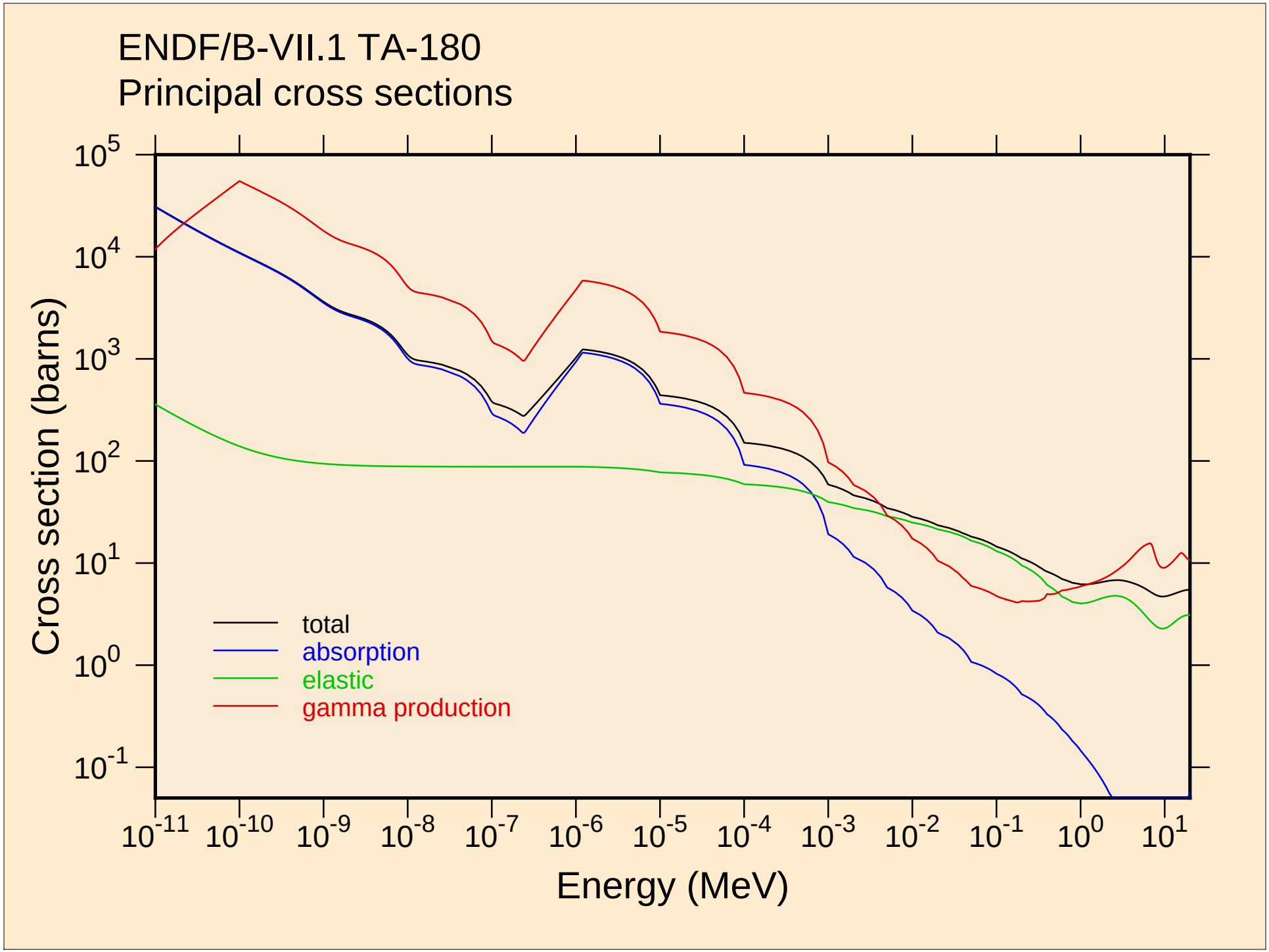
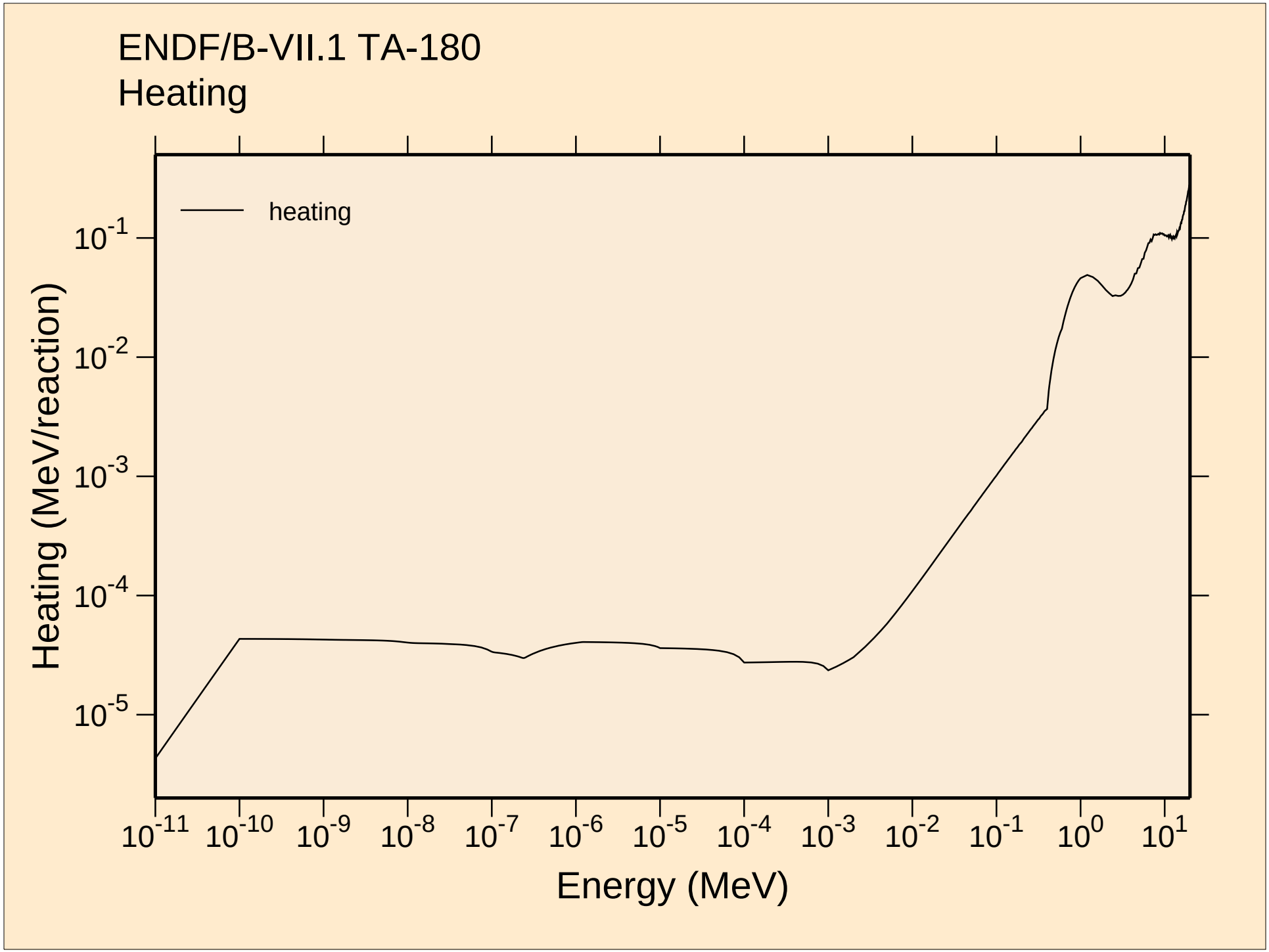
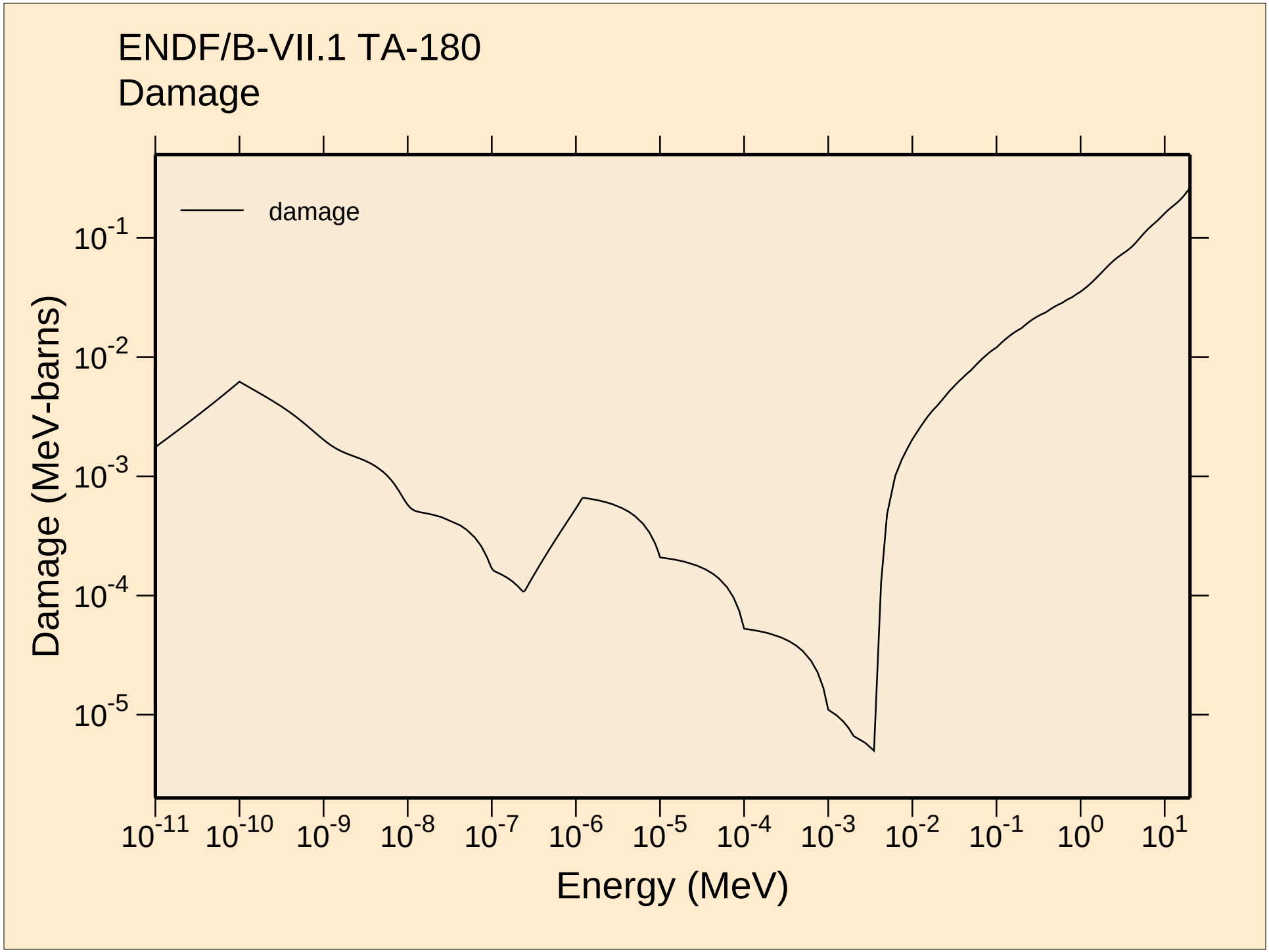
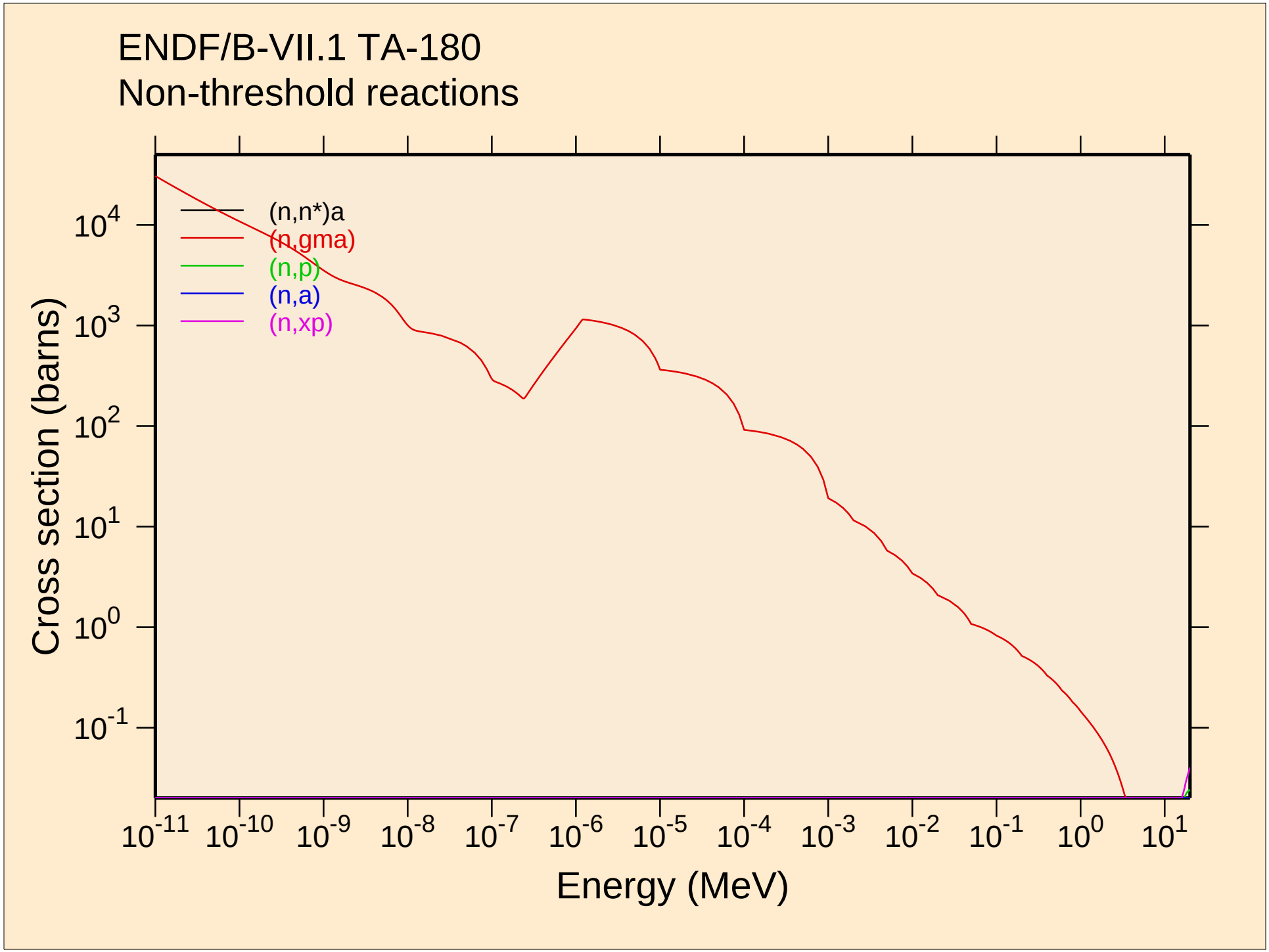
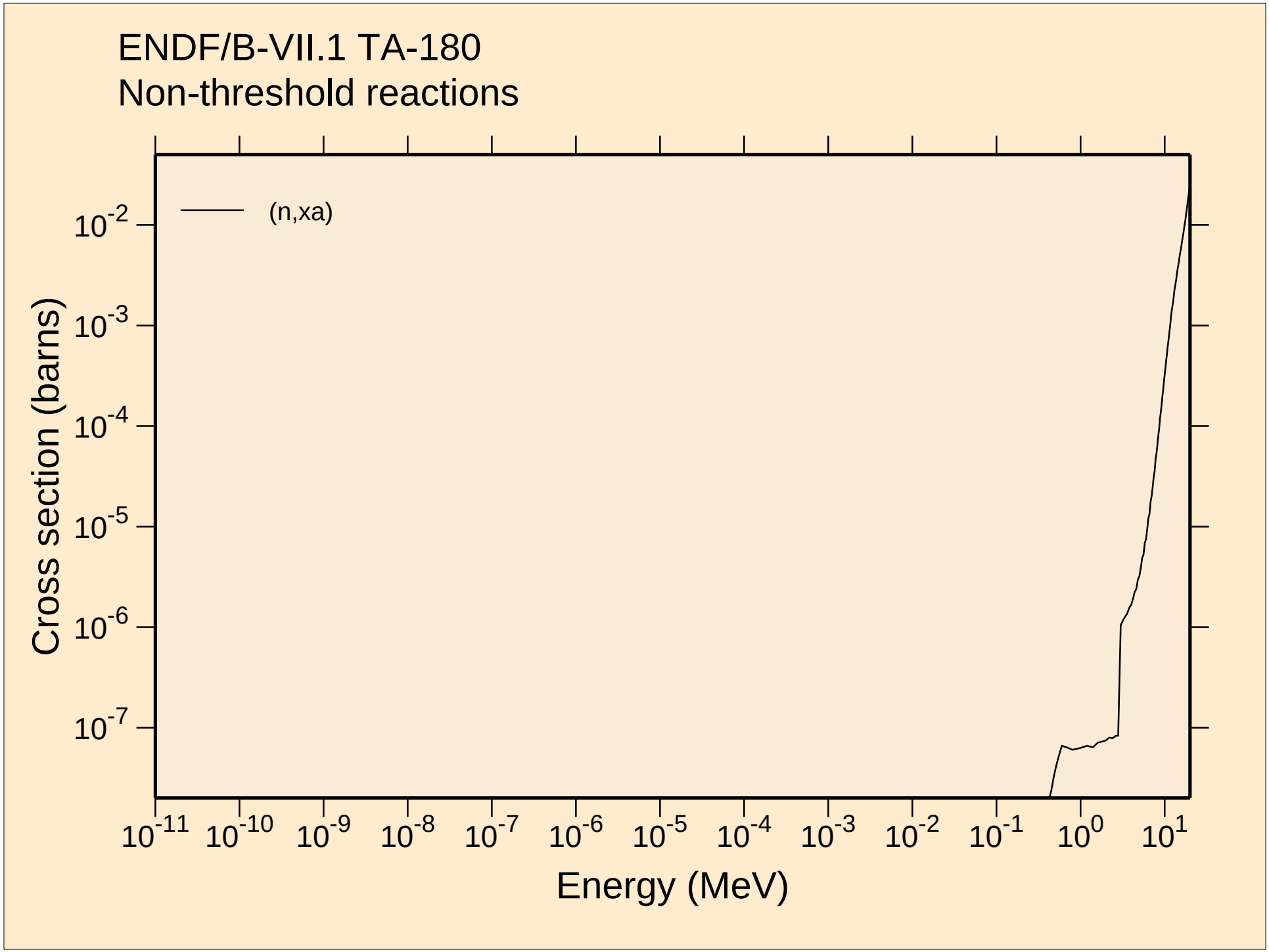
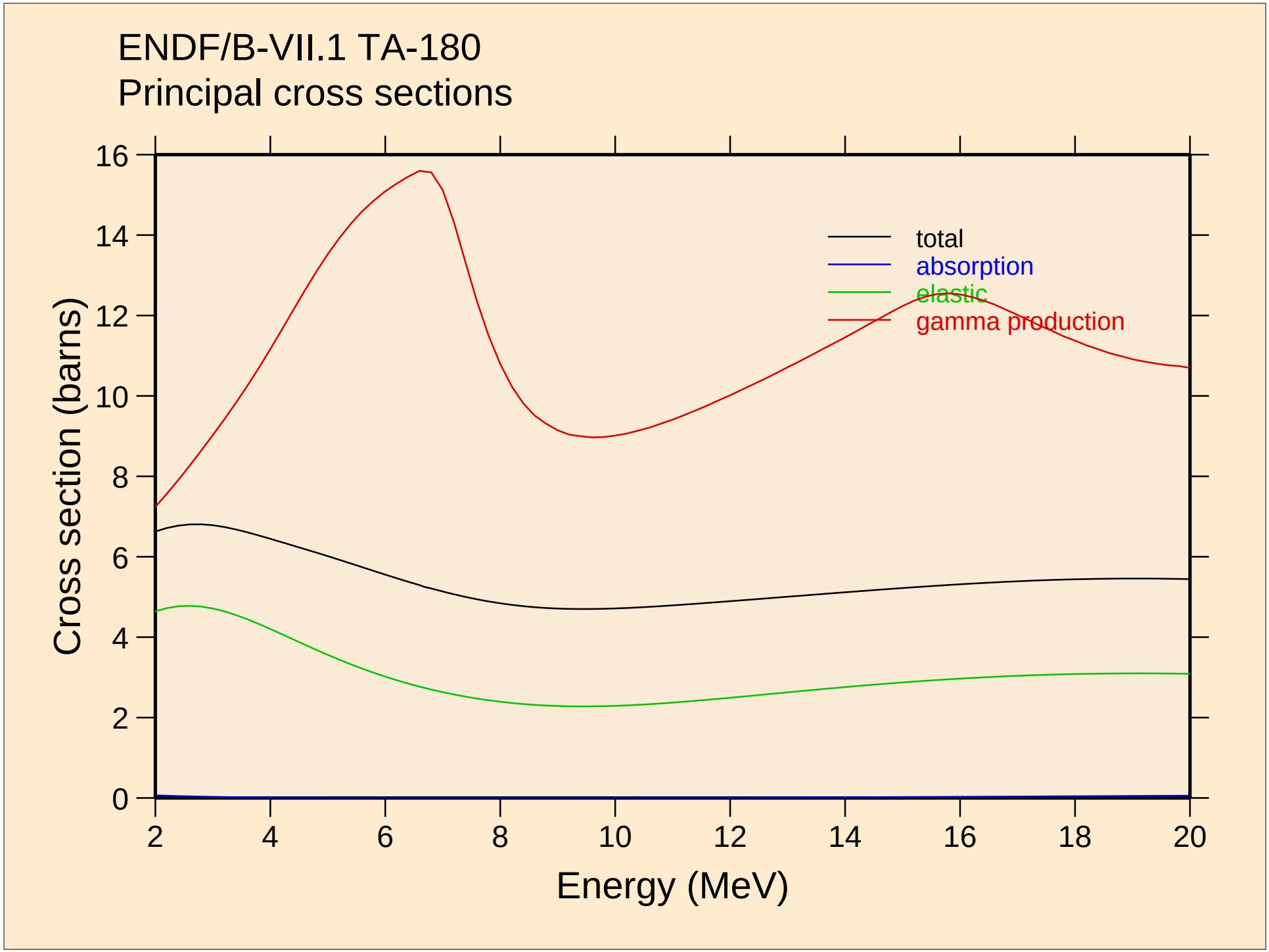

ENDF/B-VII.1 TA-180
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production

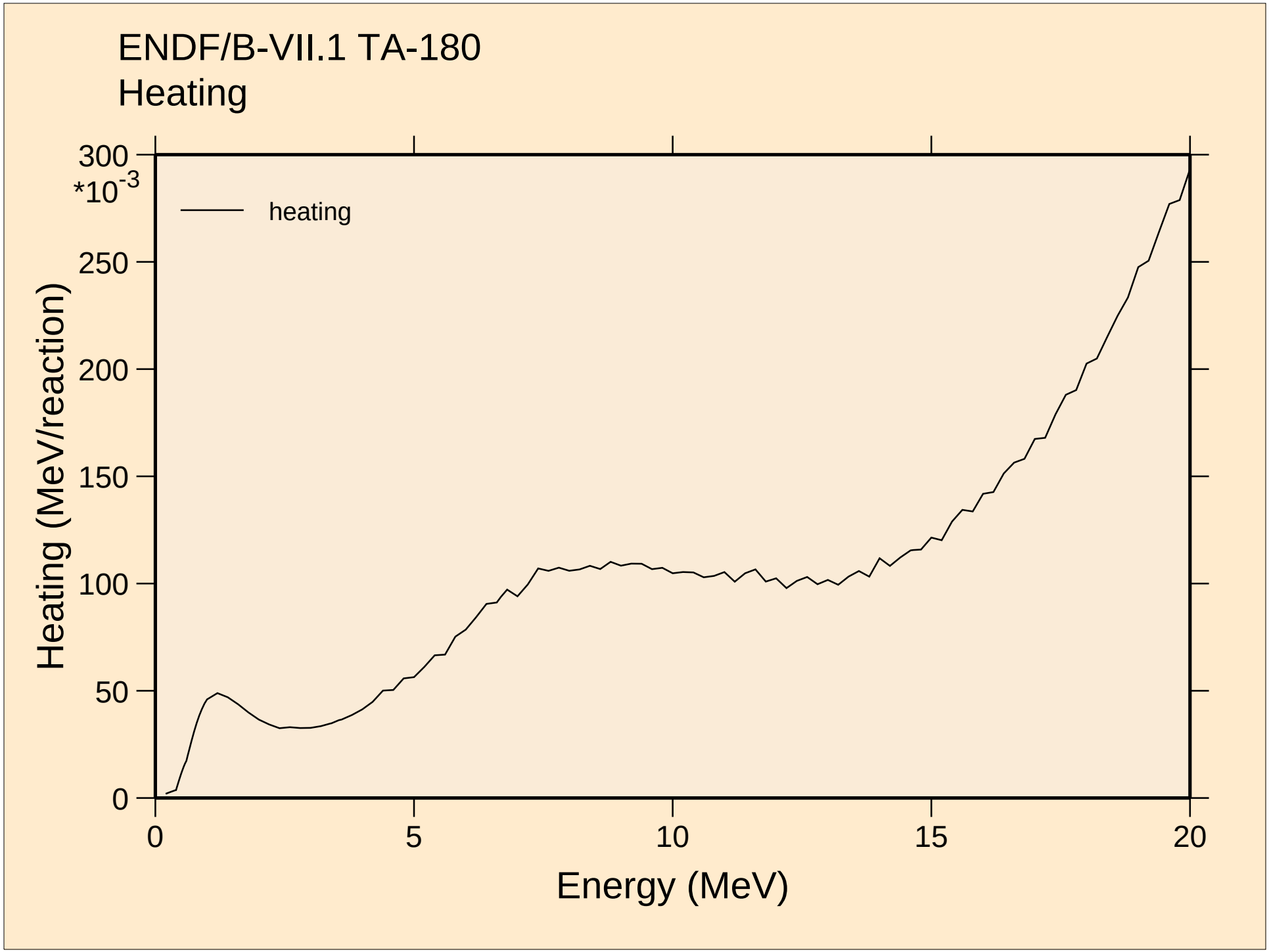

ENDF/B-VII.1 TA-180
Heating
heating
Heating (MeV/reaction)
10-1
10-2
10-3
10-4
10-5
10-11 10-10 10-9 10-8 10-7 10-6 10-5 10-4 10-3 10-2 10-1 100 101
Energy (MeV)

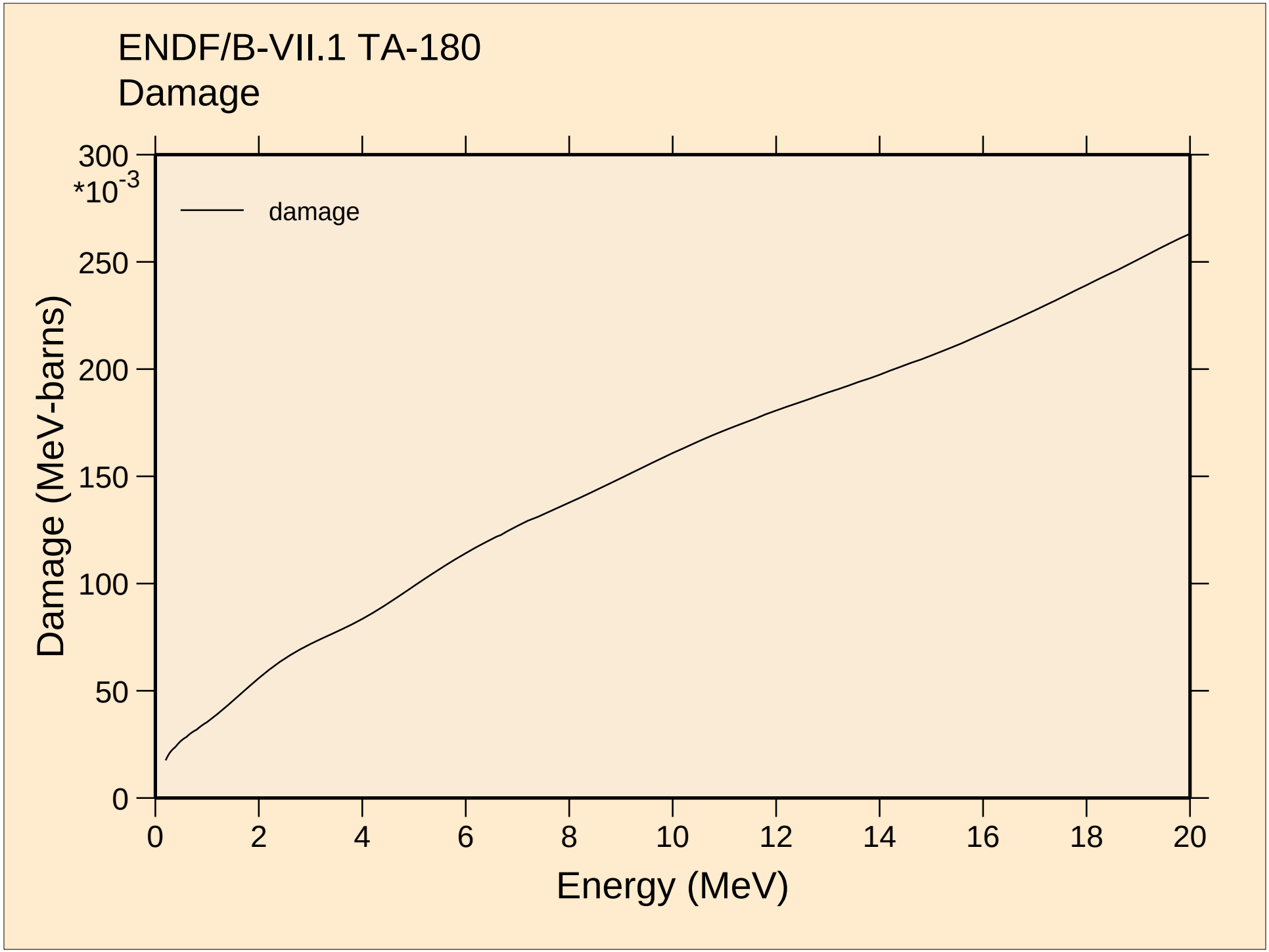

ENDF/B-VII.1 TA-180
Damage
damage
Damage (MeV-barns)
10-1
10-2
10-3
10-4
10-5
10-11 10-10 10-9 10-8 10-7 10-6 10-5 10-4 10-3 10-2 10-1 100 101
Energy (MeV)

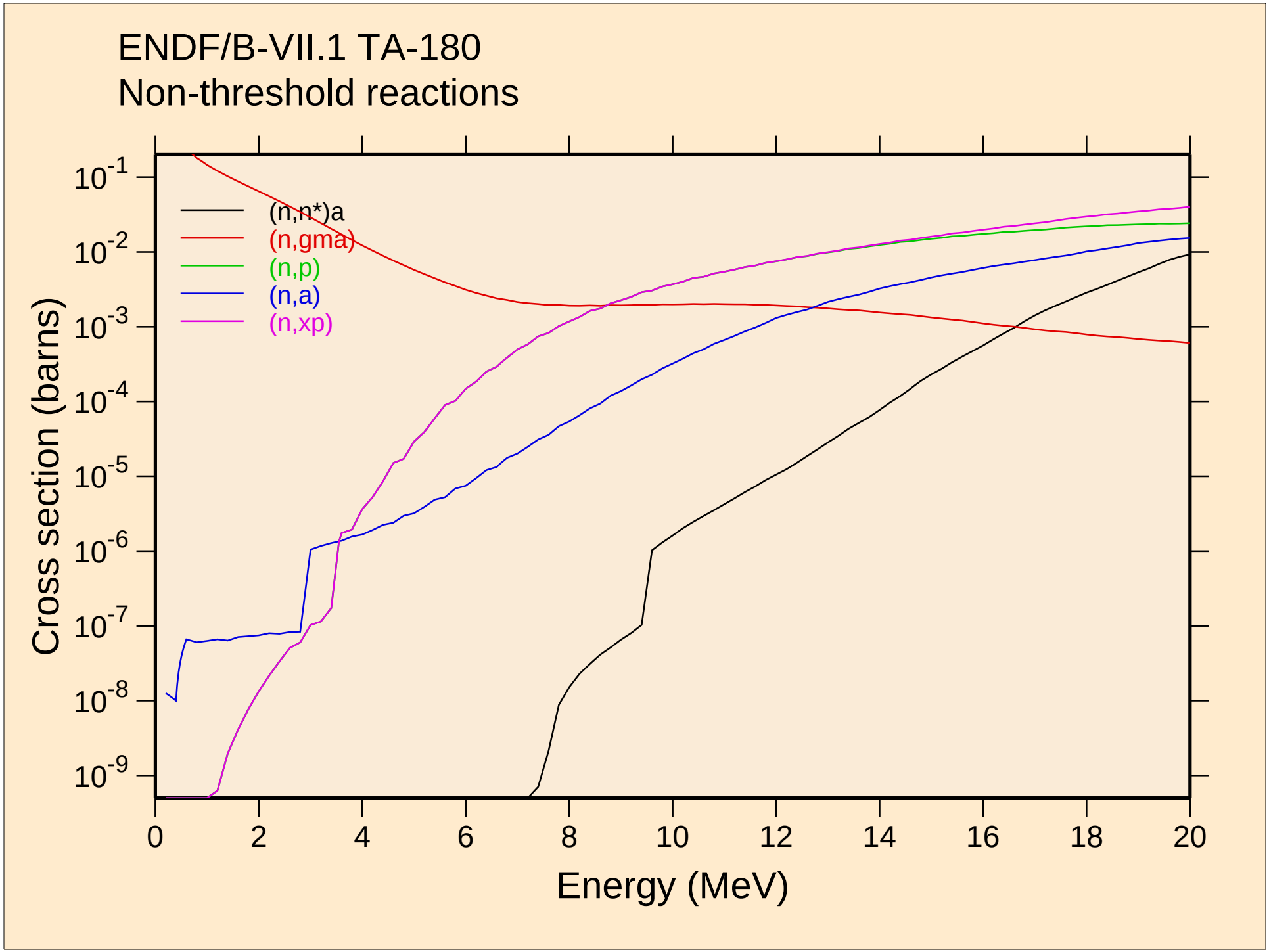

ENDF/B-VII.1 TA-180
Non-threshold reactions
(n,n*)a
(n,gma)
(n,p)
(n,a)
(n,xp)
Cross section (barns)
10^{4}
10^{3}
10^{2}
10^{1}
10^{0}
10^{-1}
10^{-11} 10^{-10} 10^{-9} 10^{-8} 10^{-7} 10^{-6} 10^{-5} 10^{-4} 10^{-3} 10^{-2} 10^{-1} 10^{0} 10^{1}
Energy (MeV)

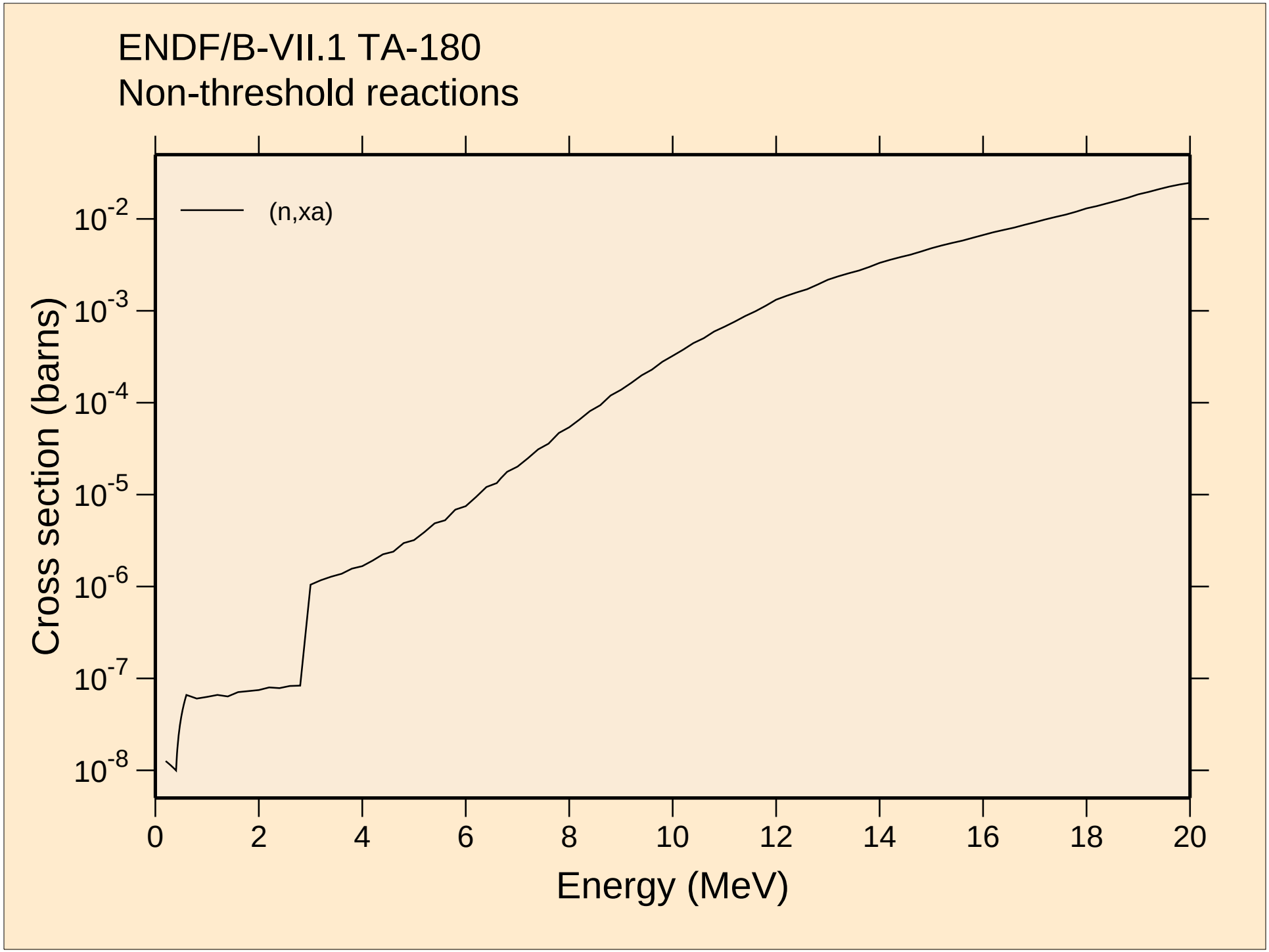

ENDF/B-VII.1 TA-180
Non-threshold reactions
(n,xa)
Cross section (barns)
10-2
10-3
10-4
10-5
10-6
10-7
10-11 10-10 10-9 10-8 10-7 10-6 10-5 10-4 10-3 10-2 10-1 100 101
Energy (MeV)

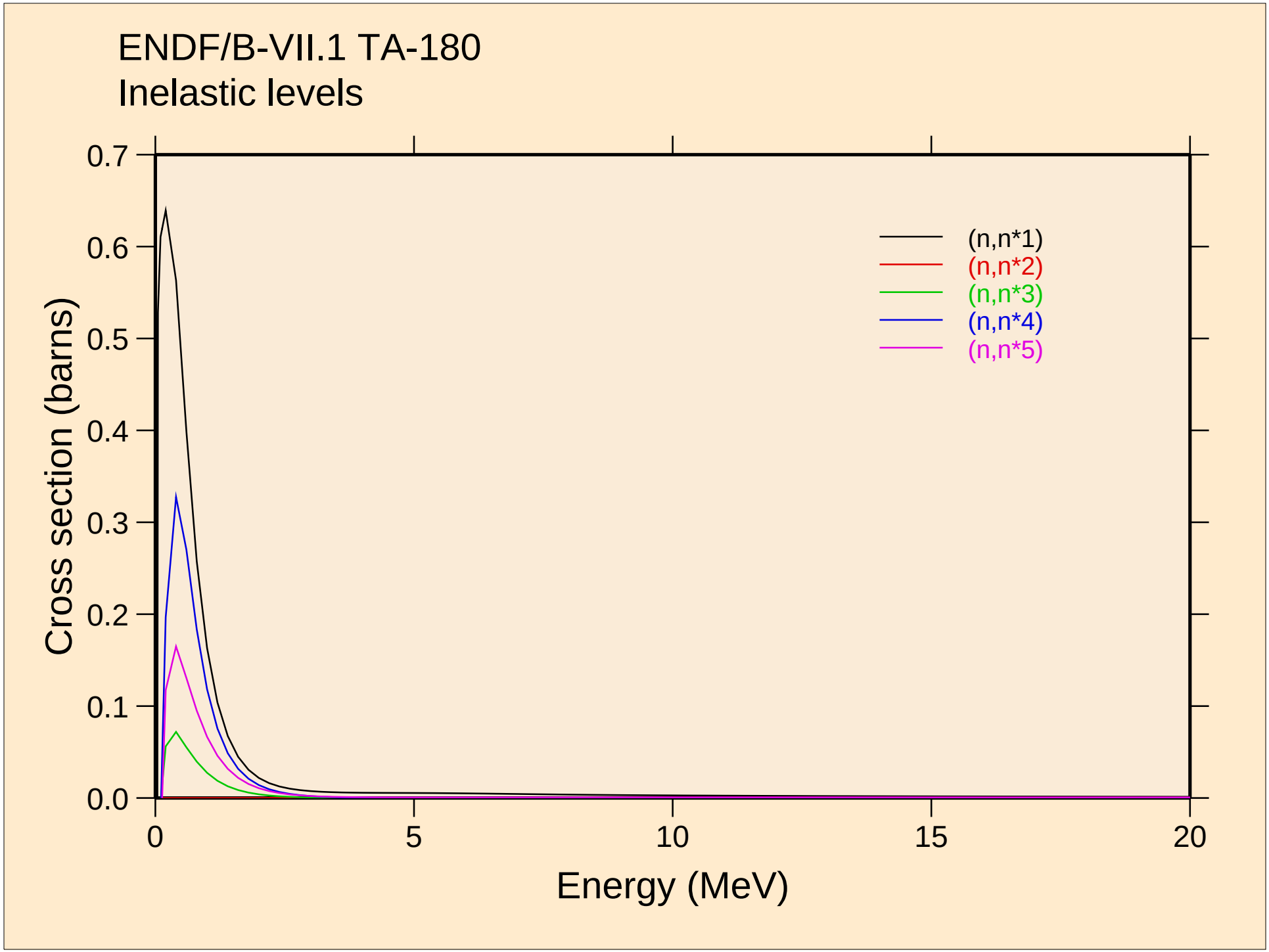

ENDF/B-VII.1 TA-180
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production
0
2
4
6
8
10
12
14
16
18
20

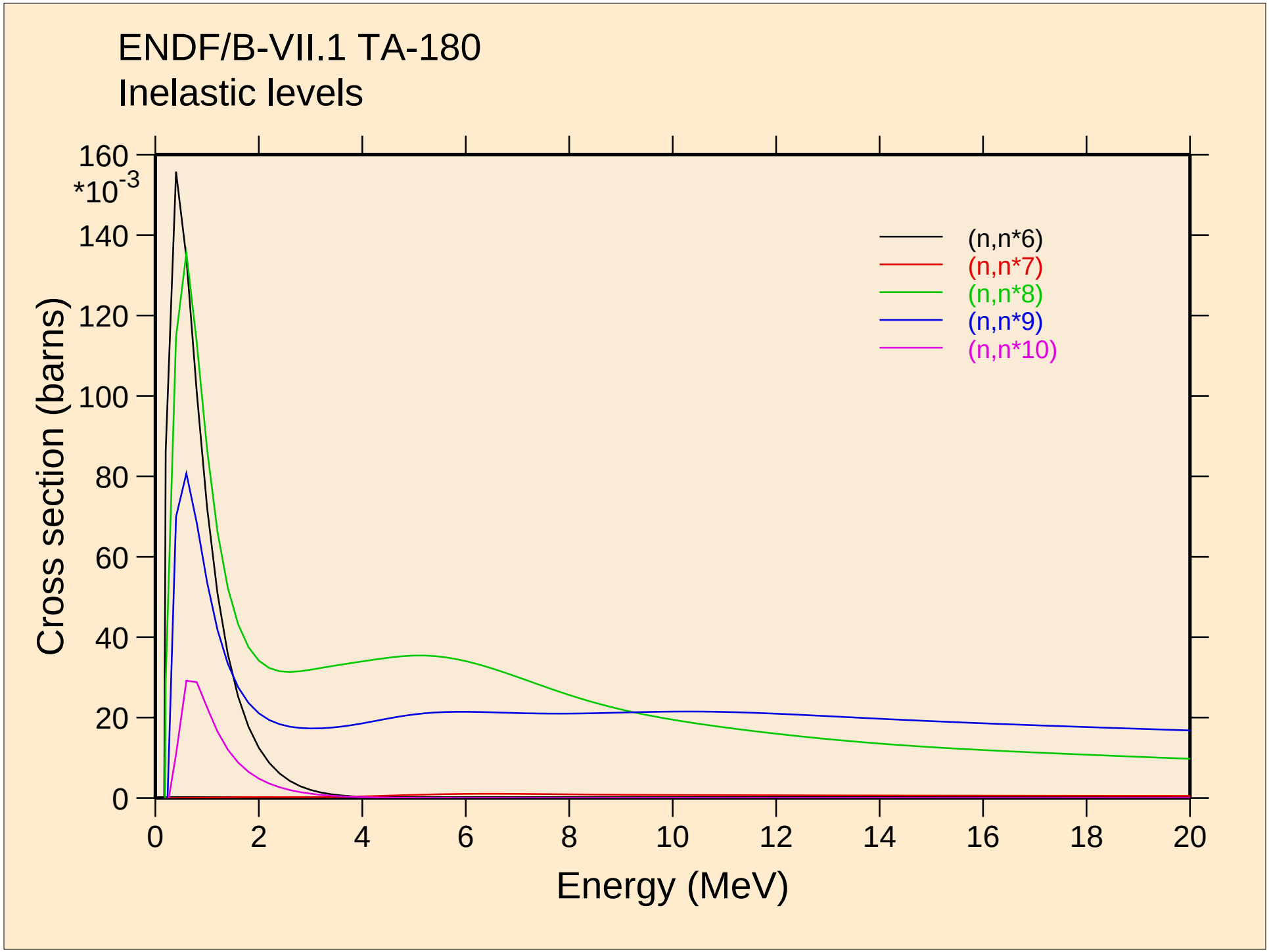

ENDF/B-VII.1 TA-180
Heating
300
*10-3
250
200
150
100
50
0
heating
Heating (MeV/reaction)
0
5
10
15
20
Energy (MeV)

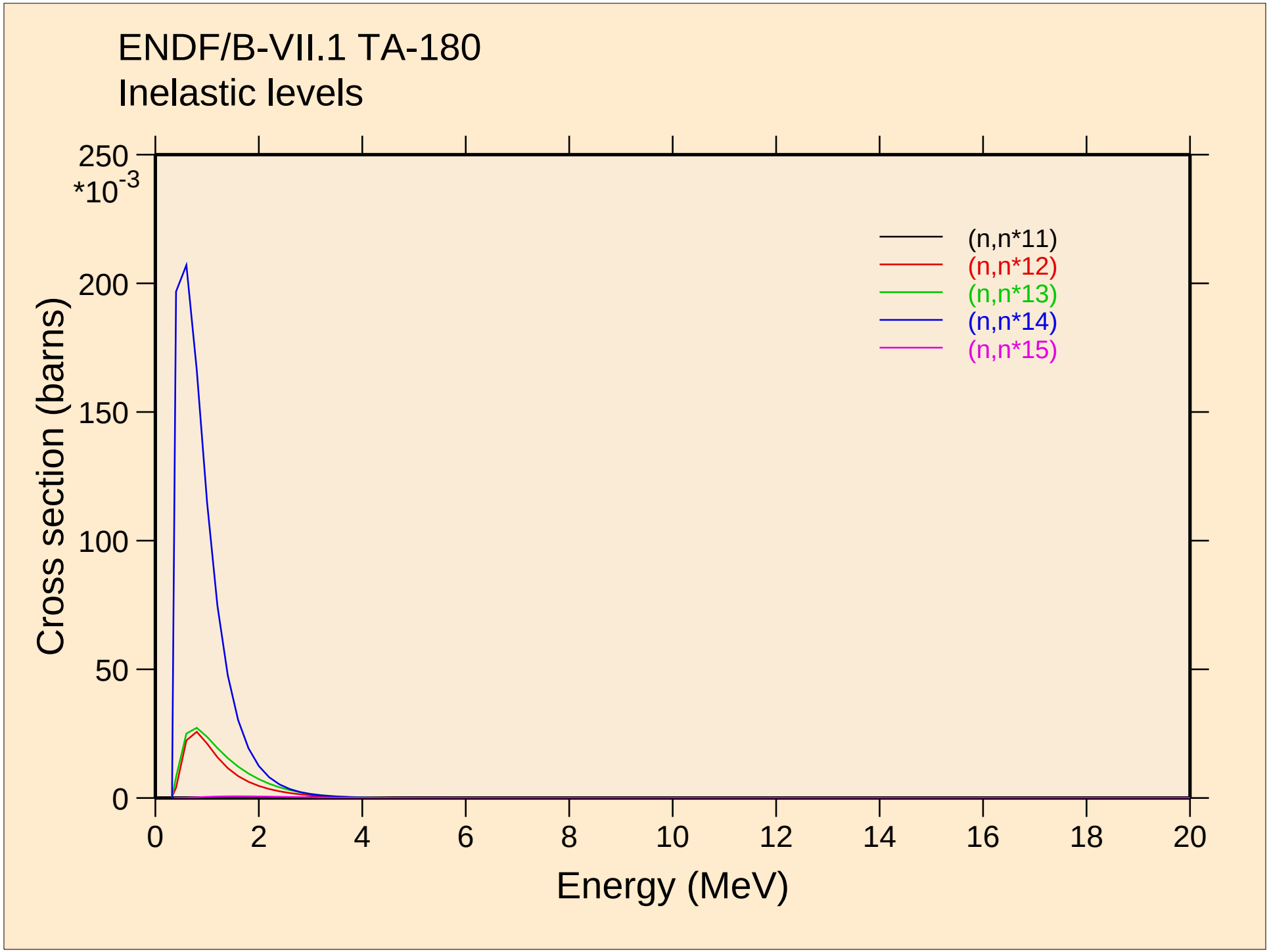

ENDF/B-VII.1 TA-180
Damage
300
*10-3
250
200
150
100
50
0
damage
Damage (MeV-barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

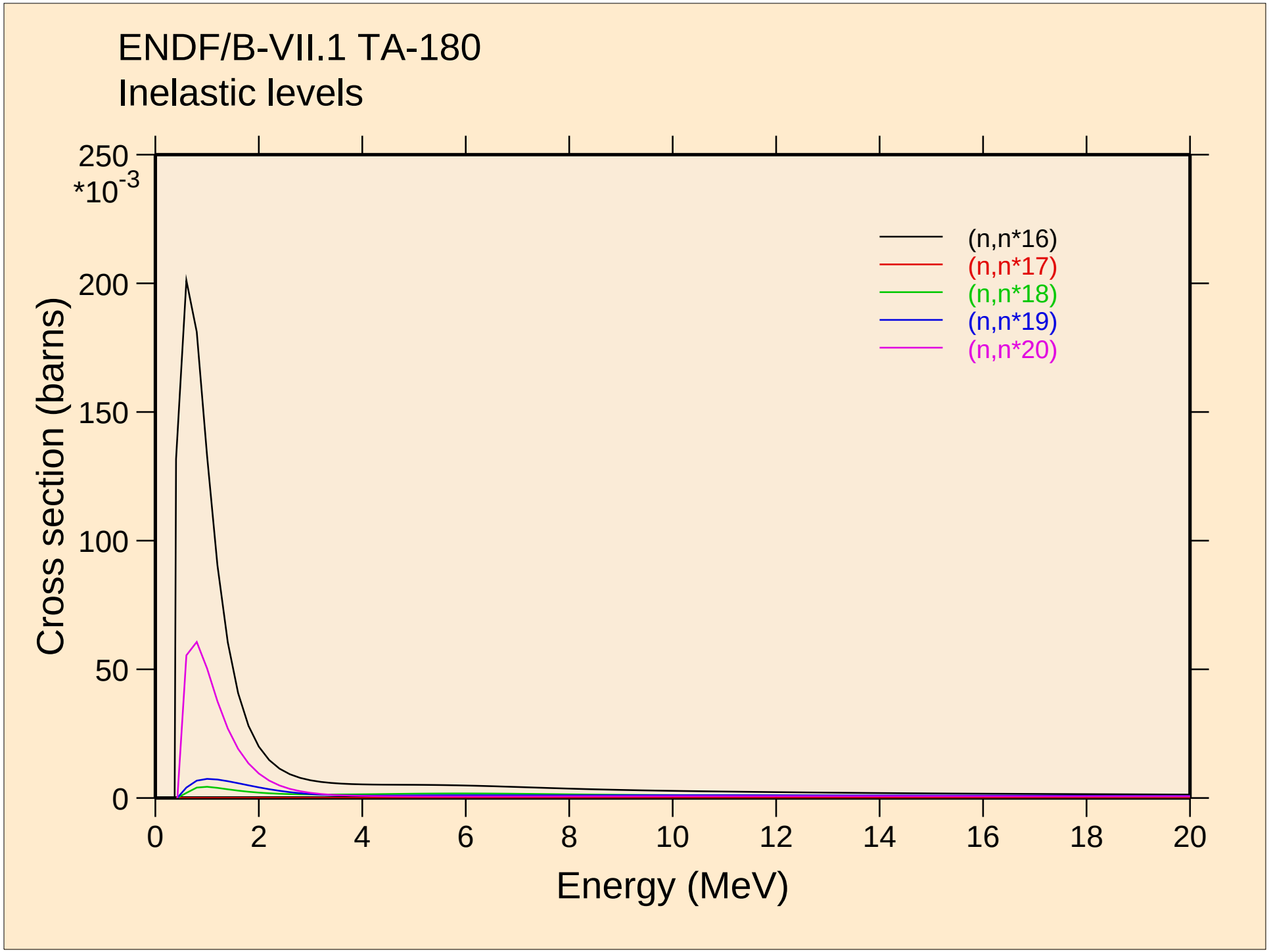

ENDF/B-VII.1 TA-180
Non-threshold reactions
(n,n*)a
(n,gma)
(n,p)
(n,a)
(n,xp)
Cross section (barns)
10-1
10-2
10-3
10-4
10-5
10-6
10-7
10-8
10-9
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

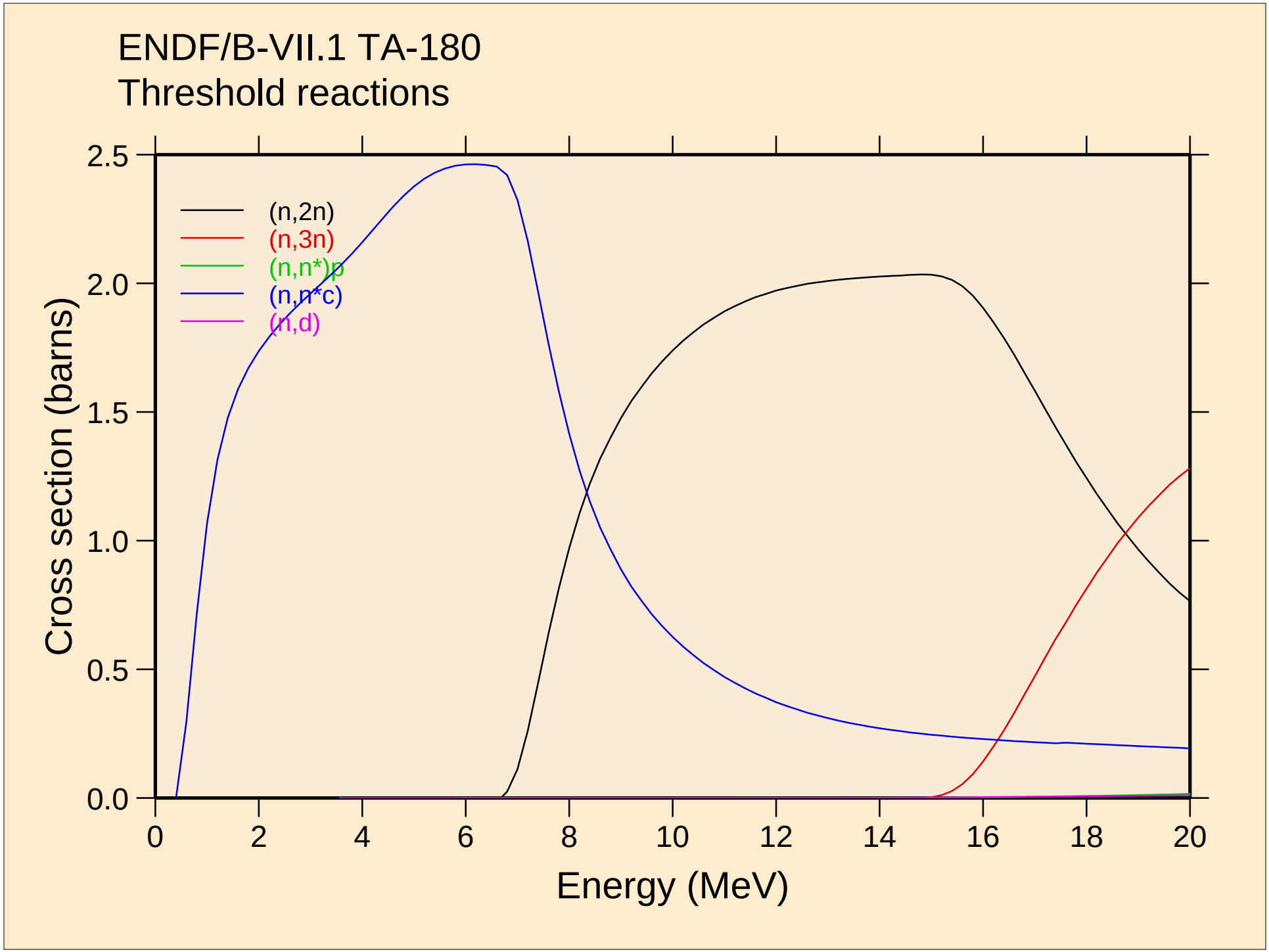

ENDF/B-VII.1 TA-180
Non-threshold reactions
(n,xa)
Cross section (barns)
10-2
10-3
10-4
10-5
10-6
10-7
10-8
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

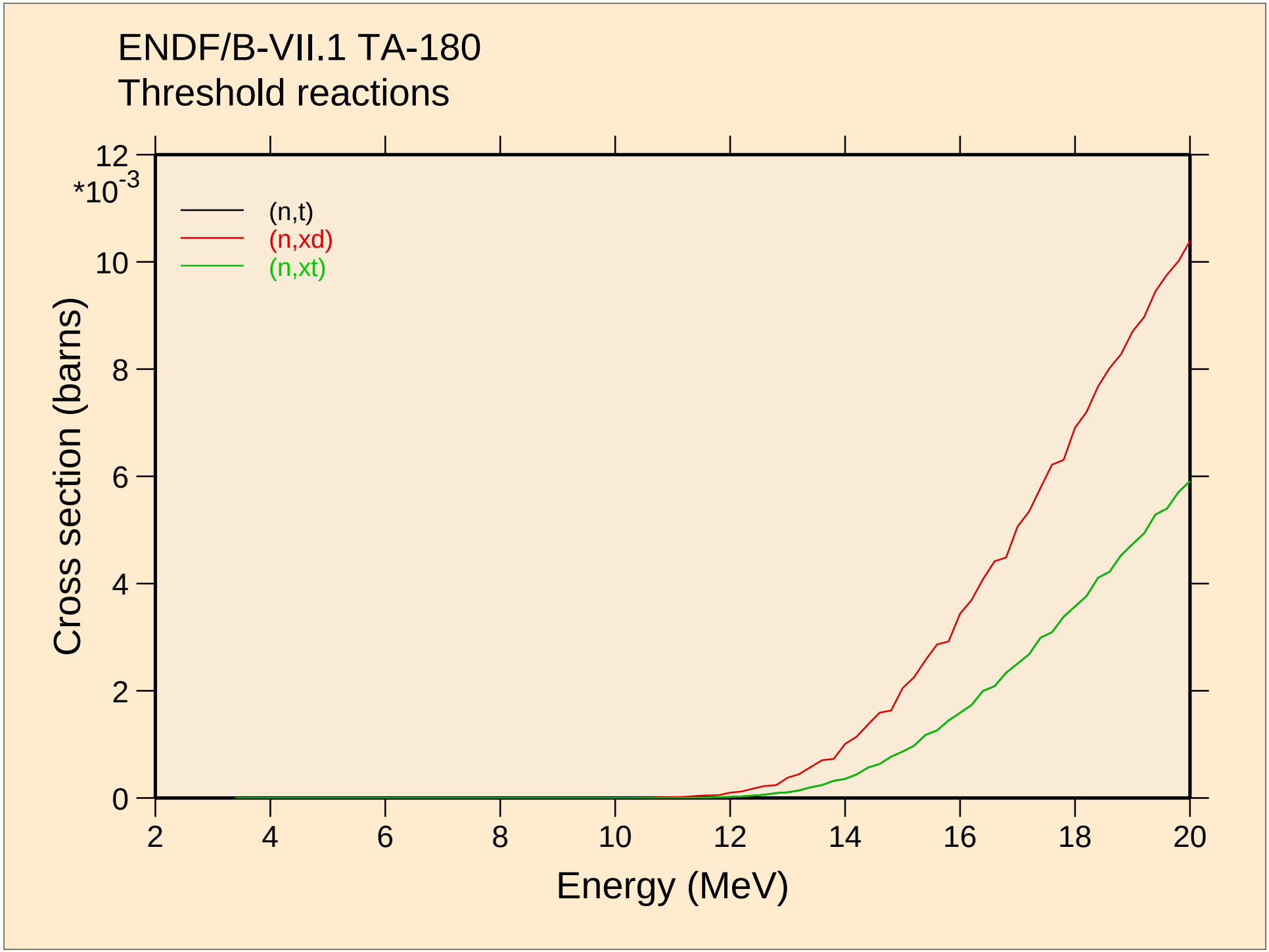

ENDF/B-VII.1 TA-180
Inelastic levels
Cross section (barns)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0
5
10
15
20
Energy (MeV)
(n,n*1)
(n,n*2)
(n,n*3)
(n,n*4)
(n,n*5)

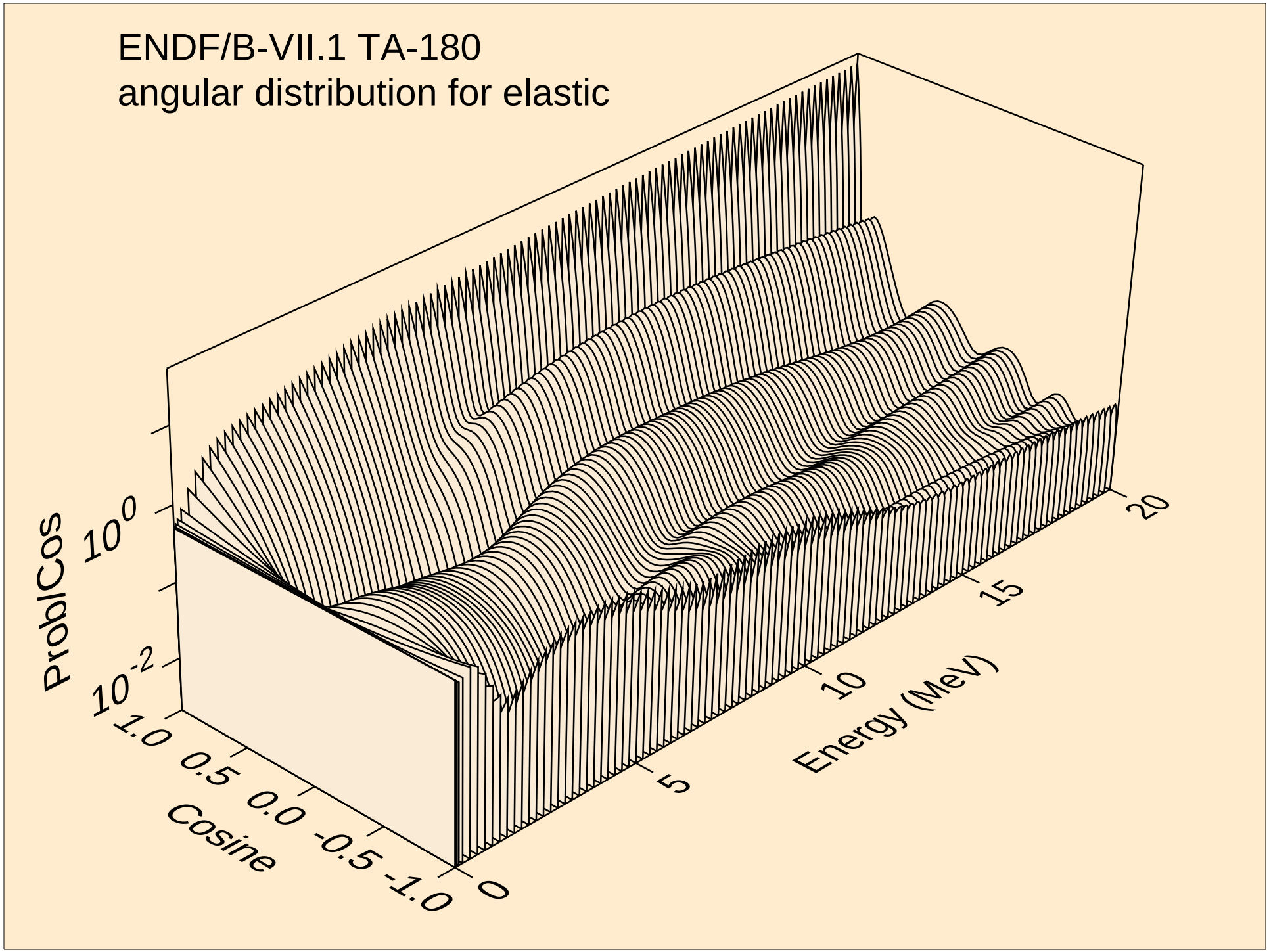

ENDF/B-VII.1 TA-180
Inelastic levels
Cross section (barns)
*10-3
160
140
120
100
80
60
40
20
0
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*6)
(n,n*7)
(n,n*8)
(n,n*9)
(n,n*10)

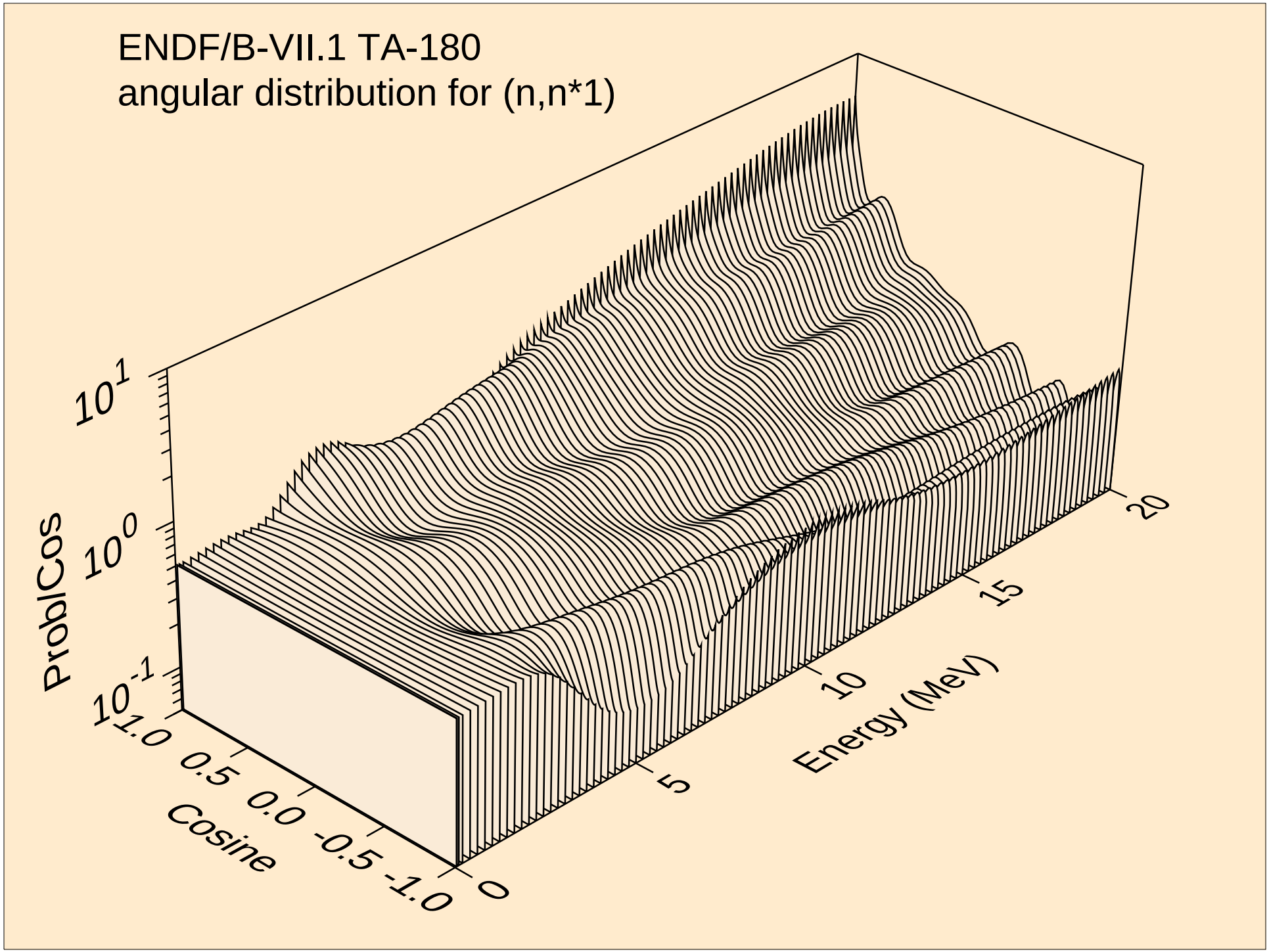

ENDF/B-VII.1 TA-180
Inelastic levels
250
*10-3
200
150
100
50
0
Cross section (barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*11)
(n,n*12)
(n,n*13)
(n,n*14)
(n,n*15)

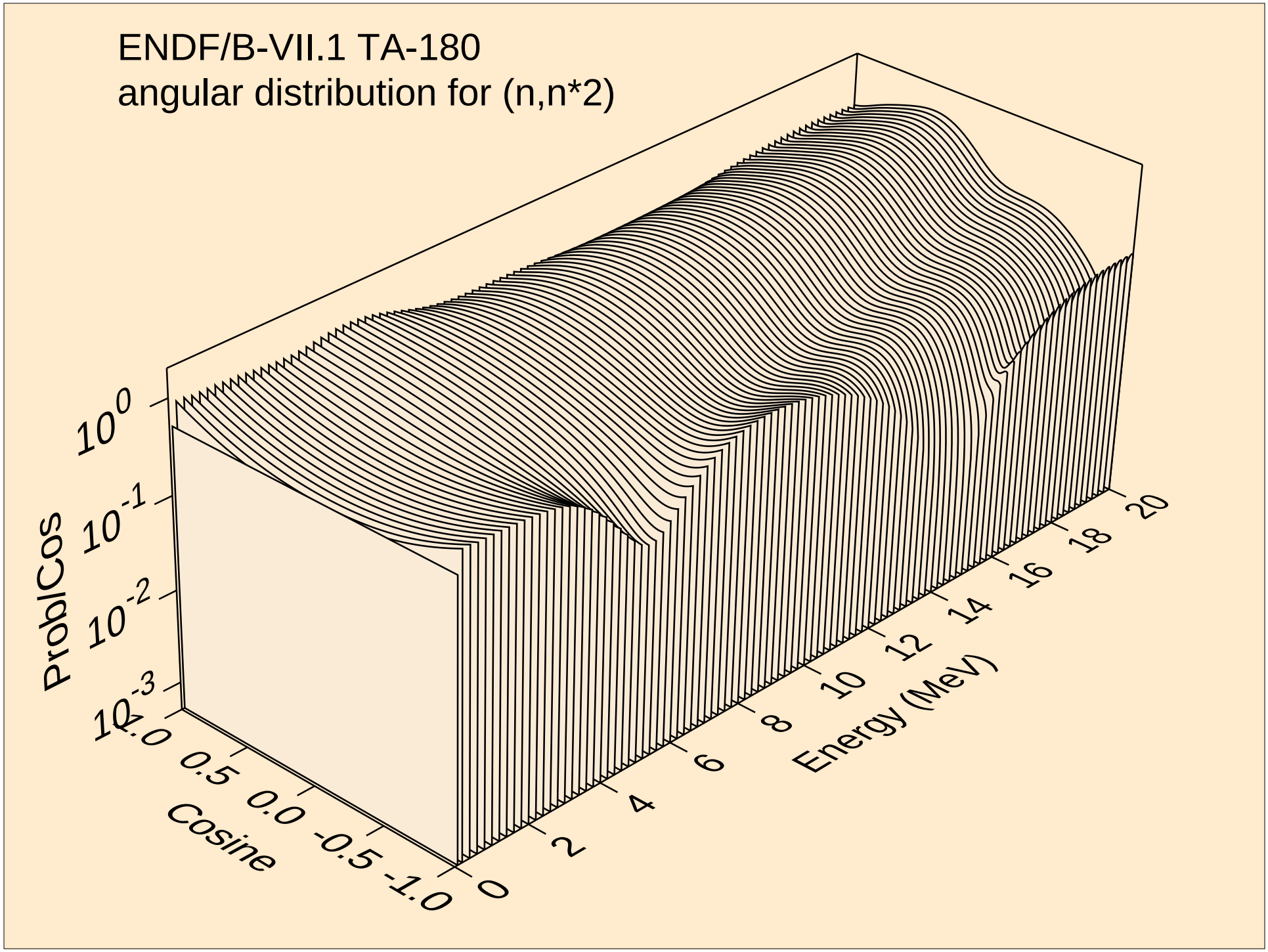

ENDF/B-VII.1 TA-180
Inelastic levels
250
*10-3
200
150
100
50
0
Cross section (barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*16)
(n,n*17)
(n,n*18)
(n,n*19)
(n,n*20)

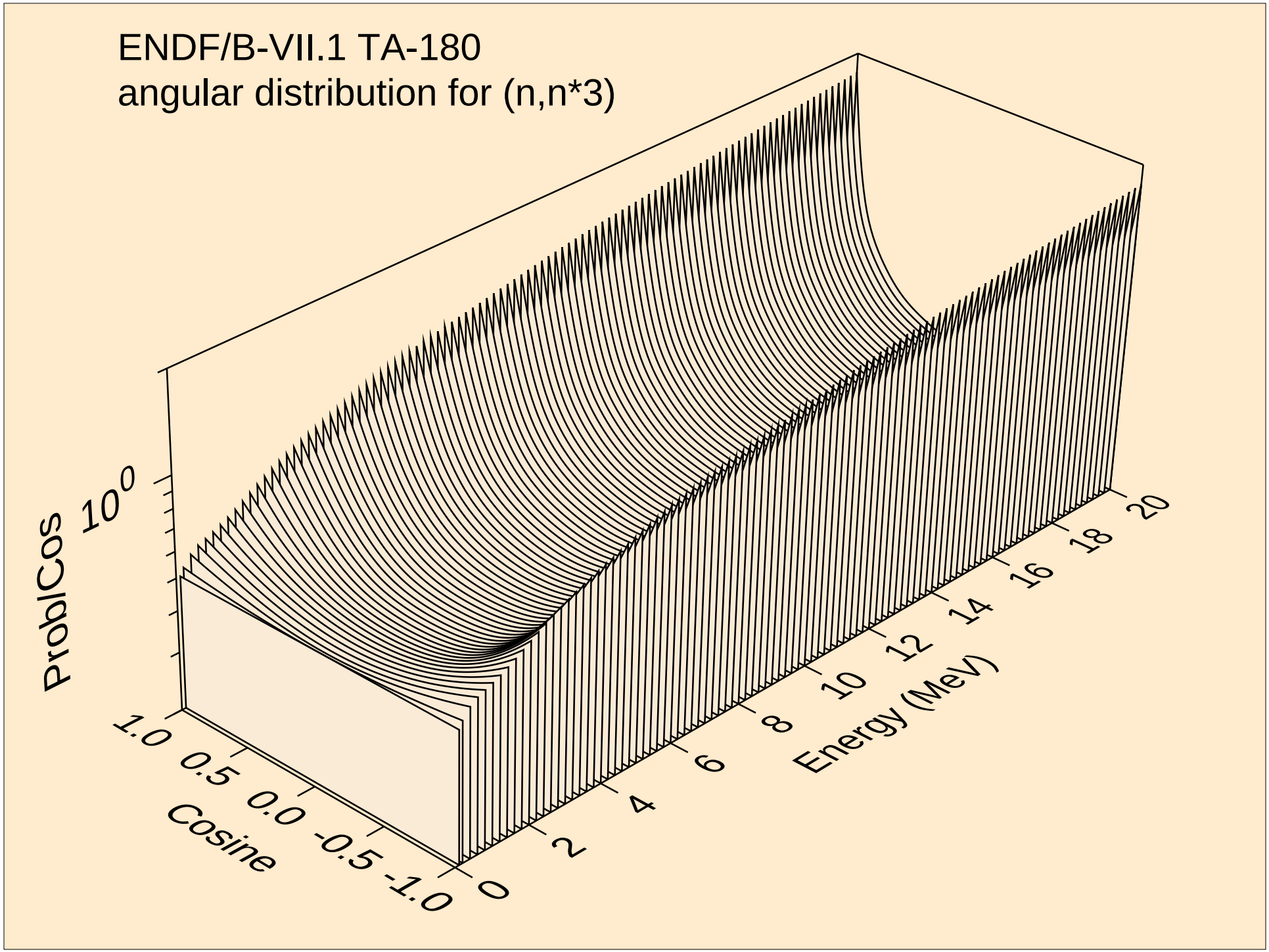

ENDF/B-VII.1 TA-180
Threshold reactions
(n,2n)
(n,3n)
(n,n*)p
(n,n*c)
(n,d)
Cross section (barns)
Energy (MeV)
0.0
0.5
1.0
1.5
2.0
2.5
0
2
4
6
8
10
12
14
16
18
20

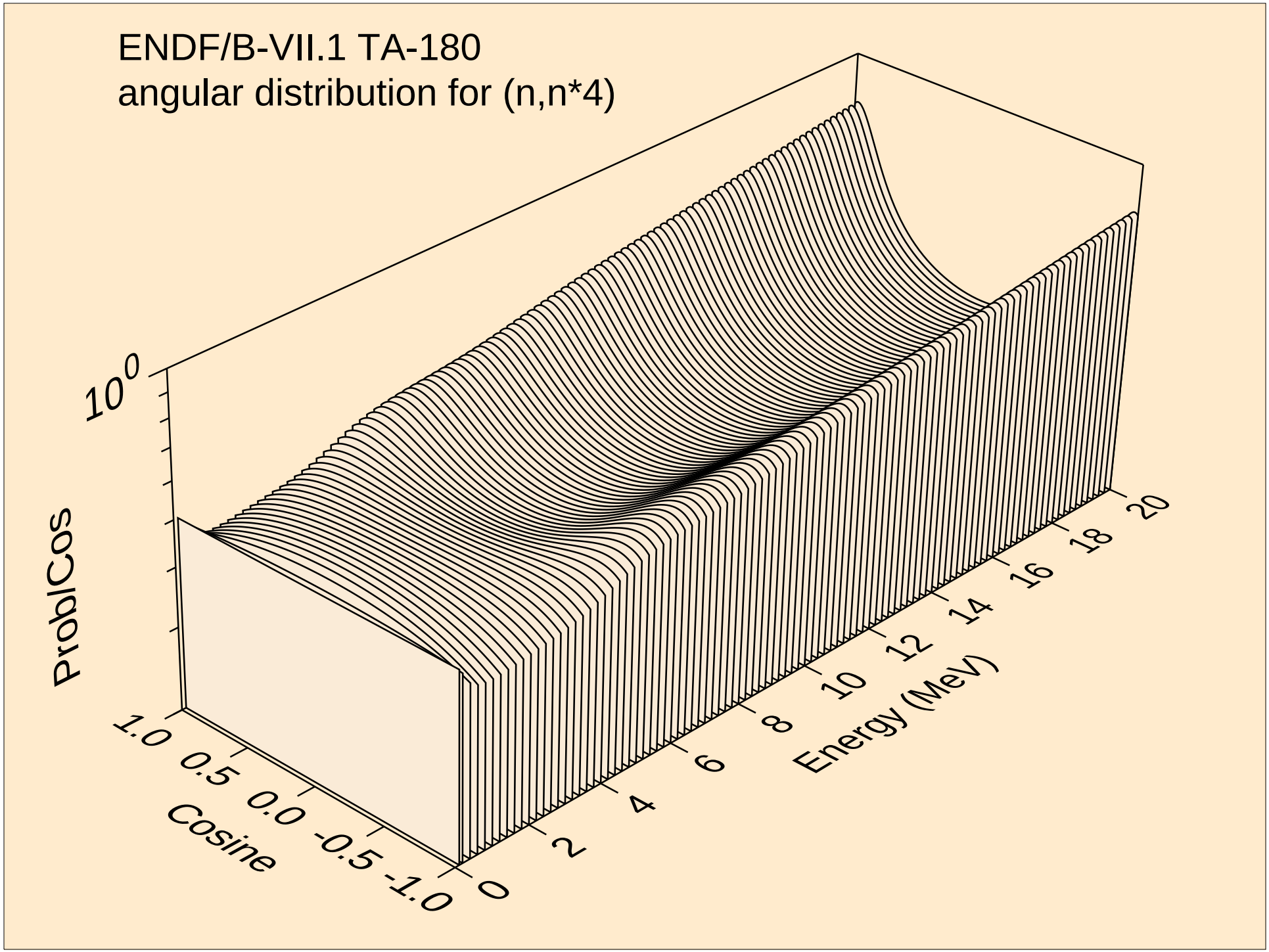

ENDF/B-VII.1 TA-180
Threshold reactions
*10-3
12
10
8
6
4
2
0
(n,t)
(n,xd)
(n,xt)
Cross section (barns)
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

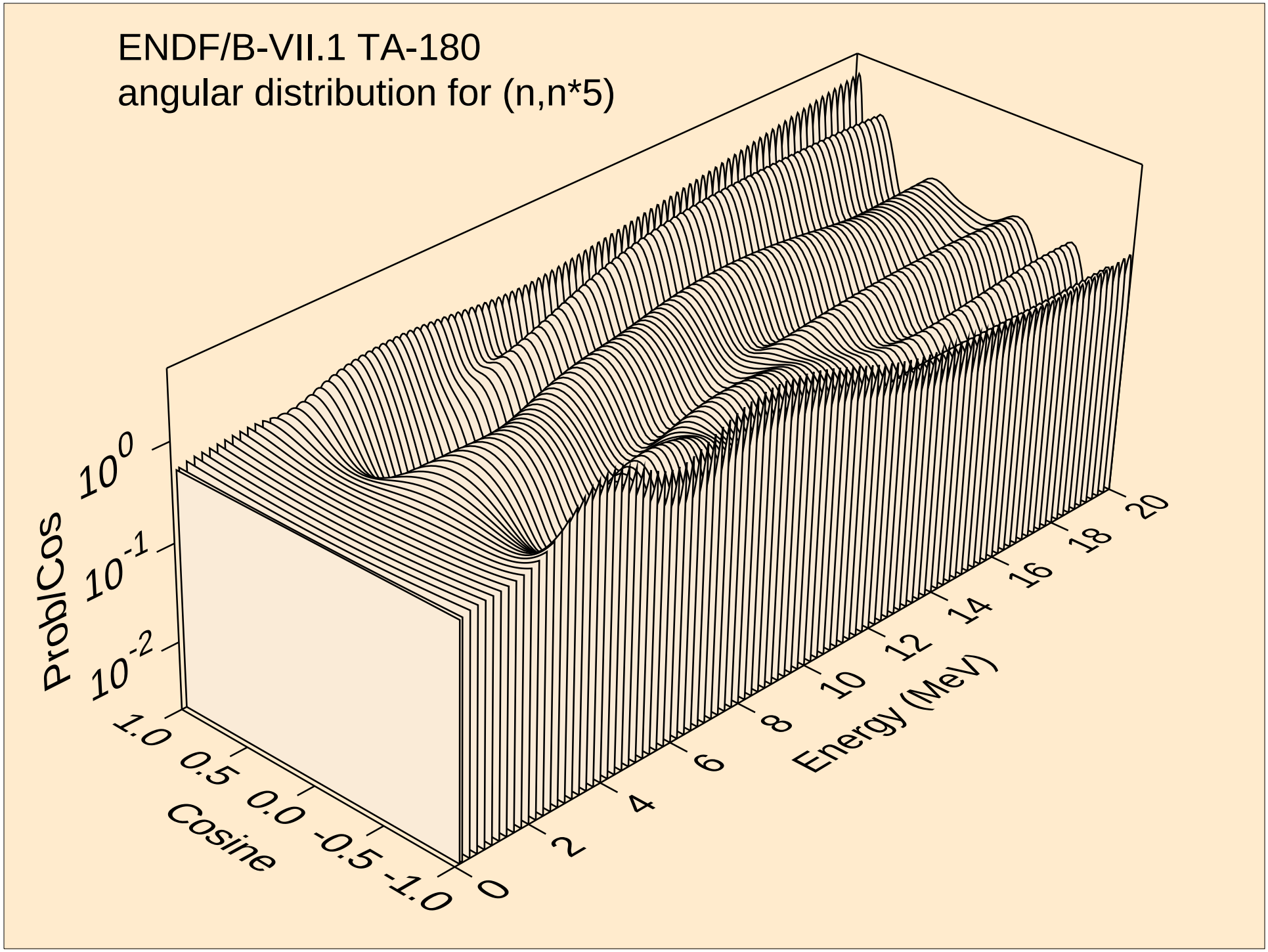

ENDF/B-VII.1 TA-180
angular distribution for elastic
ProbICos
10^{0}
10^{-2}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)

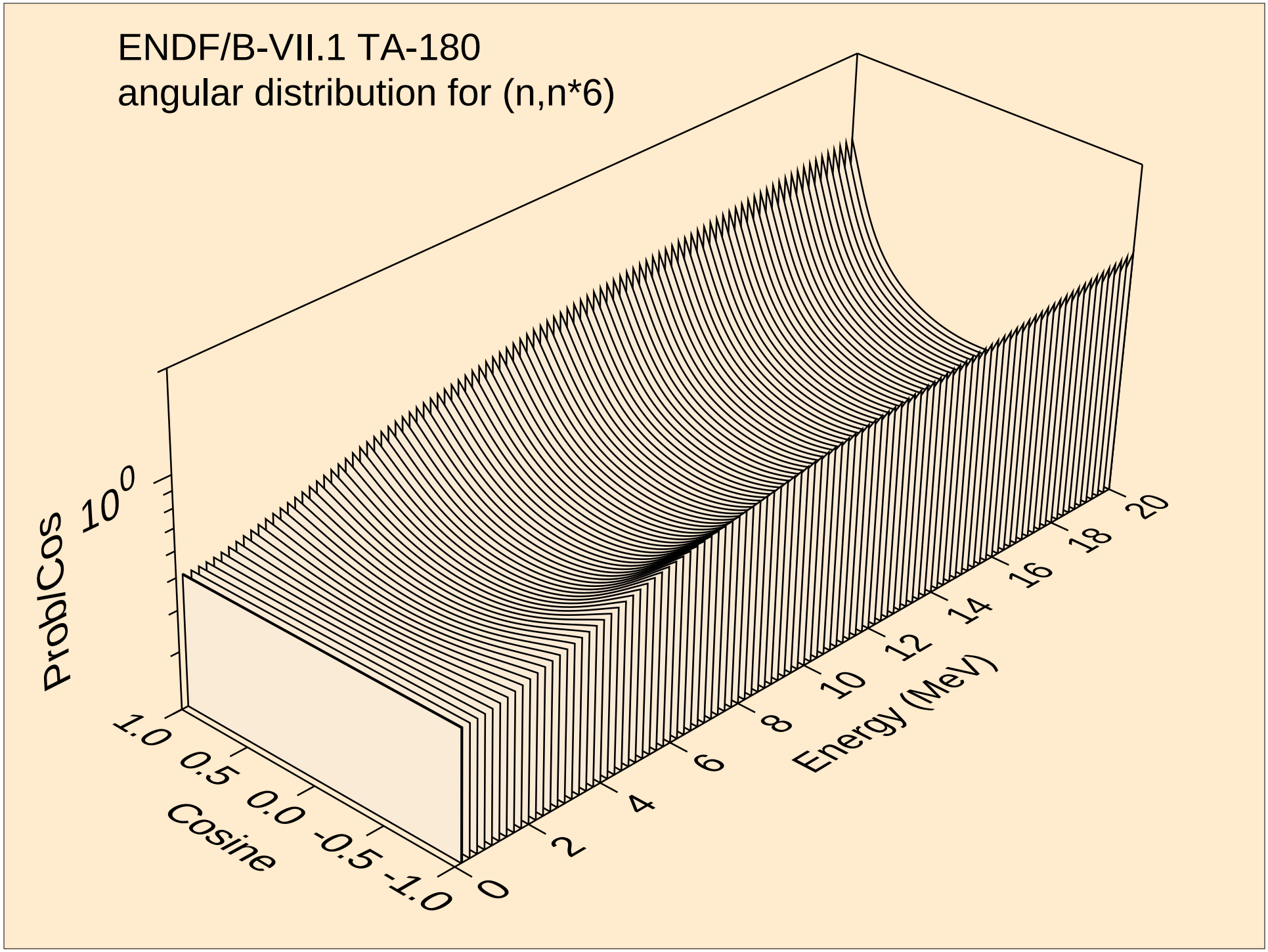

ENDF/B-VII.1 TA-180
angular distribution for (n,n*1)
ProbCos
10^{1}
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)

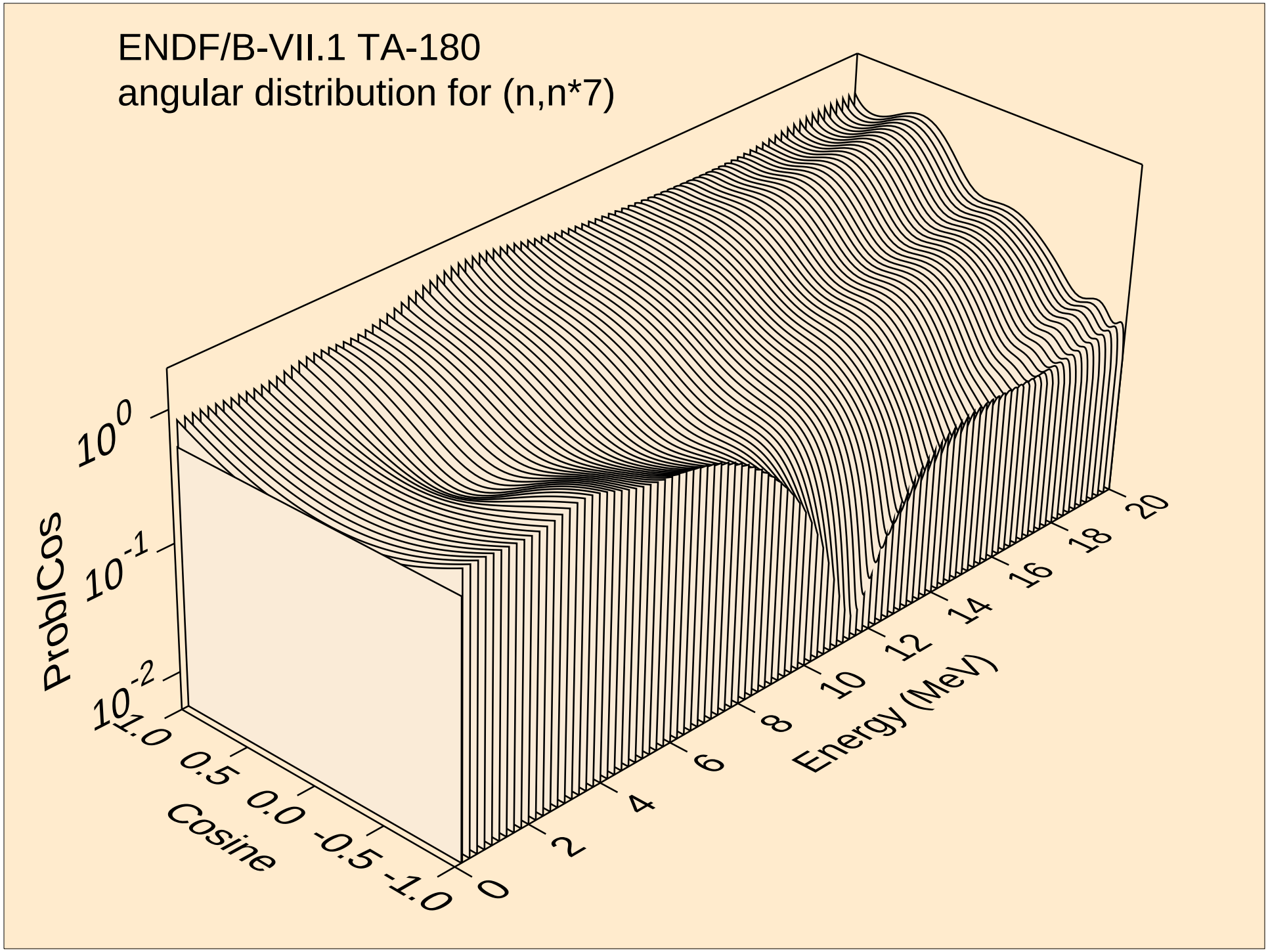

ENDF/B-VII.1 TA-180
angular distribution for (n,n*2)
ProbICos
10^0
10^-1
10^-2
10^-3
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

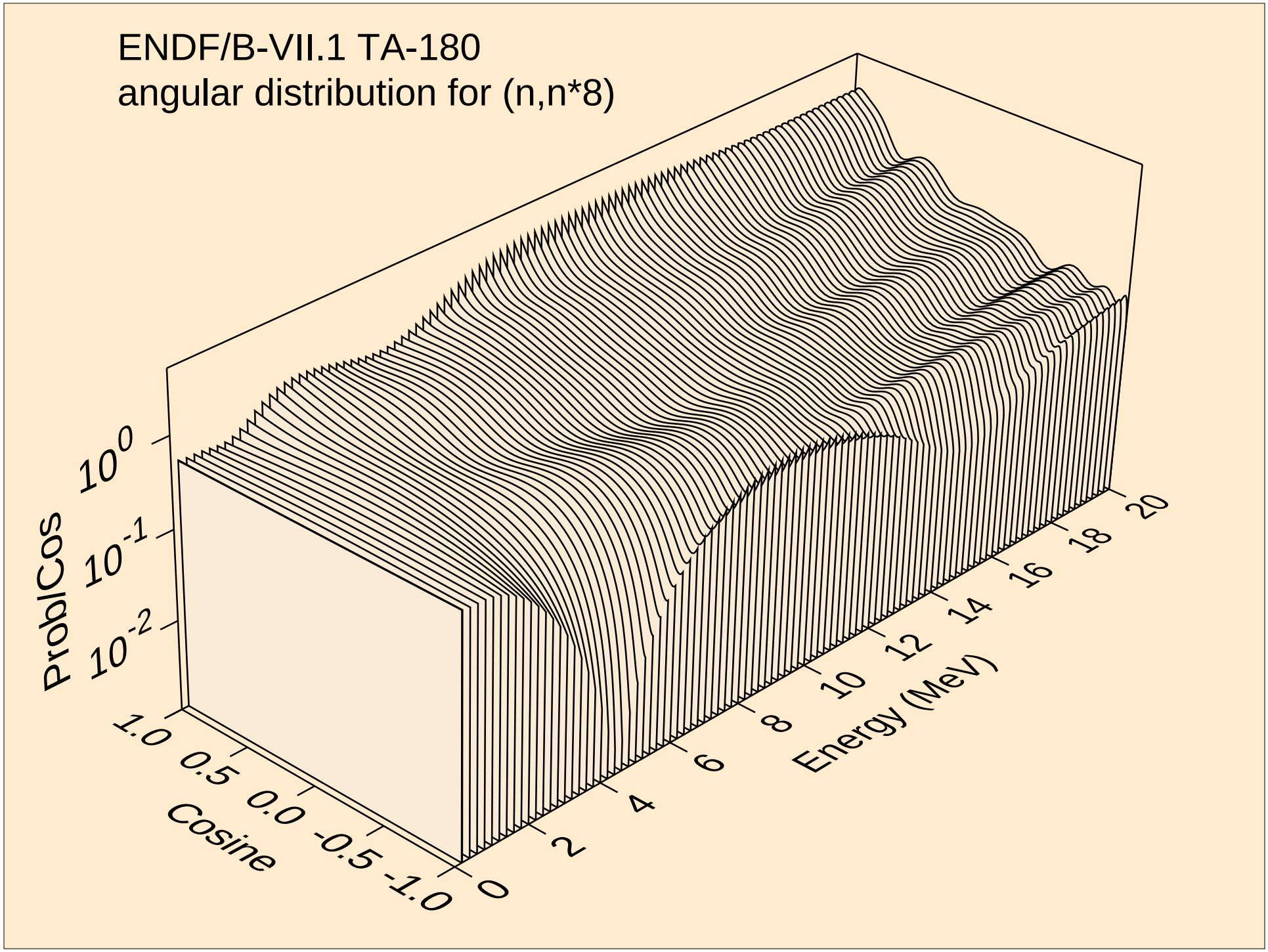

ENDF/B-VII.1 TA-180
angular distribution for (n,n*3)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

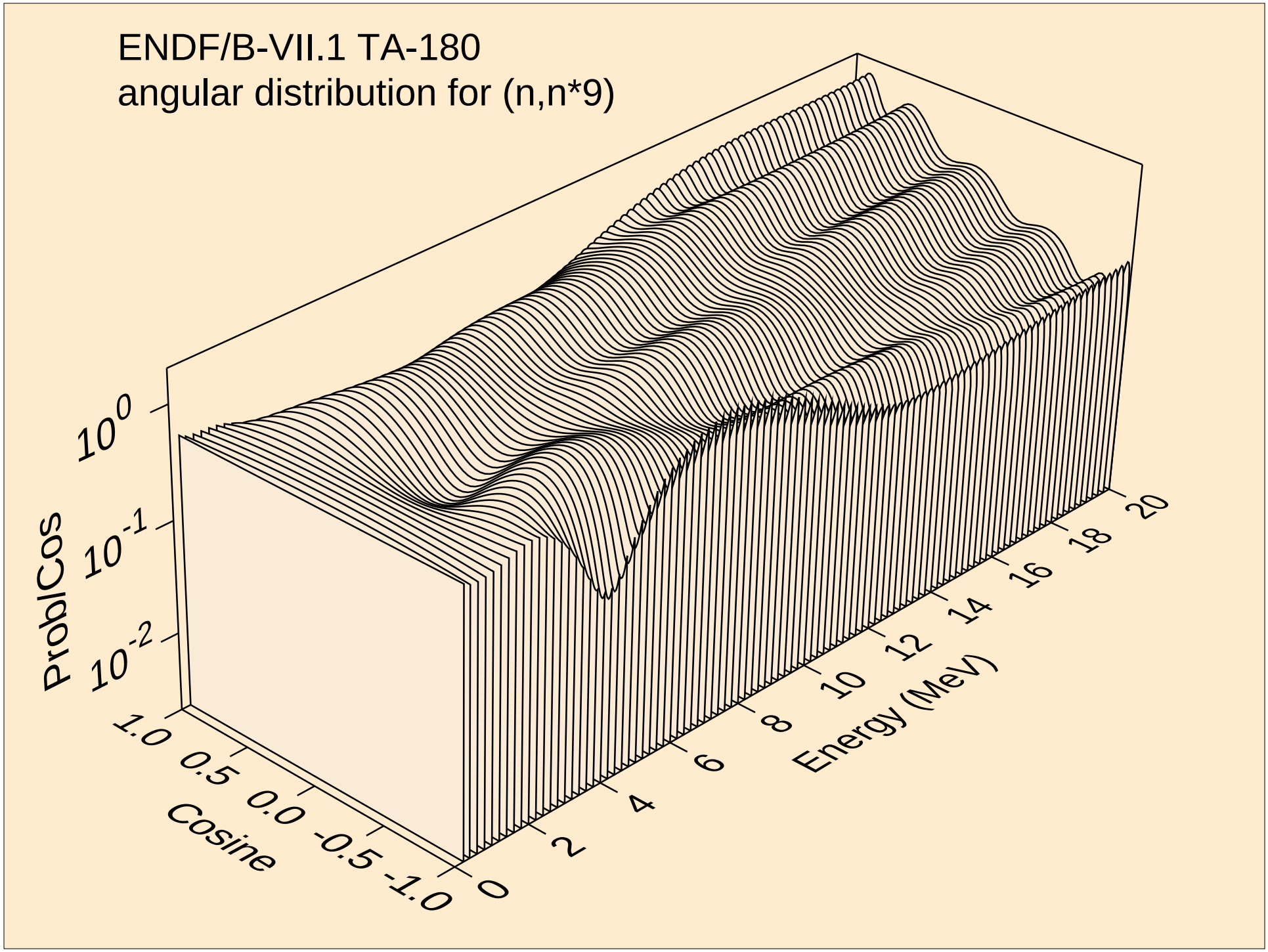

ENDF/B-VII.1 TA-180
angular distribution for (n,n*4)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

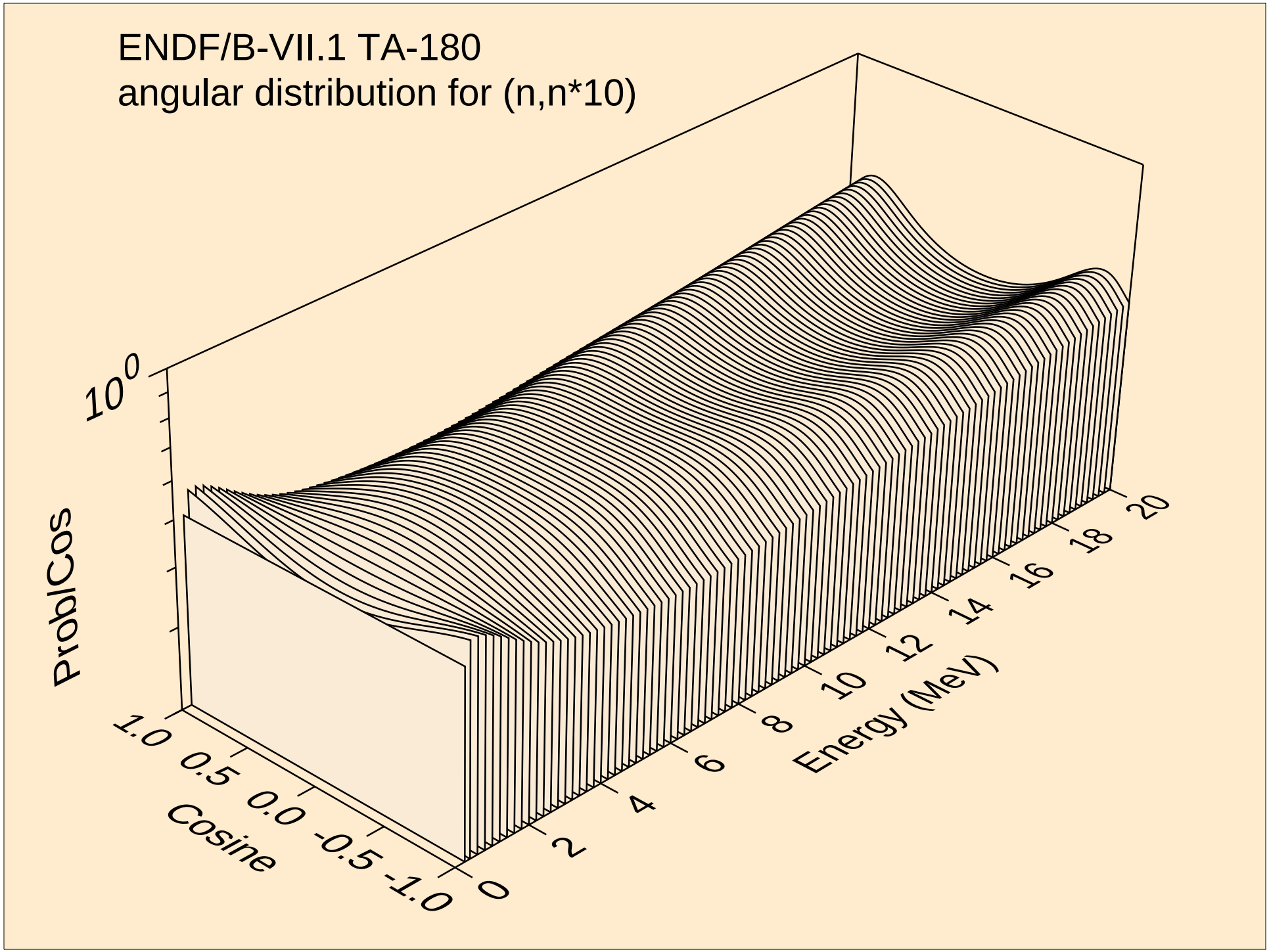

ENDF/B-VII.1 TA-180
angular distribution for (n,n*5)
ProbICos
10^{0}
10^{-1}
10^{-2}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

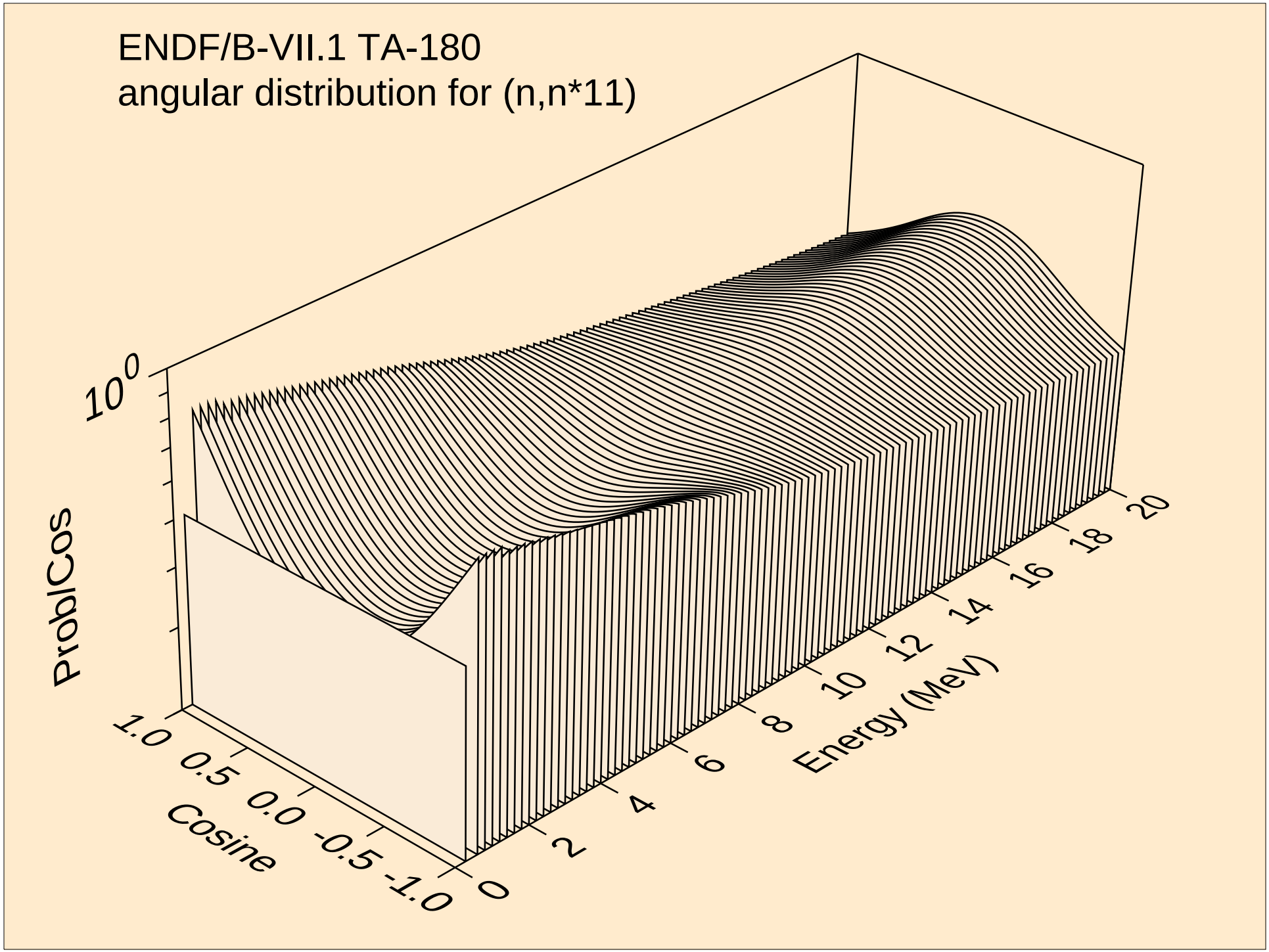

ENDF/B-VII.1 TA-180
angular distribution for (n,n*6)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

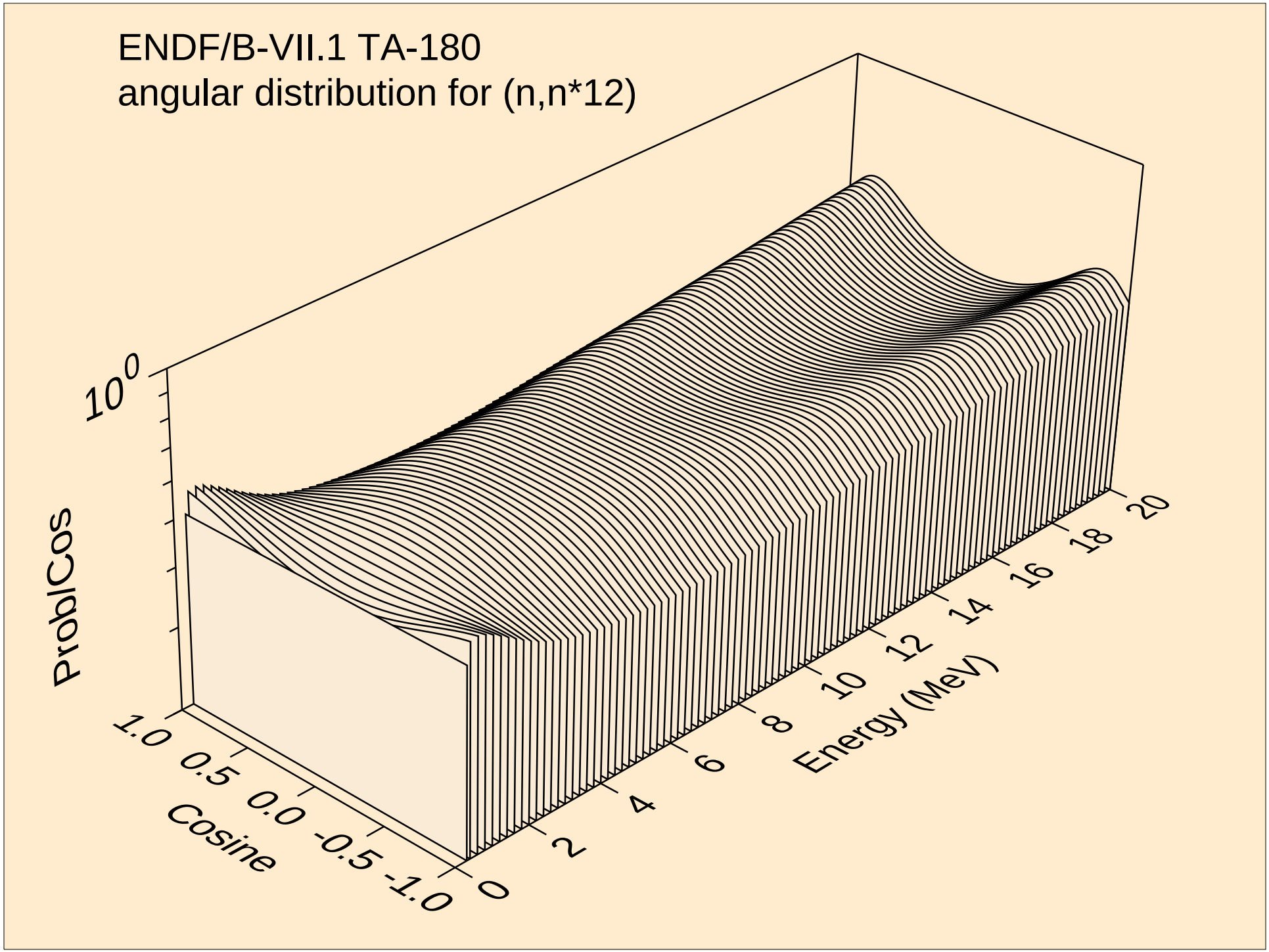

ENDF/B-VII.1 TA-180
angular distribution for (n,n*7)
ProbICos
10^{0}
10^{-1}
10^{-2}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

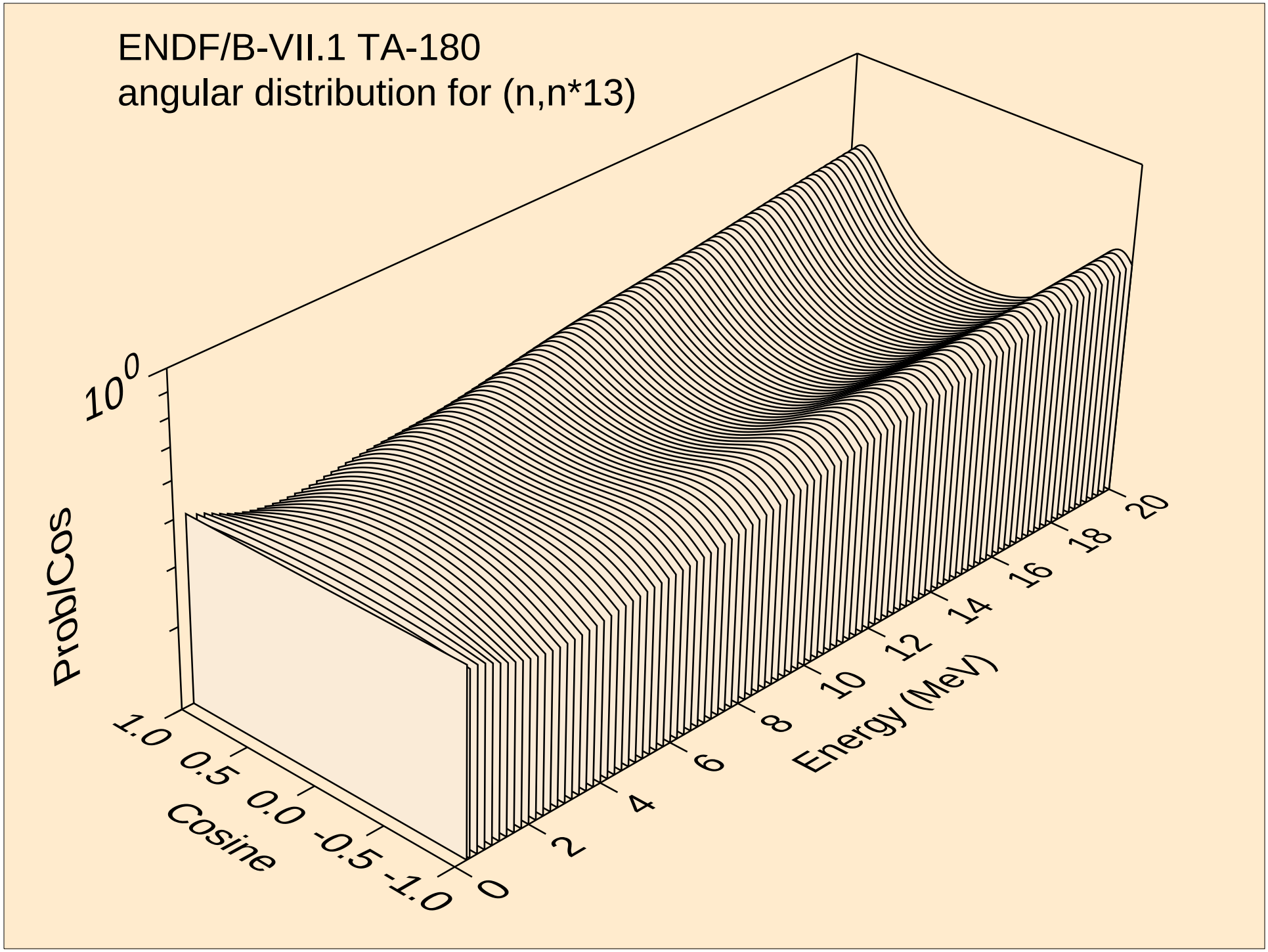

ENDF/B-VII.1 TA-180
angular distribution for (n,n*8)
ProbCos
10^{0}
10^{-1}
10^{-2}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

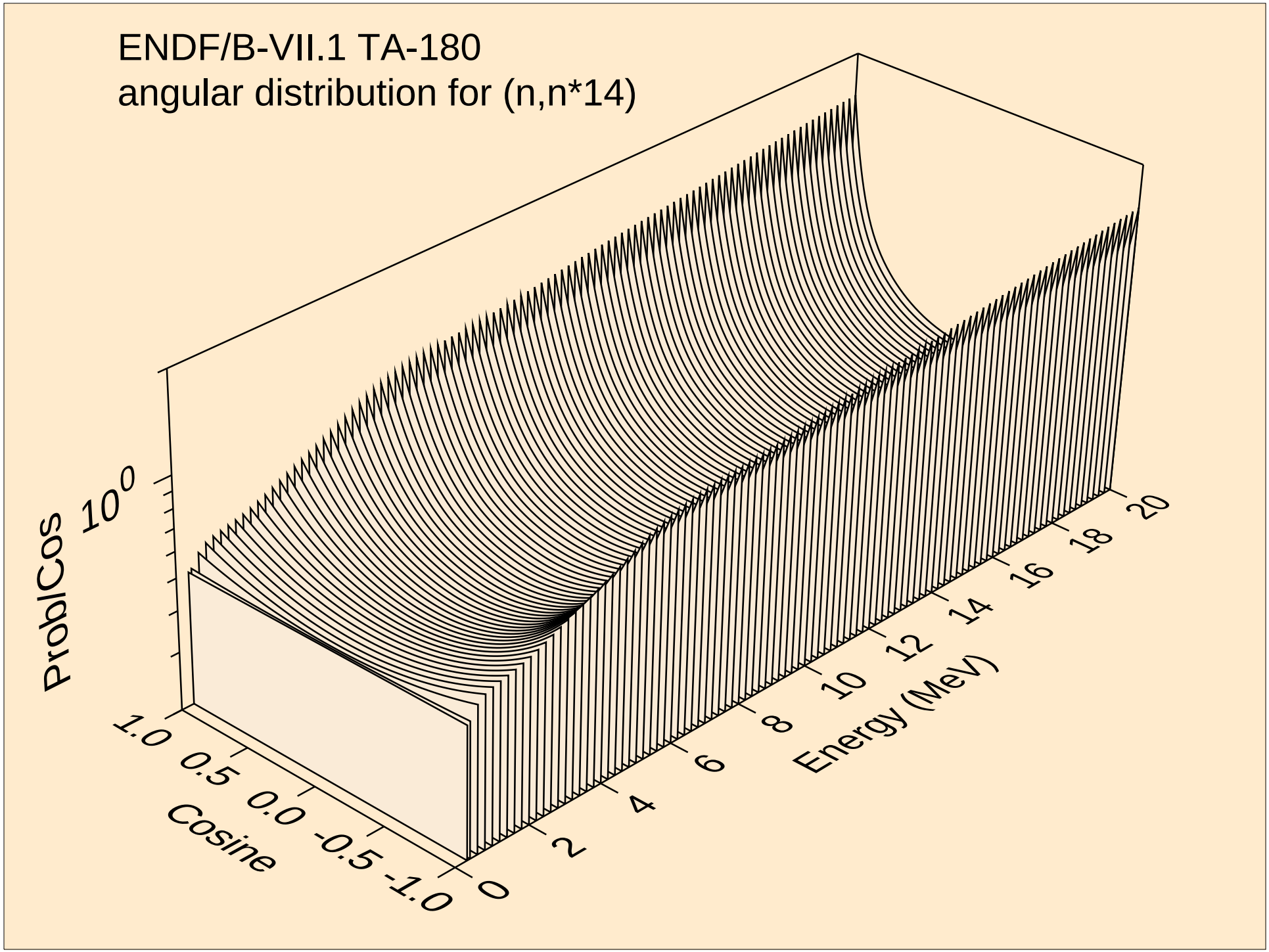

ENDF/B-VII.1 TA-180
angular distribution for (n,n*9)
ProbCos
10^{0}
10^{-1}
10^{-2}
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

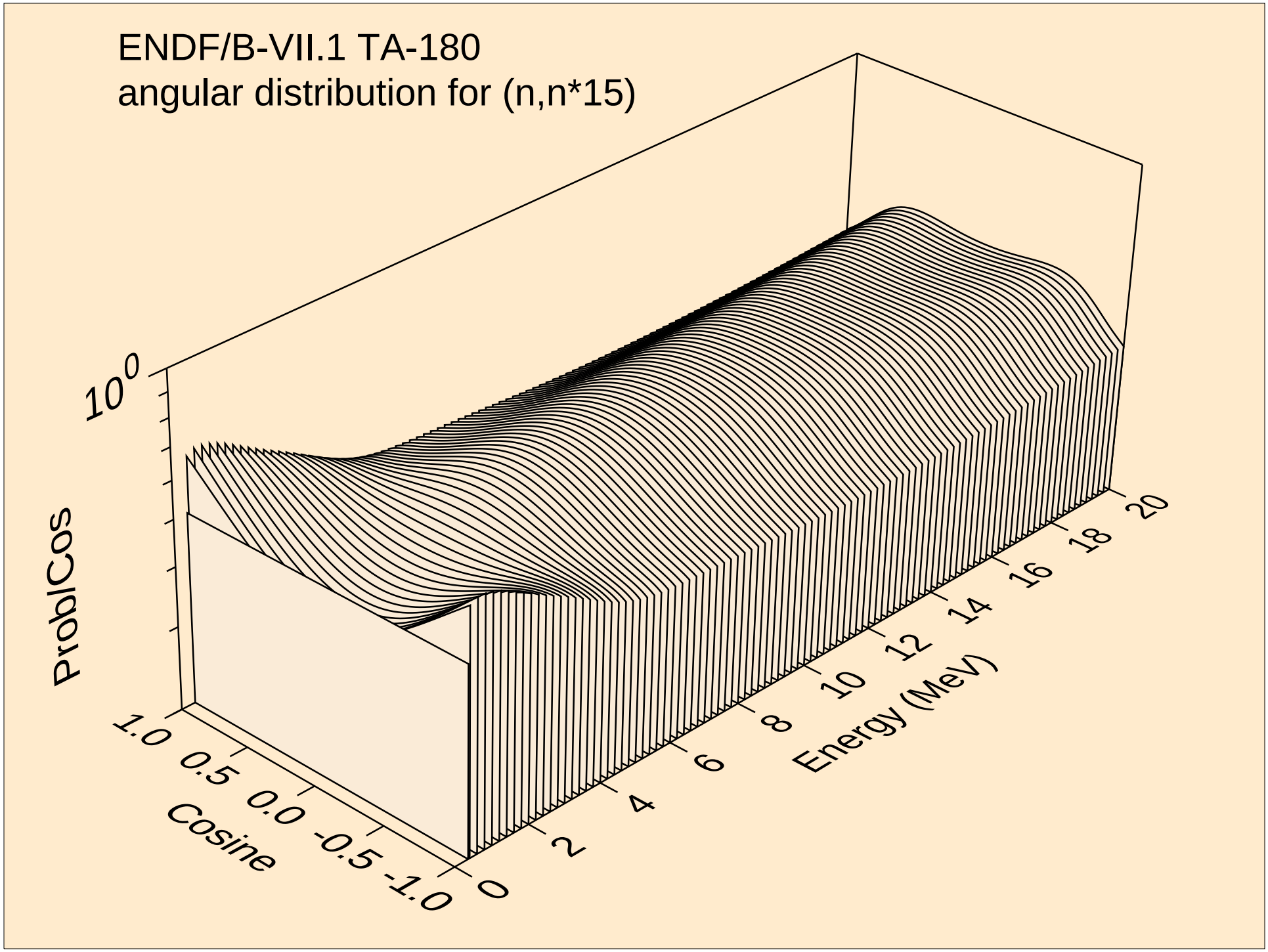

ENDF/B-VII.1 TA-180
angular distribution for (n,n*10)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

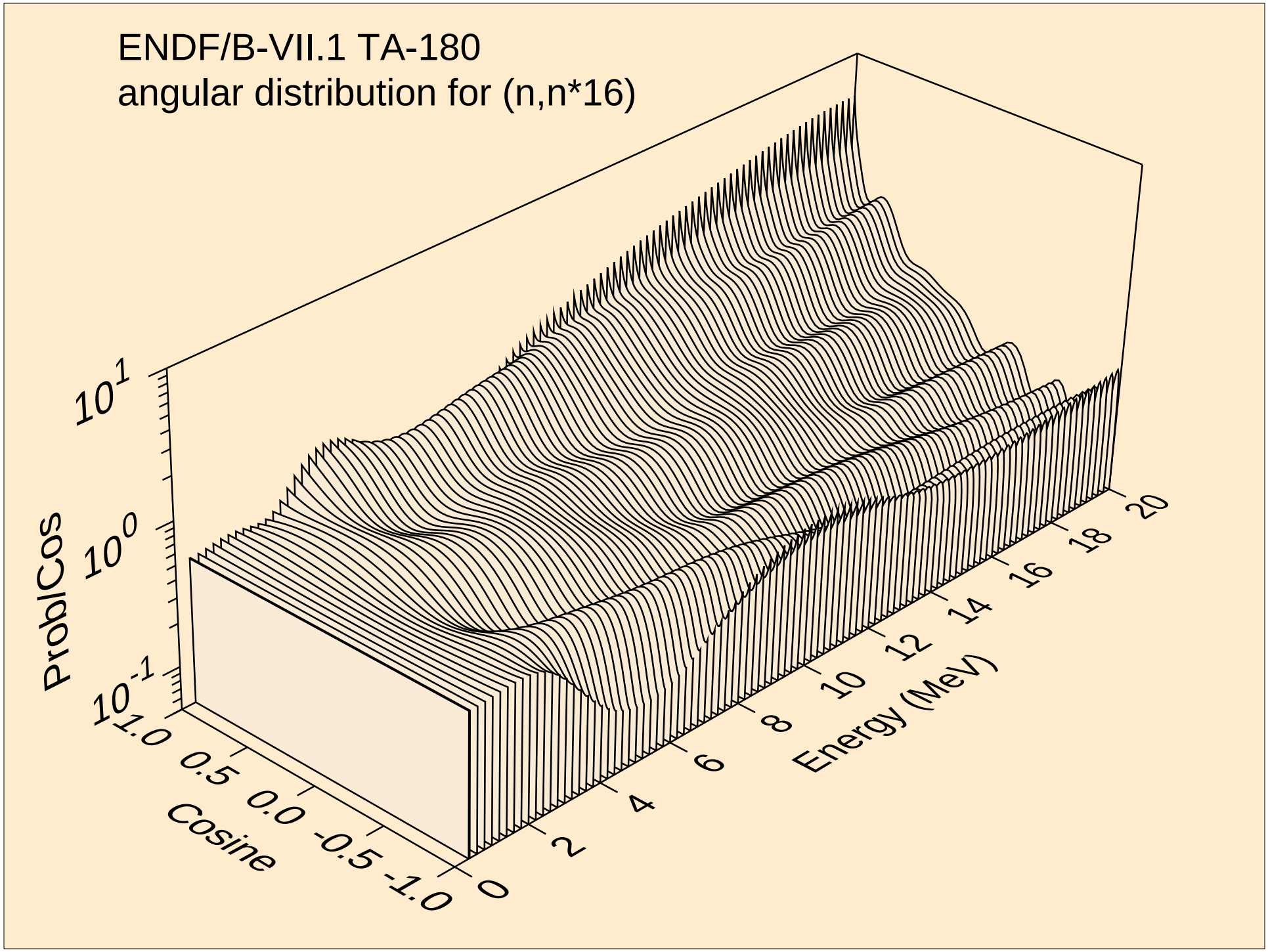

ENDF/B-VII.1 TA-180
angular distribution for (n,n*11)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

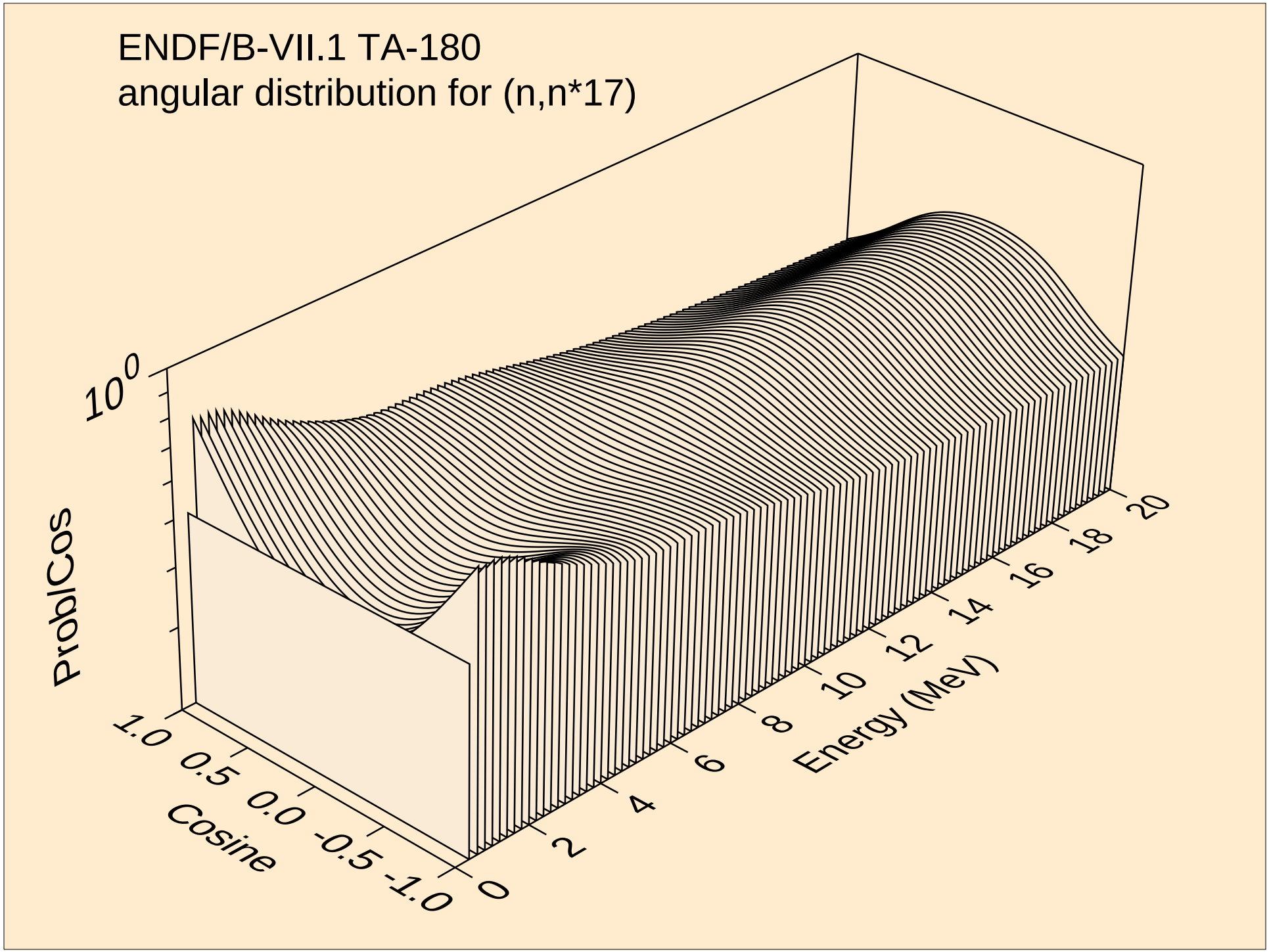

ENDF/B-VII.1 TA-180
angular distribution for (n,n*12)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

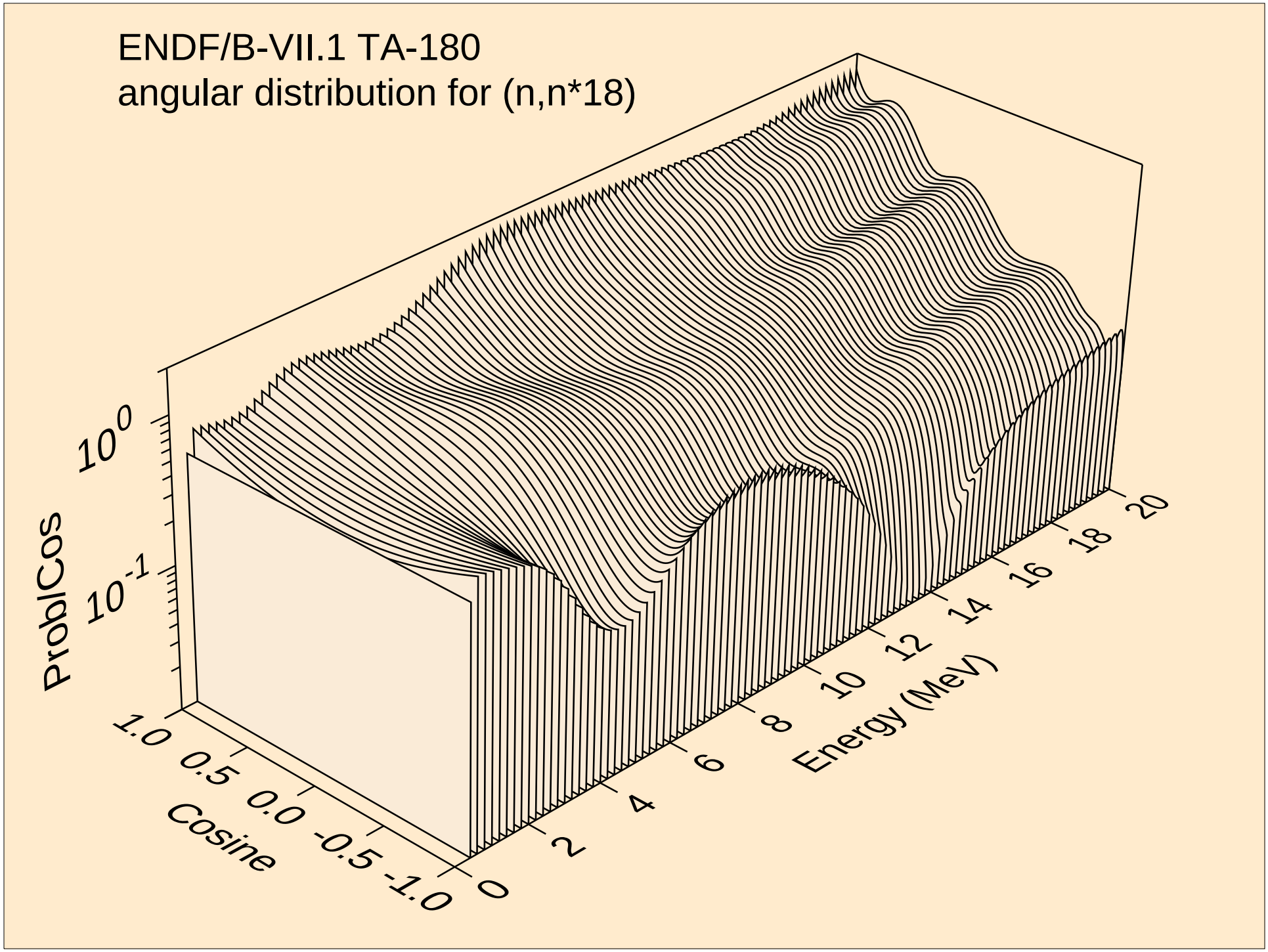

ENDF/B-VII.1 TA-180
angular distribution for (n,n*13)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

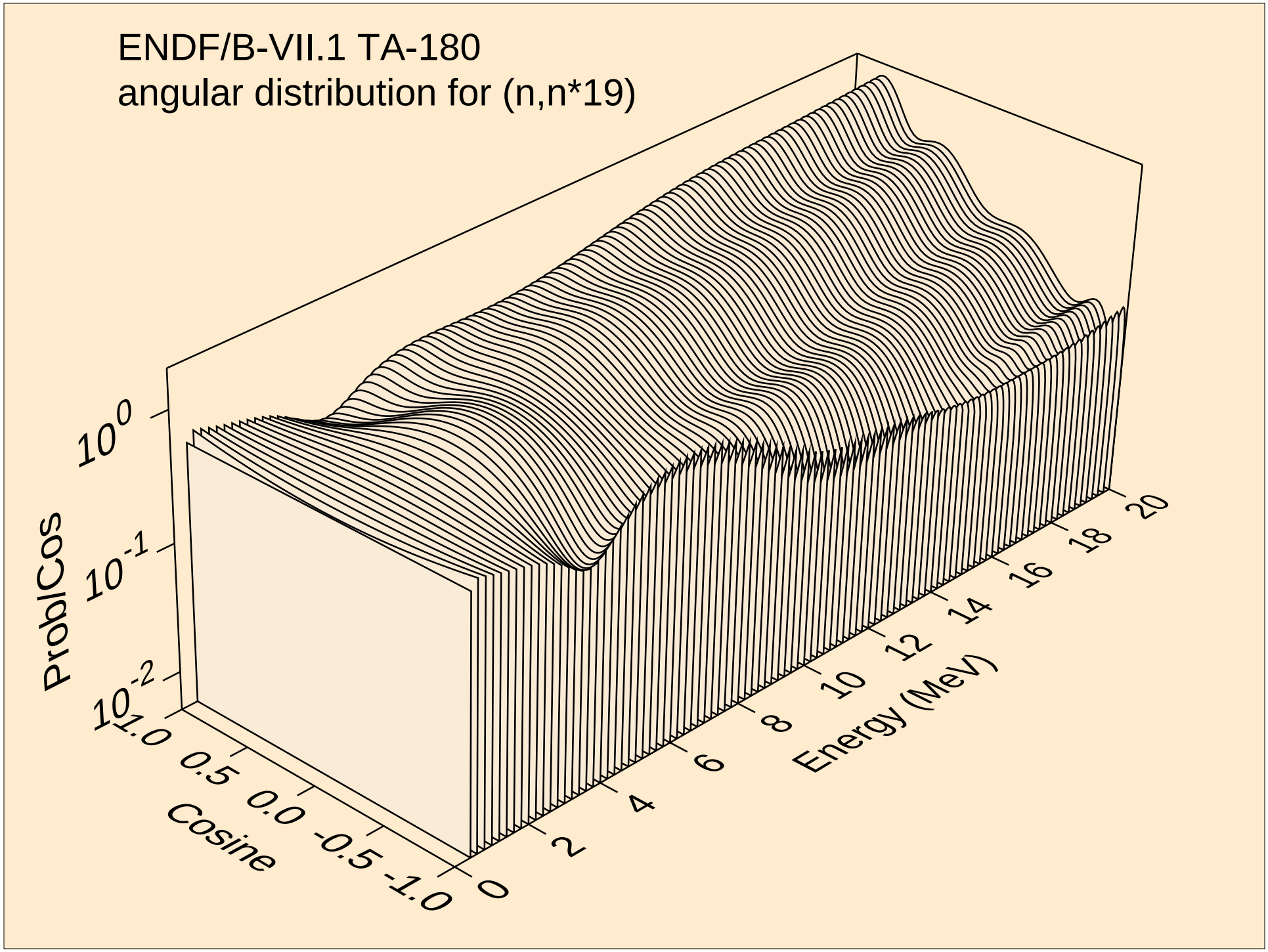

ENDF/B-VII.1 TA-180
angular distribution for (n,n*14)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

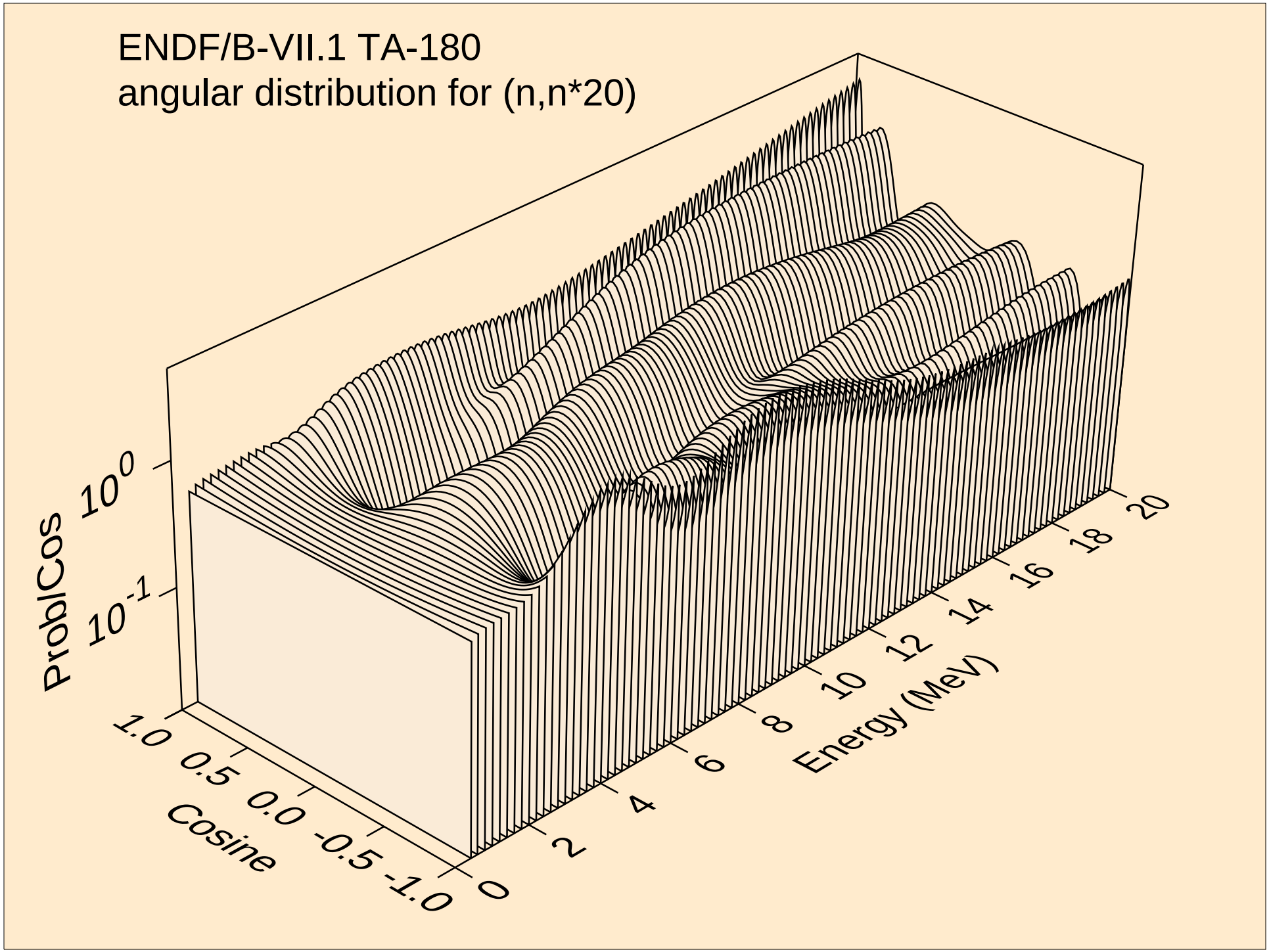

ENDF/B-VII.1 TA-180
angular distribution for (n,n*15)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

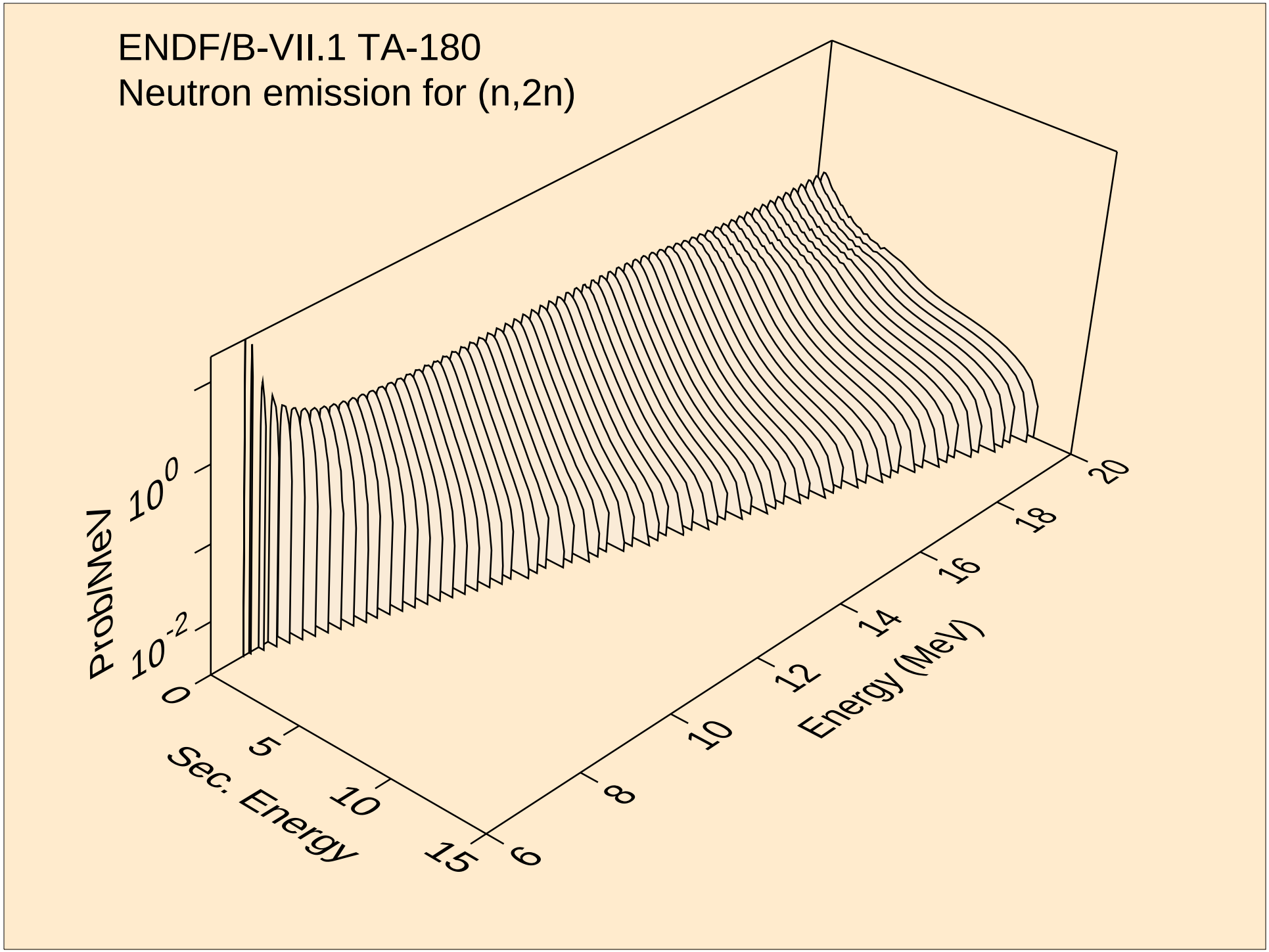

ENDF/B-VII.1 TA-180
angular distribution for (n,n*16)
ProbICos
10^{1}
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

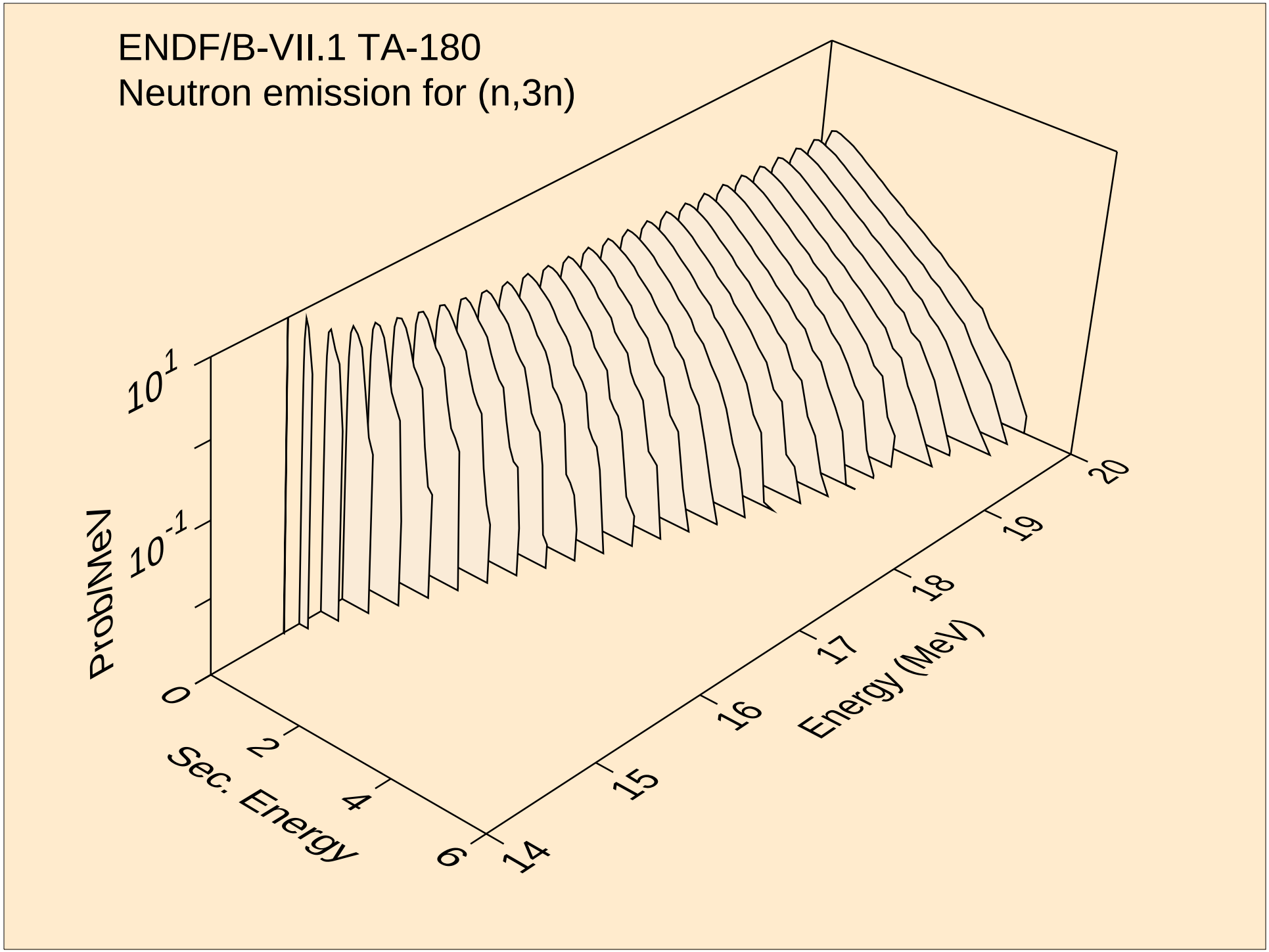

ENDF/B-VII.1 TA-180
angular distribution for (n,n*17)
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

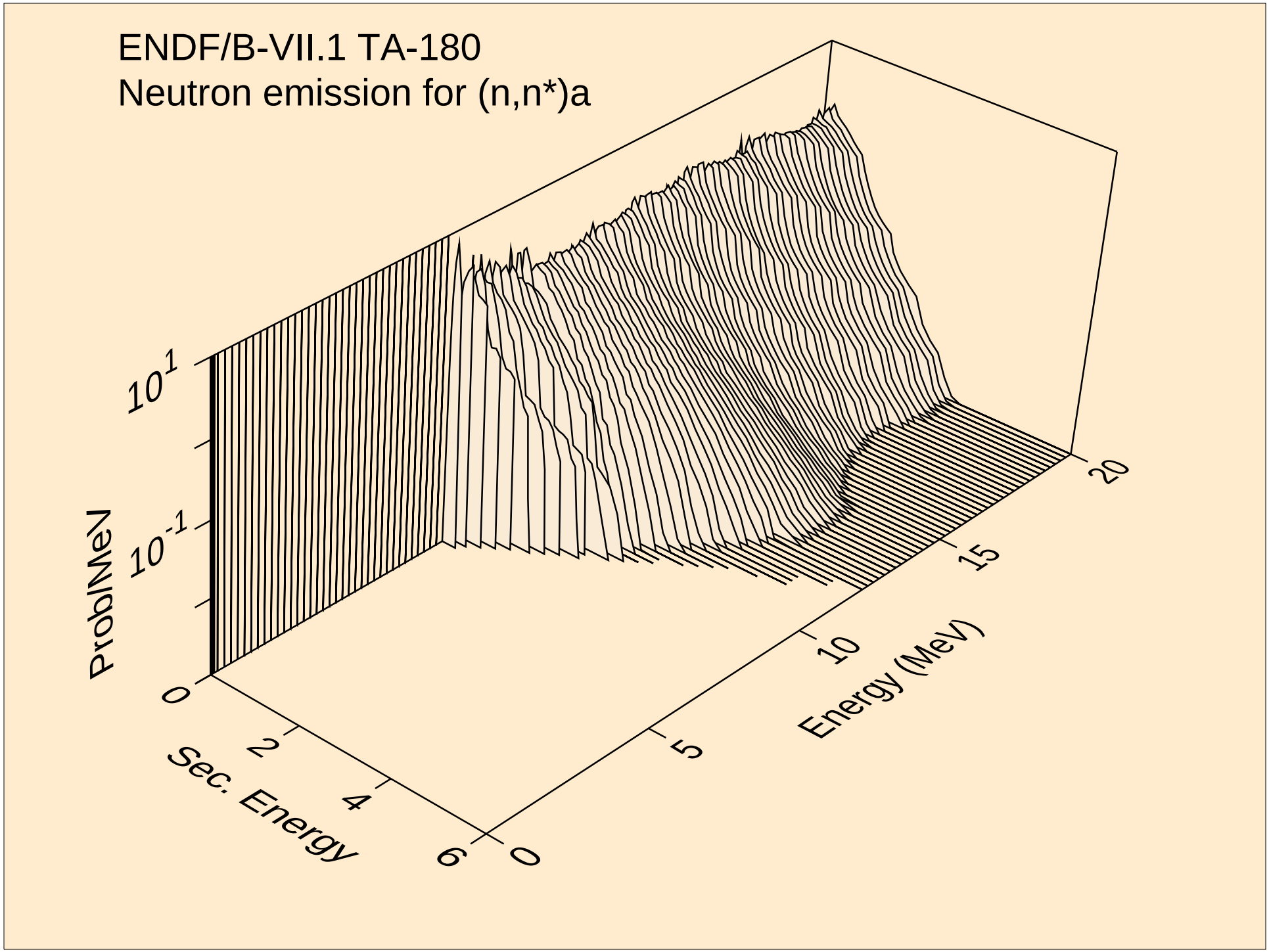

ENDF/B-VII.1 TA-180
angular distribution for (n,n*18)
ProbICos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

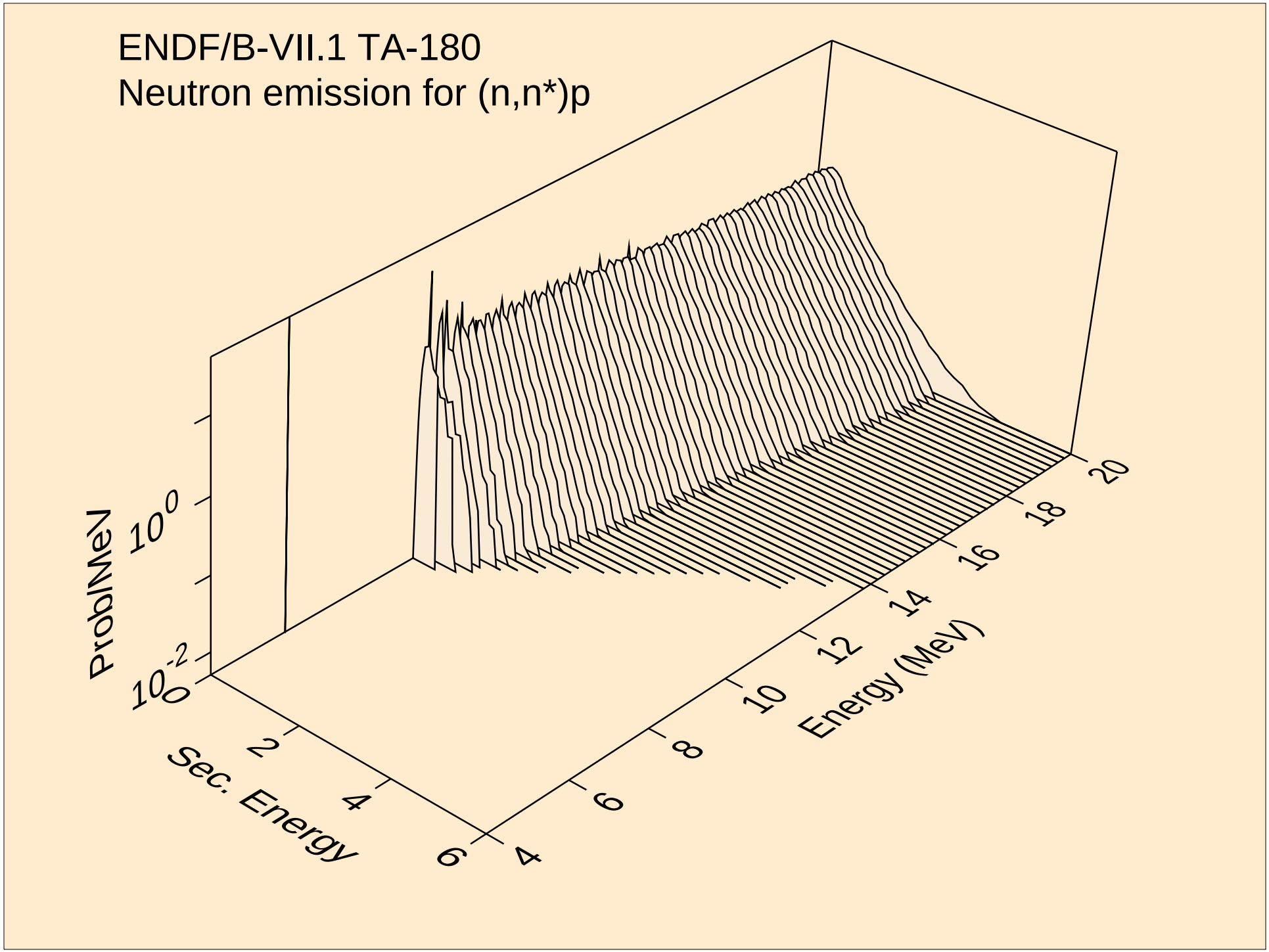

ENDF/B-VII.1 TA-180
angular distribution for (n,n*19)
ProbCos
10^{0}
10^{-1}
10^{-2}
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

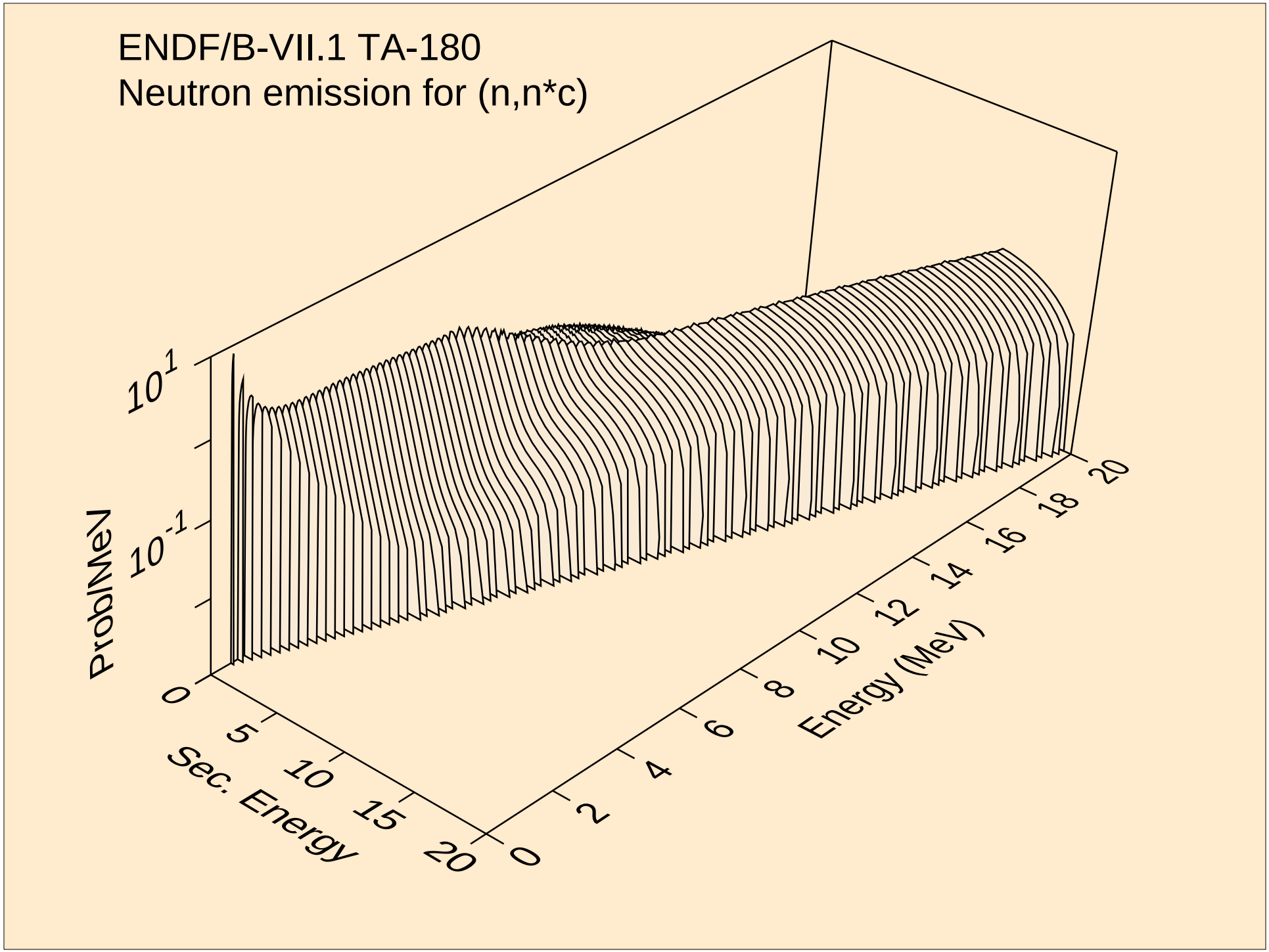

ENDF/B-VII.1 TA-180
angular distribution for (n,n*20)
ProbICos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

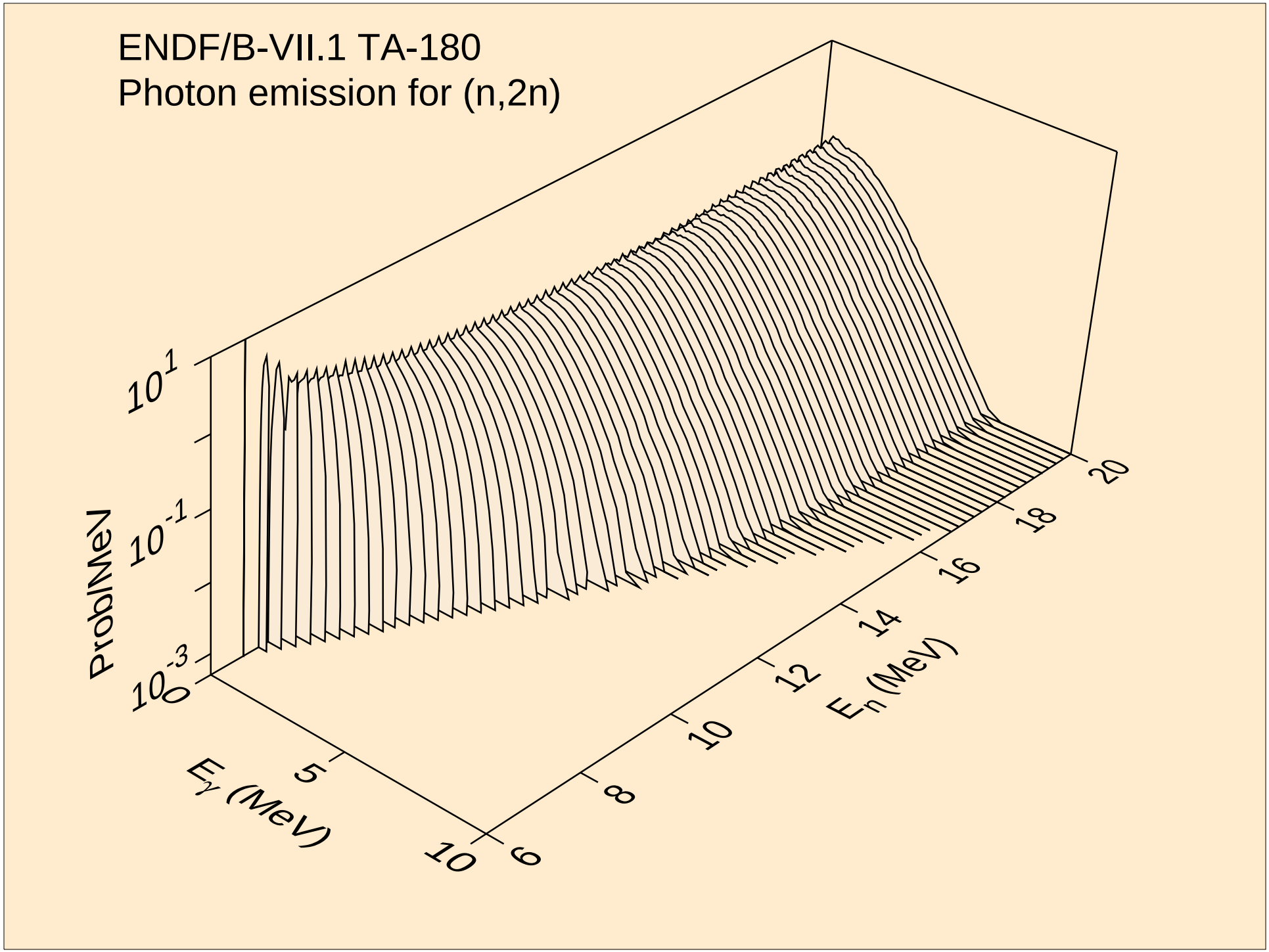

ENDF/B-VII.1 TA-180
Neutron emission for (n,2n)
Prob/MeV
10^{0}
10^{-2}
0
Sec. Energy
5
10
15
Energy (MeV)
6
8
10
12
14
16
18
20

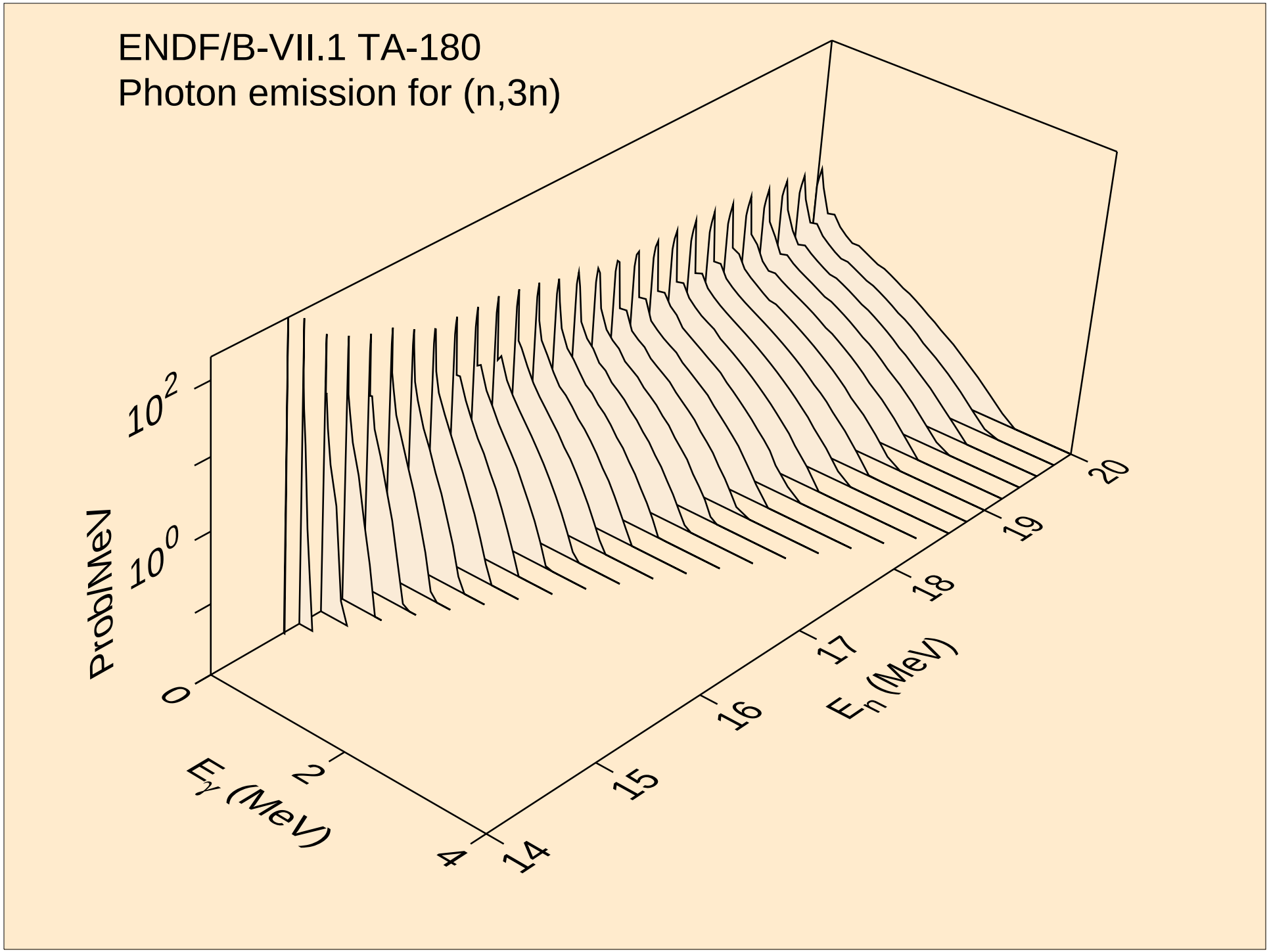

ENDF/B-VII.1 TA-180
Neutron emission for (n,3n)
Prob/MeV
10^{1}
10^{-1}
0
2
4
6
Sec. Energy
14
15
16
17
18
19
20
Energy (MeV)

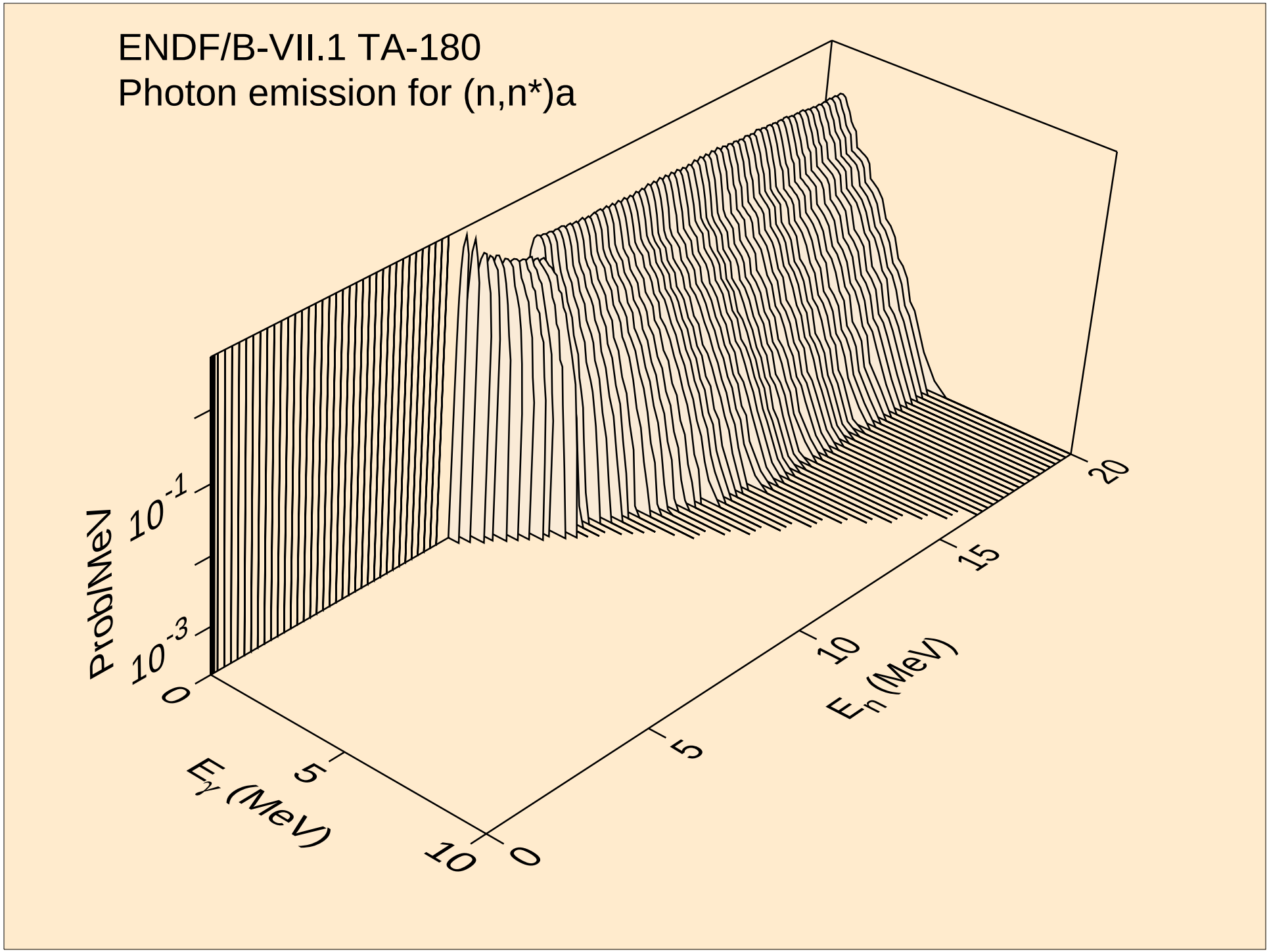

ENDF/B-VII.1 TA-180
Neutron emission for (n,n*)a
Prob/MeV
10^{1}
10^{-1}
0
2
4
6
Sec. Energy
0
5
10
15
20
Energy (MeV)

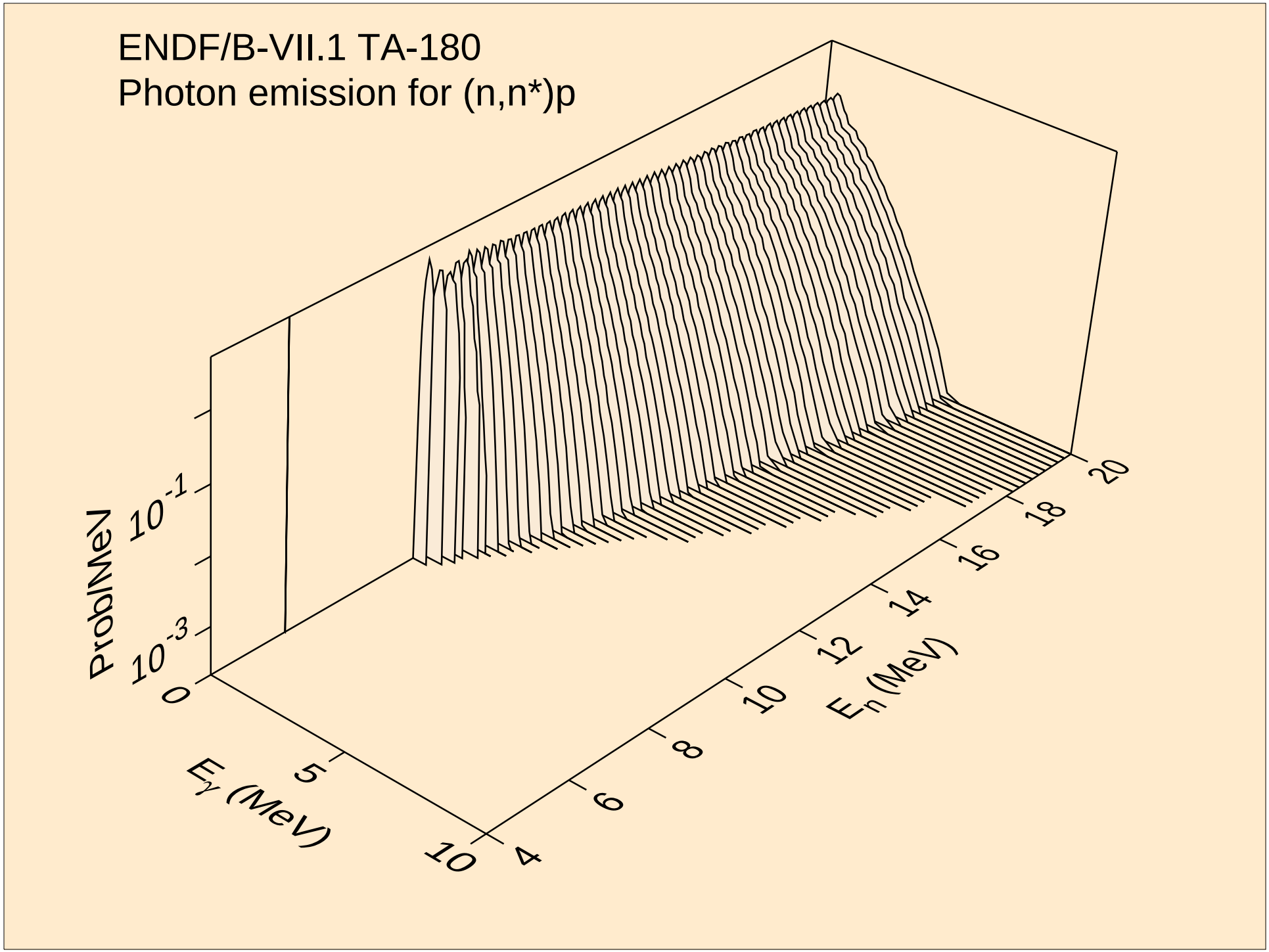

ENDF/B-VII.1 TA-180
Neutron emission for (n,n*)p
Prob/MeV
10^{0}
10^{-2}
0
2
4
6
Sec. Energy
4
6
8
10
12
14
16
18
20
Energy (MeV)

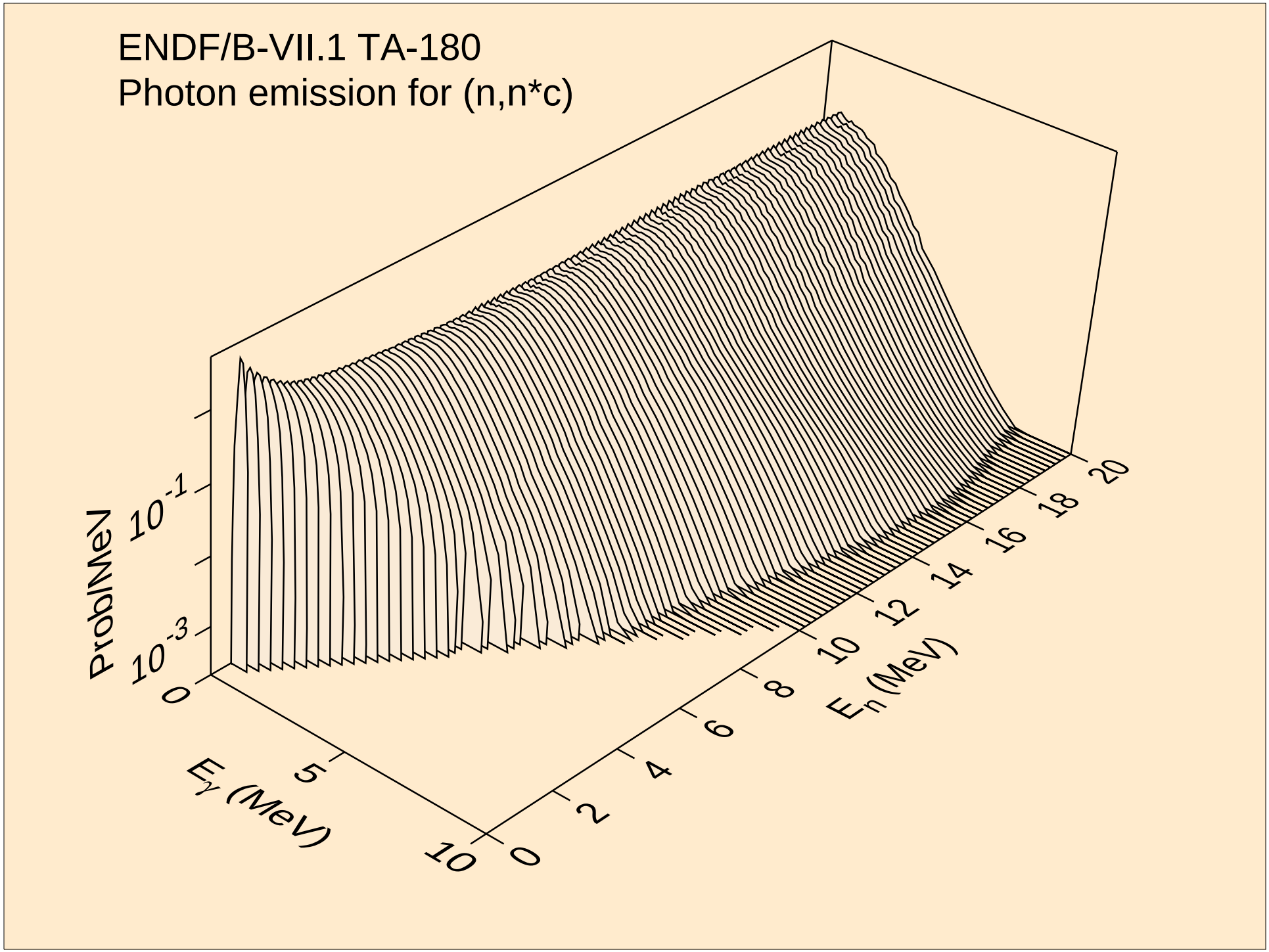

ENDF/B-VII.1 TA-180
Neutron emission for (n,n*c)
Prob/MeV
10^{1}
10^{-1}
0
5
10
15
20
Sec. Energy
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

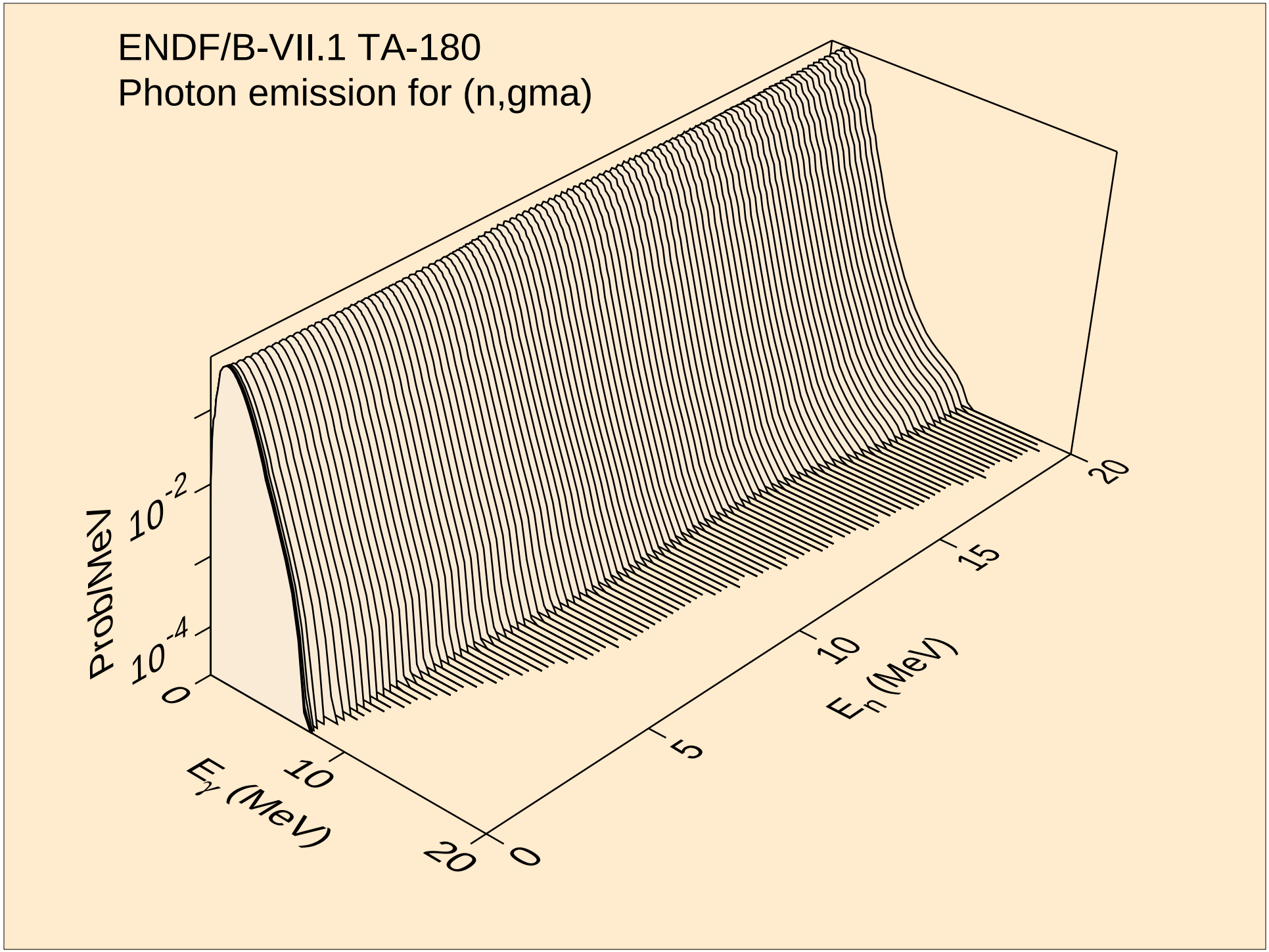

ENDF/B-VII.1 TA-180
Photon emission for (n,2n)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
5
10
E_γ (MeV)
6
8
10
12
14
16
18
20
E_n (MeV)

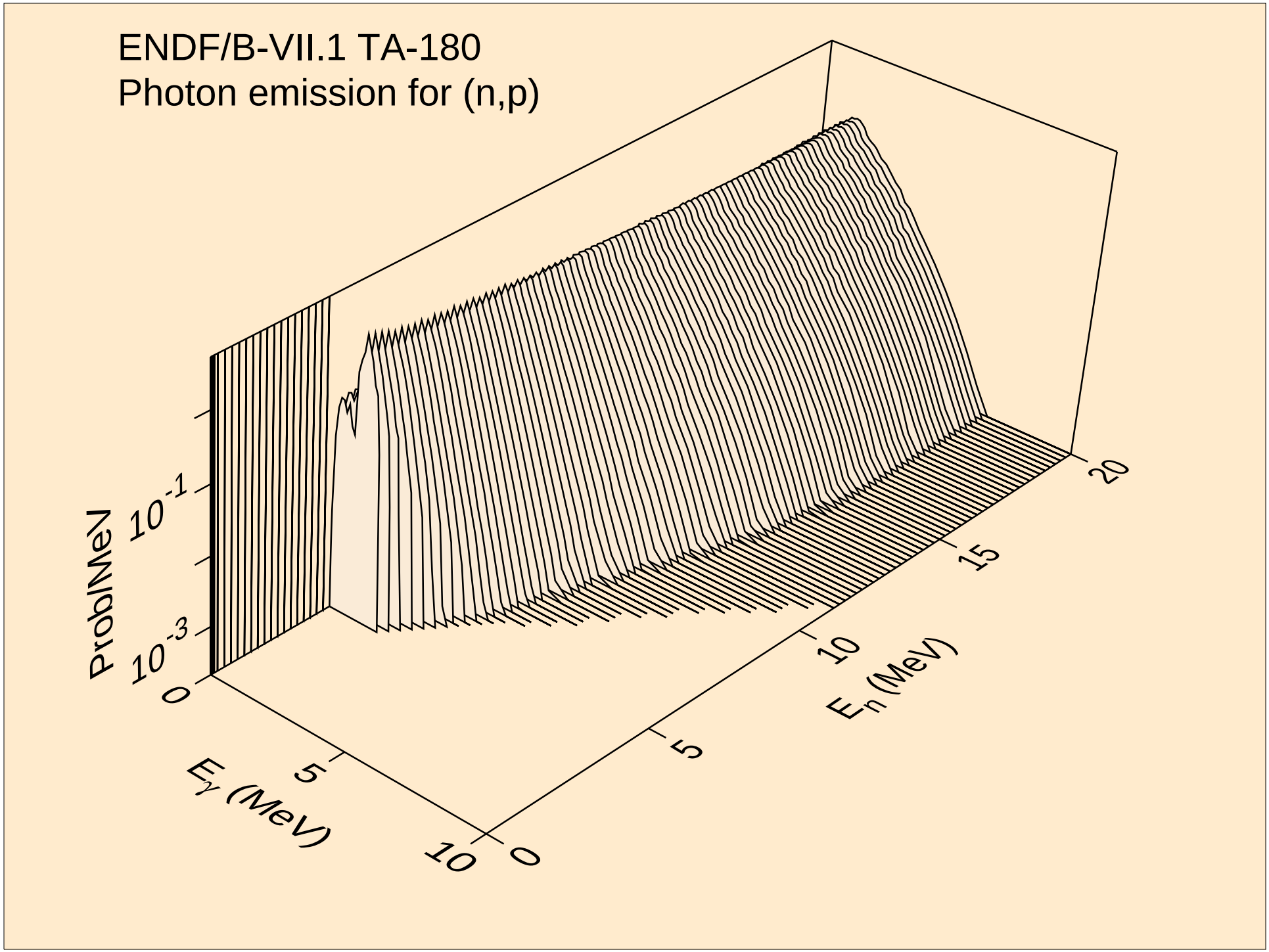

ENDF/B-VII.1 TA-180
Photon emission for (n,3n)
Prob/MeV
10^2
10^0
0
E_γ (MeV)
2
4
14
15
16
17
18
19
20
E_n (MeV)

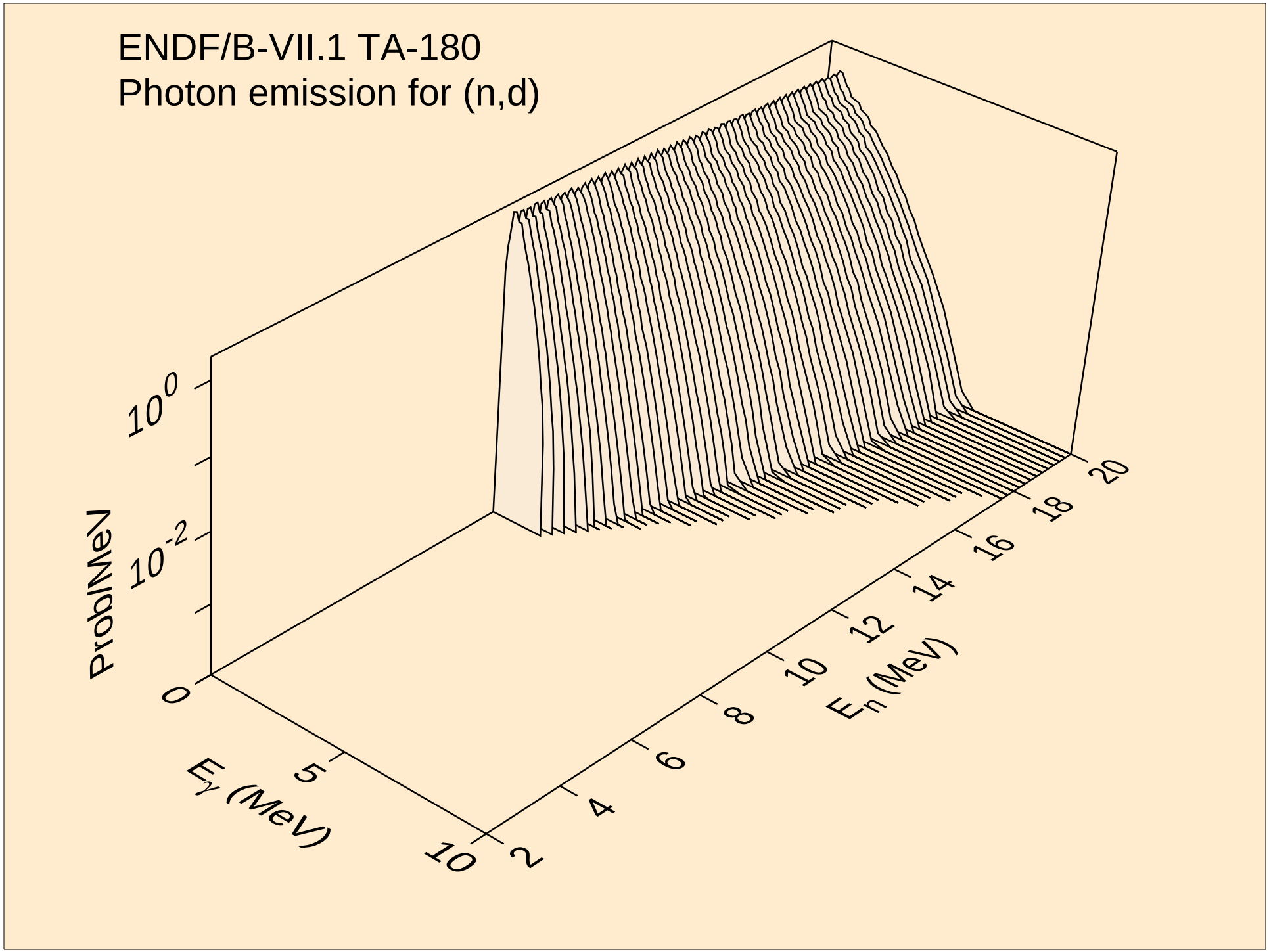

ENDF/B-VII.1 TA-180
Photon emission for (n,n*)a
Prob/MeV
10^-1
10^-3
0
5
10
E_γ (MeV)
0
5
10
15
20
E_n (MeV)

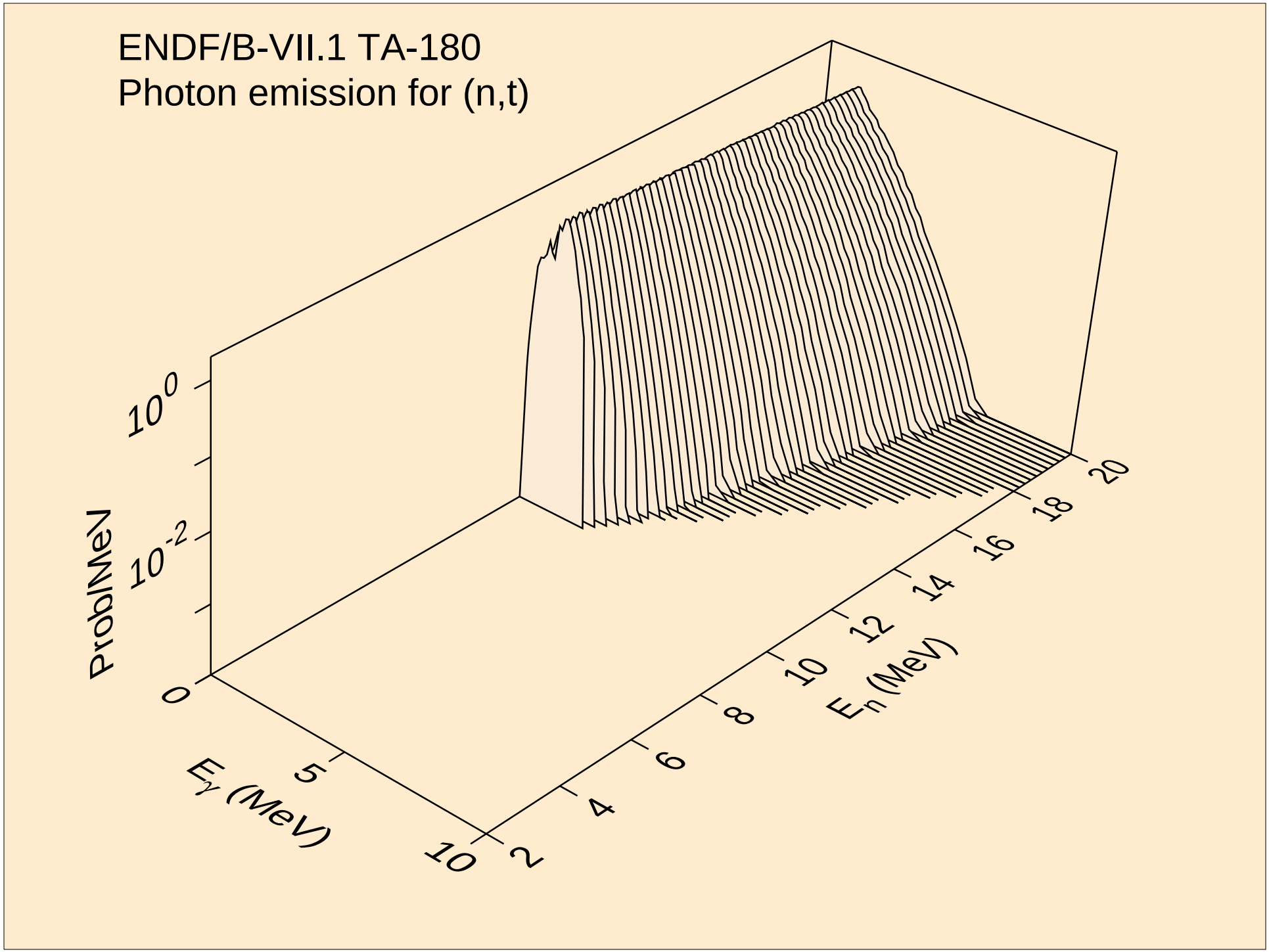

ENDF/B-VII.1 TA-180
Photon emission for (n,n*)p
Prob/MeV
10^-1
10^-3
0
5
10
E_γ (MeV)
4
6
8
10
12
14
16
18
20
E_n (MeV)

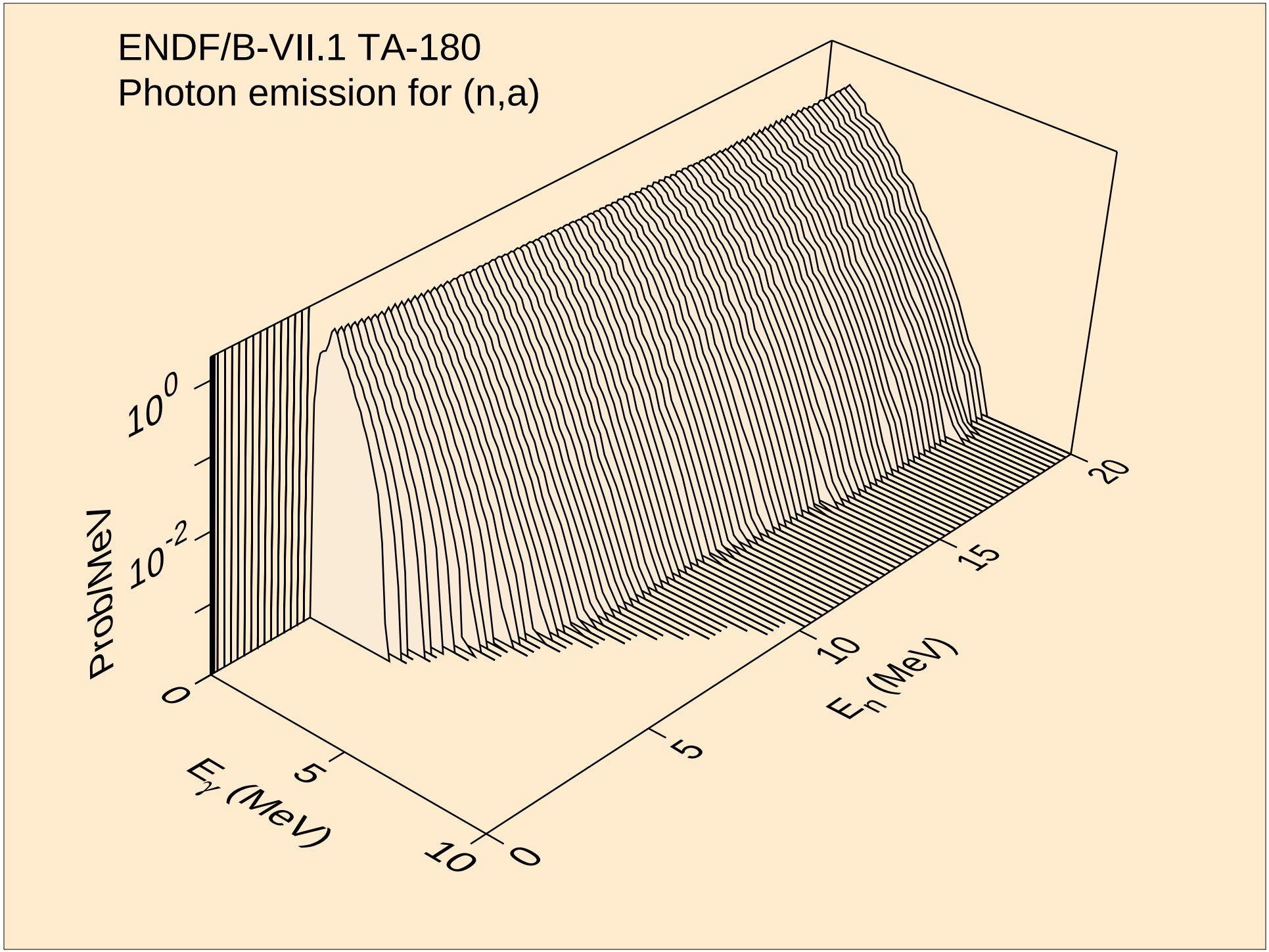

ENDF/B-VII.1 TA-180
Photon emission for (n,n*c)
Prob/MeV
10^-1
10^-3
0
Eγ (MeV)
5
10
0
2
4
6
8
10
12
14
16
18
20
En (MeV)

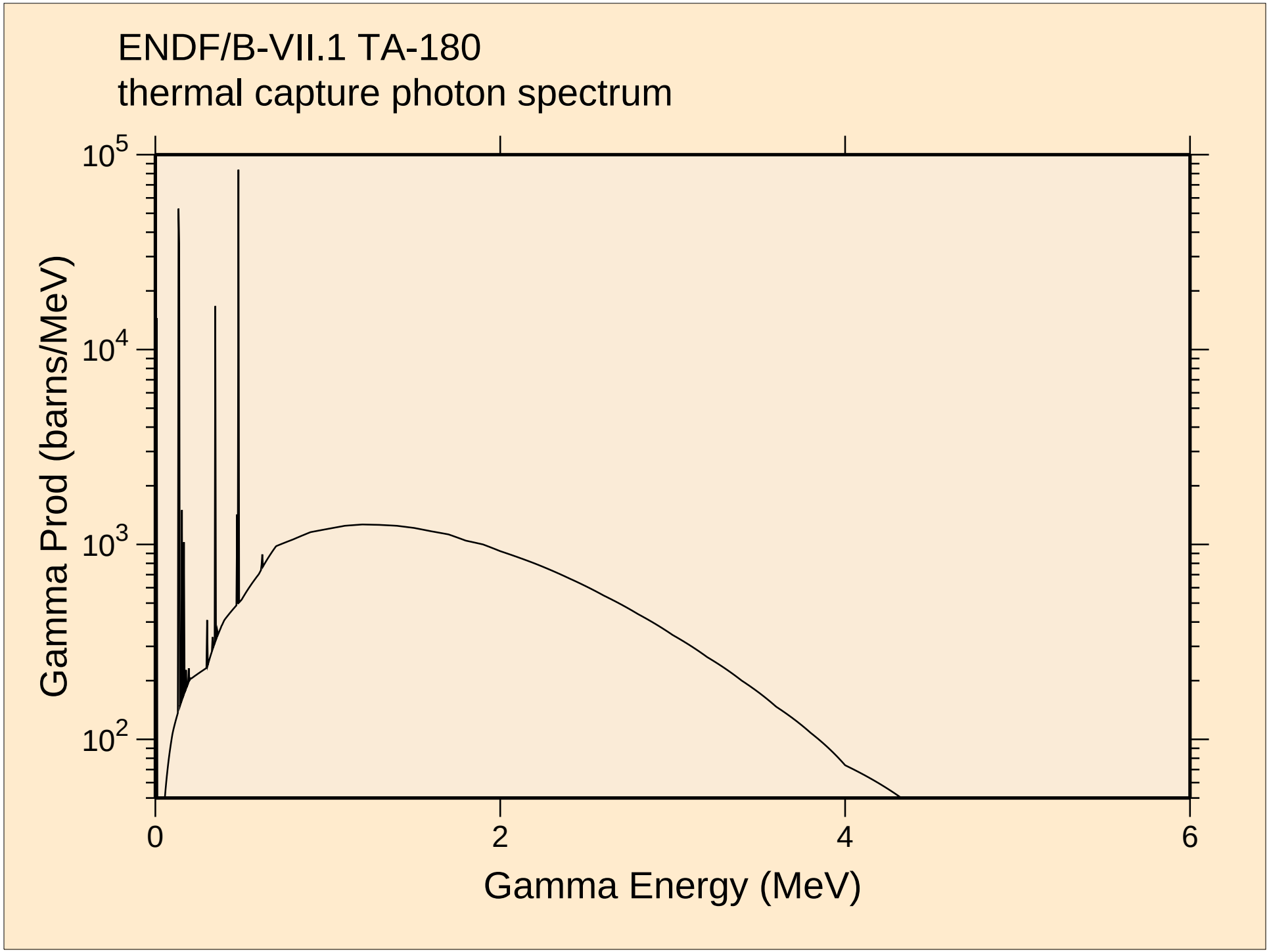

ENDF/B-VII.1 TA-180
Photon emission for (n,gma)
Prob/MeV
10-2
10-4
0
Eγ (MeV)
10
20
0
5
10
15
20
En (MeV)

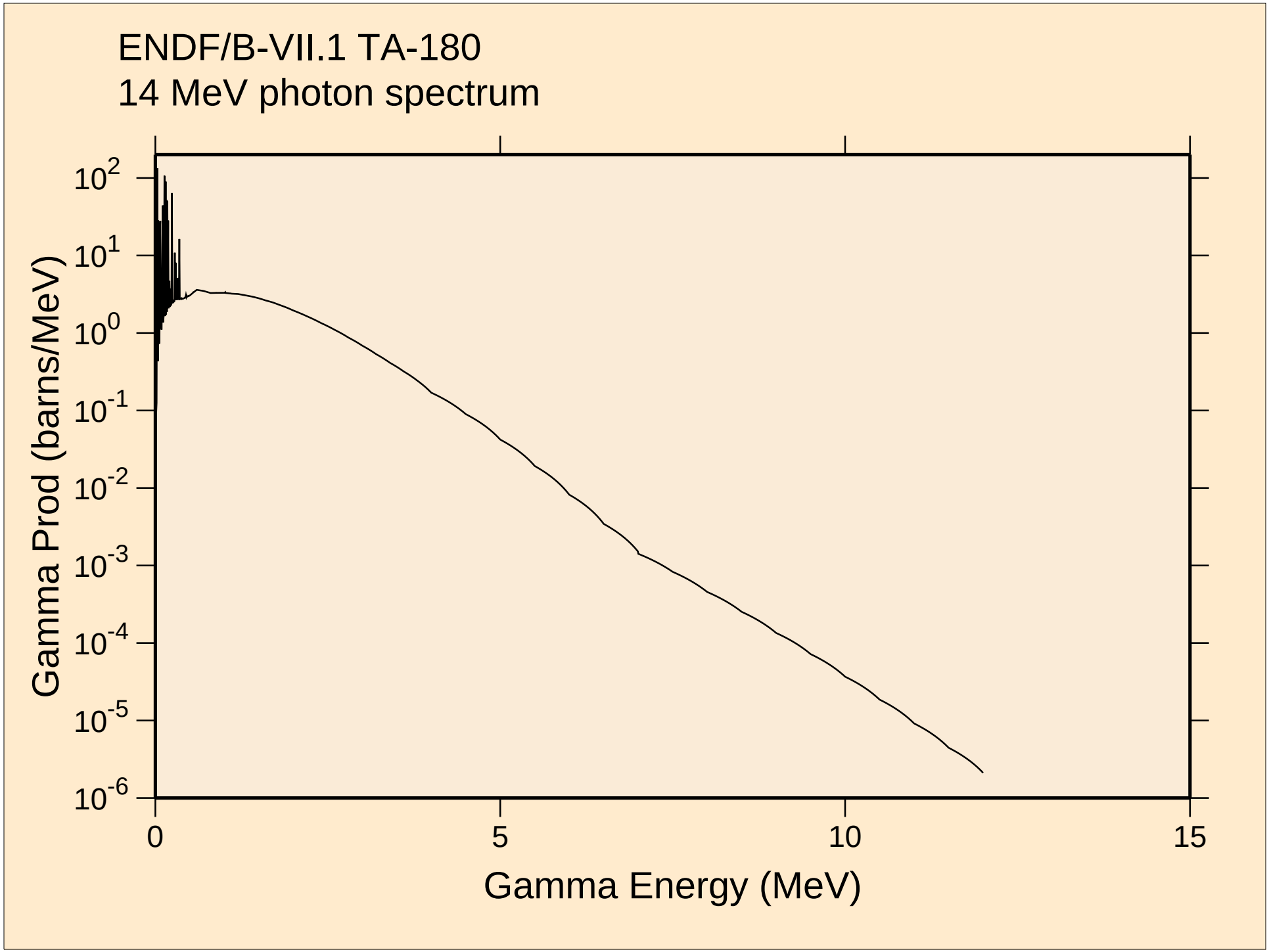

ENDF/B-VII.1 TA-180
Photon emission for (n,p)
Prob/MeV
10^-1
10^-3
0
5
10
E_γ (MeV)
0
5
10
15
20
E_n (MeV)

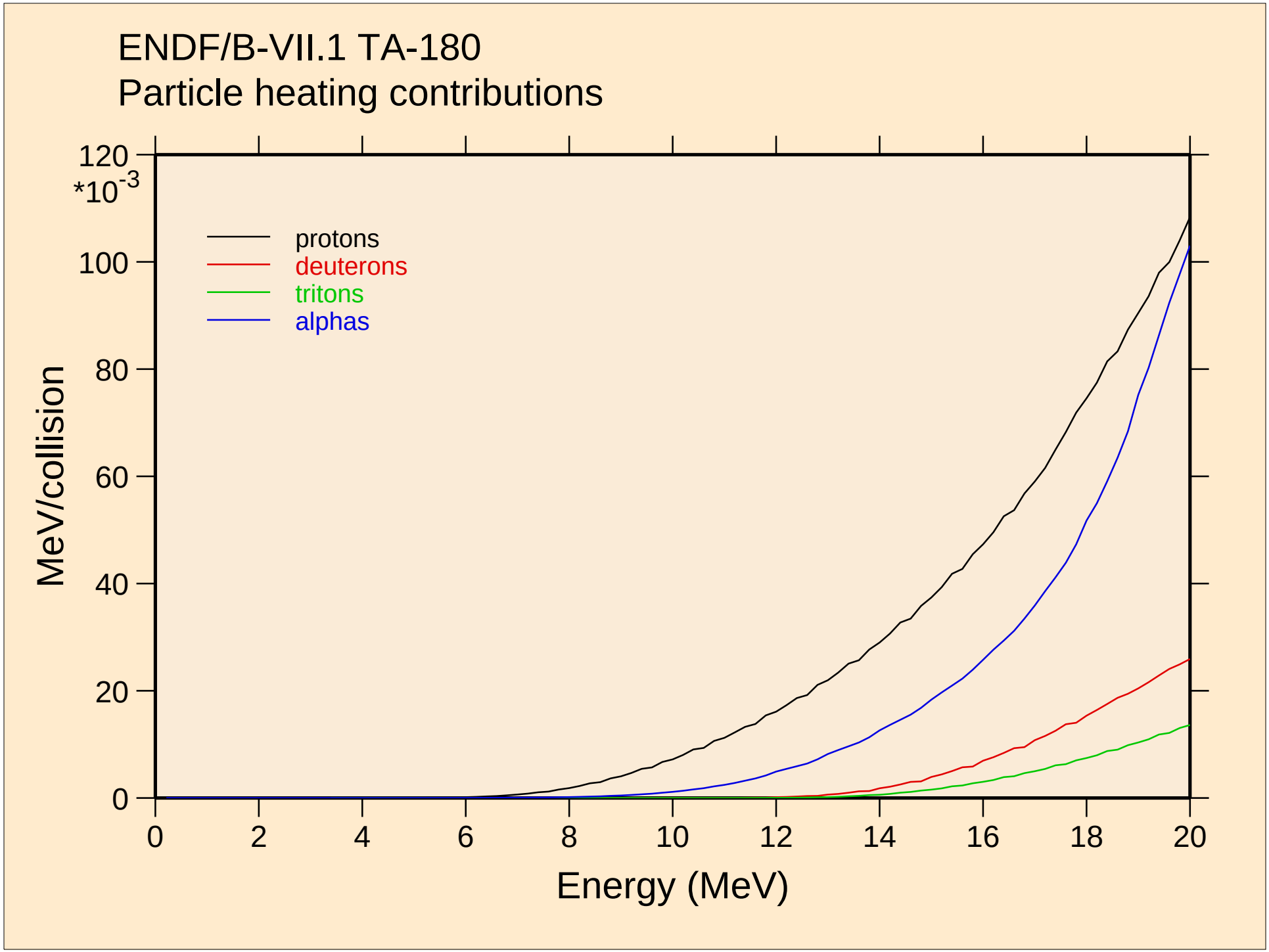

ENDF/B-VII.1 TA-180
Photon emission for (n,d)
Prob/MeV
10^0
10^{-2}
0
E_γ (MeV)
5
10
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

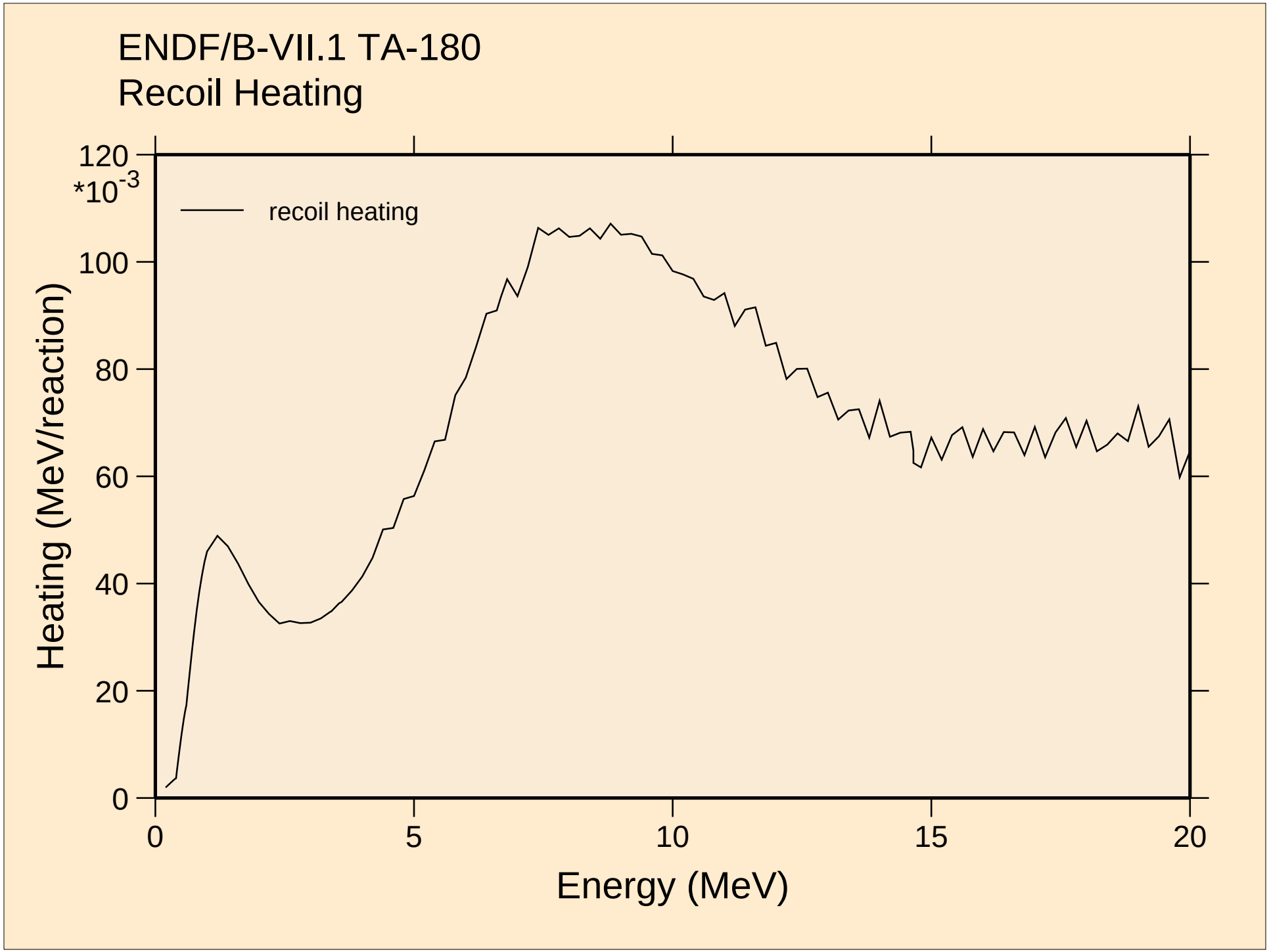

ENDF/B-VII.1 TA-180
Photon emission for (n,t)
Prob/MeV
10^0
10^{-2}
0
E_γ (MeV)
5
10
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

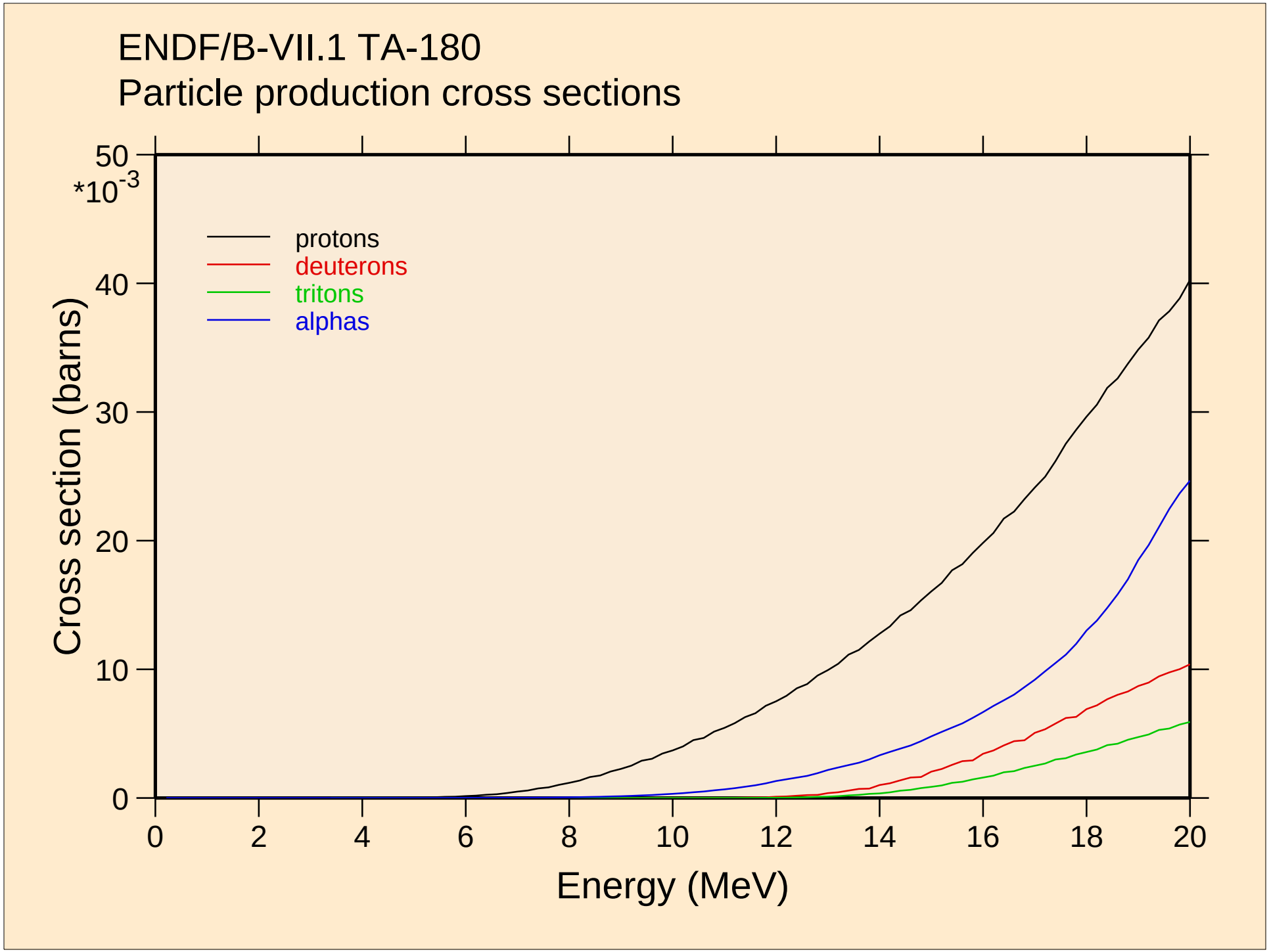

ENDF/B-VII.1 TA-180
Photon emission for (n,a)
Prob/MeV
10^{0}
10^{-2}
0
5
10
E_γ (MeV)
0
5
10
15
20
E_n (MeV)

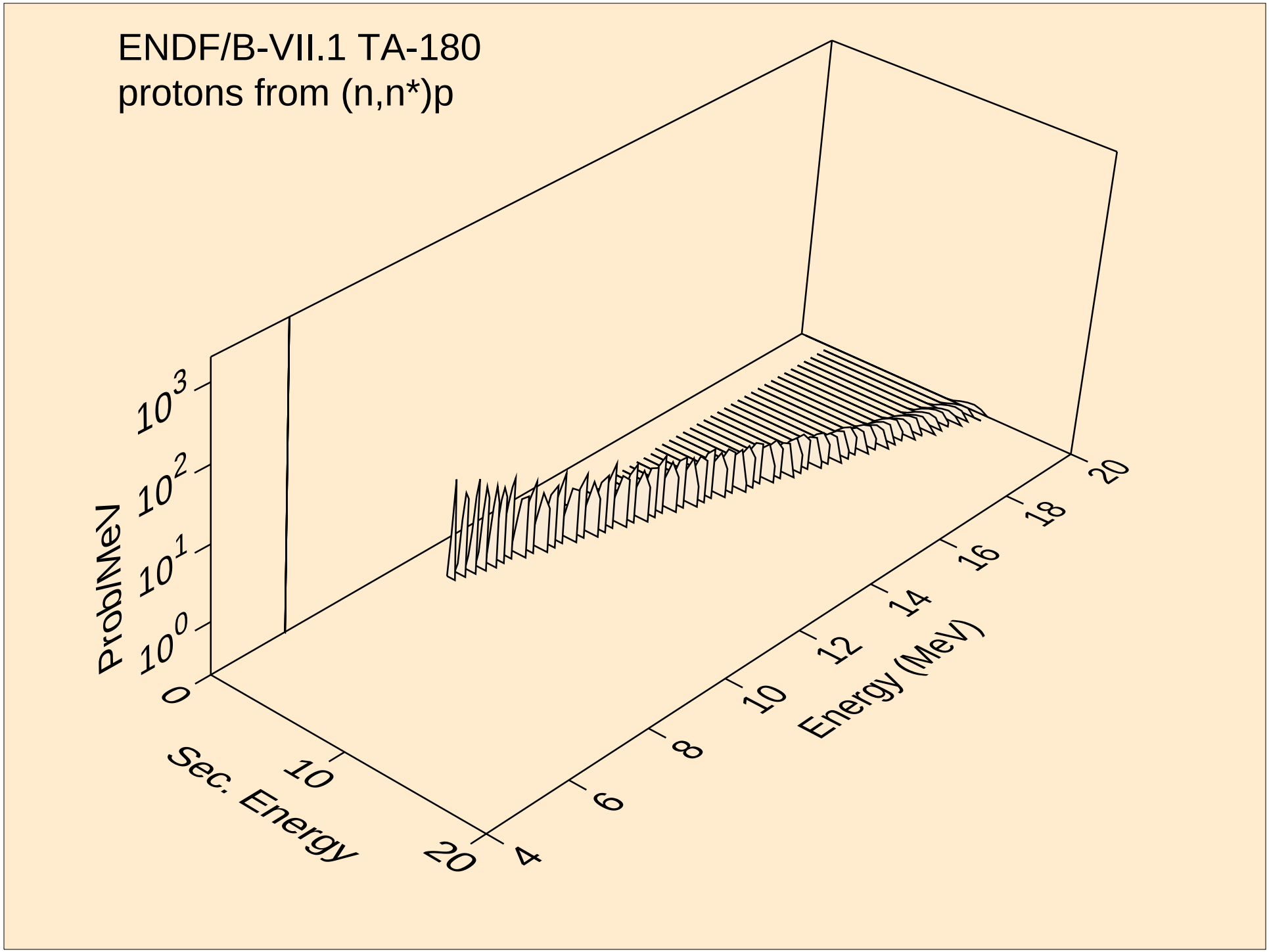

ENDF/B-VII.1 TA-180
thermal capture photon spectrum
Gamma Prod (barns/MeV)
10^5
10^4
10^3
10^2
0
2
4
6
Gamma Energy (MeV)

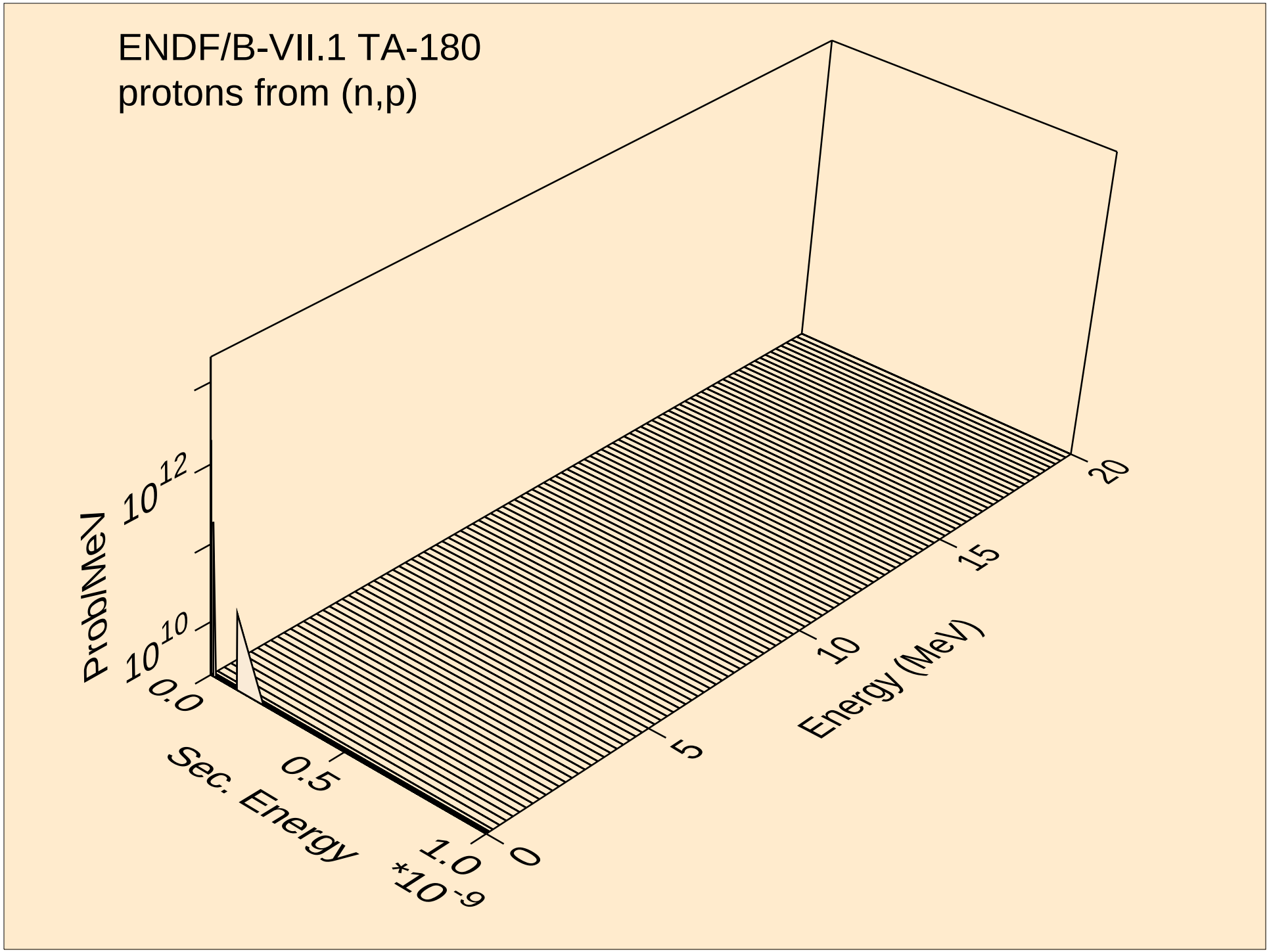

ENDF/B-VII.1 TA-180
14 MeV photon spectrum
Gamma Prod (barns/MeV)
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
10^-6
0
5
10
15
Gamma Energy (MeV)

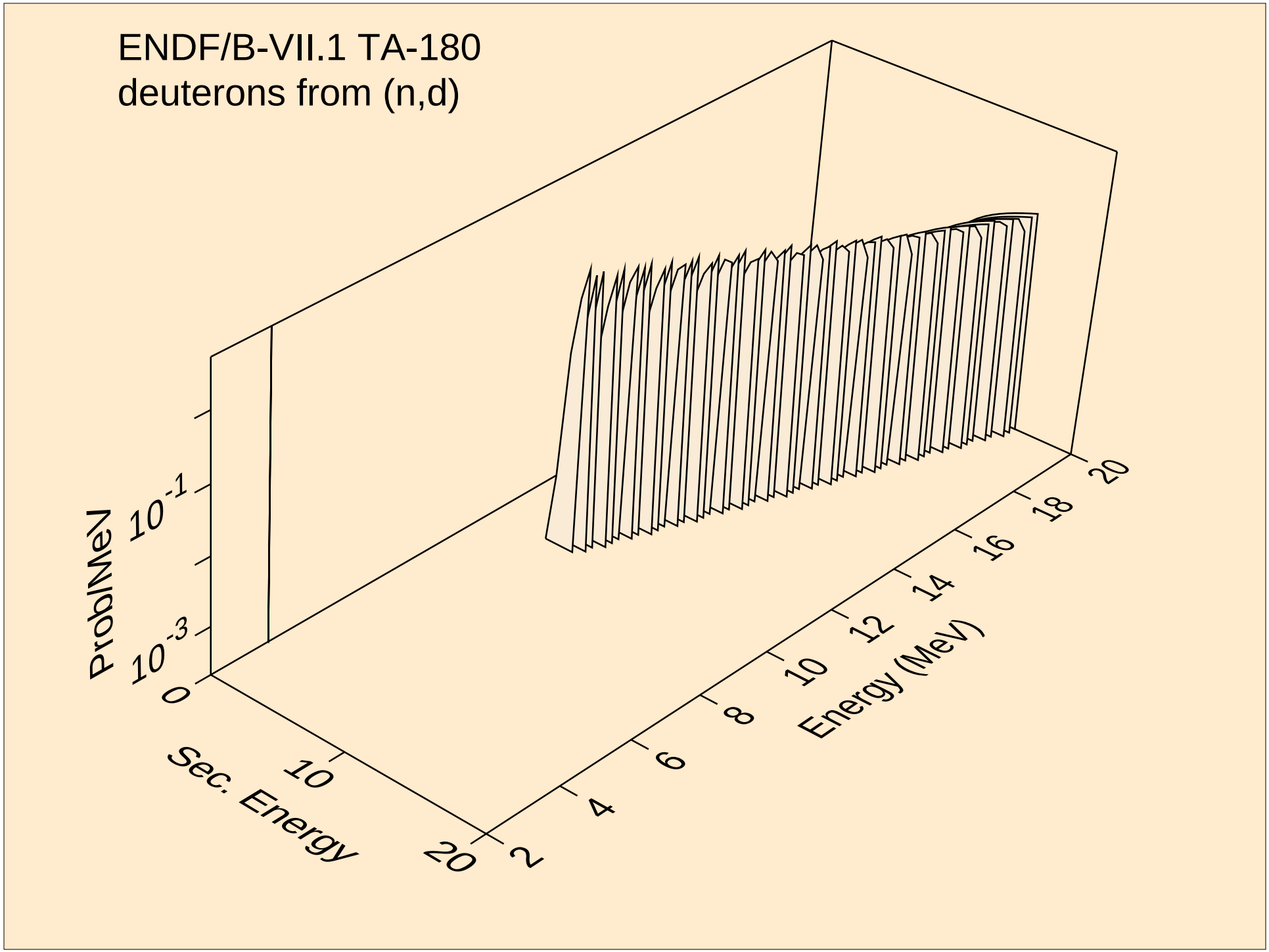

ENDF/B-VII.1 TA-180
Particle heating contributions
120
*10-3
100
80
60
40
20
0
MeV/collision
protons
deuterons
tritons
alphas
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

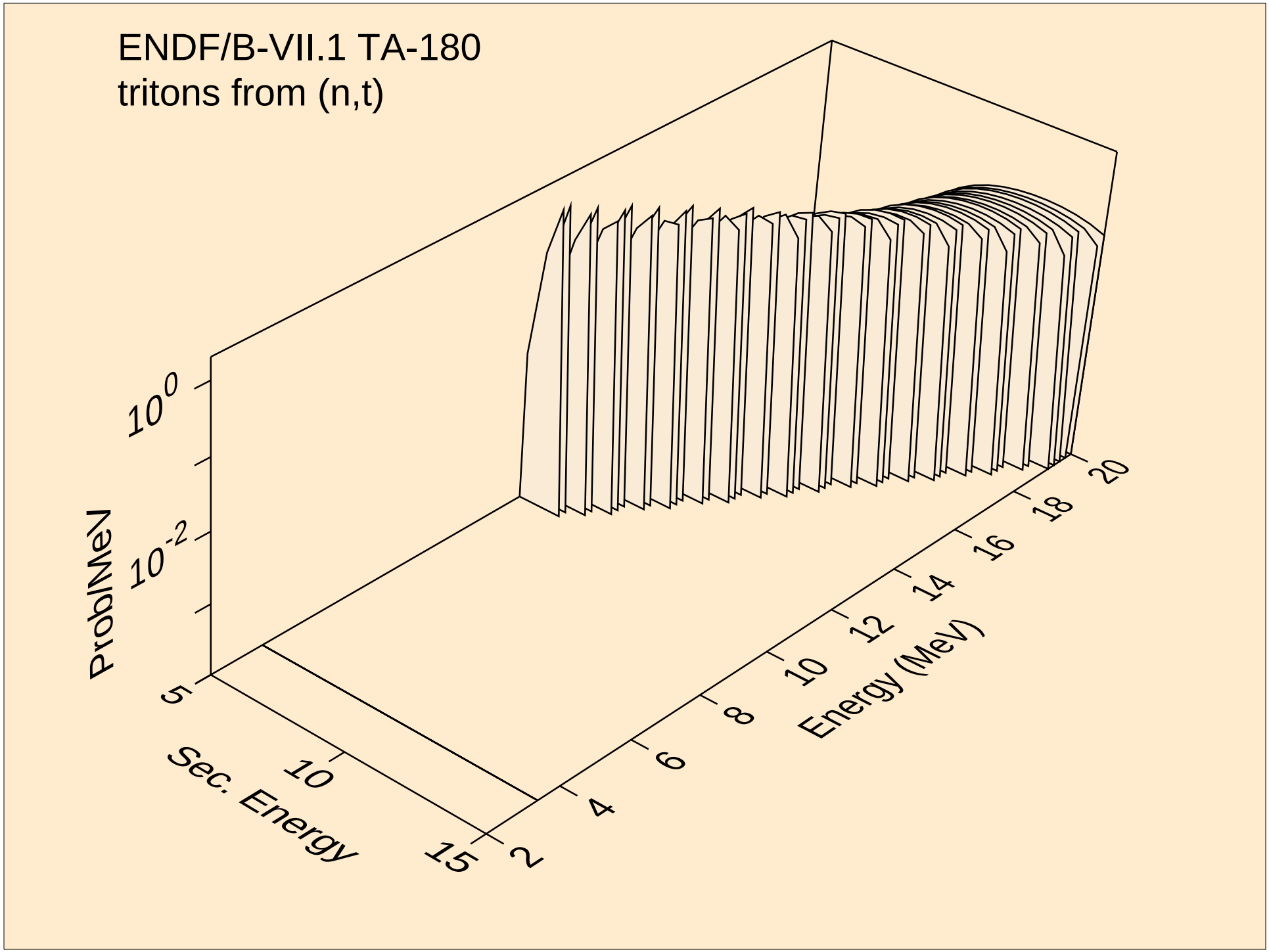

ENDF/B-VII.1 TA-180
Recoil Heating
120
*10-3
100
80
60
40
20
0
recoil heating
Heating (MeV/reaction)
0
5
10
15
20
Energy (MeV)

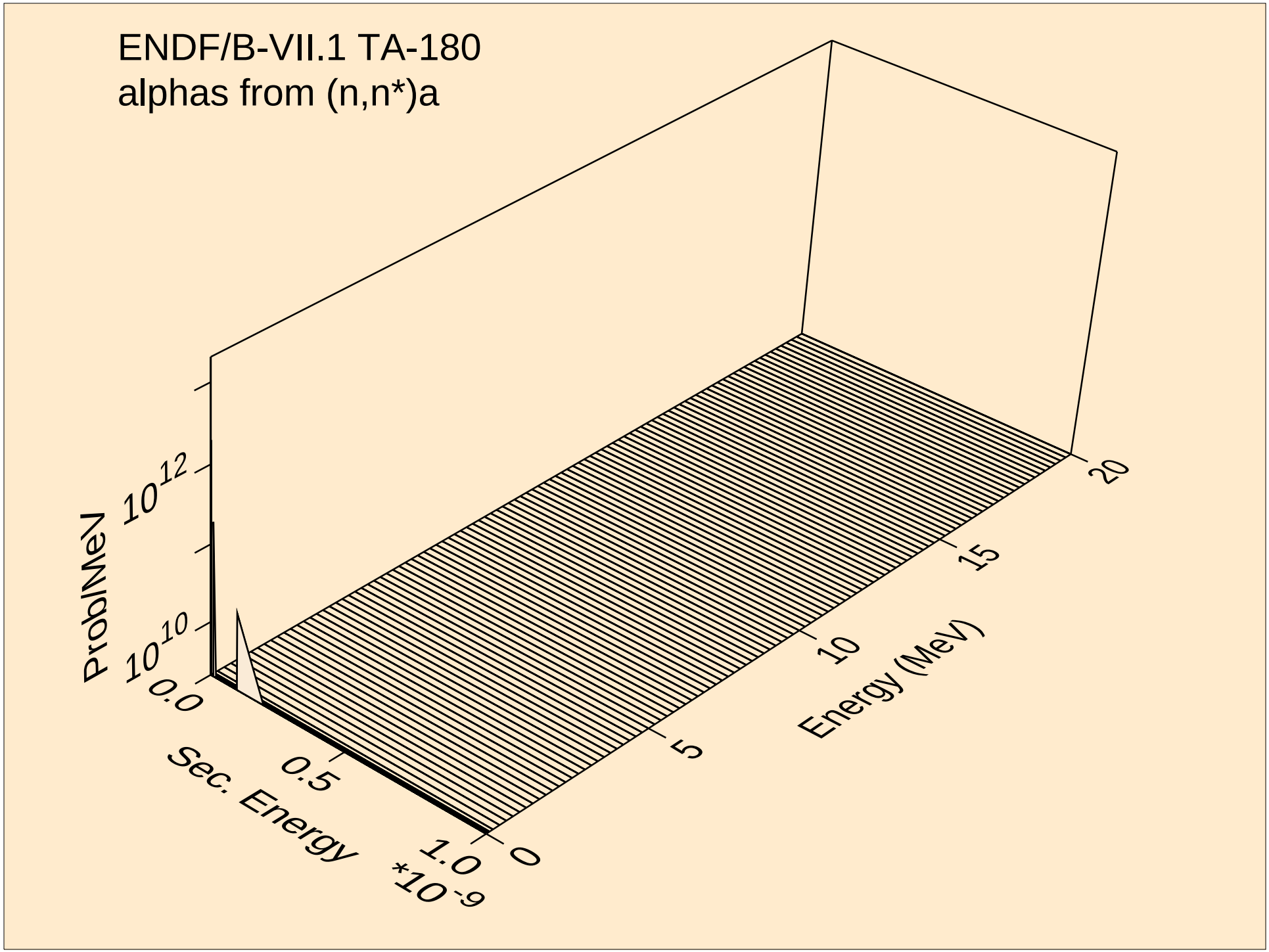

ENDF/B-VII.1 TA-180
Particle production cross sections
Cross section (barns)
*10-3
50
40
30
20
10
0
protons
deuterons
tritons
alphas
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

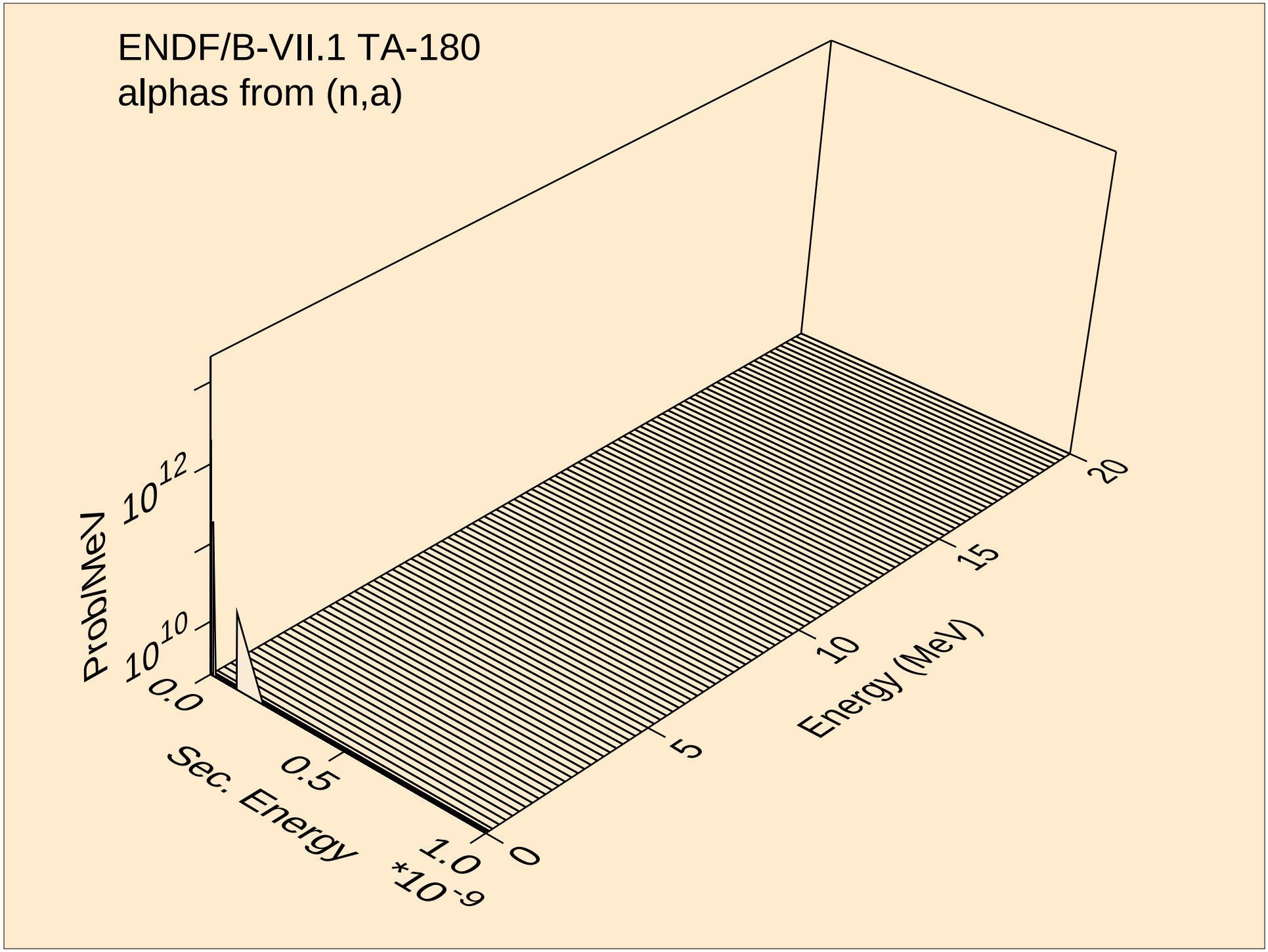

ENDF/B-VII.1 TA-180
protons from (n,n*)p
Prob/MeV
10^3
10^2
10^1
10^0
0
10
20
Sec. Energy
4
6
8
10
12
14
16
18
20
Energy (MeV)


ENDF/B-VII.1 TA-180
protons from (n,p)
Prob/MeV
10^{12}
10^{10}
0.0
0.5
1.0
Sec. Energy
*10 -9
0
5
10
15
20
Energy (MeV)


ENDF/B-VII.1 TA-180
deuterons from (n,d)
Prob/MeV
10^-1
10^-3
0
Sec. Energy
10
20
Energy (MeV)
2
4
6
8
10
12
14
16
18
20


ENDF/B-VII.1 TA-180
tritons from (n,t)
Prob/MeV
10^{0}
10^{-2}
5
10
15
Sec. Energy
2
4
6
8
10
12
14
16
18
20
Energy (MeV)


ENDF/B-VII.1 TA-180
alphas from (n,n*)a
Prob/MeV
10^{12}
10^{10}
0.0
0.5
1.0
*10^{-9}
Sec. Energy
0
5
10
15
20
Energy (MeV)


ENDF/B-VII.1 TA-180
alphas from (n,a)
Prob/MeV
10^{12}
10^{10}
0.0
0.5
1.0
Sec. Energy
*10 -9
0
5
10
15
20
Energy (MeV)