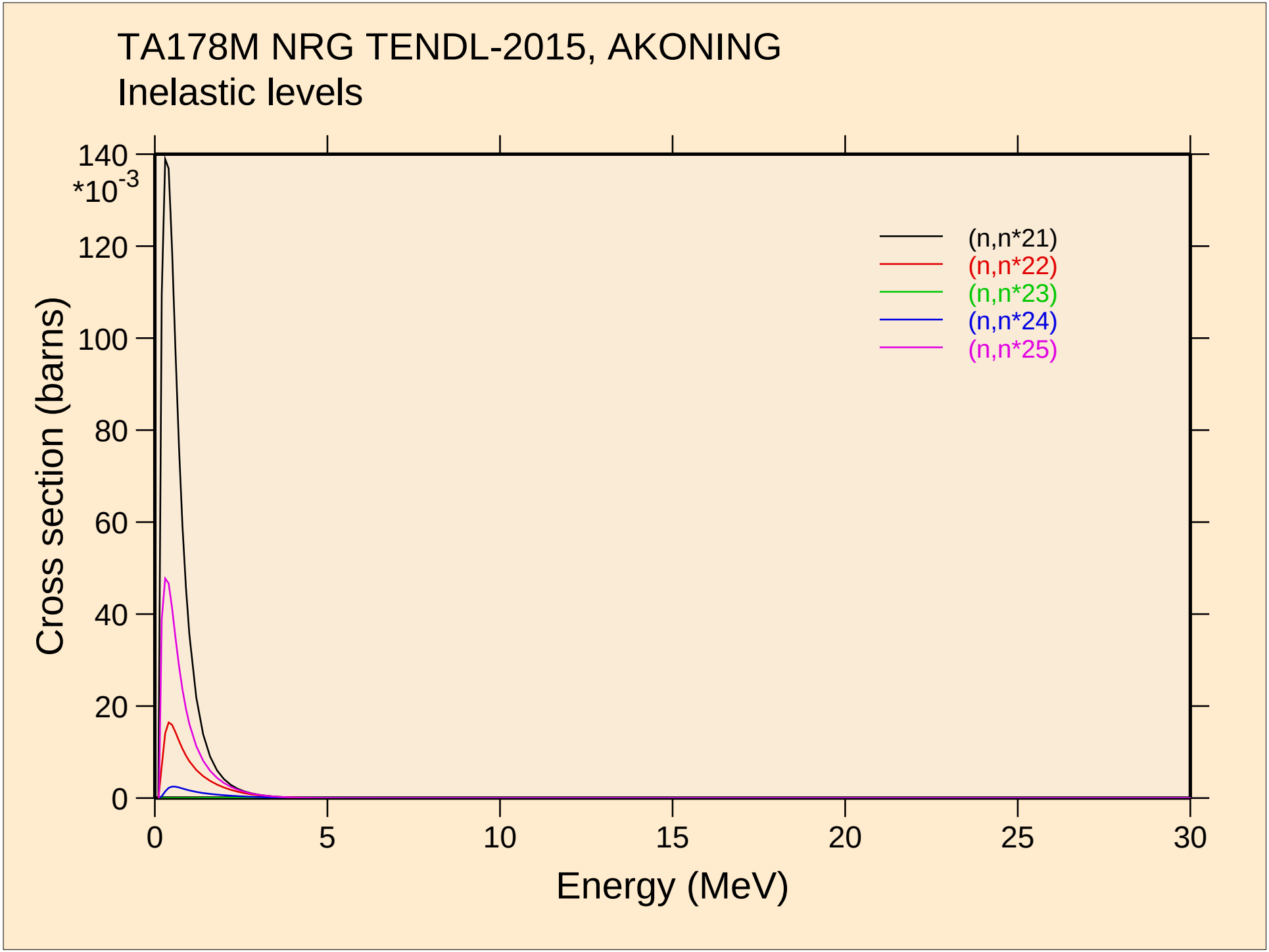

TA178M NRG TENDL-2015, AKONING
Non-threshold reactions
(n,gma)
(n,p)
(n,a)
Cross section (barns)
10-1
10-2
10-3
10-4
10-5
10-6
0
5
10
15
20
25
30
Energy (MeV)

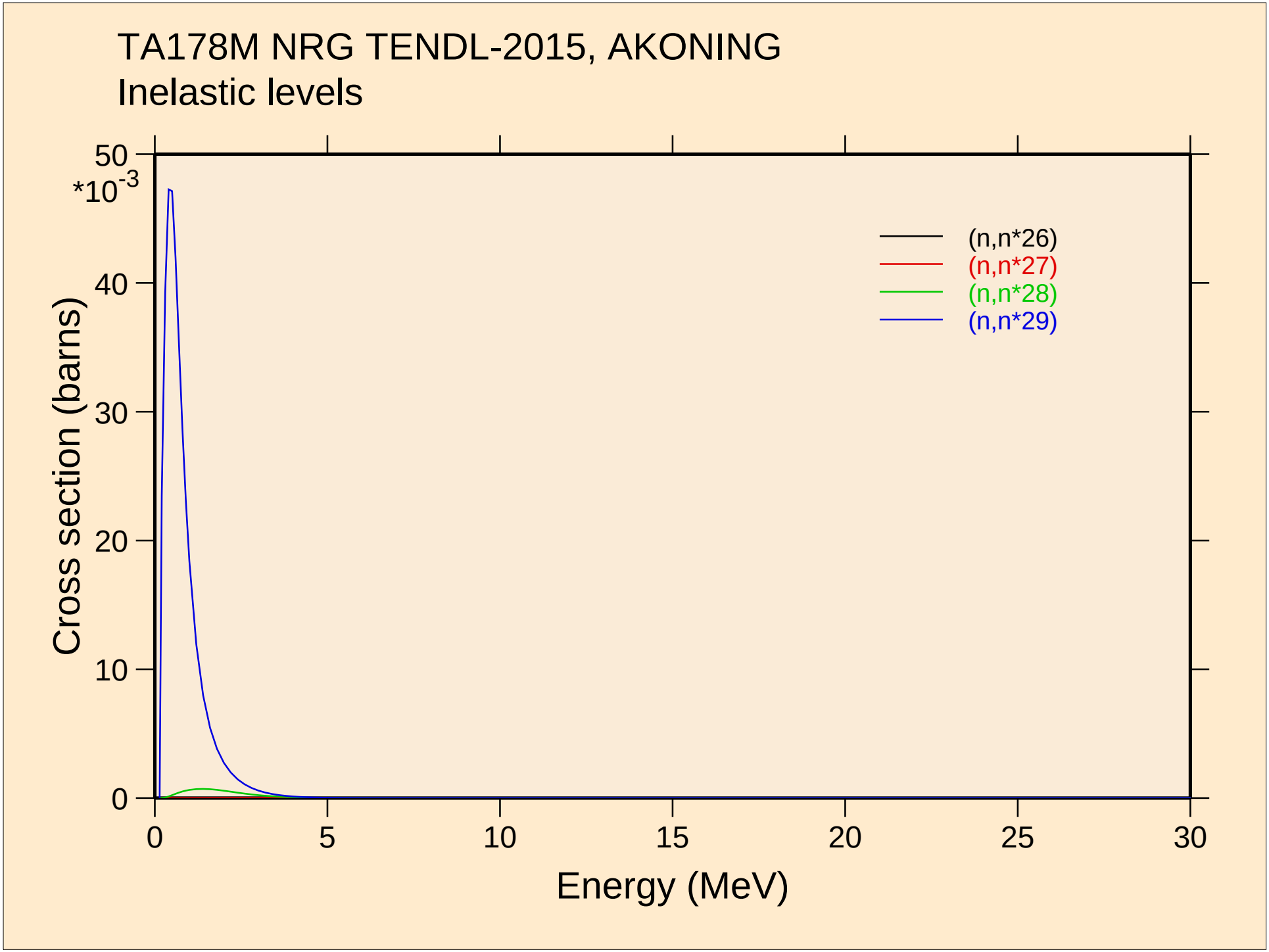

TA178M NRG TENDL-2015, AKONING
Inelastic levels
Cross section (barns)
Energy (MeV)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
5
10
15
20
25
30
(n,n*1)
(n,n*2)
(n,n*3)
(n,n*4)
(n,n*5)

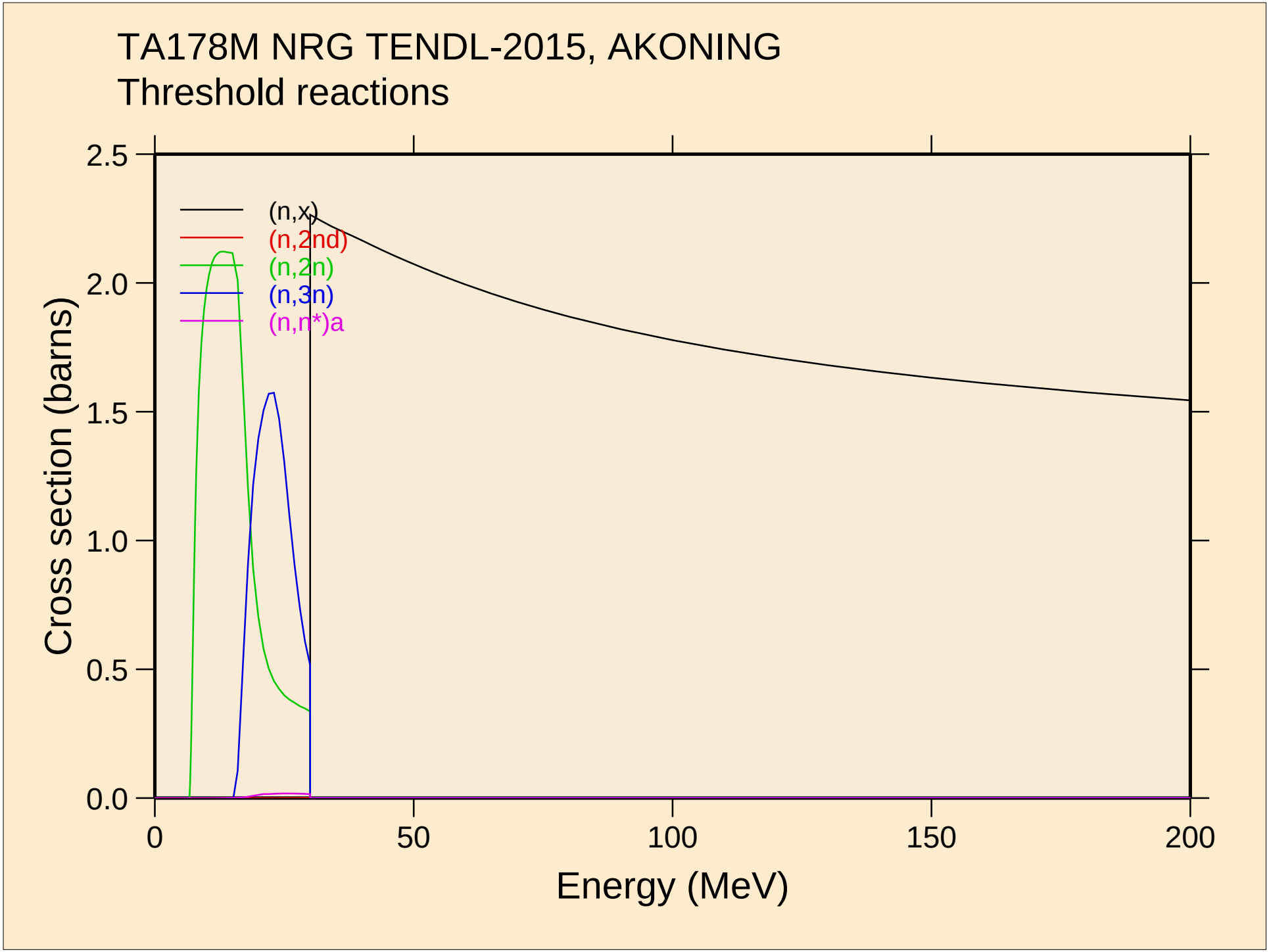

TA178M NRG TENDL-2015, AKONING
Inelastic levels
160
*10-3
140
120
100
80
60
40
20
0
Cross section (barns)
0
5
10
15
20
25
30
Energy (MeV)
(n,n*6)
(n,n*7)
(n,n*8)
(n,n*9)
(n,n*10)

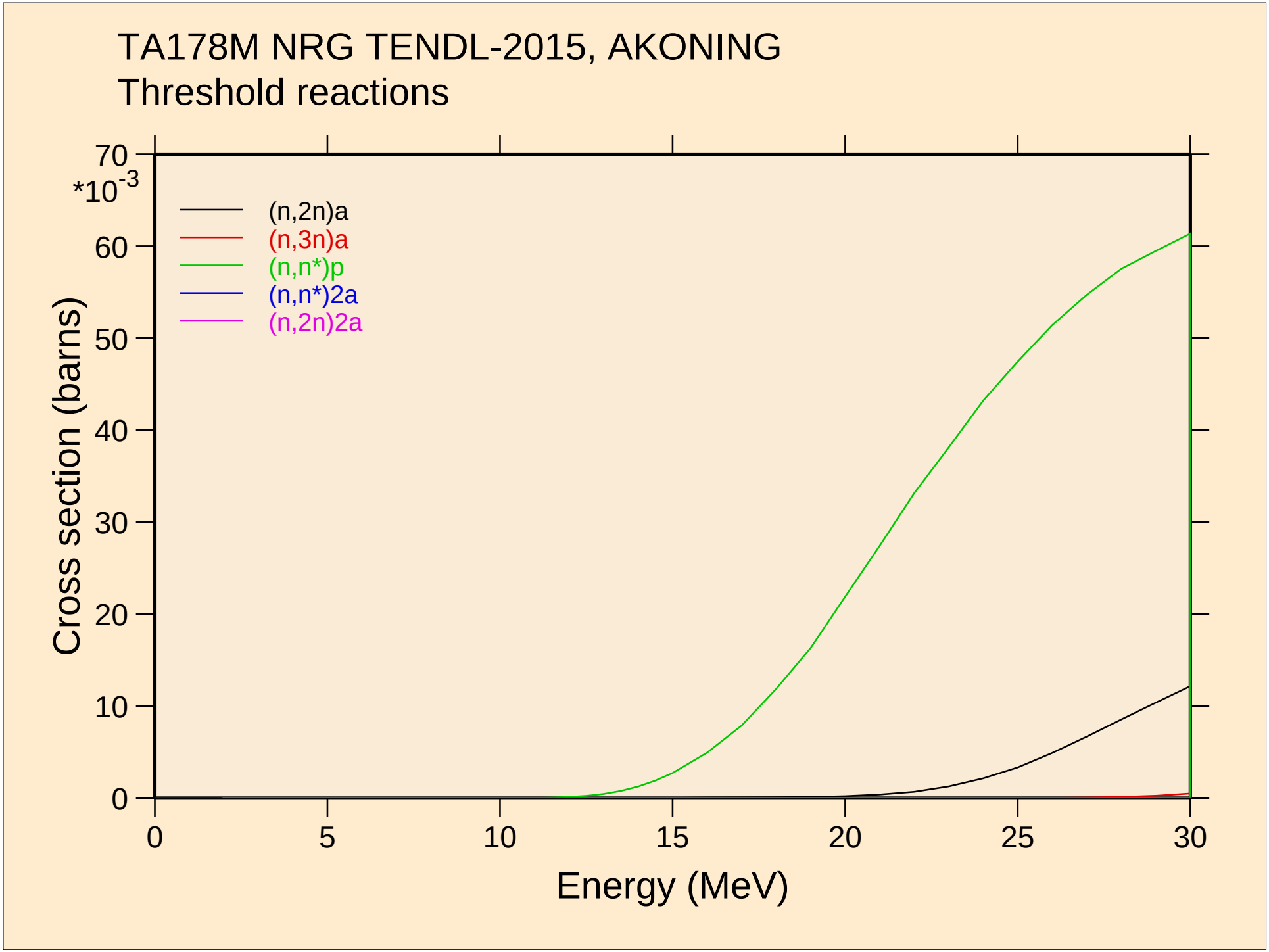

TA178M NRG TENDL-2015, AKONING
Inelastic levels
Cross section (barns)
*10-3
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
Energy (MeV)
(n,n*11)
(n,n*12)
(n,n*13)
(n,n*14)
(n,n*15)

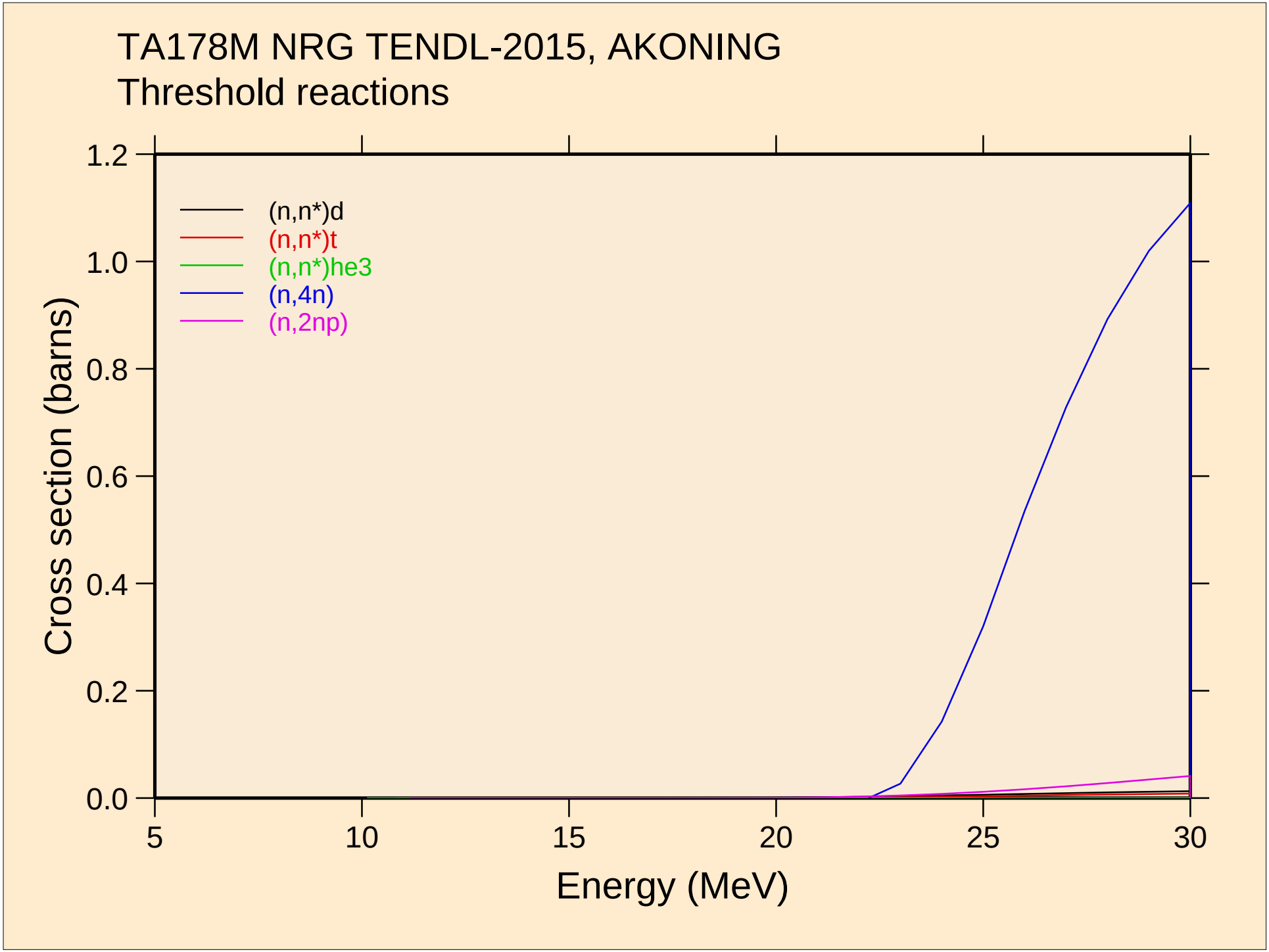

TA178M NRG TENDL-2015, AKONING
Inelastic levels
350
*10-3
300
250
200
150
100
50
0
Cross section (barns)
0
5
10
15
20
25
30
Energy (MeV)
(n,n*16)
(n,n*17)
(n,n*18)
(n,n*19)
(n,n*20)

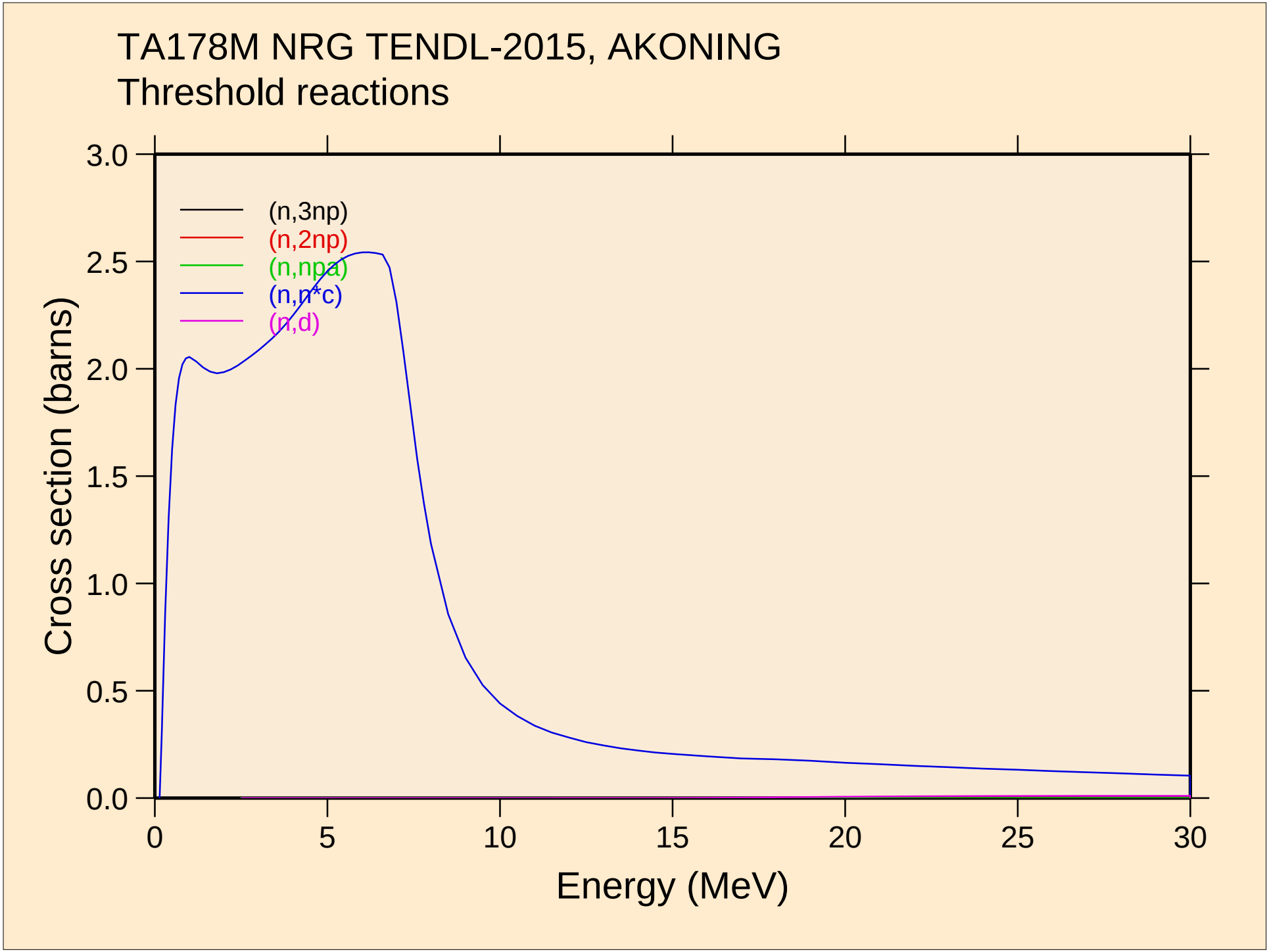

TA178M NRG TENDL-2015, AKONING
Inelastic levels
140
*10-3
120
100
80
60
40
20
0
Cross section (barns)
0
5
10
15
20
25
30
Energy (MeV)
(n,n*21)
(n,n*22)
(n,n*23)
(n,n*24)
(n,n*25)

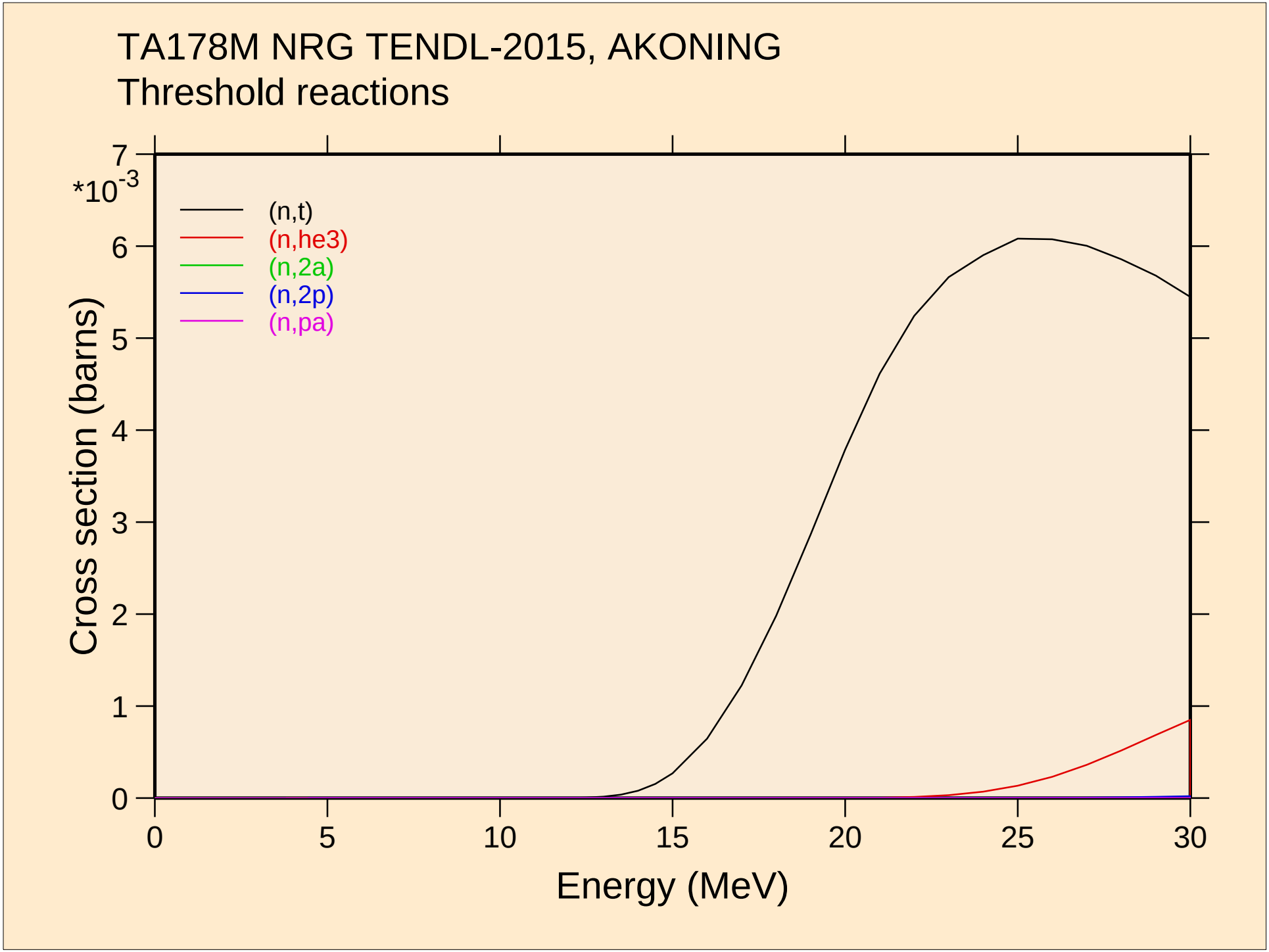

TA178M NRG TENDL-2015, AKONING
Inelastic levels
Cross section (barns)
*10-3
50
40
30
20
10
0
0
5
10
15
20
25
30
Energy (MeV)
(n,n*26)
(n,n*27)
(n,n*28)
(n,n*29)

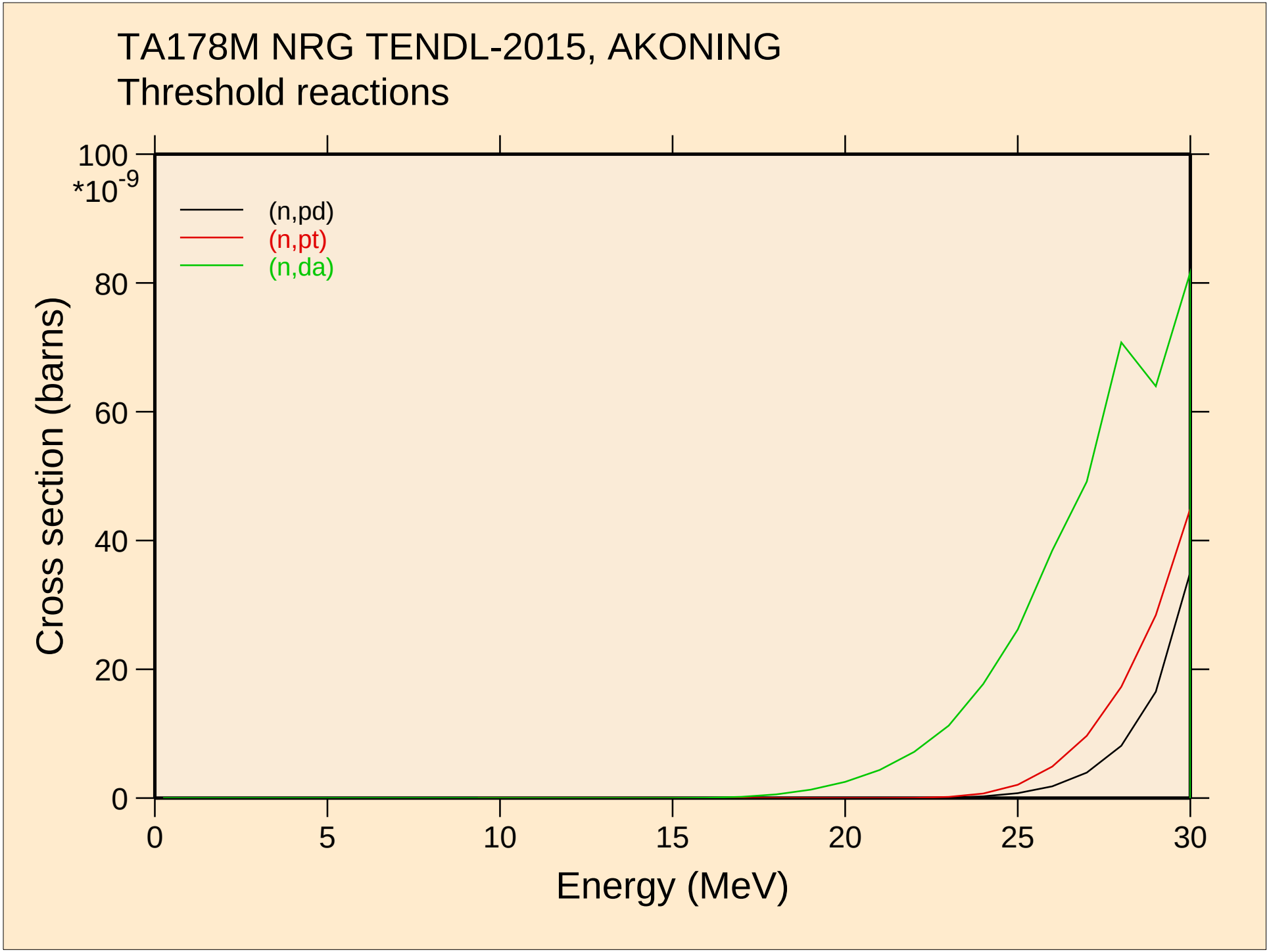

TA178M NRG TENDL-2015, AKONING
Threshold reactions
(n,x)
(n,2nd)
(n,2n)
(n,3n)
(n,n*)a
Cross section (barns)
2.5
2.0
1.5
1.0
0.5
0.0
0
50
100
150
200
Energy (MeV)

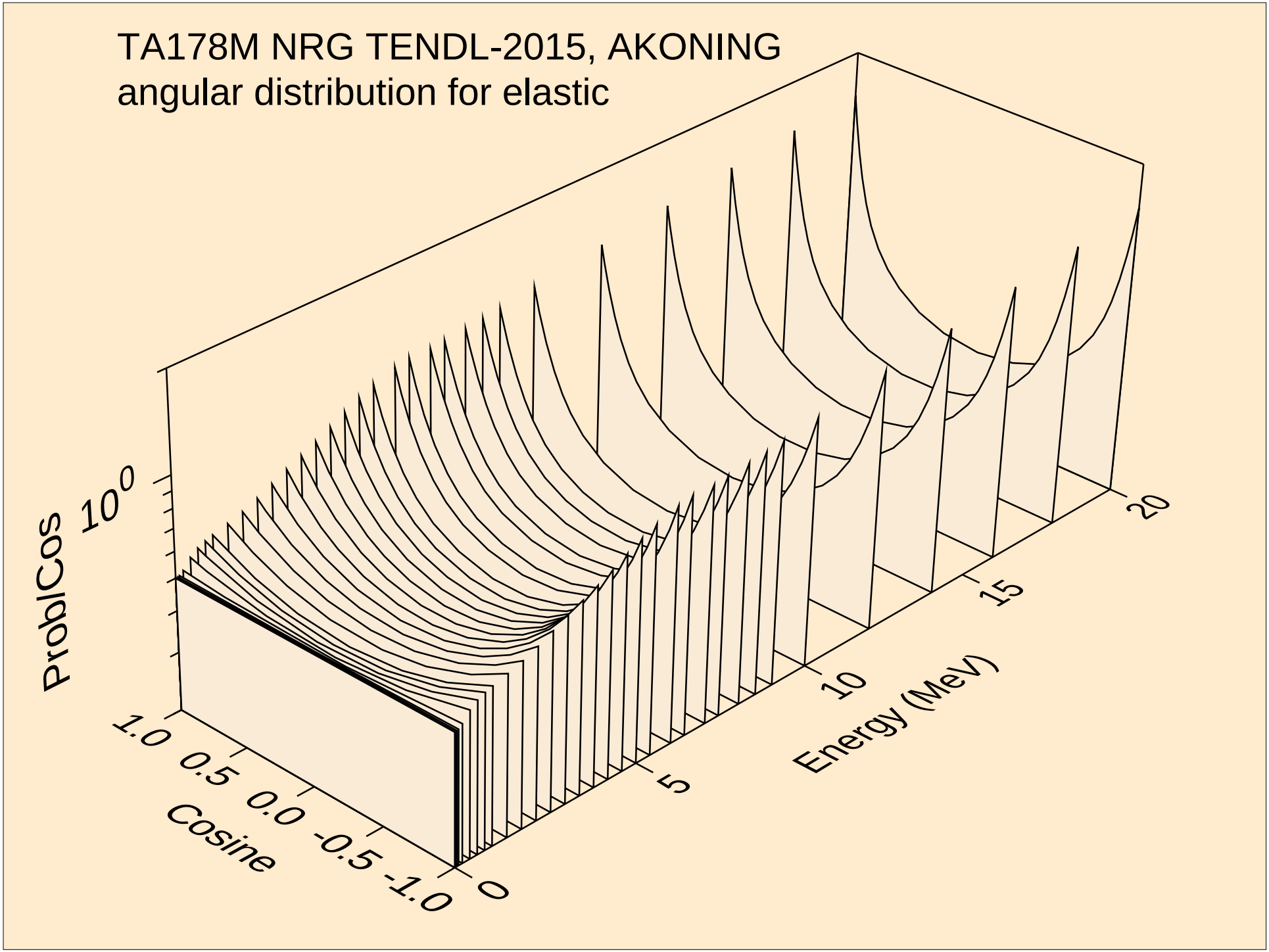

TA178M NRG TENDL-2015, AKONING
Threshold reactions
*10-3
70
60
50
40
30
20
10
0
(n,2n)a
(n,3n)a
(n,n*)p
(n,n*)2a
(n,2n)2a
Cross section (barns)
0
5
10
15
20
25
30
Energy (MeV)

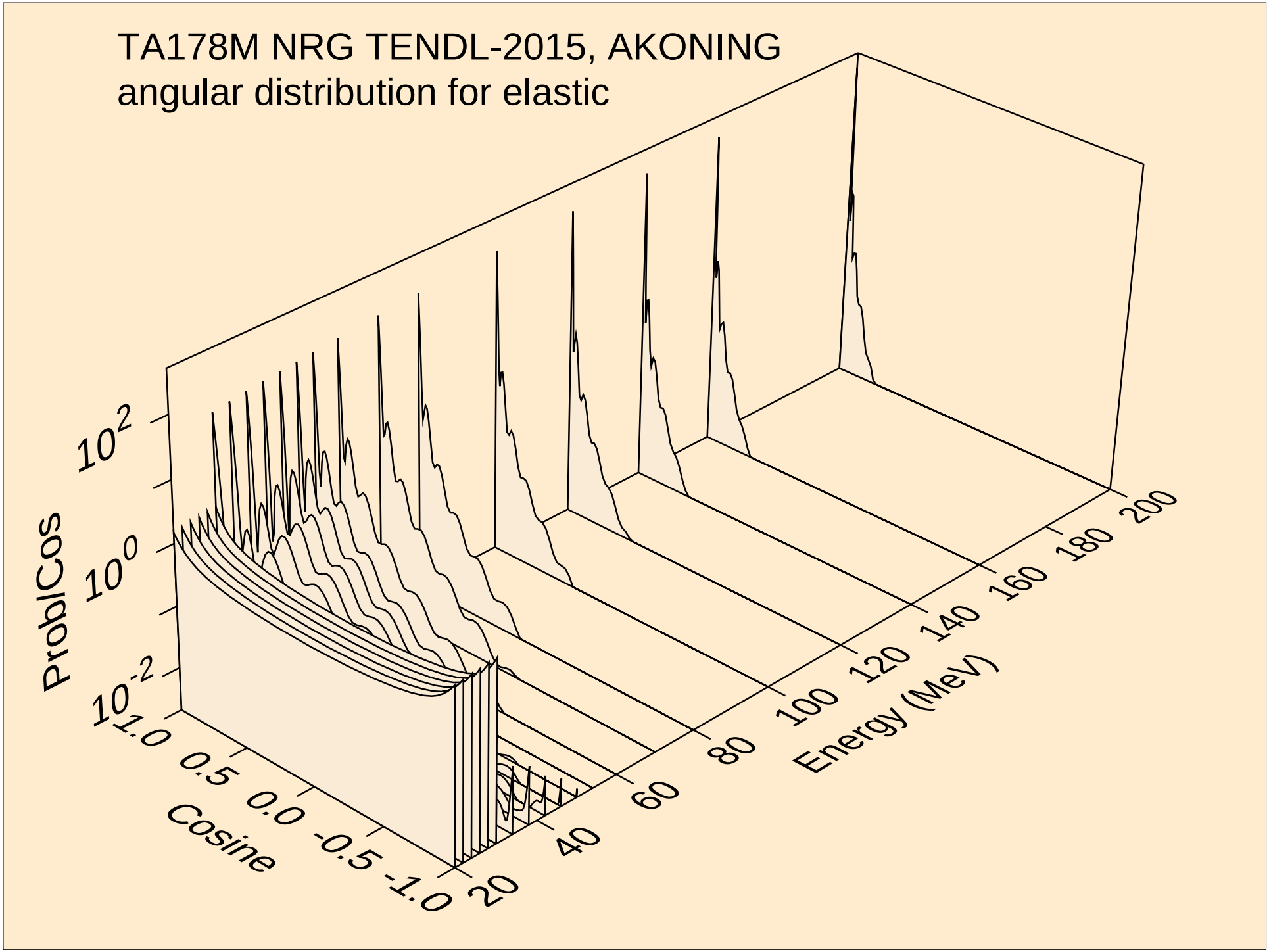

TA178M NRG TENDL-2015, AKONING
Threshold reactions
(n,n*)d
(n,n*)t
(n,n*)he3
(n,4n)
(n,2np)
Cross section (barns)
Energy (MeV)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
5
10
15
20
25
30

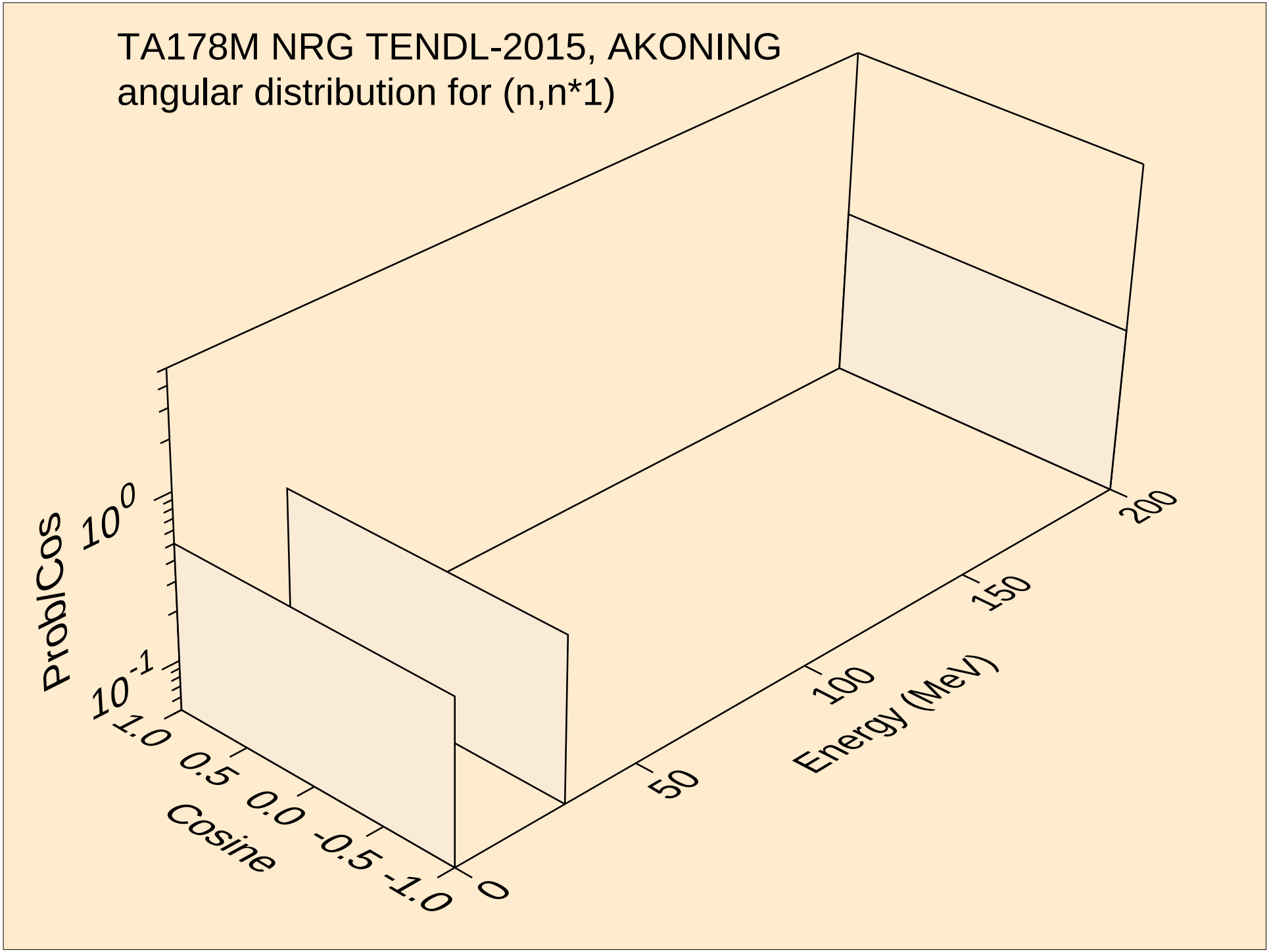

TA178M NRG TENDL-2015, AKONING
Threshold reactions
(n,3np)
(n,2np)
(n,npa)
(n,n*c)
(n,d)
Cross section (barns)
Energy (MeV)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
5
10
15
20
25
30

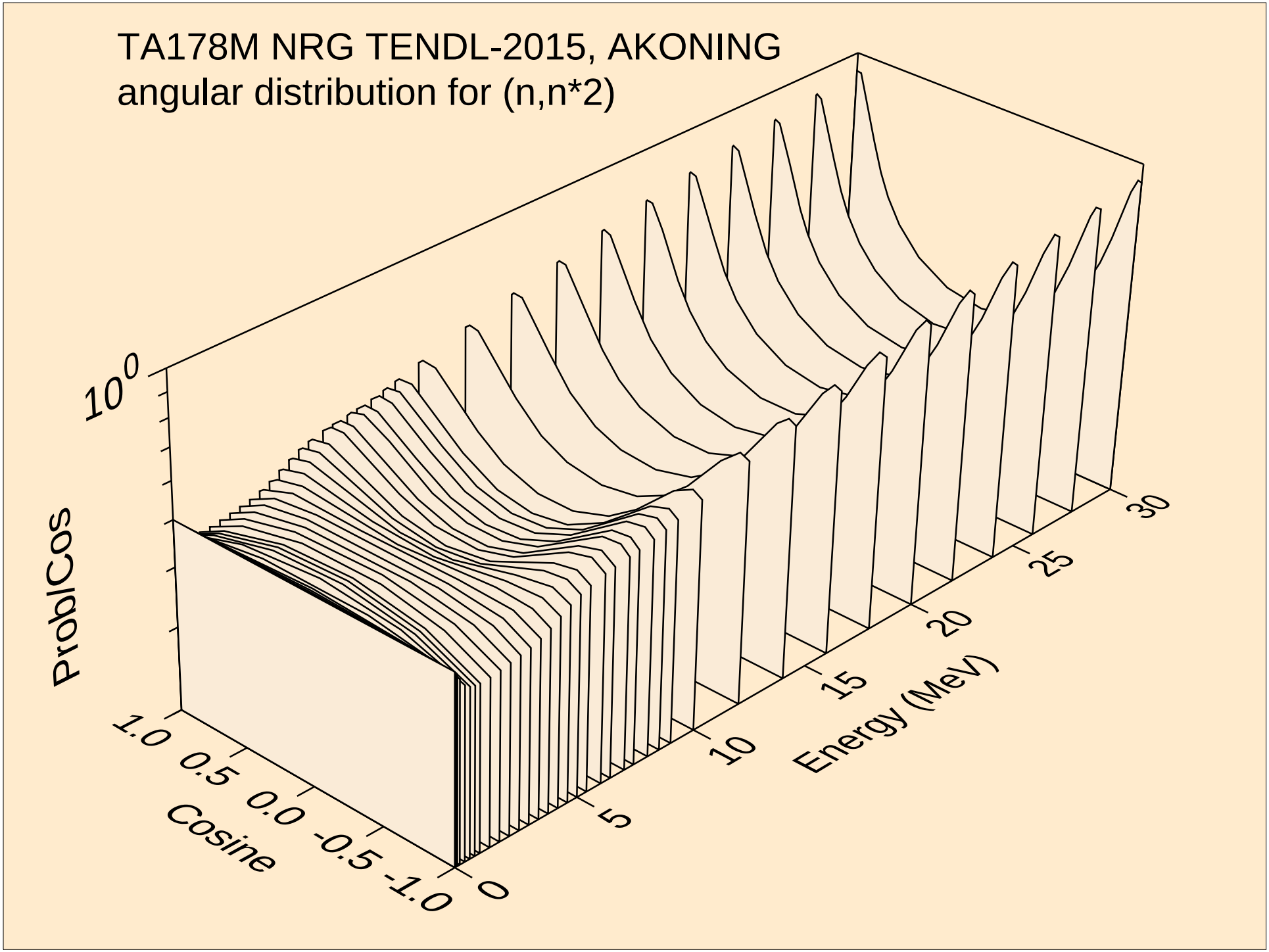

TA178M NRG TENDL-2015, AKONING
Threshold reactions
*10-3
Cross section (barns)
(n,t)
(n,he3)
(n,2a)
(n,2p)
(n,pa)
0
1
2
3
4
5
6
7
0
5
10
15
20
25
30
Energy (MeV)

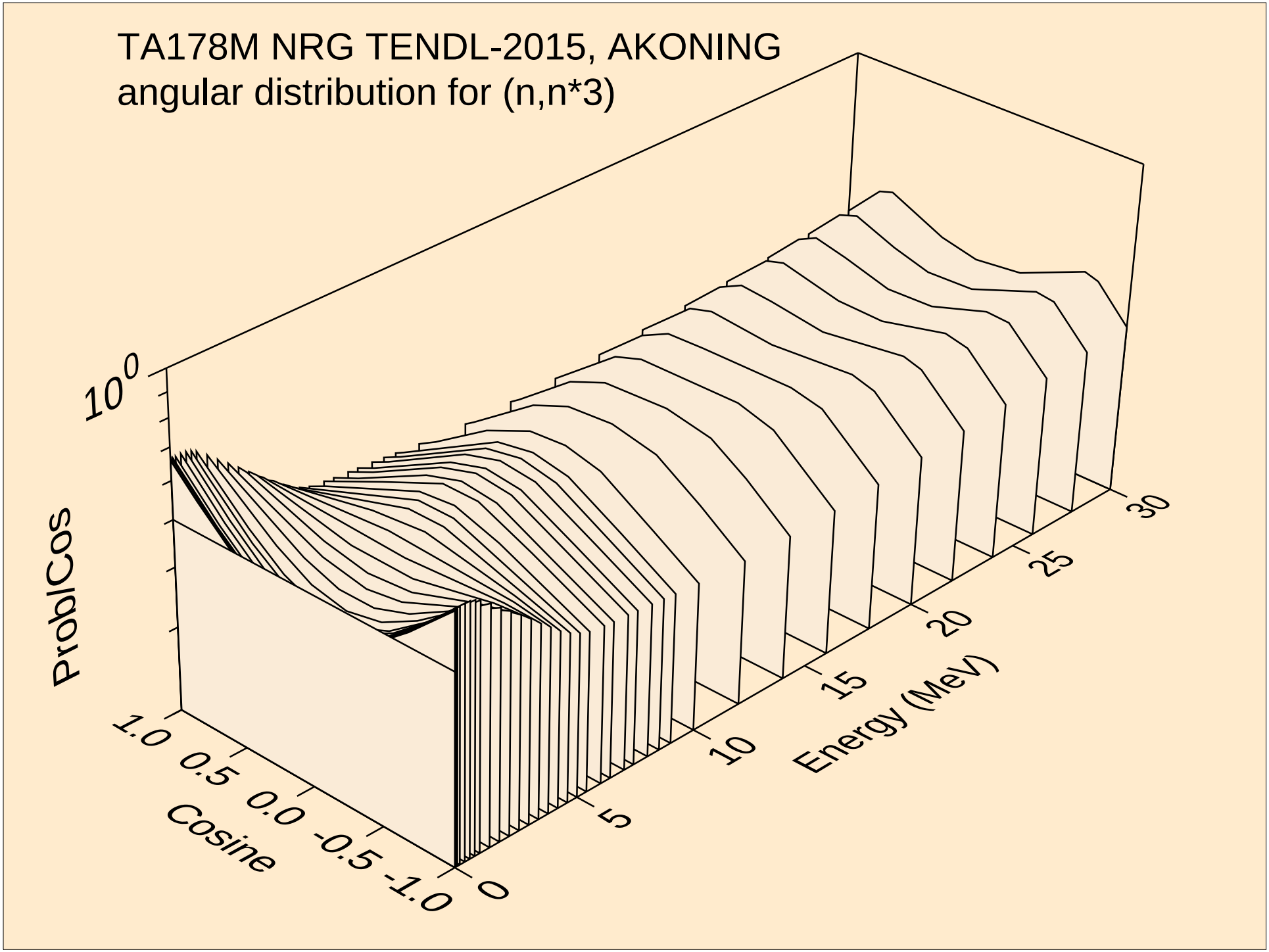

TA178M NRG TENDL-2015, AKONING
Threshold reactions
100
*10-9
80
60
40
20
0
(n,pd)
(n,pt)
(n,da)
Cross section (barns)
0
5
10
15
20
25
30
Energy (MeV)

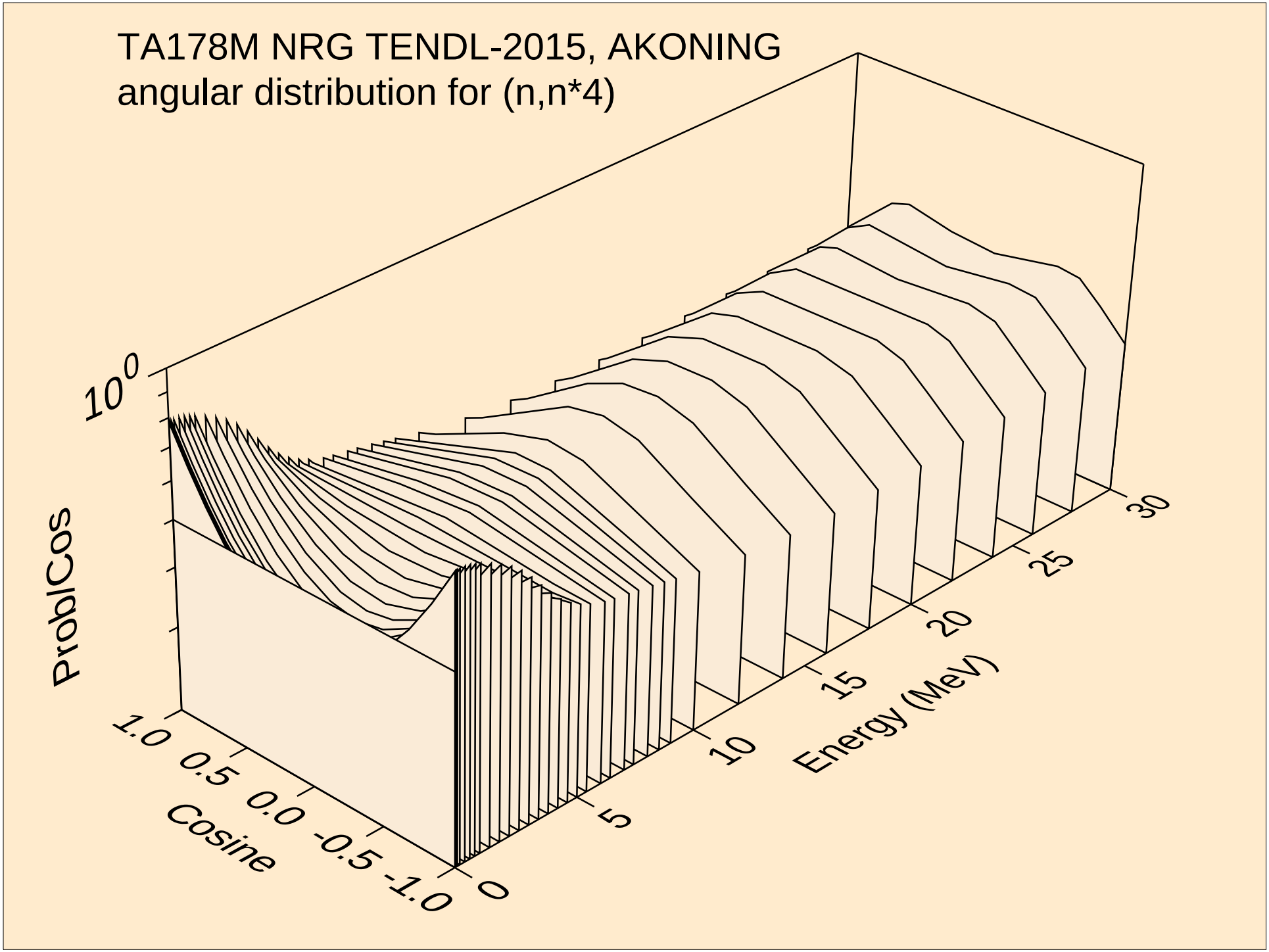

TA178M NRG TENDL-2015, AKONING
angular distribution for elastic
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)

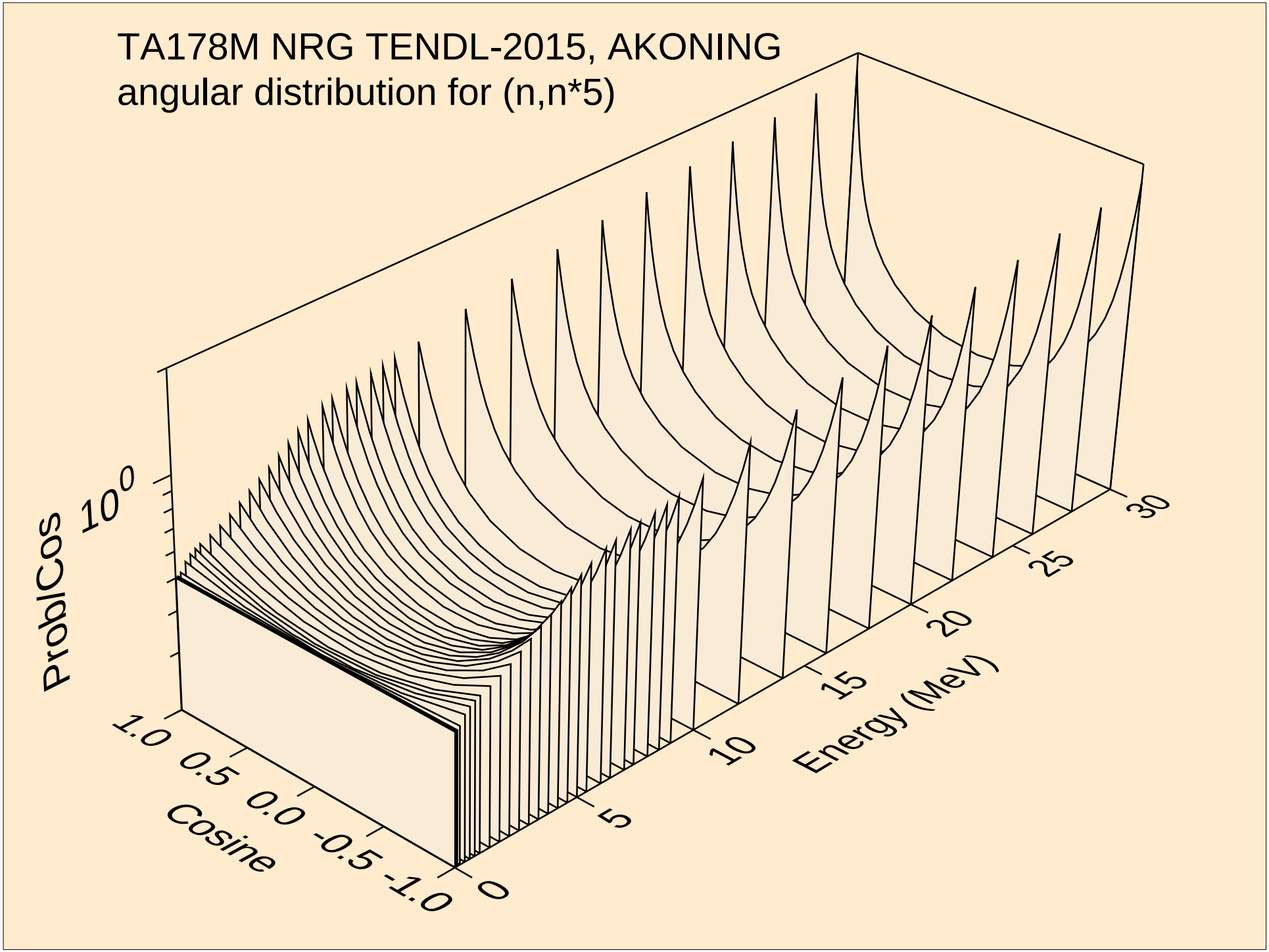

TA178M NRG TENDL-2015, AKONING
angular distribution for elastic
ProbCos
10^2
10^0
10^{-2}
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
180
200
Energy (MeV)

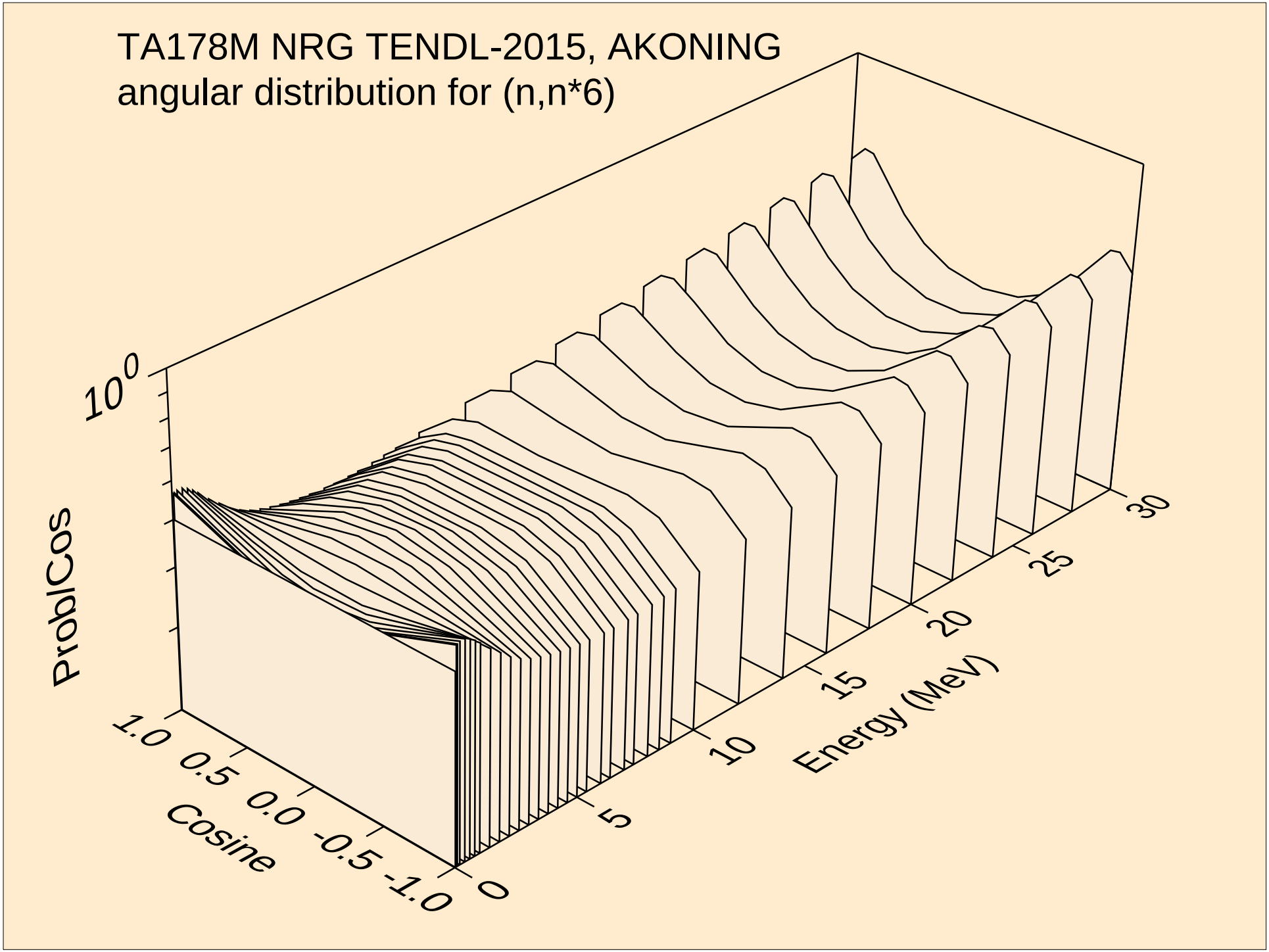

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*1)
Prob\Cos
10^0
10^-1
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
50
100
150
200
Energy (MeV)

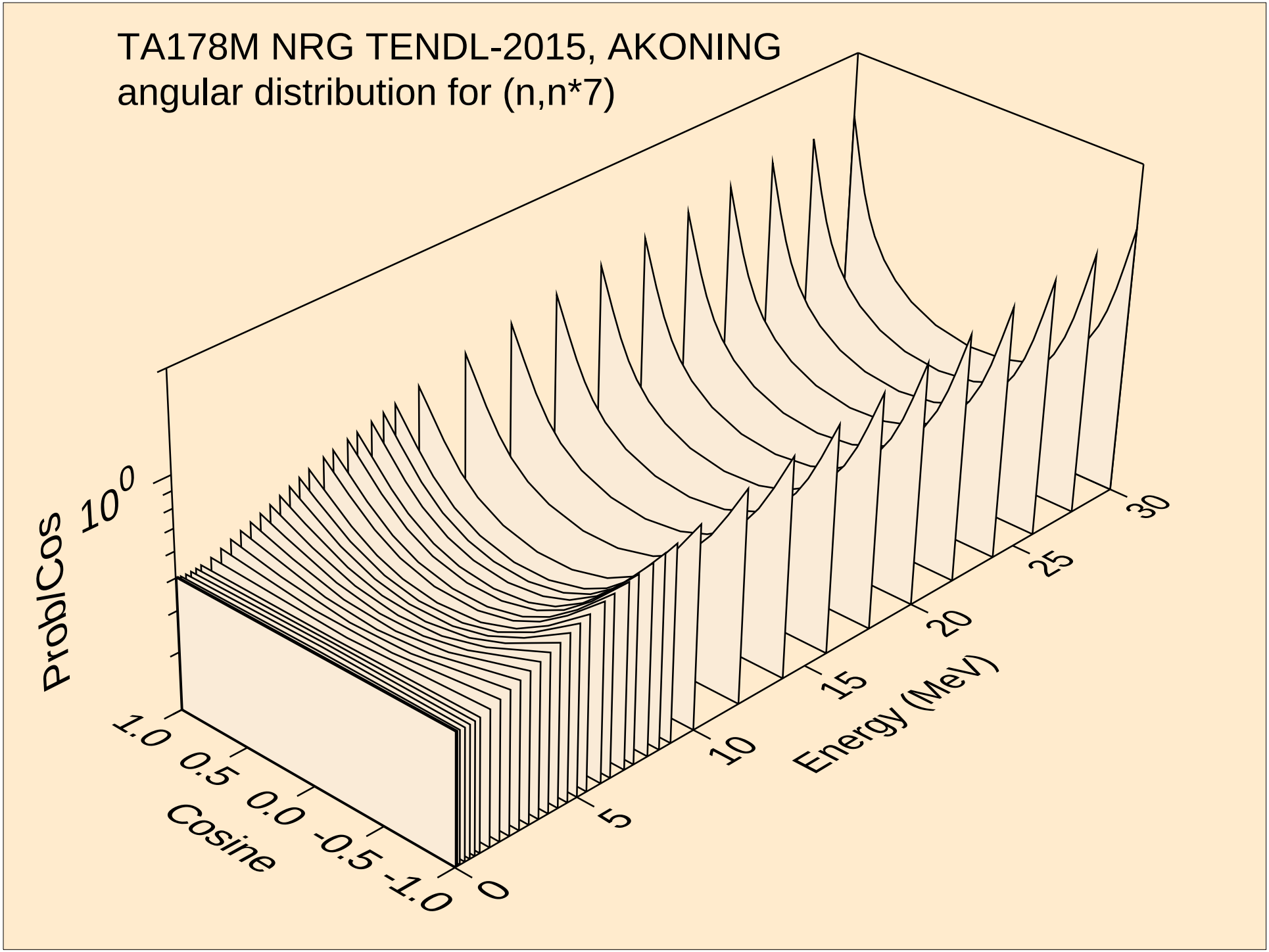

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*2)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

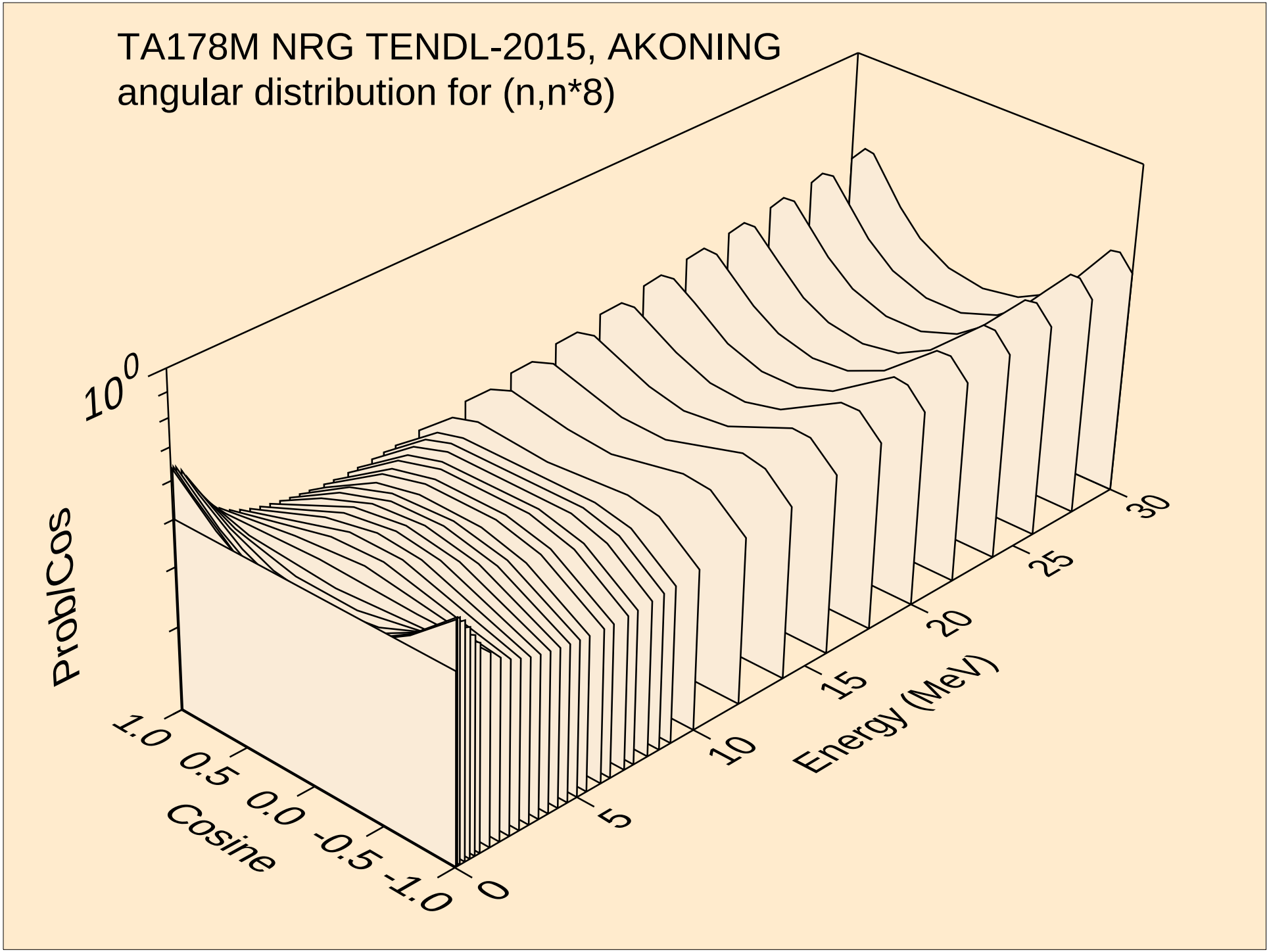

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*3)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

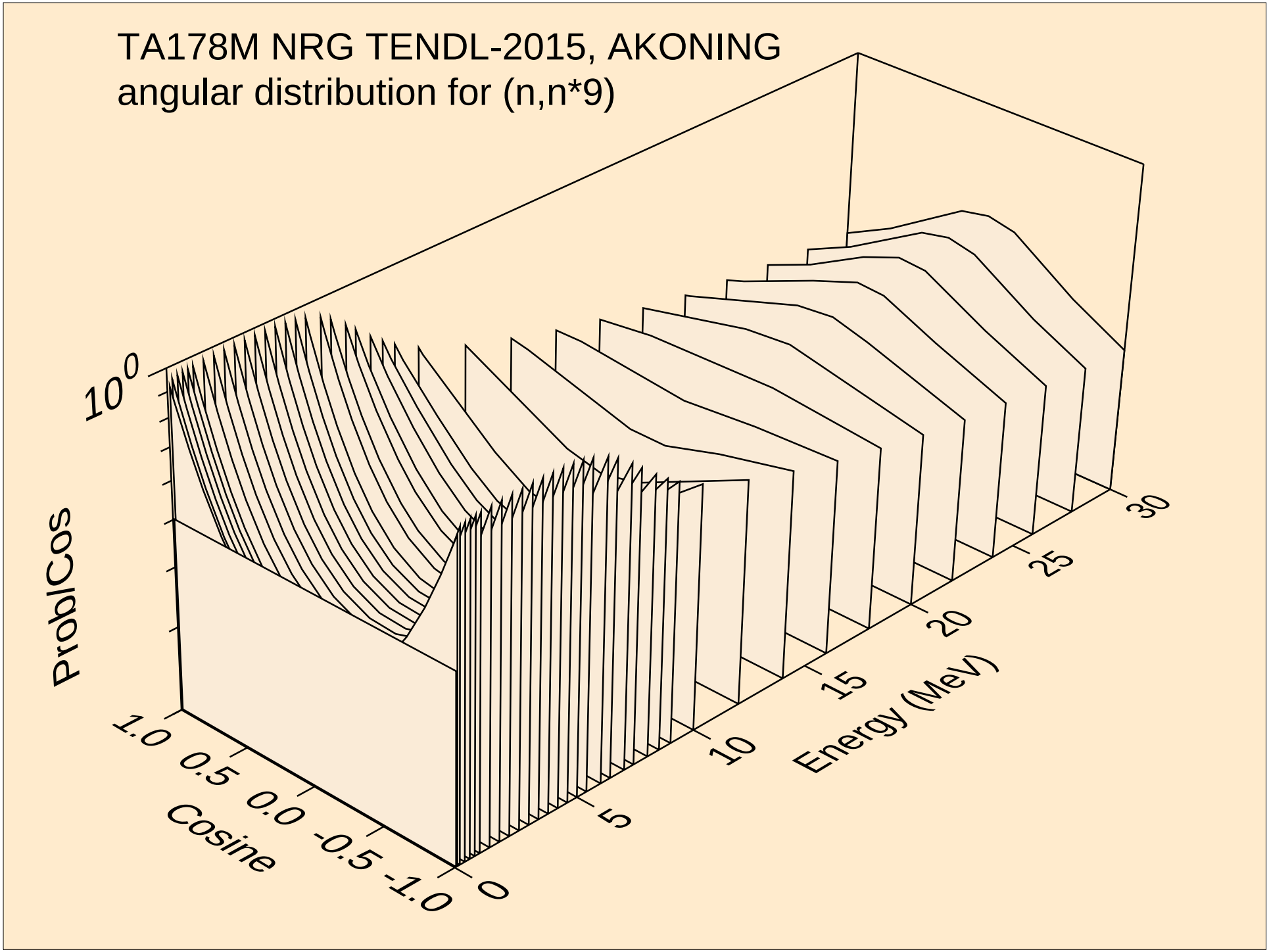

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*4)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

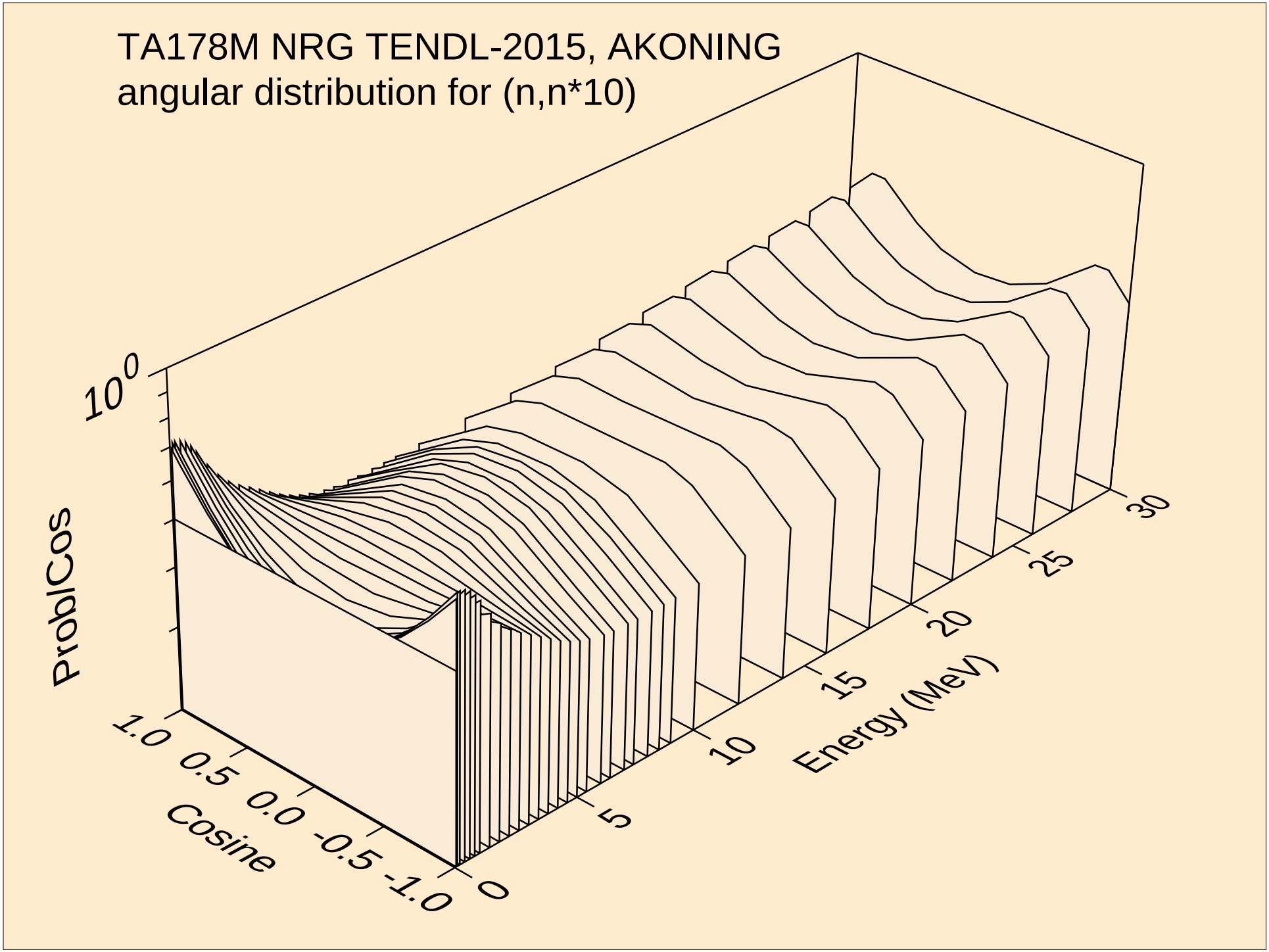

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*5)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

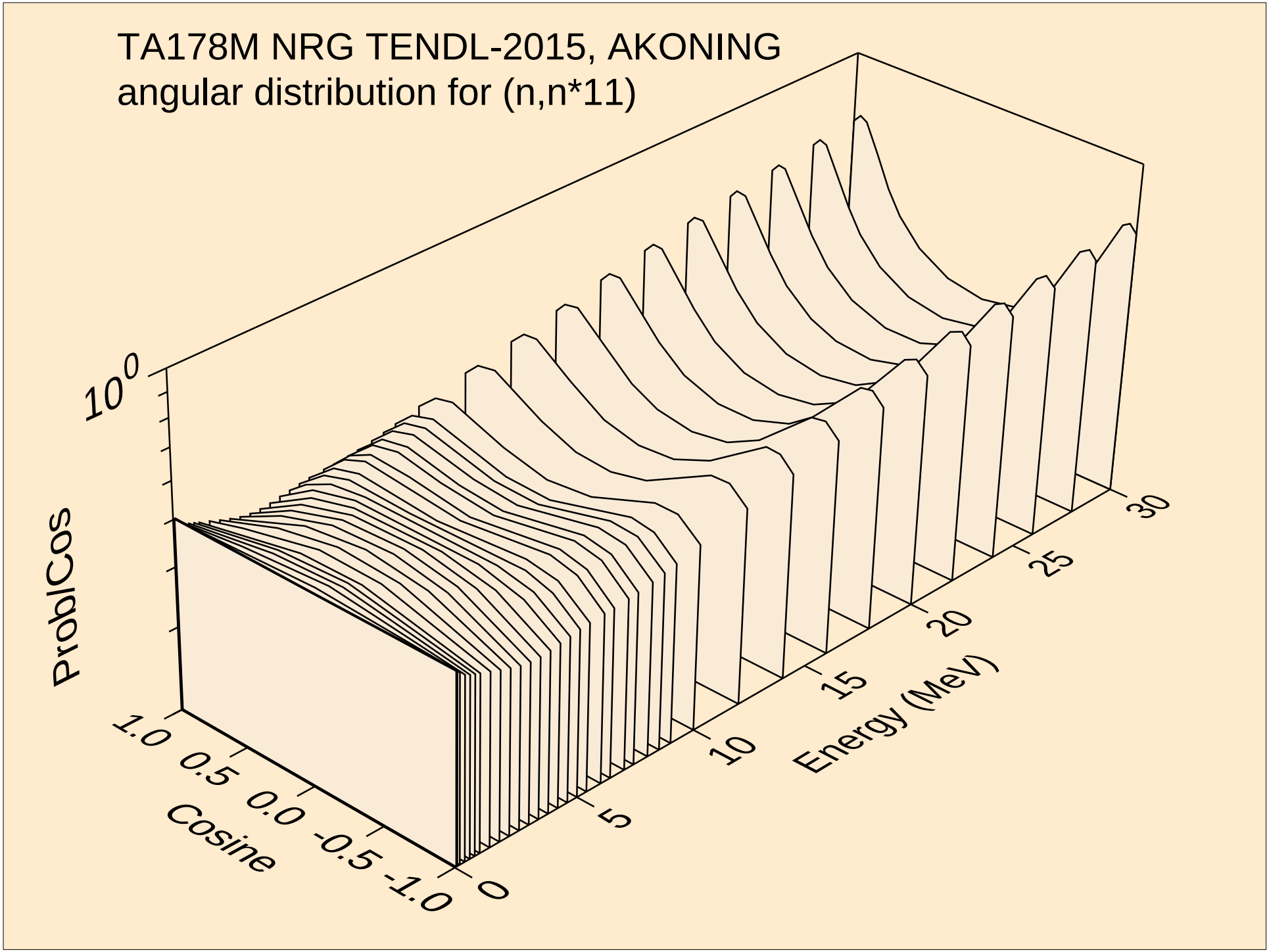

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*6)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

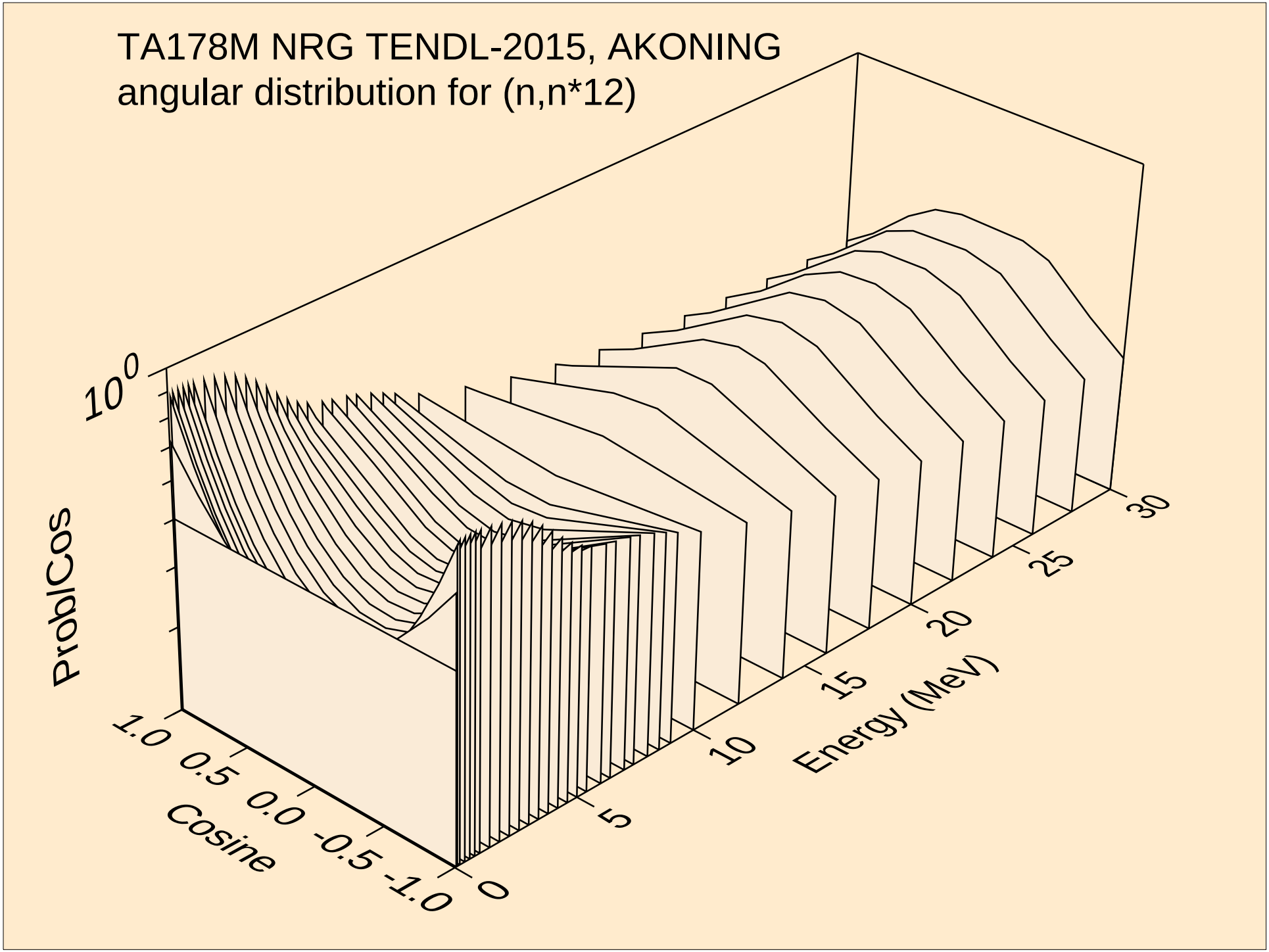

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*7)
ProbCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

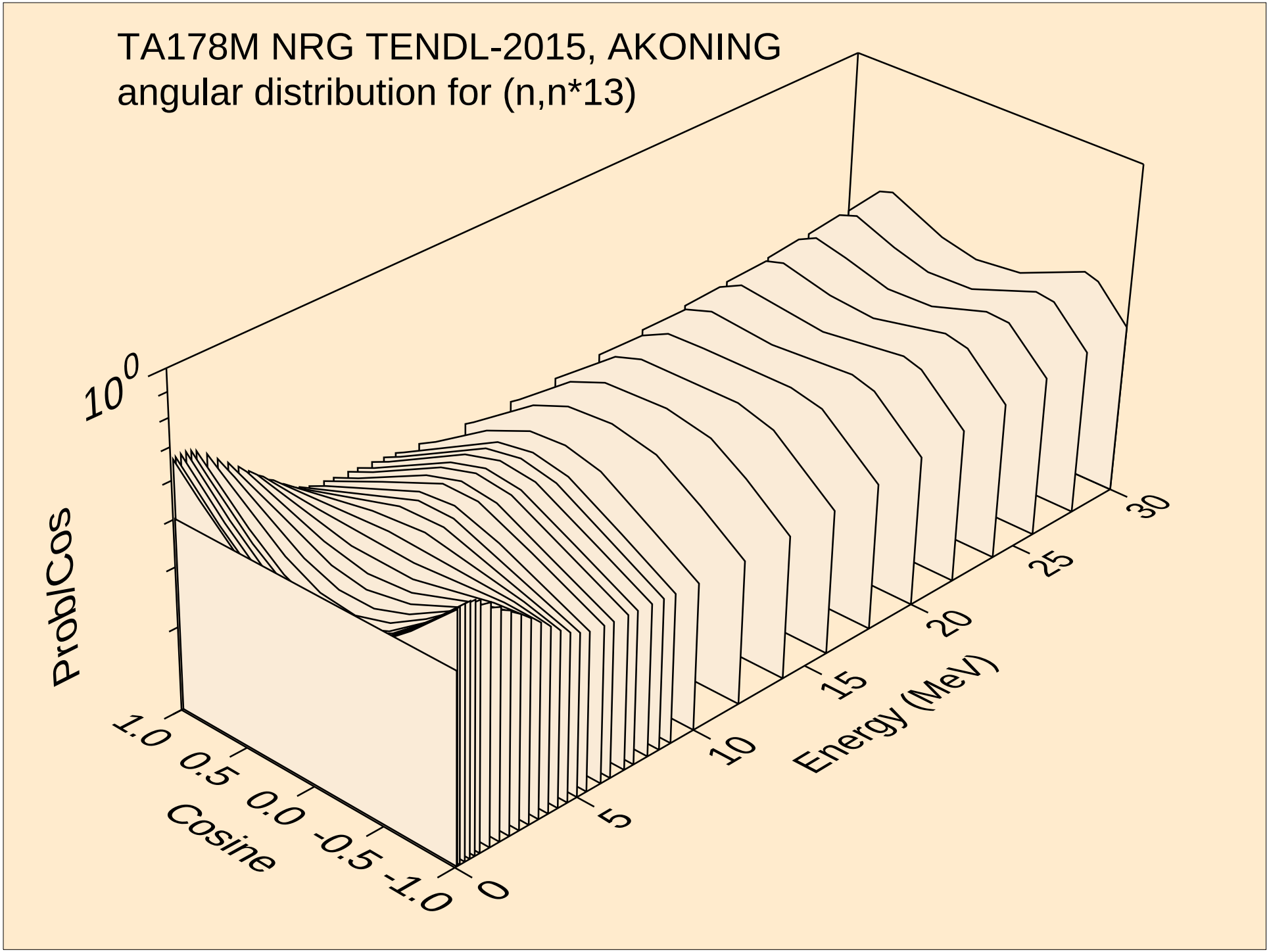

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*8)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

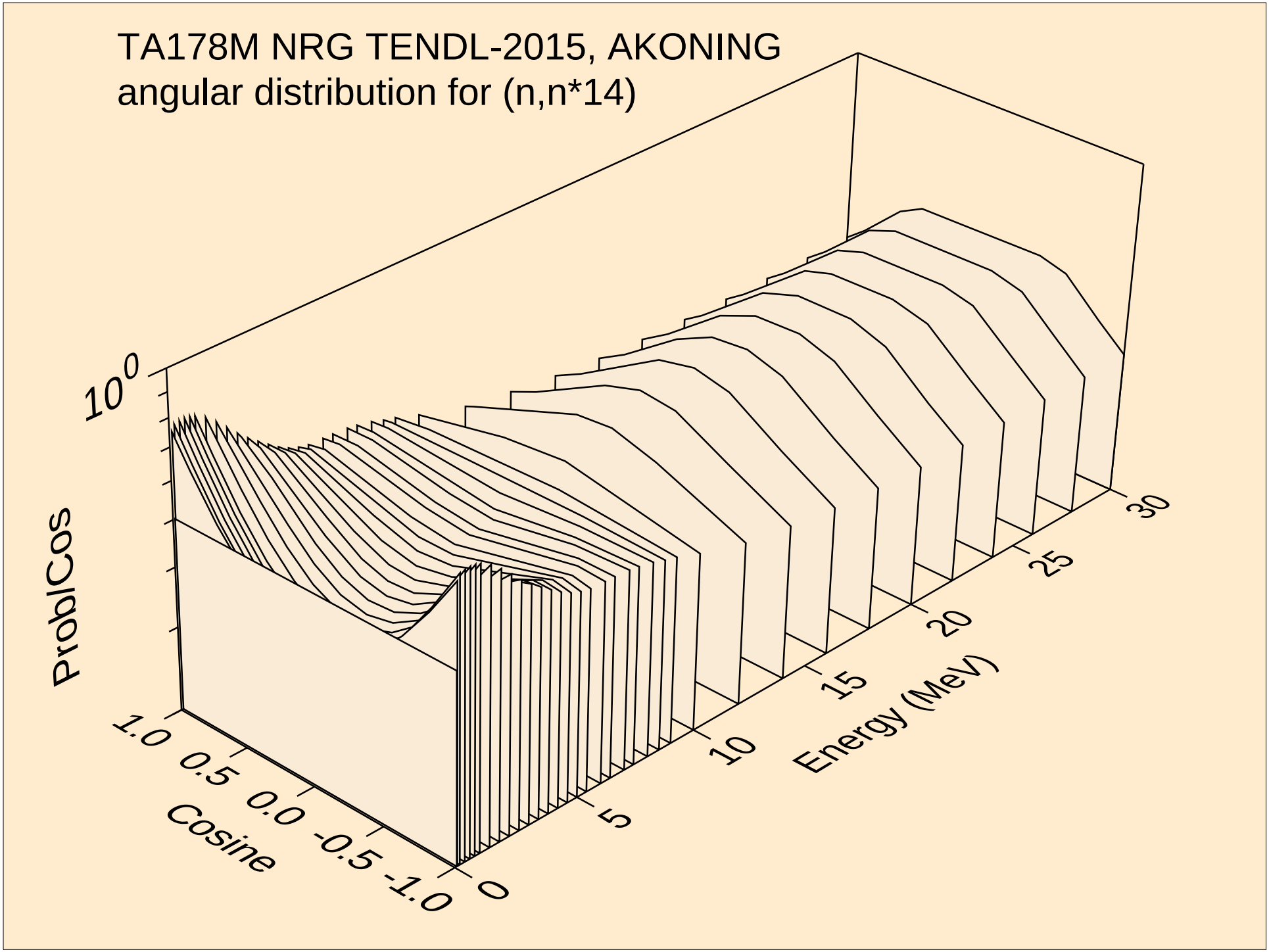

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*9)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

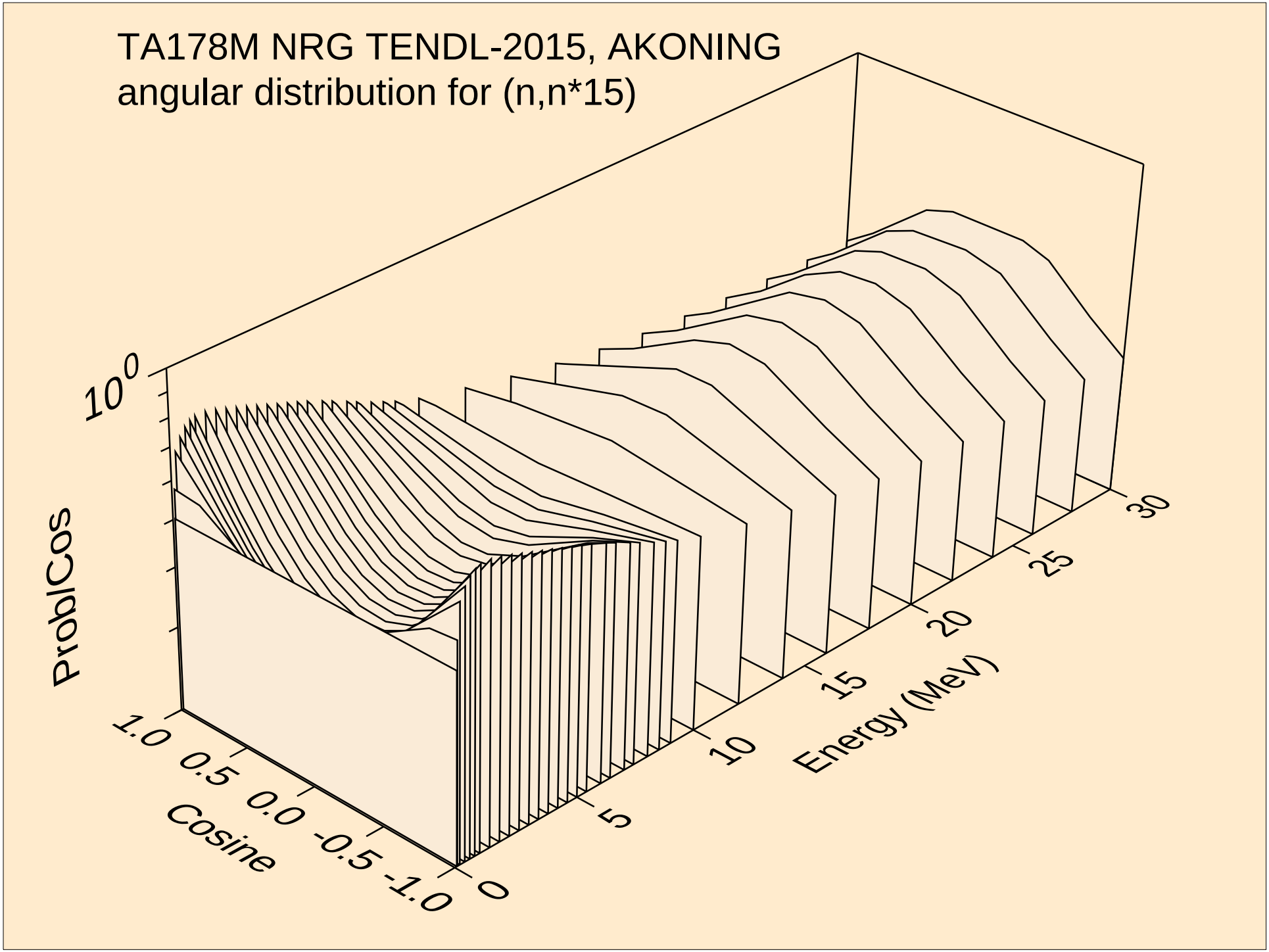

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*10)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

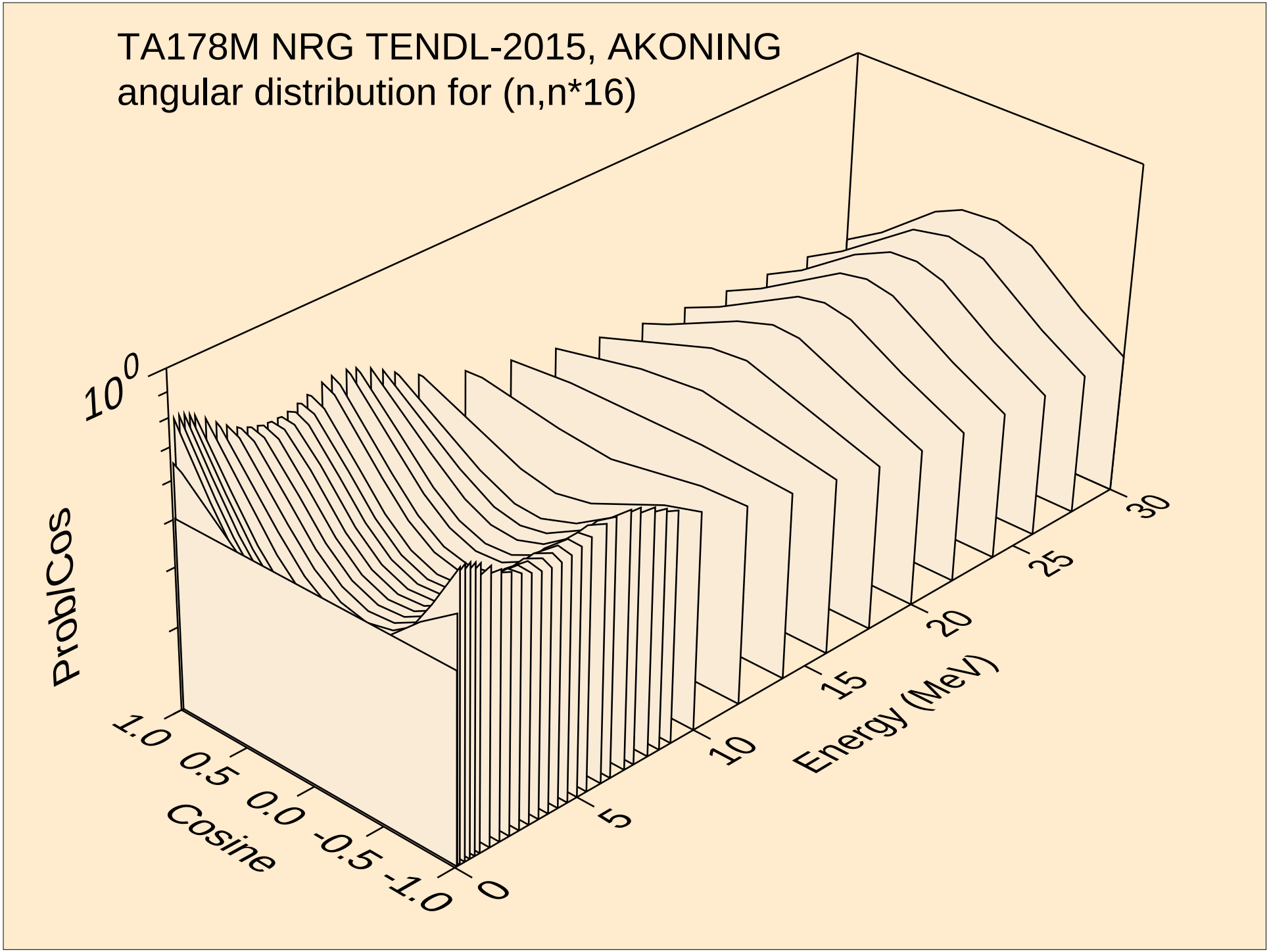

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*11)
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

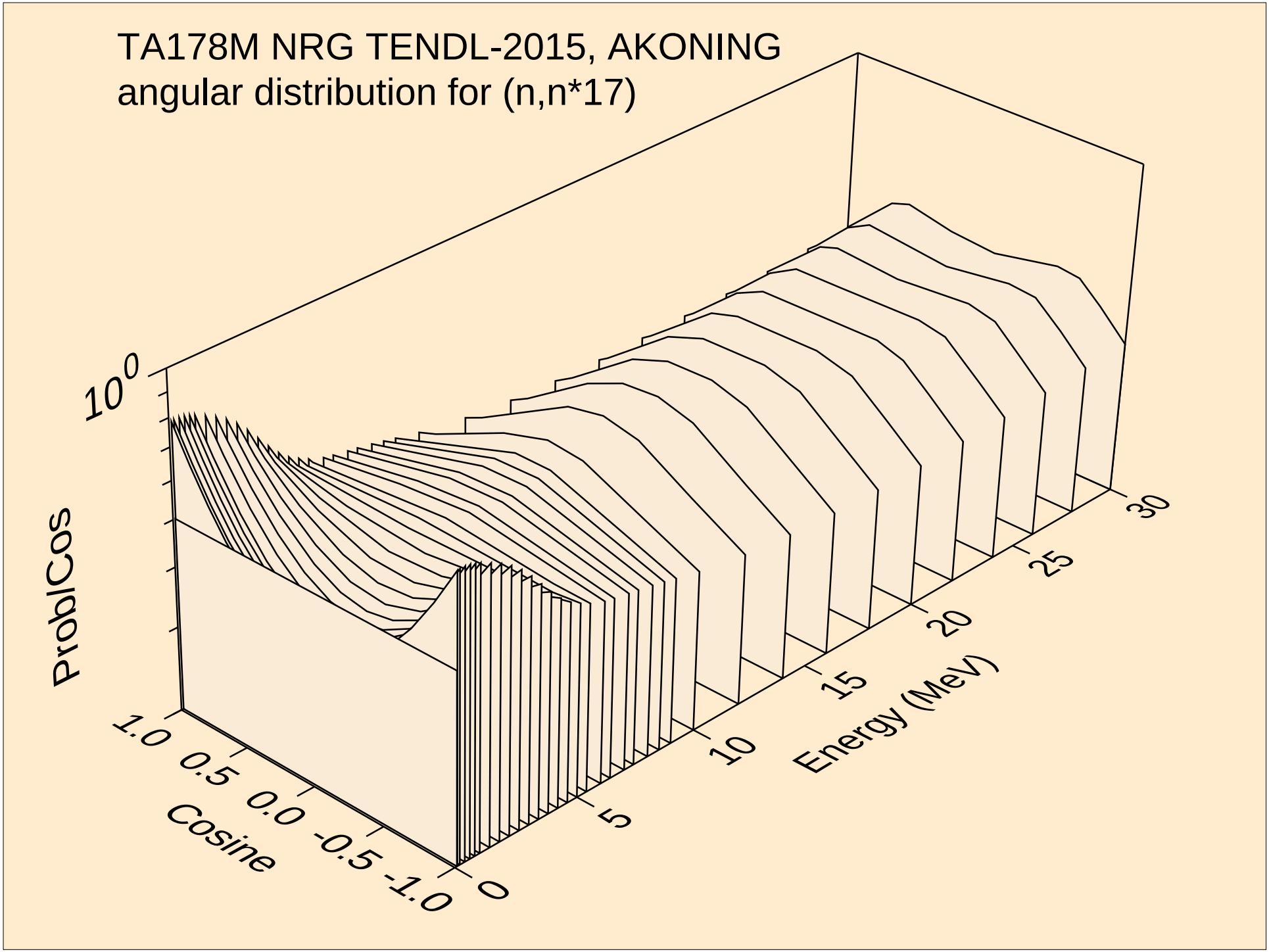

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*12)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

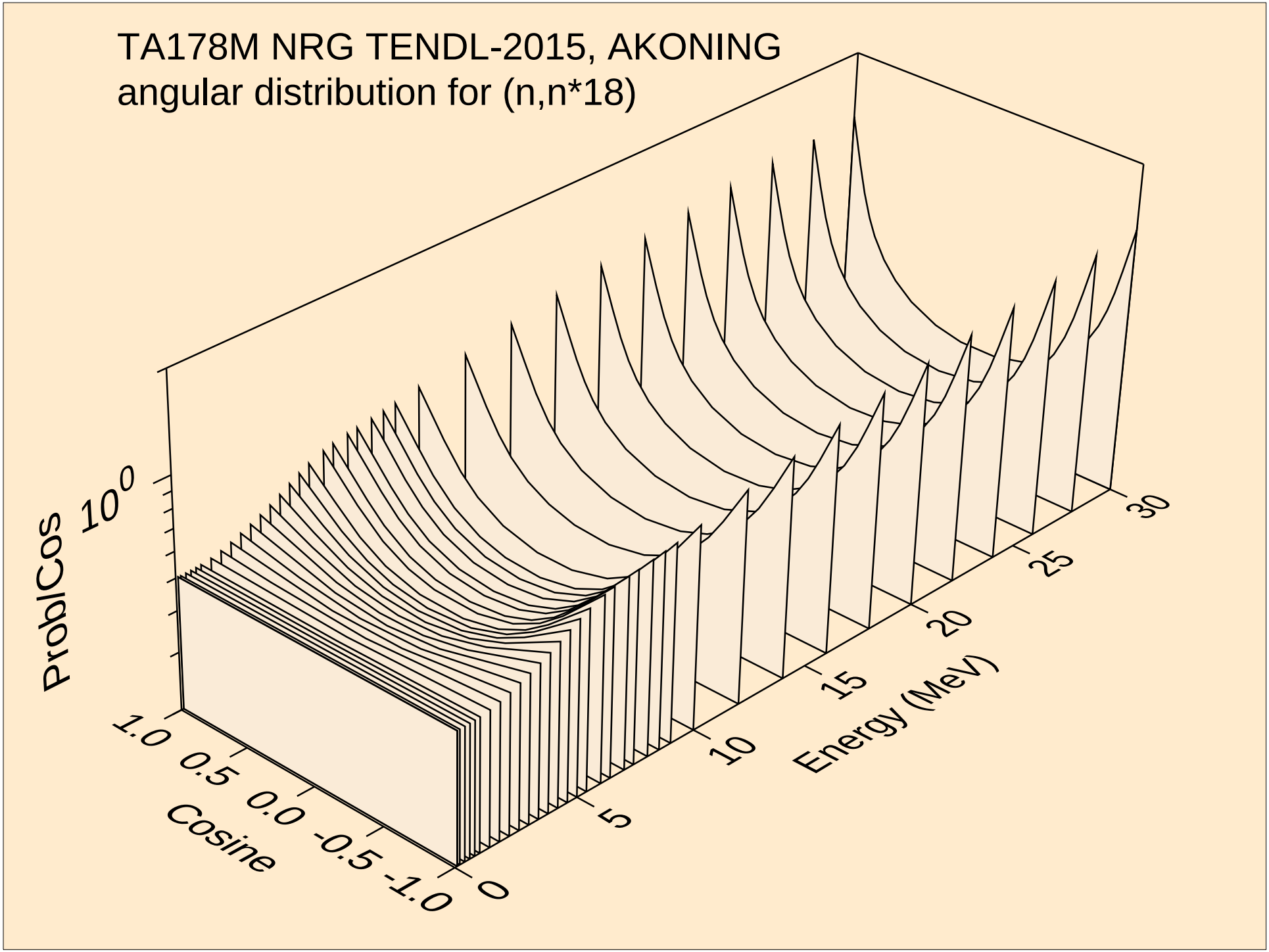

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*13)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

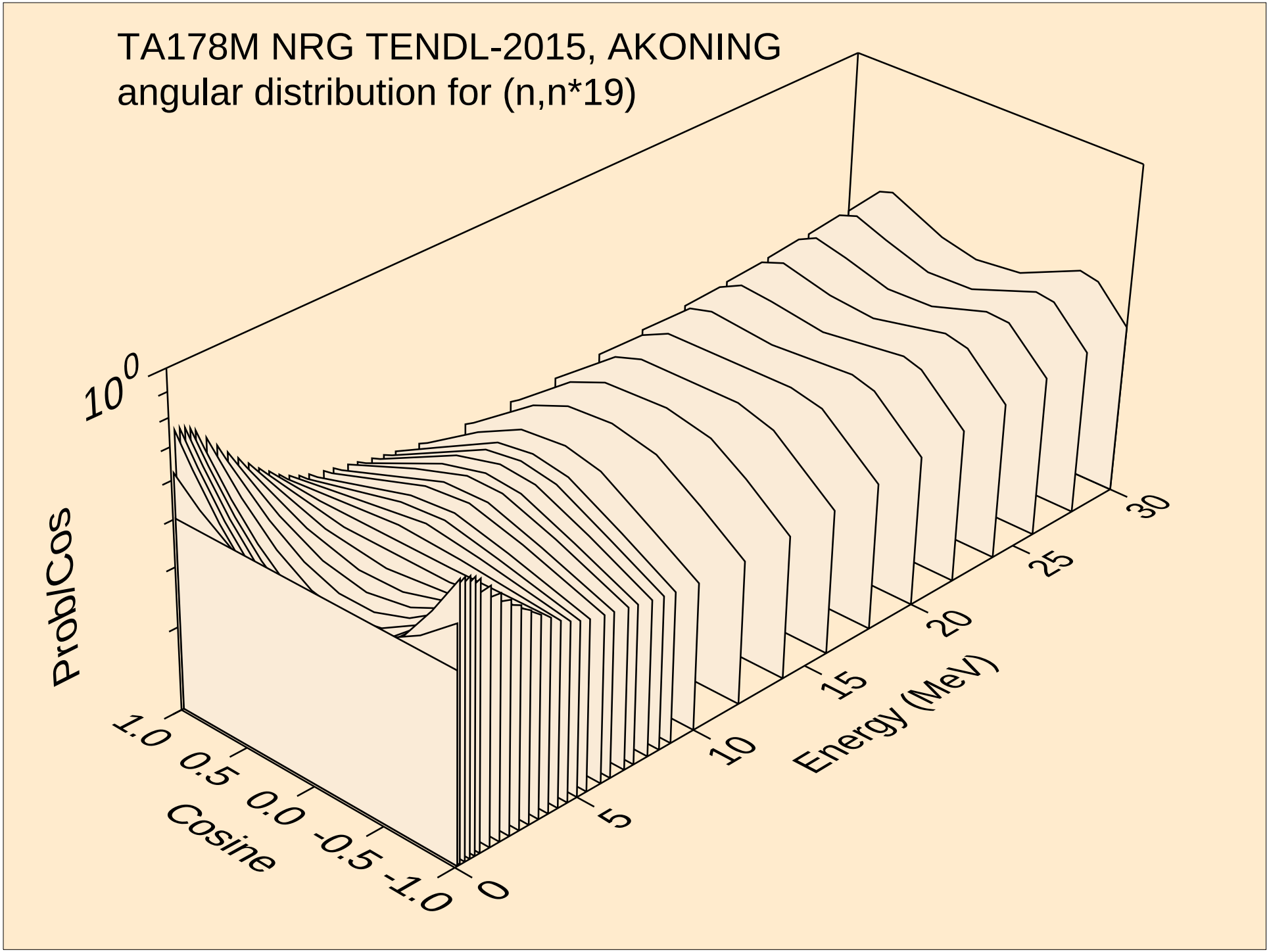

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*14)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

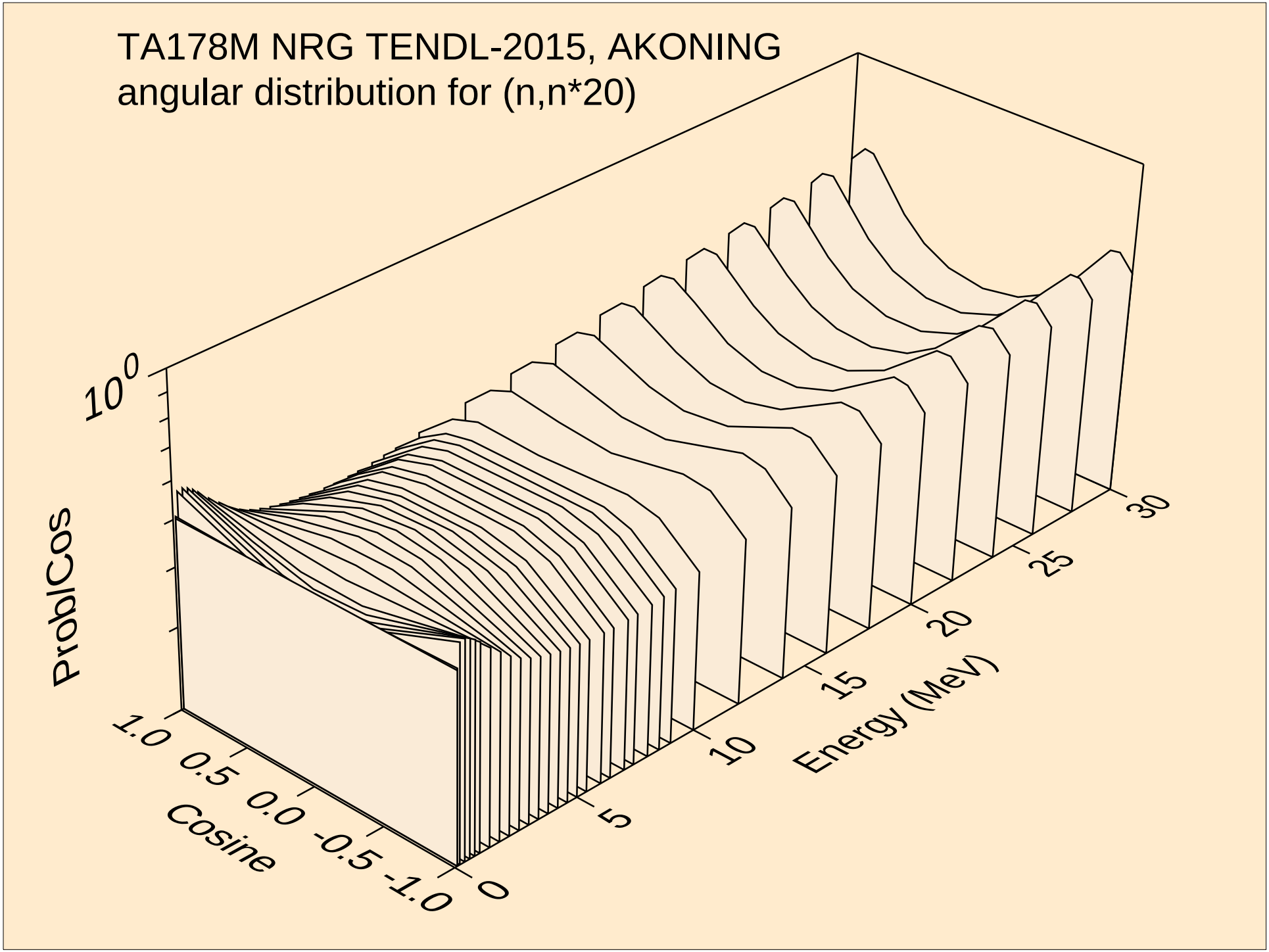

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*15)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

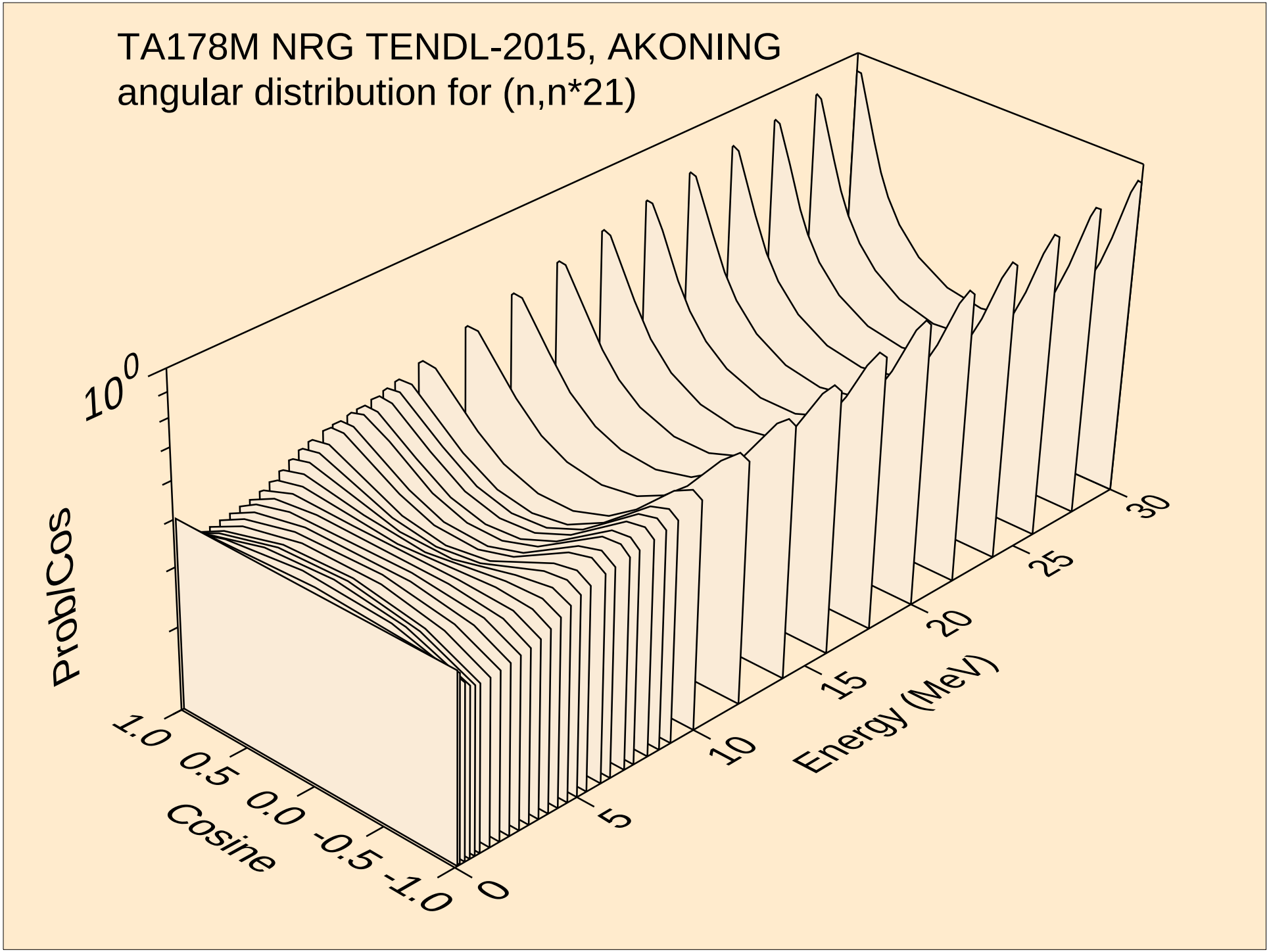

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*16)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

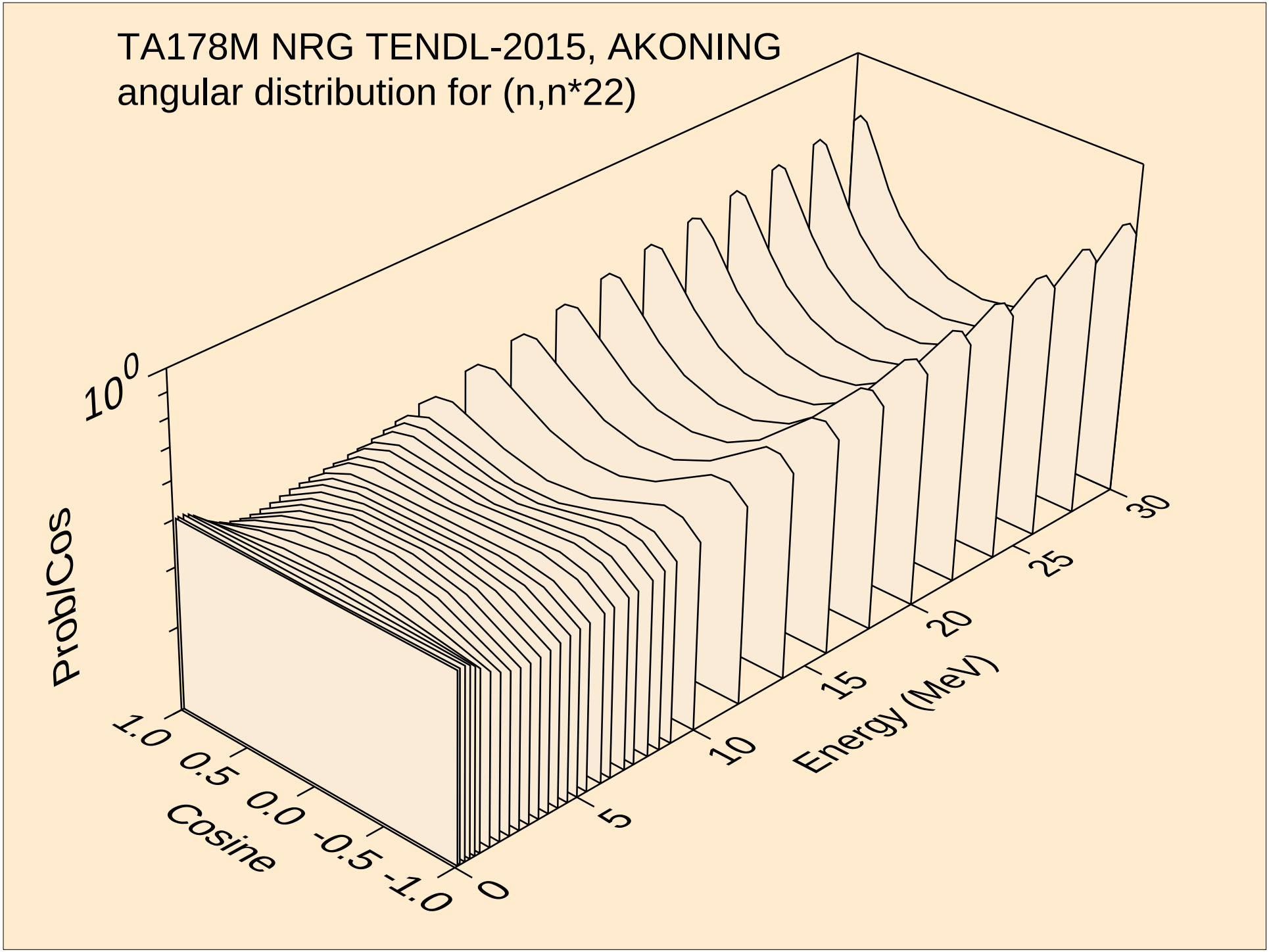

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*17)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

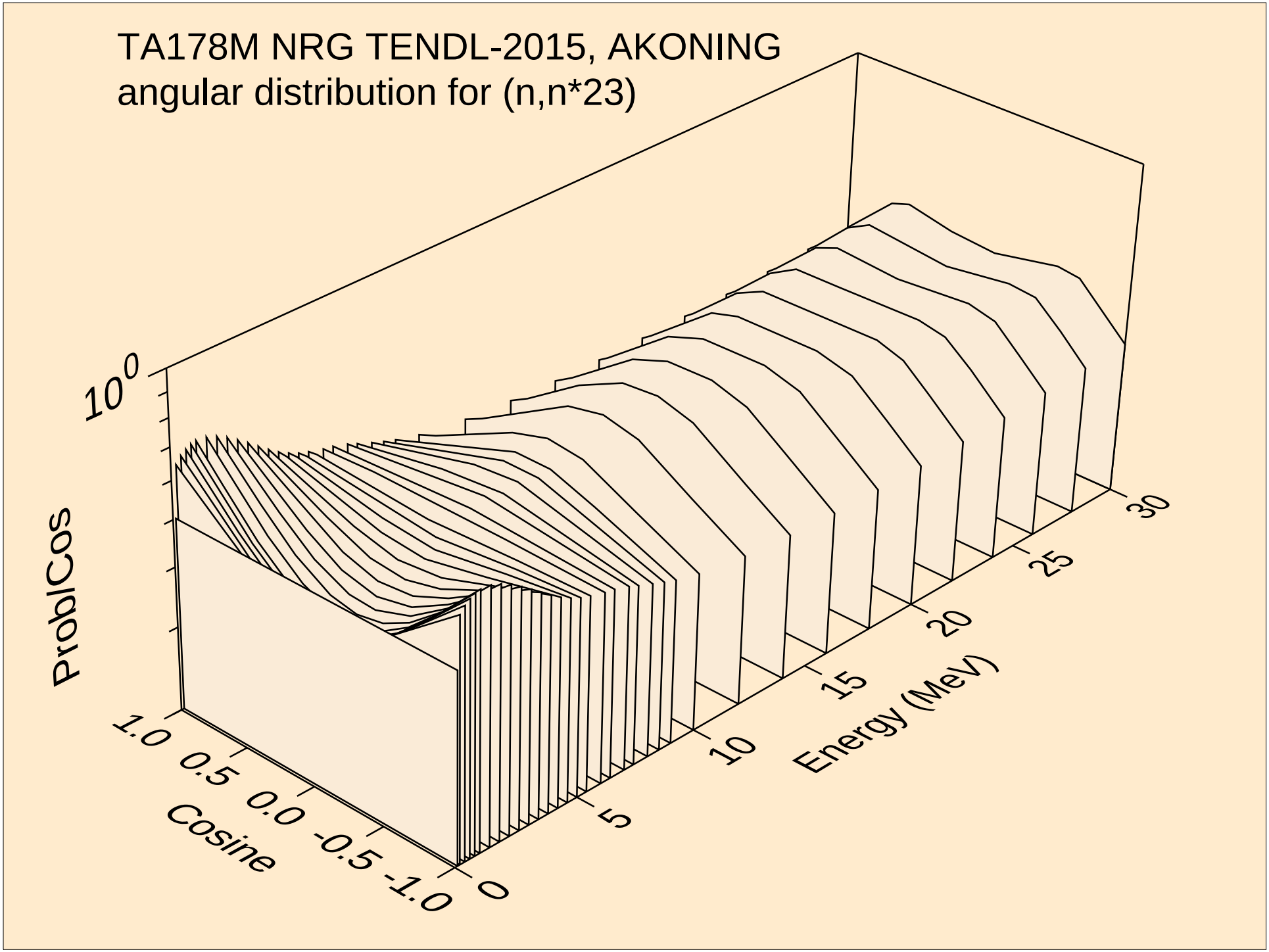

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*18)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

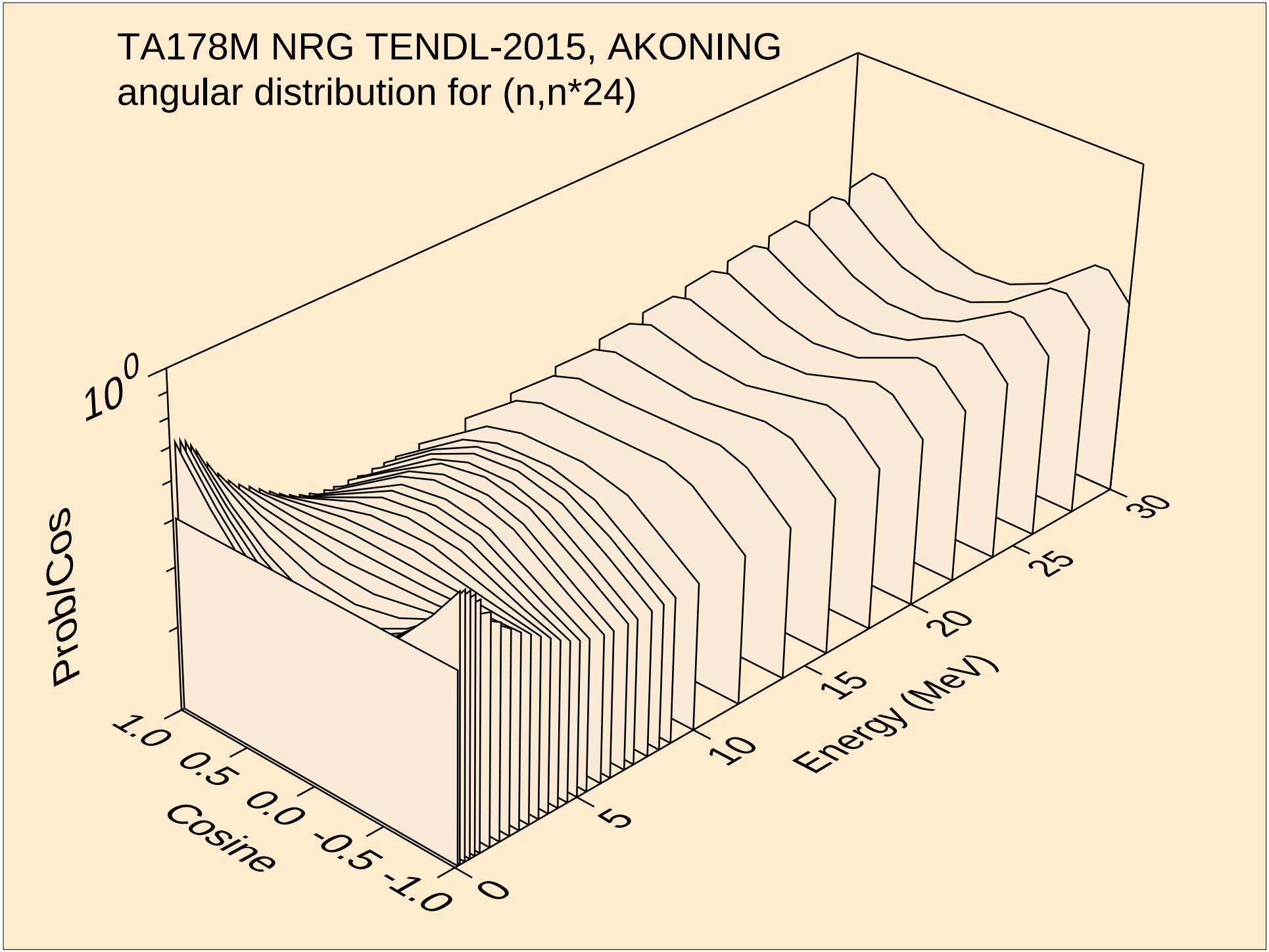

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*19)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

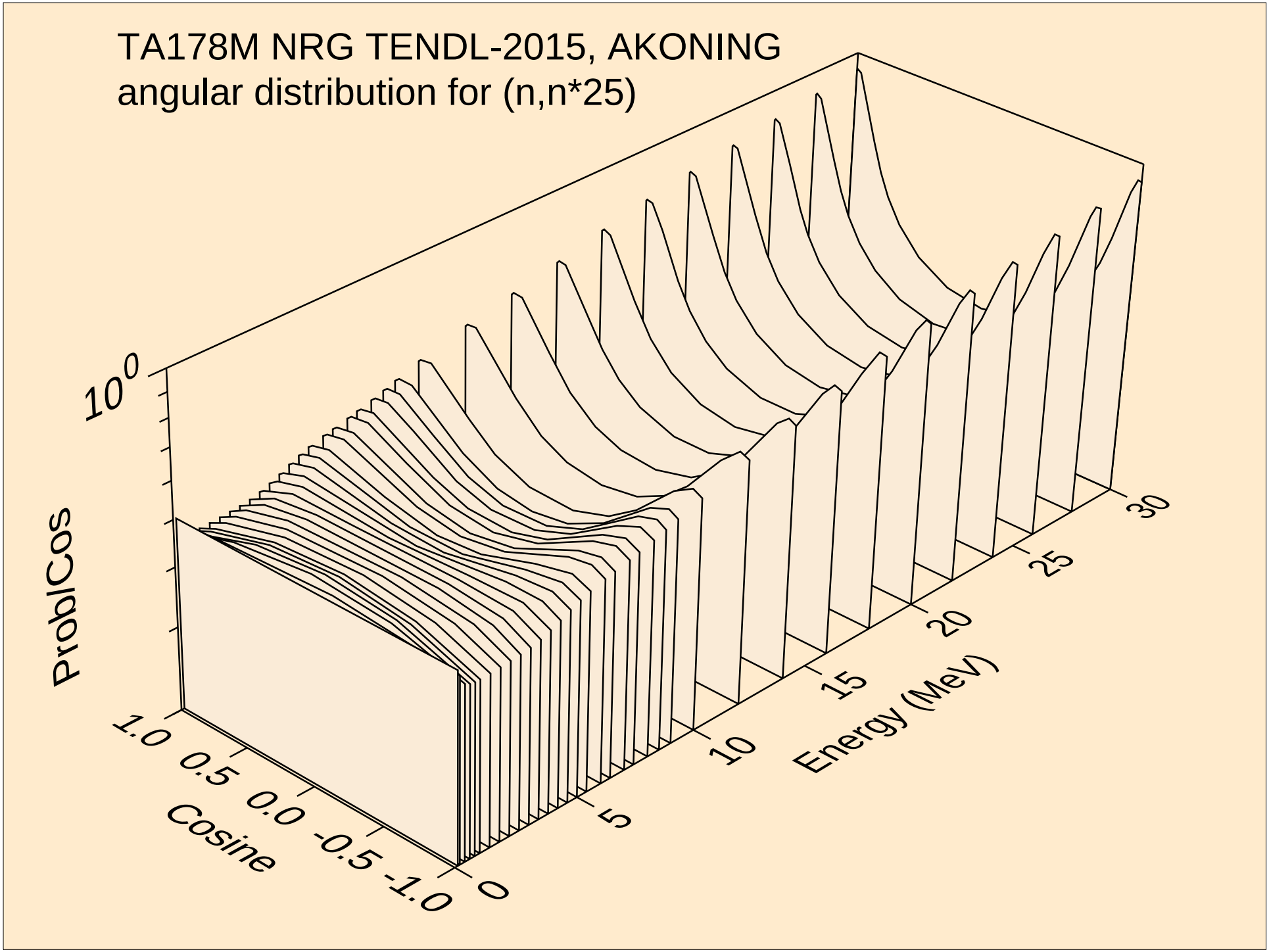

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*20)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

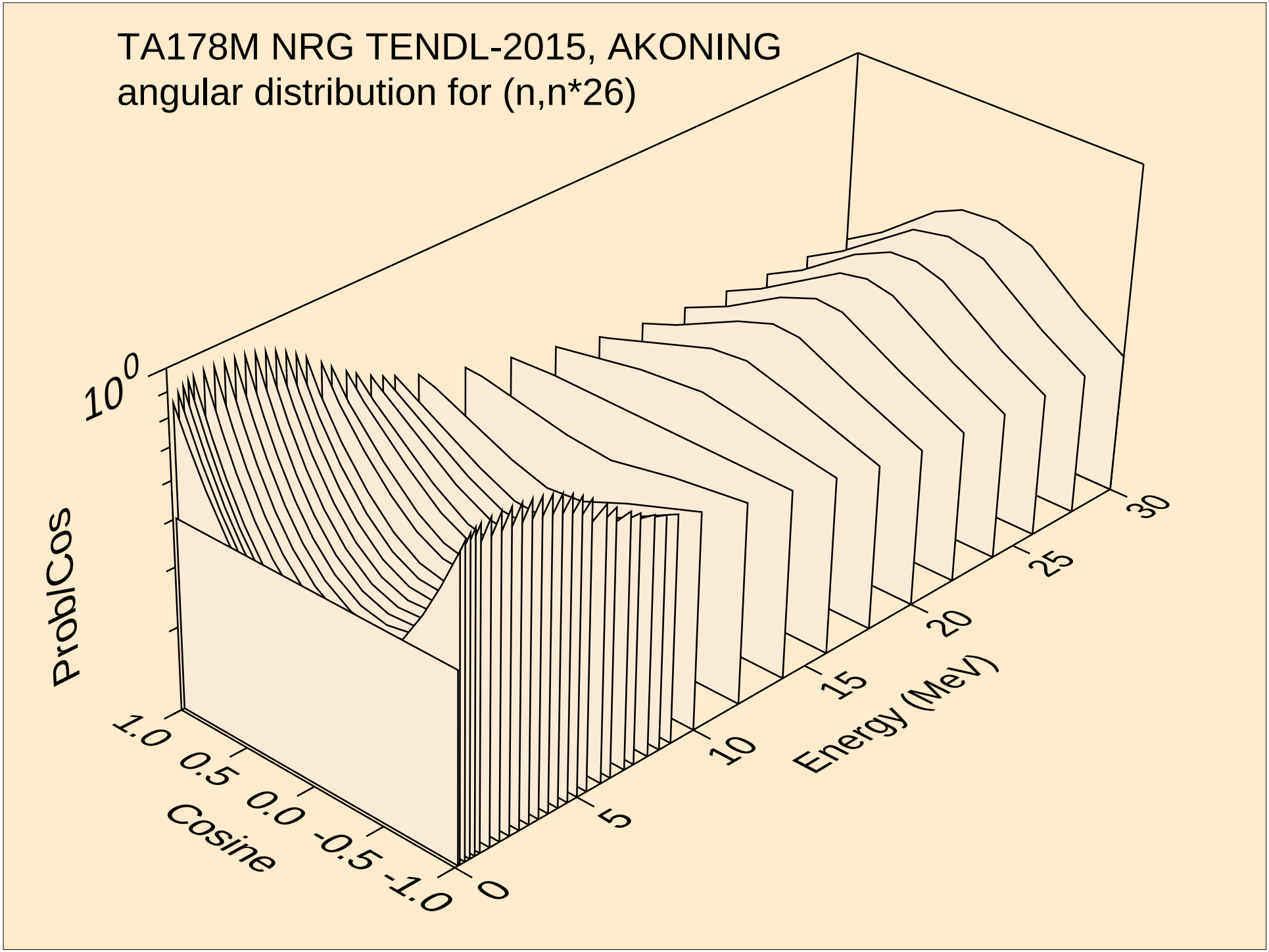

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*21)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

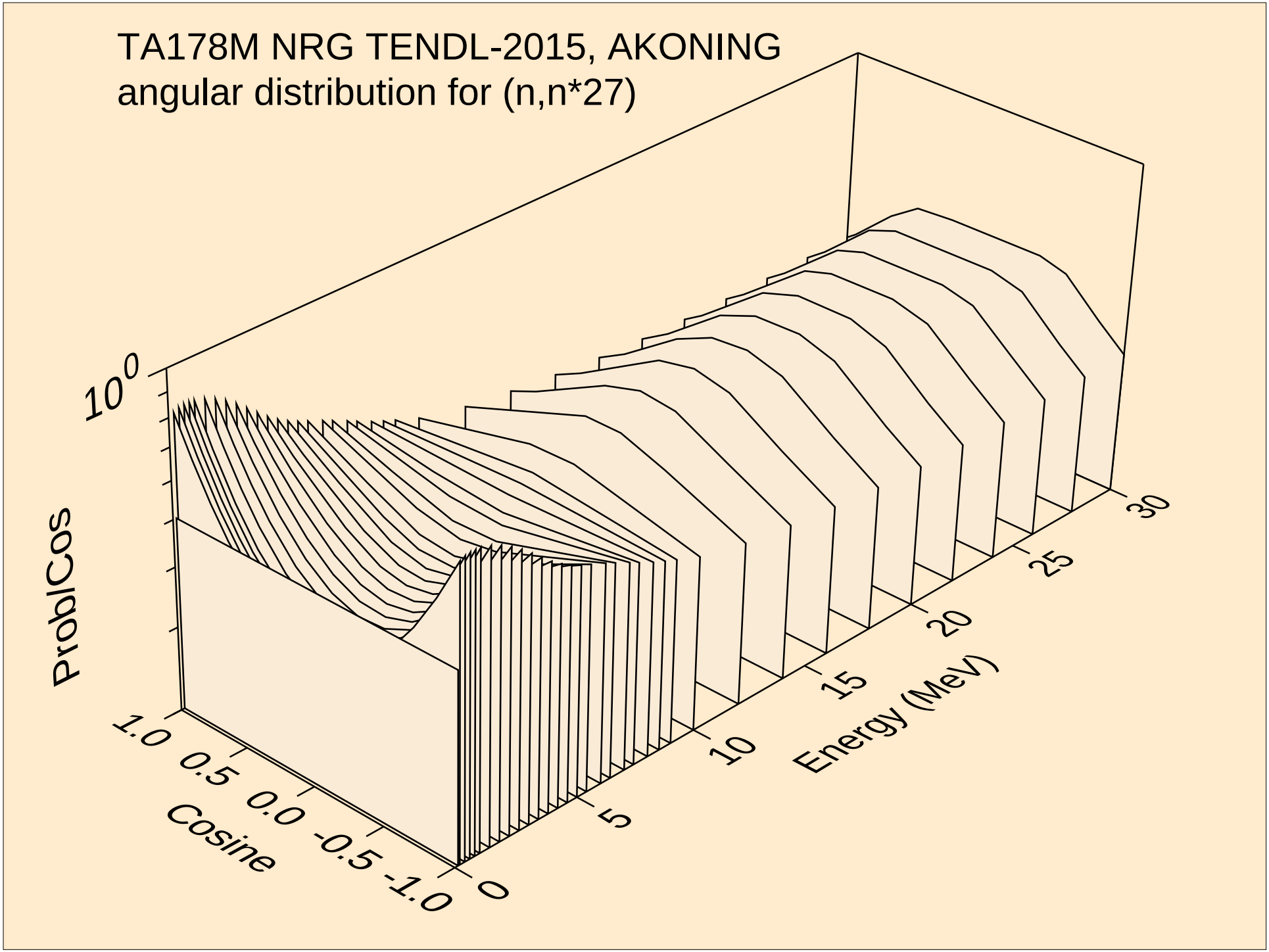

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*22)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

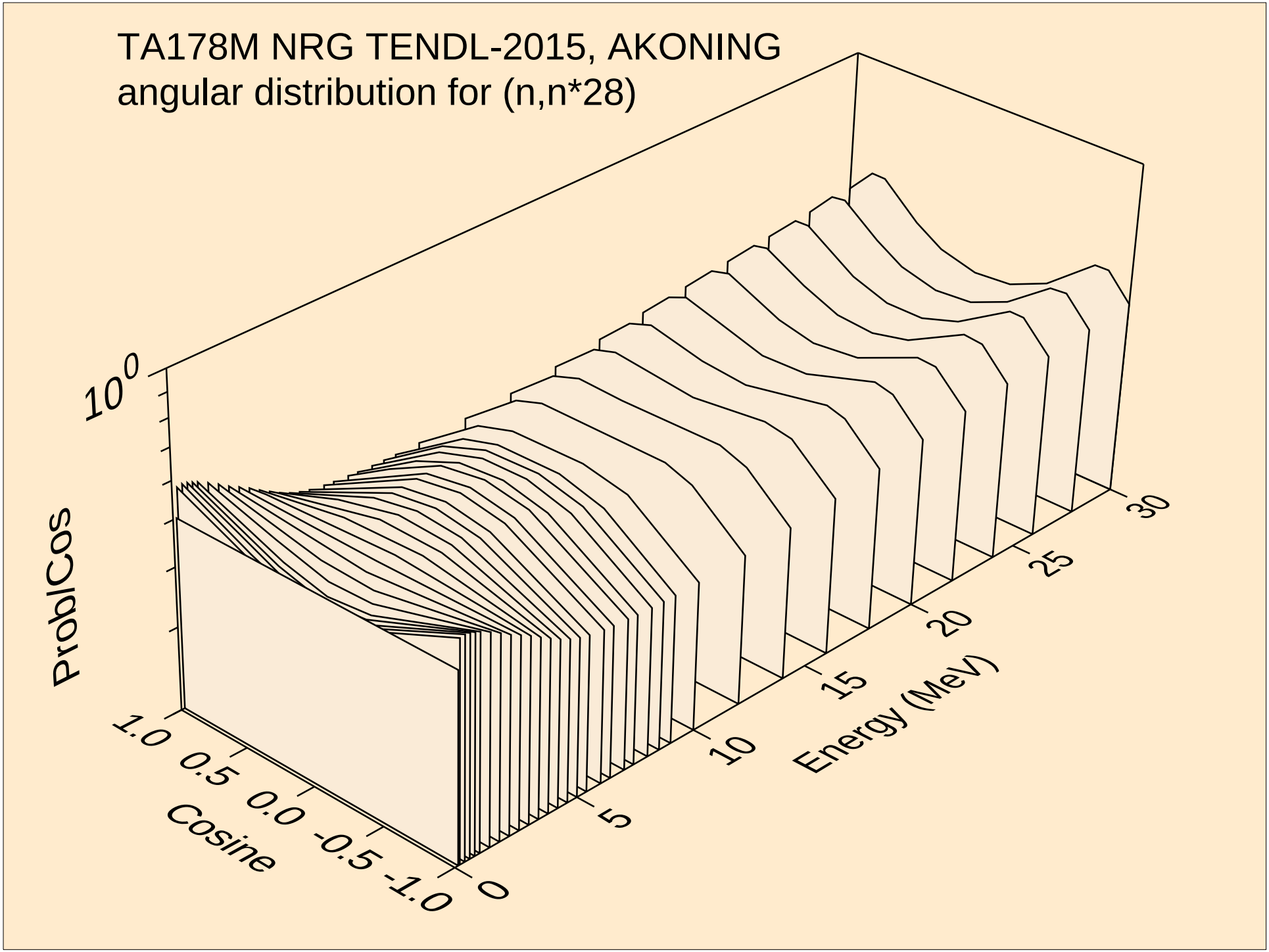

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*23)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

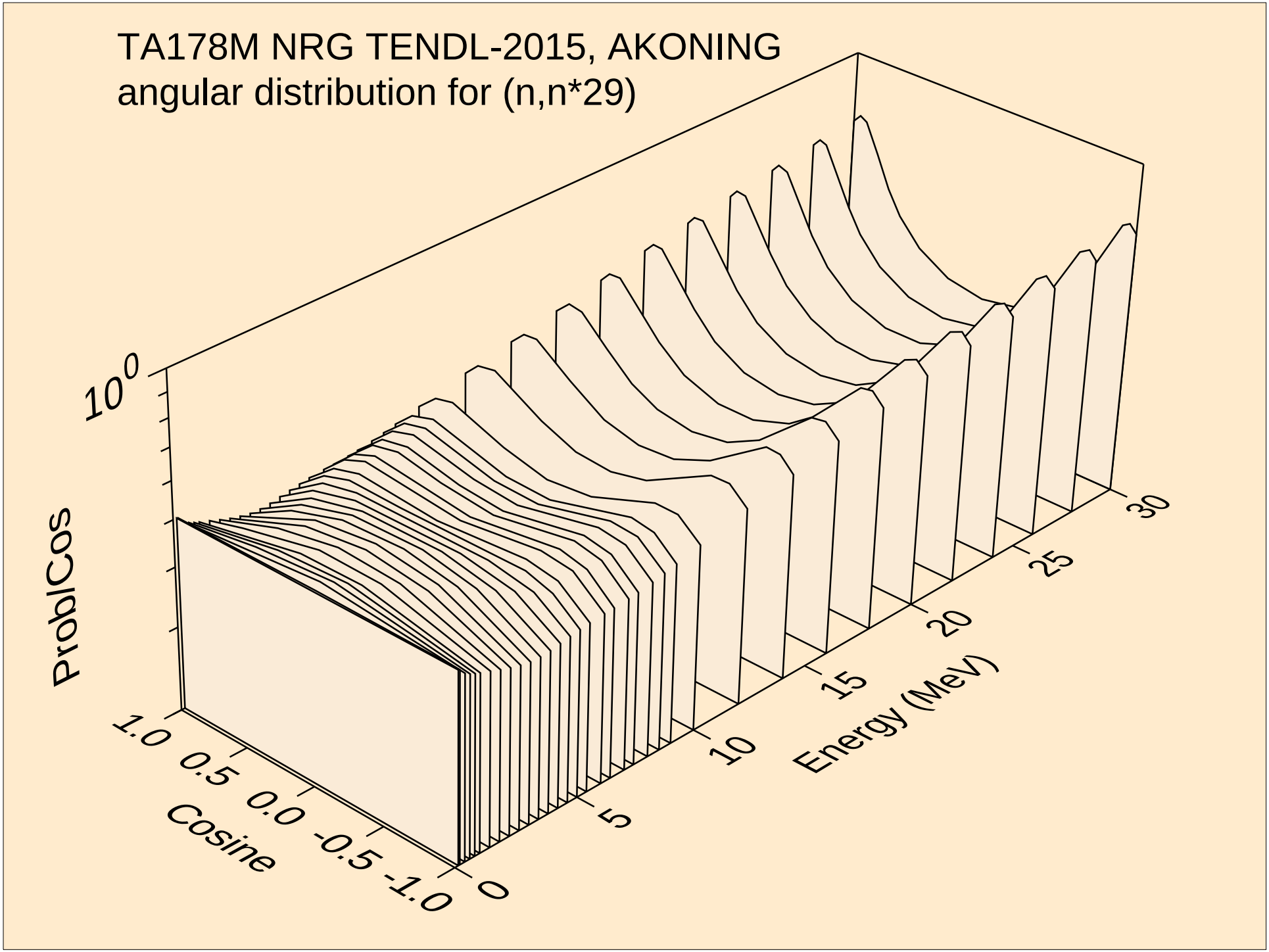

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*24)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

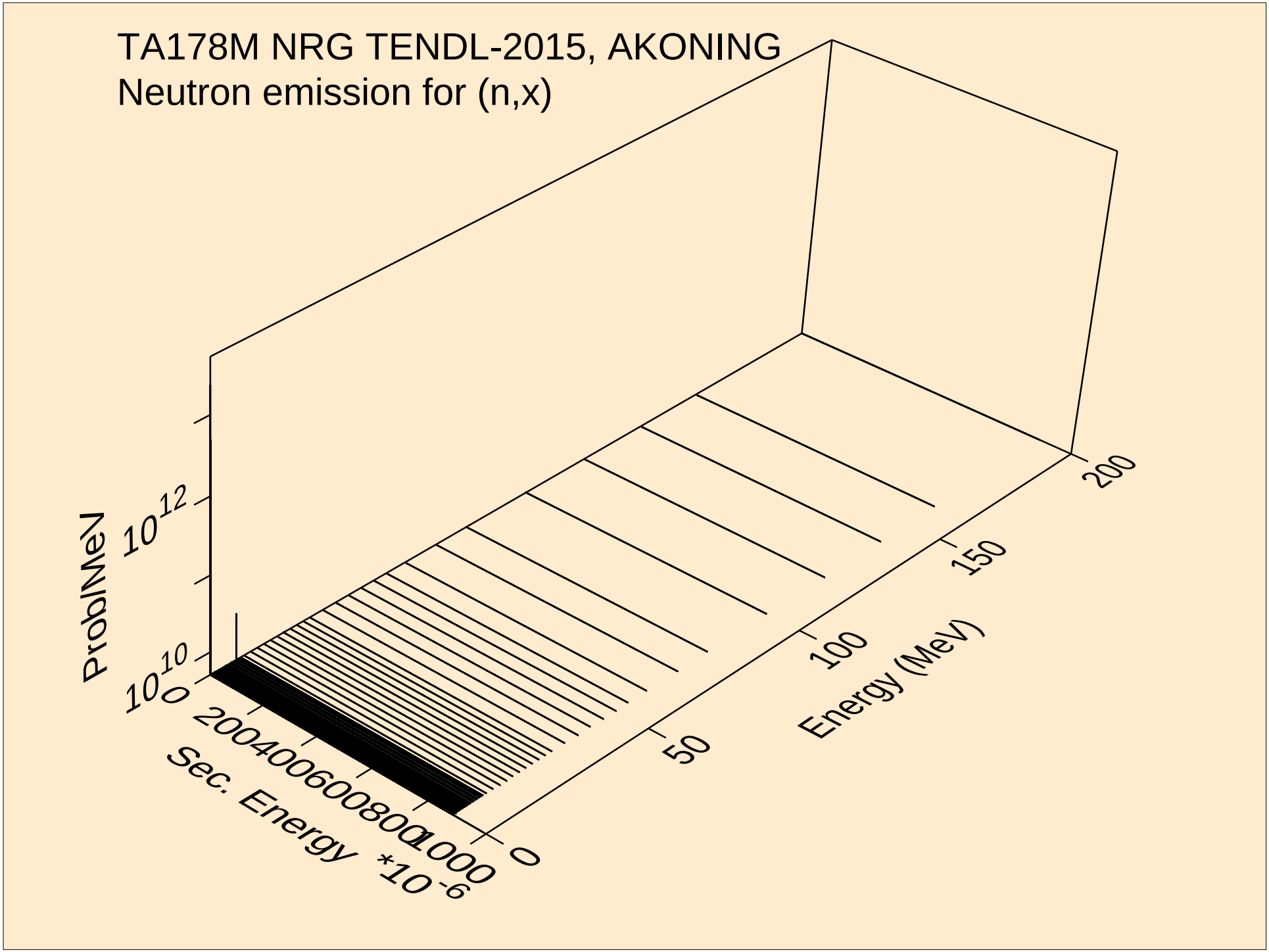

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*25)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

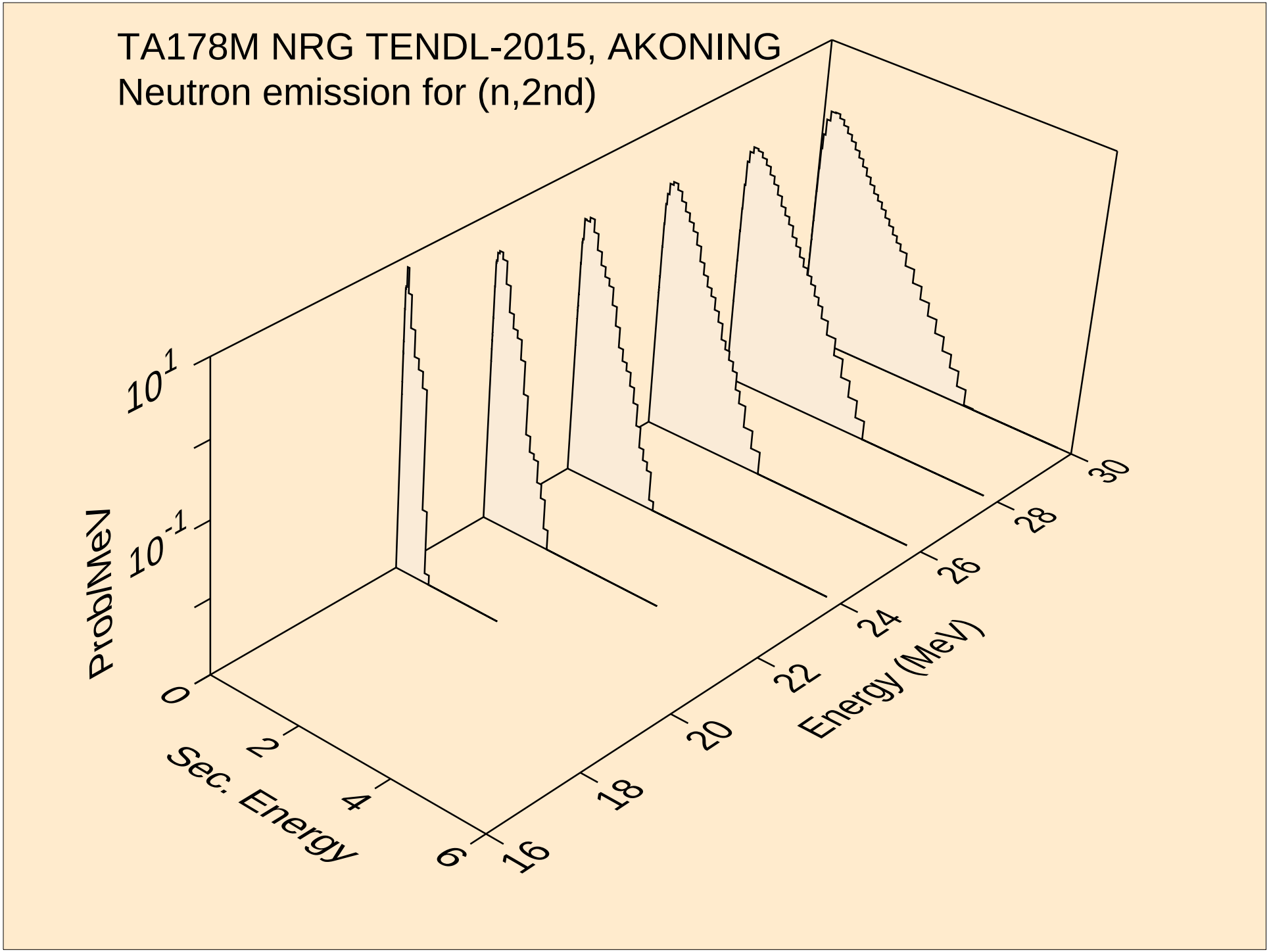

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*26)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

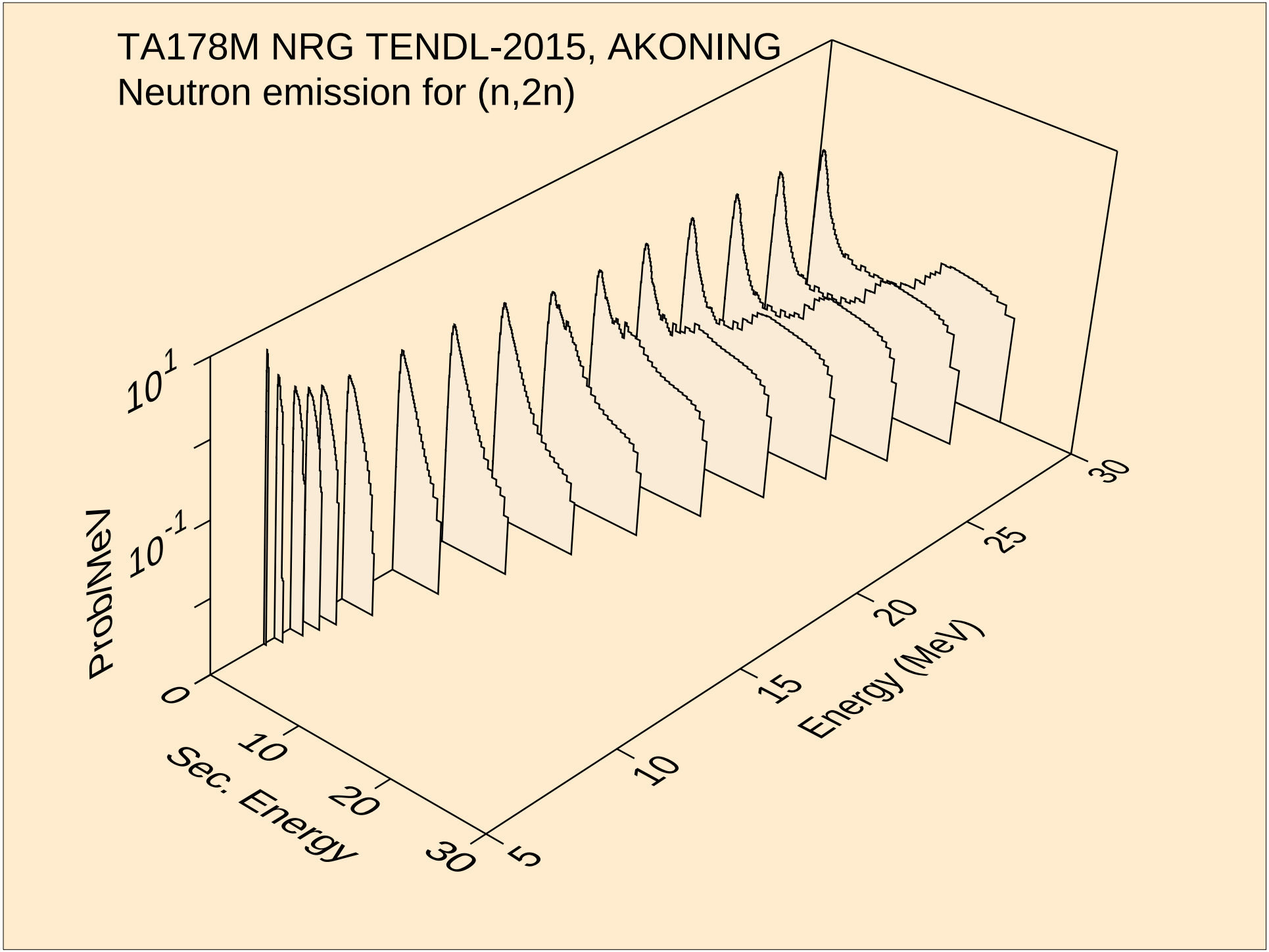

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*27)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

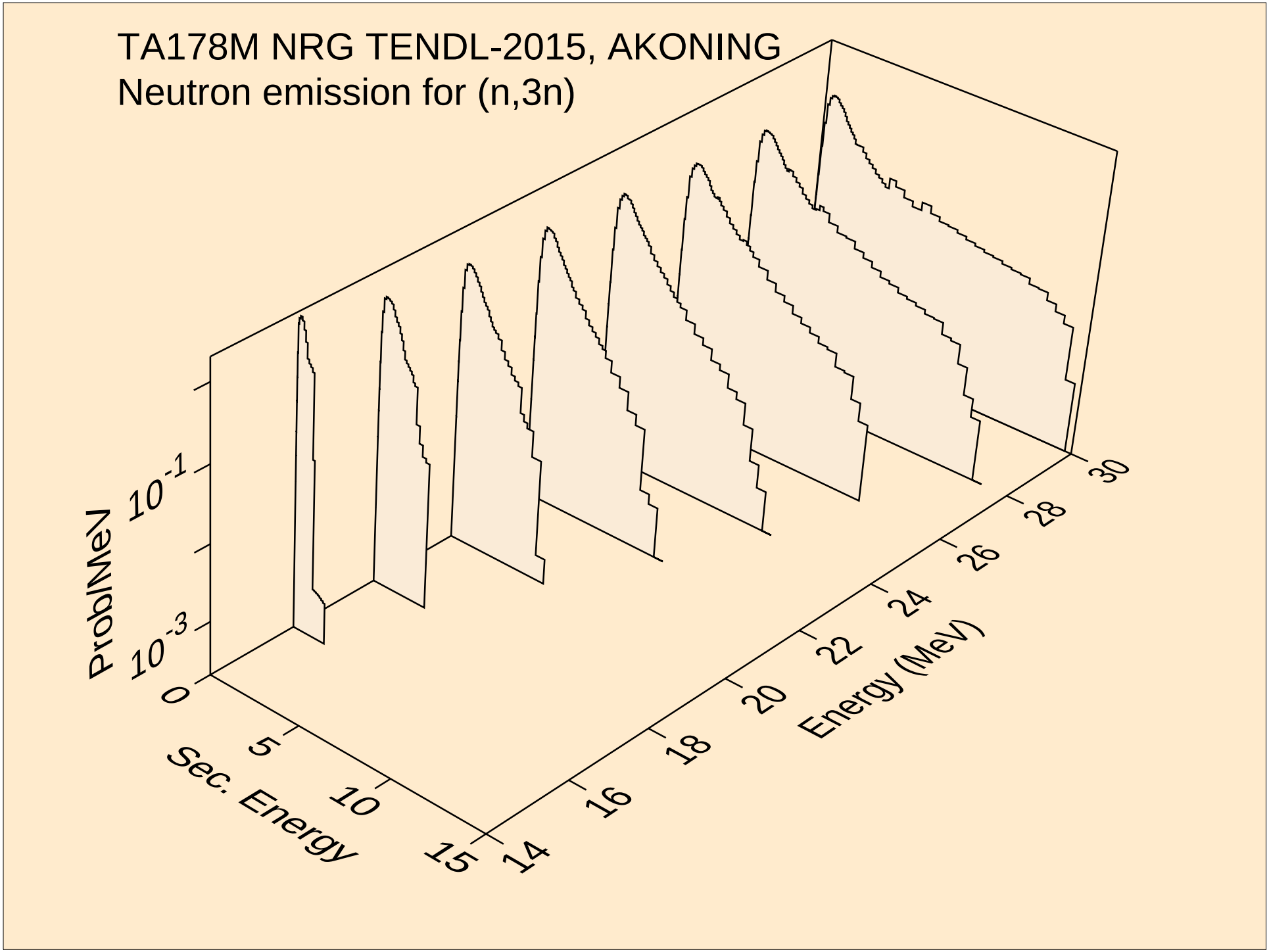

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*28)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

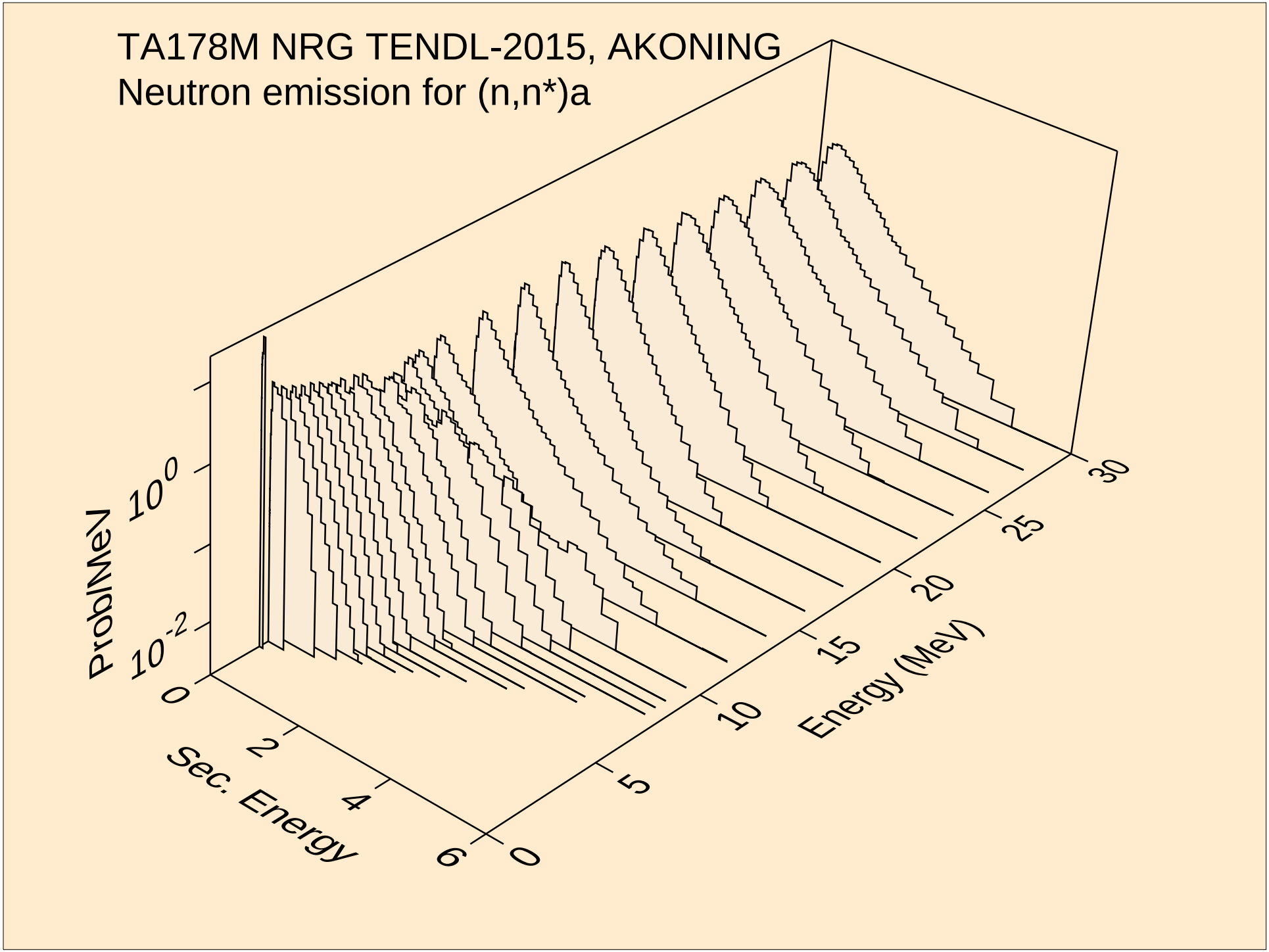

TA178M NRG TENDL-2015, AKONING
angular distribution for (n,n*29)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
25
30
Energy (MeV)

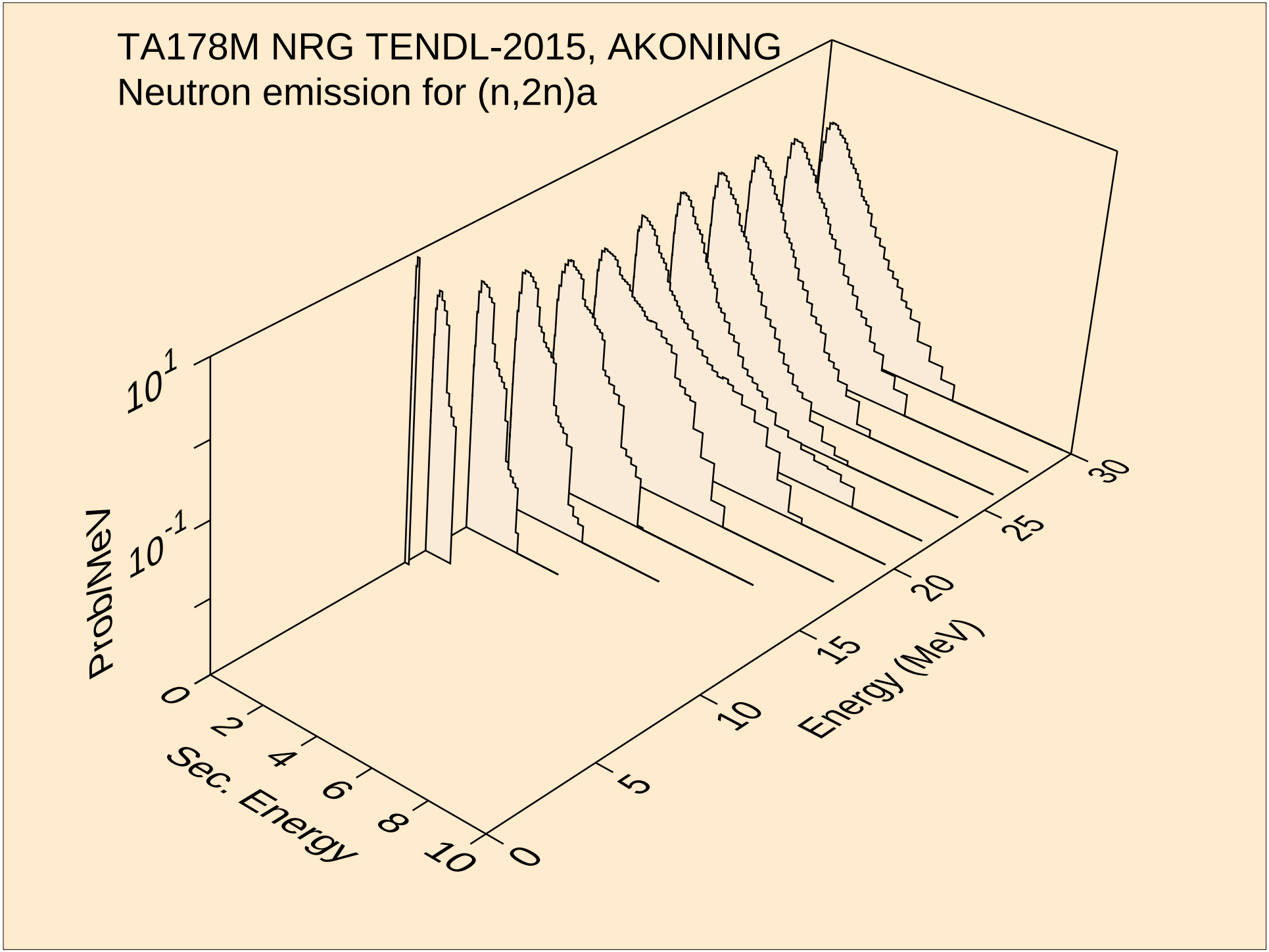

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,x)
Prob/MeV
10^12
10^10
0
2000
4000
6000
8000
10000
Sec. Energy *10^-6
0
50
100
150
200
Energy (MeV)

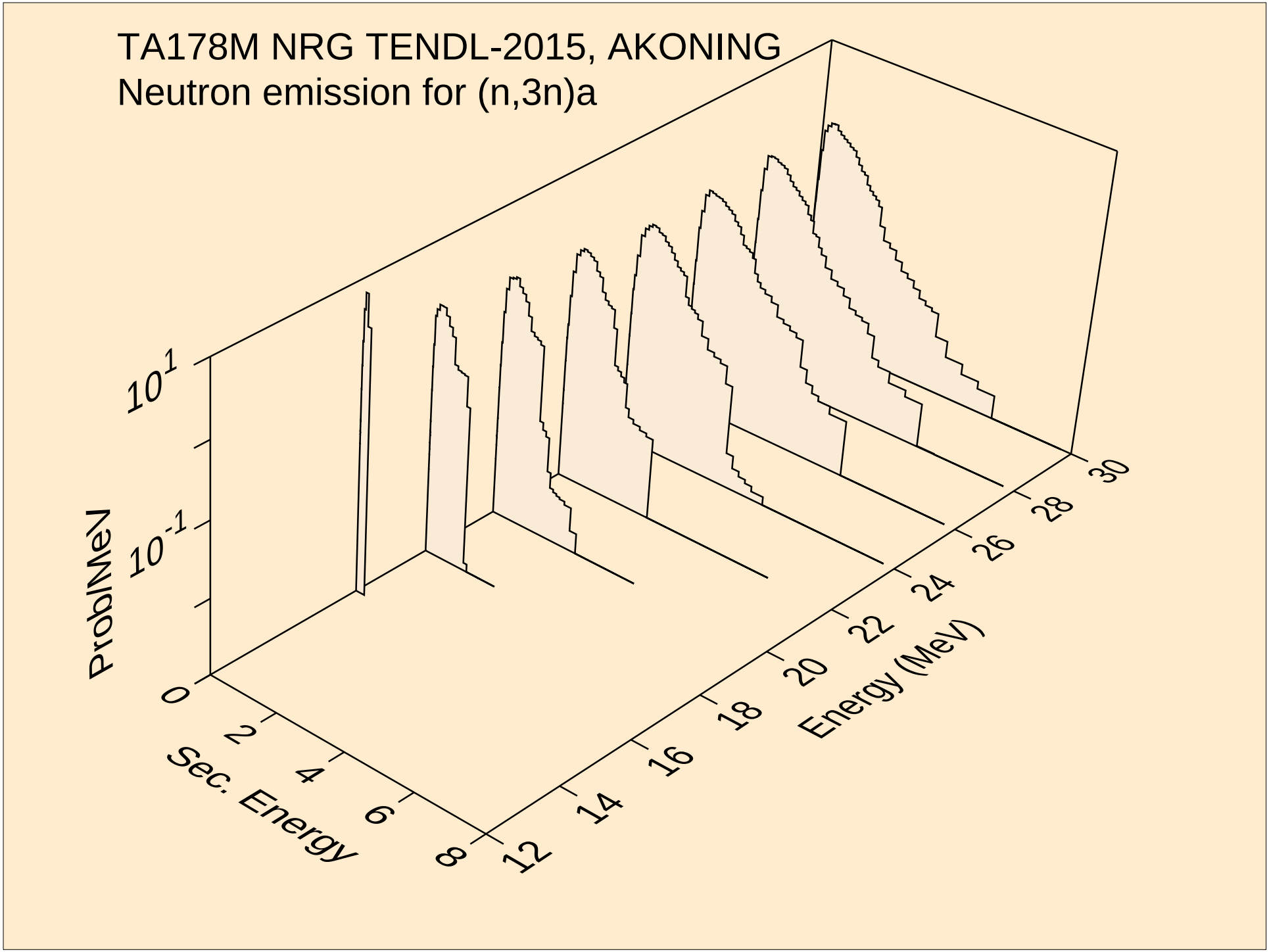

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,2nd)
Prob/MeV
10^{1}
10^{-1}
0
2
4
6
Sec. Energy
16
18
20
22
24
26
28
30
Energy (MeV)

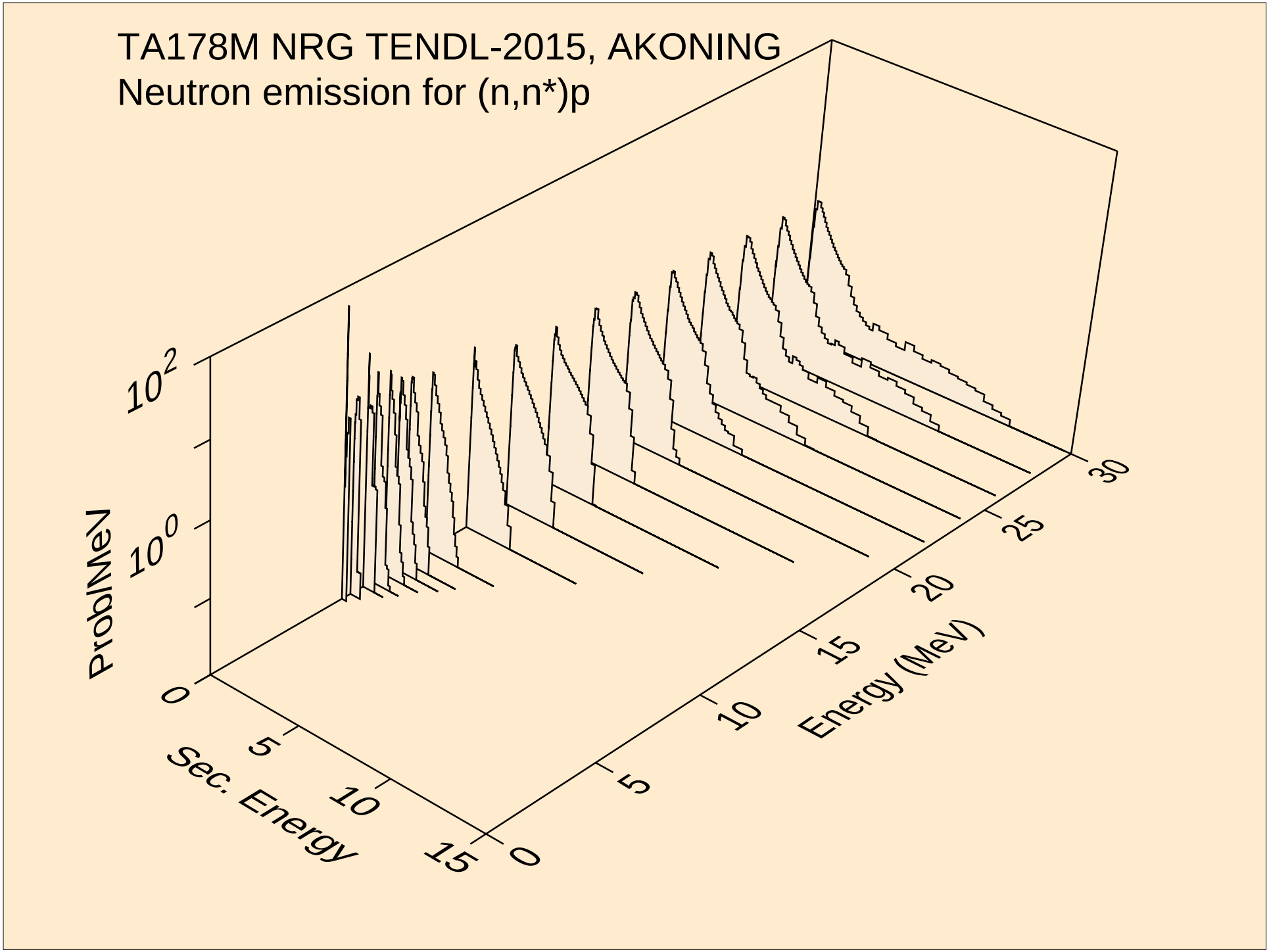

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,2n)
Prob/MeV
10^{1}
10^{-1}
0
Sec. Energy
10
20
30
5
10
15
20
25
30
Energy (MeV)

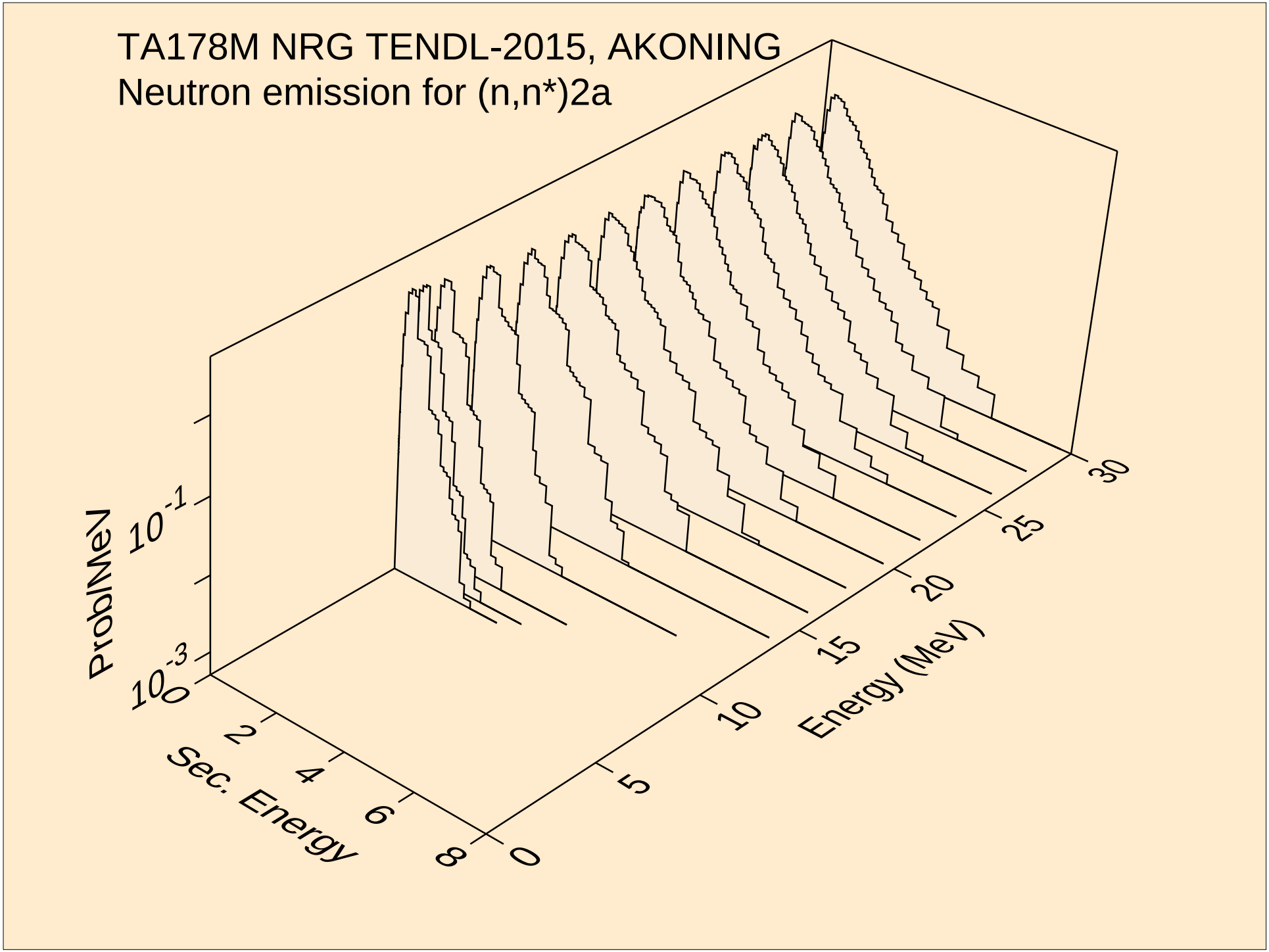

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,3n)
Prob/MeV
10-1
10-3
0
Sec. Energy
5
10
15
14
16
18
20
22
24
26
28
30
Energy (MeV)

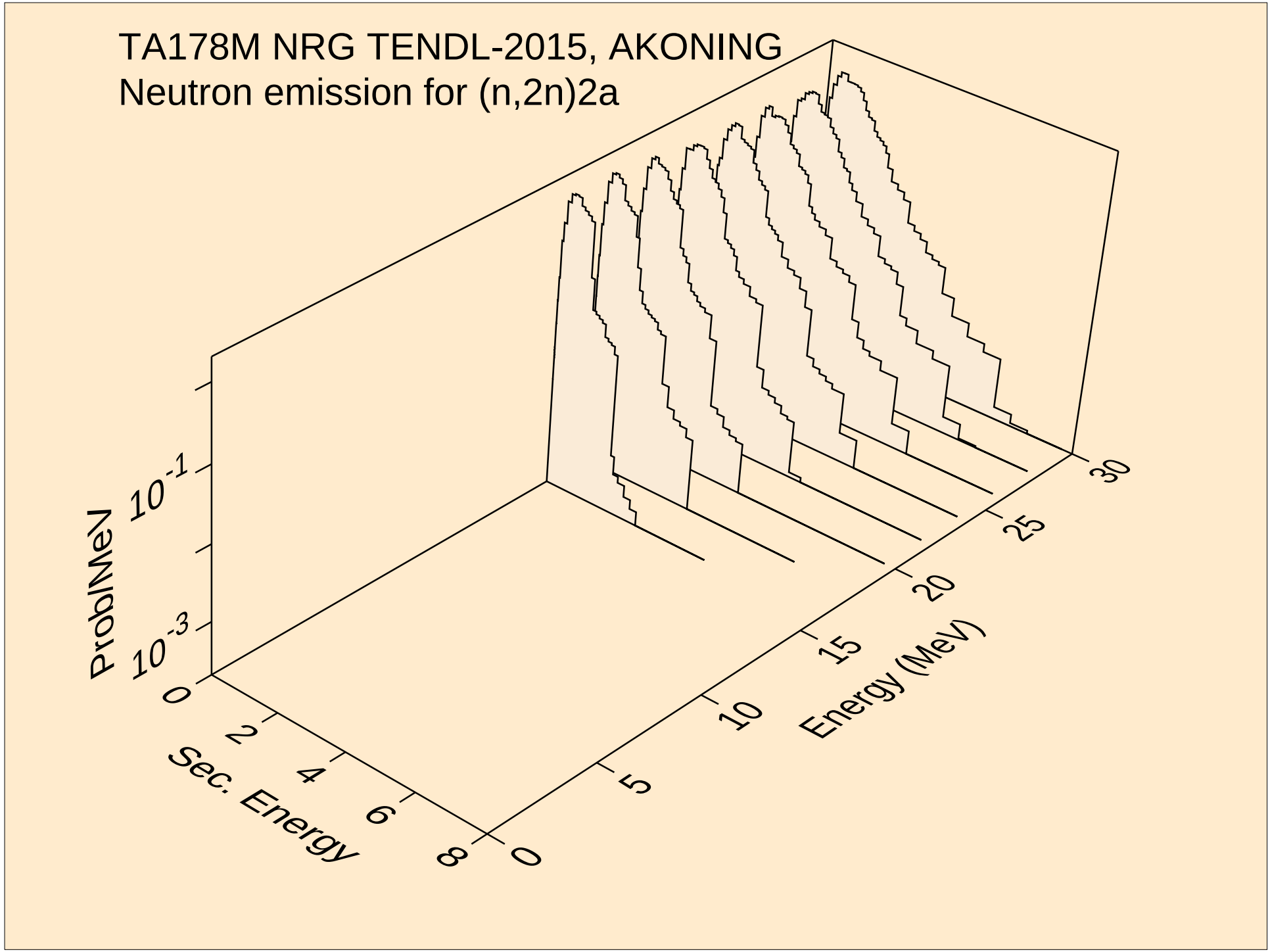

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,n*)a
Prob/MeV
10^0
10^-2
0
2
4
6
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

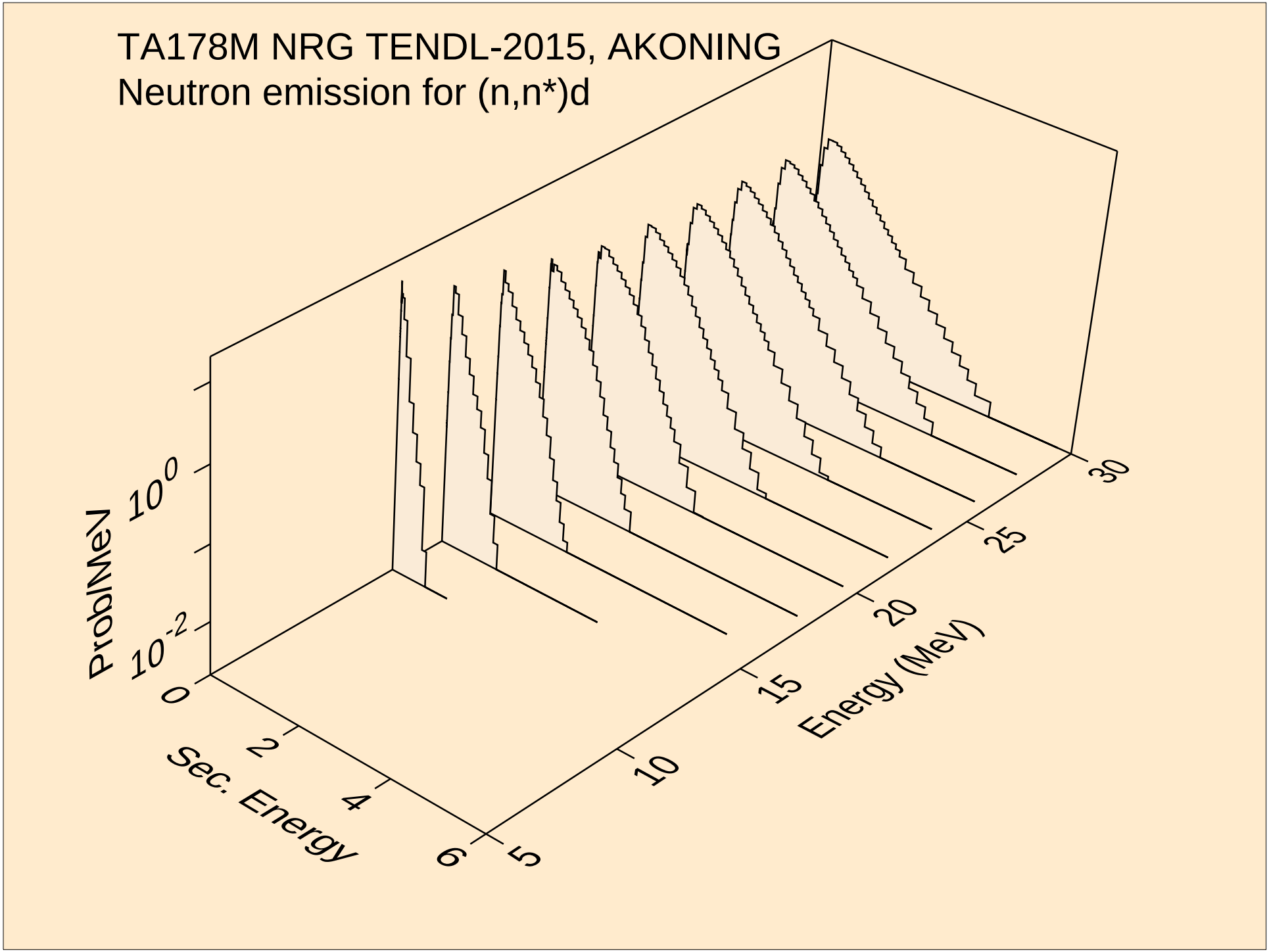

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,2n)a
Prob/MeV
10^{1}
10^{-1}
0
2
4
6
8
10
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

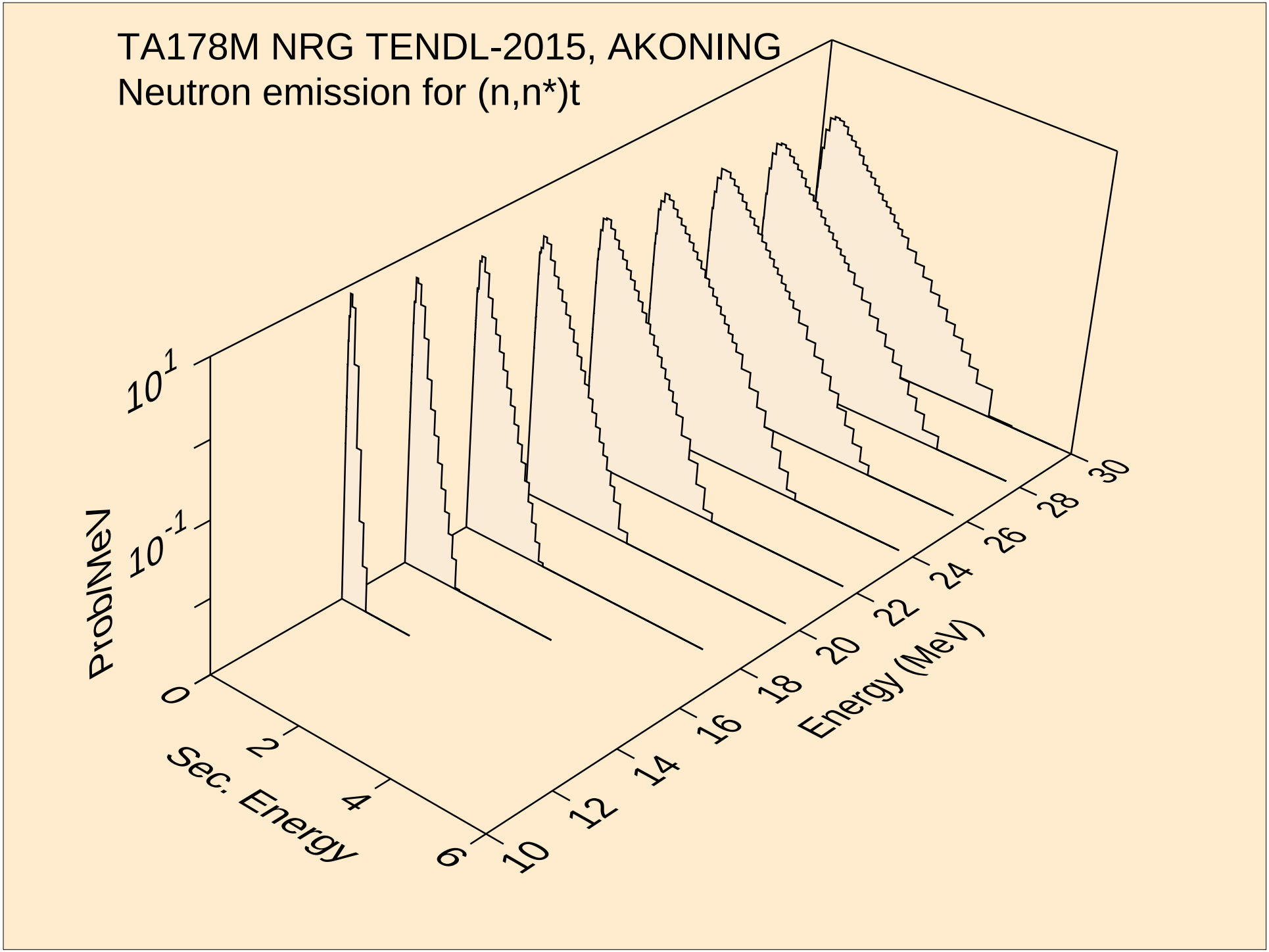

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,3n)a
Prob/MeV
10^1
10^-1
0
2
4
6
8
Sec. Energy
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

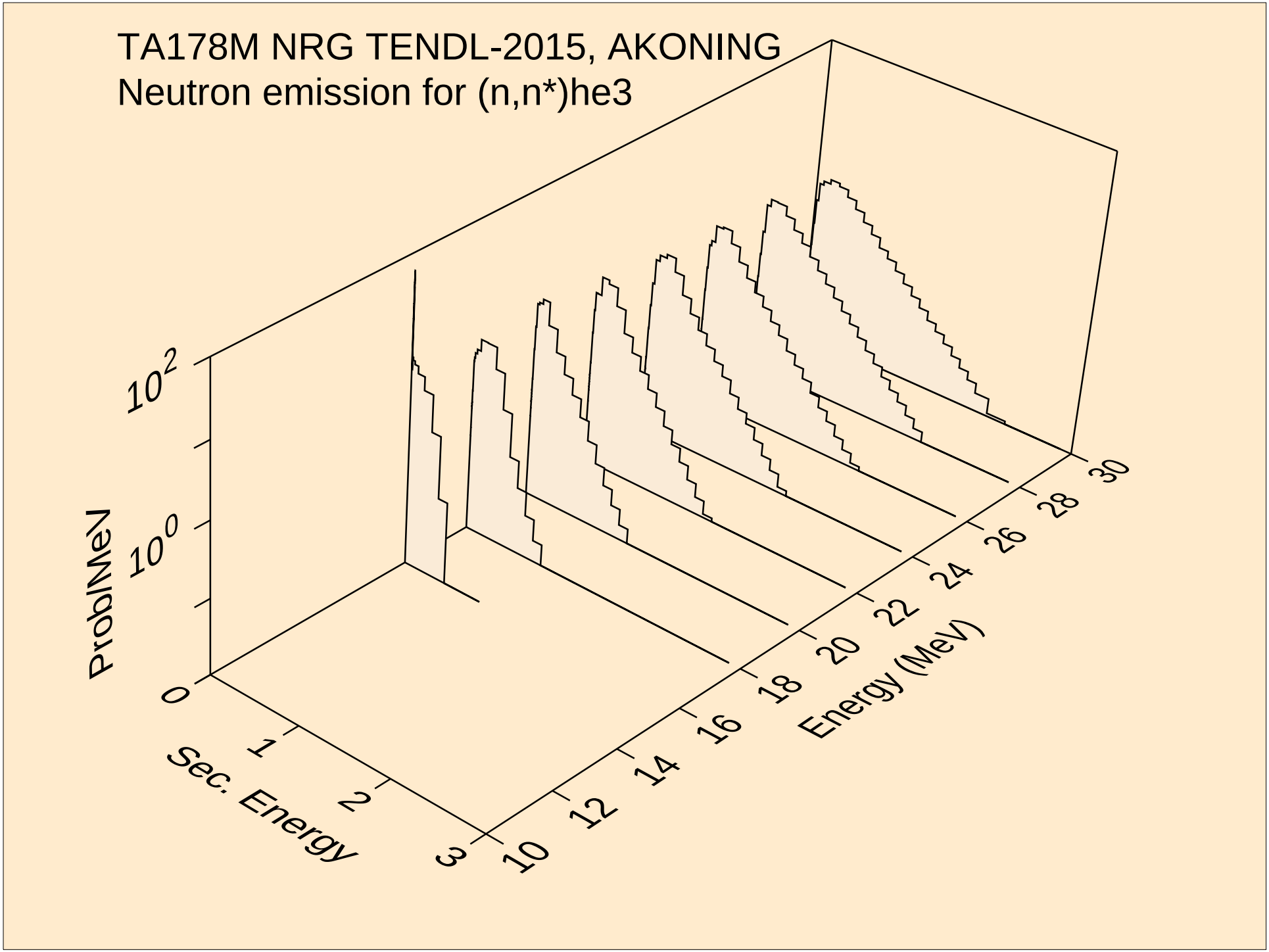

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,n*)p
Prob/MeV
10^2
10^0
0
5
10
15
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

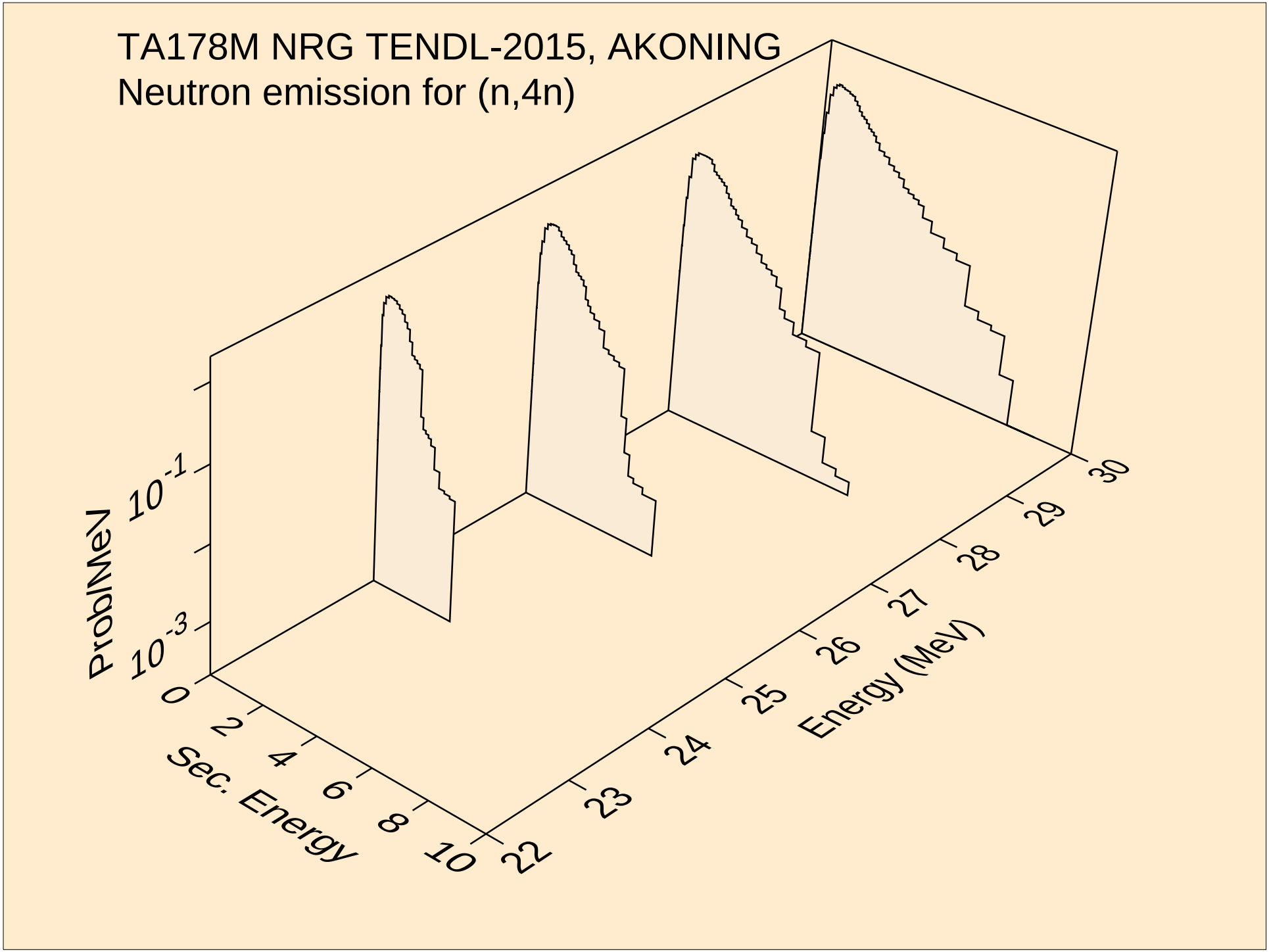

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,n*)2a
Prob/MeV
10-1
10-3
0
2
4
6
8
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

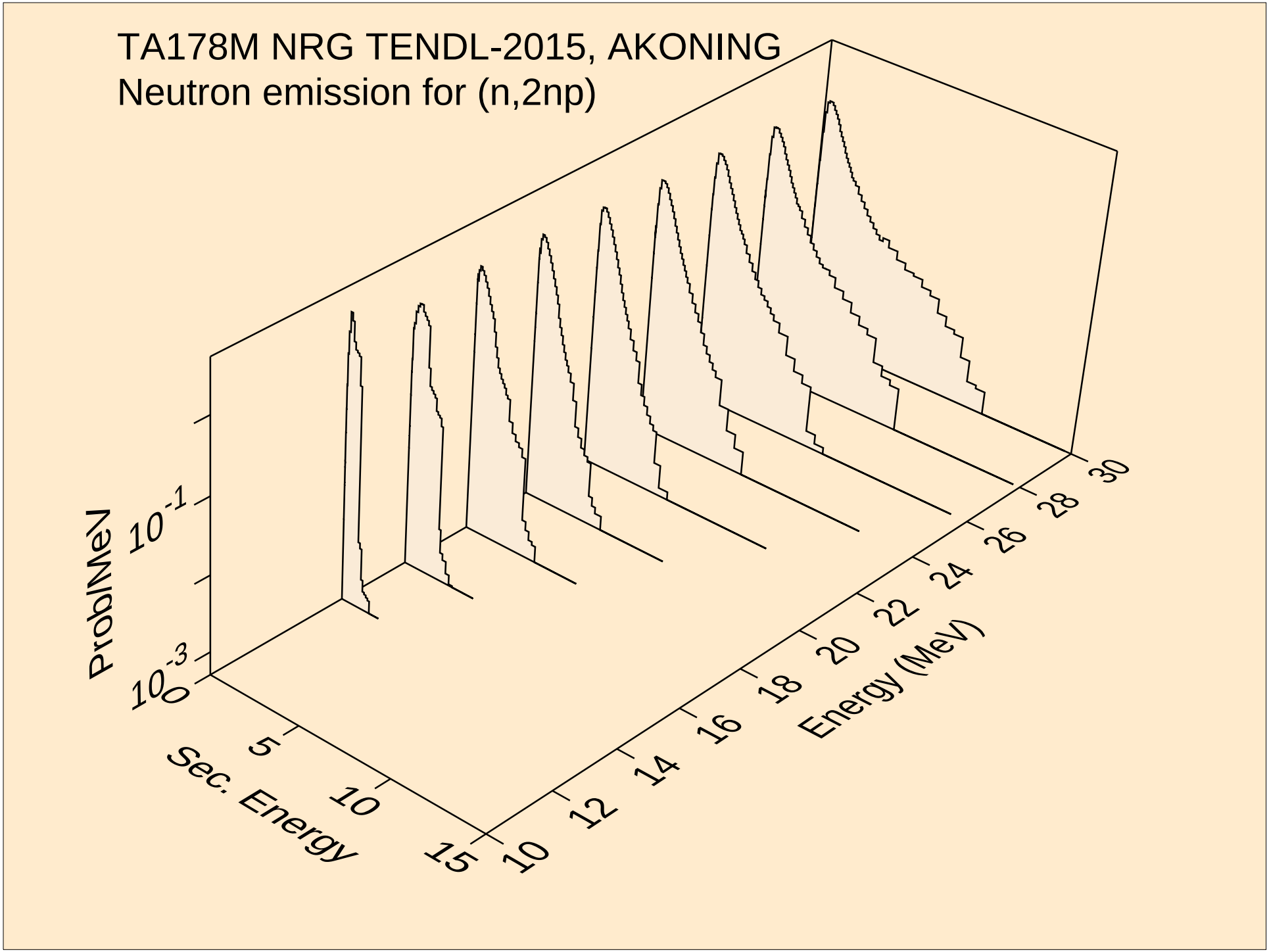

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,2n)2a
Prob/MeV
10-1
10-3
0
2
4
6
8
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

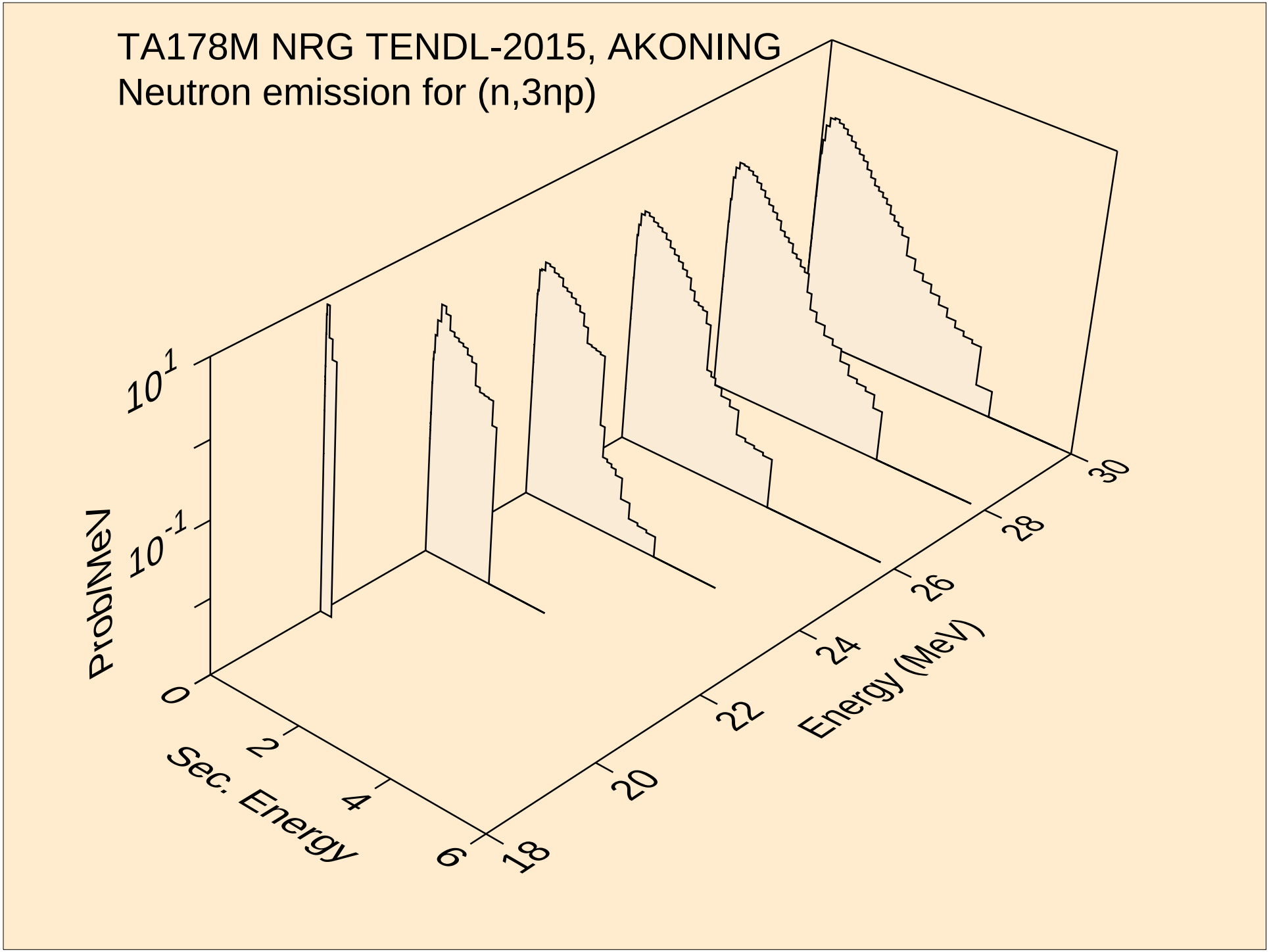

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,n*)d
Prob/MeV
10^0
10^-2
0
2
4
6
Sec. Energy
5
10
15
20
25
30
Energy (MeV)

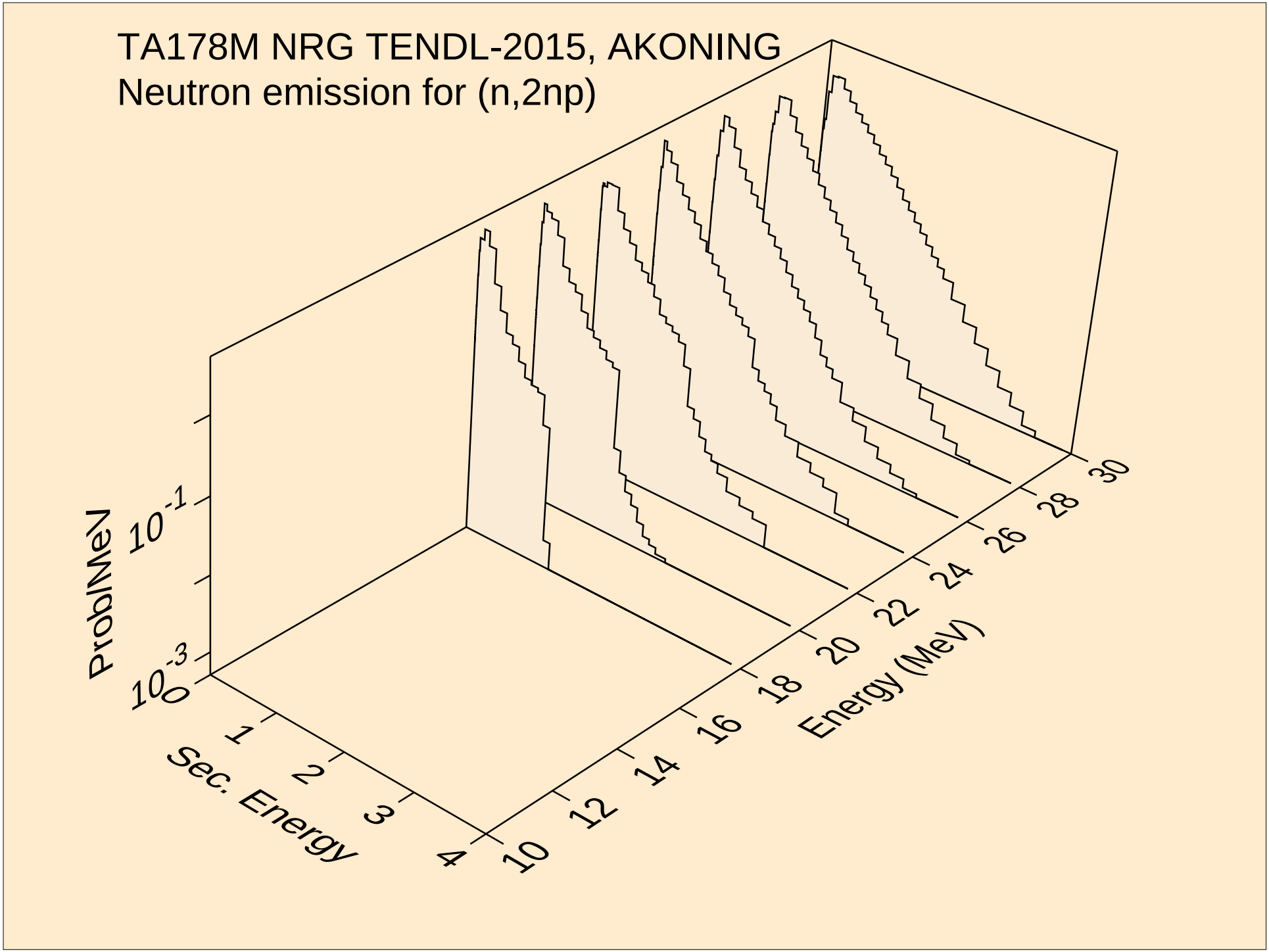

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,n*)t
Prob/MeV
10^1
10^-1
0
2
4
6
Sec. Energy
10
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

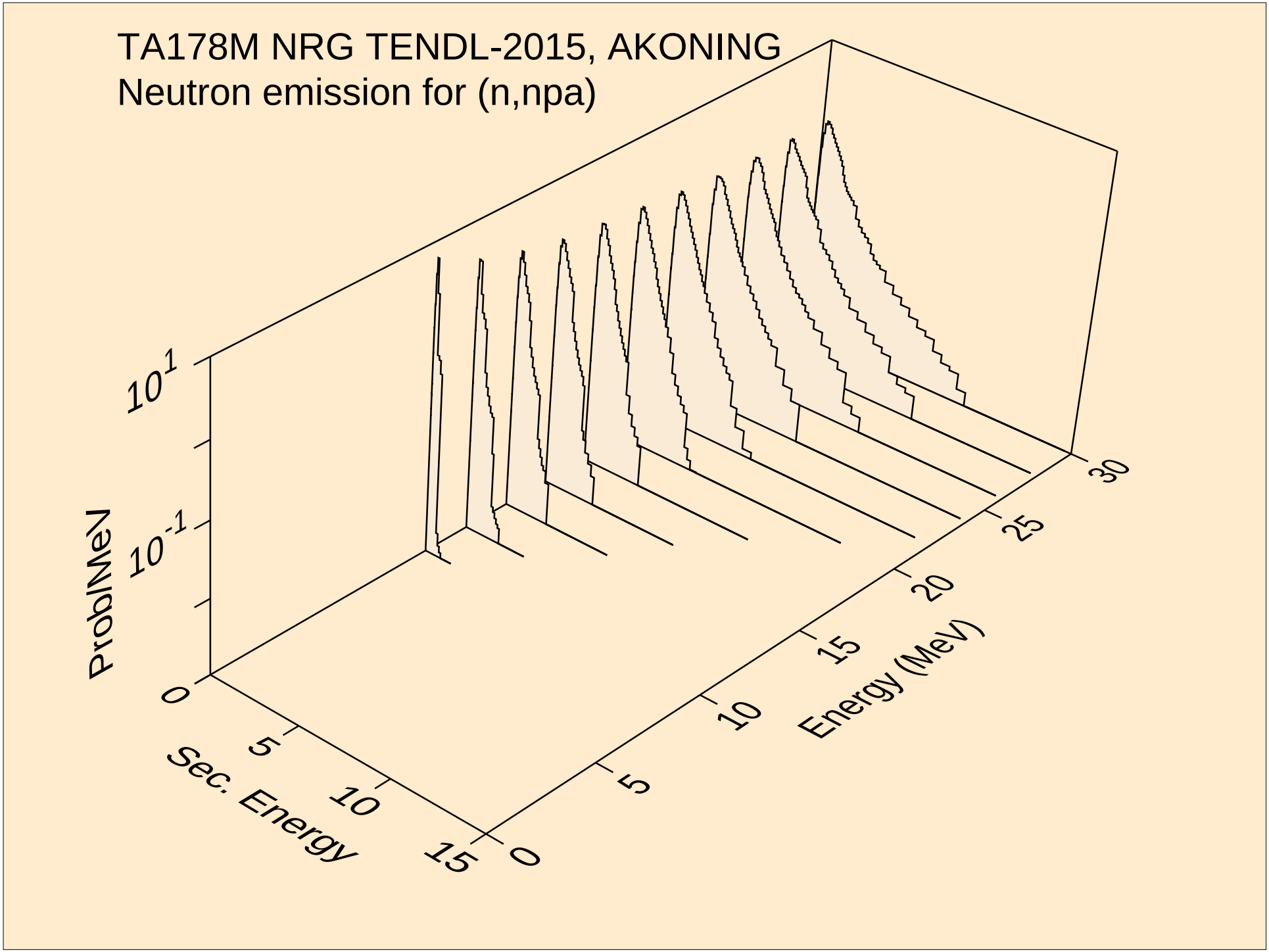

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,n*)he3
Prob/MeV
10^2
10^0
0
1
2
3
Sec. Energy
10
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

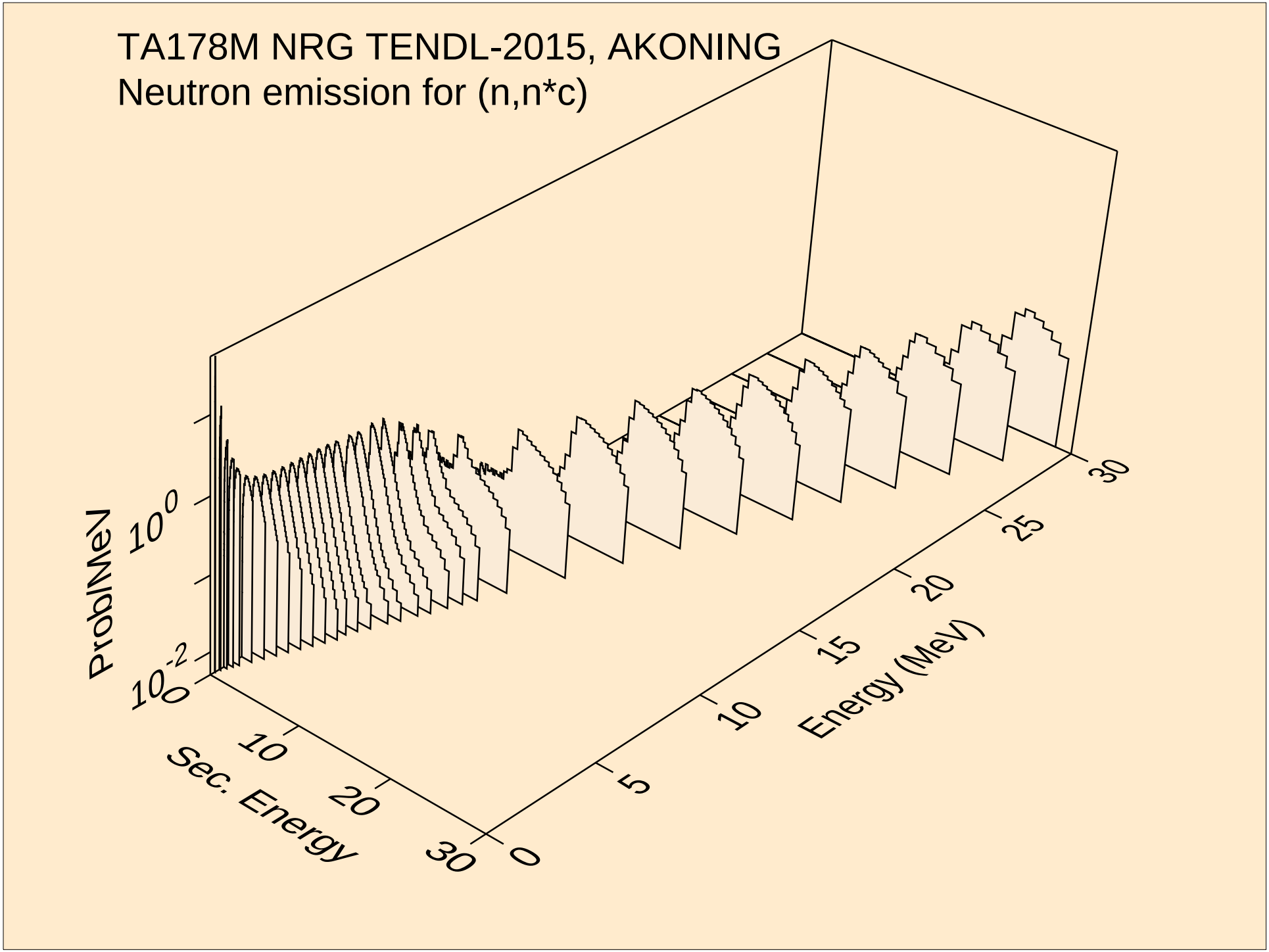

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,4n)
Prob/MeV
10-1
10-3
0
2
4
6
8
10
Sec. Energy
22
23
24
25
26
27
28
29
30
Energy (MeV)

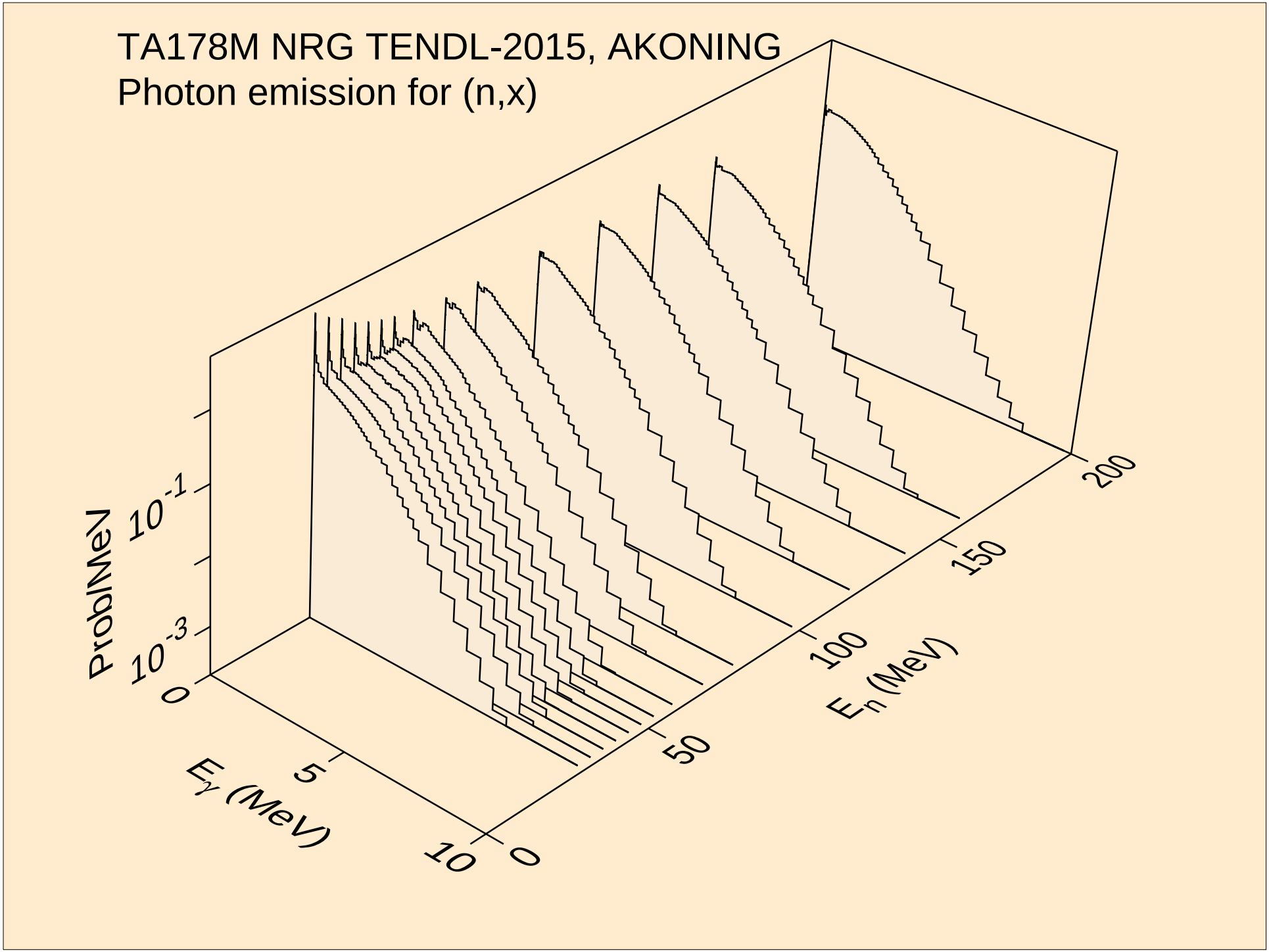

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,2np)
Prob/MeV
10-1
10-3
0
5
10
15
Sec. Energy
10
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

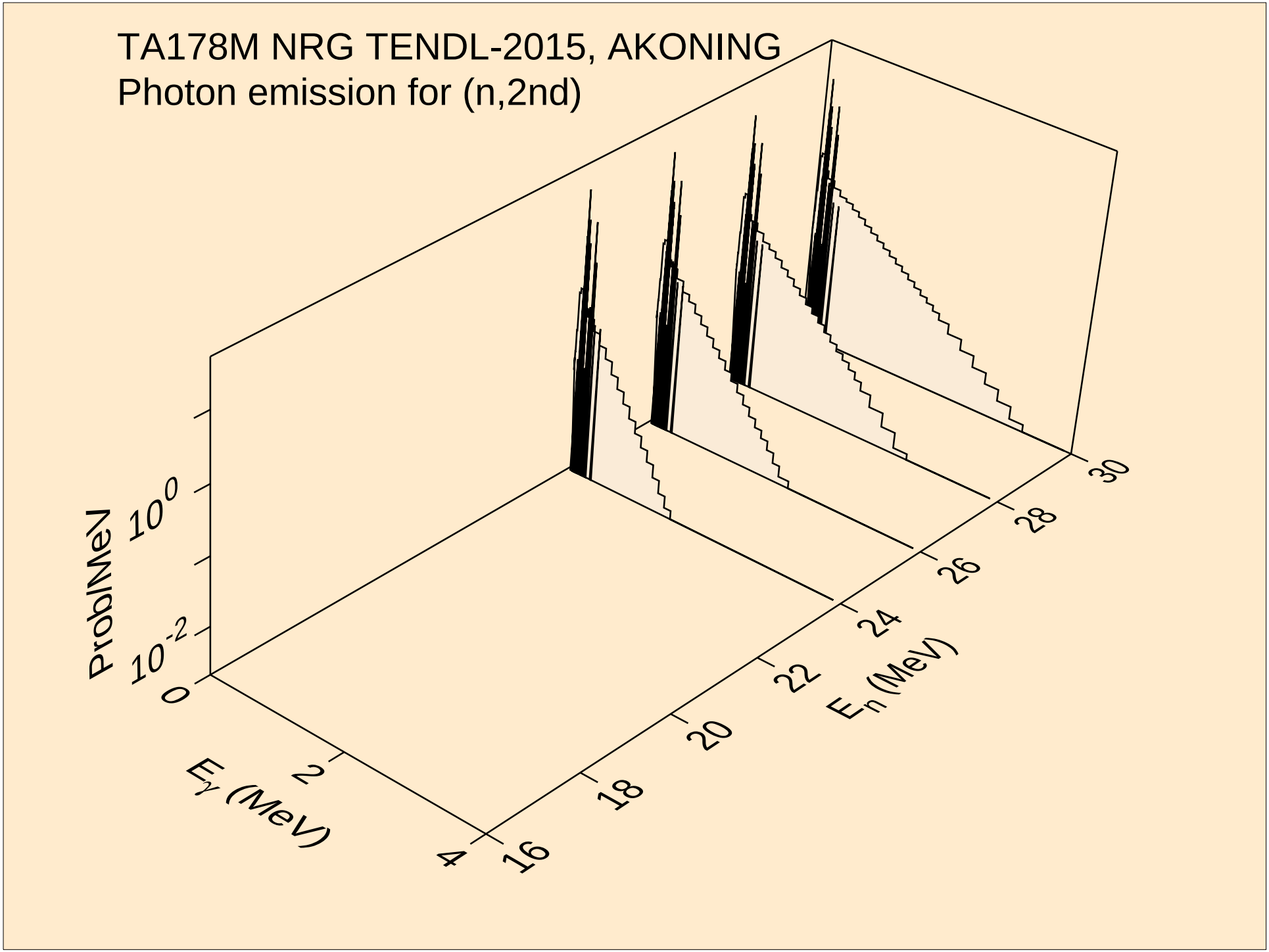

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,3np)
Prob/MeV
10^{1}
10^{-1}
0
2
4
6
Sec. Energy
18
20
22
24
26
28
30
Energy (MeV)

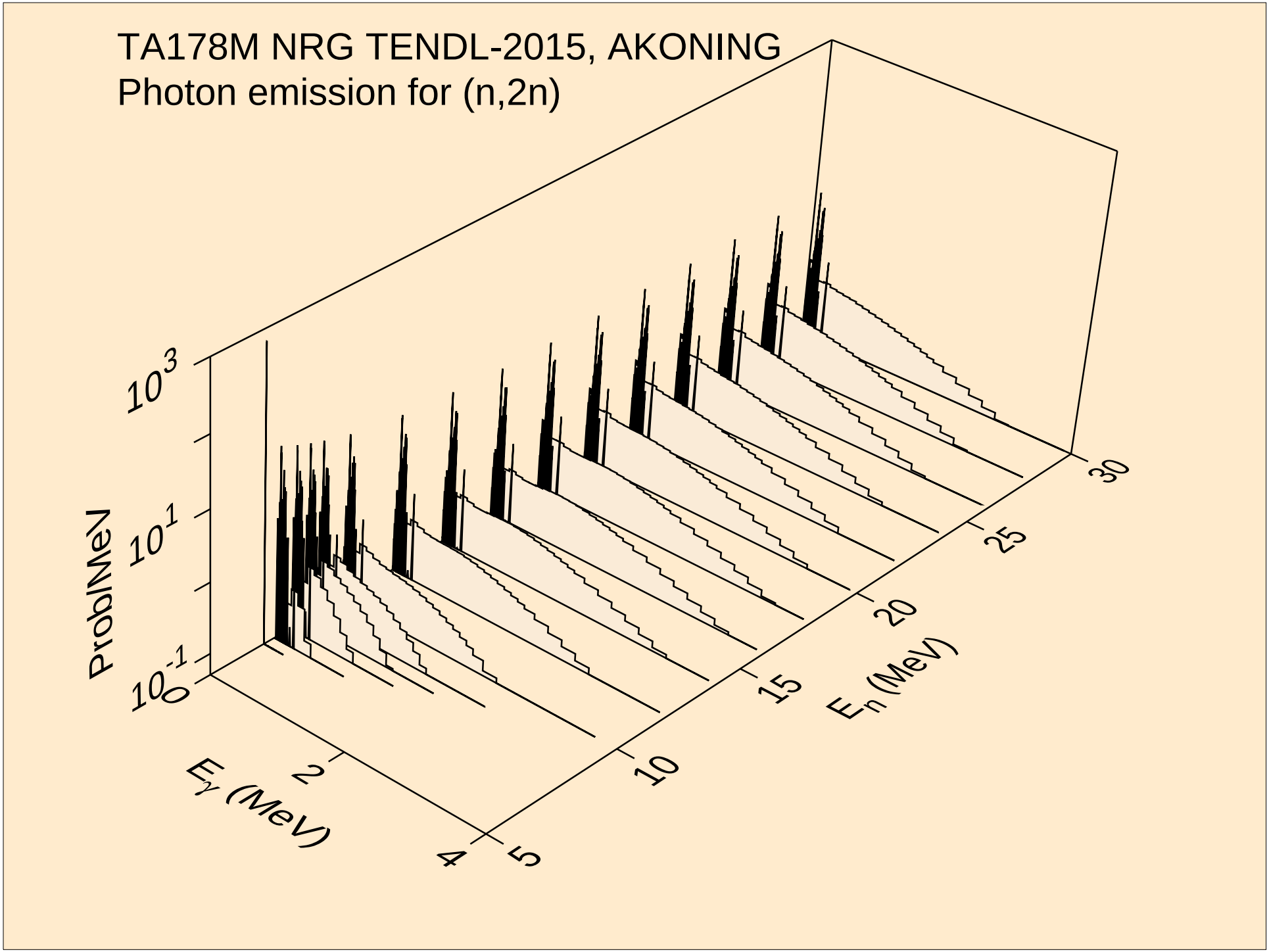

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,2np)
Prob/MeV
10-1
10-3
0
Sec. Energy
1
2
3
4
10
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

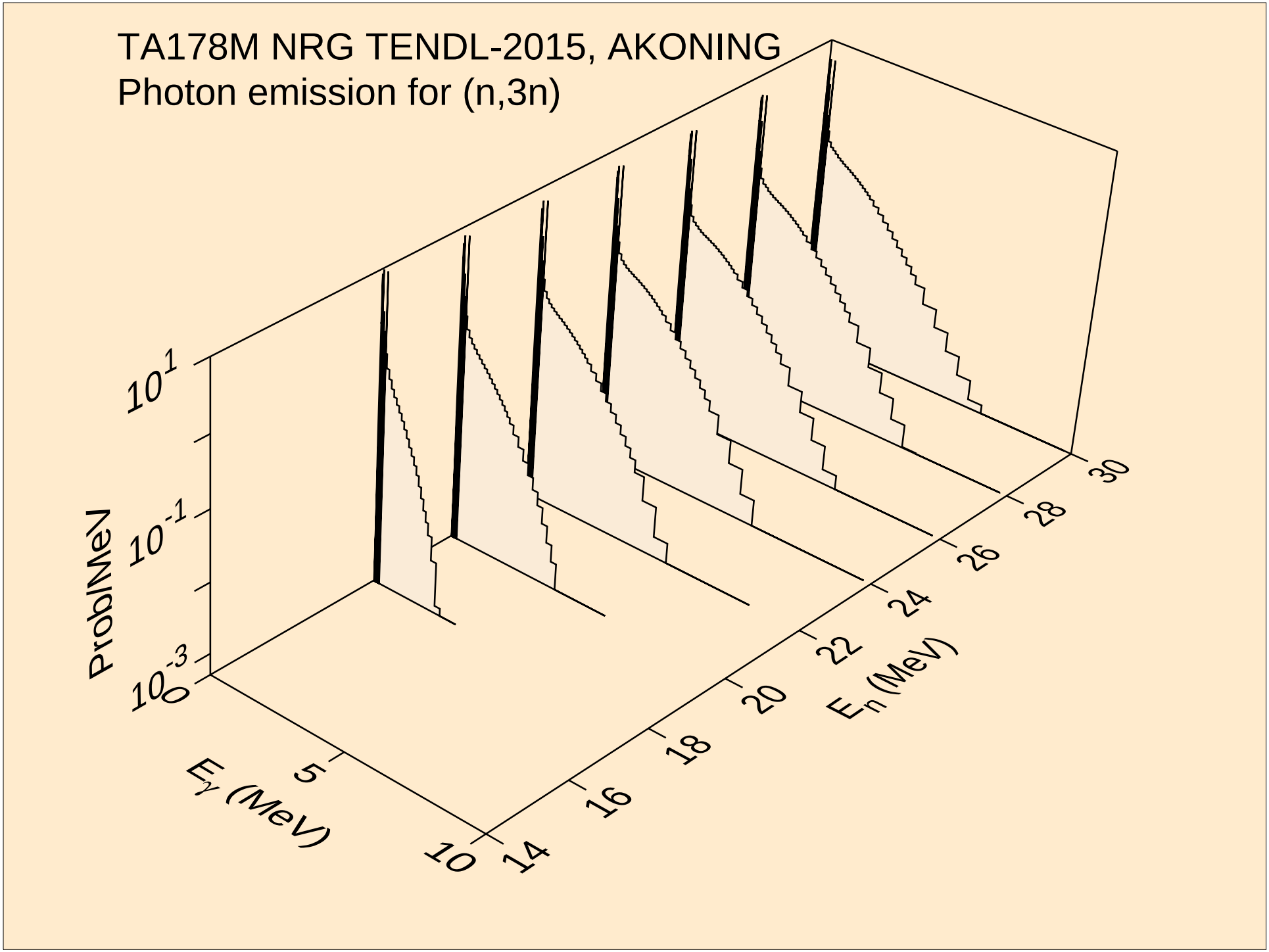

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,npa)
Prob/MeV
10^{1}
10^{-1}
0
5
10
15
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

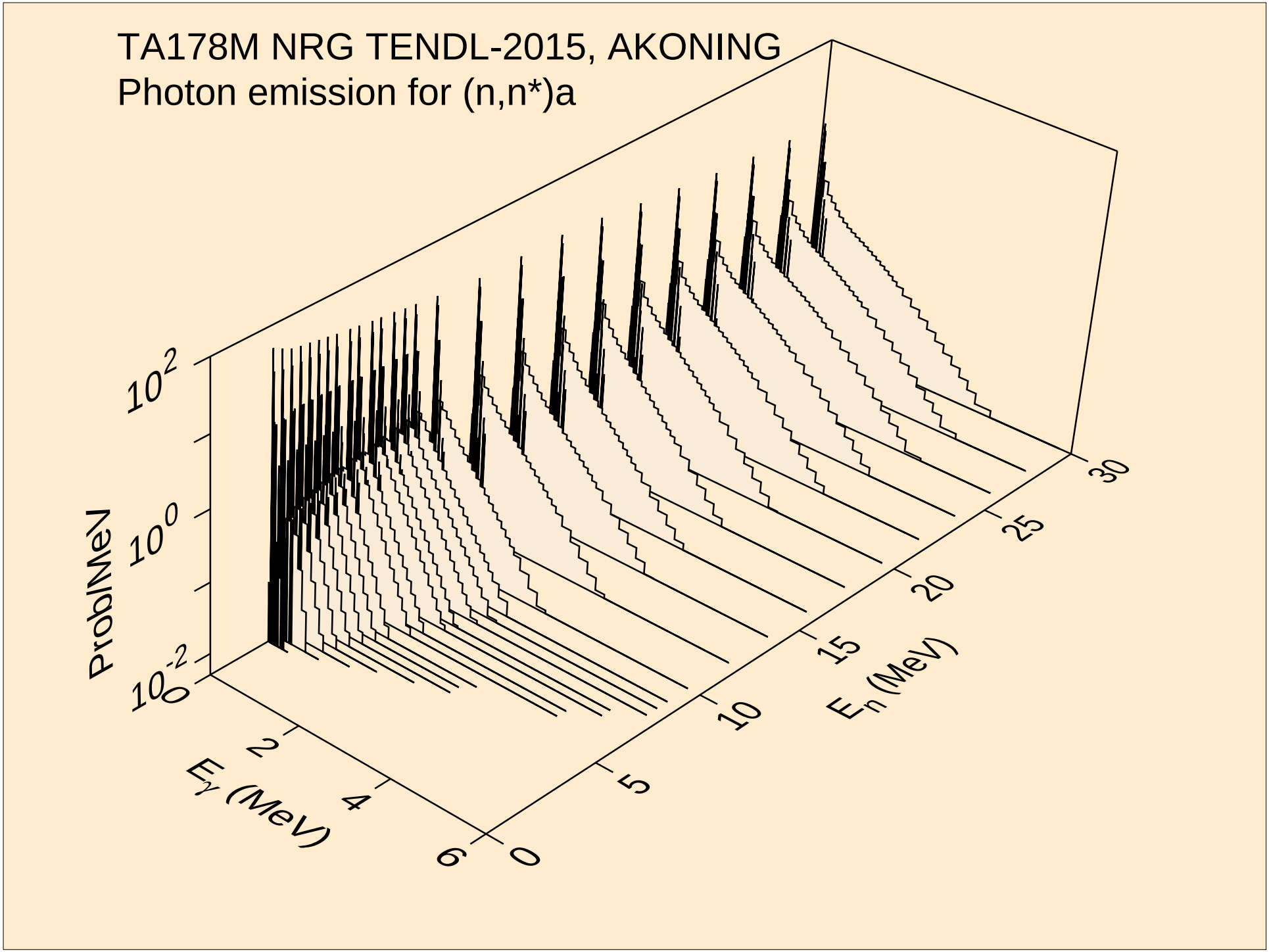

TA178M NRG TENDL-2015, AKONING
Neutron emission for (n,n*c)
Prob/MeV
10^0
10^-2
0
10
20
30
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

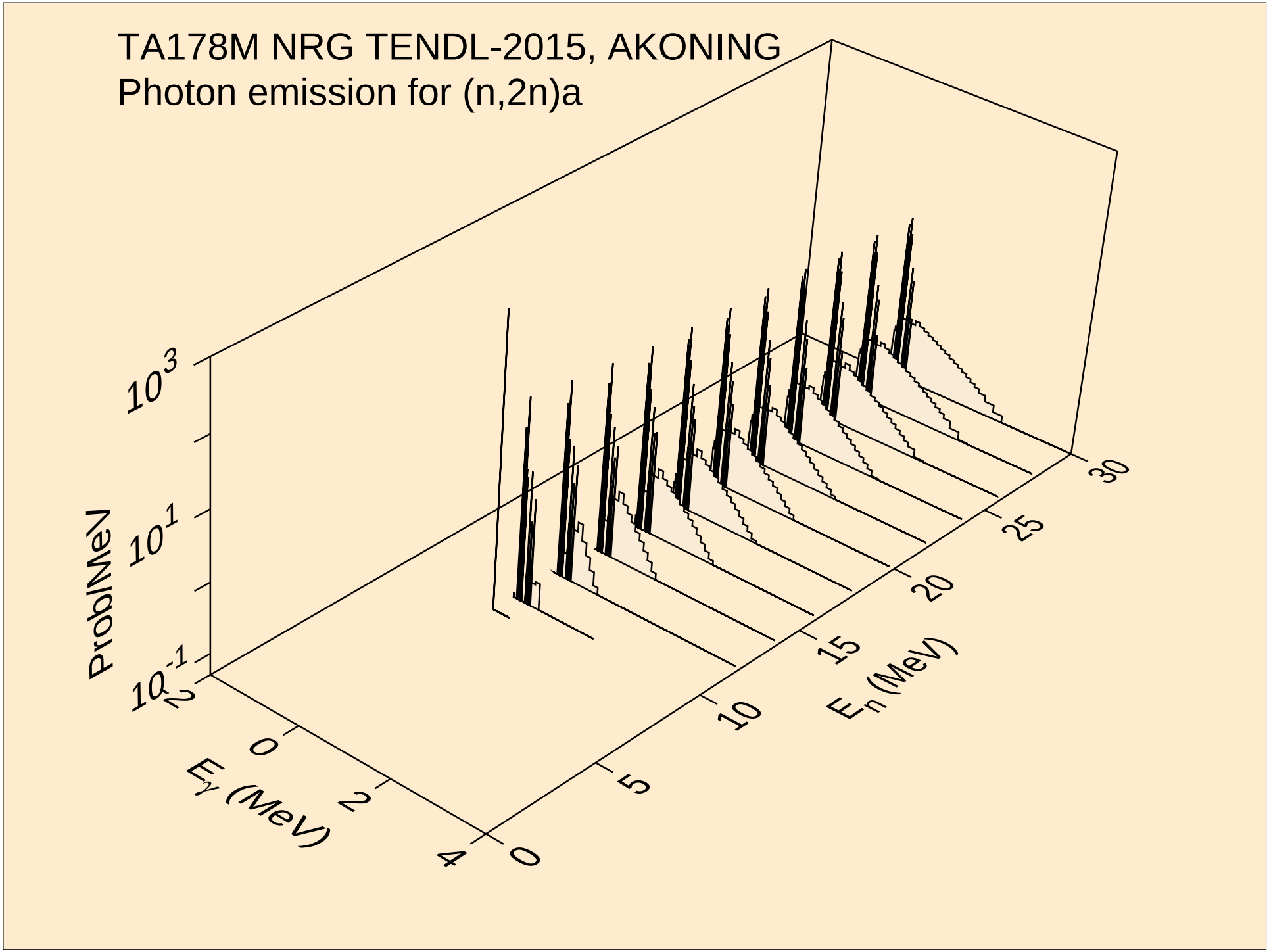

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,x)
Prob/MeV
10-1
10-3
0
5
Eγ (MeV)
10
0
50
100
150
200
En (MeV)

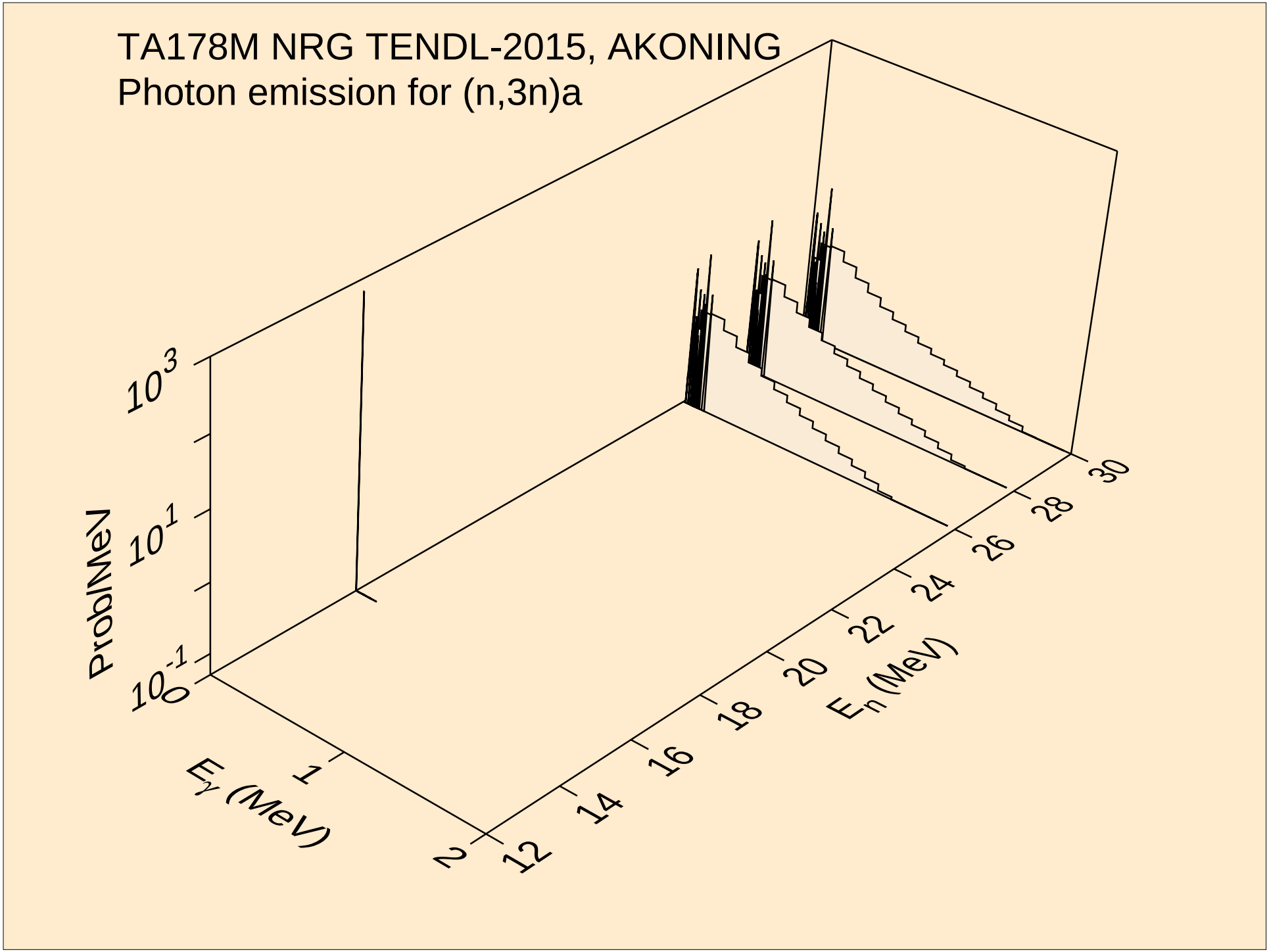

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,2nd)
Prob/MeV
10^0
10^-2
0
2
4
Eγ (MeV)
16
18
20
22
24
26
28
30
En (MeV)

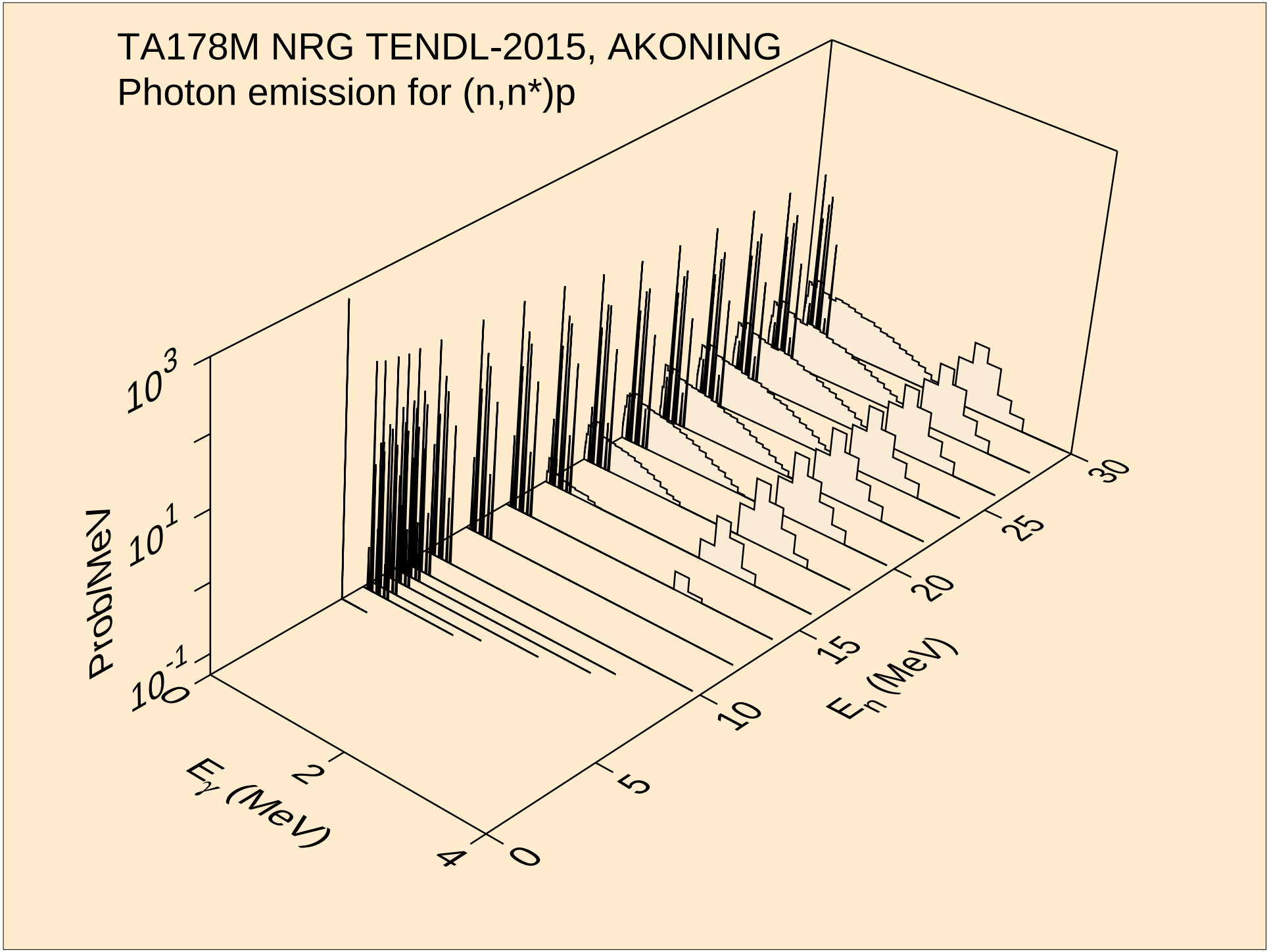

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,2n)
Prob/MeV
10^{3}
10^{1}
10^{-1}
0
2
4
E_γ (MeV)
5
10
15
20
25
30
E_n (MeV)

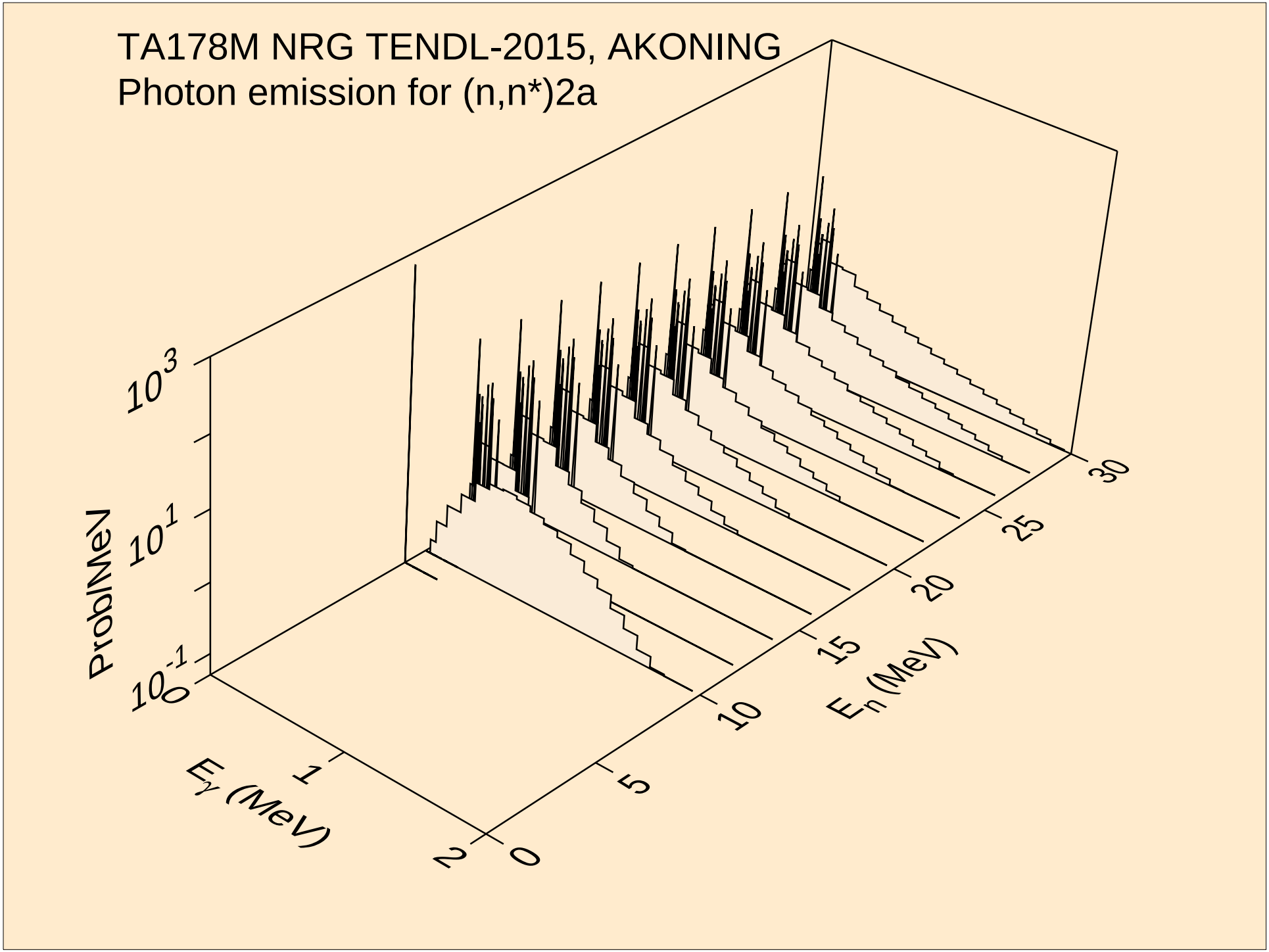

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,3n)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
5
10
E_γ (MeV)
14
16
18
20
22
24
26
28
30
E_n (MeV)

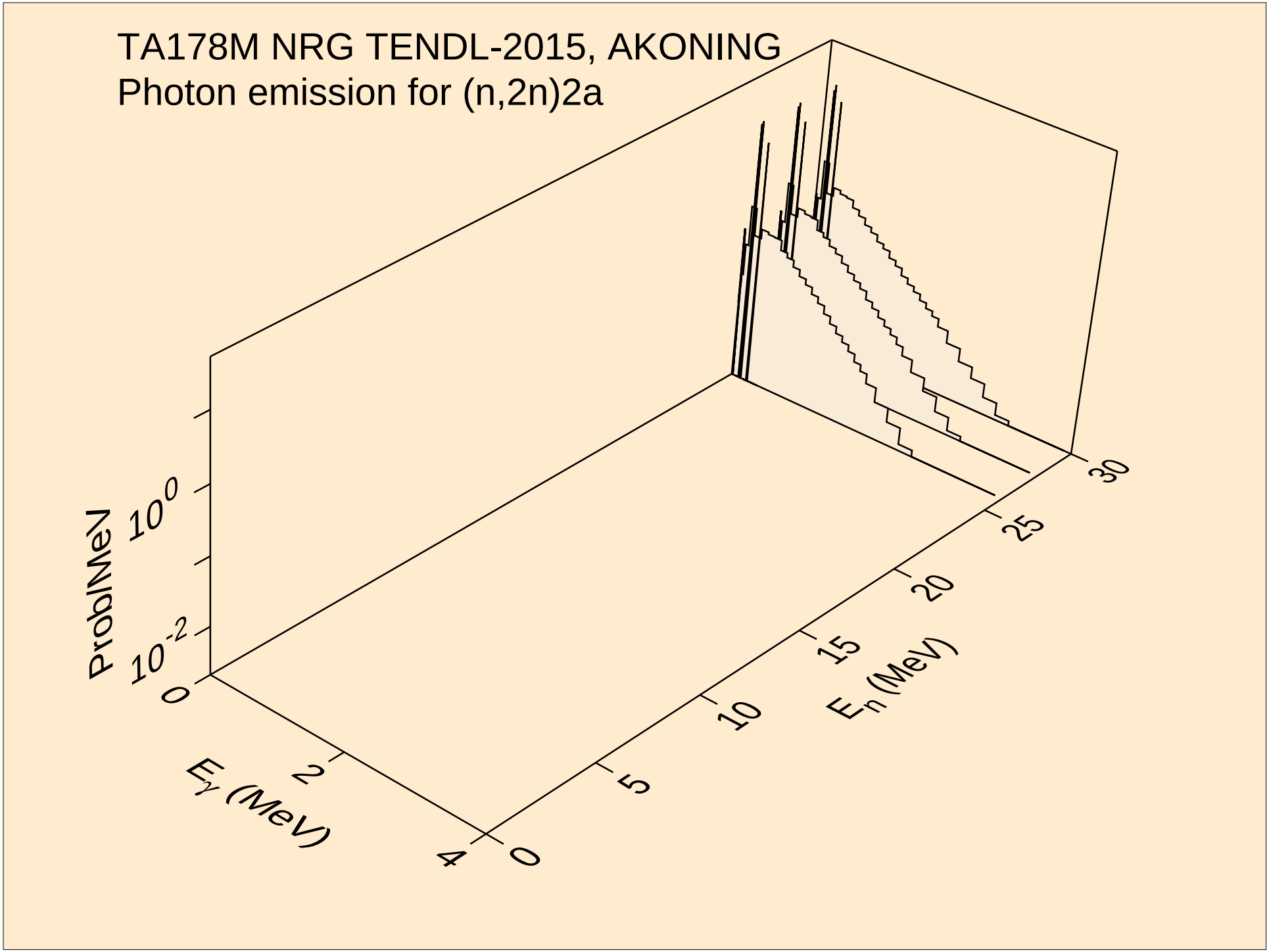

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*)a
Prob/MeV
10^{2}
10^{0}
10^{-2}
0
2
4
6
E_γ (MeV)
0
5
10
15
20
25
30
E_n (MeV)

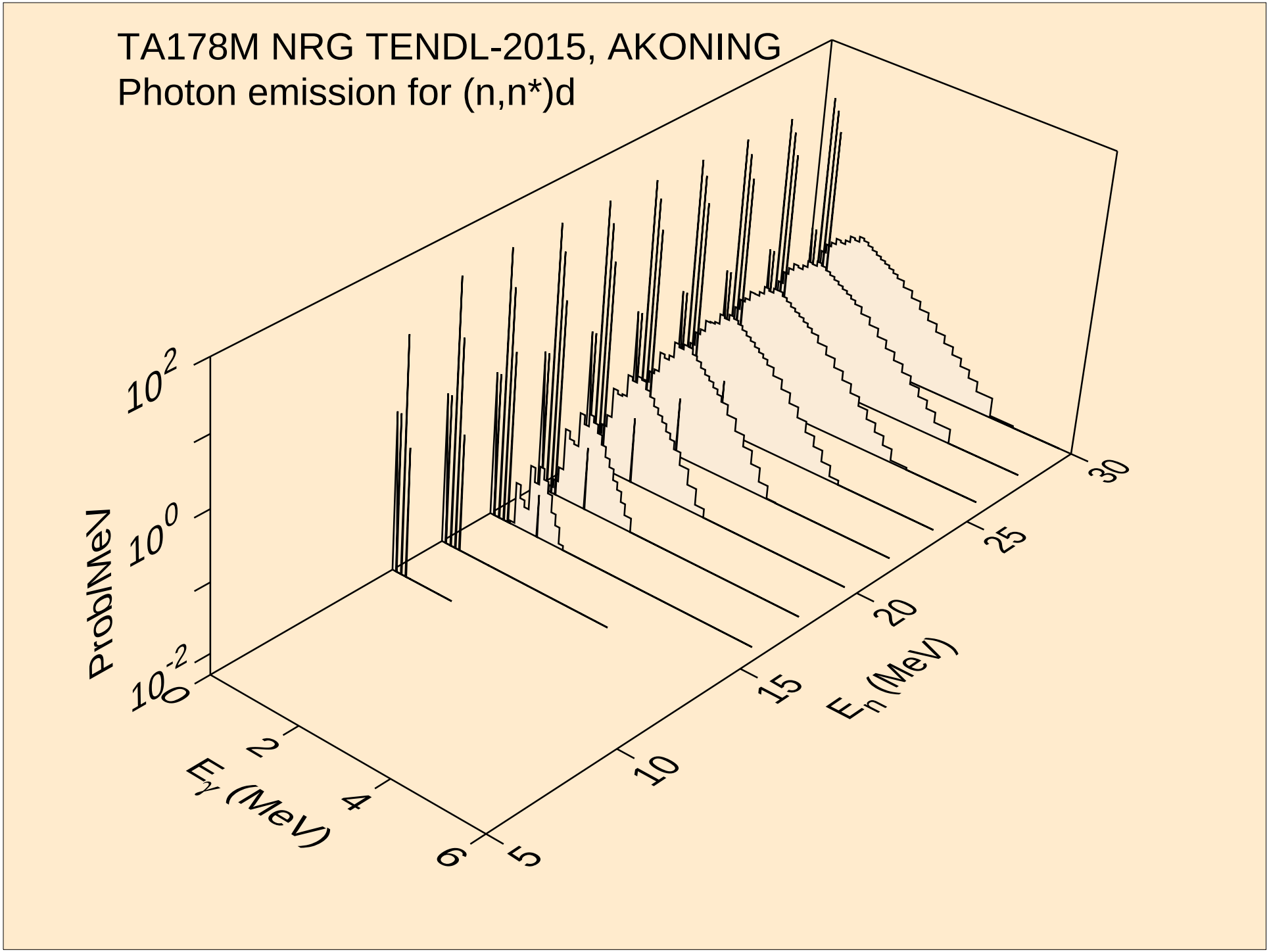

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,2n)a
Prob/MeV
10^{3}
10^{1}
10^{-1}
E_γ (MeV)
0
2
4
E_n (MeV)
0
5
10
15
20
25
30

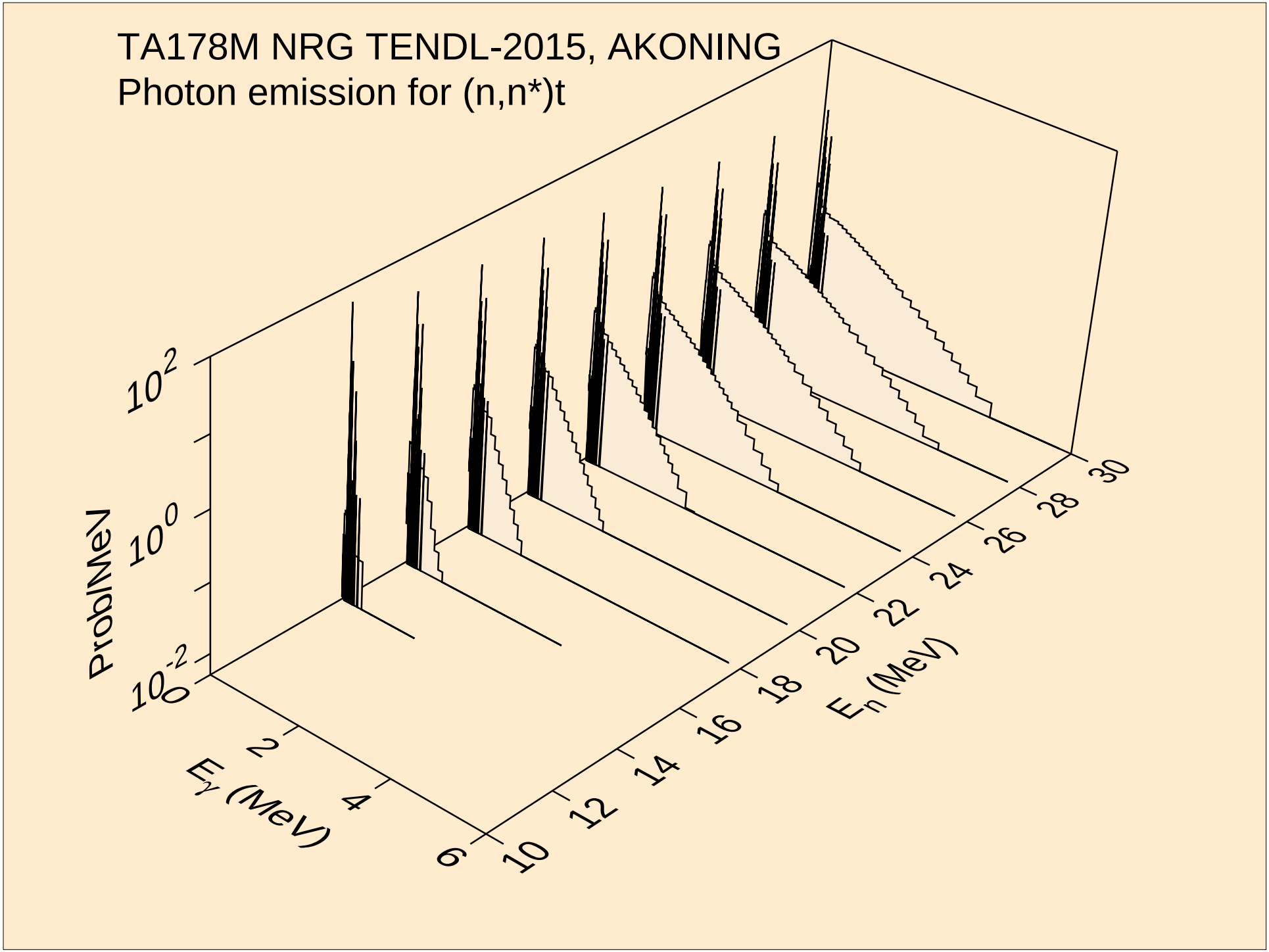

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,3n)a
Prob/MeV
10^{3}
10^{1}
10^{-1}
0
1
2
E_γ (MeV)
12
14
16
18
20
22
24
26
28
30
E_n (MeV)

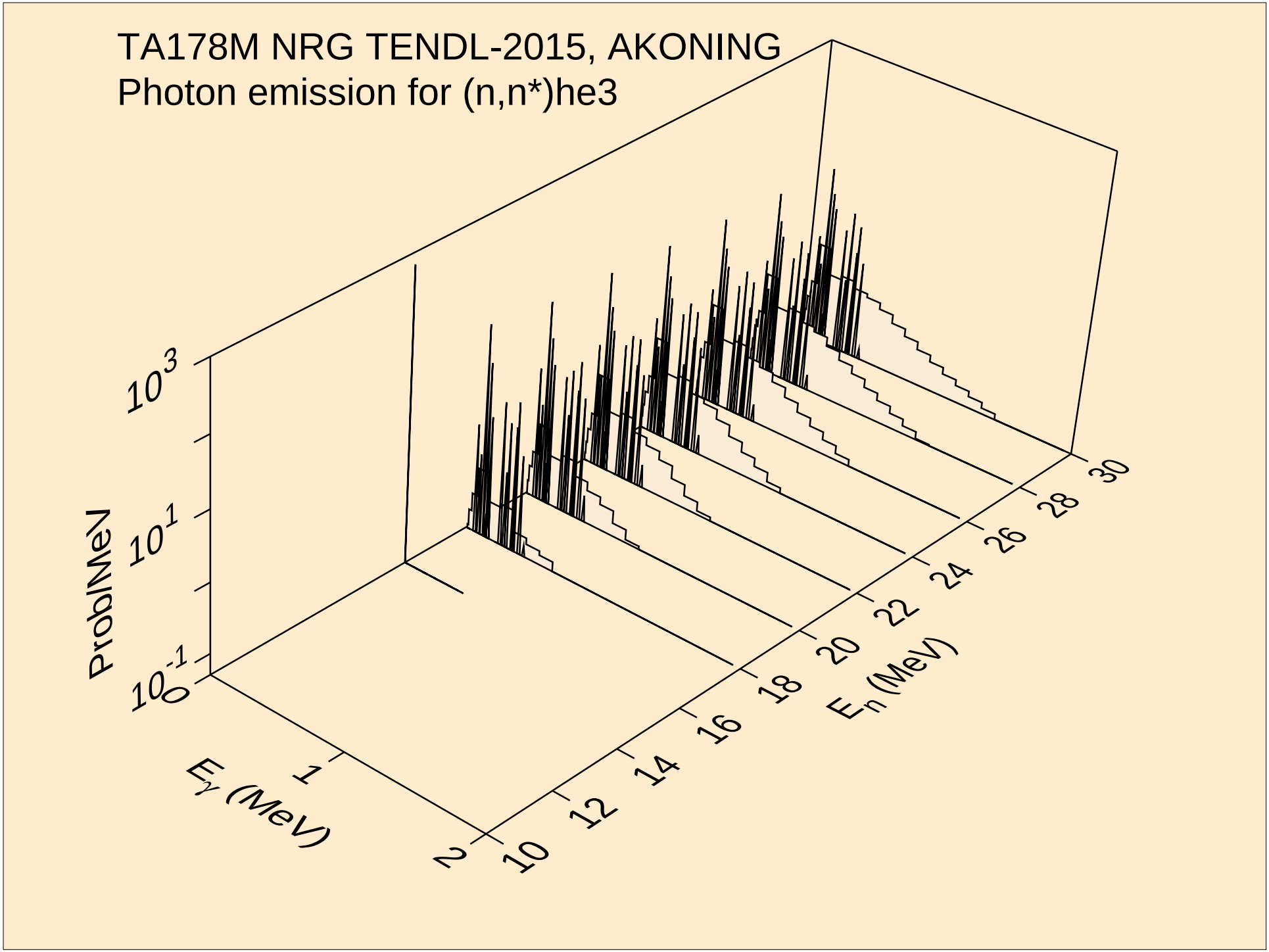

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*)p
Prob/MeV
10^{3}
10^{1}
10^{-1}
0
2
4
E_γ (MeV)
0
5
10
15
20
25
30
E_n (MeV)

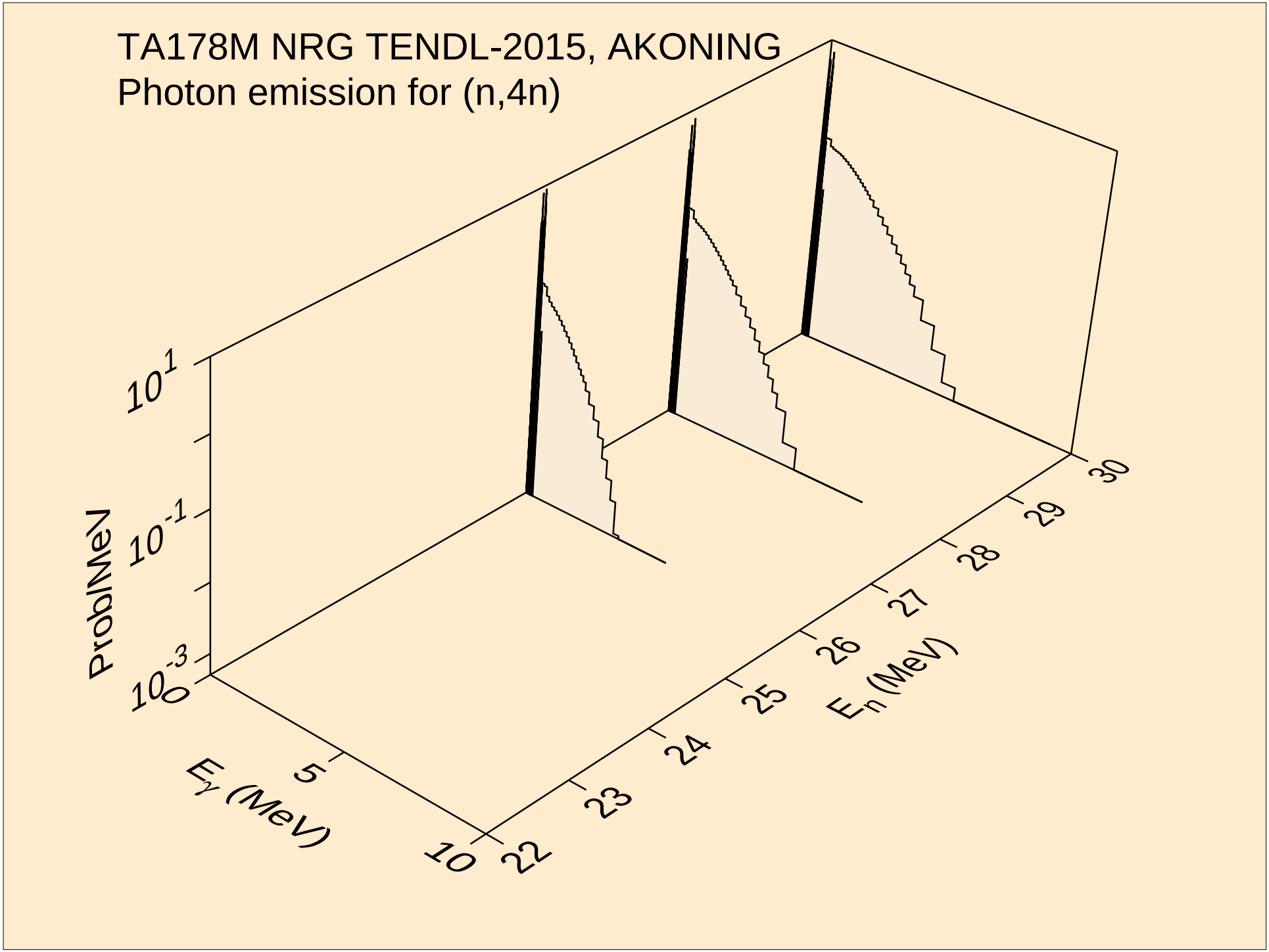

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*)2a
Prob/MeV
10^{3}
10^{1}
10^{-1}
E_γ (MeV)
0
1
2
E_n (MeV)
0
5
10
15
20
25
30

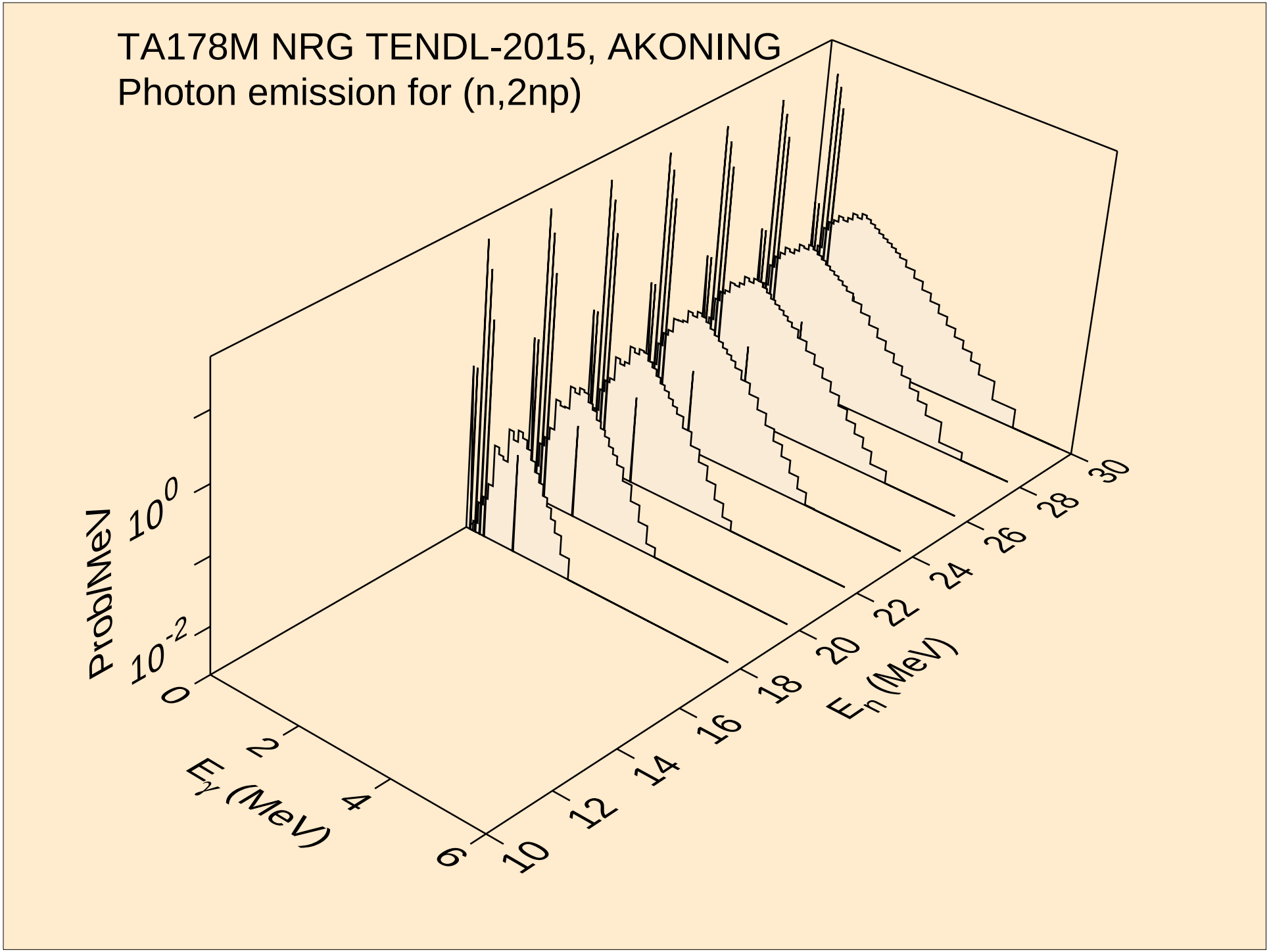

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,2n)2a
Prob/MeV
10^0
10^-2
0
2
4
Eγ (MeV)
0
5
10
15
20
25
30
En (MeV)

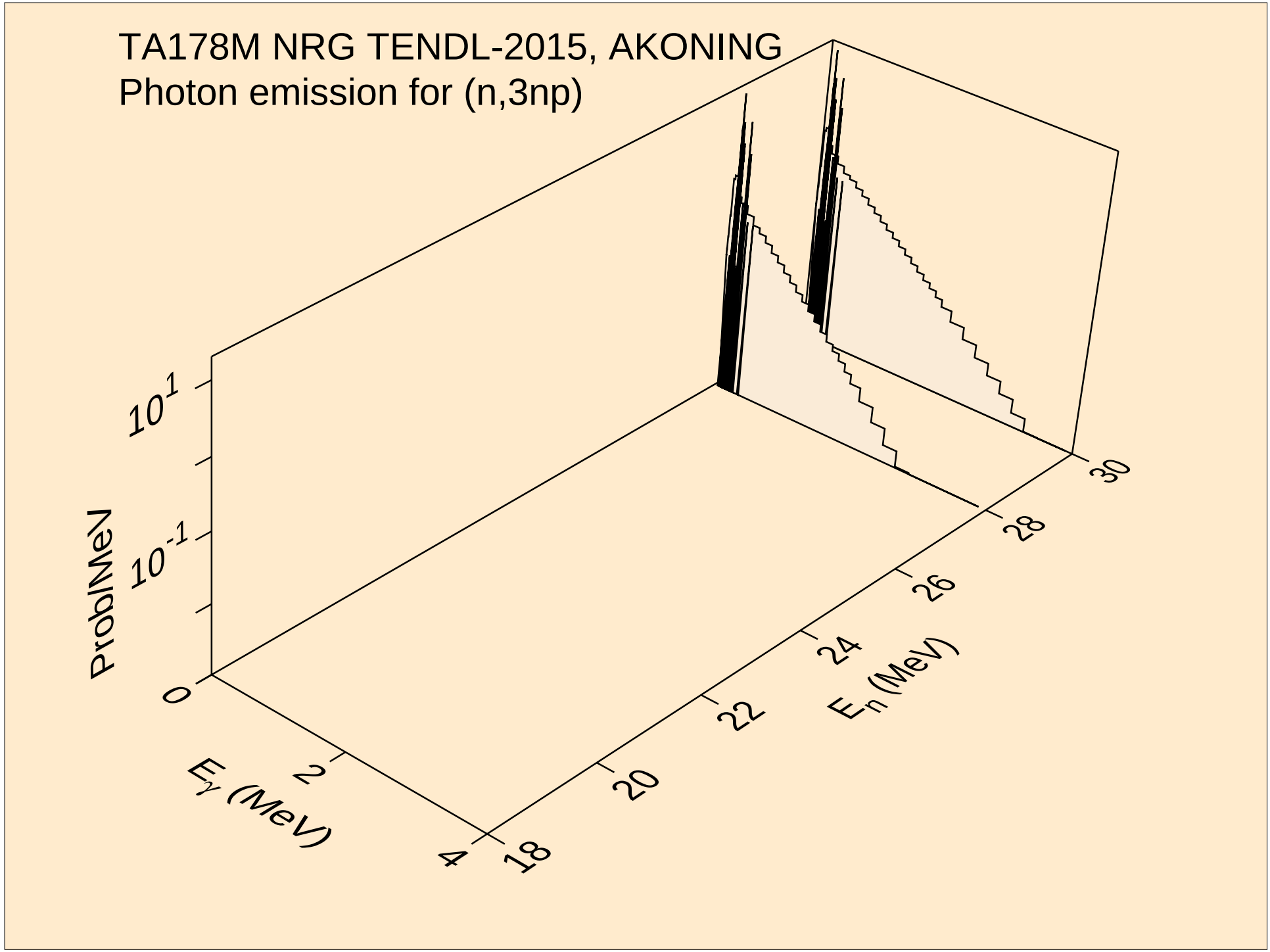

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*)d
Prob/MeV
10^{2}
10^{0}
10^{-2}
0
2
4
6
E_γ (MeV)
5
10
15
20
25
30
E_n (MeV)

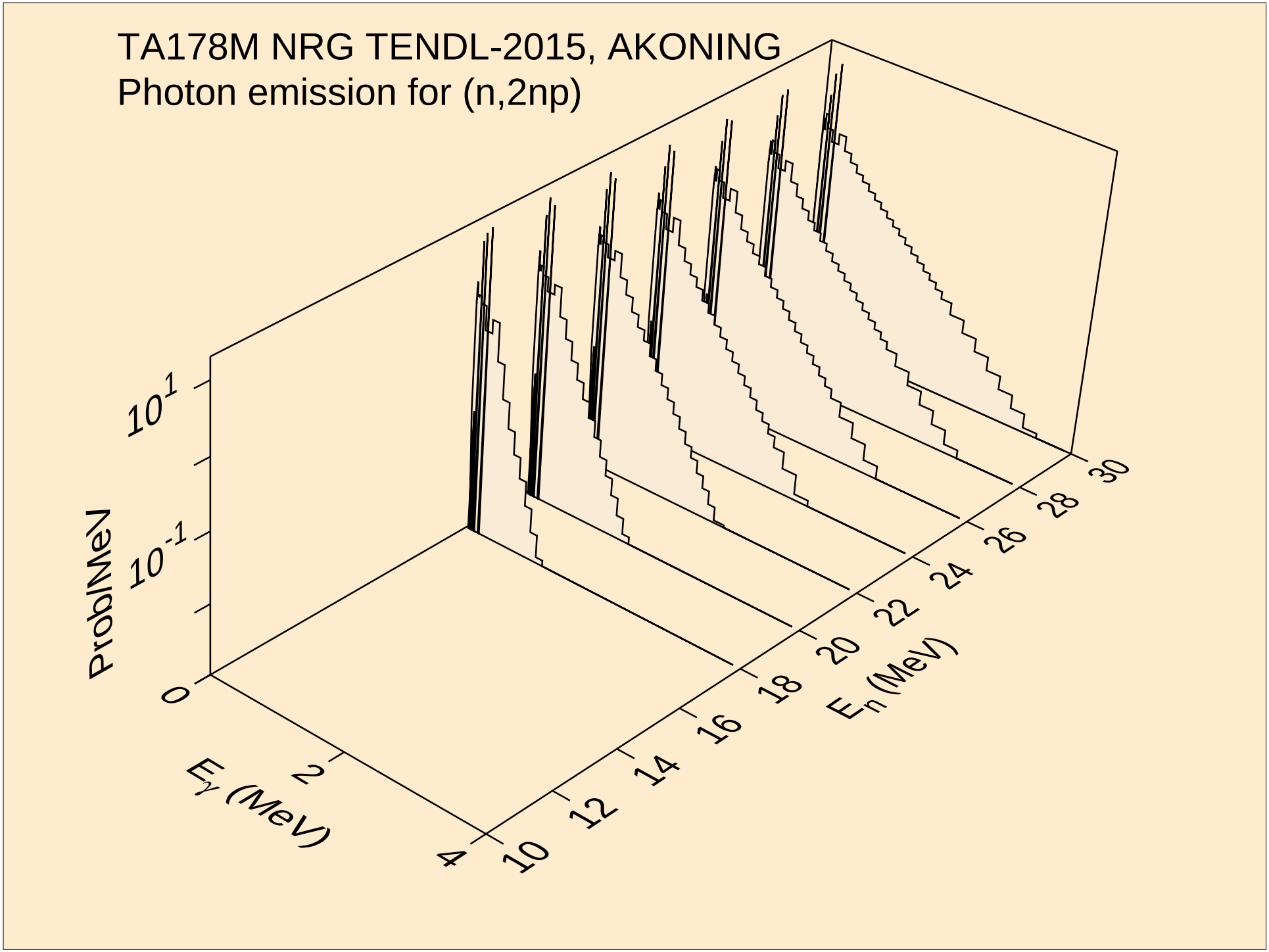

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*)t
Prob/MeV
10^{2}
10^{0}
10^{-2}
0
2
4
6
E_γ (MeV)
10
12
14
16
18
20
22
24
26
28
30
E_n (MeV)

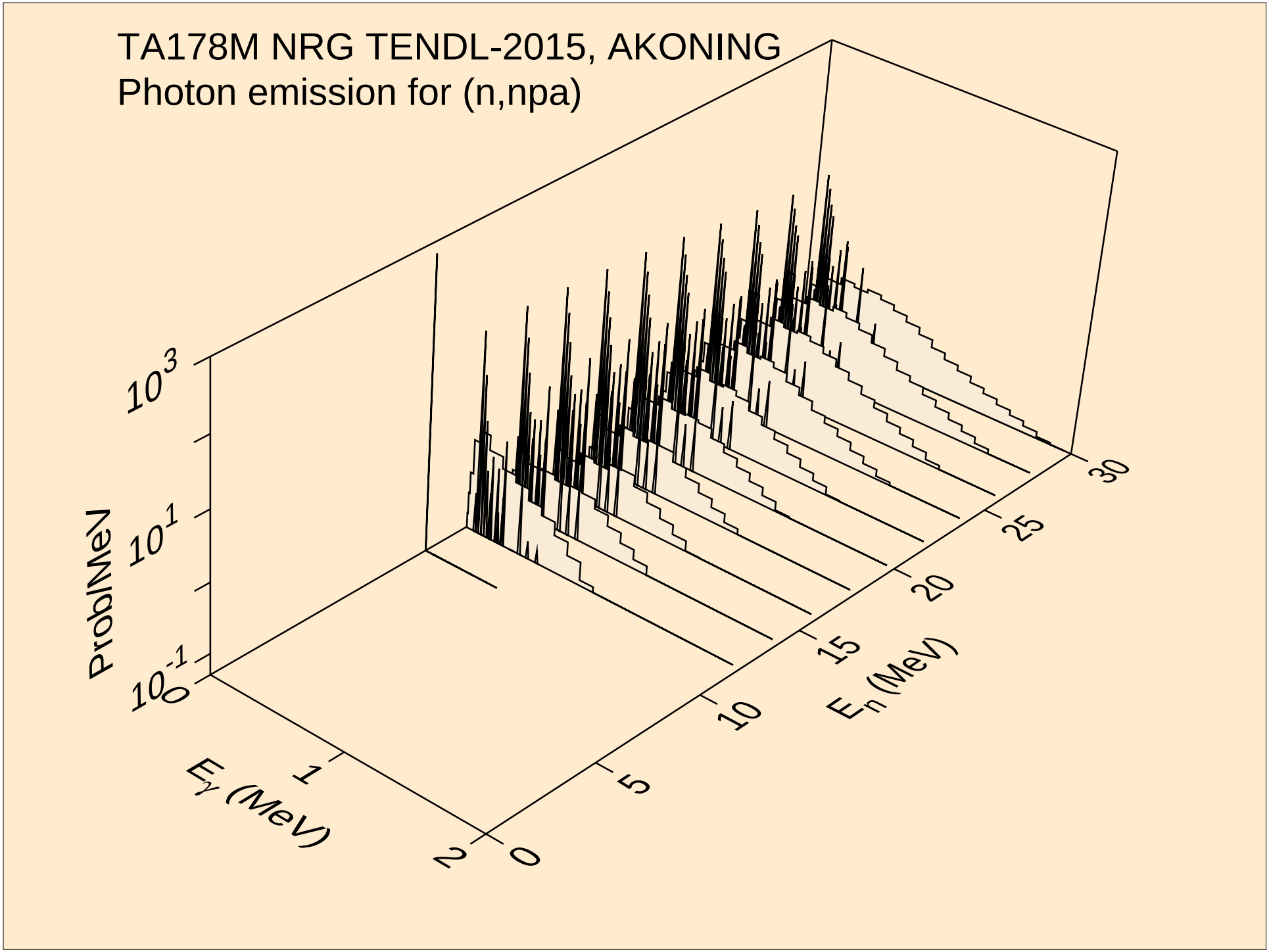

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*)he3
Prob/MeV
10^{3}
10^{1}
10^{-1}
0
1
2
E_γ (MeV)
10
12
14
16
18
20
22
24
26
28
30
E_n (MeV)

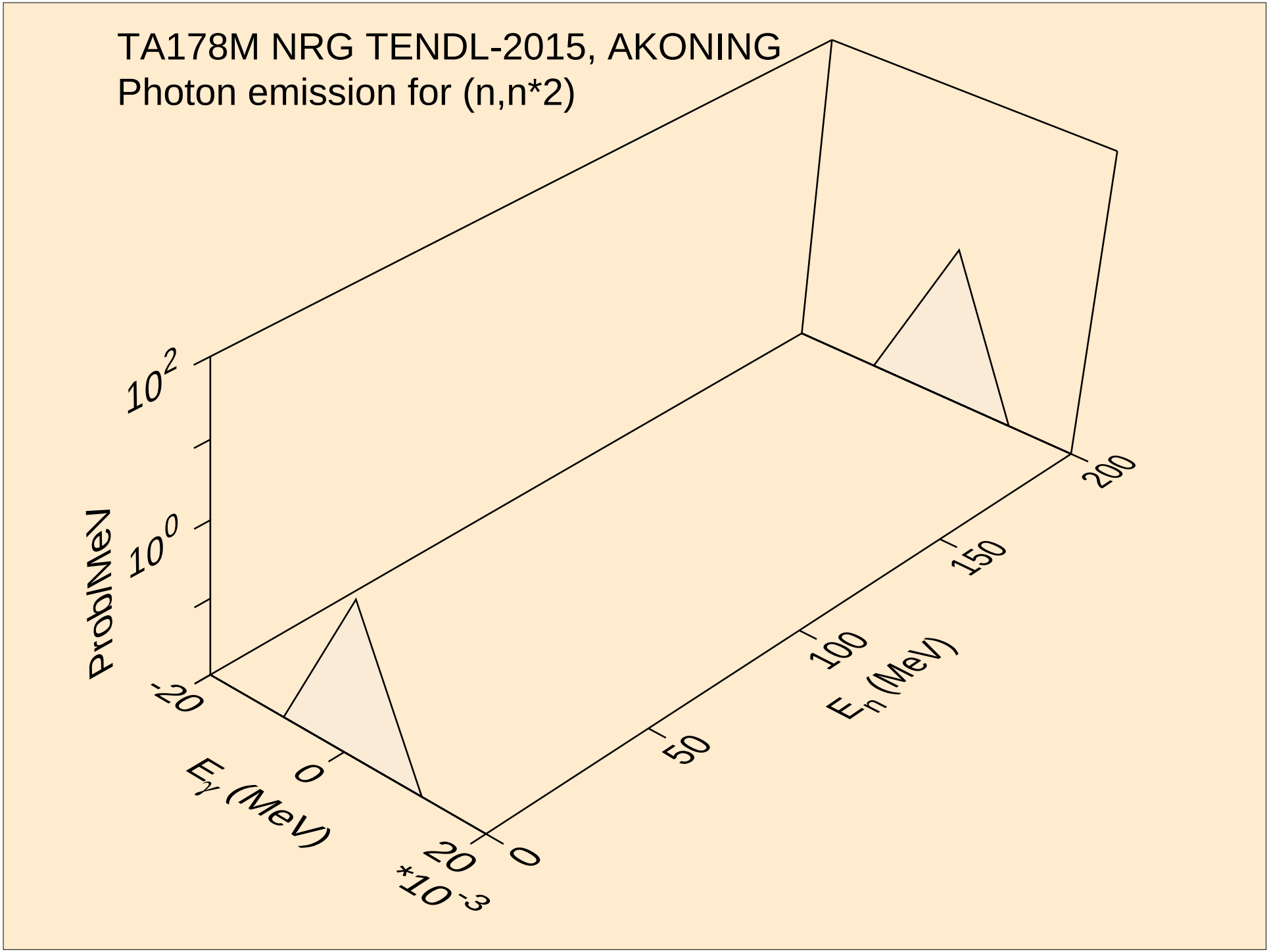

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,4n)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
5
10
E_γ (MeV)
22
23
24
25
26
27
28
29
30
E_n (MeV)

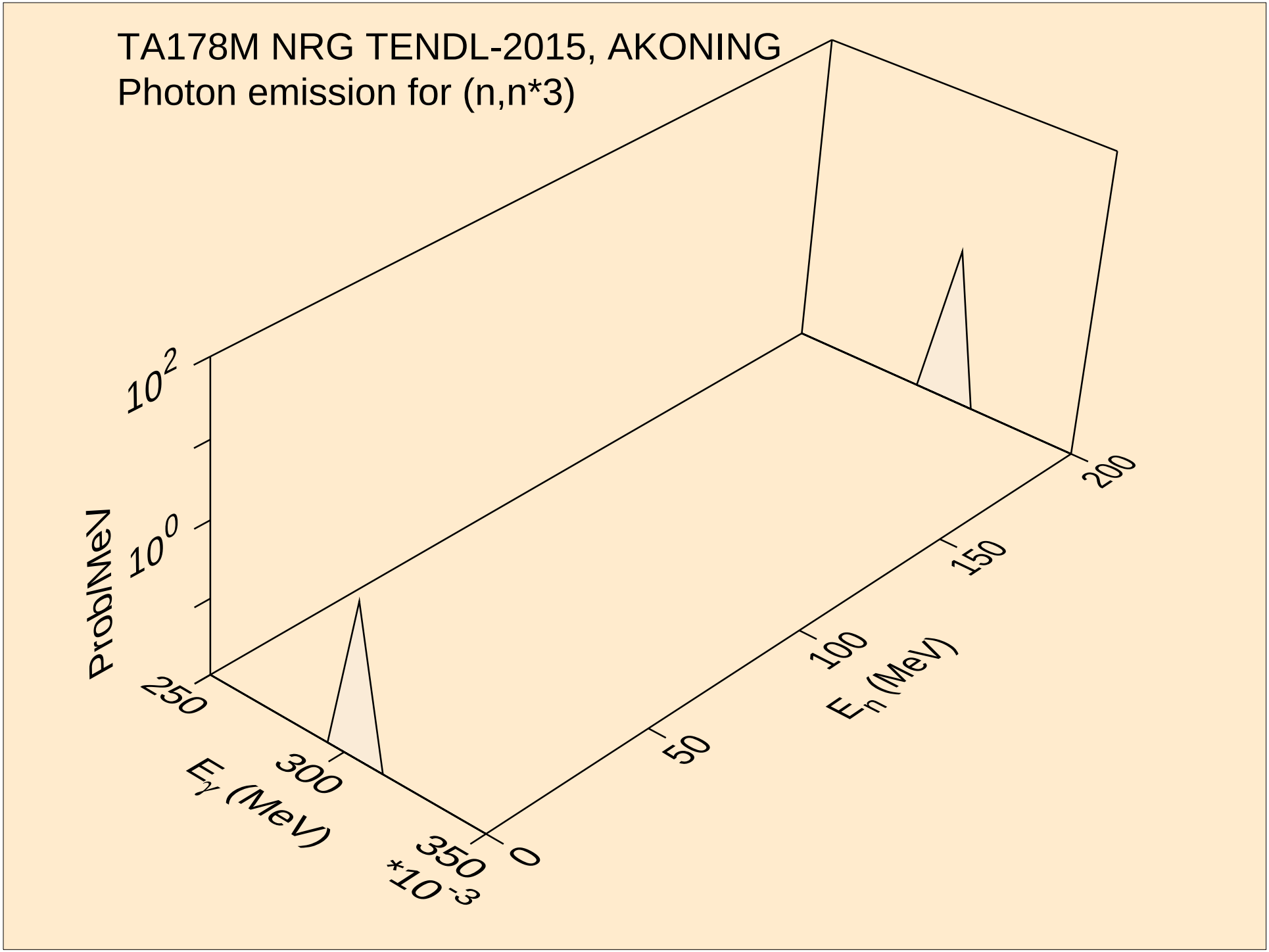

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,2np)
Prob/MeV
10^{0}
10^{-2}
0
2
4
6
E_γ (MeV)
10
12
14
16
18
20
22
24
26
28
30
E_n (MeV)

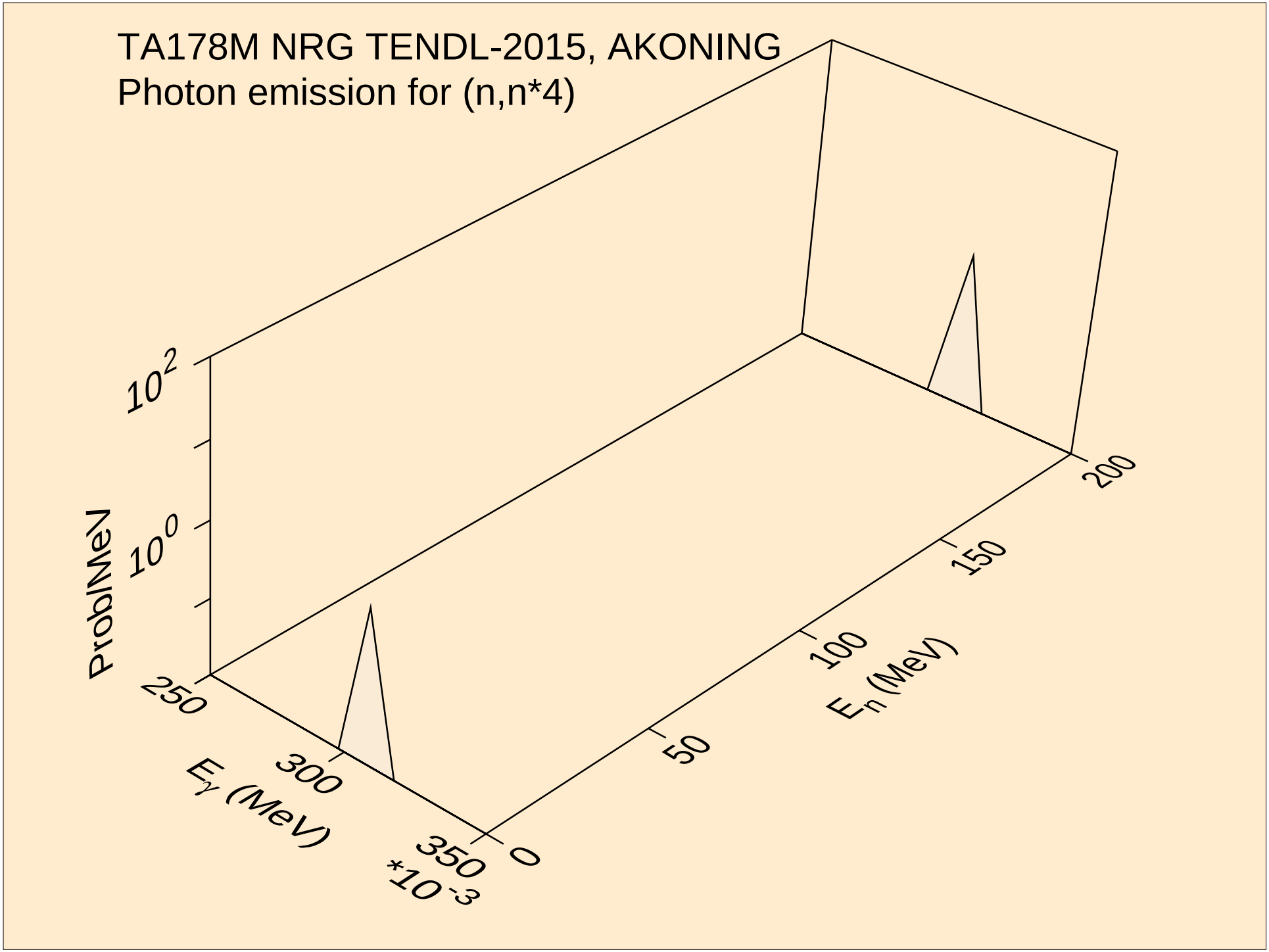

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,3np)
Prob/MeV
10^1
10^-1
0
2
4
E_γ (MeV)
18
20
22
24
26
28
30
E_n (MeV)

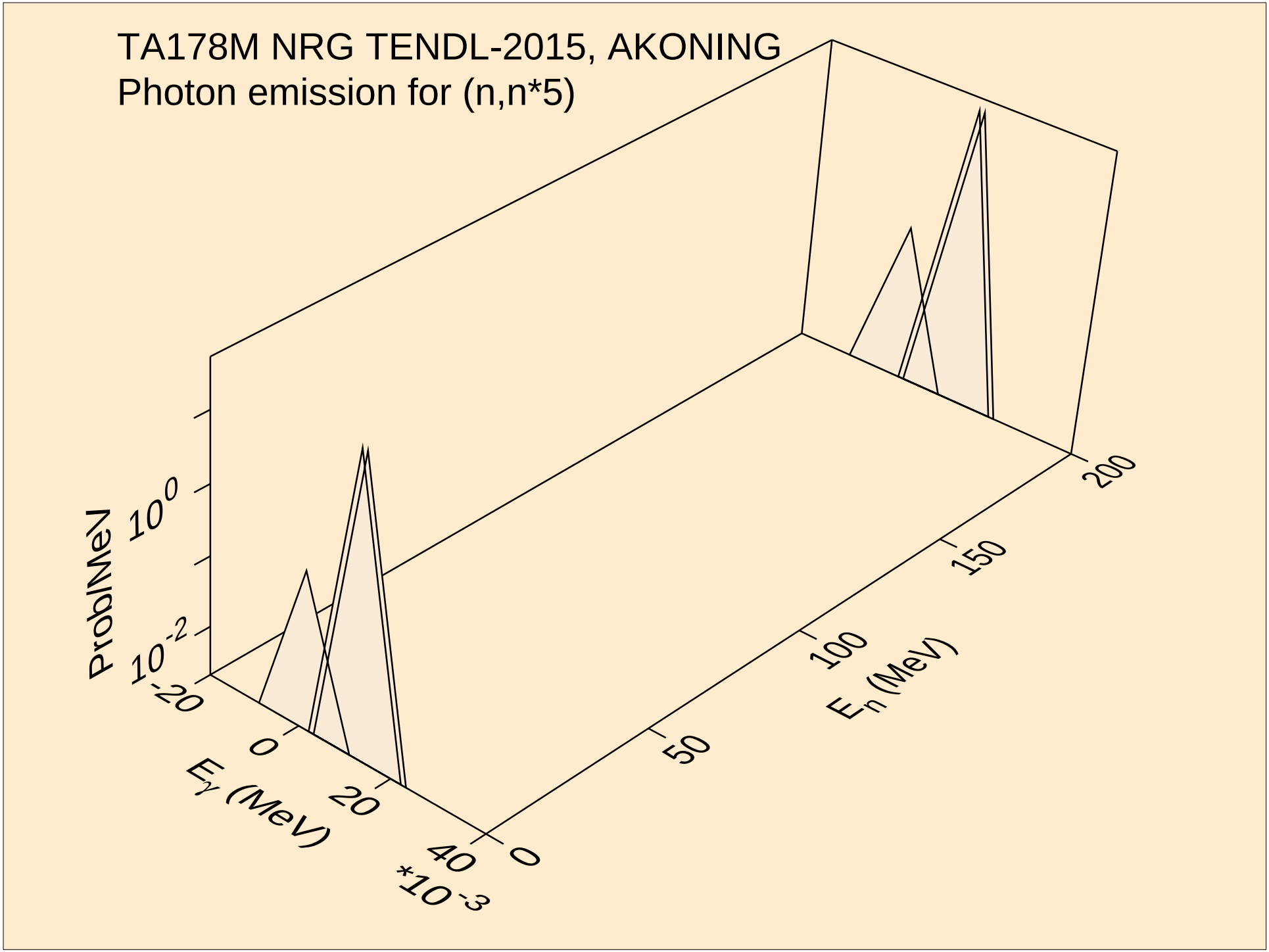

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,2np)
Prob/MeV
10^{1}
10^{-1}
0
2
4
E_γ (MeV)
10
12
14
16
18
20
22
24
26
28
30
E_n (MeV)

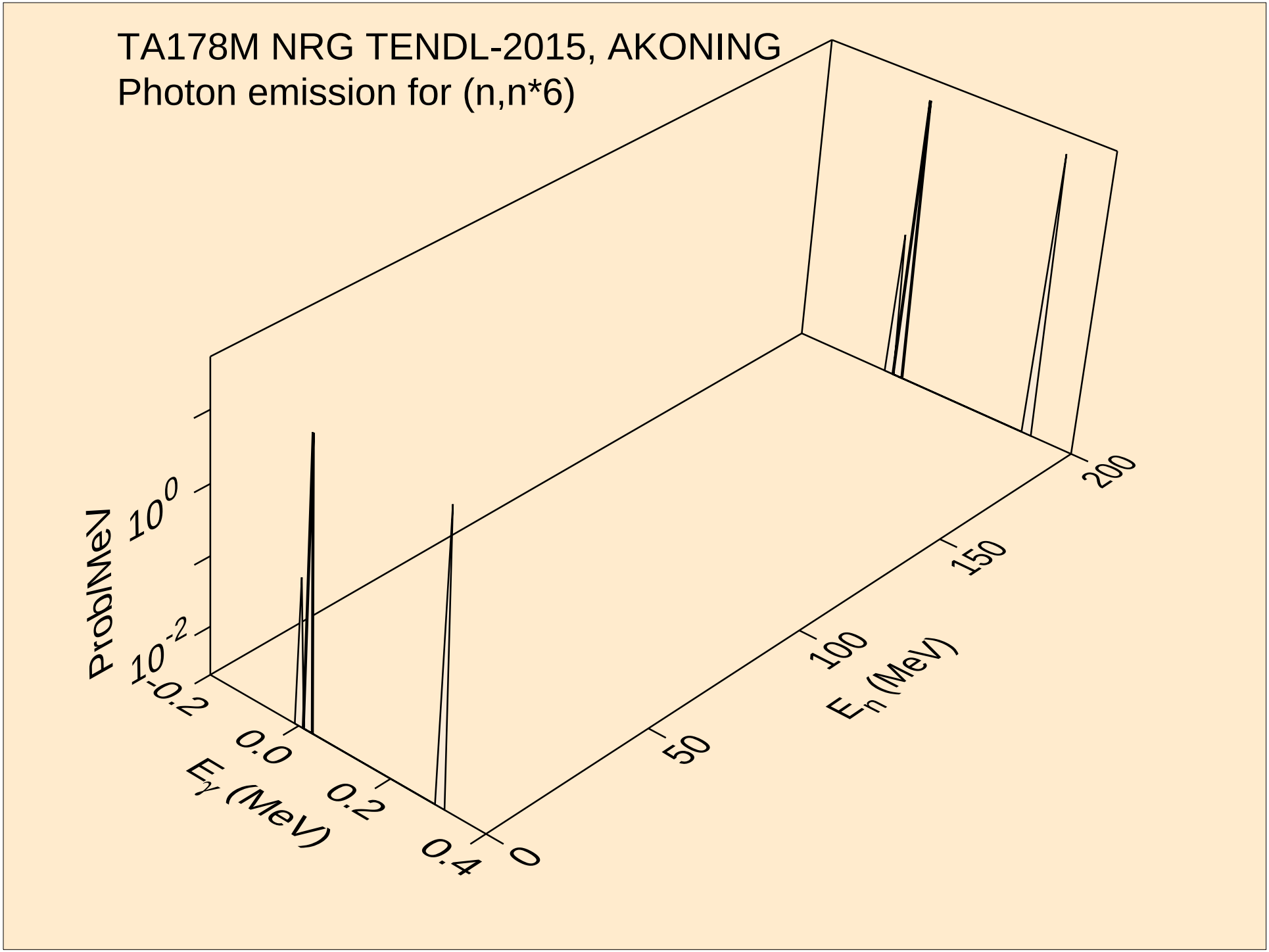

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,npa)
Prob/MeV
10^{3}
10^{1}
10^{-1}
E_γ (MeV)
0
1
2
E_n (MeV)
0
5
10
15
20
25
30

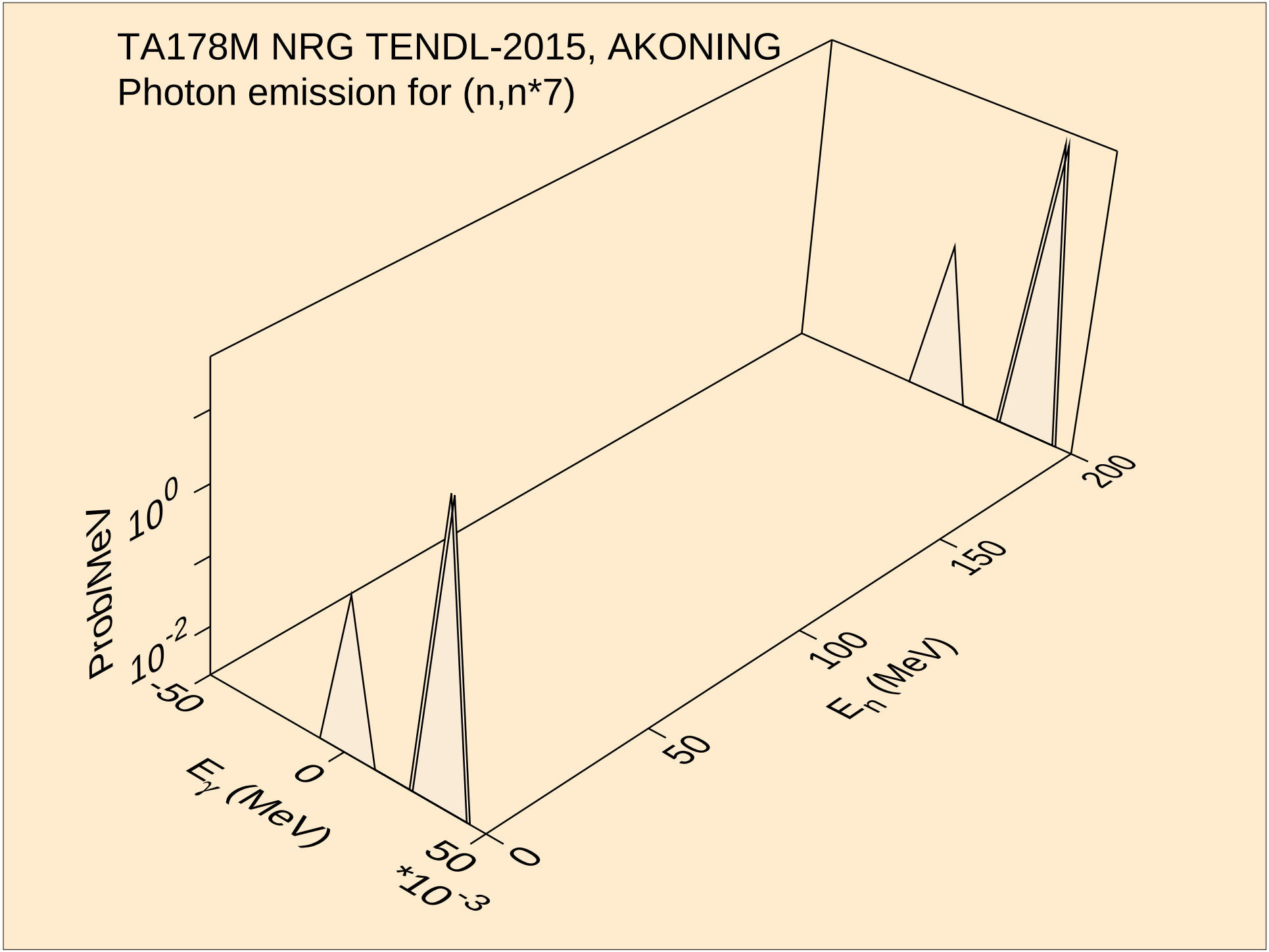

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*2)
Prob/MeV
10^2
10^0
-20
0
20
*10^-3
Eγ (MeV)
0
50
100
150
200
En (MeV)

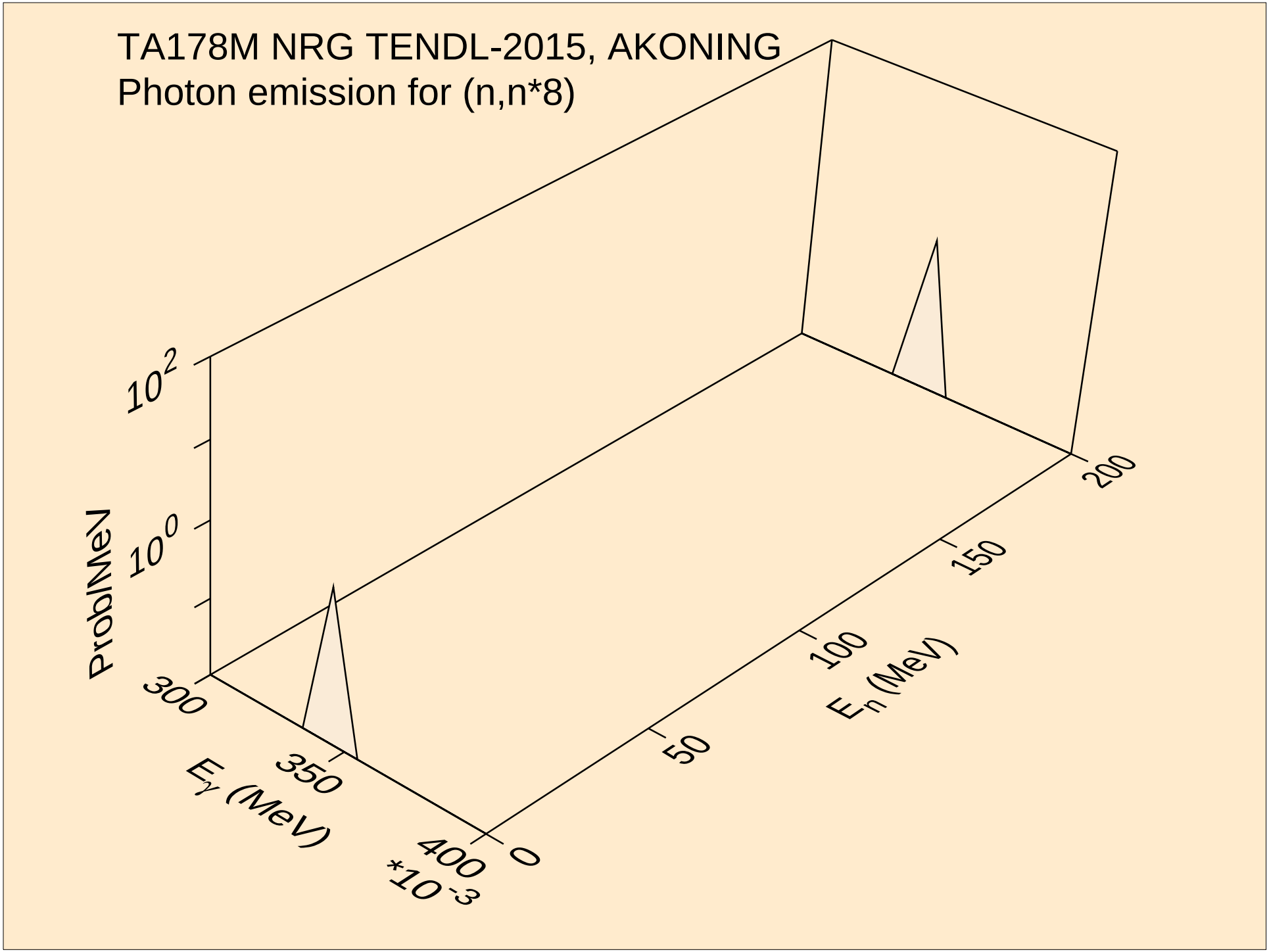

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*3)
Prob/MeV
10^2
10^0
250
300
350
E_γ (MeV)
*10 -3
0
50
100
150
200
E_n (MeV)

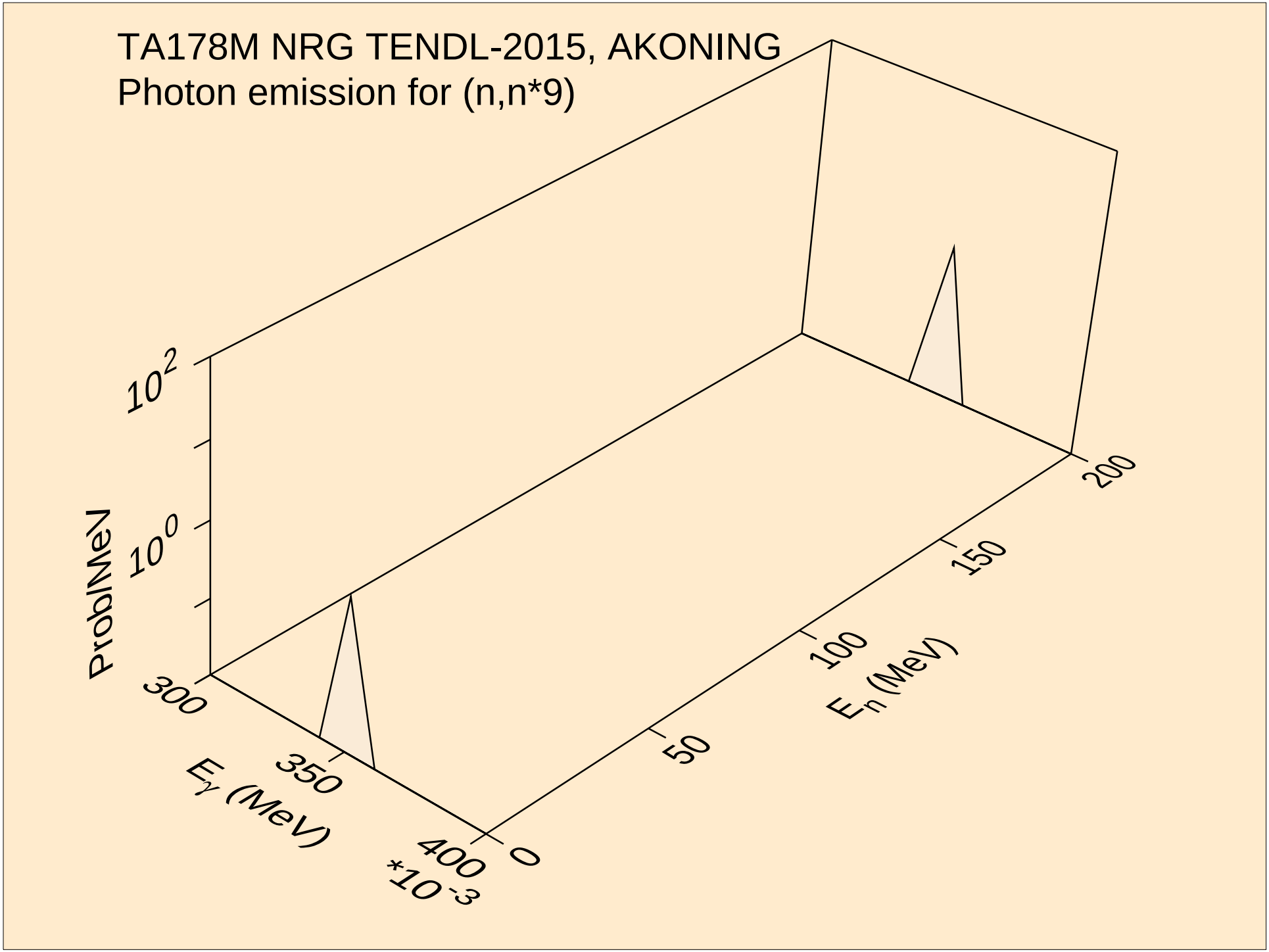

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*4)
Prob/MeV
10^2
10^0
250
300
350
E_γ (MeV)
*10 -3
0
50
100
150
200
E_n (MeV)

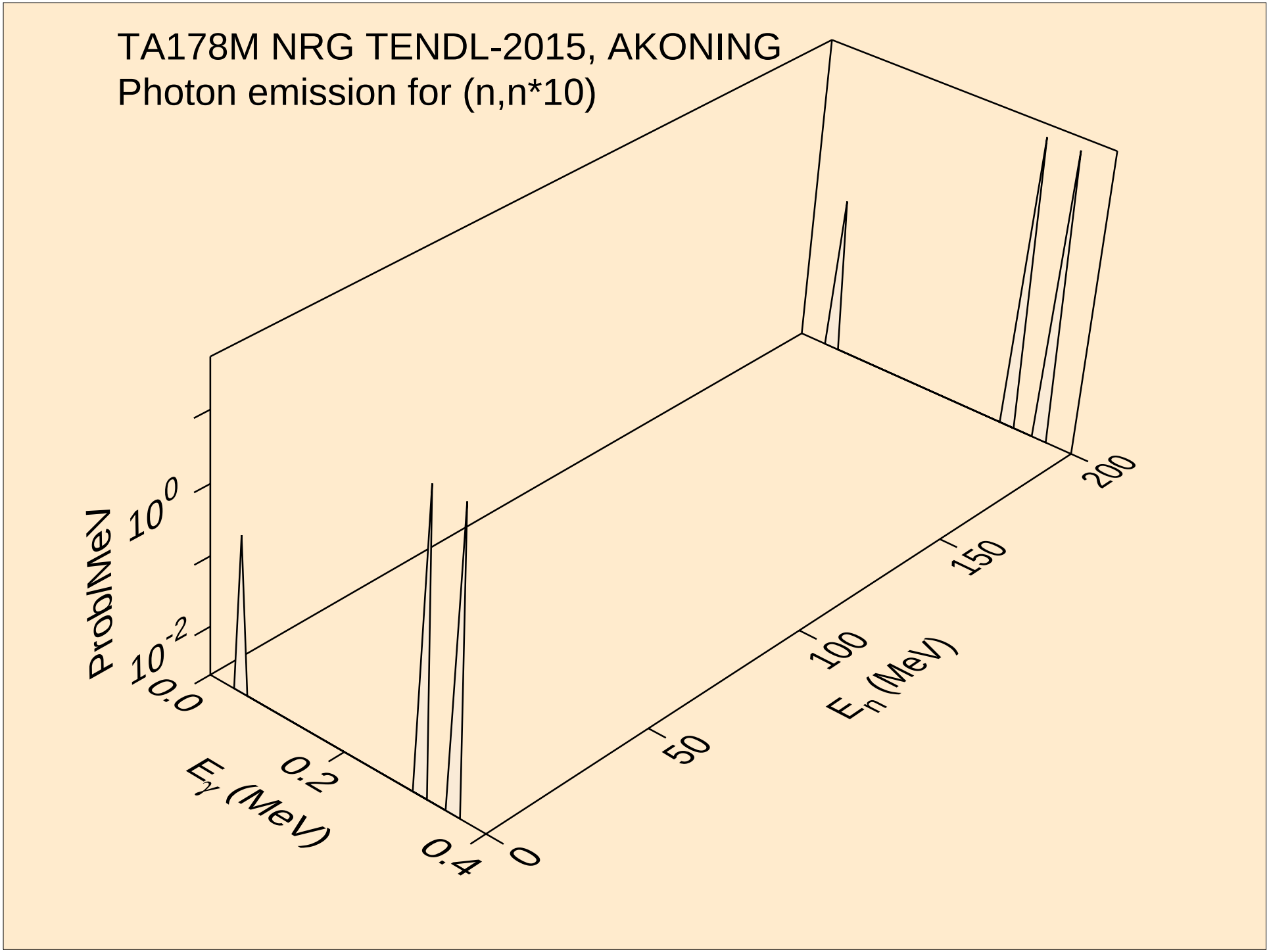

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*5)
Prob/MeV
10^0
10^-2
-20
0
20
40
*10^-3
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

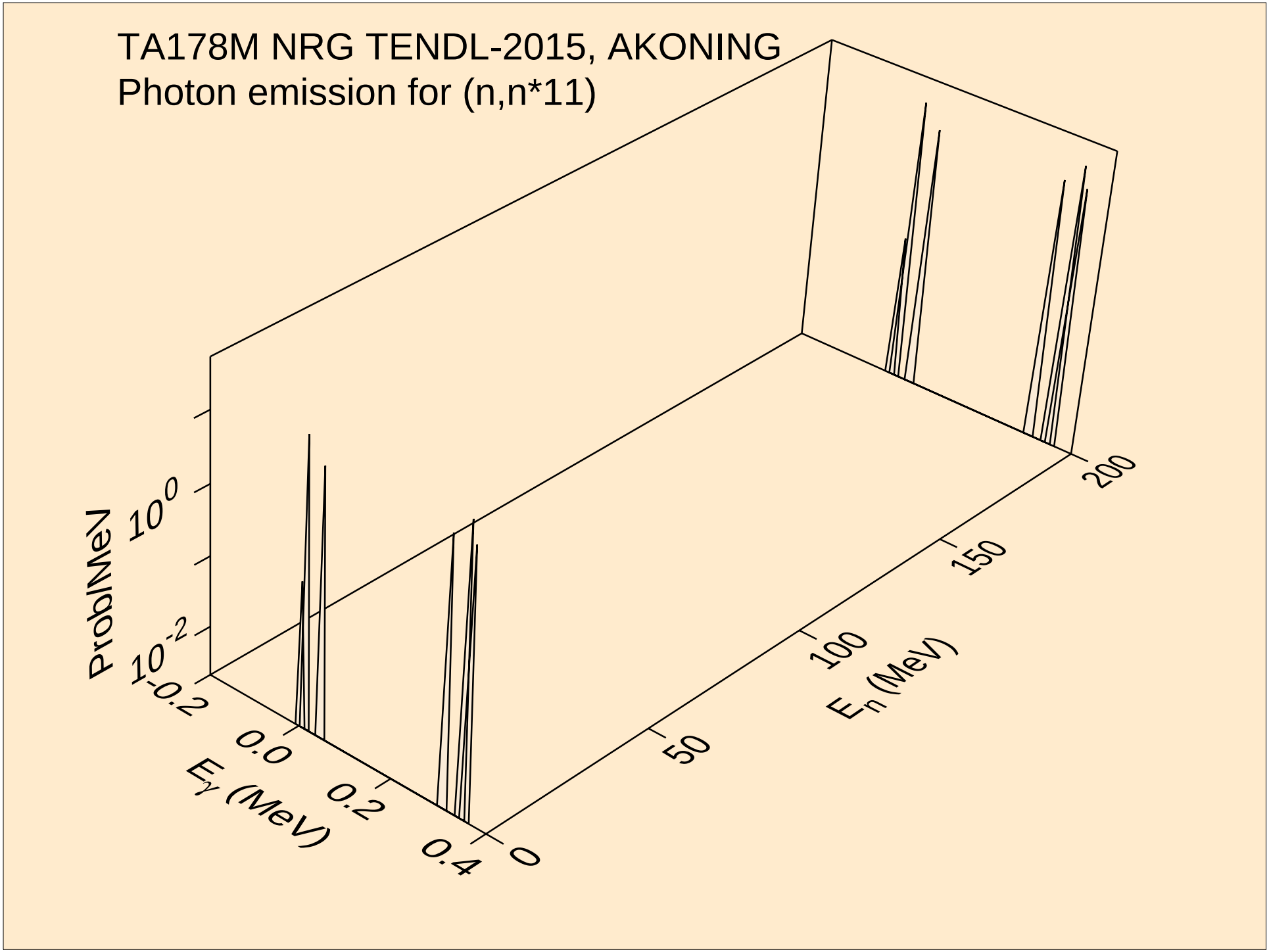

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*6)
Prob/MeV
10^0
10^-2
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

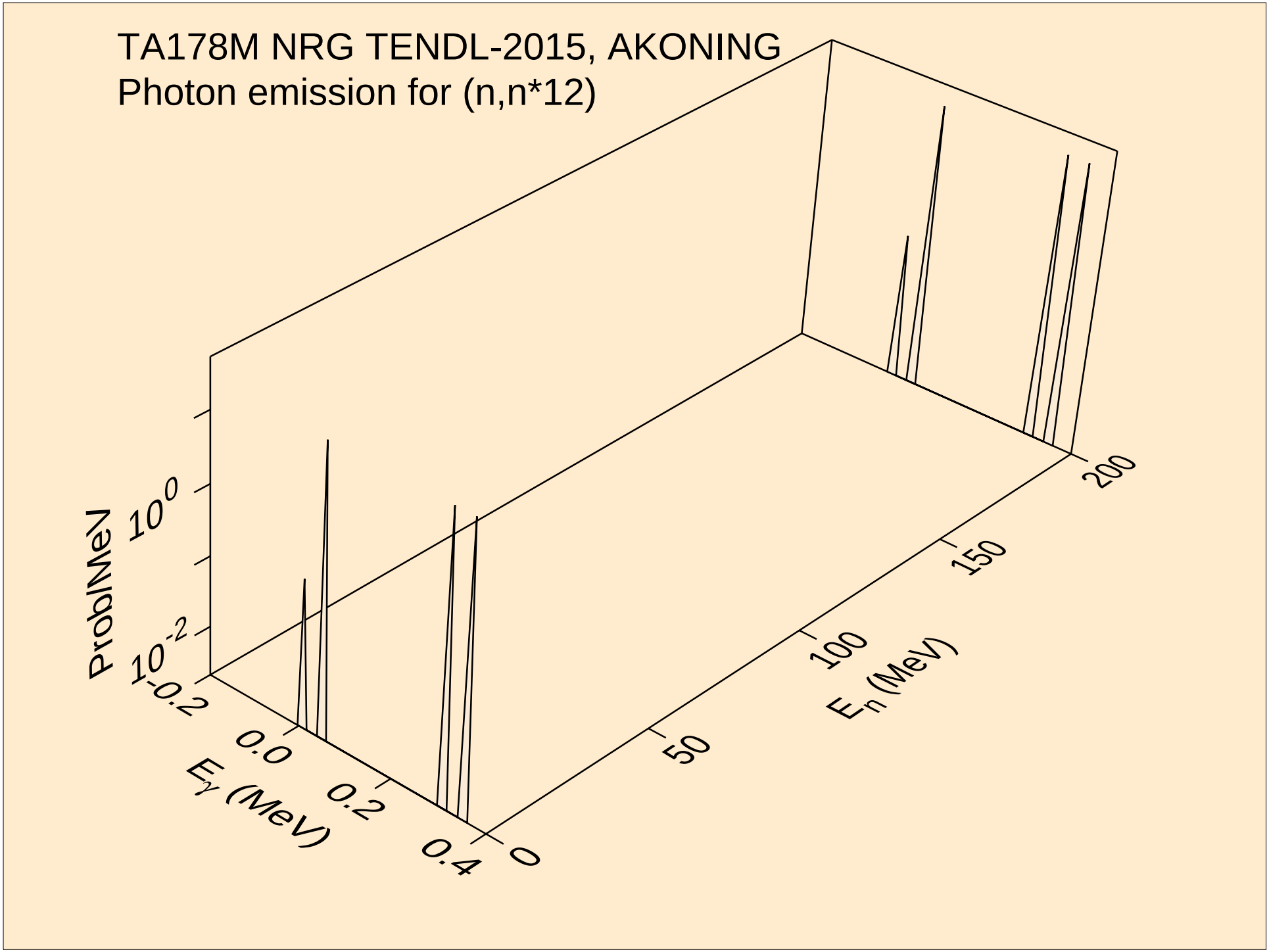

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*7)
Prob/MeV
10^0
10^-2
-50
0
50
E_γ (MeV)
*10^-3
0
50
100
150
200
E_n (MeV)

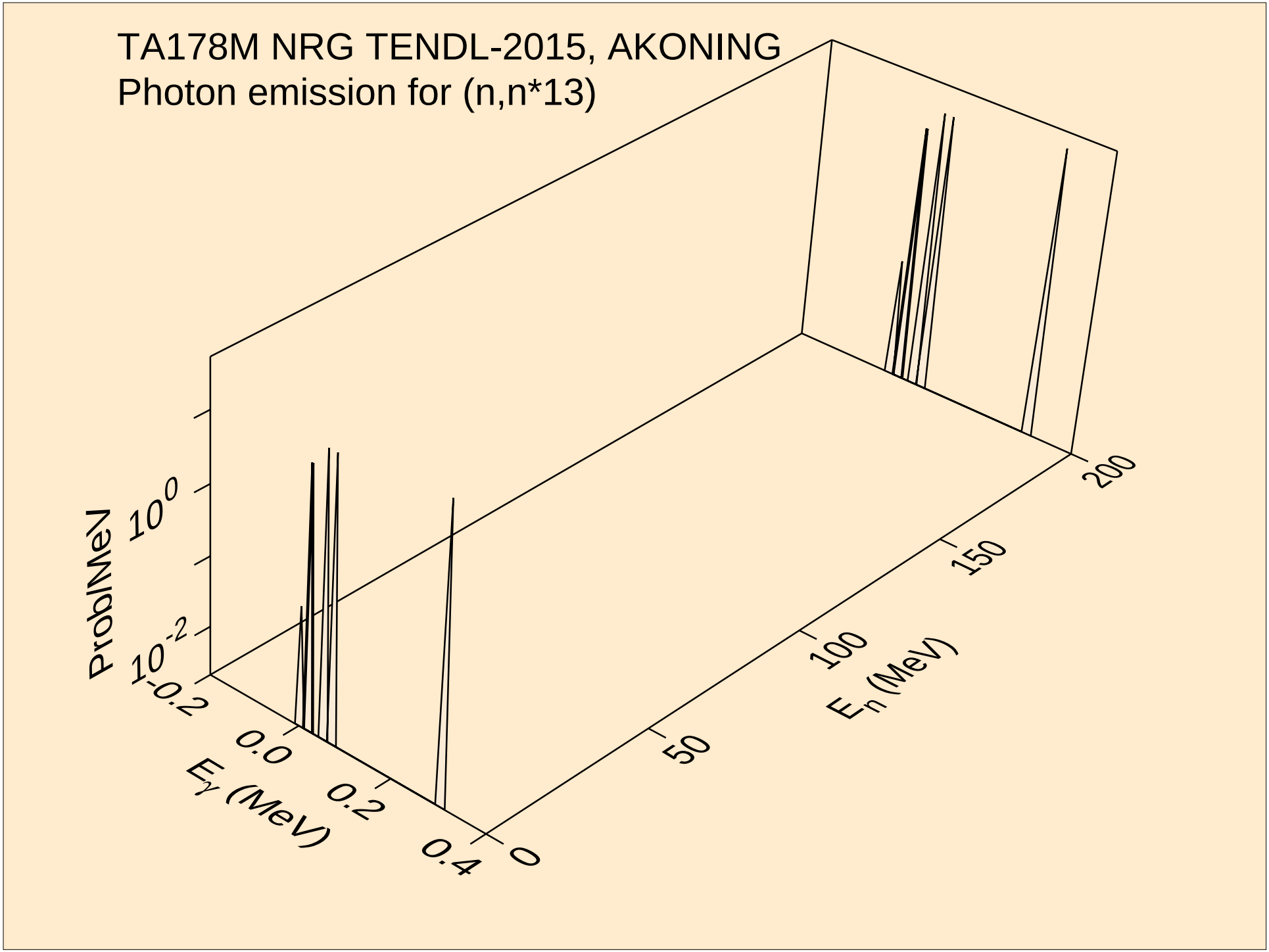

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*8)
Prob/MeV
10^2
10^0
300
350
400
E_γ (MeV)
*10 -3
0
50
100
150
200
E_n (MeV)

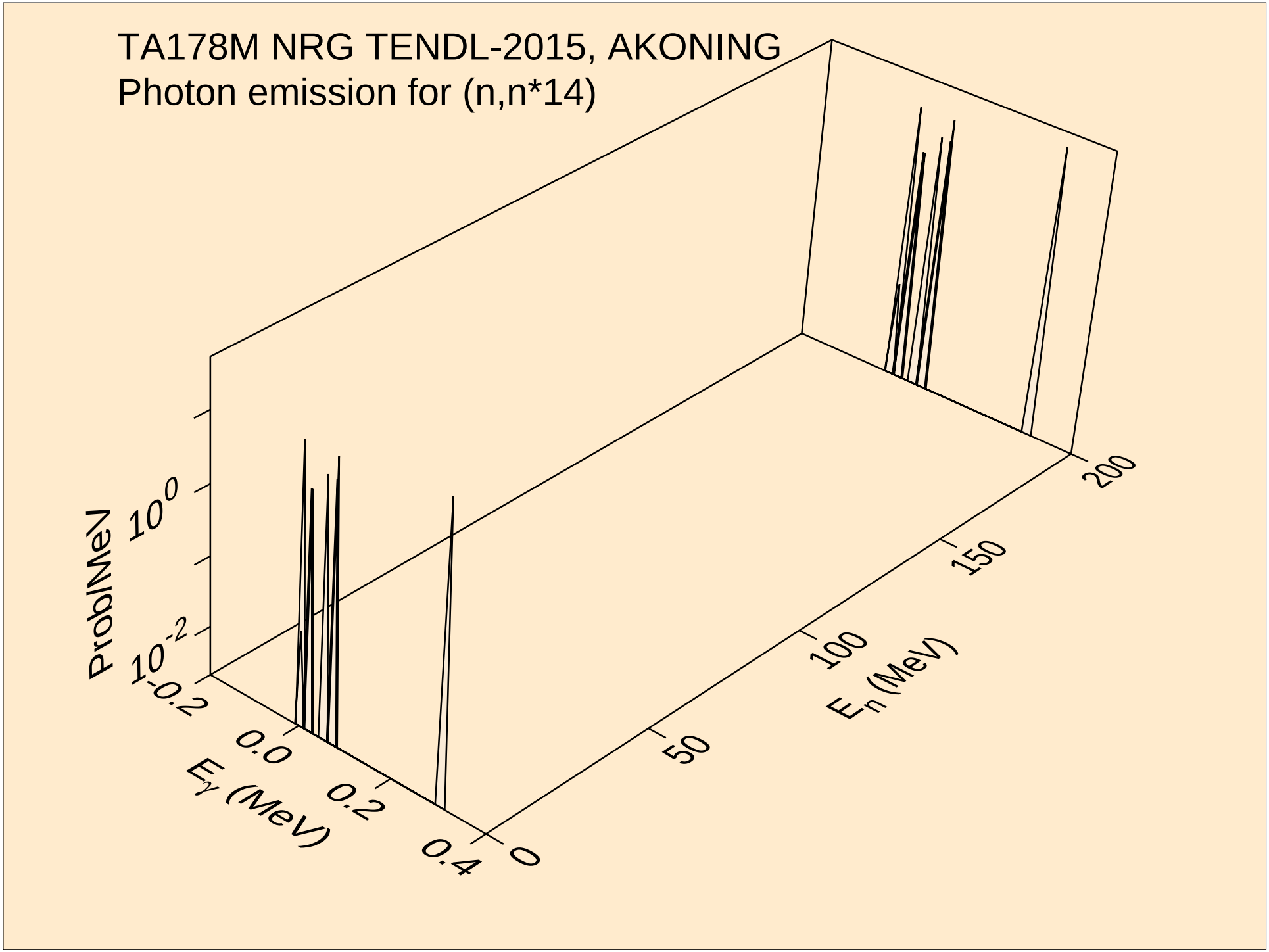

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*9)
Prob/MeV
10^2
10^0
300
350
400
E_γ (MeV)
*10 -3
0
50
100
150
200
E_n (MeV)

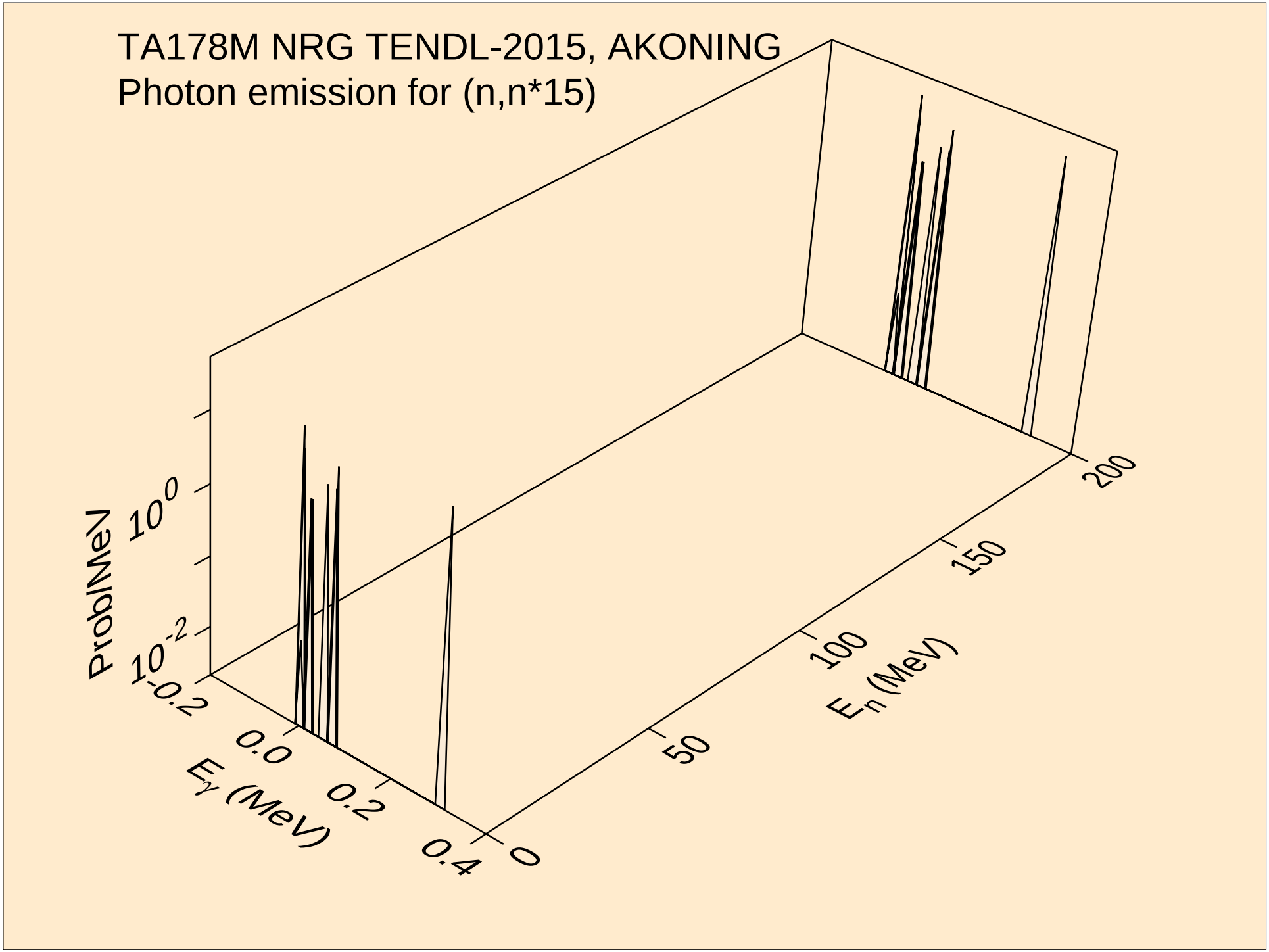

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*10)
Prob/MeV
10^0
10^-2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

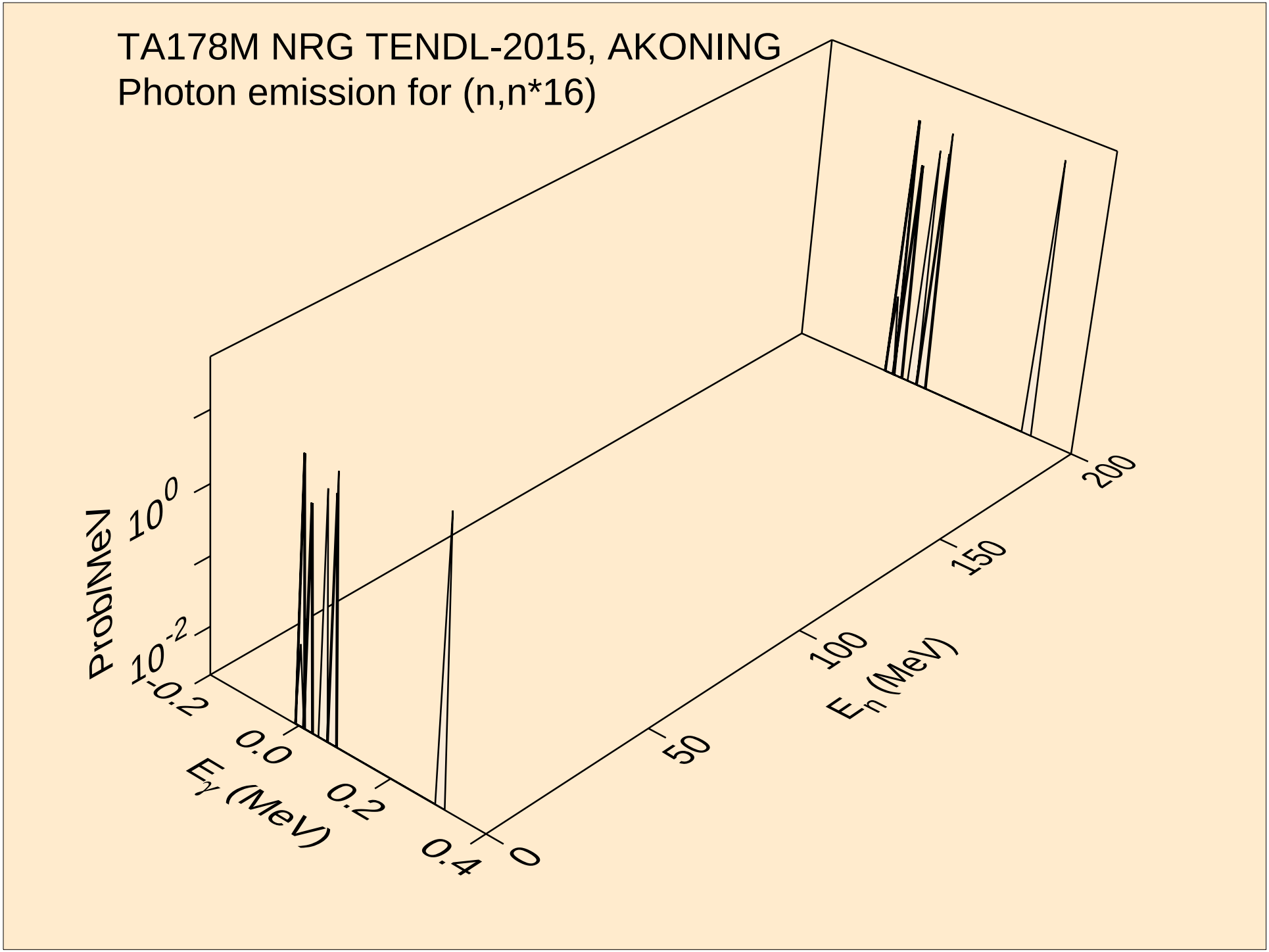

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*11)
Prob/MeV
10^{0}
10^{-2}
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

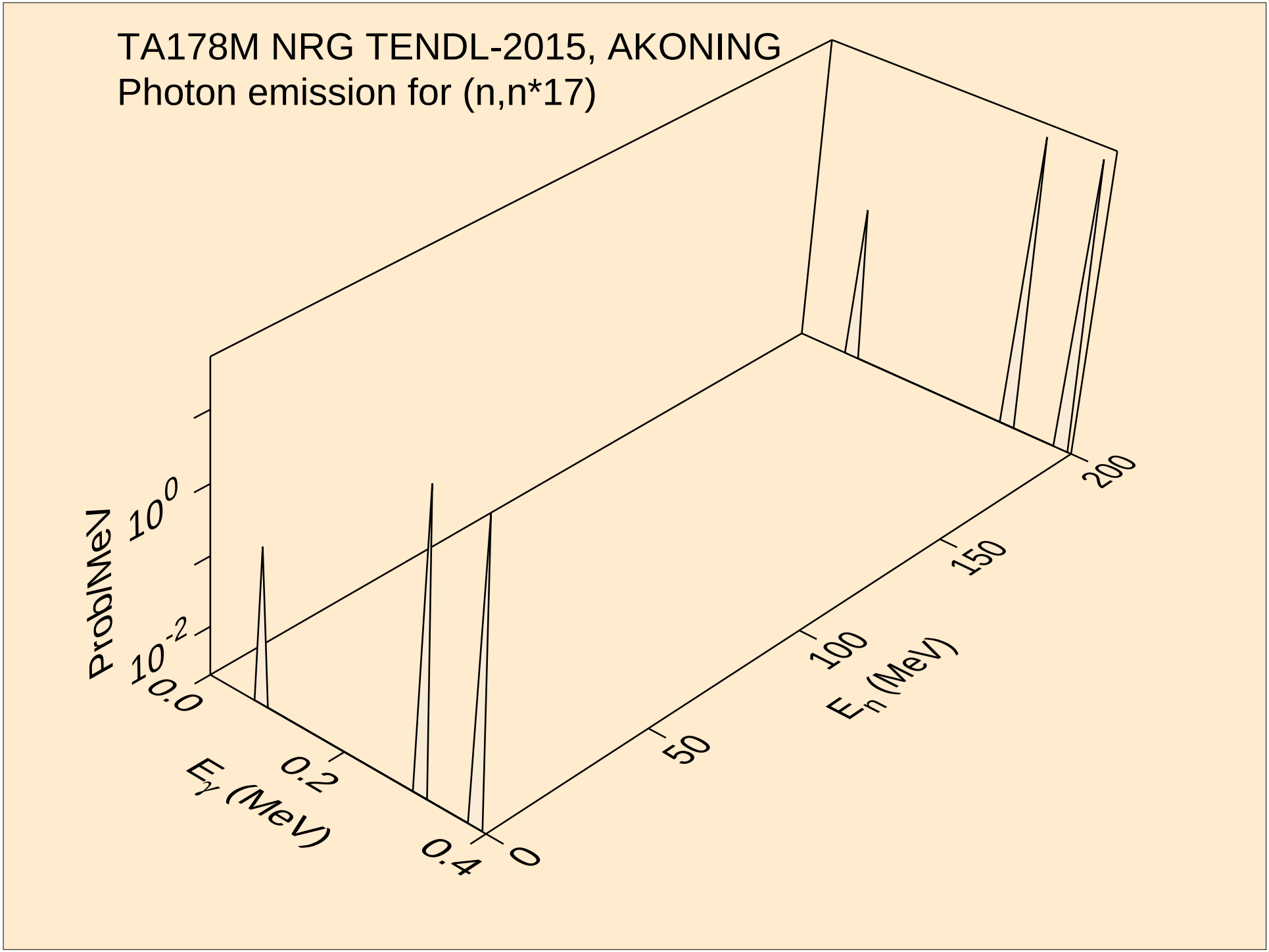

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*12)
Prob/MeV
10^0
10^-2
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

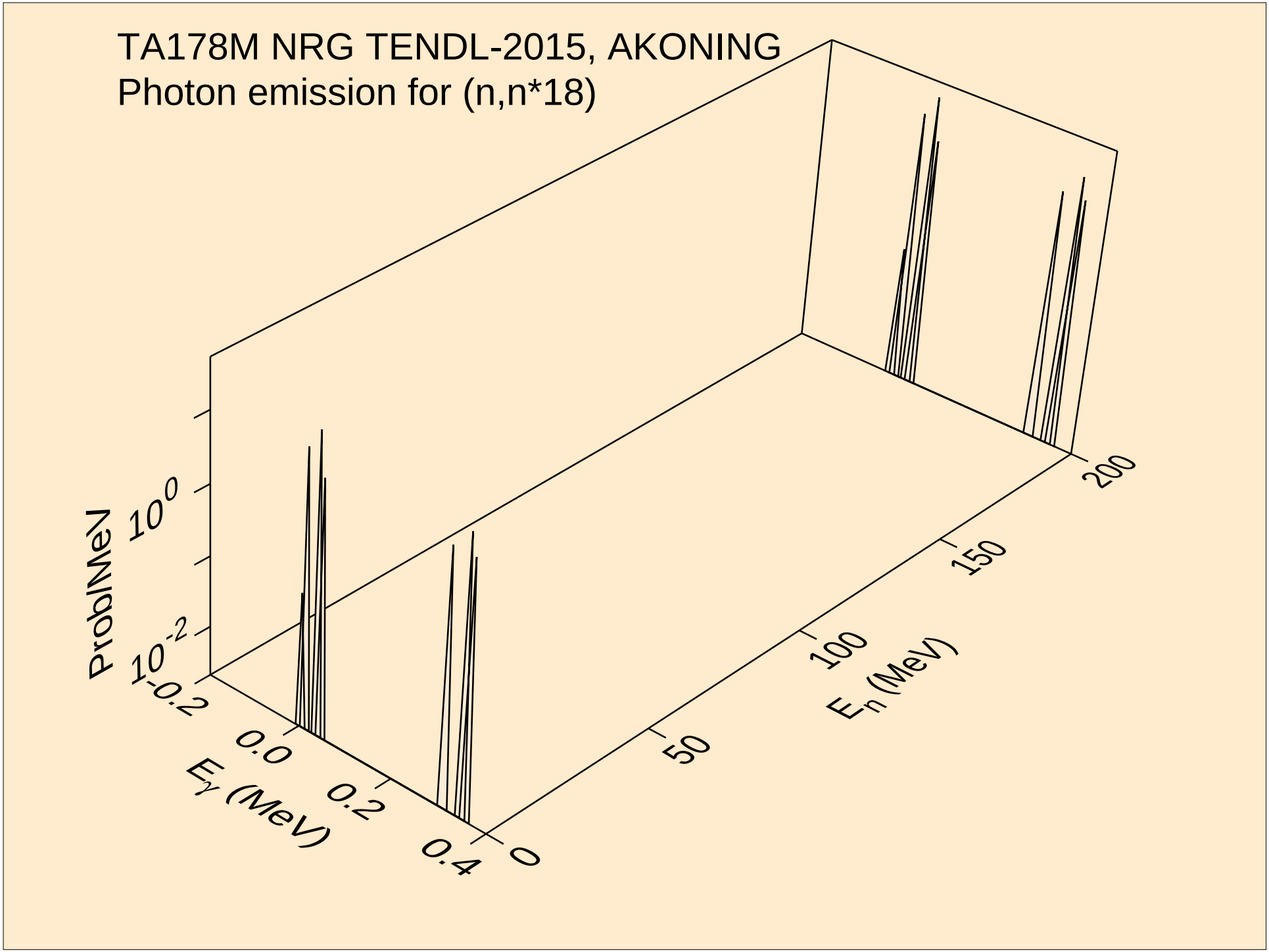

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*13)
Prob/MeV
10^{0}
10^{-2}
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

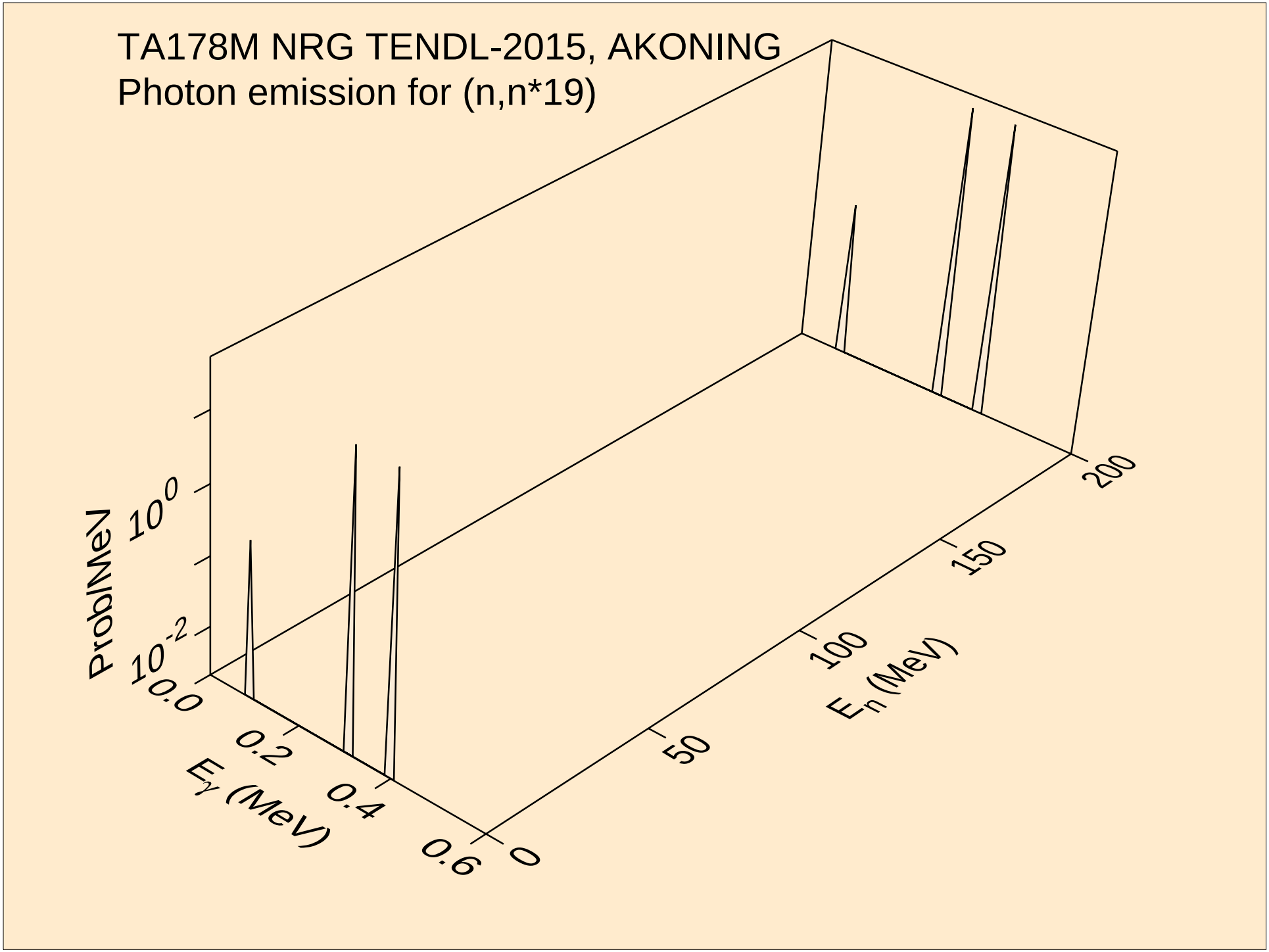

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*14)
Prob/MeV
10^0
10^-2
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

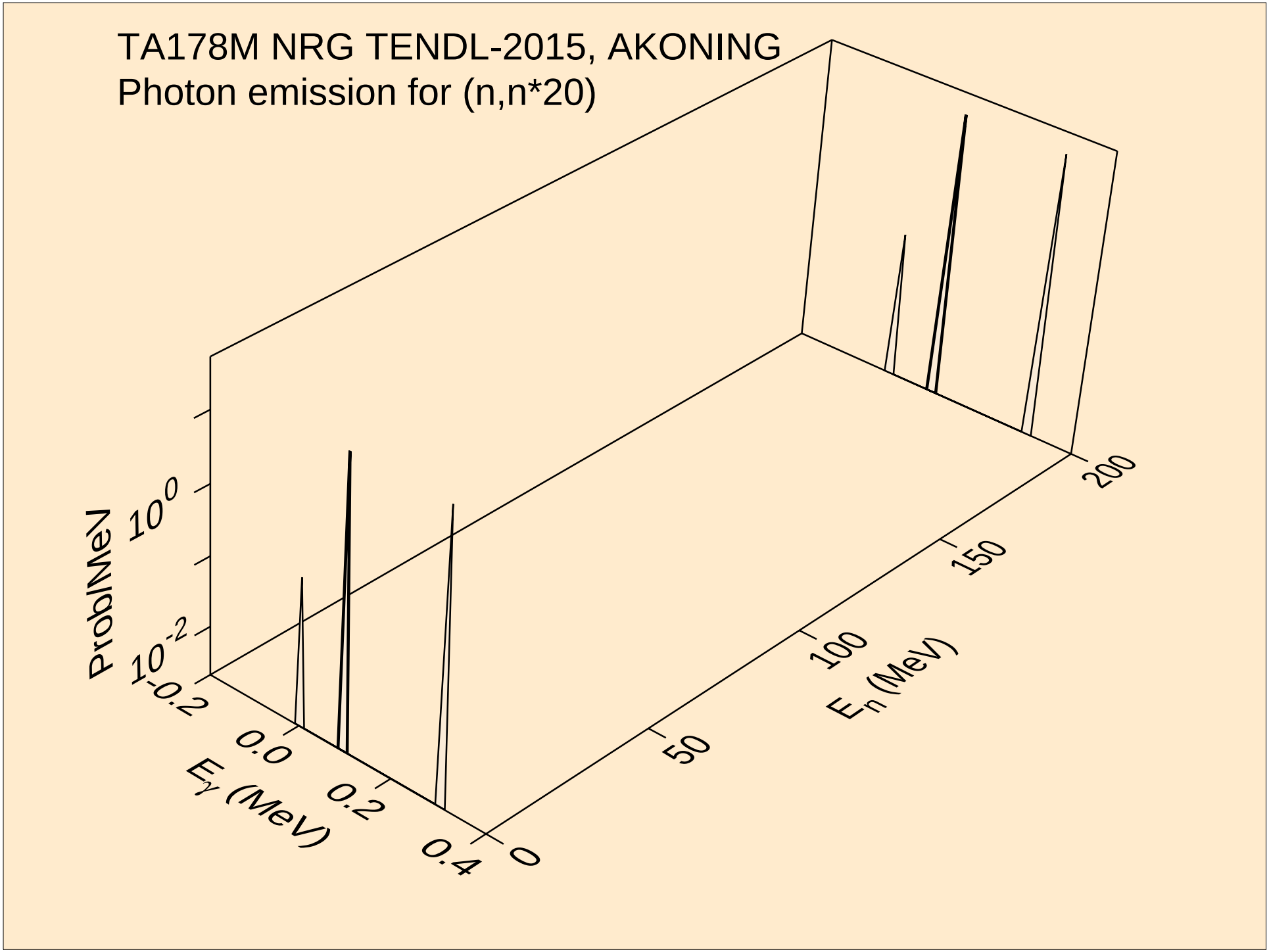

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*15)
Prob/MeV
10^0
10^-2
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

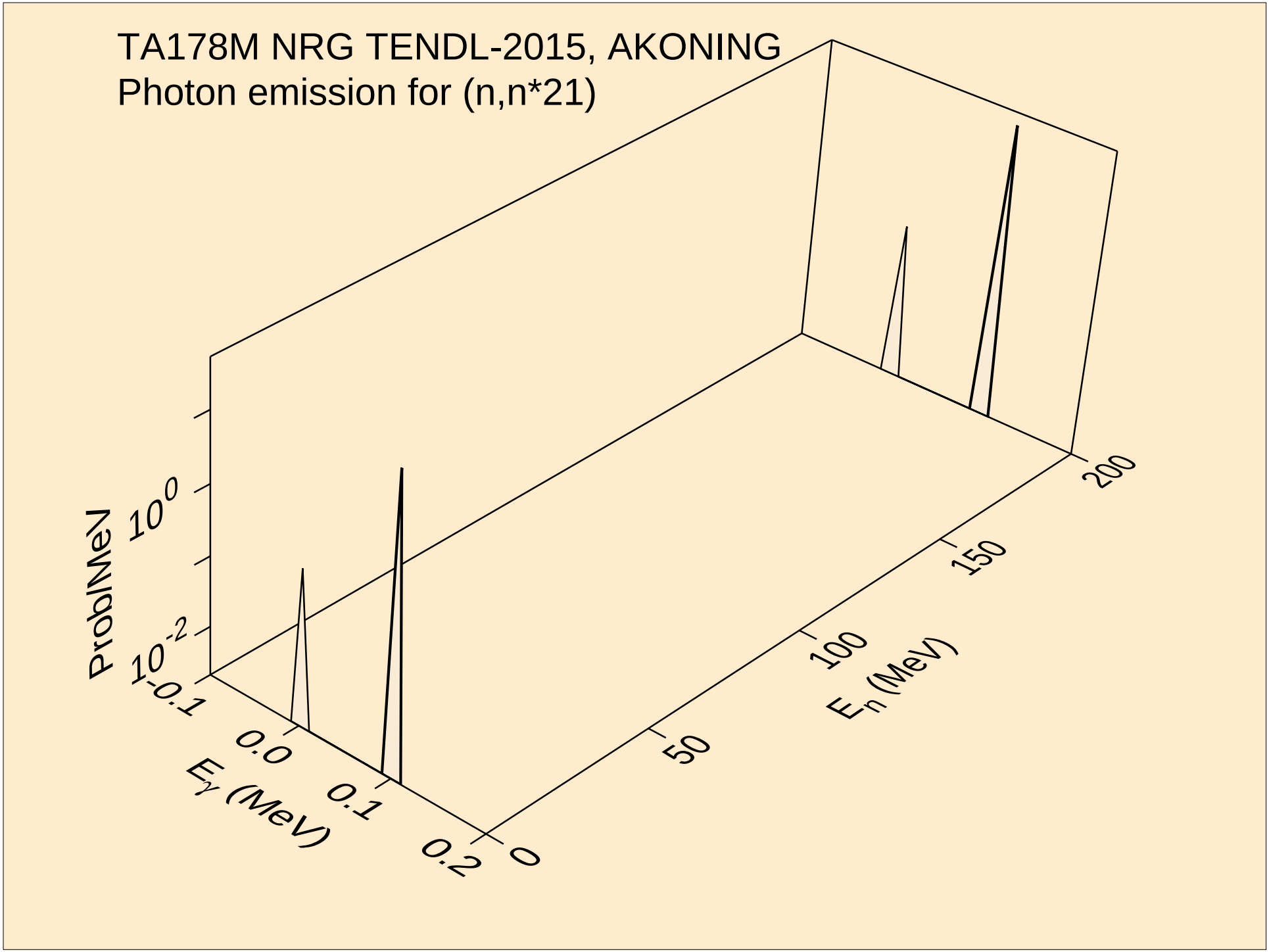

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*16)
Prob/MeV
10^0
10^-2
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

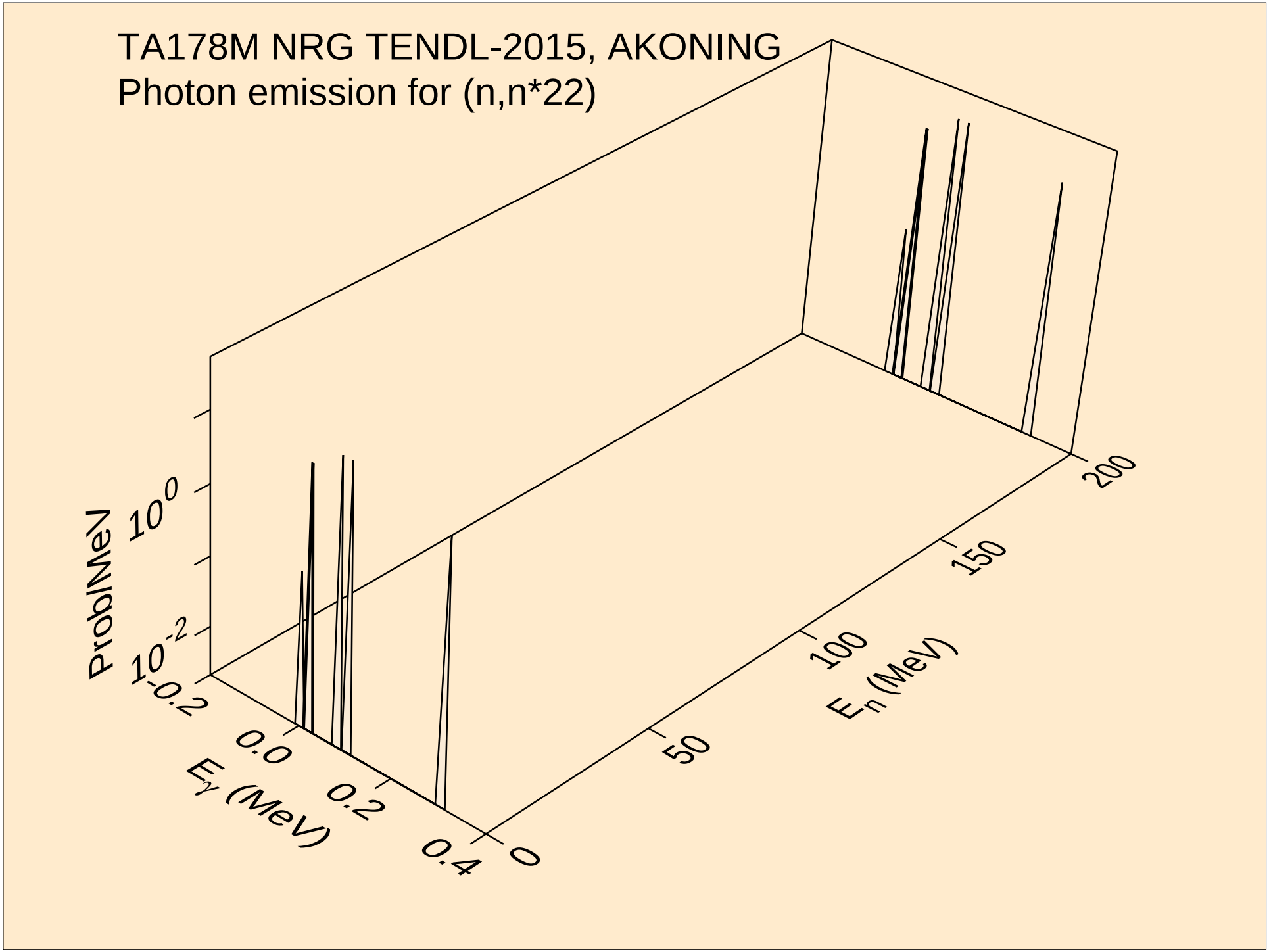

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*17)
Prob/MeV
10^{0}
10^{-2}
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

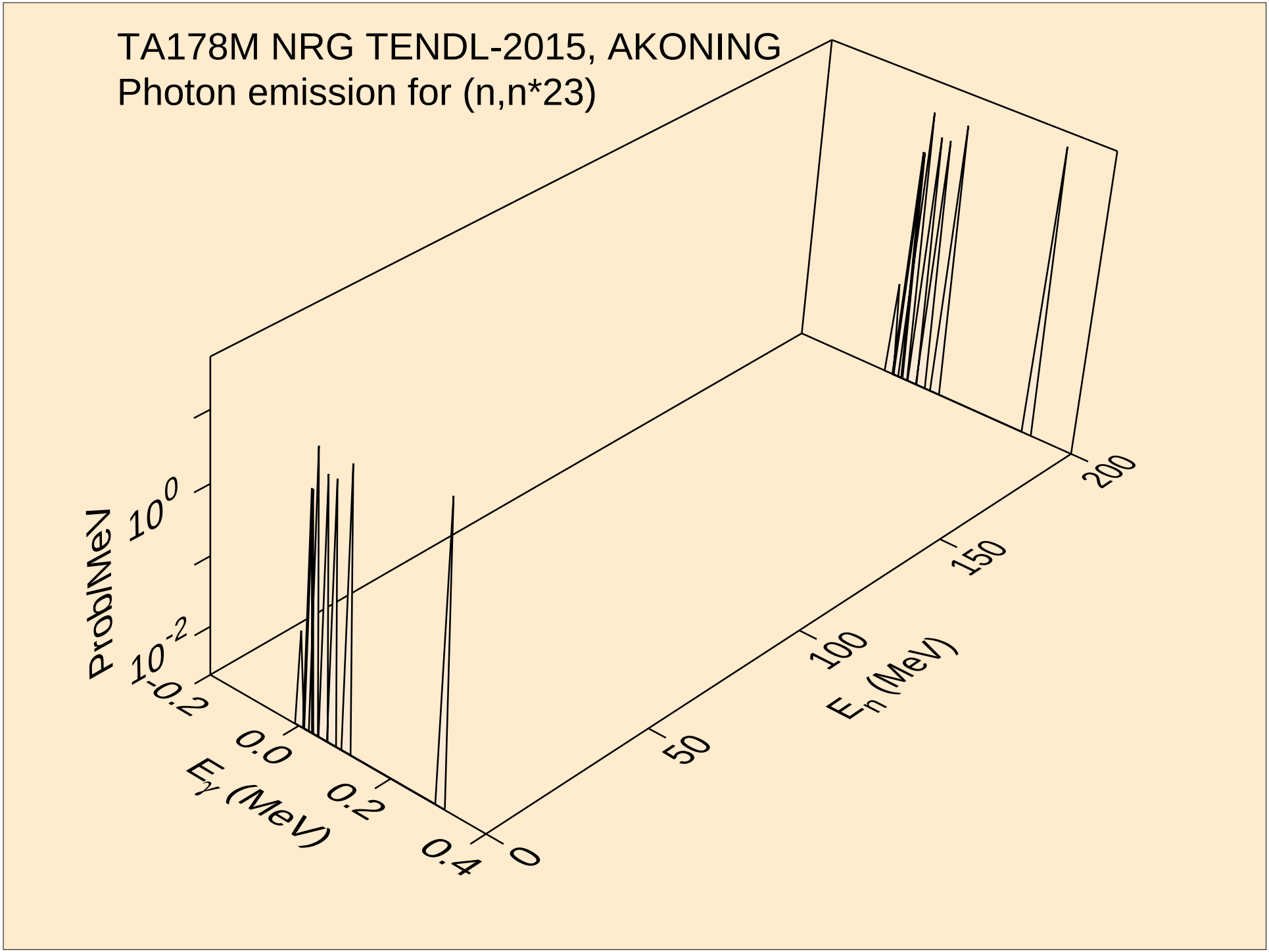

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*18)
Prob/MeV
10^{0}
10^{-2}
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

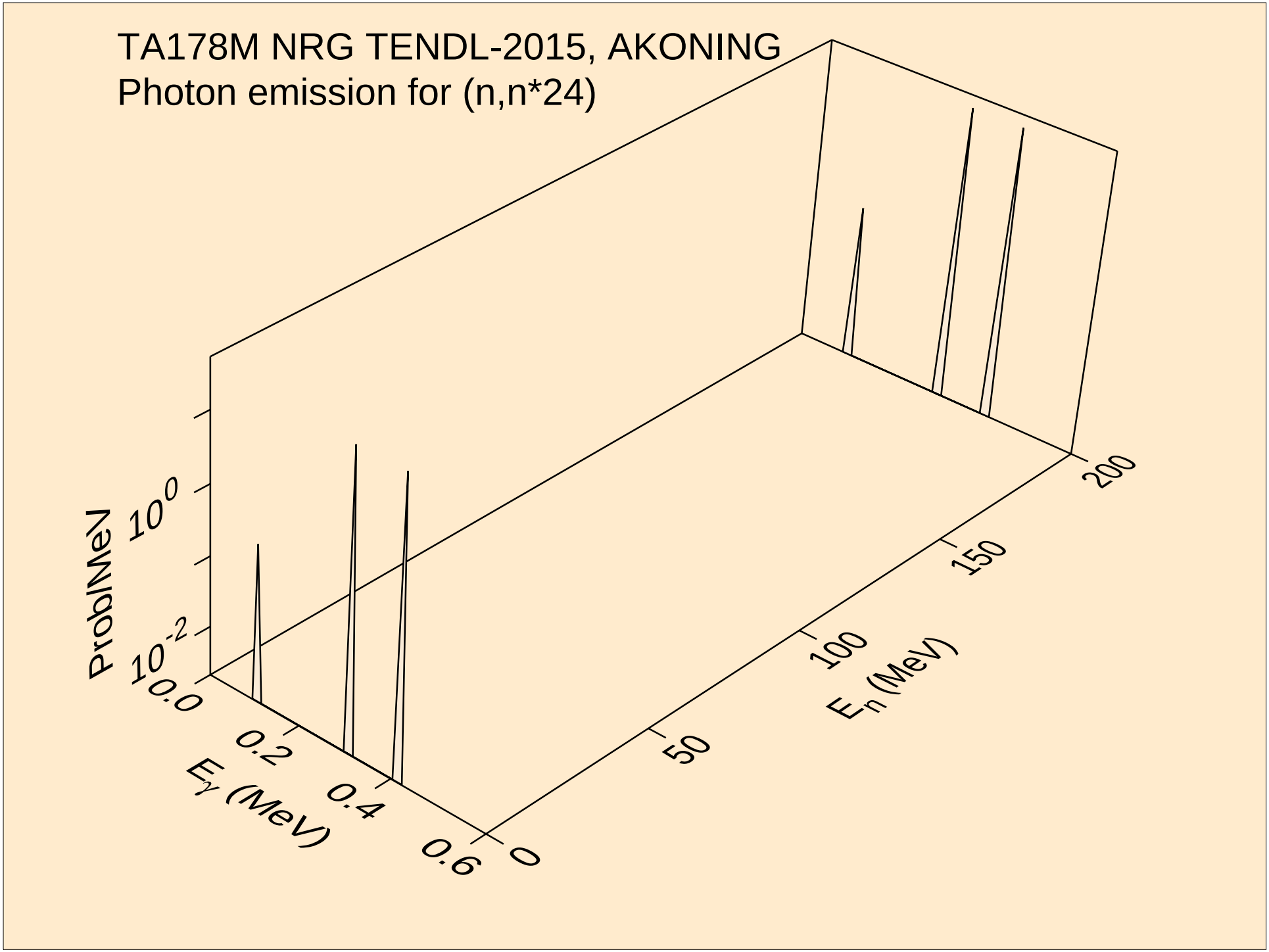

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*19)
Prob/MeV
10^0
10^-2
0.0
0.2
0.4
0.6
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

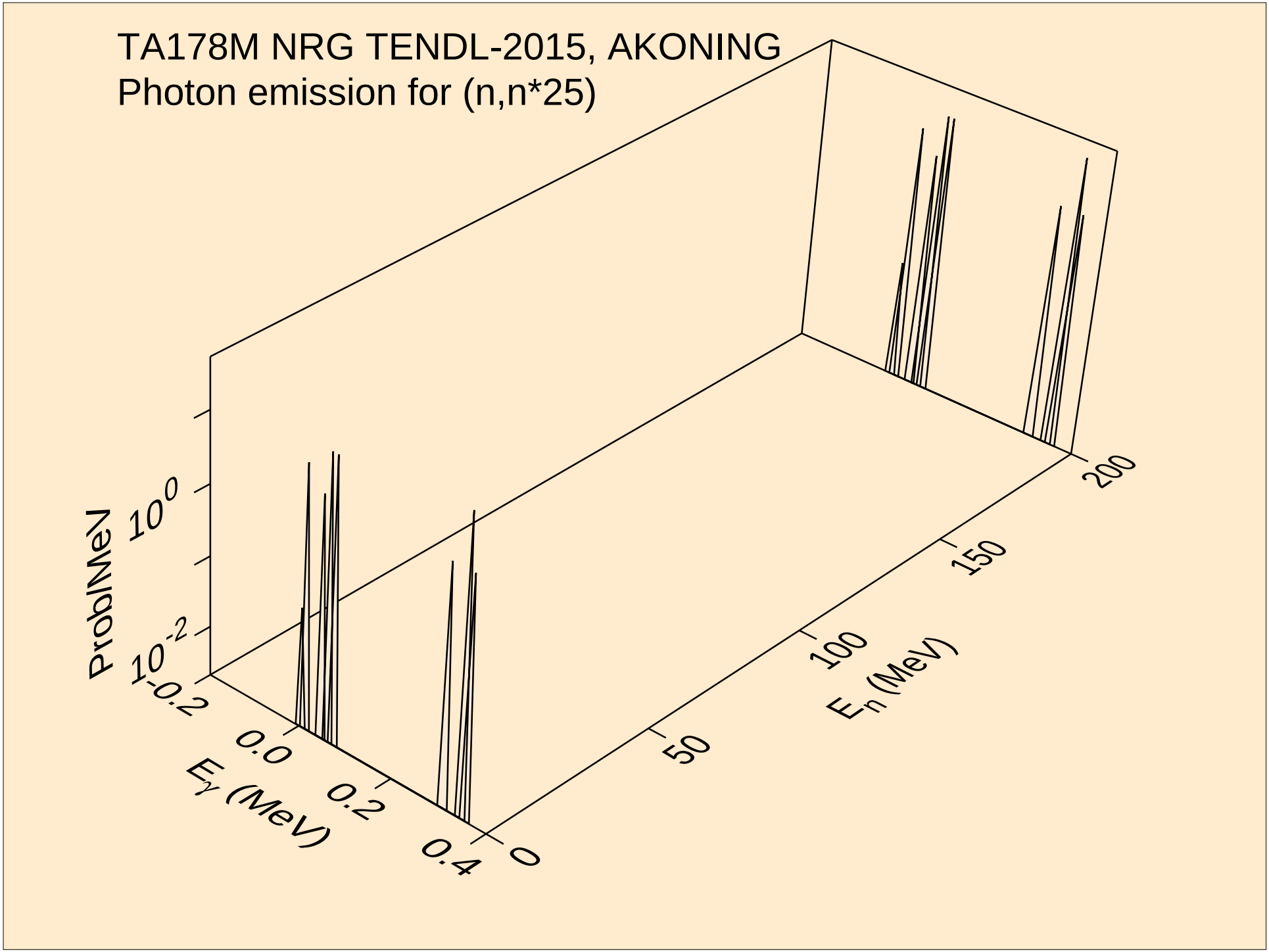

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*20)
Prob/MeV
10^{0}
10^{-2}
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

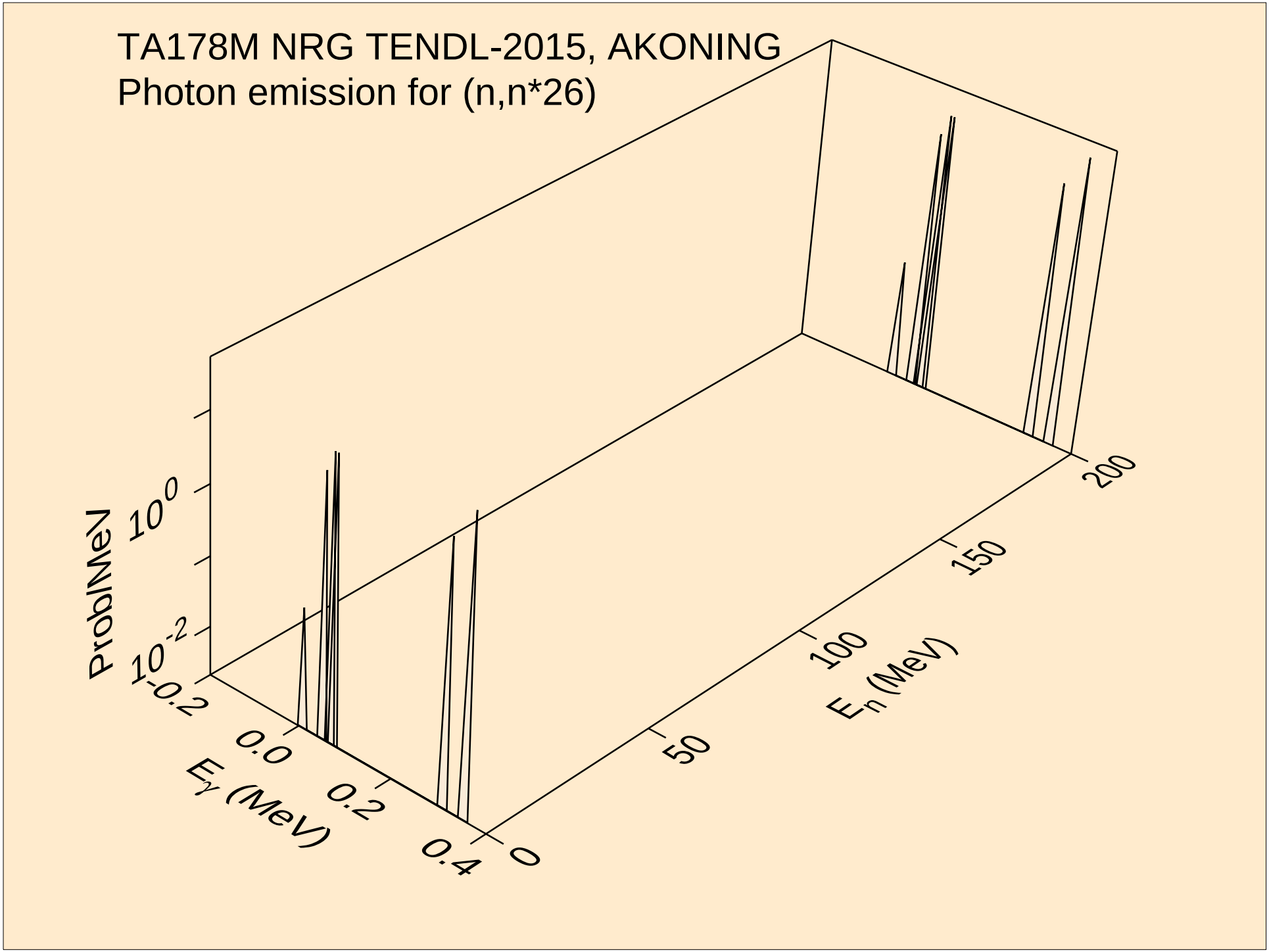

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*21)
Prob/MeV
10^0
10^-2
-0.1
0.0
0.1
0.2
Eγ (MeV)
0
50
100
150
200
En (MeV)

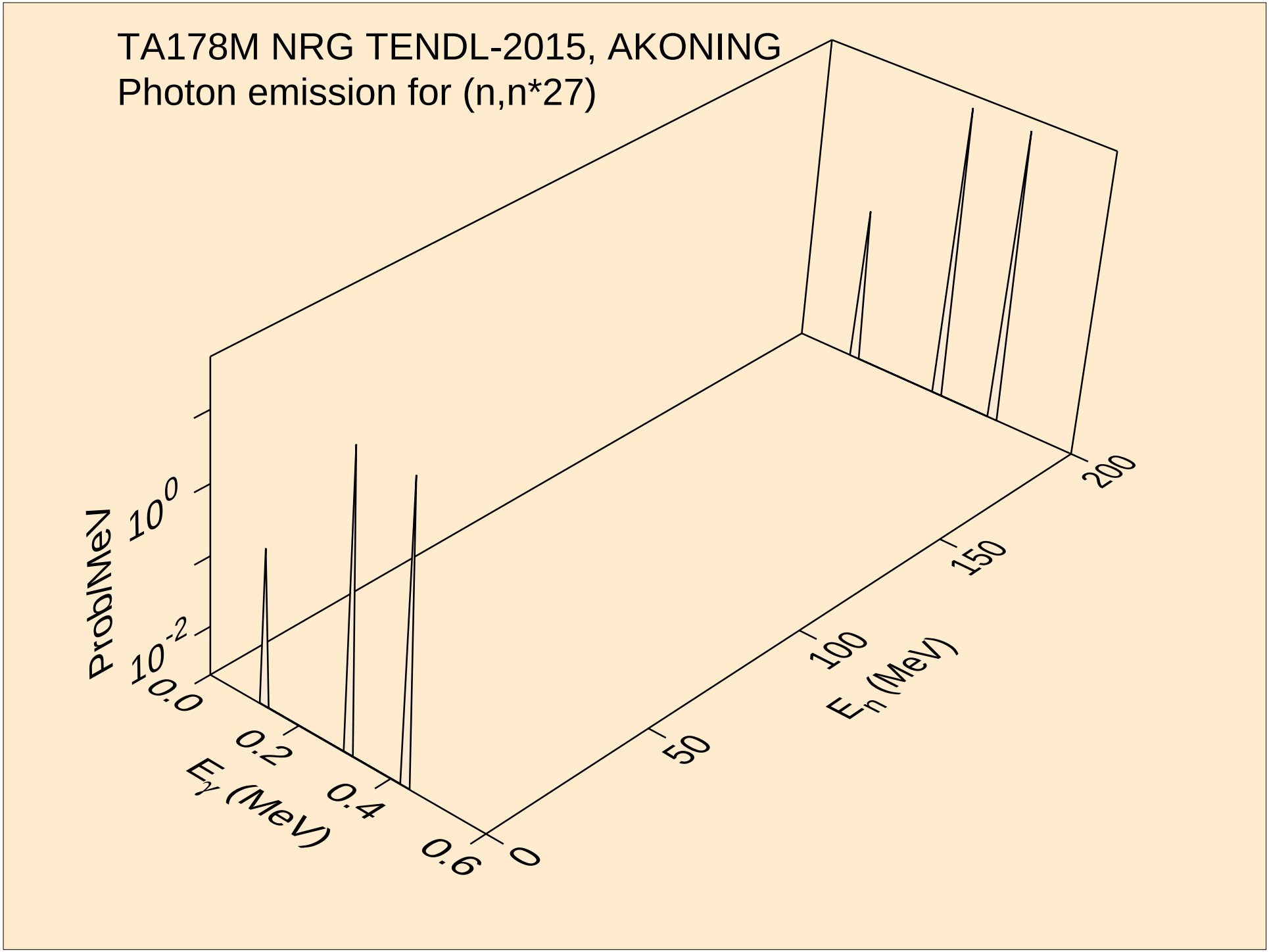

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*22)
Prob/MeV
10^0
10^-2
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

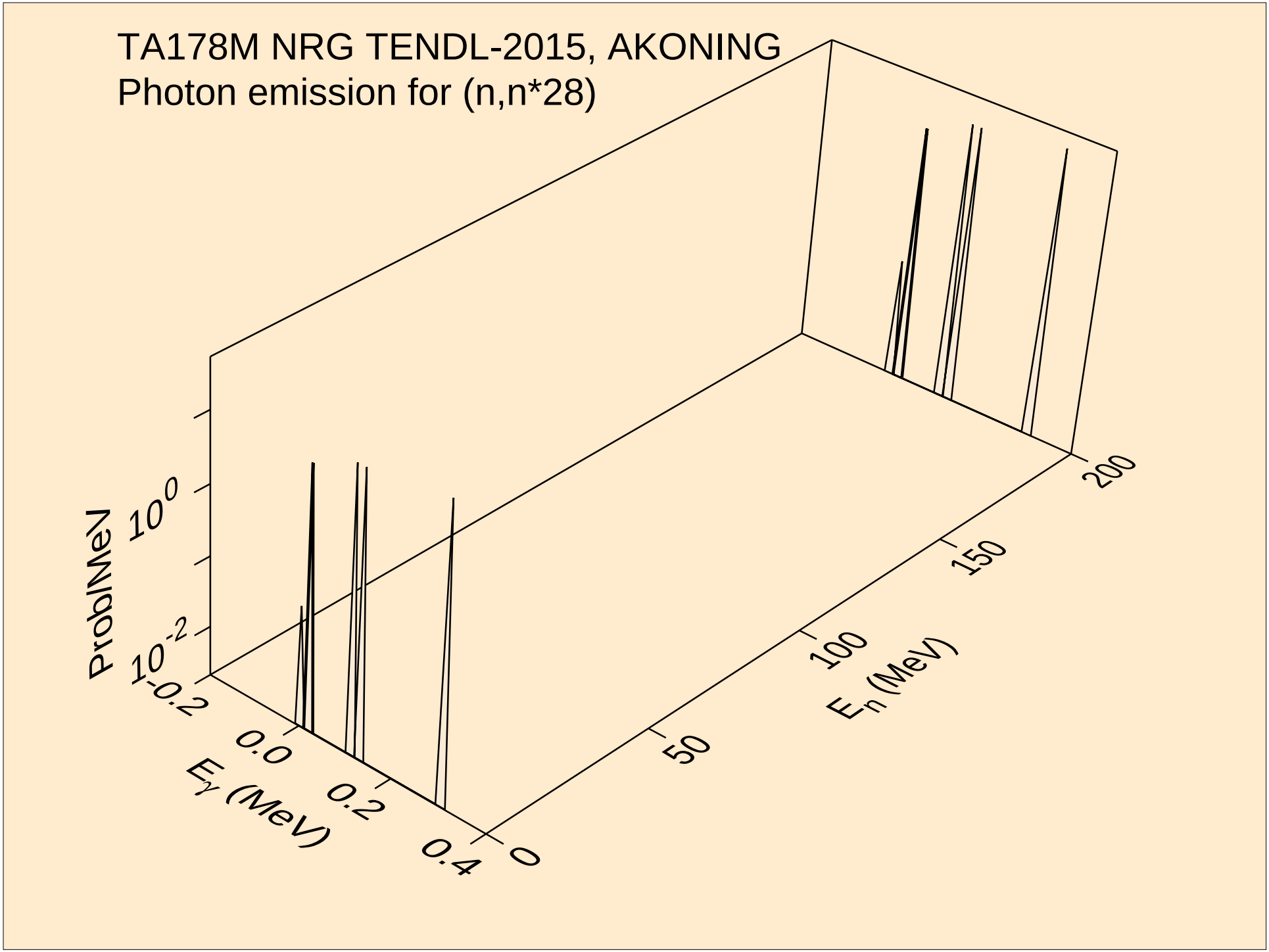

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*23)
Prob/MeV
10^0
10^-2
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

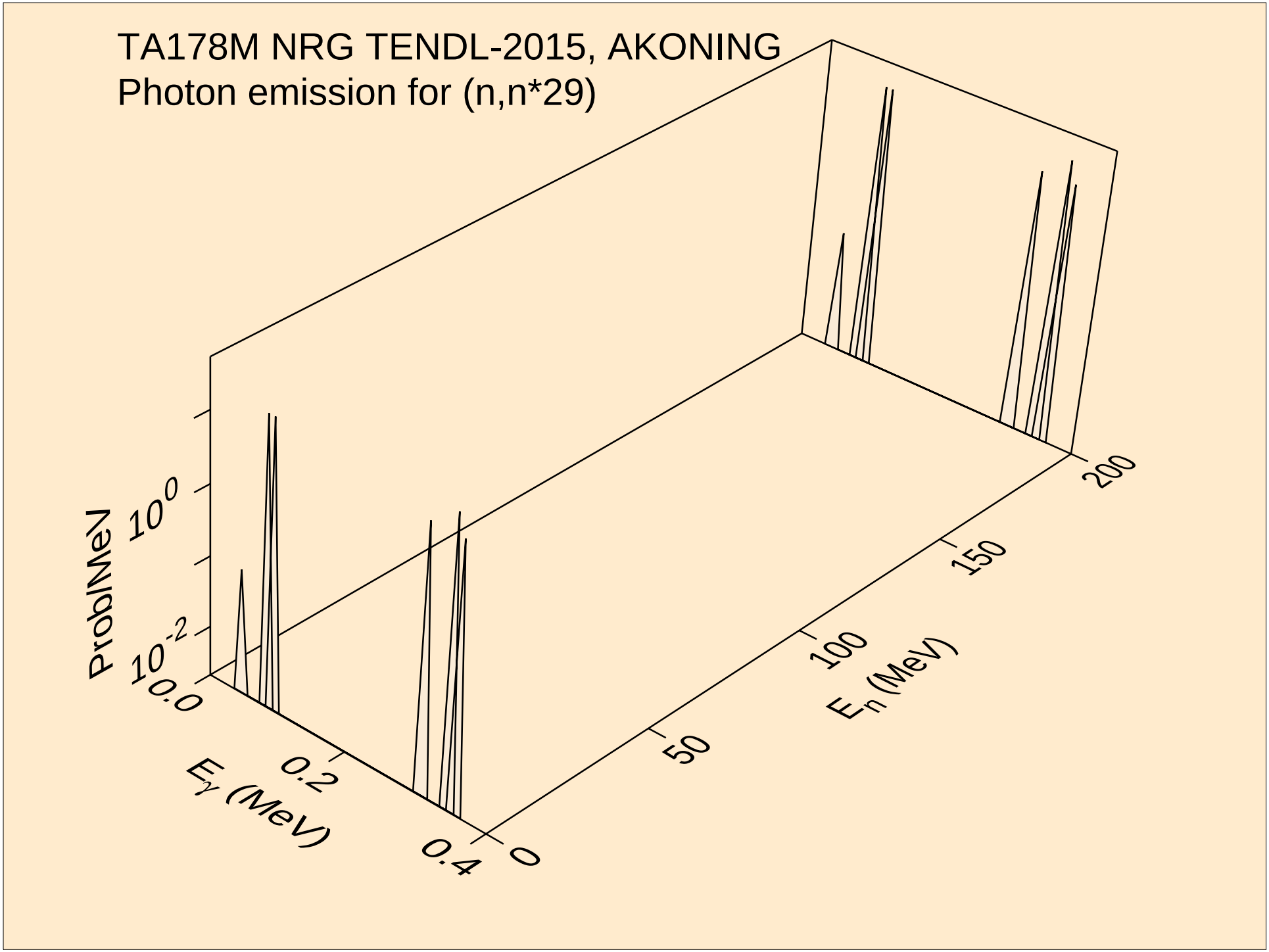

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*24)
Prob/MeV
10^0
10^-2
0.0
0.2
0.4
0.6
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

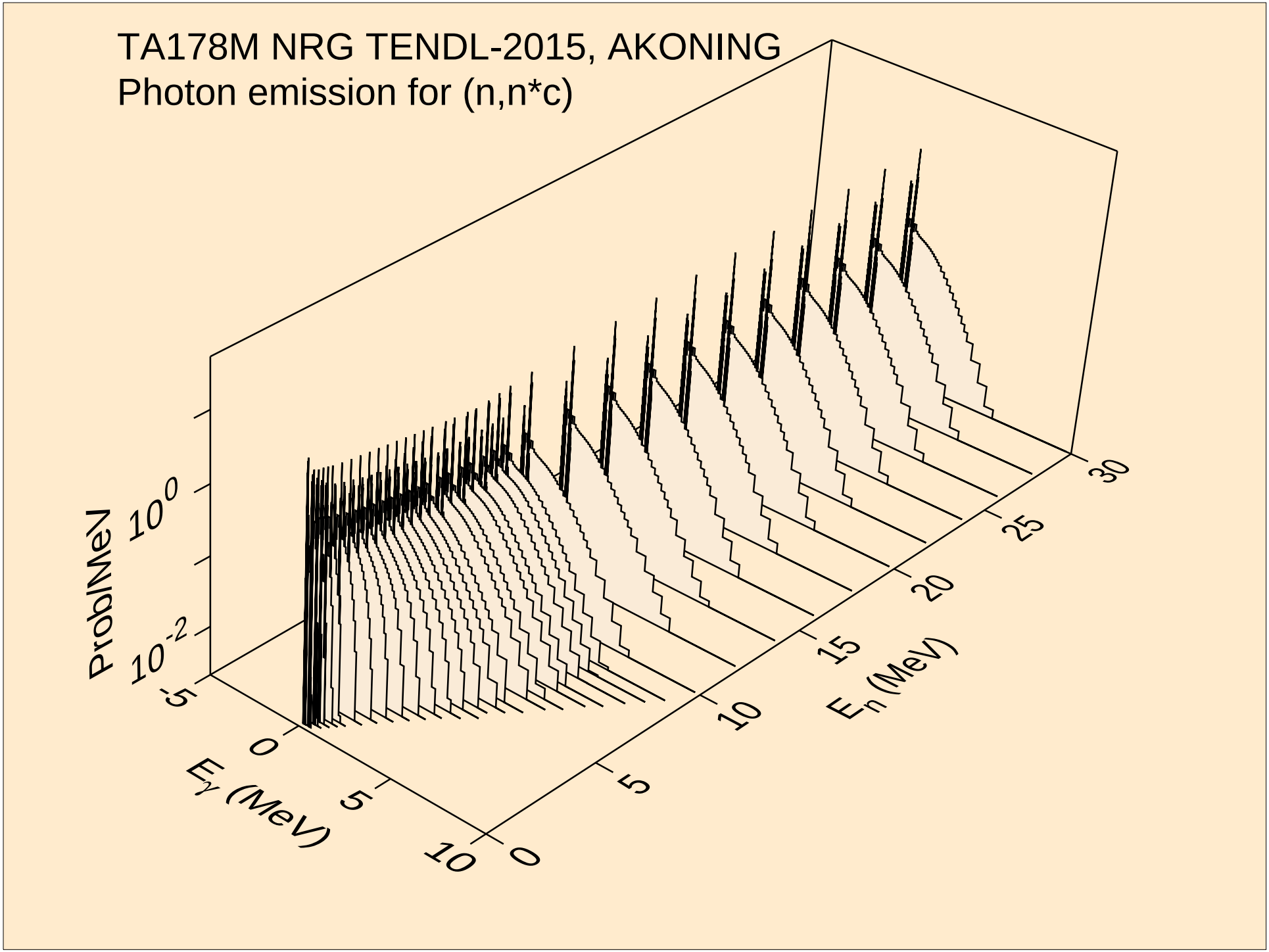

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*25)
Prob/MeV
10^0
10^-2
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

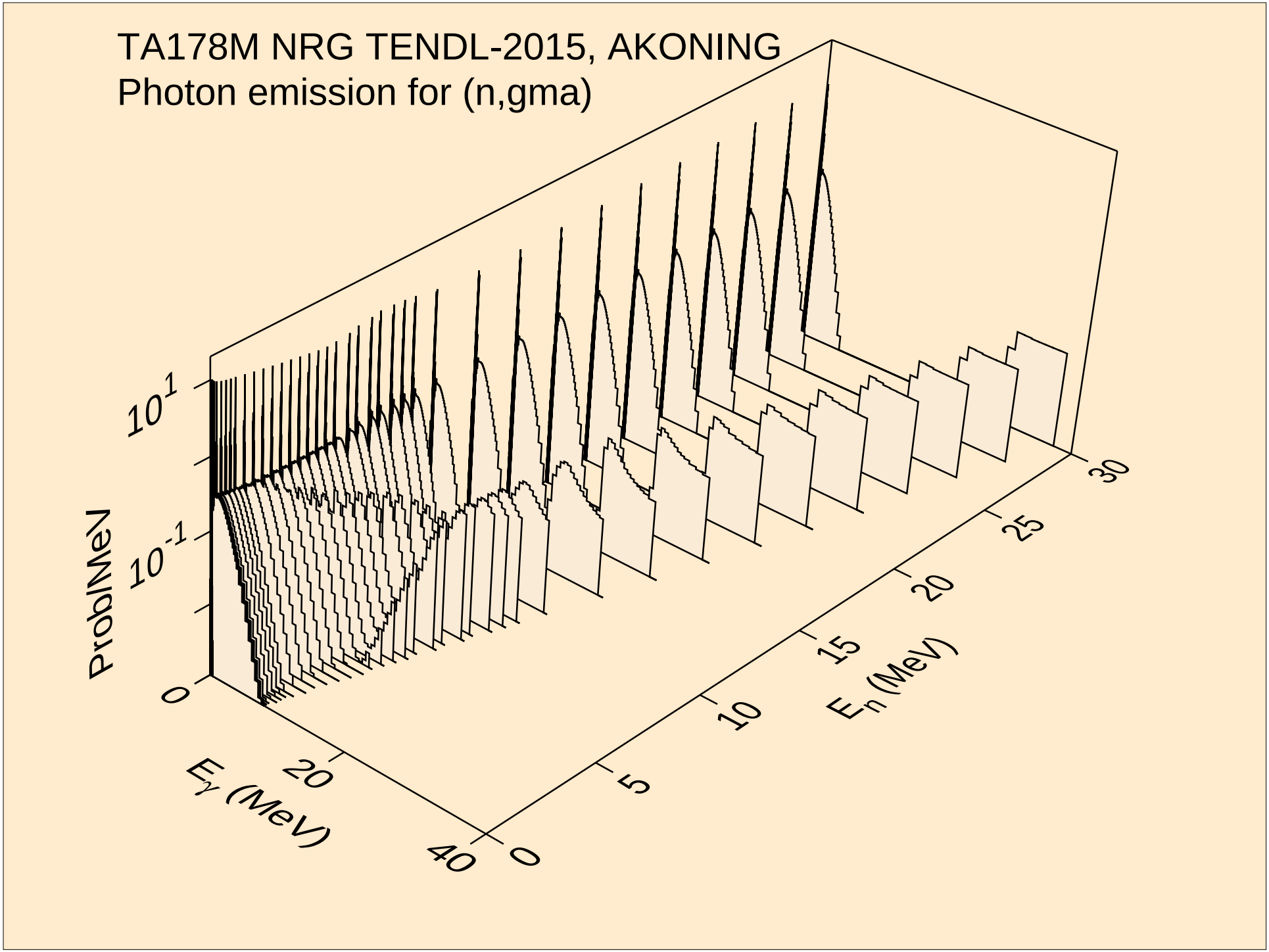

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*26)
Prob/MeV
10^0
10^-2
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

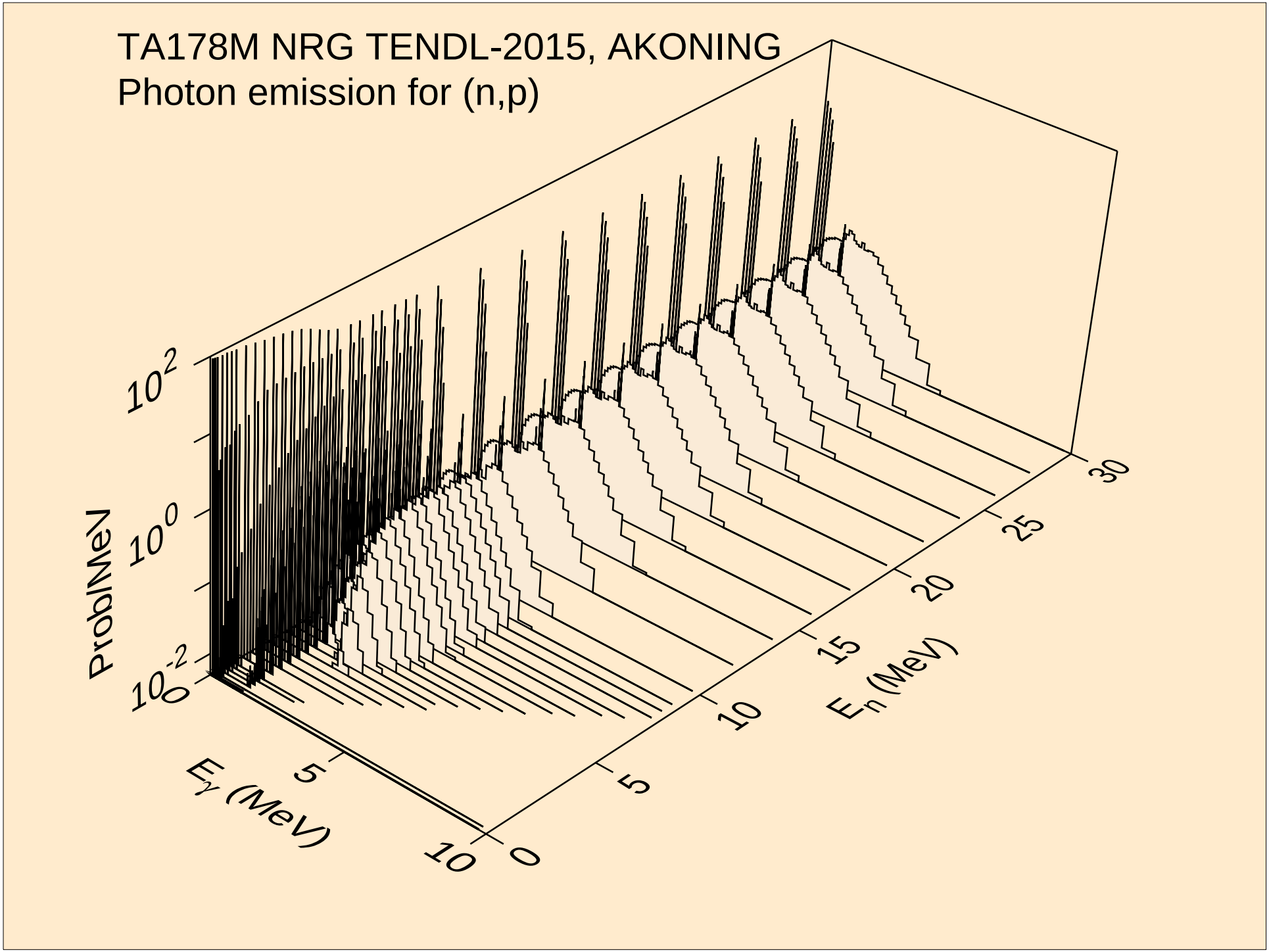

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*27)
Prob/MeV
10^0
10^-2
0.0
0.2
0.4
0.6
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

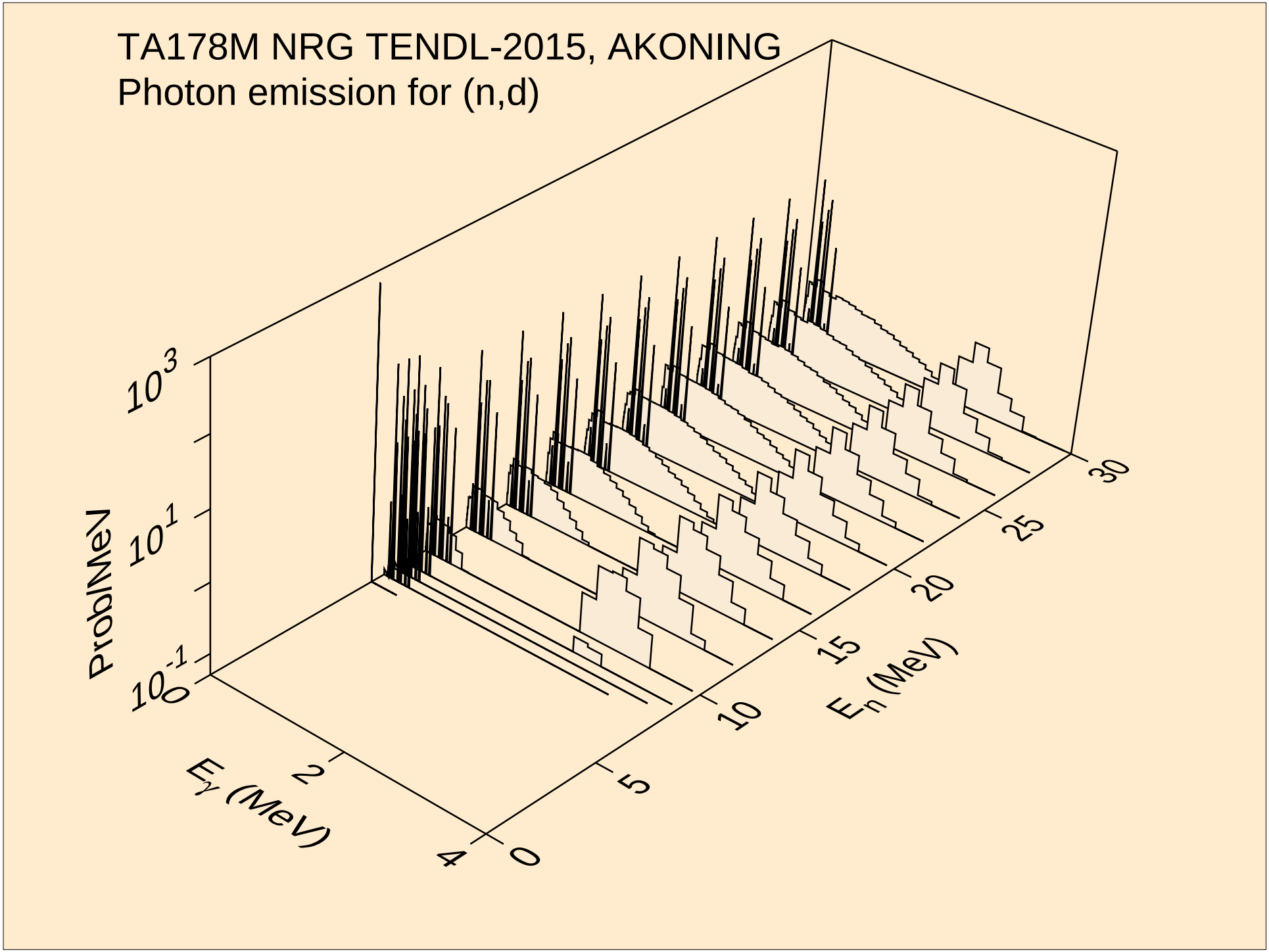

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*28)
Prob/MeV
10^0
10^-2
-0.2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

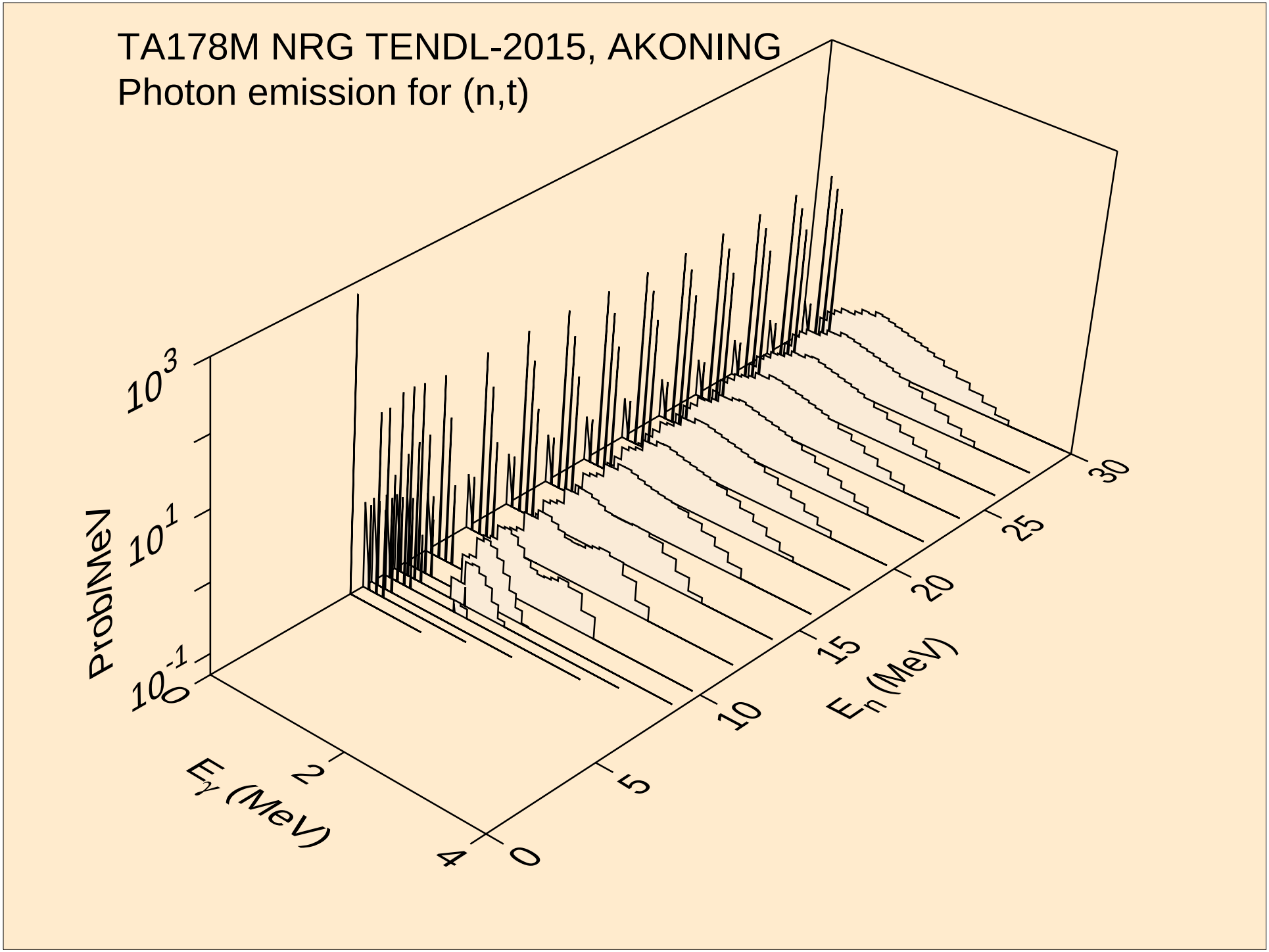

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*29)
Prob/MeV
10^0
10^-2
0.0
0.2
0.4
E_γ (MeV)
0
50
100
150
200
E_n (MeV)

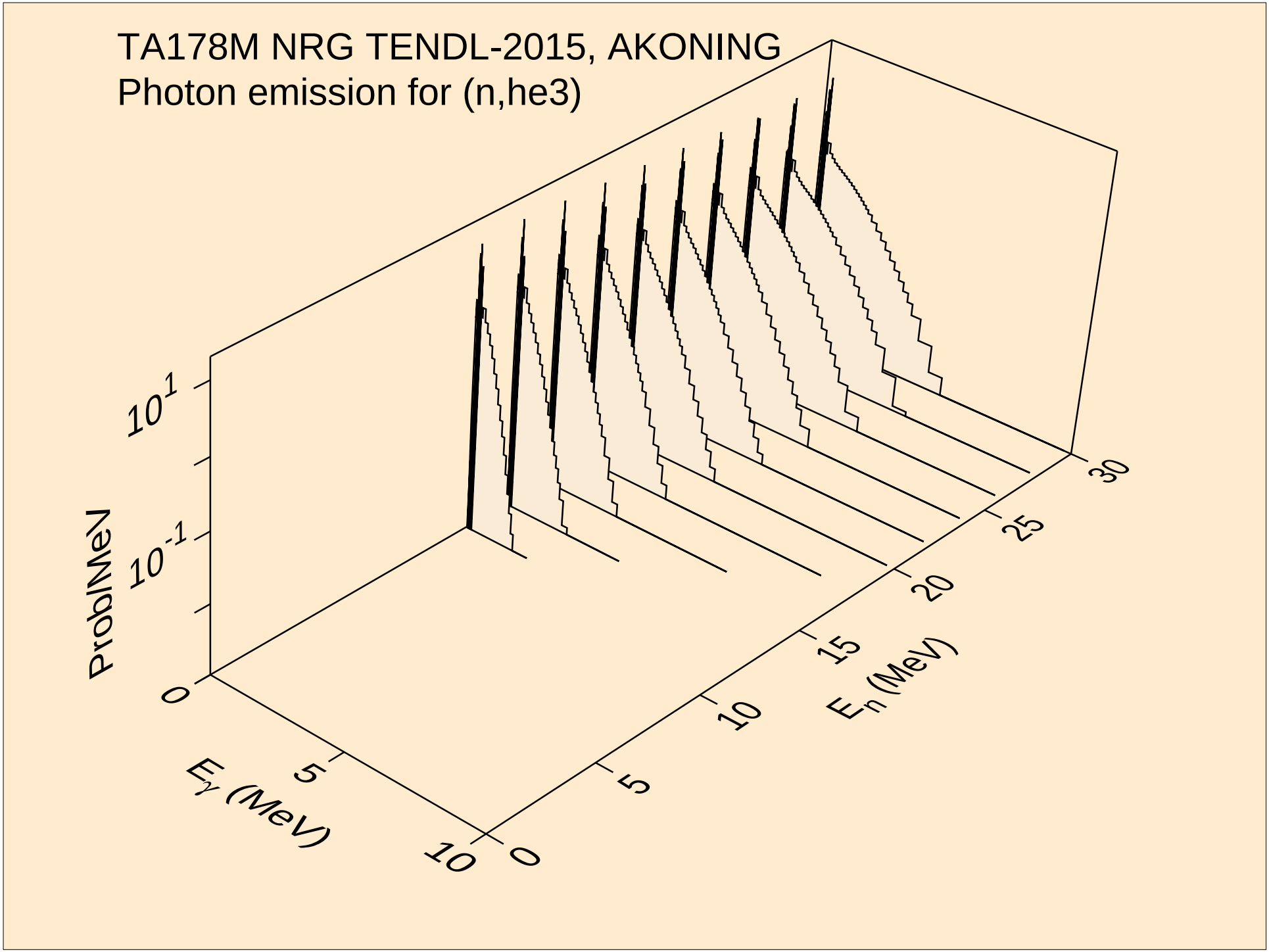

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,n*c)
Prob/MeV
10^{0}
10^{-2}
E_γ (MeV)
-5
0
5
10
E_n (MeV)
0
5
10
15
20
25
30

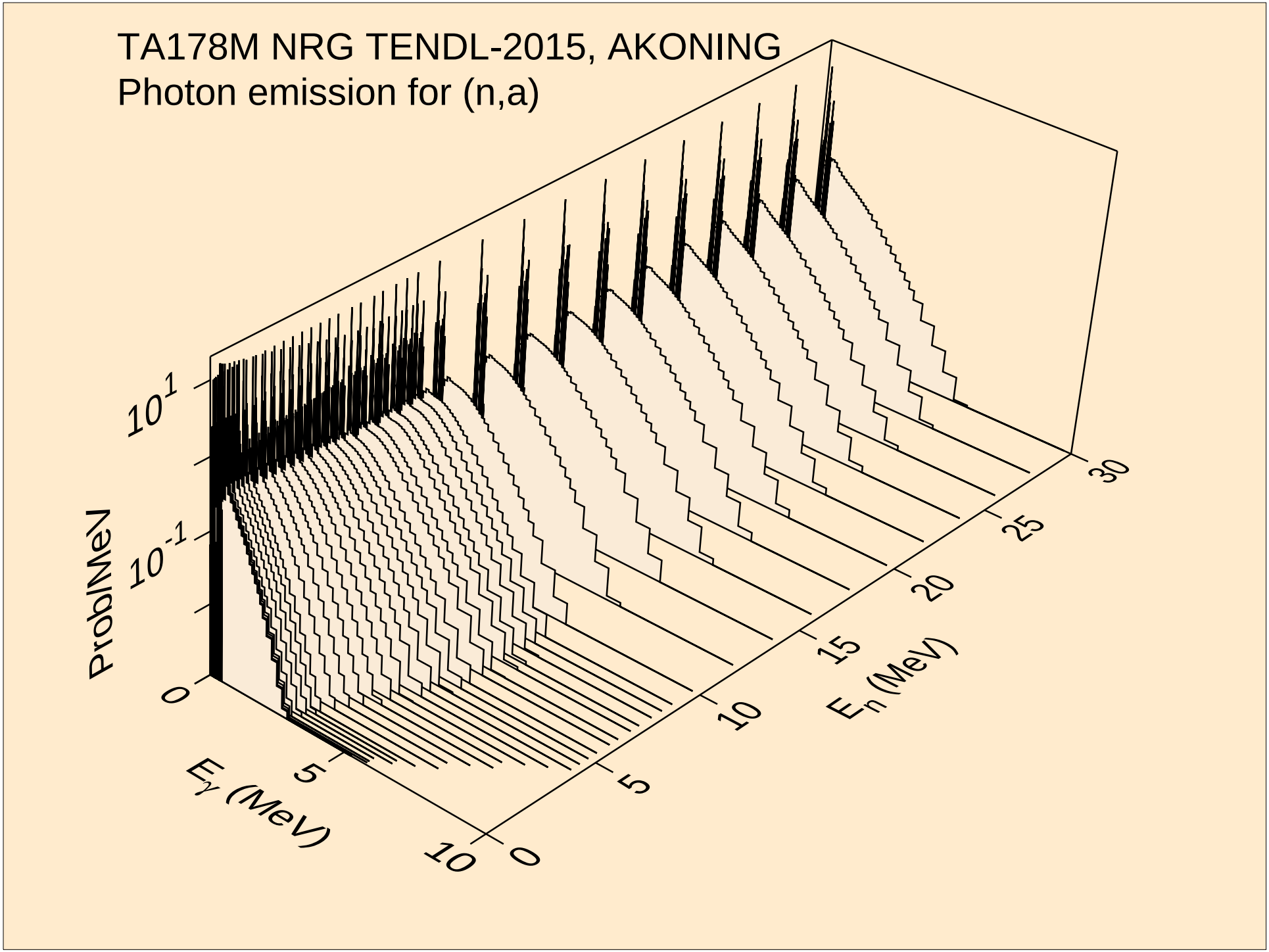

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,gma)
Prob/MeV
10^{1}
10^{-1}
0
20
40
E_γ (MeV)
0
5
10
15
20
25
30
E_n (MeV)

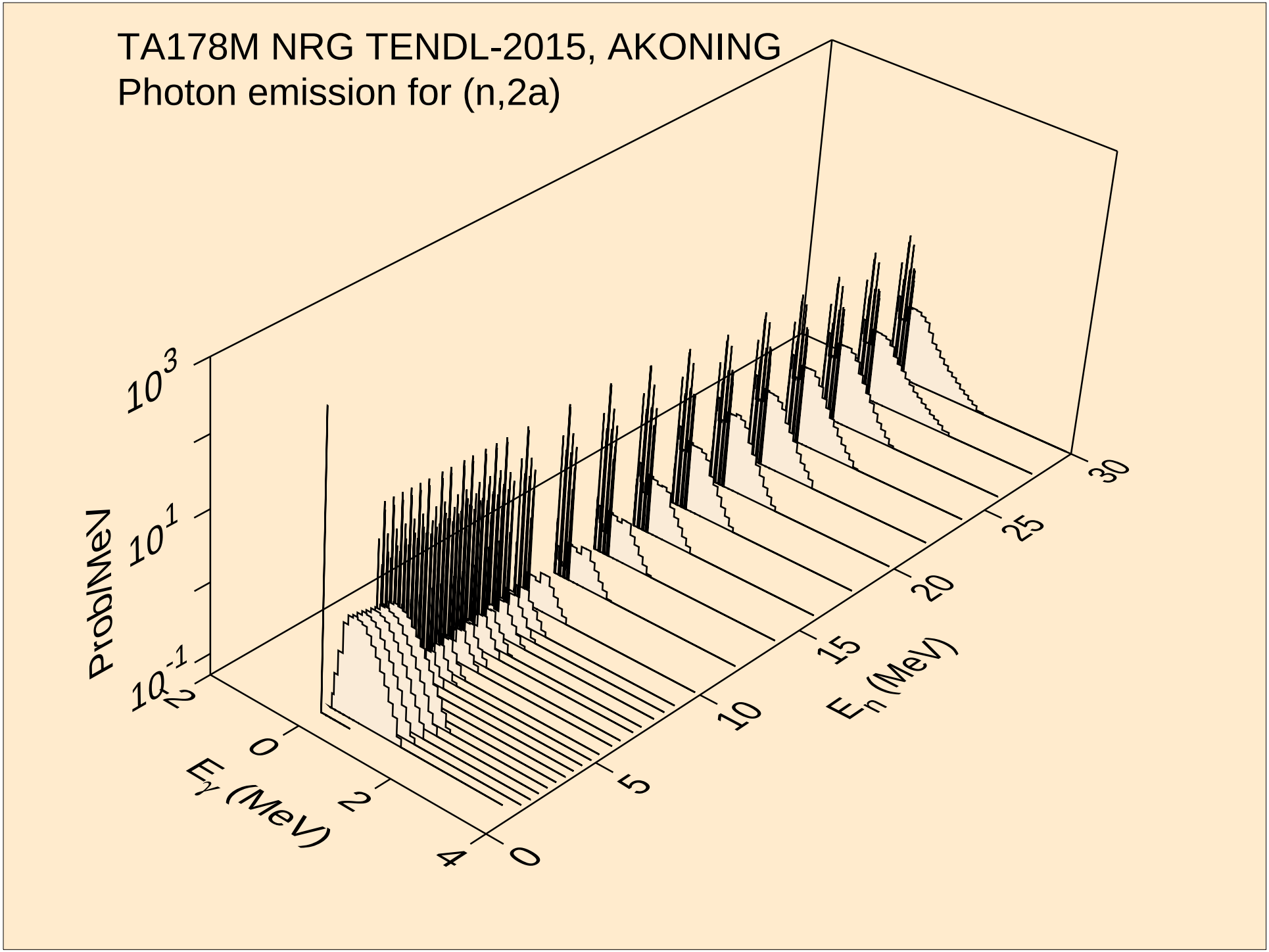

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,p)
Prob/MeV
10^{2}
10^{0}
10^{-2}
E_γ (MeV)
0
5
10
E_n (MeV)
0
5
10
15
20
25
30

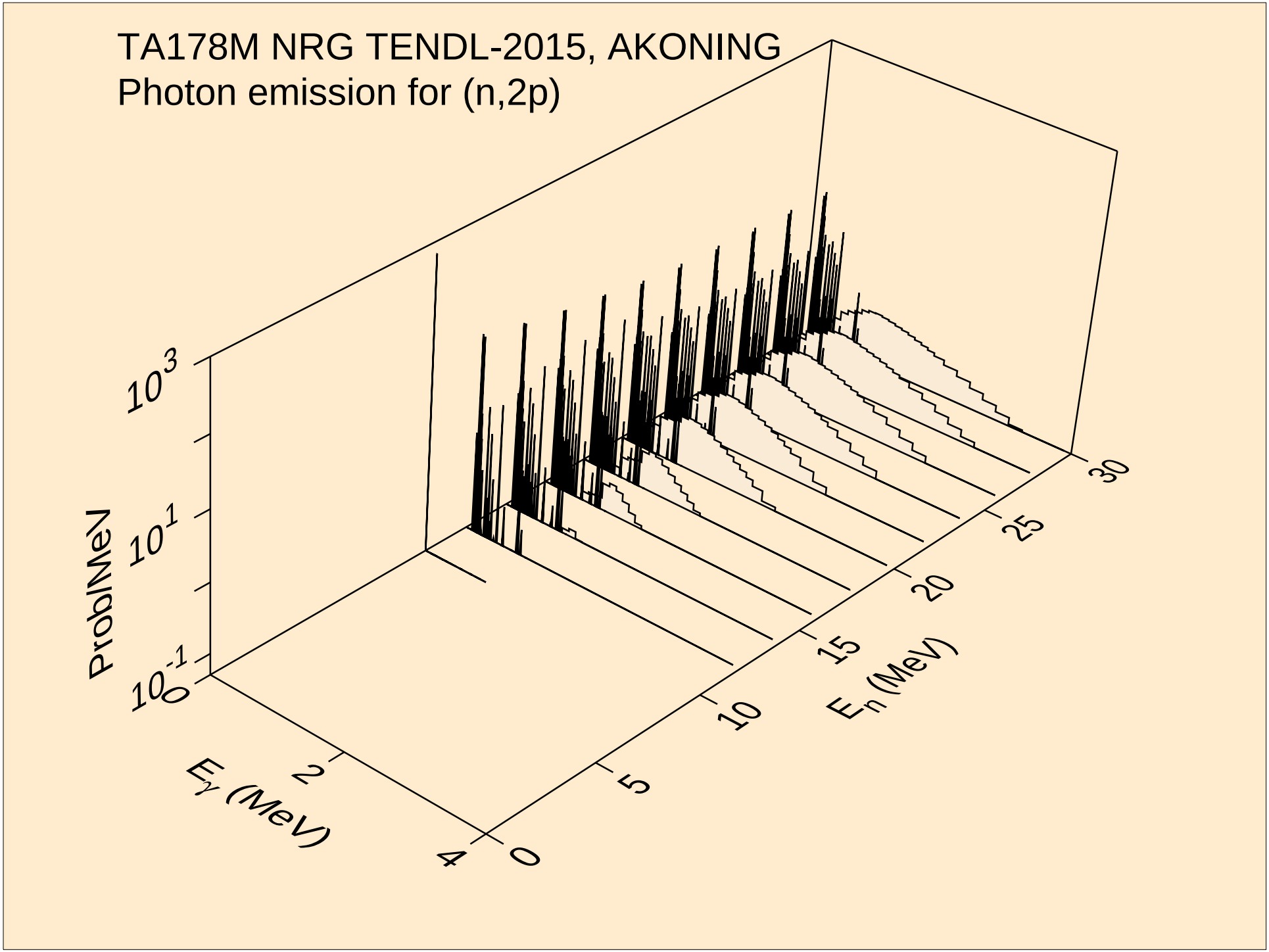

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,d)
Prob/MeV
10^{3}
10^{1}
10^{-1}
0
2
4
E_γ (MeV)
0
5
10
15
20
25
30
E_n (MeV)

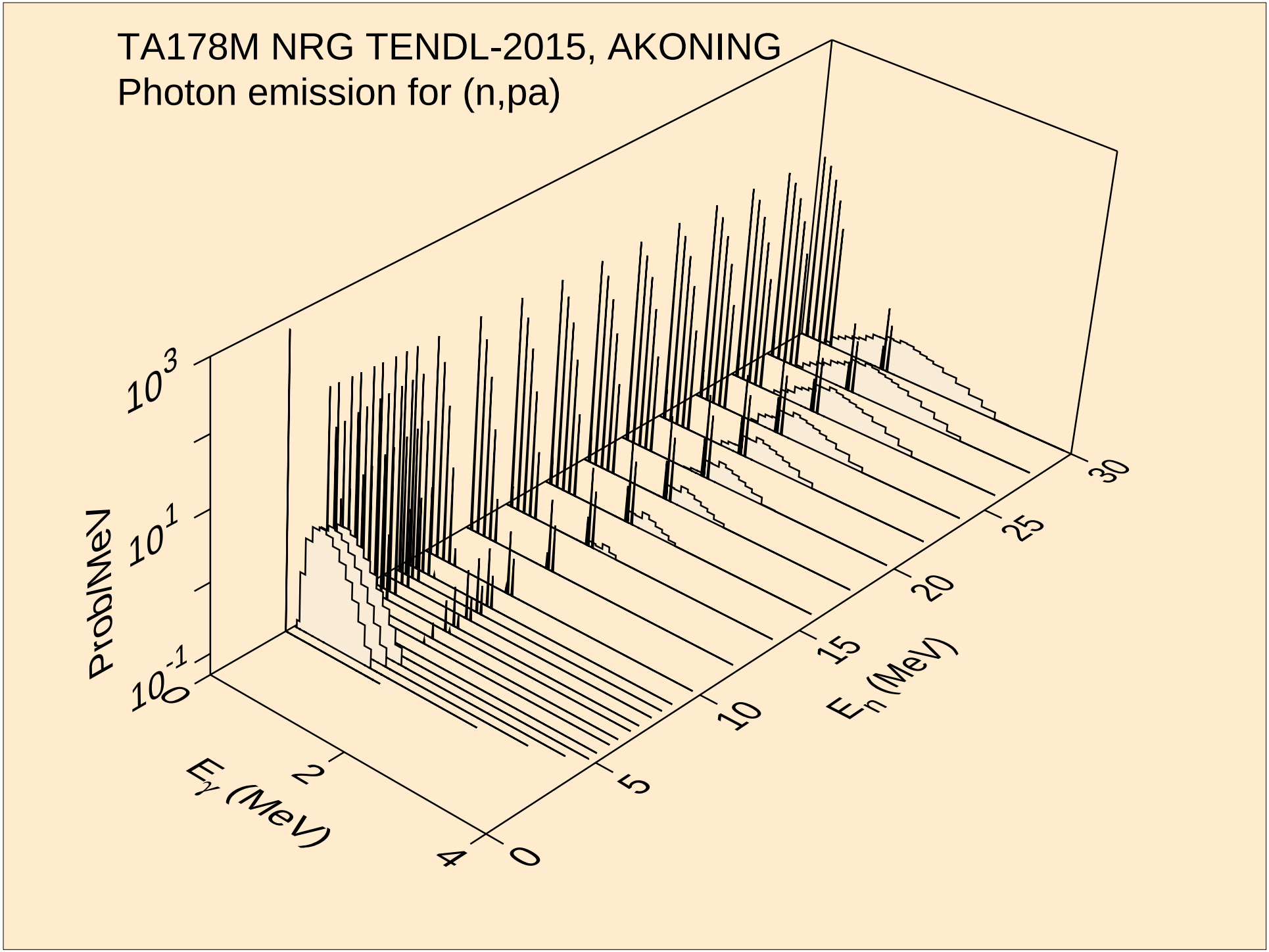

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,t)
Prob/MeV
10^{3}
10^{1}
10^{-1}
E_γ (MeV)
0
2
4
E_n (MeV)
0
5
10
15
20
25
30

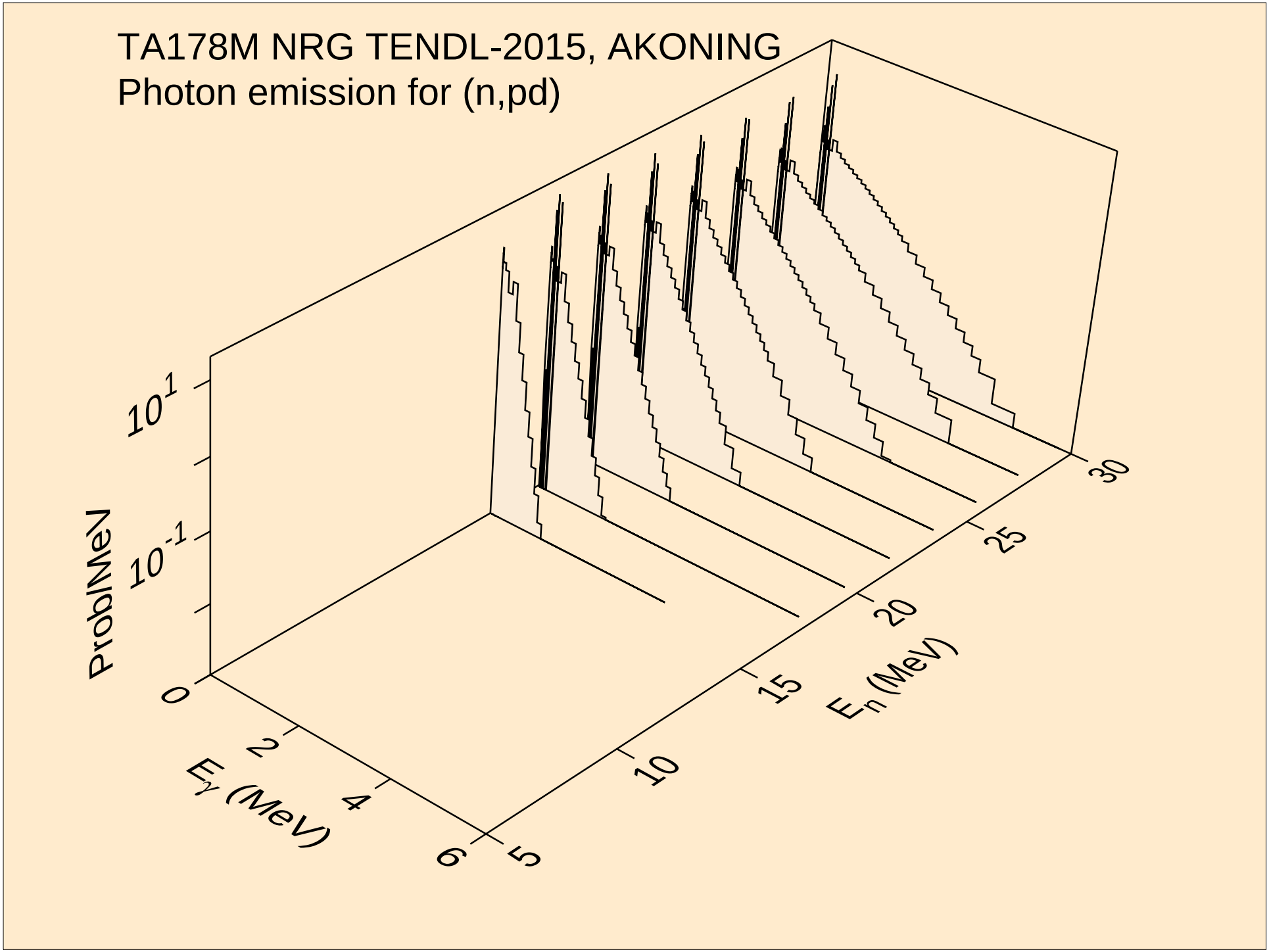

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,he3)
Prob/MeV
10^{1}
10^{-1}
0
5
10
E_γ (MeV)
0
5
10
15
20
25
30
E_n (MeV)

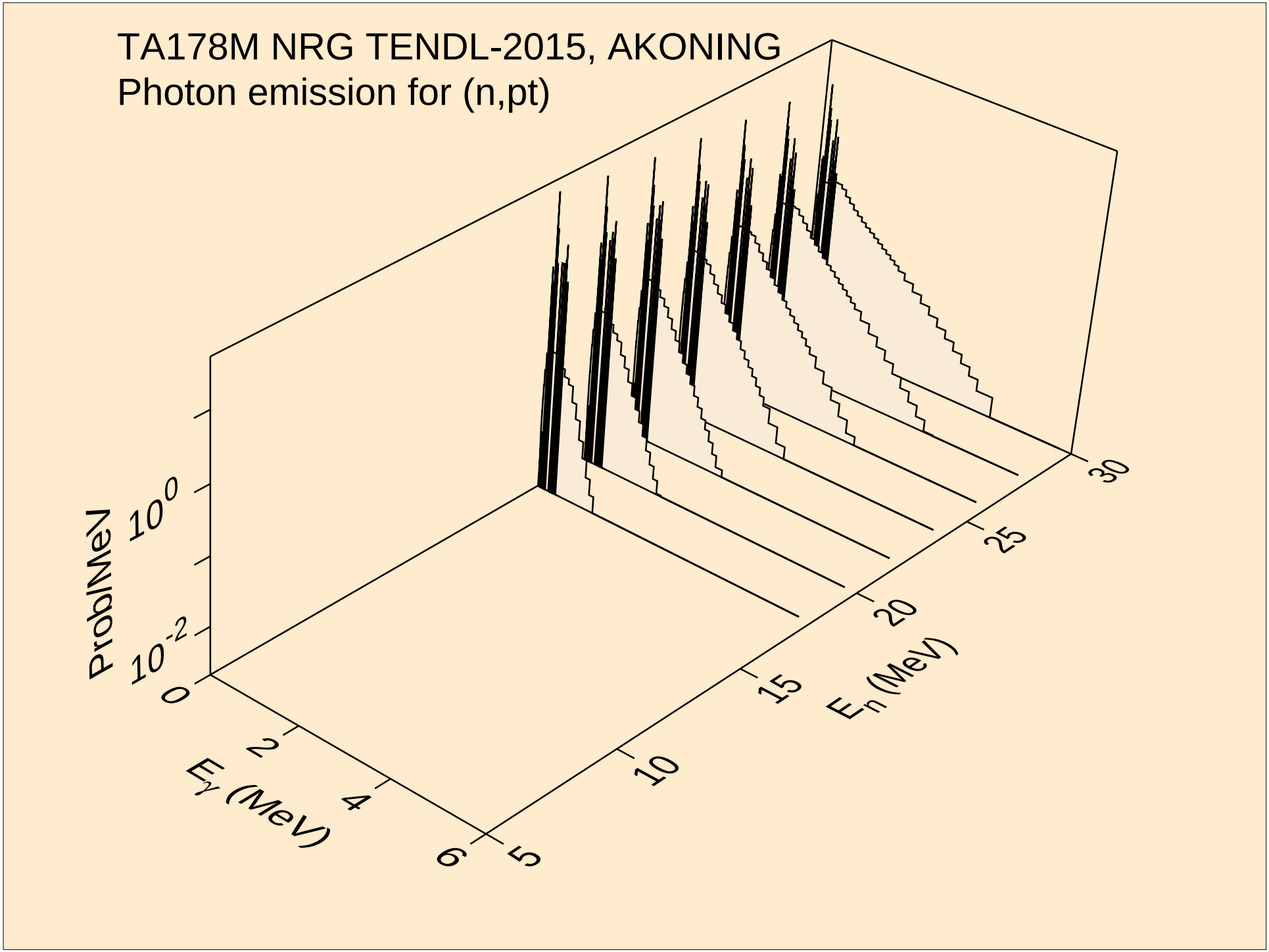

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,a)
Prob/MeV
10^{1}
10^{-1}
0
E_γ (MeV)
5
10
0
5
10
15
20
25
30
E_n (MeV)

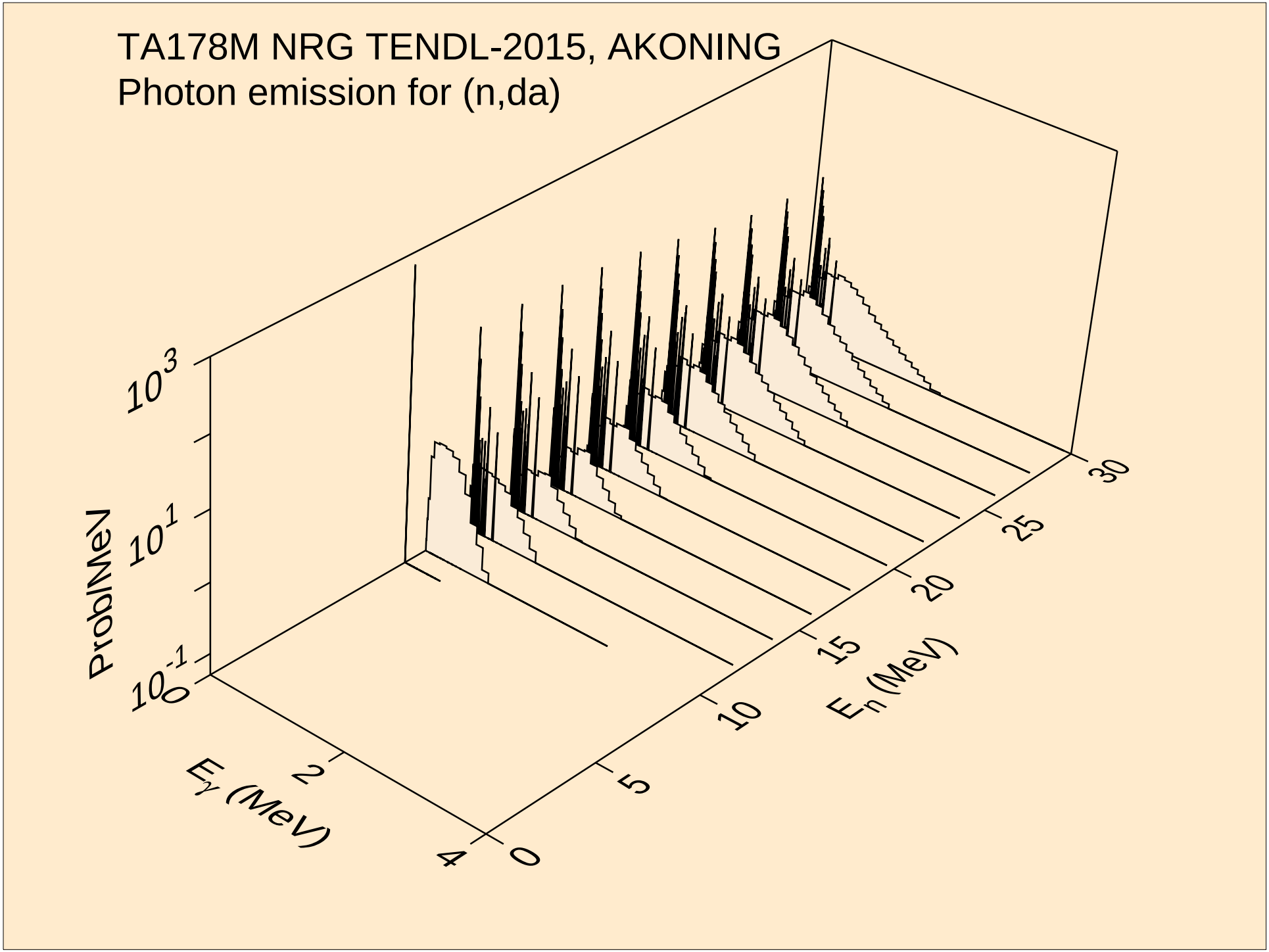

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,2a)
Prob/MeV
10^{3}
10^{1}
10^{-1}
E_γ (MeV)
0
2
4
E_n (MeV)
0
5
10
15
20
25
30

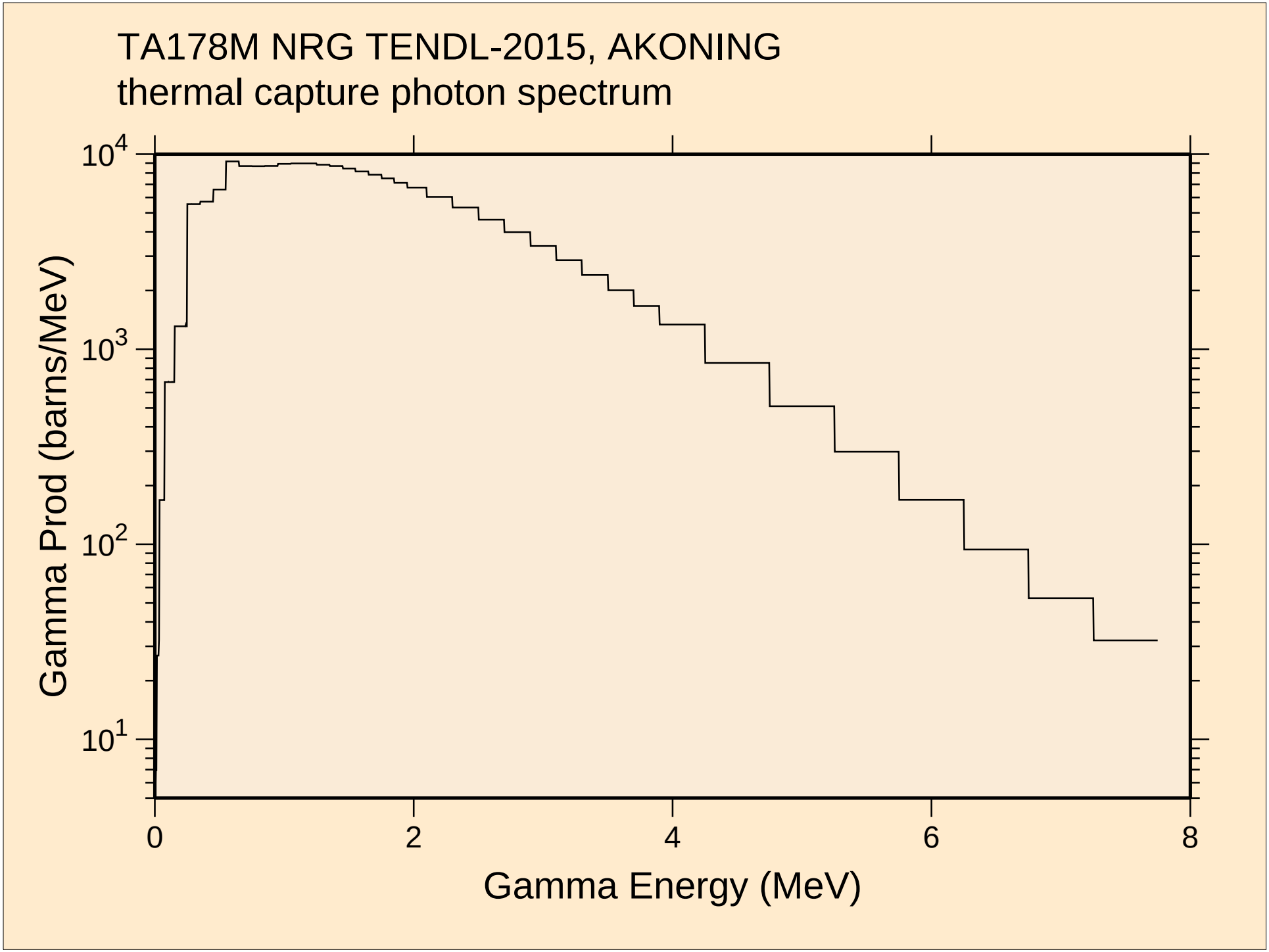

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,2p)
Prob/MeV
10^{3}
10^{1}
10^{-1}
0
2
4
E_γ (MeV)
0
5
10
15
20
25
30
E_n (MeV)

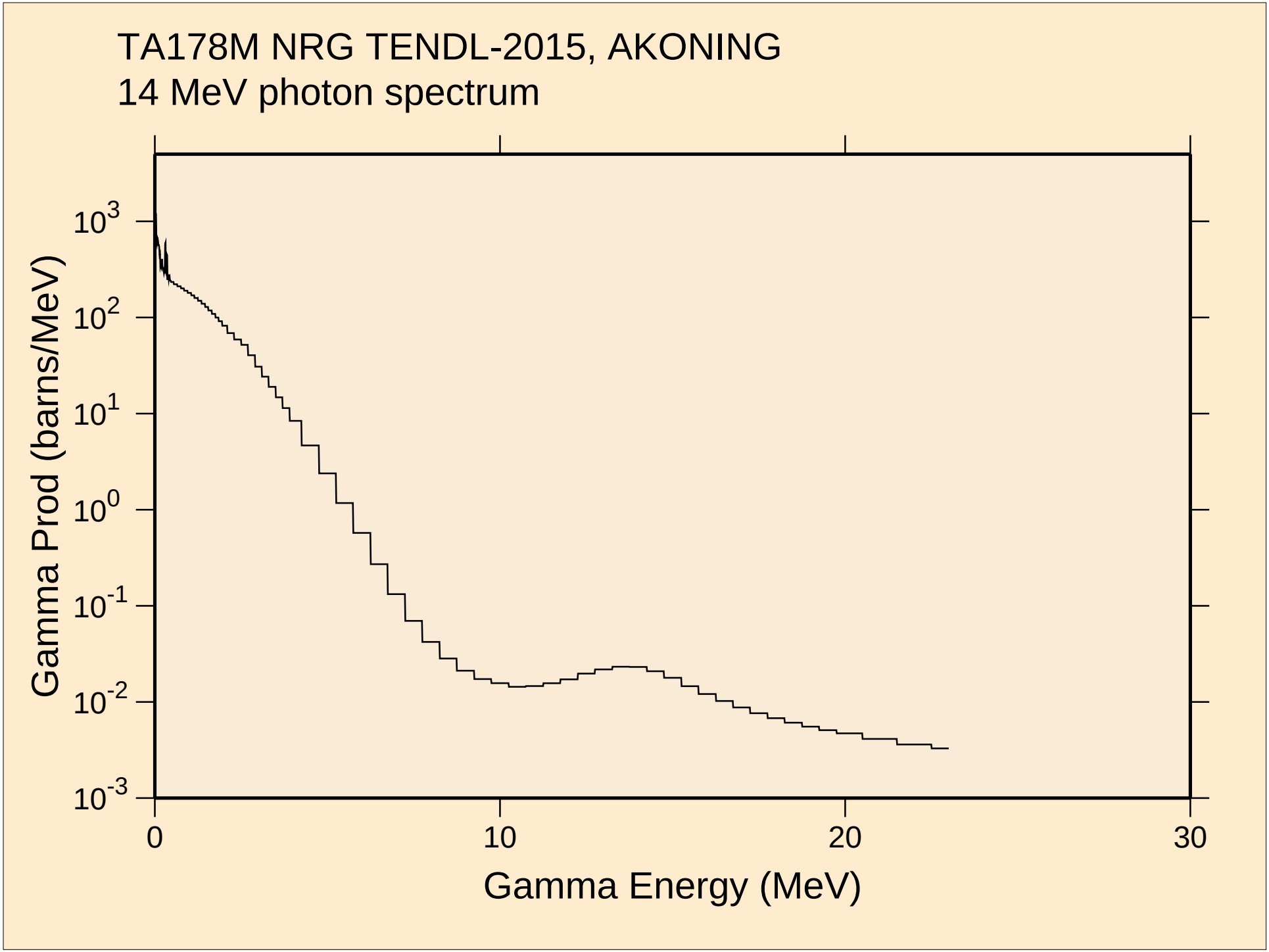

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,pa)
Prob/MeV
10^{3}
10^{1}
10^{-1}
E_γ (MeV)
0
2
4
E_n (MeV)
0
5
10
15
20
25
30

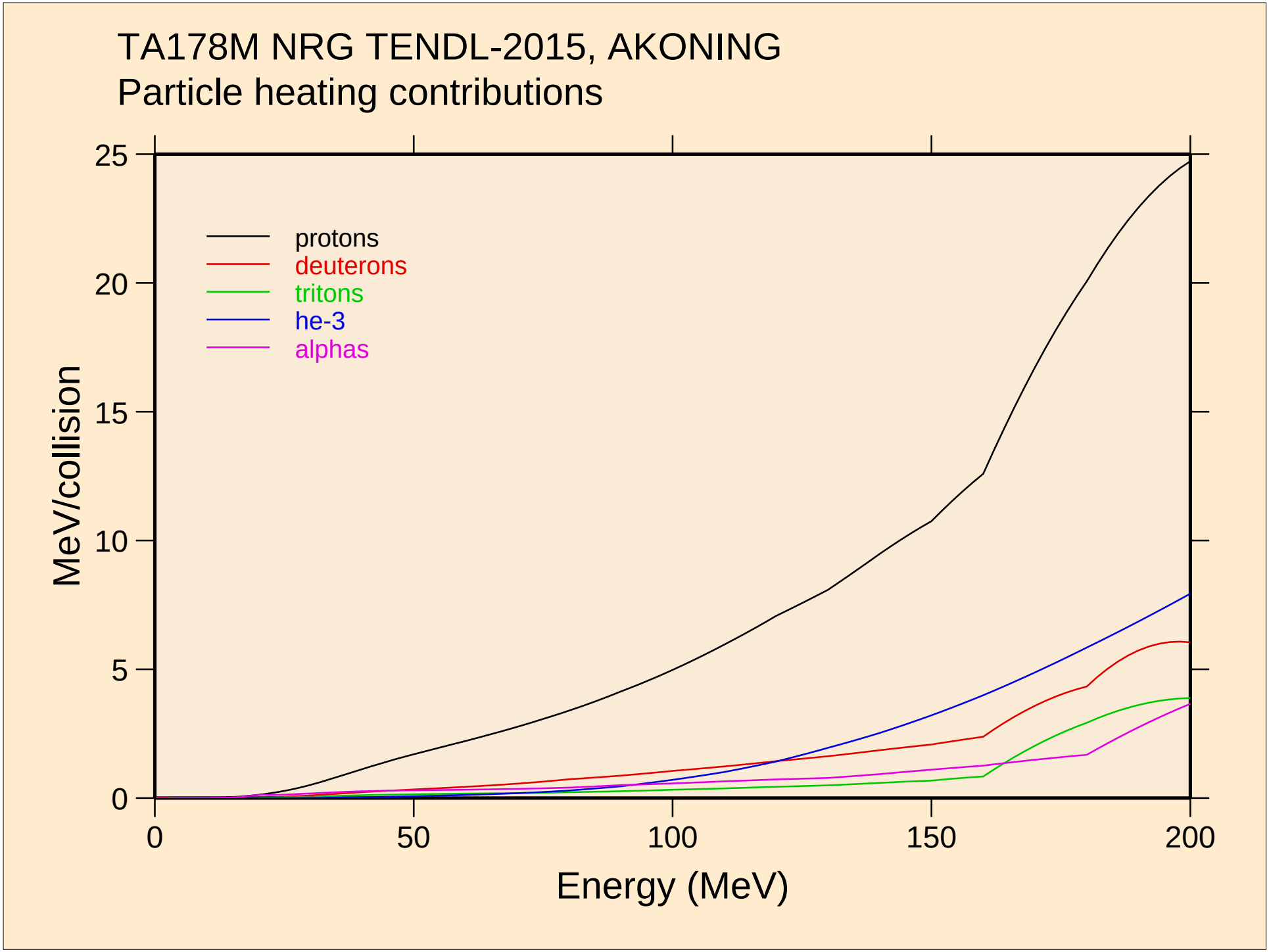

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,pd)
Prob/MeV
10^{1}
10^{-1}
0
2
4
6
E_γ (MeV)
5
10
15
20
25
30
E_n (MeV)

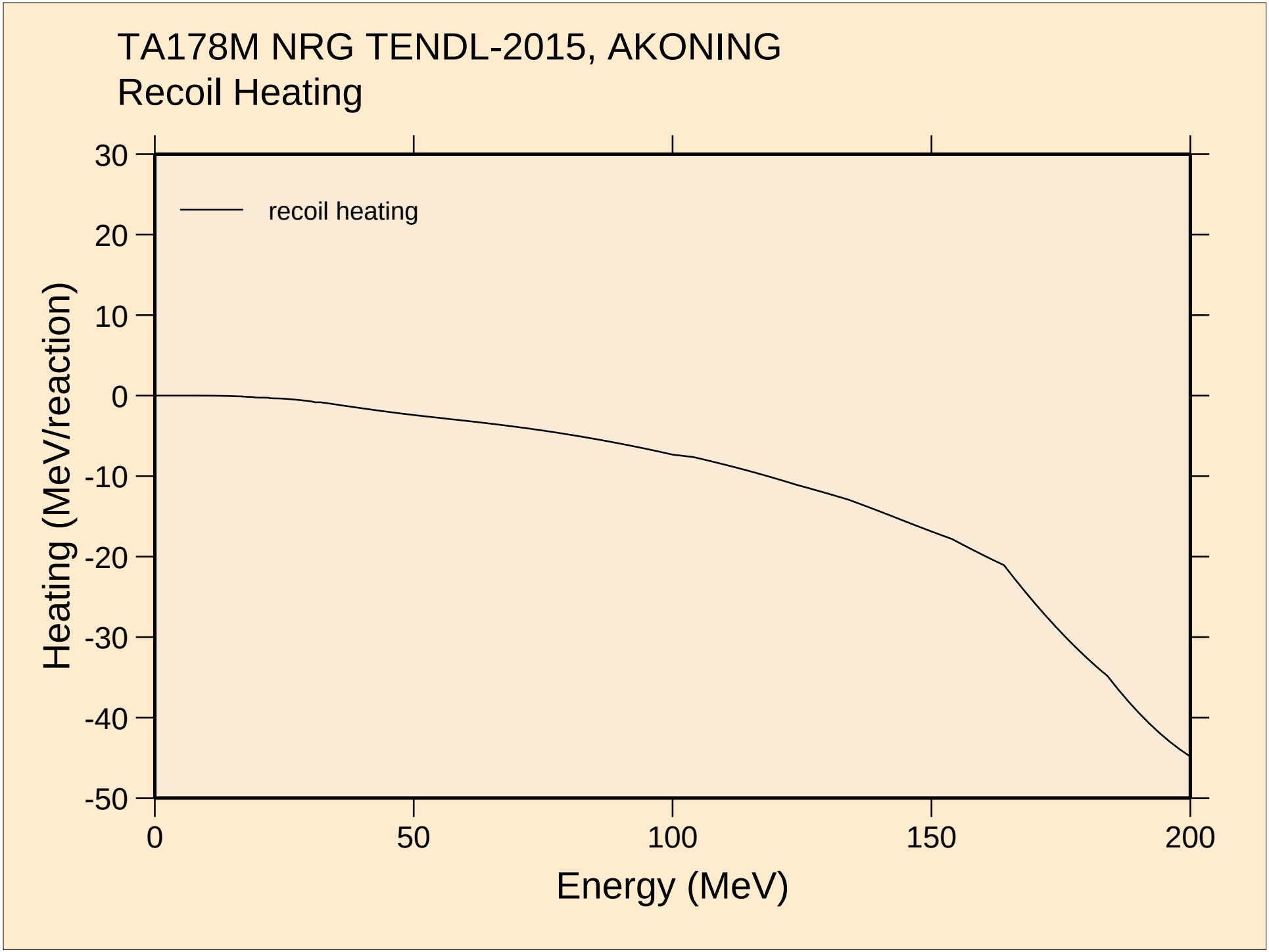

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,pt)
Prob/MeV
10^{0}
10^{-2}
0
2
4
6
E_γ (MeV)
5
10
15
20
25
30
E_n (MeV)

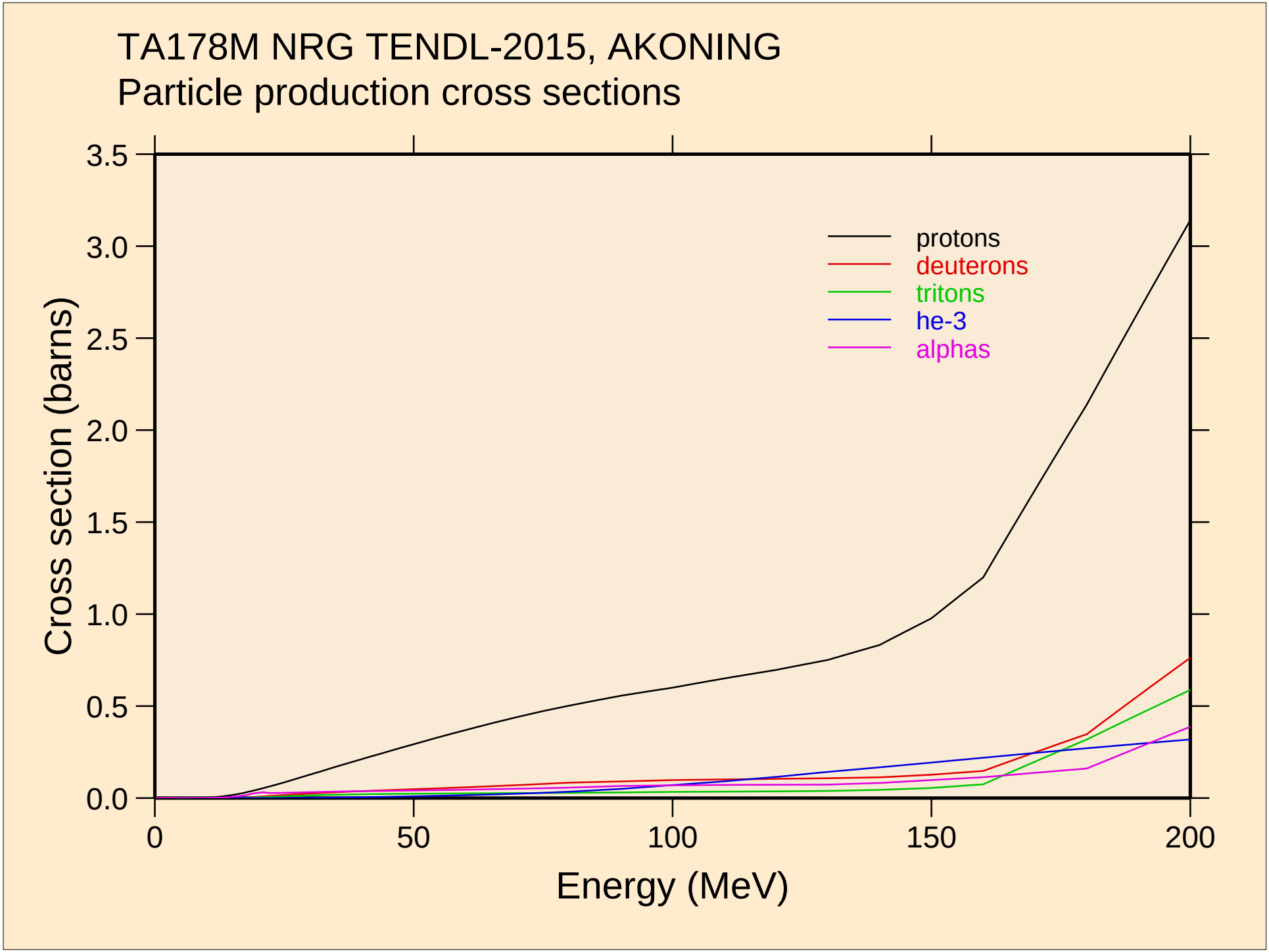

TA178M NRG TENDL-2015, AKONING
Photon emission for (n,da)
Prob/MeV
10^{3}
10^{1}
10^{-1}
E_γ (MeV)
0
2
4
E_n (MeV)
0
5
10
15
20
25
30

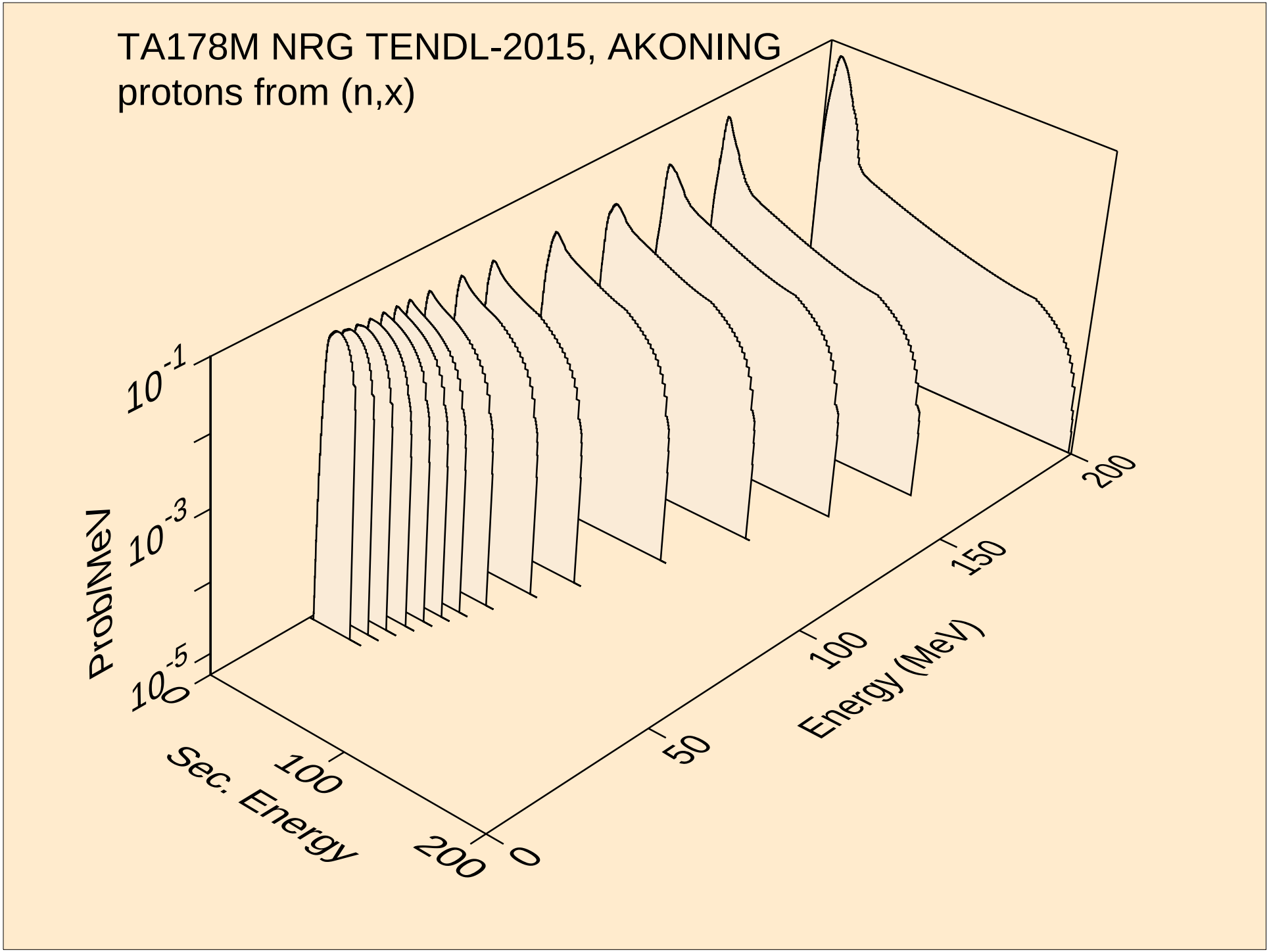

TA178M NRG TENDL-2015, AKONING
thermal capture photon spectrum
Gamma Prod (barns/MeV)
10^4
10^3
10^2
10^1
0
2
4
6
8
Gamma Energy (MeV)

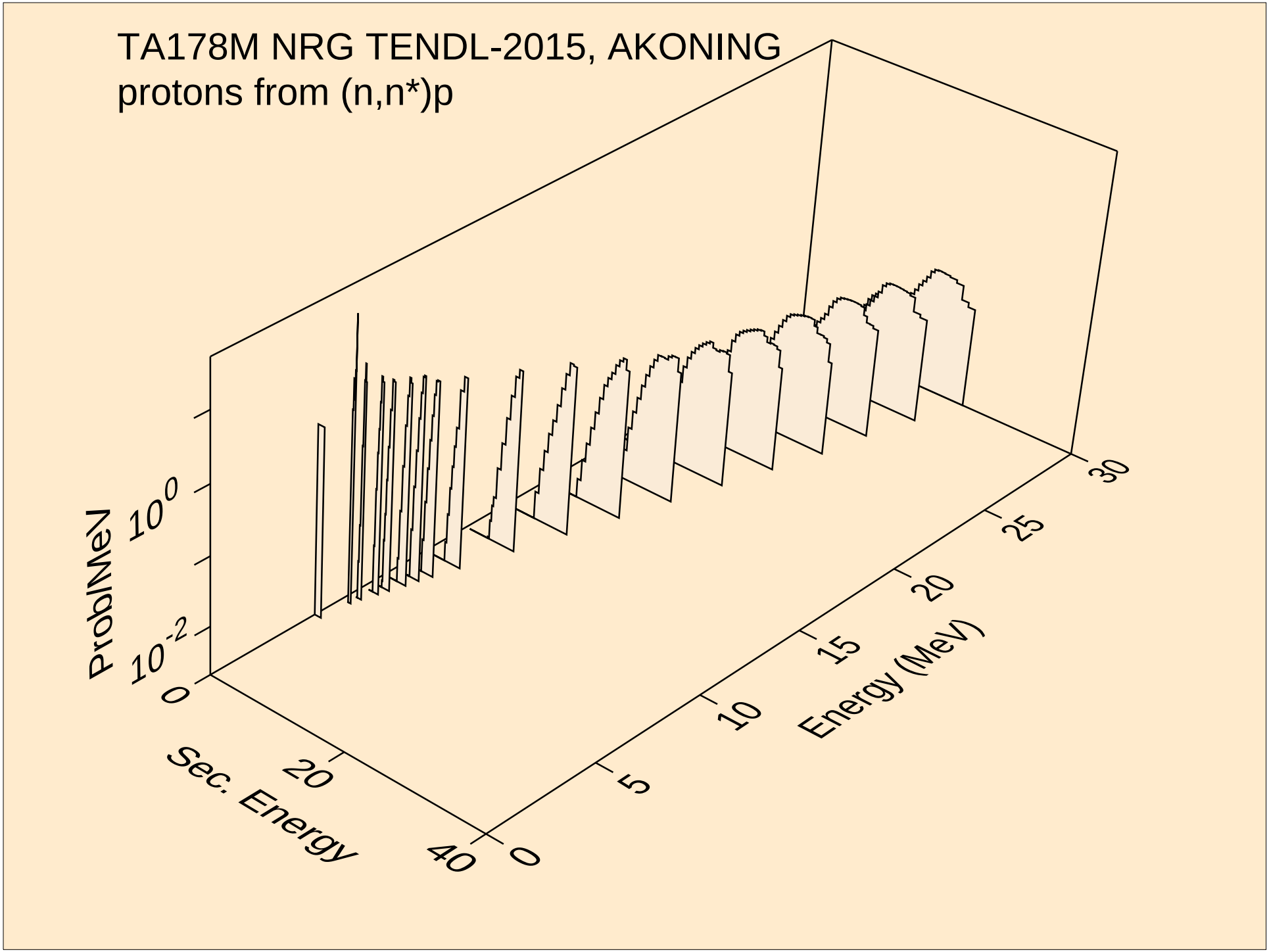

TA178M NRG TENDL-2015, AKONING
14 MeV photon spectrum
Gamma Prod (barns/MeV)
10^3
10^2
10^1
10^0
10^-1
10^-2
10^-3
0
10
20
30
Gamma Energy (MeV)

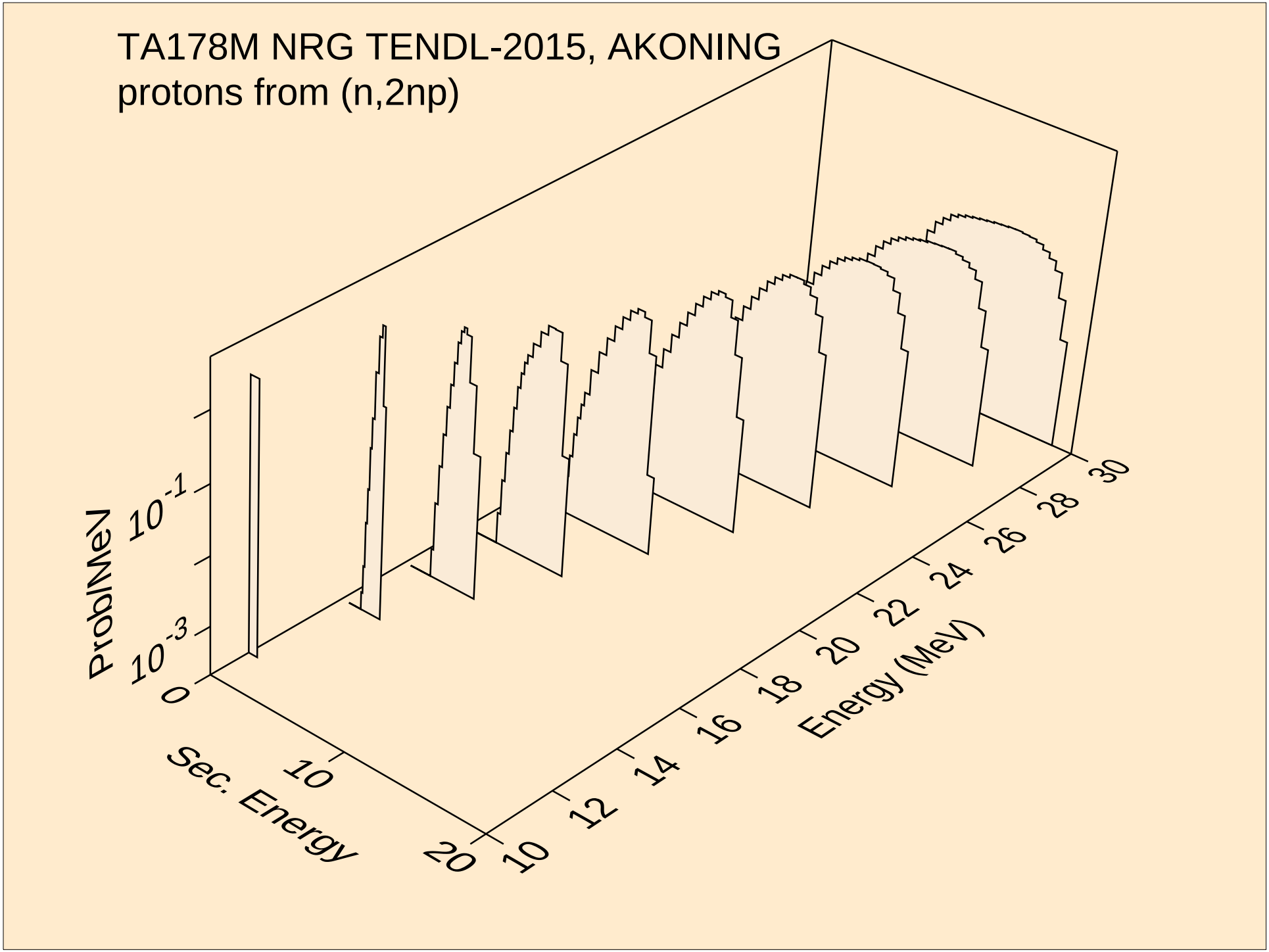

TA178M NRG TENDL-2015, AKONING
Particle heating contributions
protons
deuterons
tritons
he-3
alphas
MeV/collision
Energy (MeV)
0
5
10
15
20
25
0
50
100
150
200

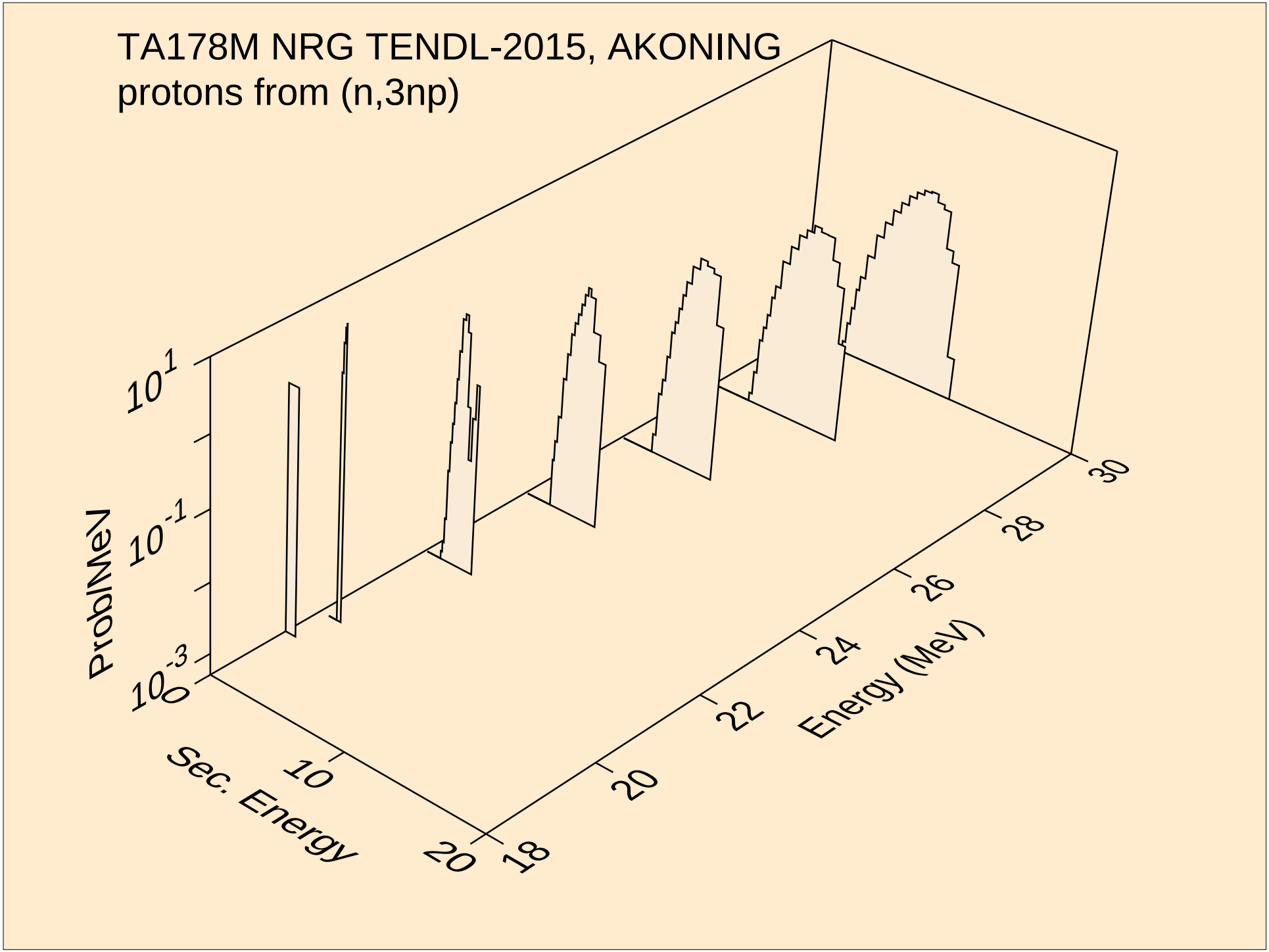

TA178M NRG TENDL-2015, AKONING
Recoil Heating
recoil heating
Heating (MeV/reaction)
30
20
10
0
-10
-20
-30
-40
-50
0
50
100
150
200
Energy (MeV)

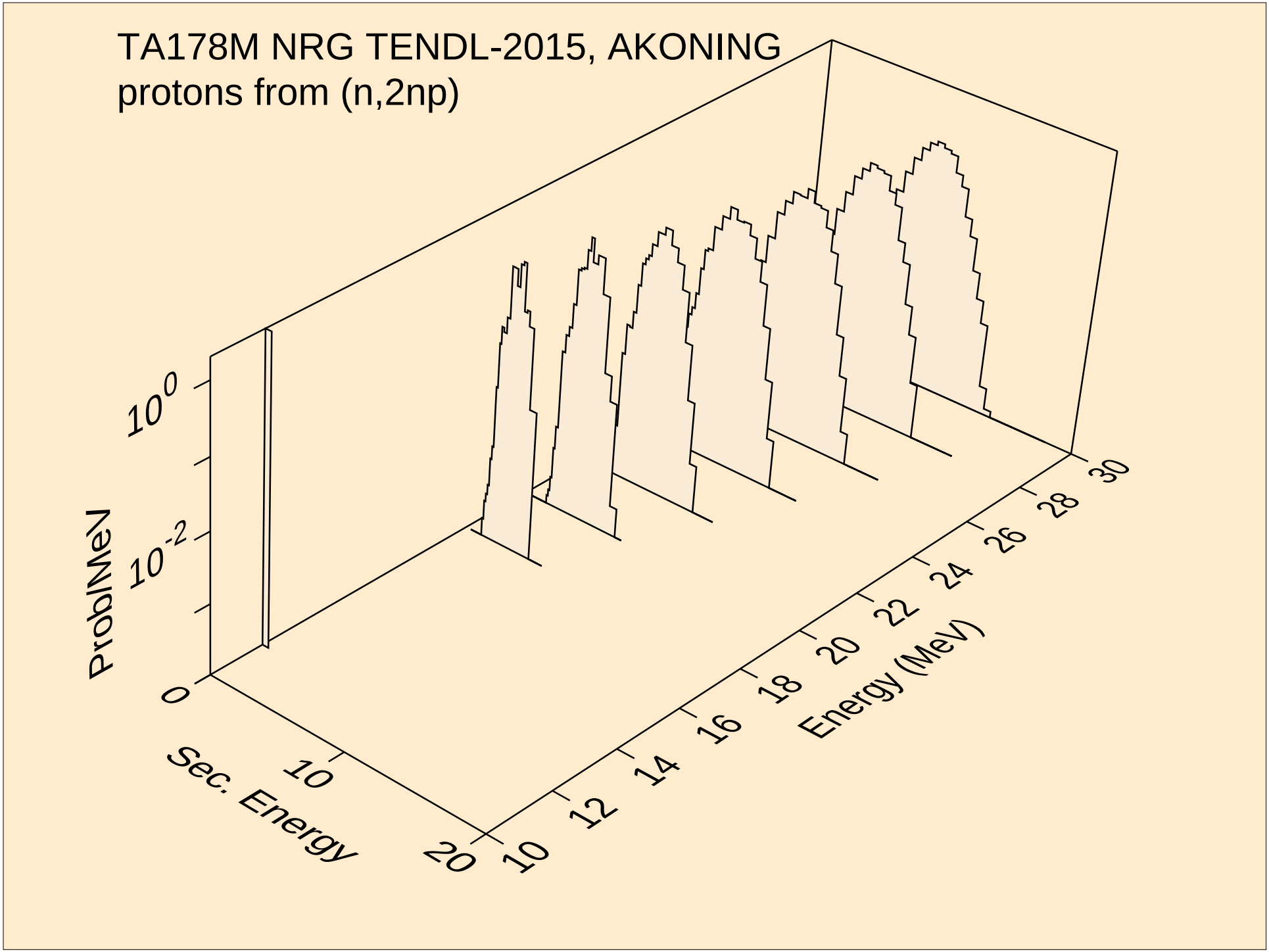

TA178M NRG TENDL-2015, AKONING
Particle production cross sections
Cross section (barns)
Energy (MeV)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
0
50
100
150
200
protons
deuterons
tritons
he-3
alphas

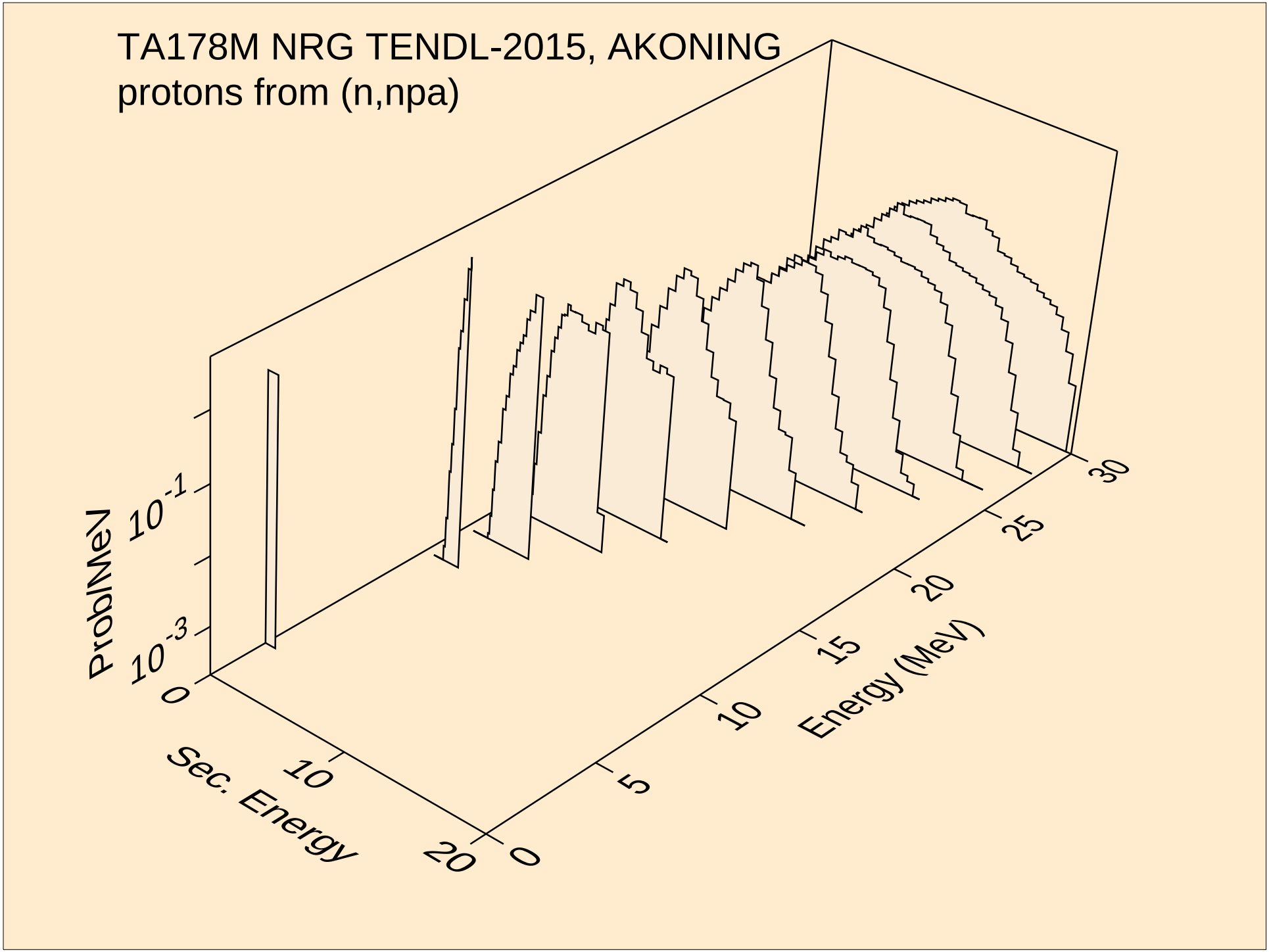

TA178M NRG TENDL-2015, AKONING
protons from (n,x)
Prob/MeV
10-1
10-3
10-5
0
100
200
Sec. Energy
0
50
100
150
200
Energy (MeV)

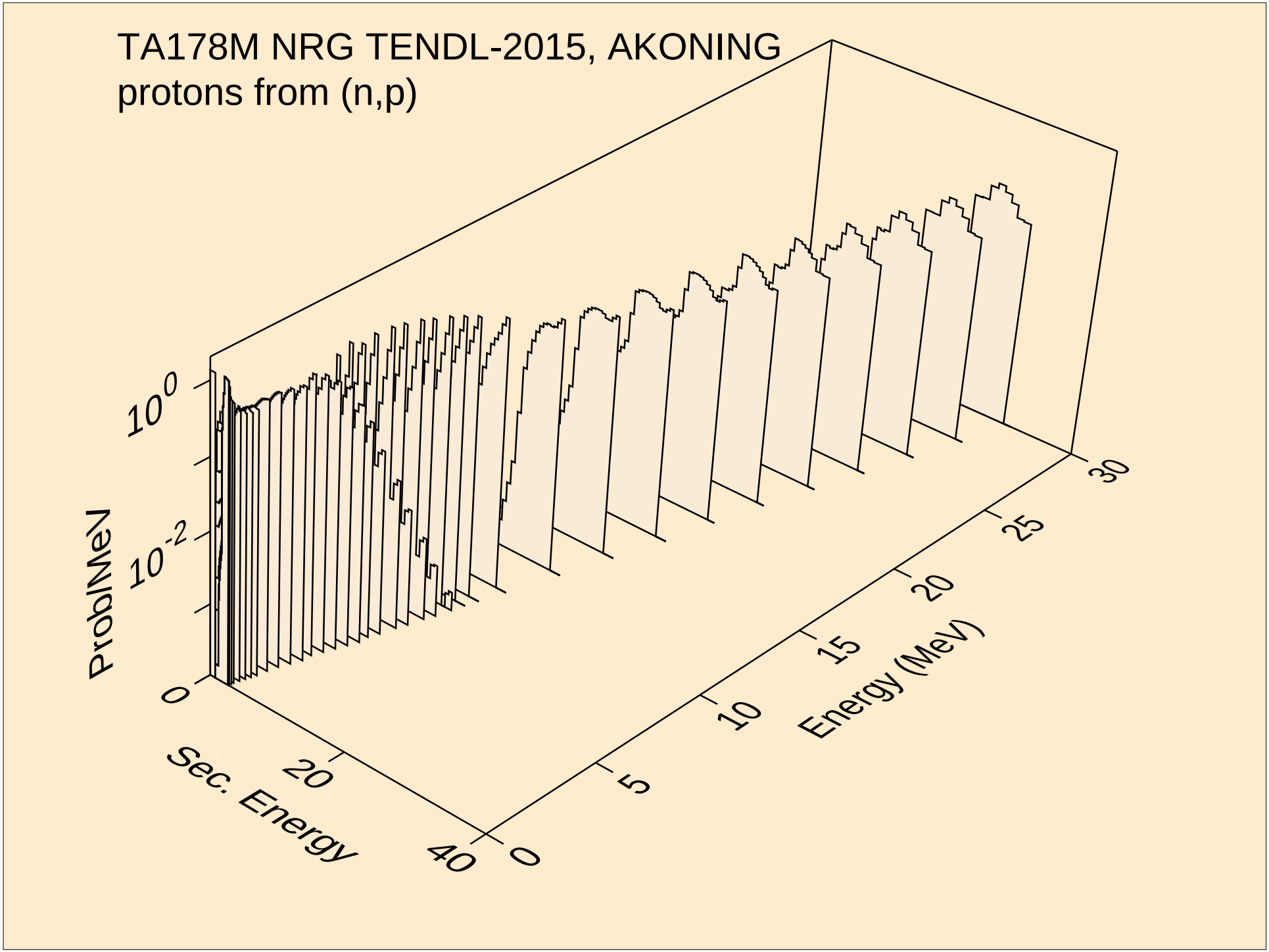

TA178M NRG TENDL-2015, AKONING
protons from (n,n*)p
Prob/MeV
10^0
10^-2
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

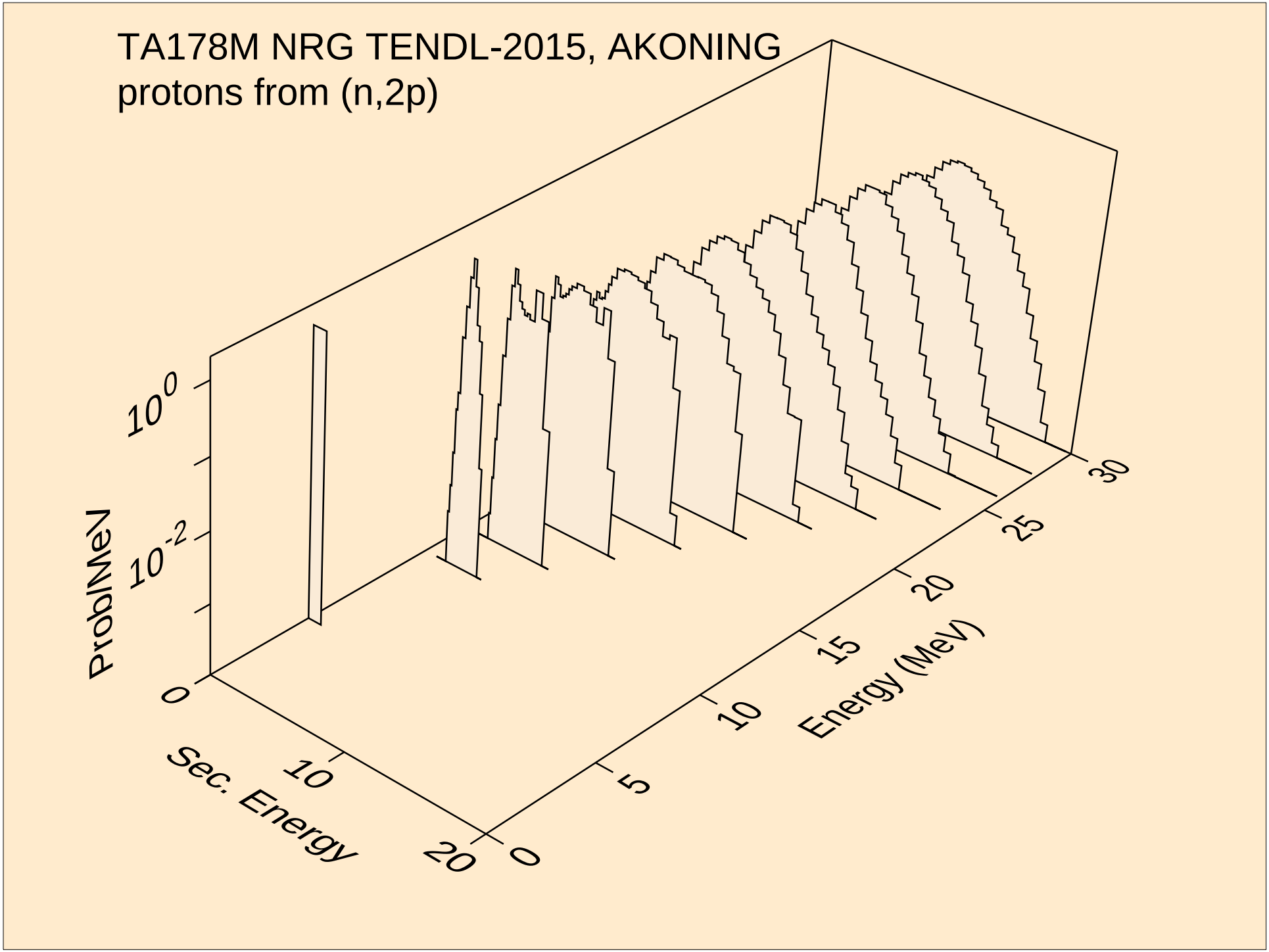

TA178M NRG TENDL-2015, AKONING
protons from (n,2np)
Prob/MeV
10-1
10-3
0
Sec. Energy
10
20
10
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

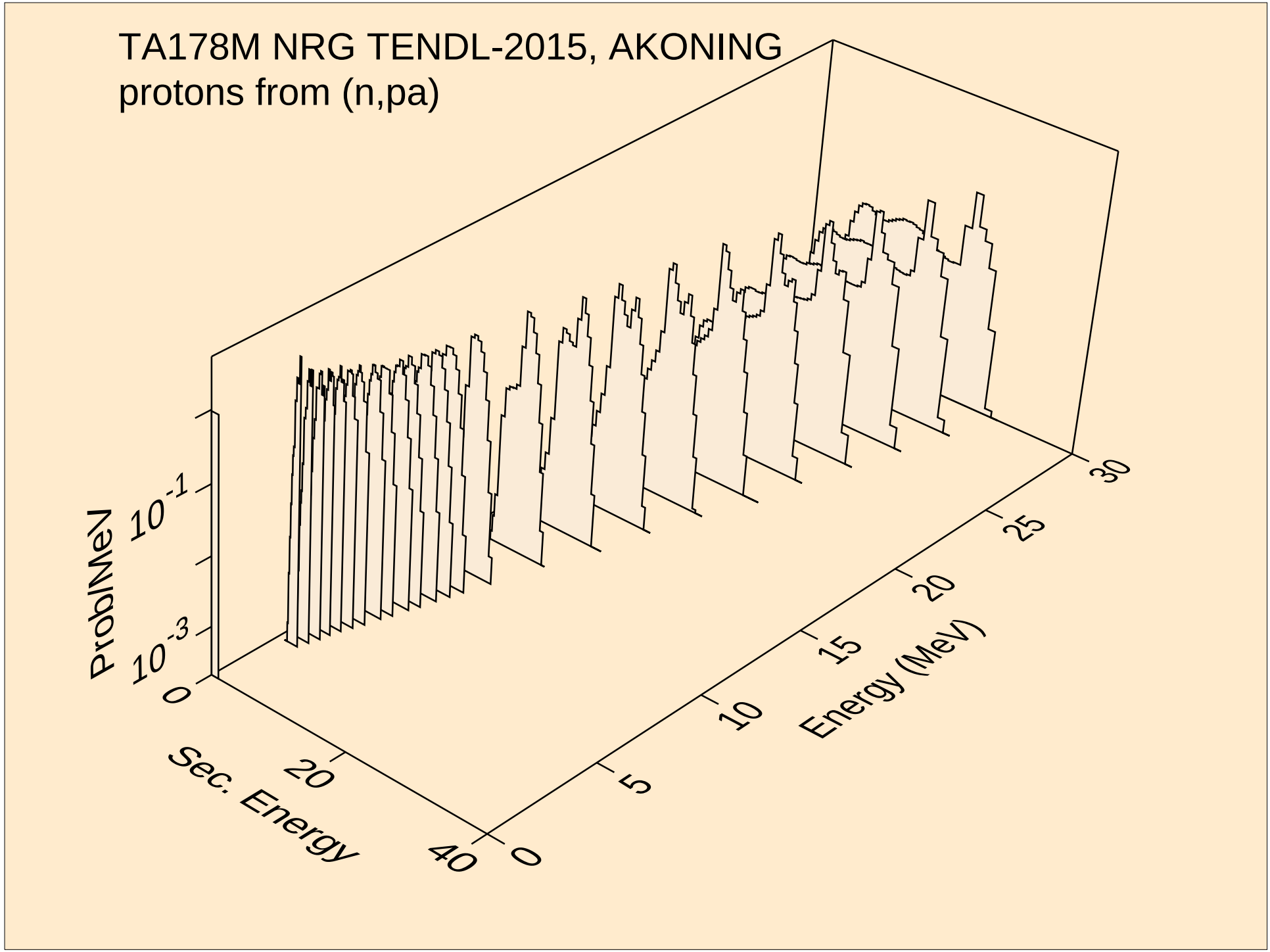

TA178M NRG TENDL-2015, AKONING
protons from (n,3np)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
10
20
Sec. Energy
18
20
22
24
26
28
30
Energy (MeV)

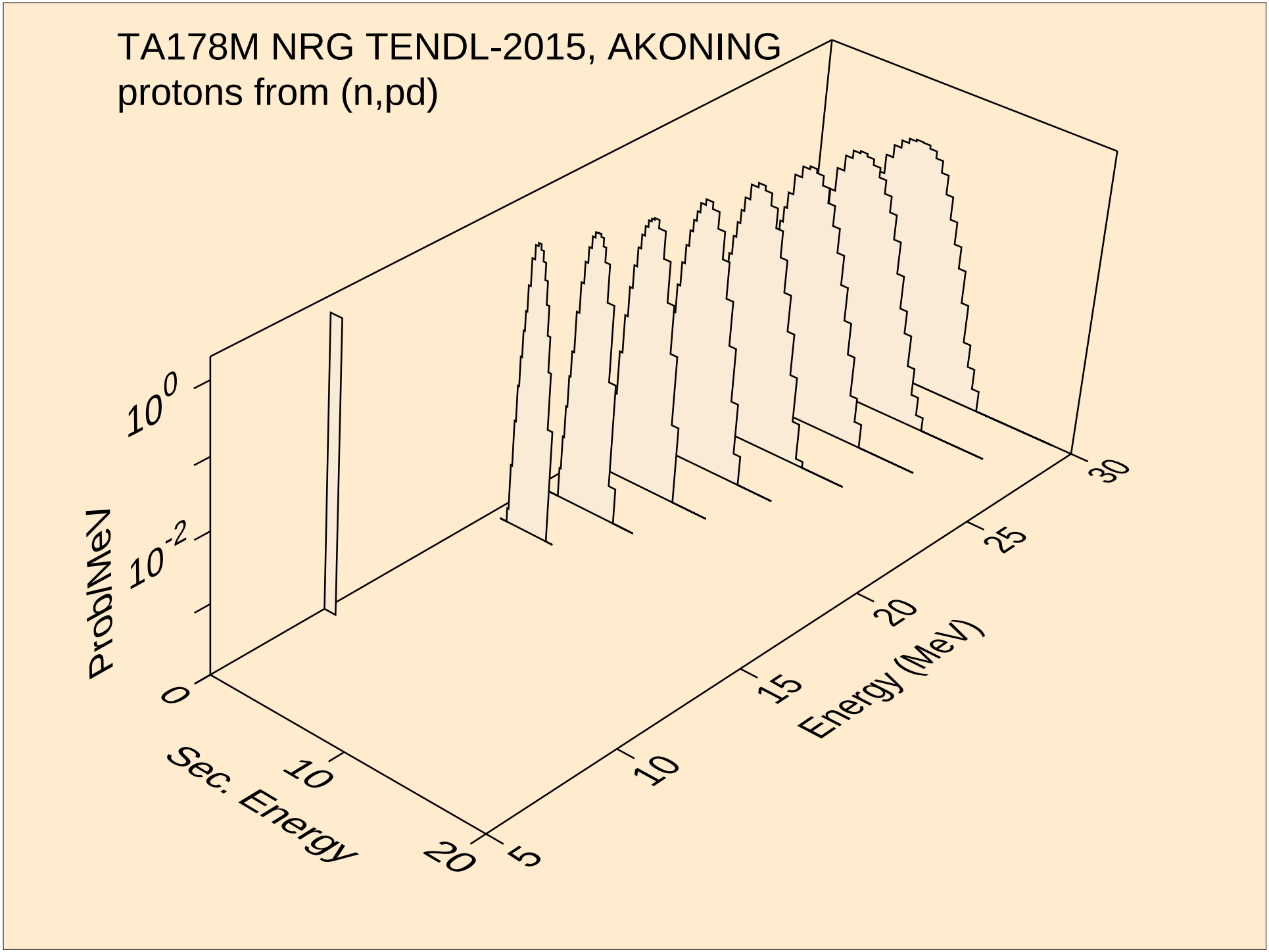

TA178M NRG TENDL-2015, AKONING
protons from (n,2np)
Prob/MeV
10^{0}
10^{-2}
0
Sec. Energy
10
20
10
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

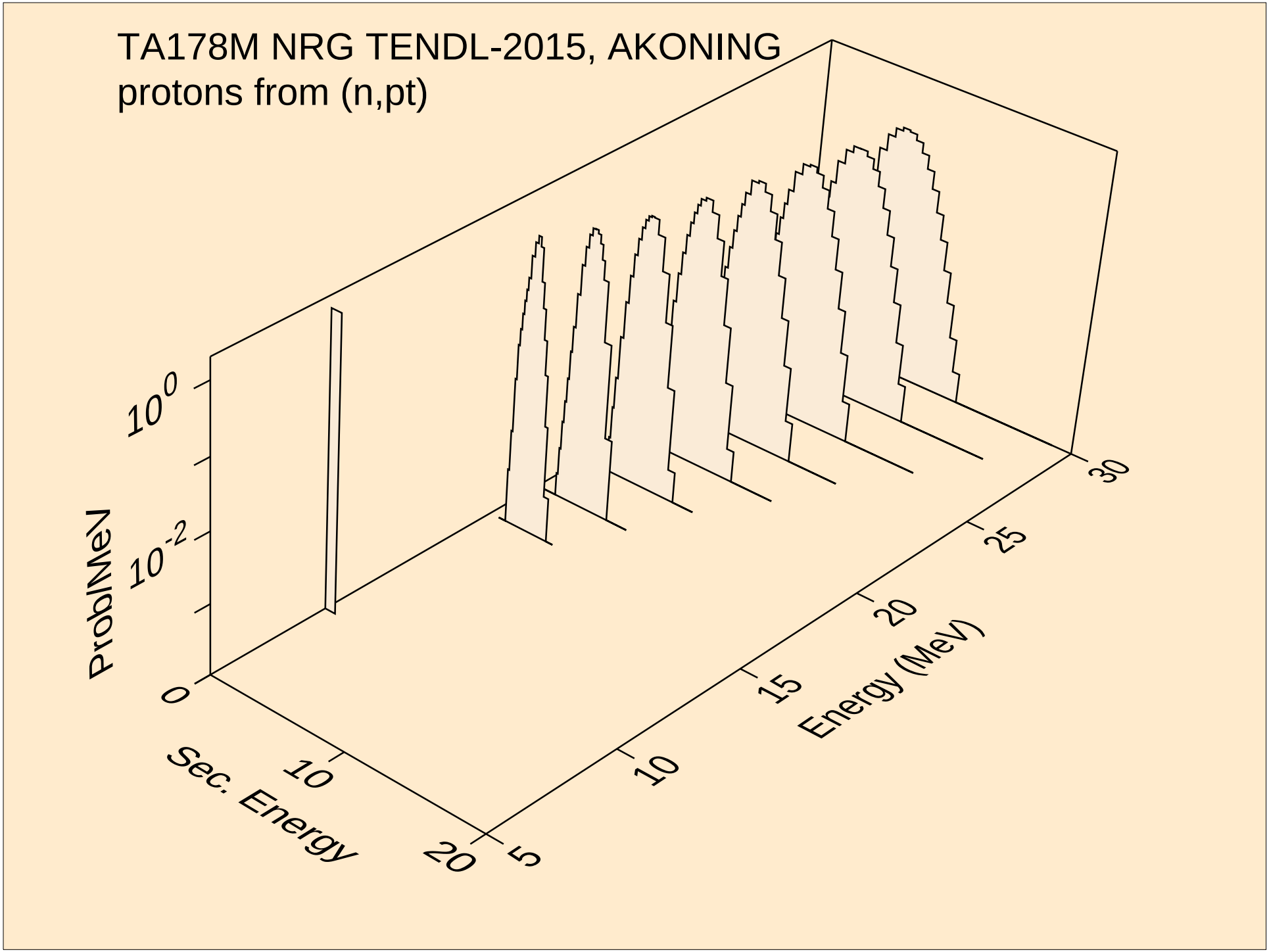

TA178M NRG TENDL-2015, AKONING
protons from (n,npa)
Prob/MeV
10-1
10-3
0
Sec. Energy
10
20
0
5
10
15
20
25
30
Energy (MeV)

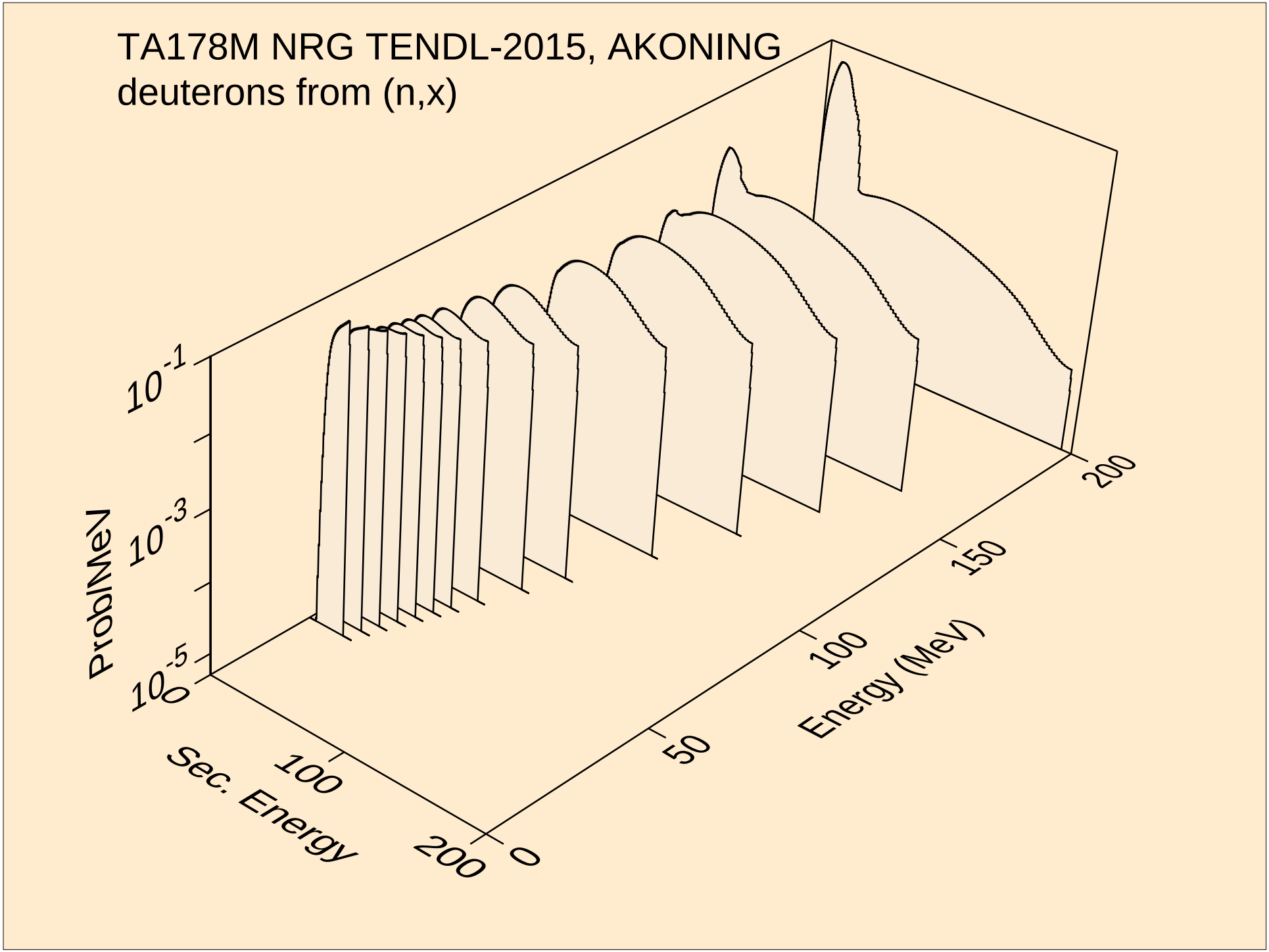

TA178M NRG TENDL-2015, AKONING
protons from (n,p)
Prob/MeV
10^{0}
10^{-2}
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

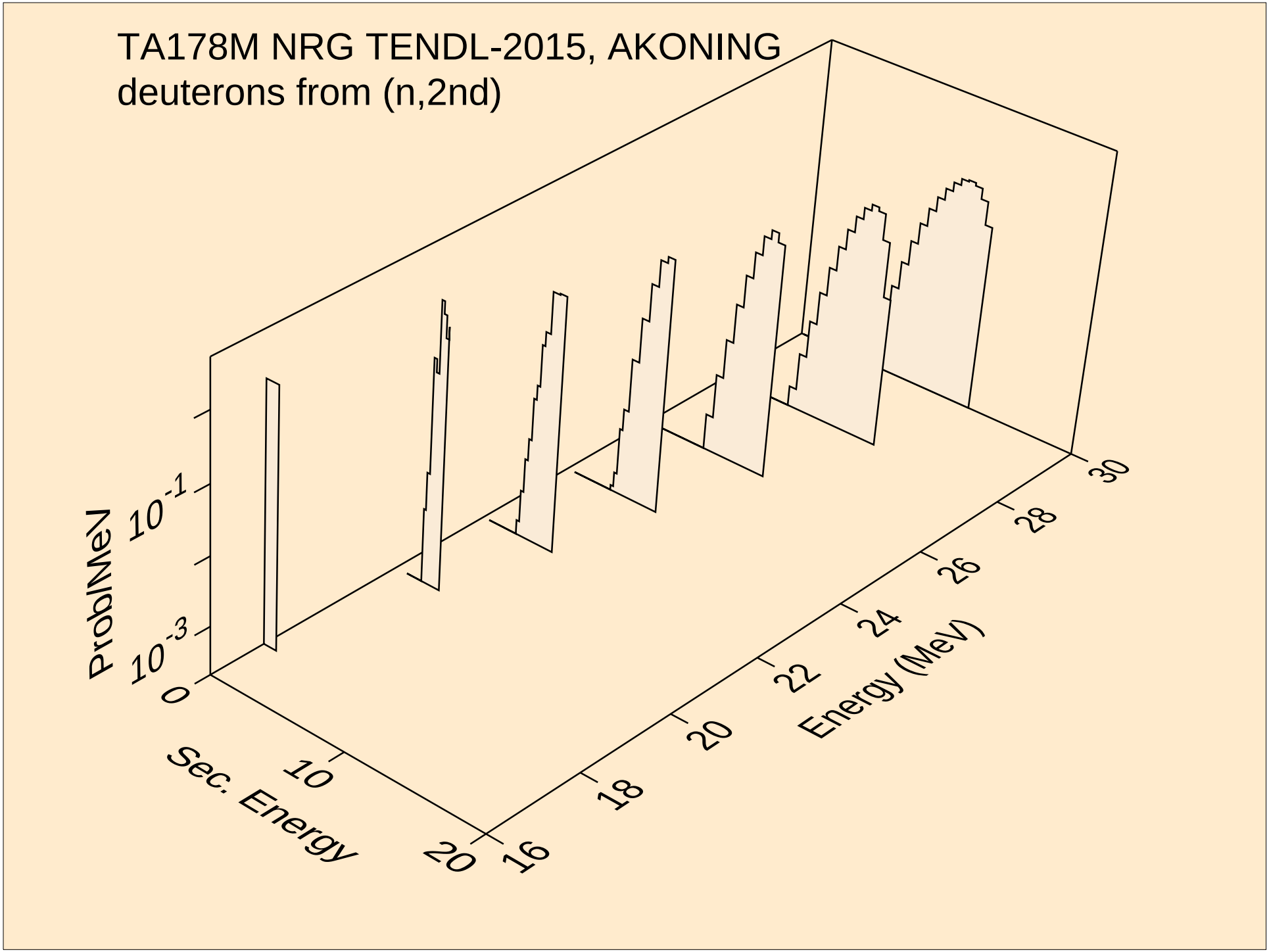

TA178M NRG TENDL-2015, AKONING
protons from (n,2p)
Prob/MeV
10^{0}
10^{-2}
0
10
Sec. Energy
20
0
5
10
15
20
25
30
Energy (MeV)

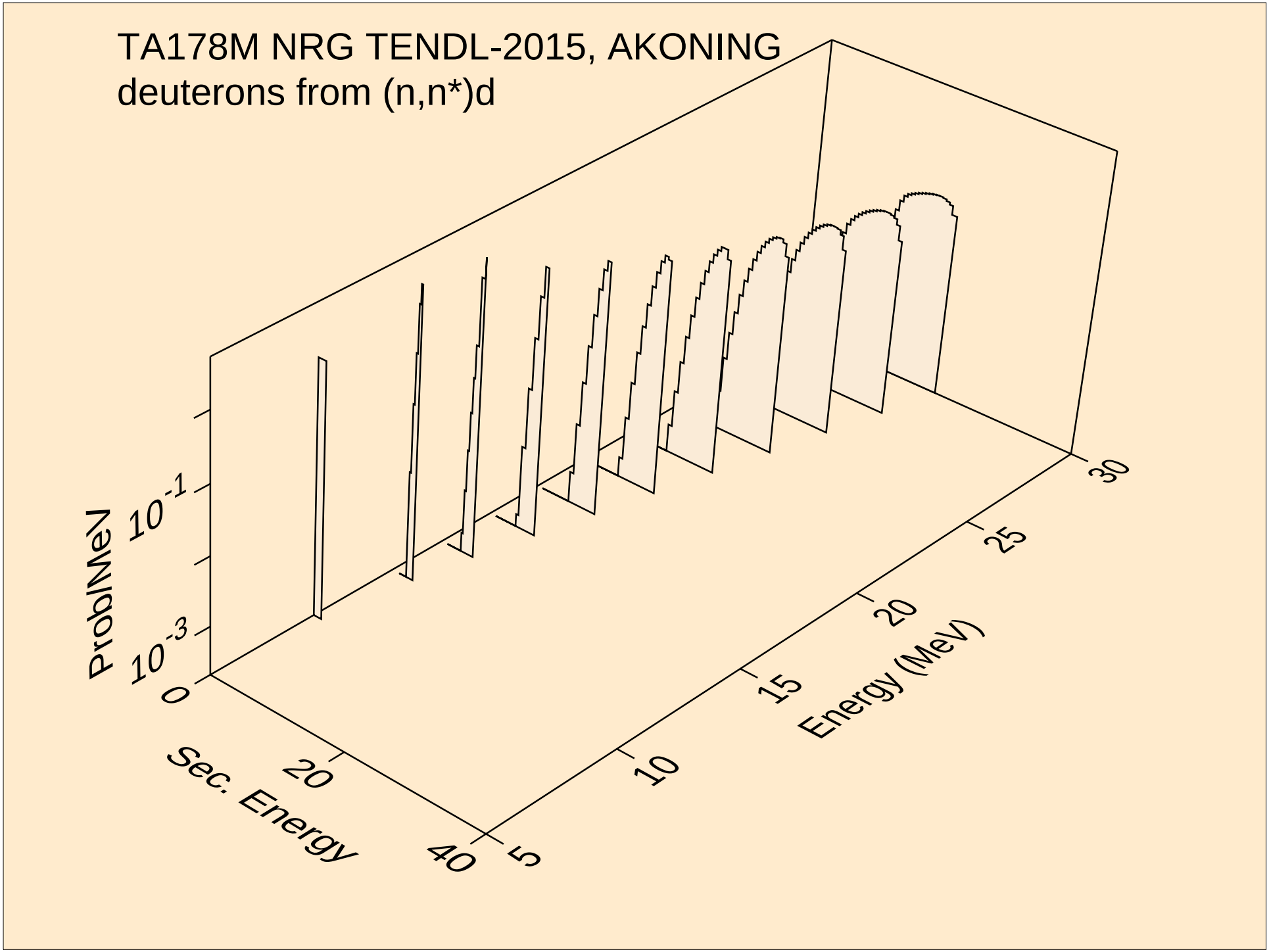

TA178M NRG TENDL-2015, AKONING
protons from (n,pa)
Prob/MeV
10-1
10-3
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

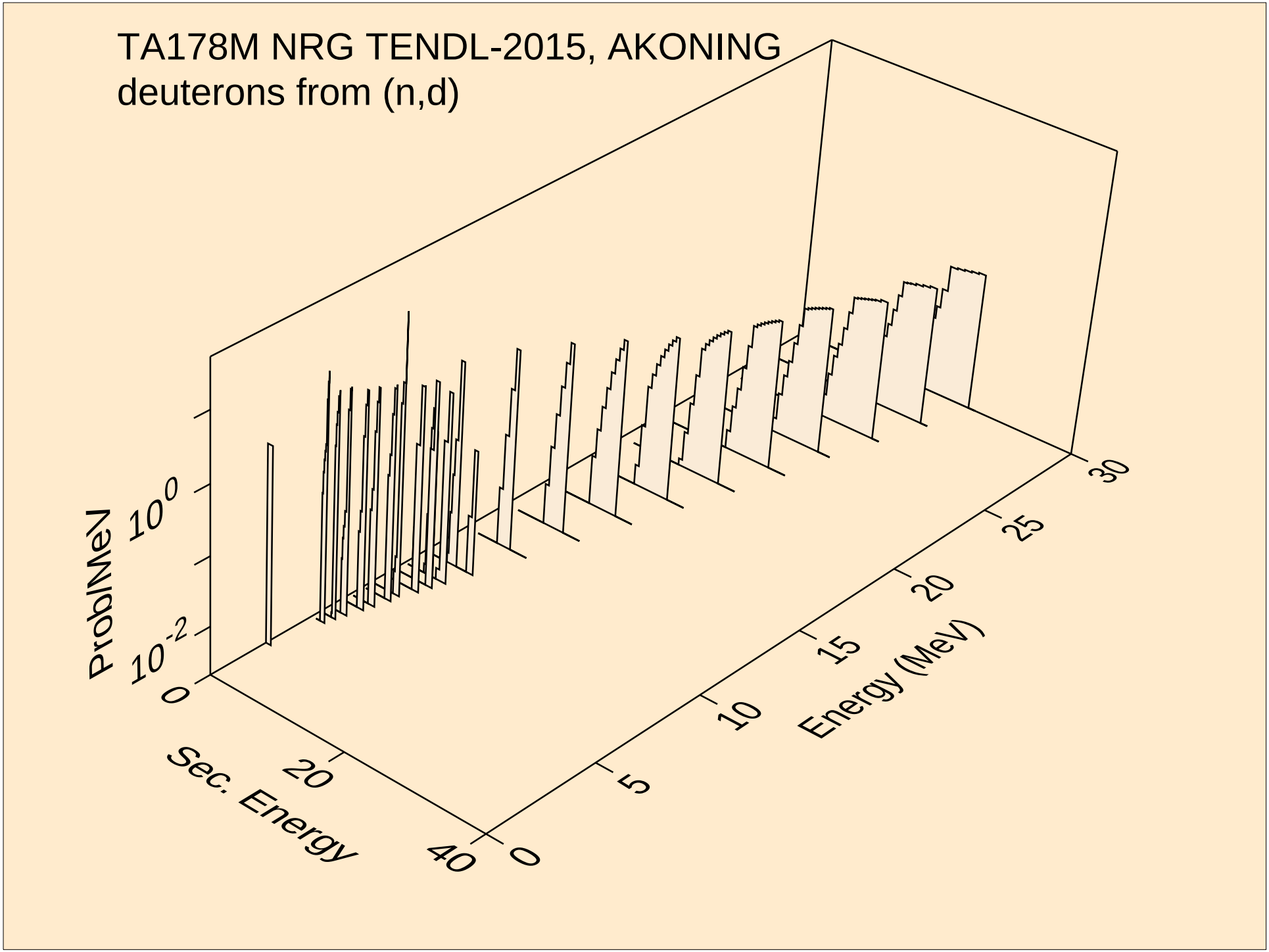

TA178M NRG TENDL-2015, AKONING
protons from (n,pd)
Prob/MeV
10^{0}
10^{-2}
0
Sec. Energy
10
20
5
10
15
20
25
30
Energy (MeV)

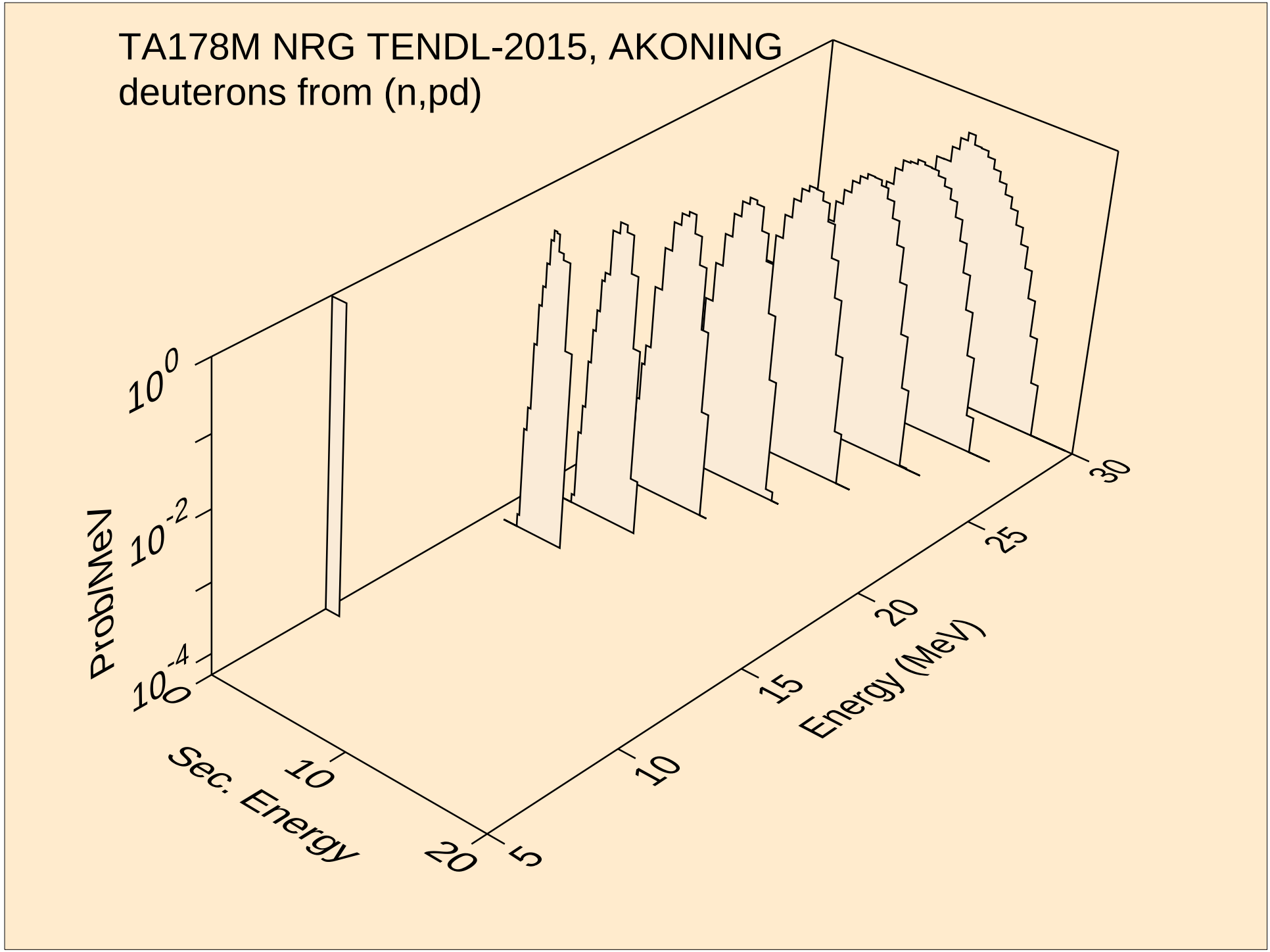

TA178M NRG TENDL-2015, AKONING
protons from (n,pt)
Prob/MeV
10^{0}
10^{-2}
0
Sec. Energy
10
20
5
10
15
20
25
30
Energy (MeV)

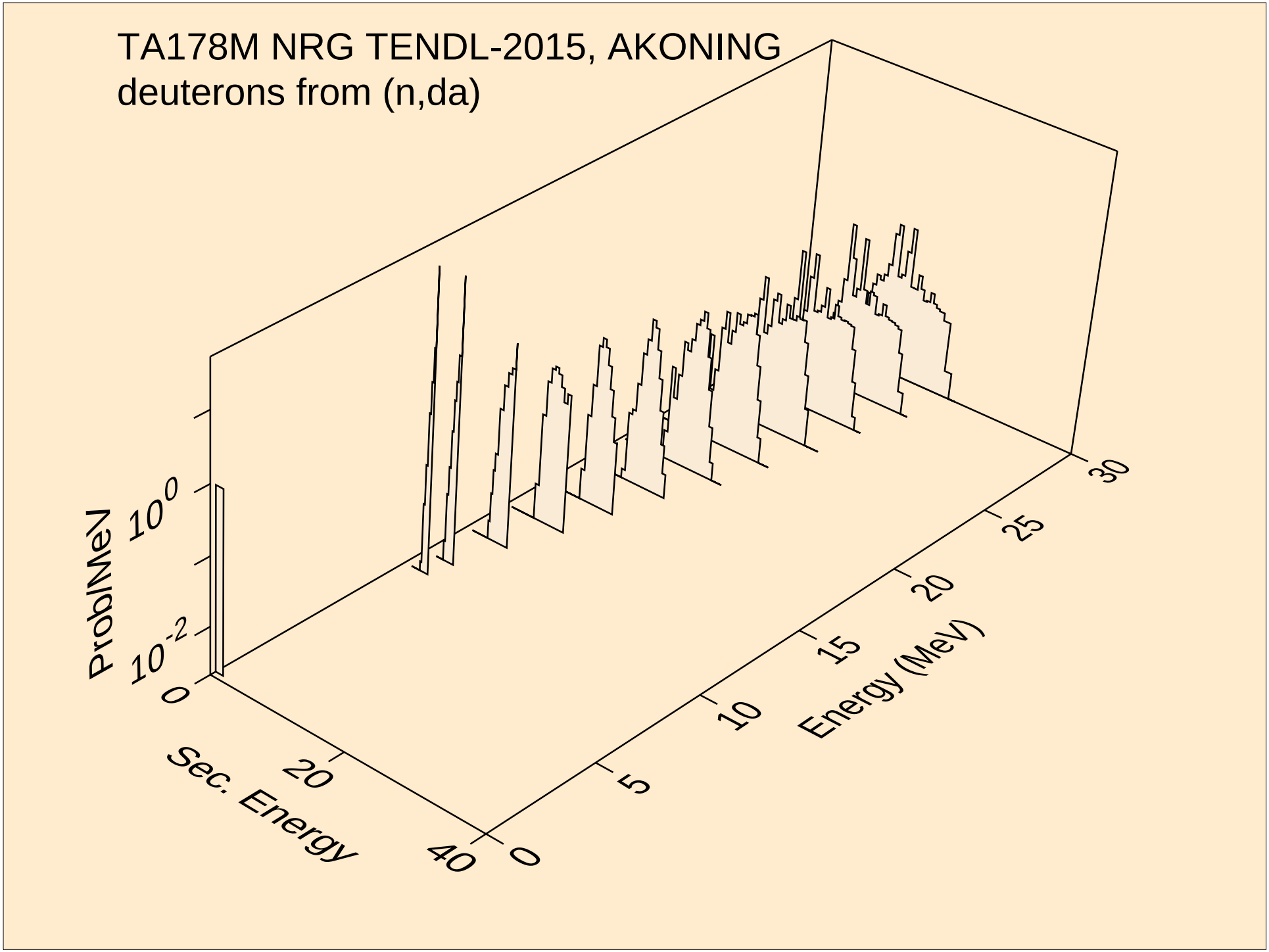

TA178M NRG TENDL-2015, AKONING
deuterons from (n,x)
Prob/MeV
10-1
10-3
10-5
0
100
200
Sec. Energy
0
50
100
150
200
Energy (MeV)

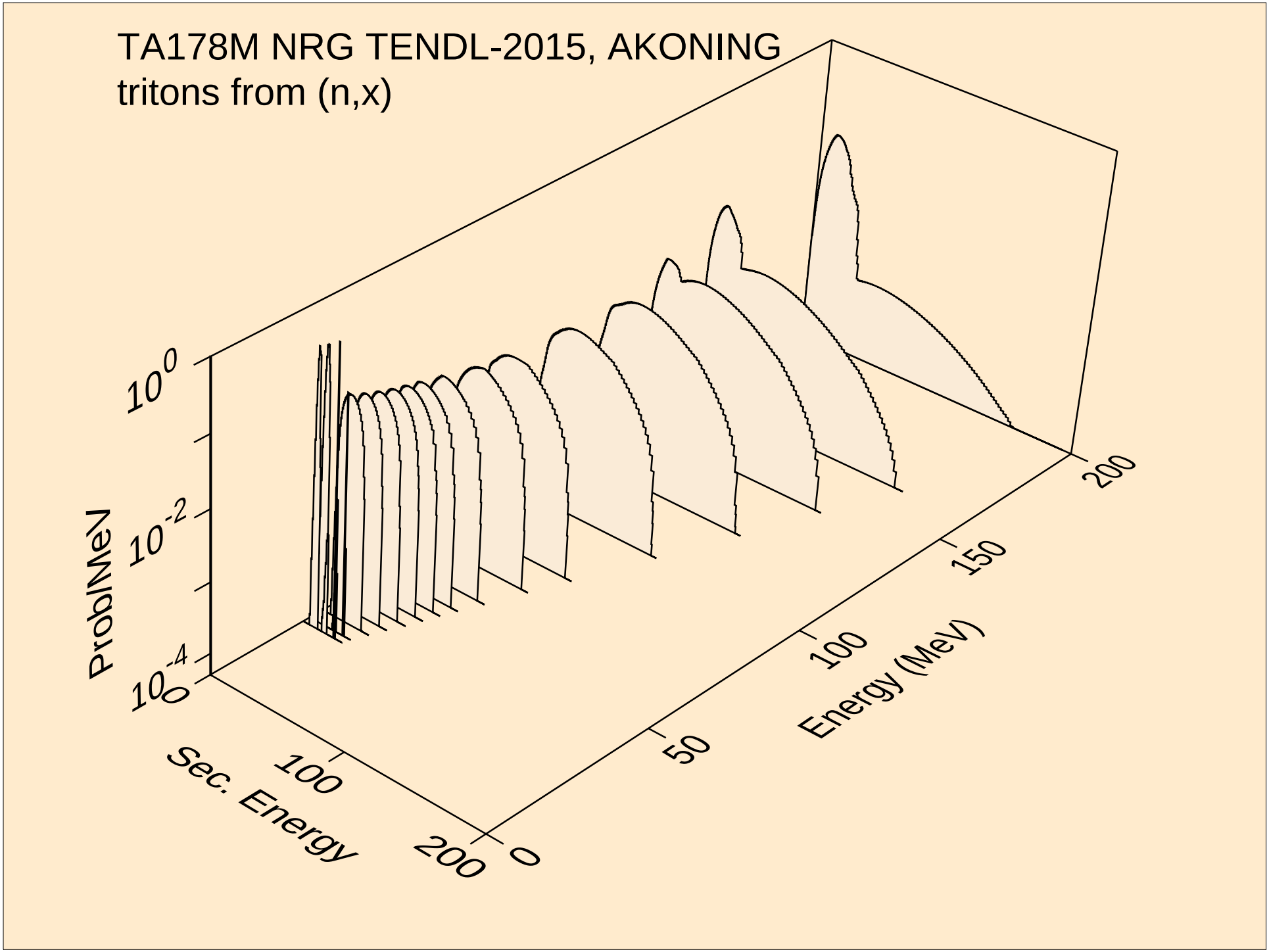

TA178M NRG TENDL-2015, AKONING
deuterons from (n,2nd)
Prob/MeV
10-1
10-3
0
Sec. Energy
10
20
16
18
20
22
24
26
28
30
Energy (MeV)

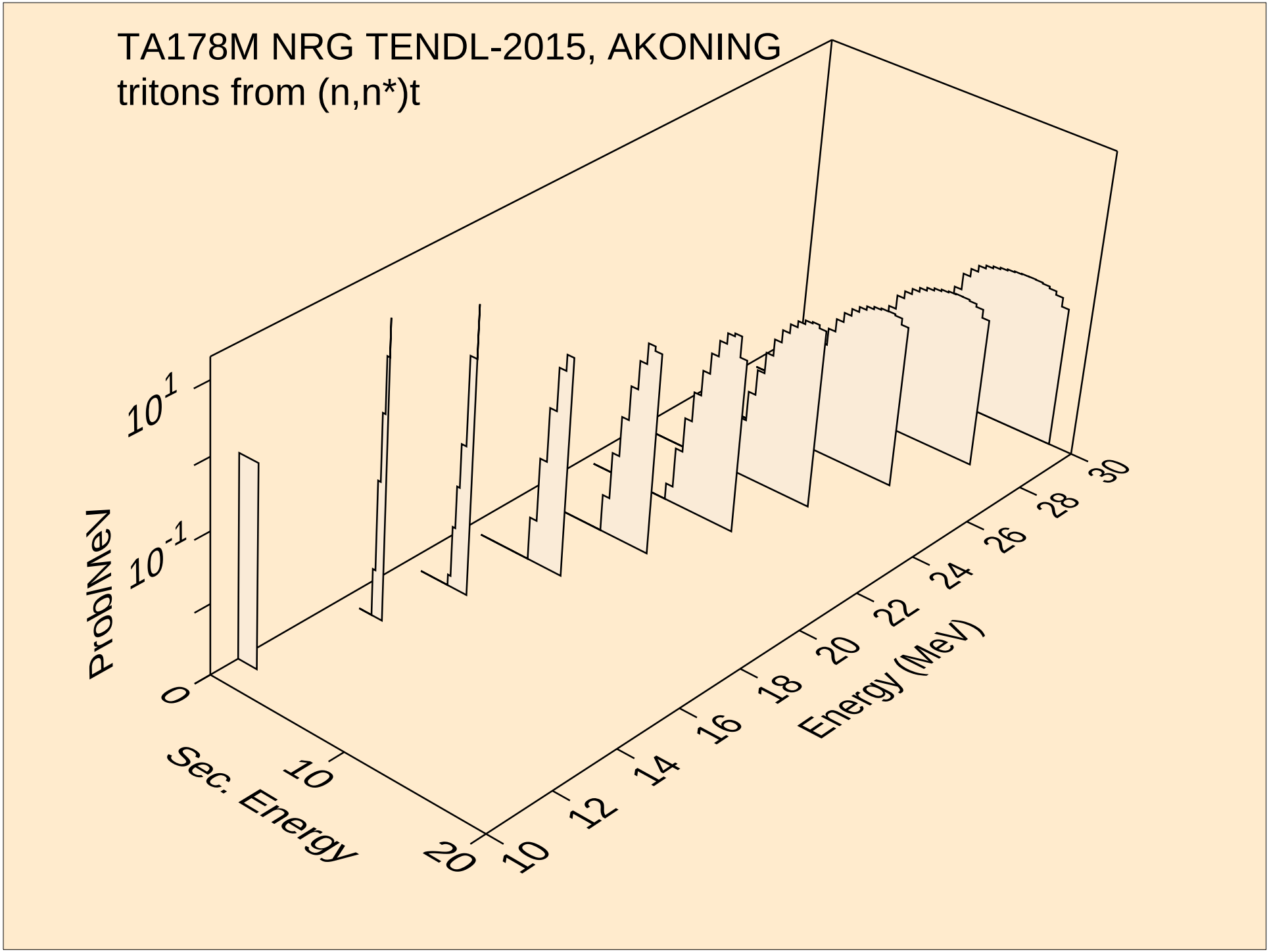

TA178M NRG TENDL-2015, AKONING
deuterons from (n,n*)d
Prob/MeV
10-1
10-3
0
Sec. Energy
20
40
5
10
15
20
25
30
Energy (MeV)

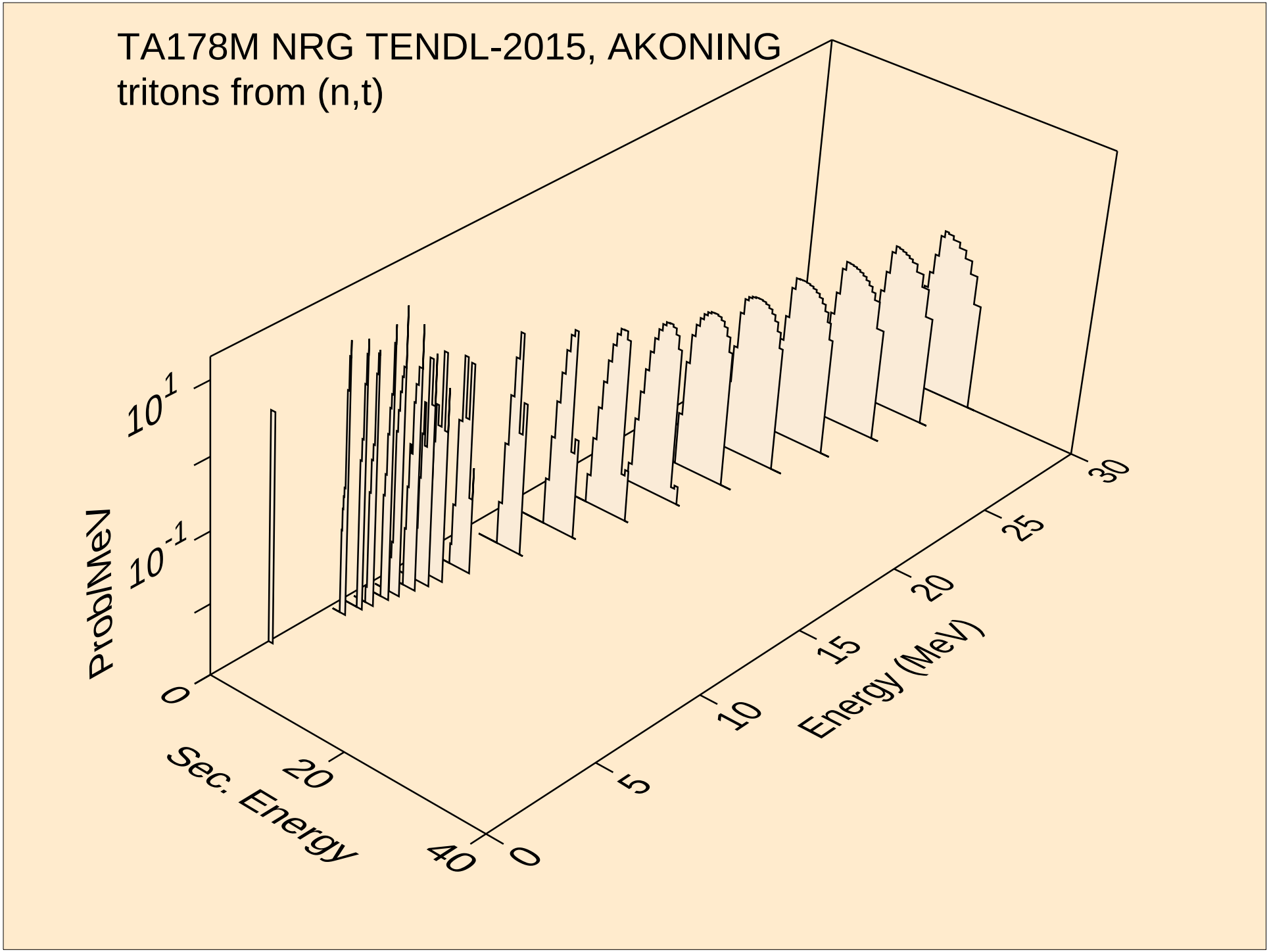

TA178M NRG TENDL-2015, AKONING
deuterons from (n,d)
Prob/MeV
10^0
10^-2
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

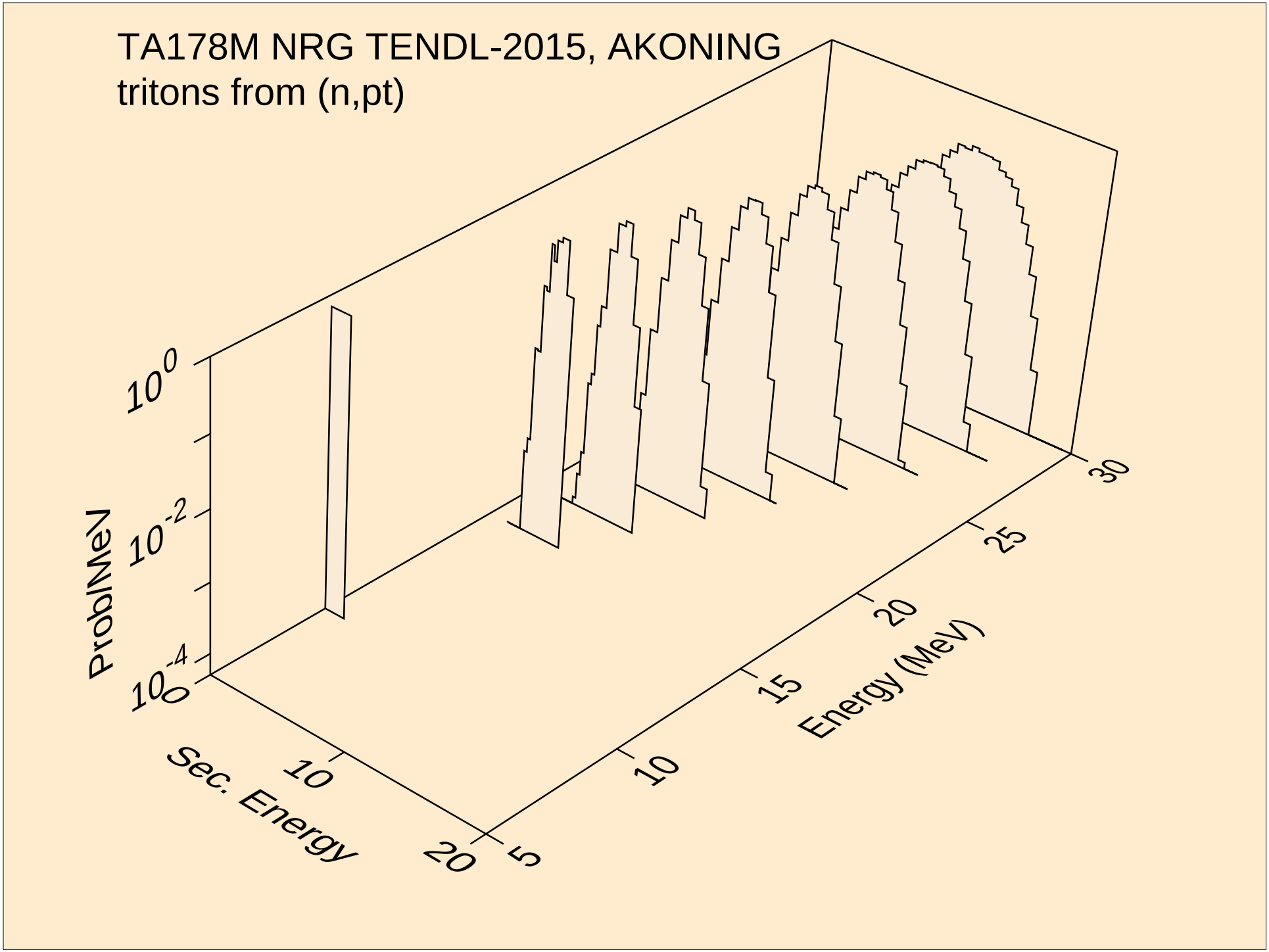

TA178M NRG TENDL-2015, AKONING
deuterons from (n,pd)
Prob/MeV
10^0
10^-2
10^-4
0
Sec. Energy
10
20
5
10
15
20
25
30
Energy (MeV)

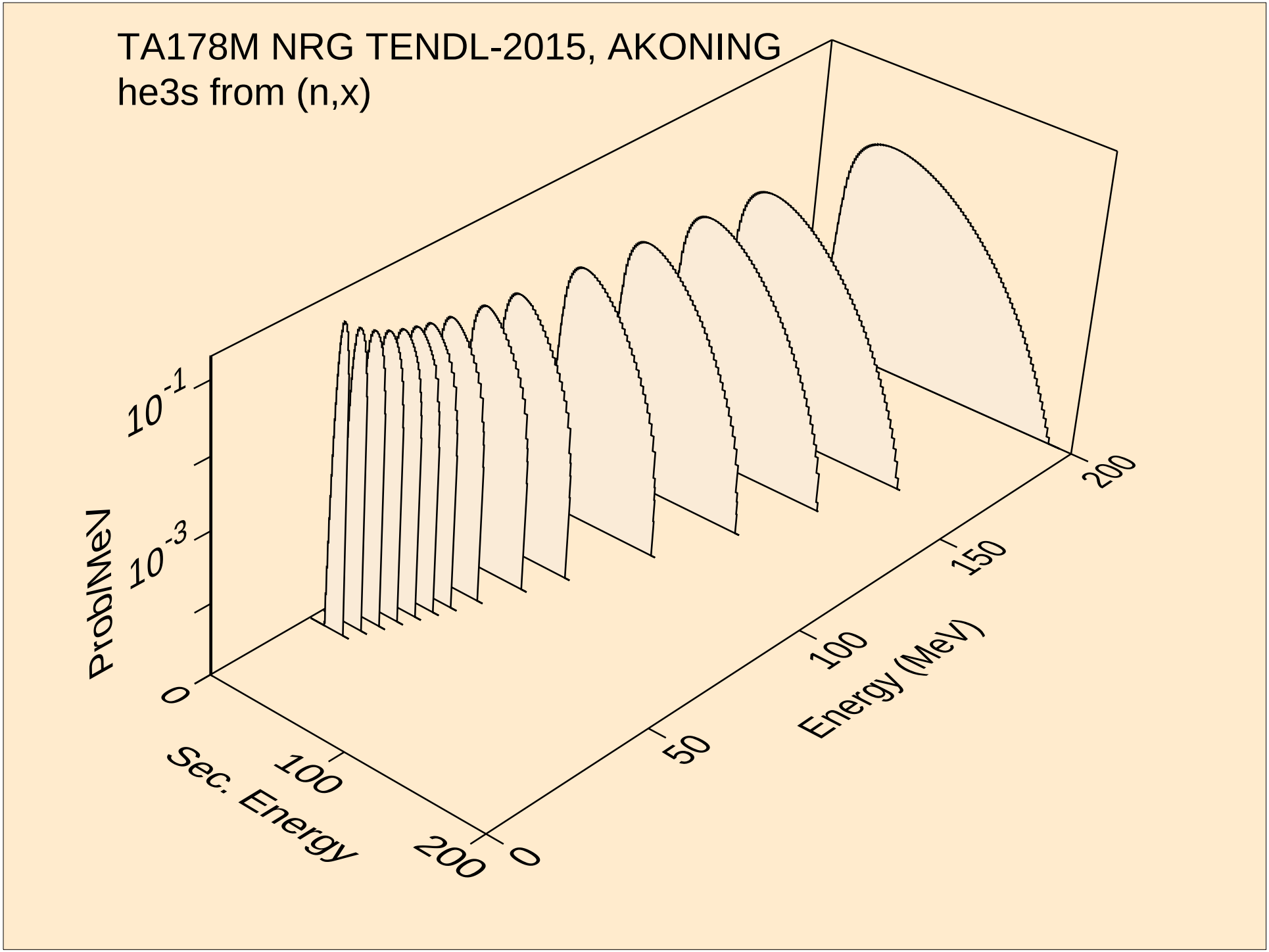

TA178M NRG TENDL-2015, AKONING
deuterons from (n,da)
Prob/MeV
10^{0}
10^{-2}
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

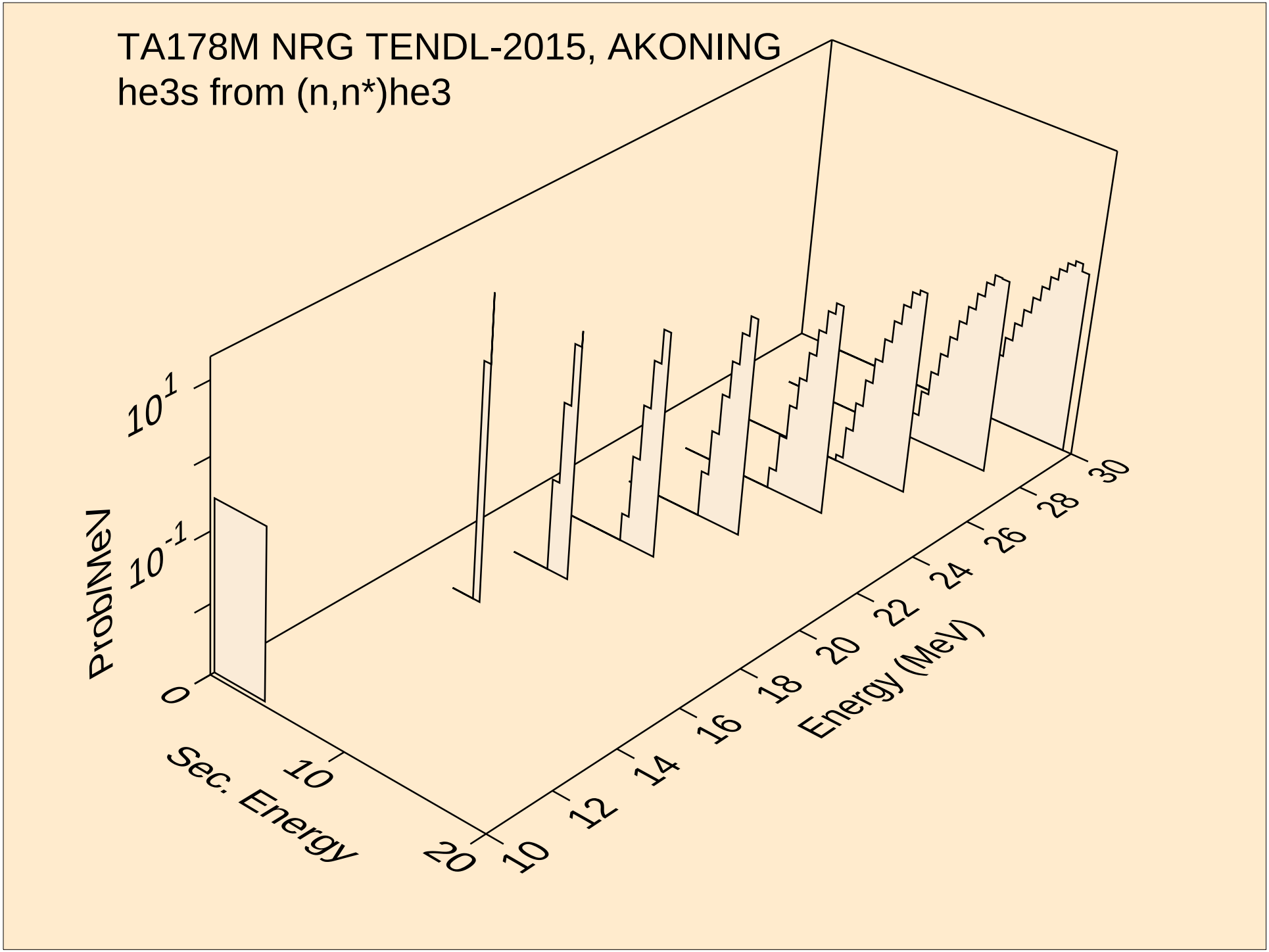

TA178M NRG TENDL-2015, AKONING
tritons from (n,x)
Prob/MeV
10^0
10^-2
10^-4
0
100
200
Sec. Energy
0
50
100
150
200
Energy (MeV)

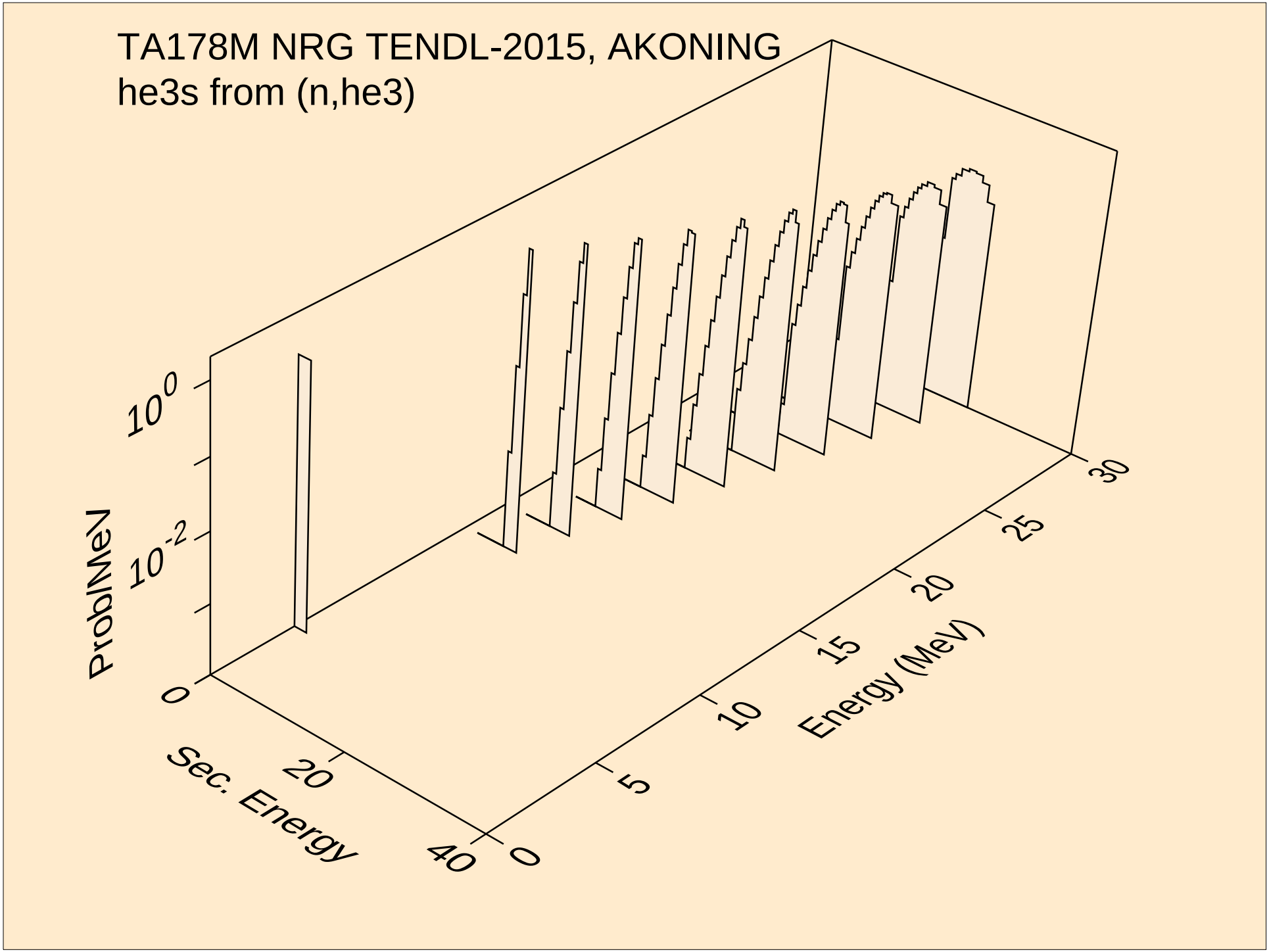

TA178M NRG TENDL-2015, AKONING
tritons from (n,n*)t
Prob/MeV
10^1
10^-1
0
Sec. Energy
10
20
10
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

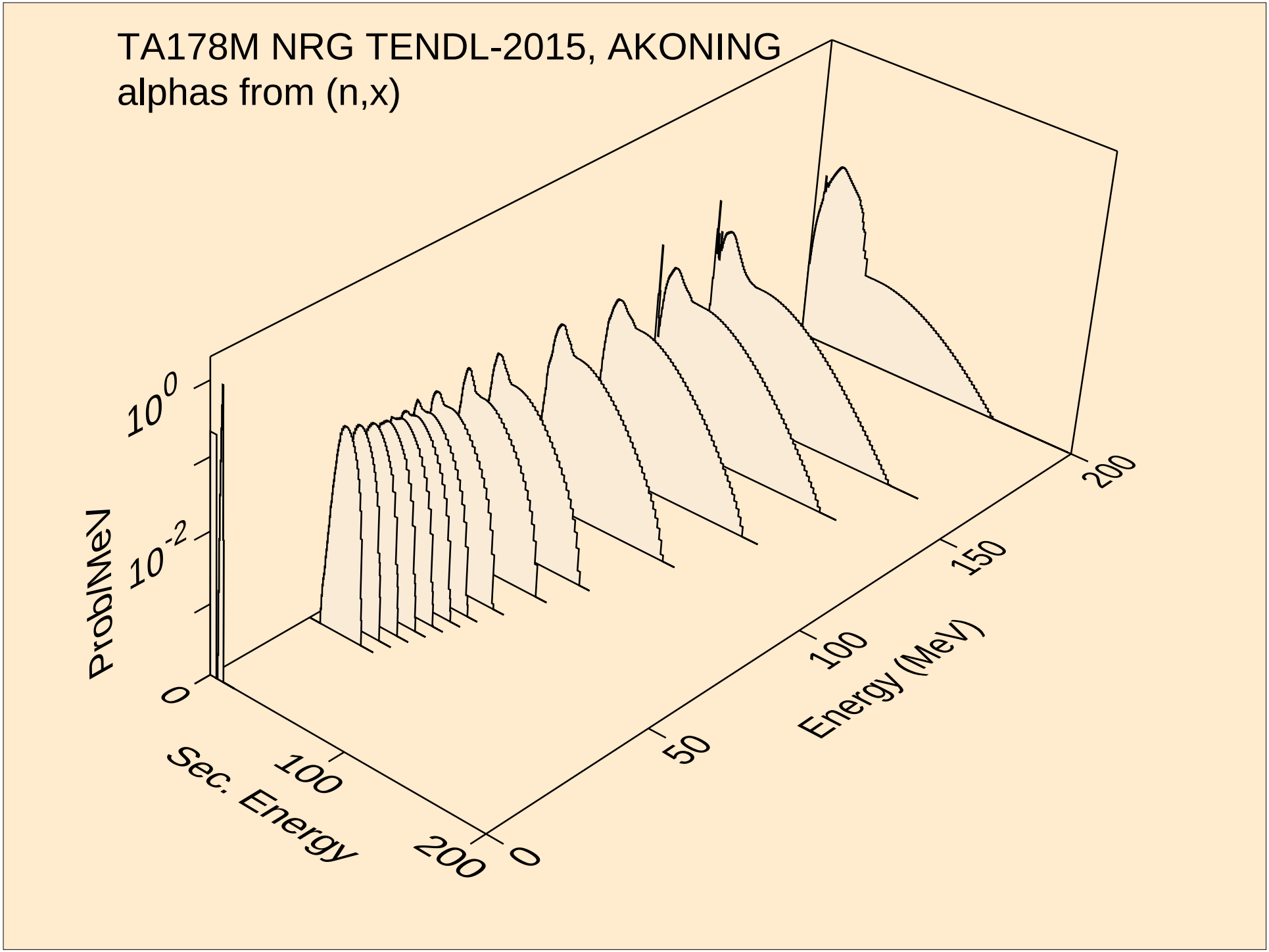

TA178M NRG TENDL-2015, AKONING
tritons from (n,t)
Prob/MeV
10^1
10^-1
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

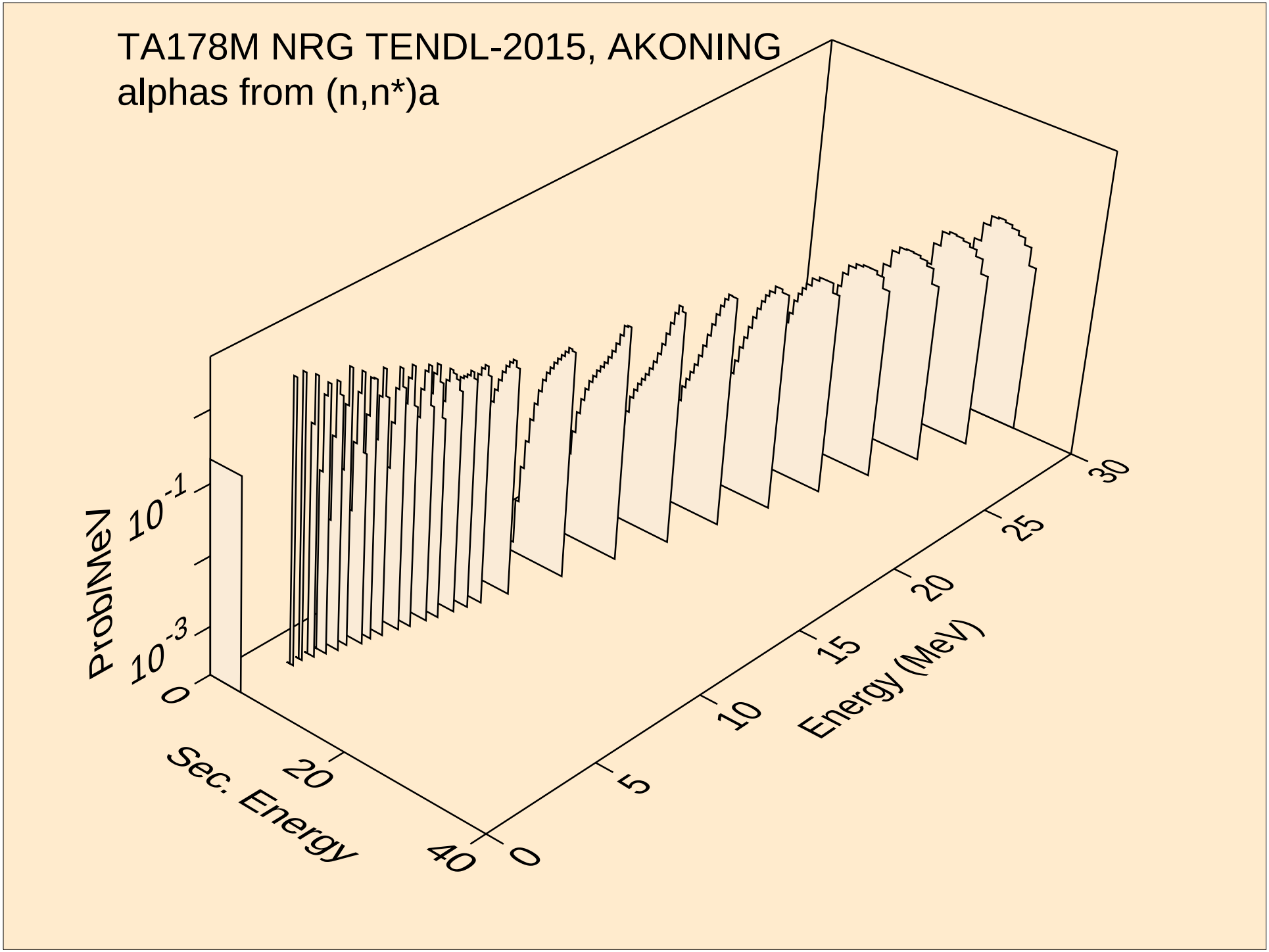

TA178M NRG TENDL-2015, AKONING
tritons from (n,pt)
Prob/MeV
10^0
10^-2
10^-4
0
Sec. Energy
10
20
5
10
15
20
25
30
Energy (MeV)

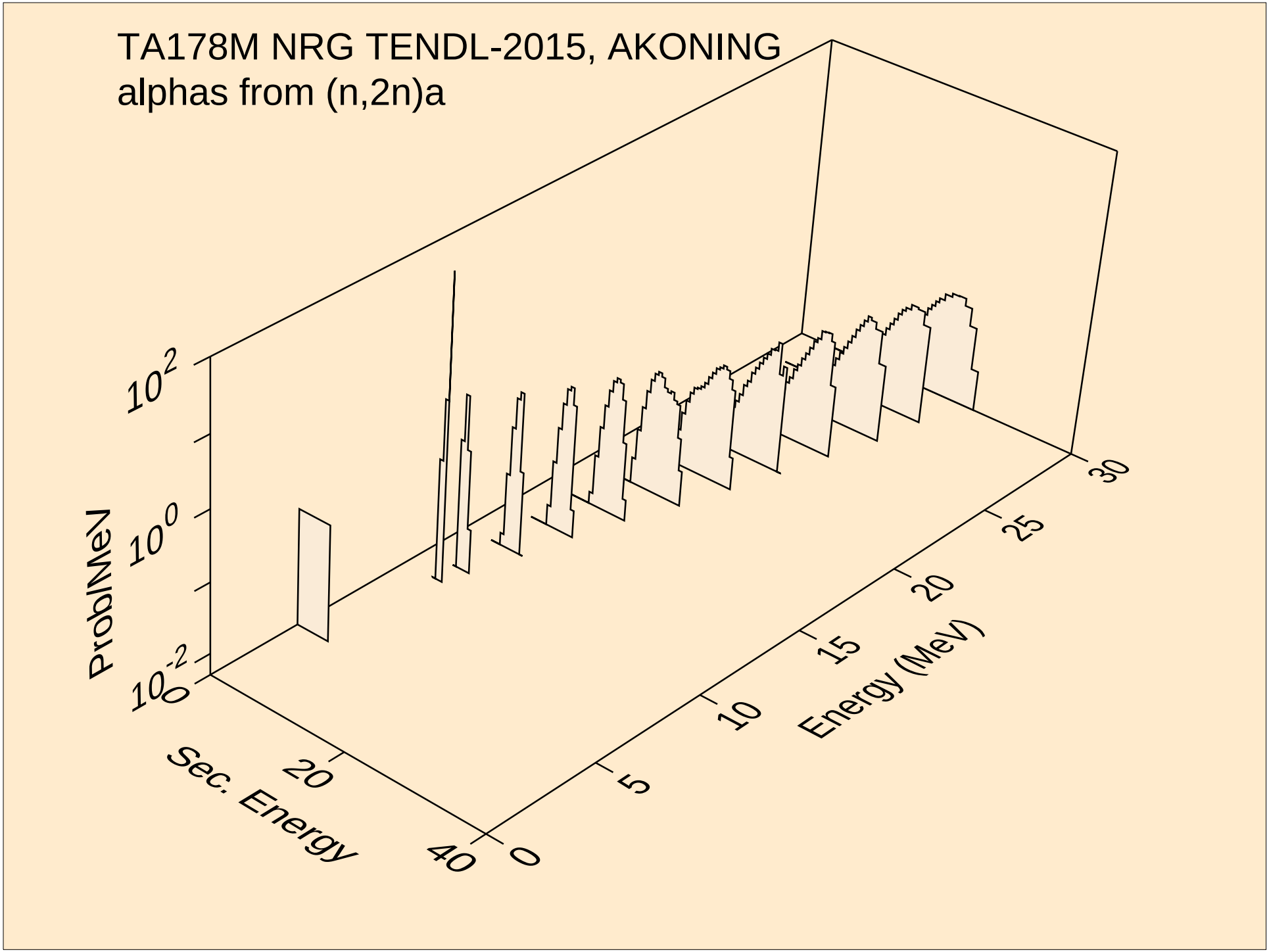

TA178M NRG TENDL-2015, AKONING
he3s from (n,x)
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)

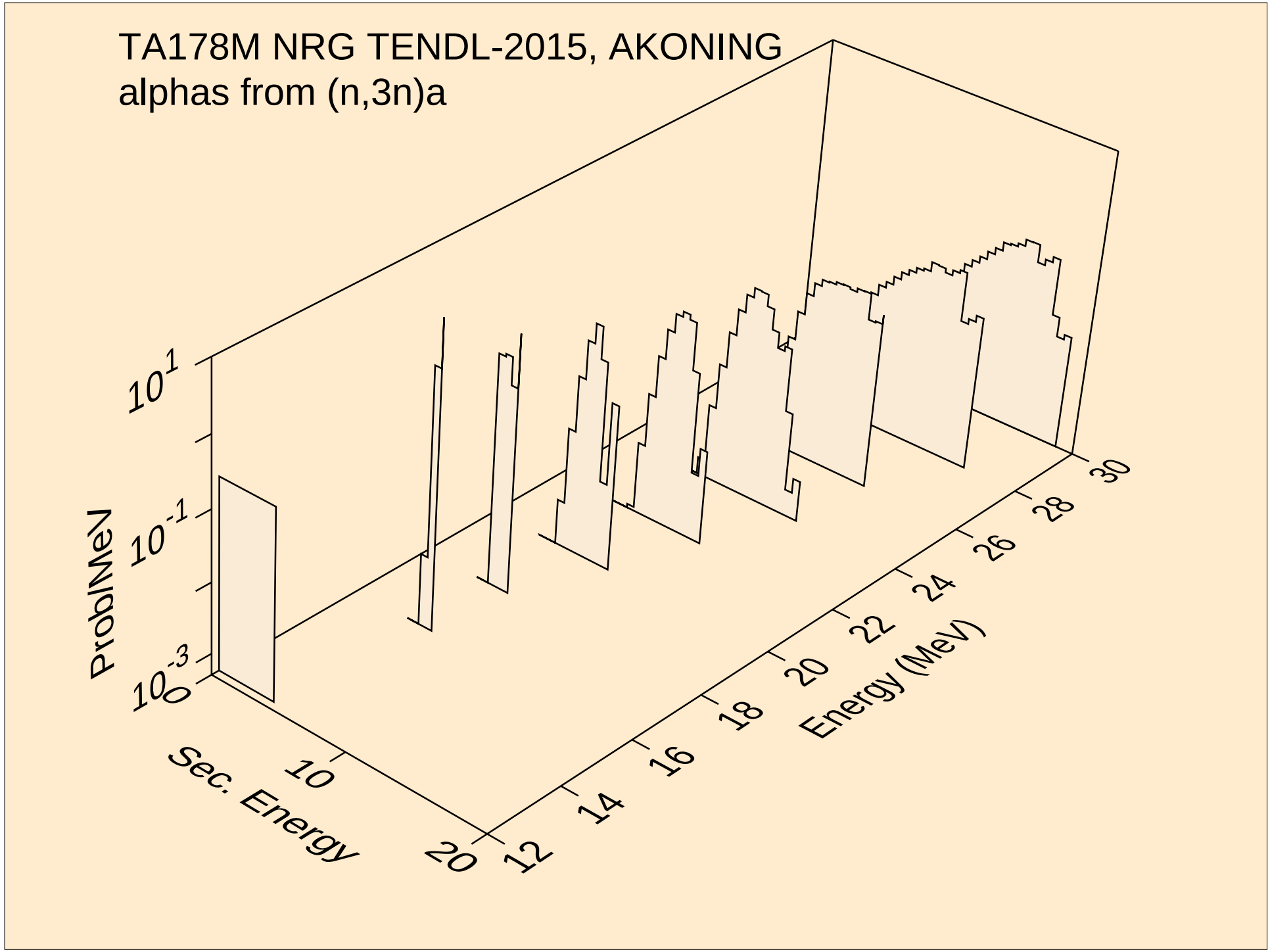

TA178M NRG TENDL-2015, AKONING
he3s from (n,n*)he3
Prob/MeV
10^1
10^-1
0
Sec. Energy
10
20
10
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

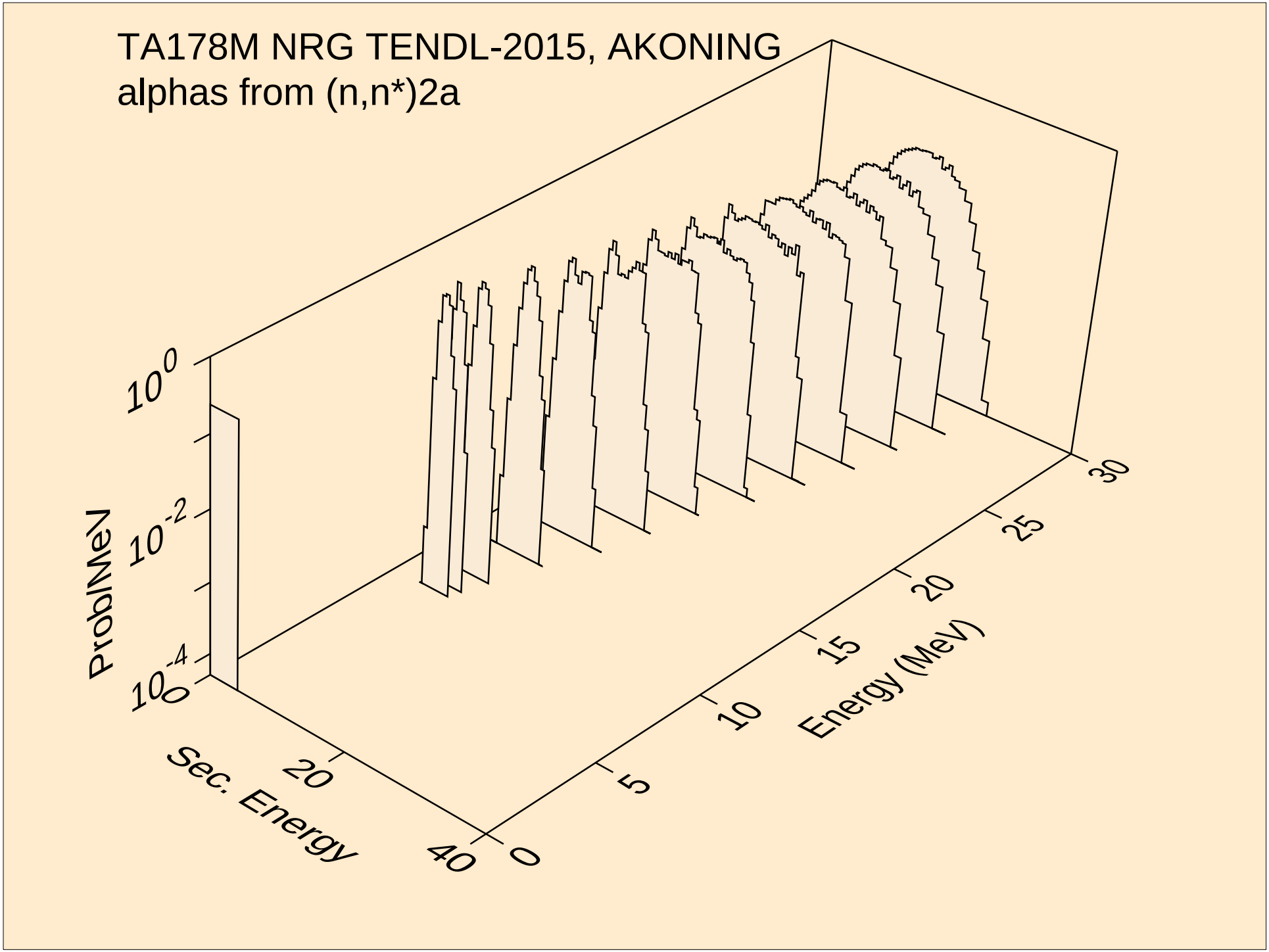

TA178M NRG TENDL-2015, AKONING
he3s from (n,he3)
Prob/MeV
10^{0}
10^{-2}
0
Sec. Energy
20
40
0
5
10
15
Energy (MeV)
20
25
30

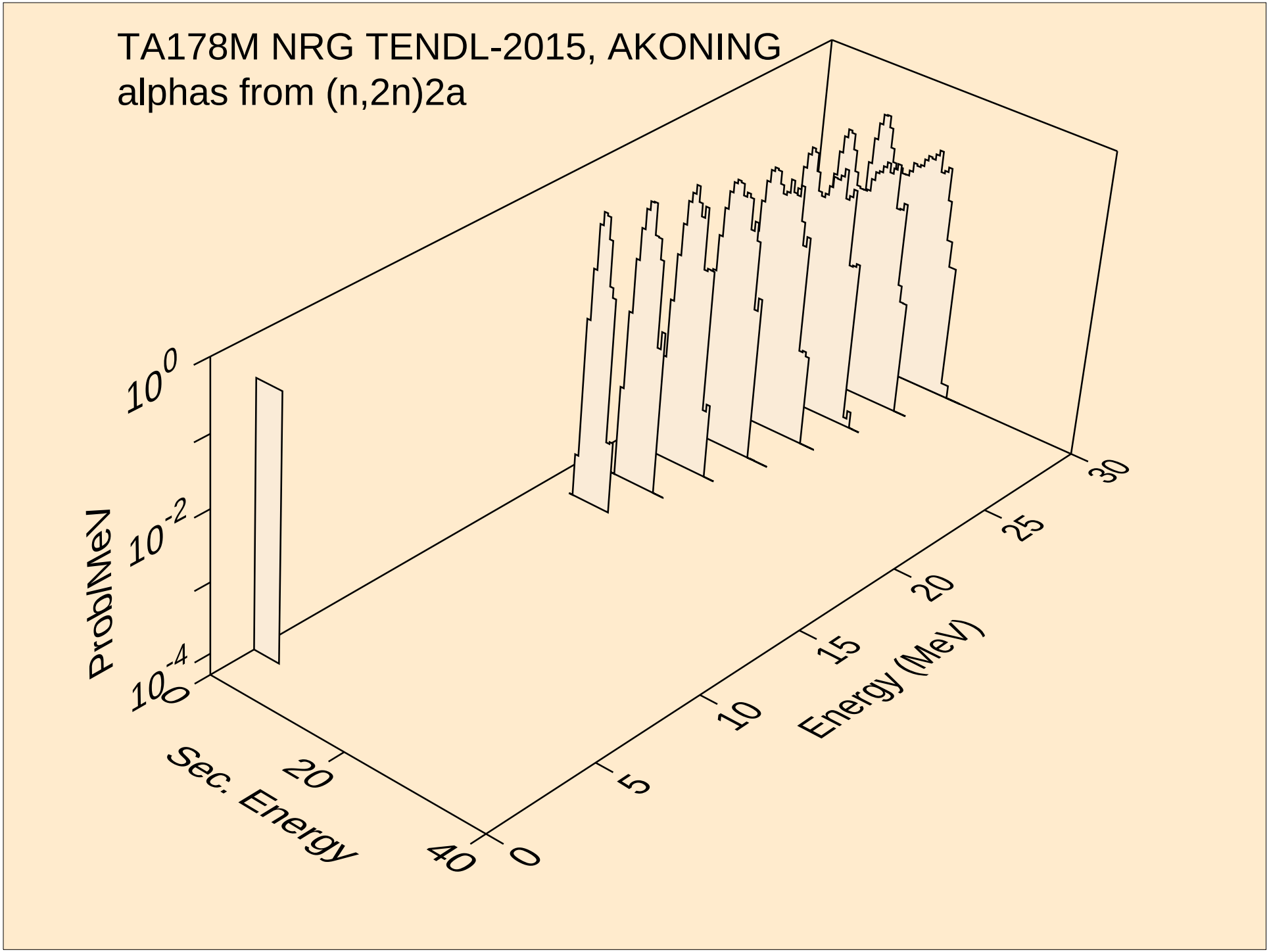

TA178M NRG TENDL-2015, AKONING
alphas from (n,x)
Prob/MeV
10^0
10^-2
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)

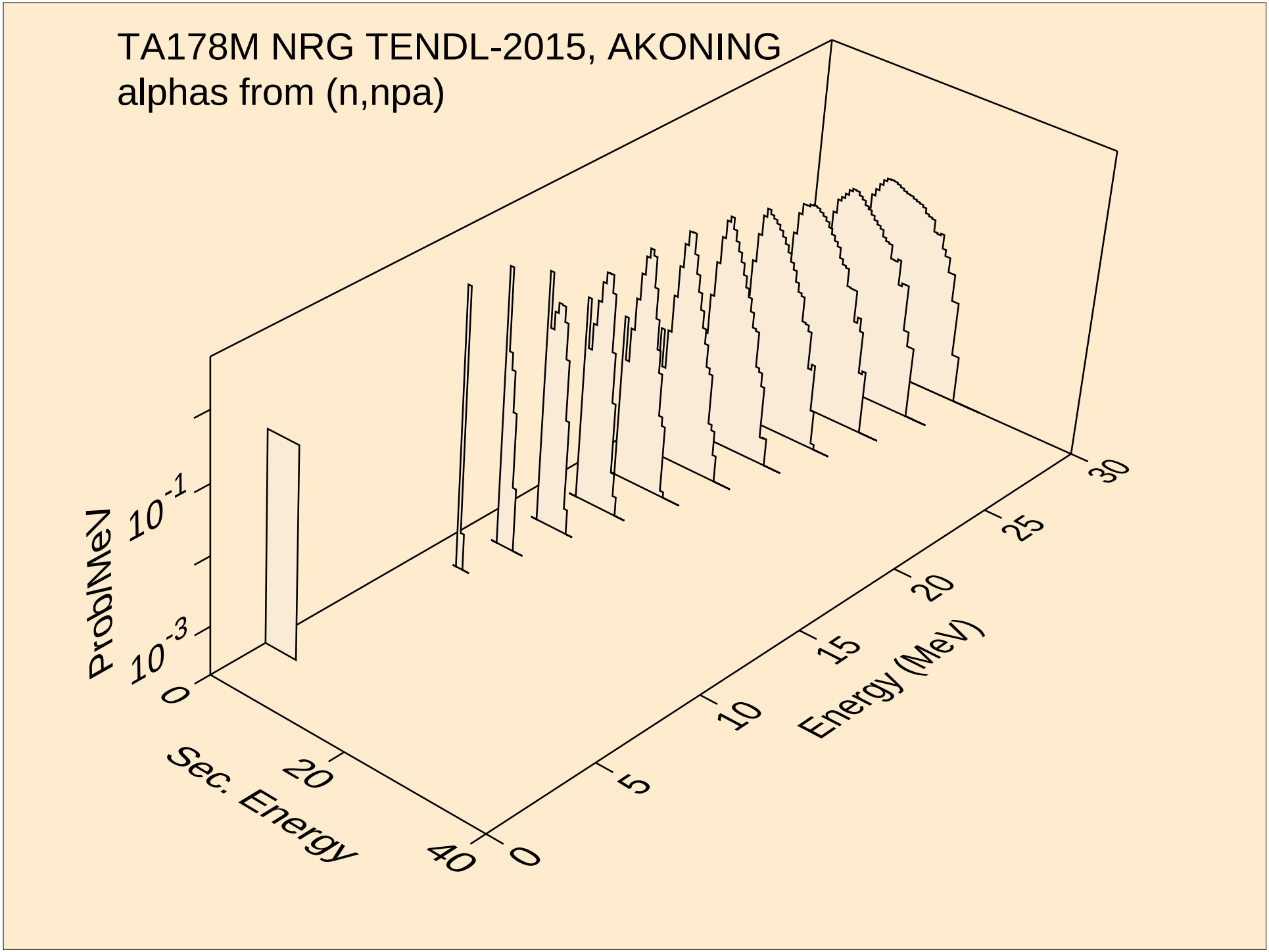

TA178M NRG TENDL-2015, AKONING
alphas from (n,n*)a
Prob/MeV
10-1
10-3
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)

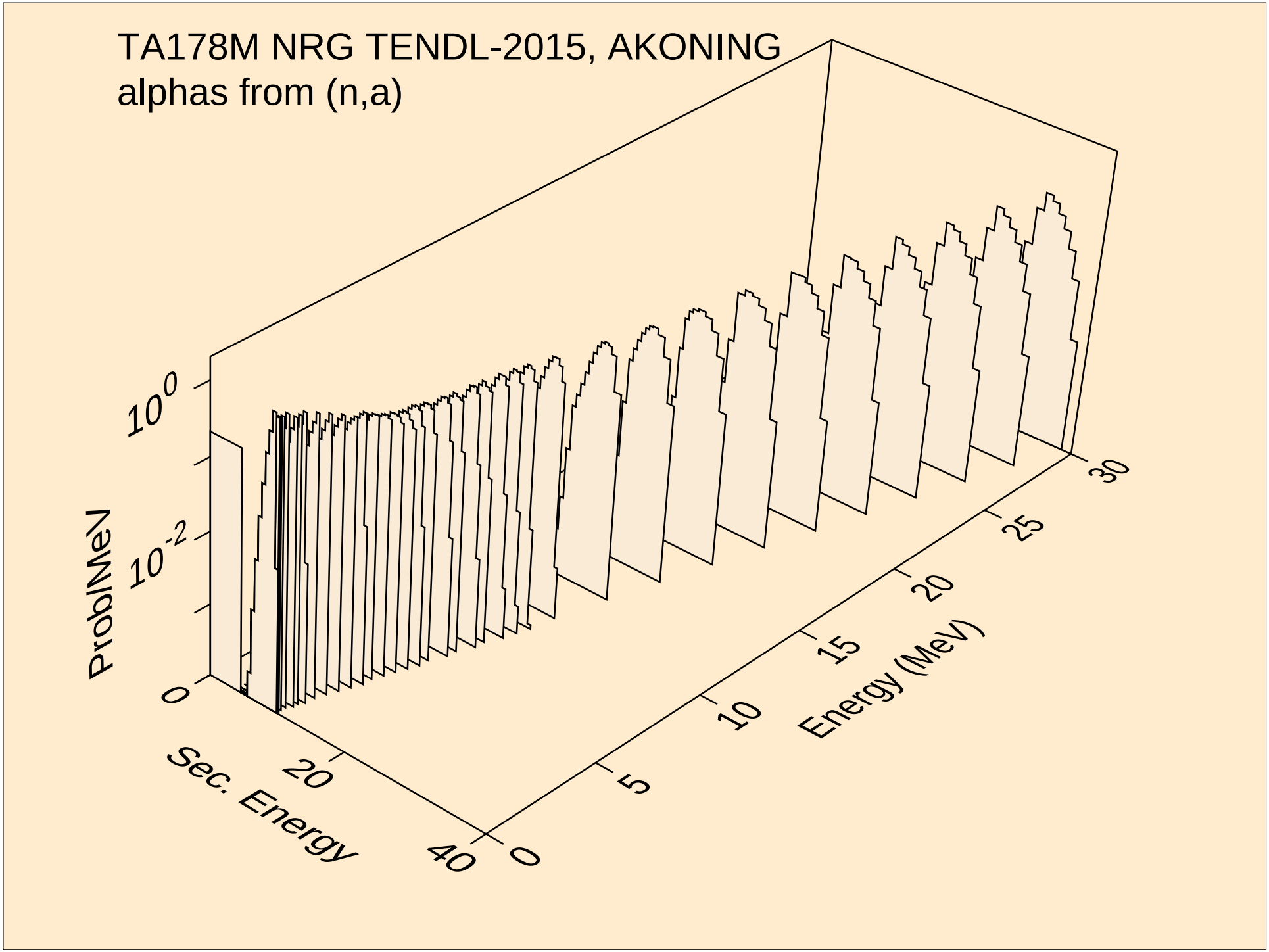

TA178M NRG TENDL-2015, AKONING
alphas from (n,2n)a
Prob/MeV
10^{2}
10^{0}
10^{-2}
0
20
40
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

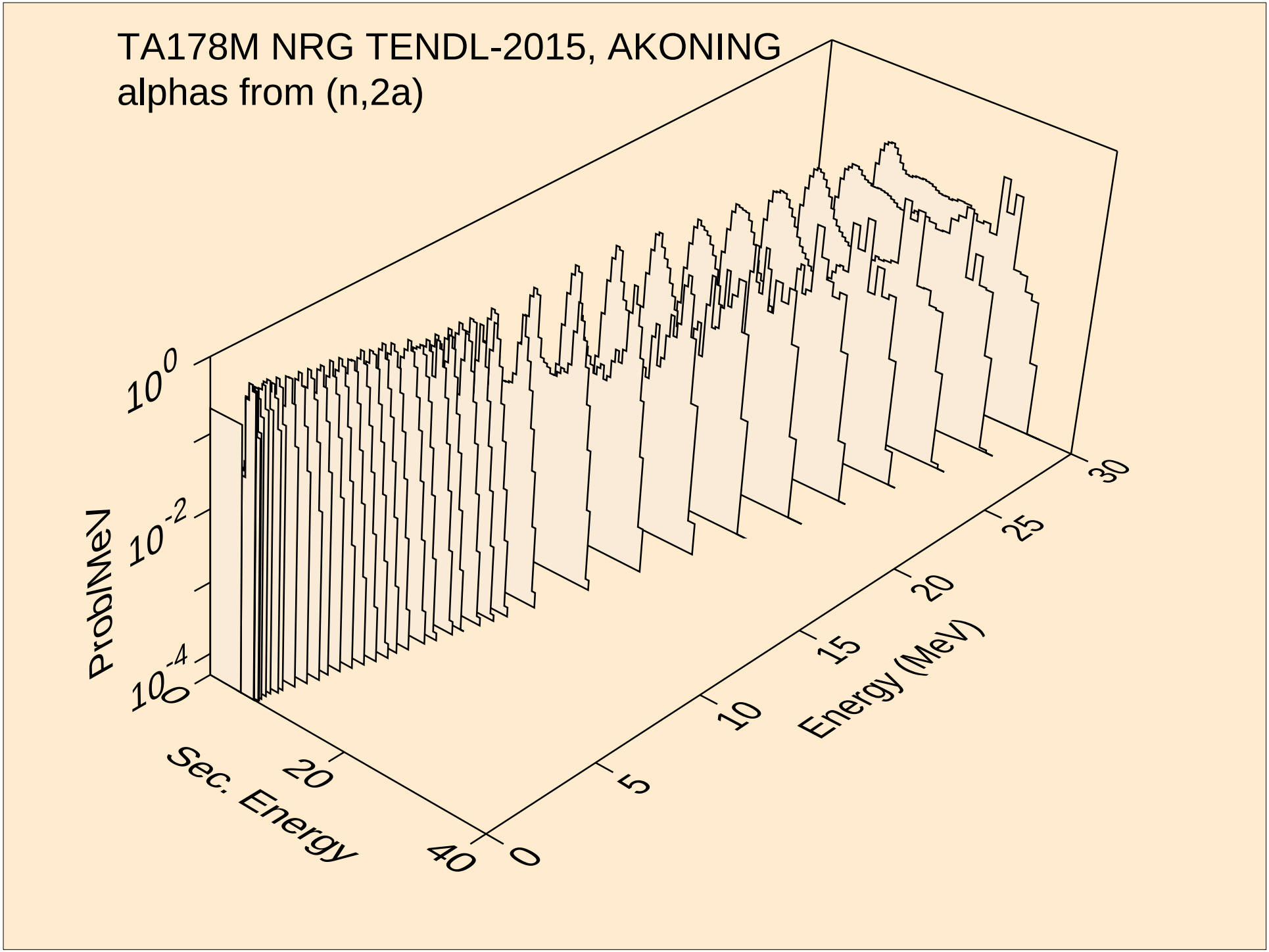

TA178M NRG TENDL-2015, AKONING
alphas from (n,3n)a
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
Sec. Energy
10
20
12
14
16
18
20
22
24
26
28
30
Energy (MeV)

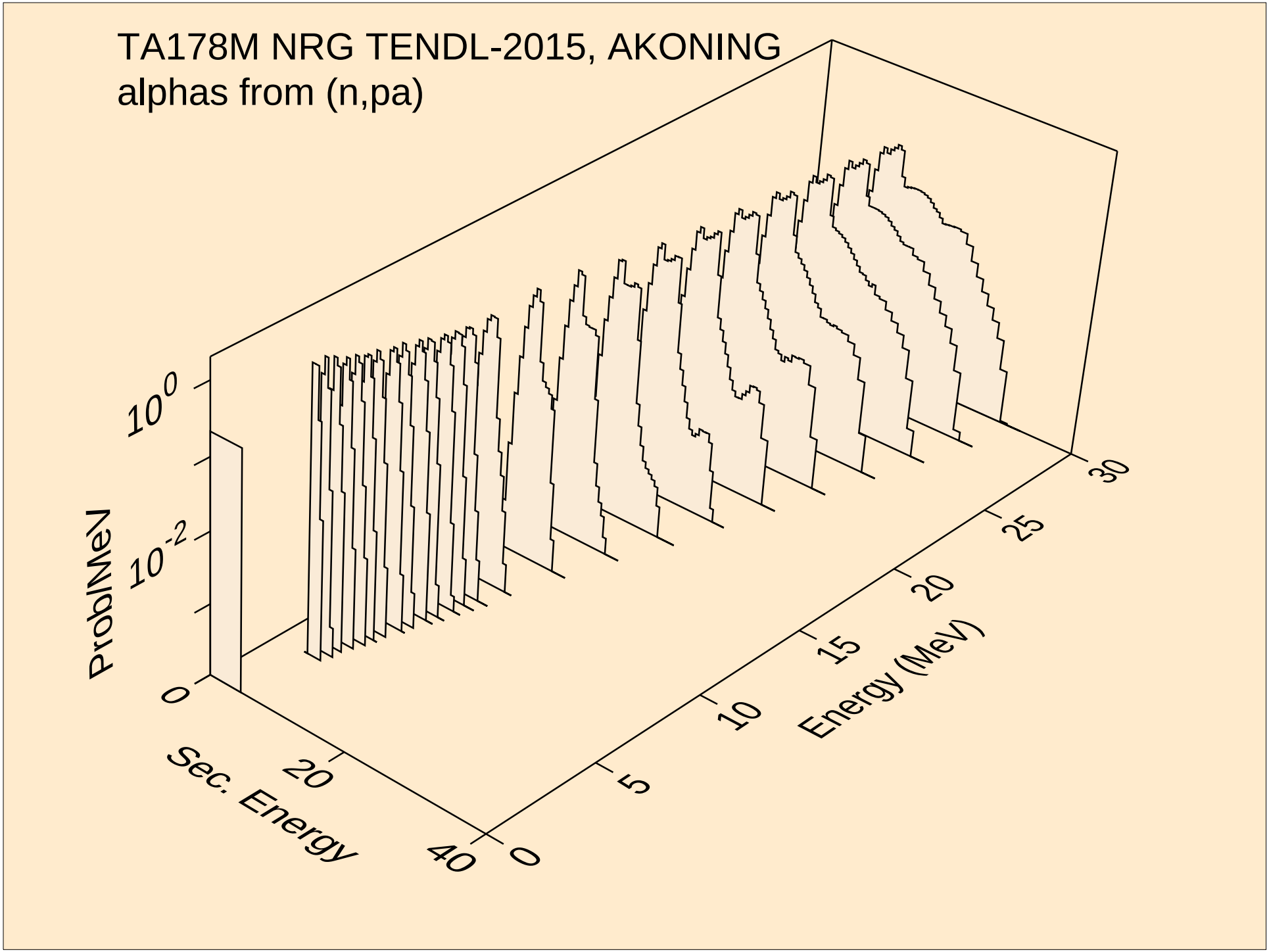

TA178M NRG TENDL-2015, AKONING
alphas from (n,n*)2a
Prob/MeV
10^{0}
10^{-2}
10^{-4}
0
20
40
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)

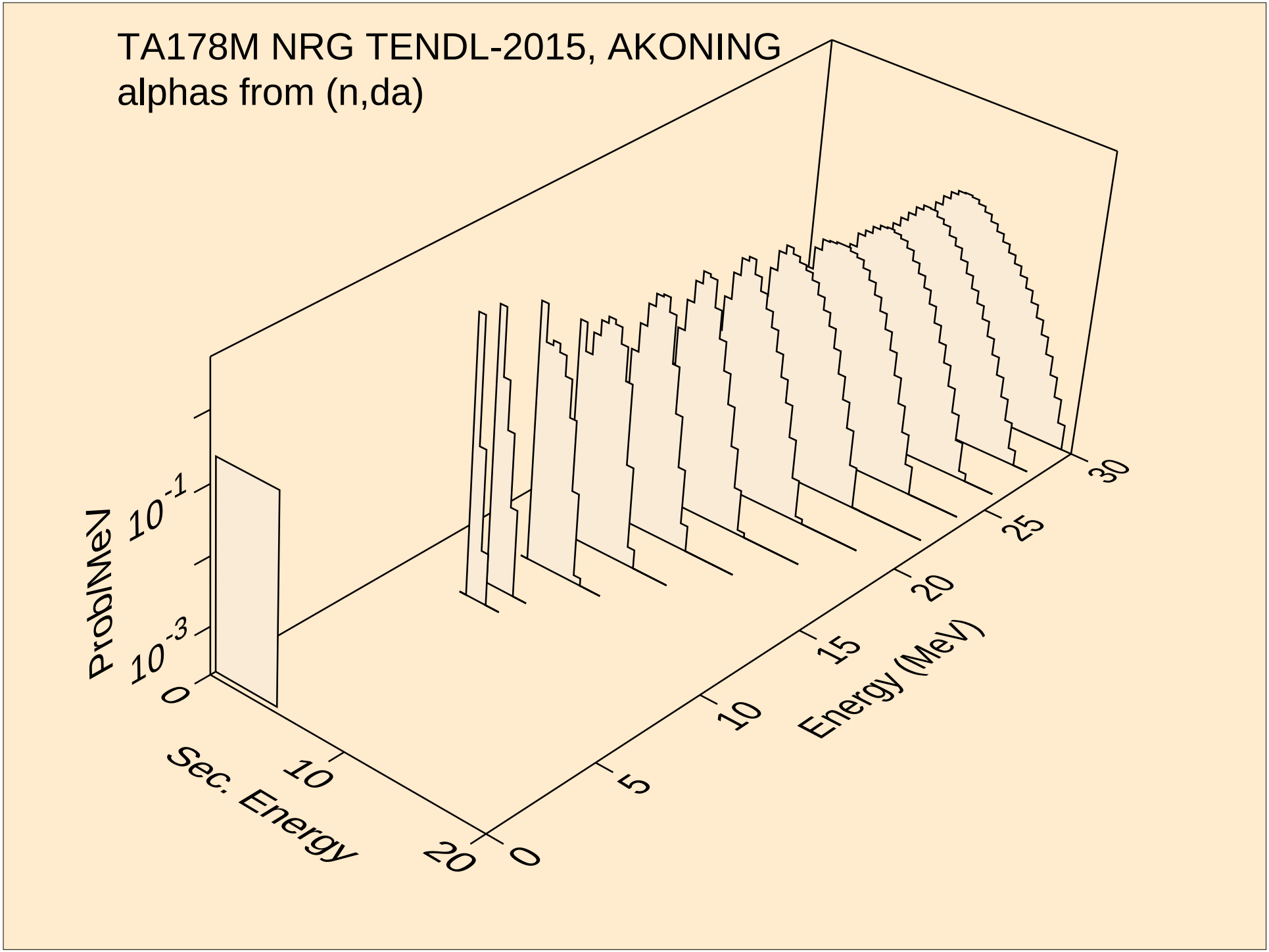

TA178M NRG TENDL-2015, AKONING
alphas from (n,2n)2a
Prob/MeV
10^{0}
10^{-2}
10^{-4}
0
20
40
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)


TA178M NRG TENDL-2015, AKONING
alphas from (n,npa)
Prob/MeV
10-1
10-3
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)


TA178M NRG TENDL-2015, AKONING
alphas from (n,a)
Prob/MeV
10^0
10^-2
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)


TA178M NRG TENDL-2015, AKONING
alphas from (n,2a)
Prob/MeV
10^{0}
10^{-2}
10^{-4}
0
20
40
Sec. Energy
0
5
10
15
20
25
30
Energy (MeV)


TA178M NRG TENDL-2015, AKONING
alphas from (n,pa)
Prob/MeV
10^0
10^-2
0
Sec. Energy
20
40
0
5
10
15
20
25
30
Energy (MeV)


TA178M NRG TENDL-2015, AKONING
alphas from (n,da)
Prob/MeV
10-1
10-3
0
Sec. Energy
10
20
0
5
10
15
20
25
30
Energy (MeV)