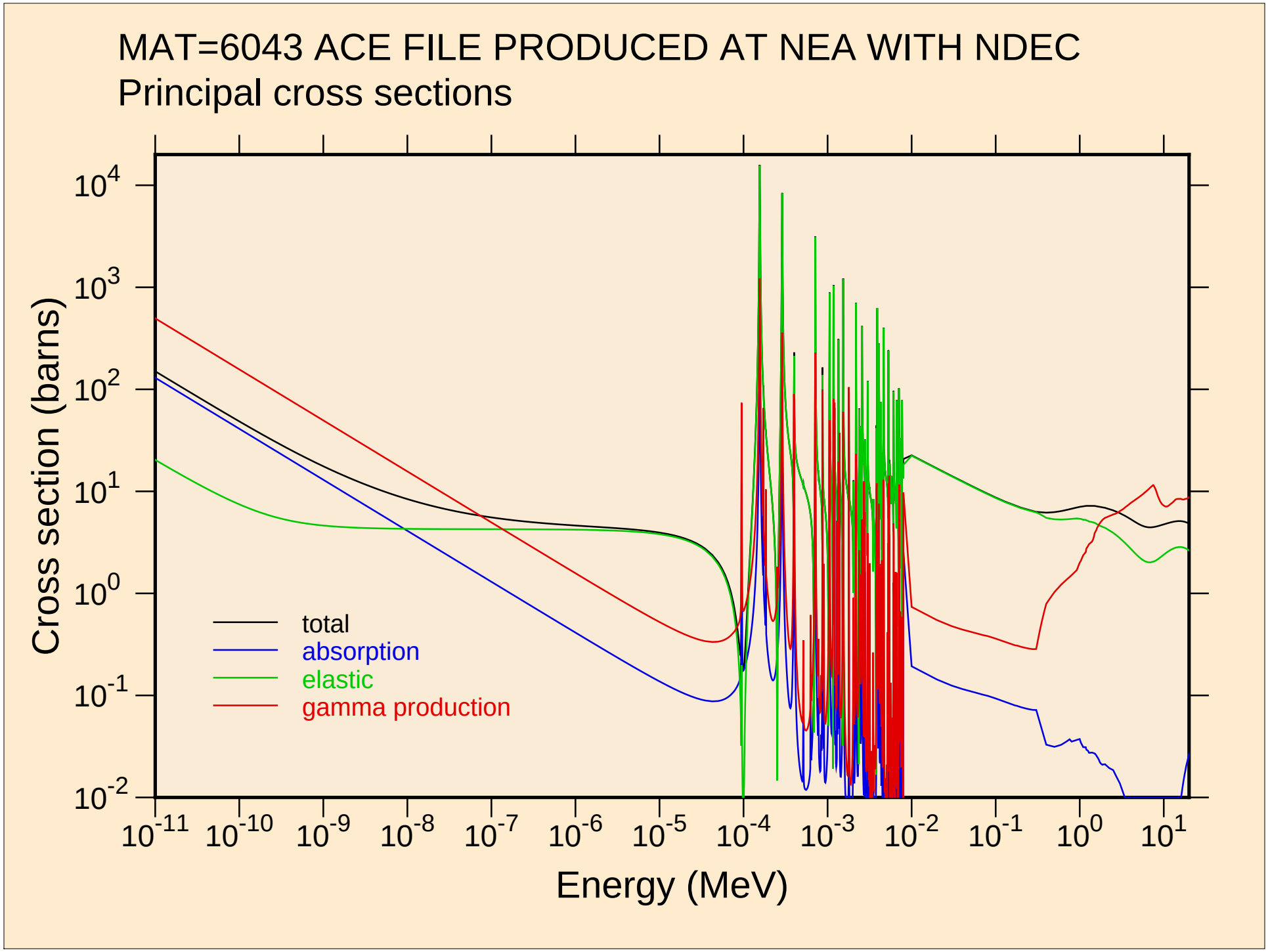
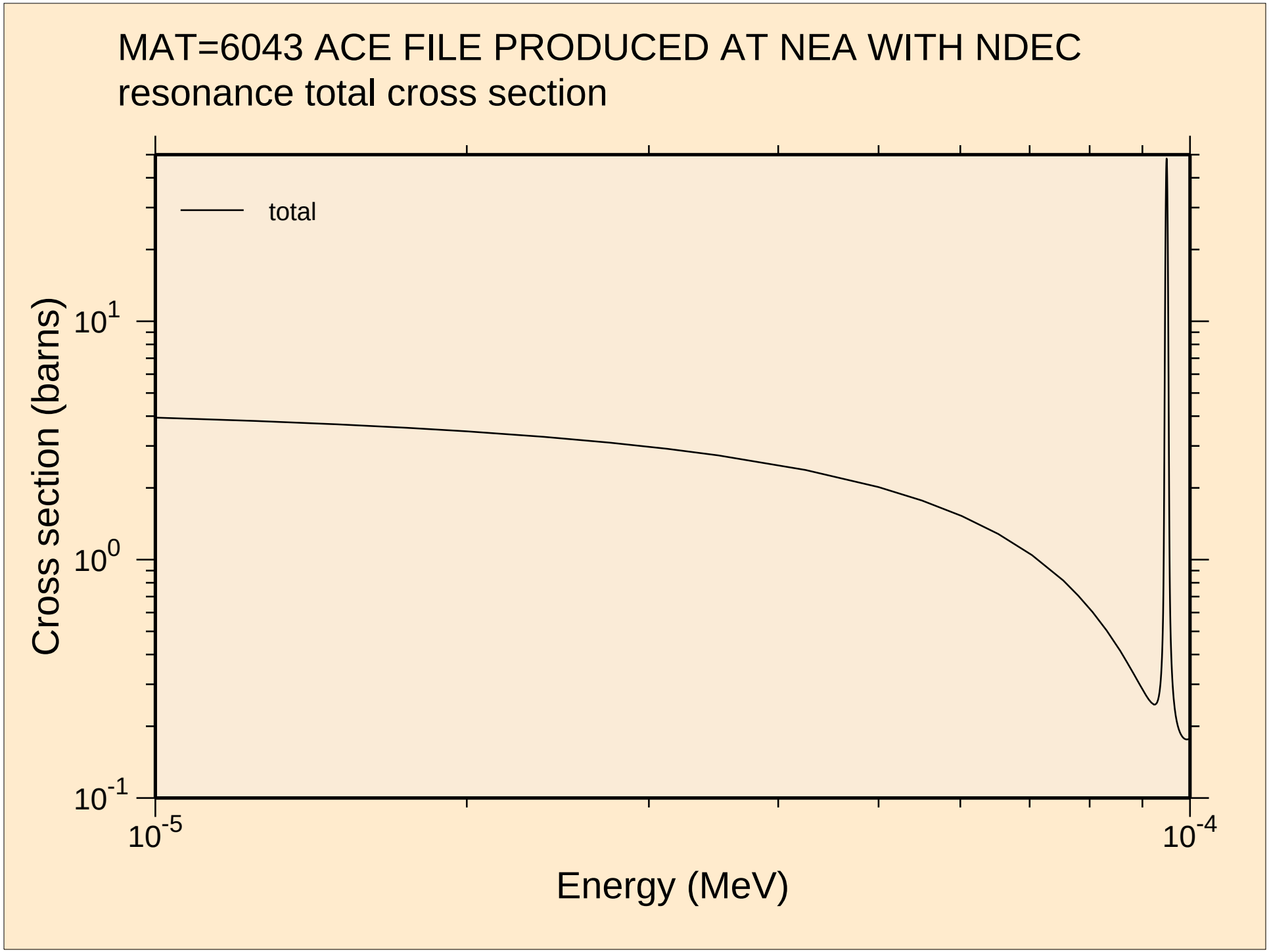
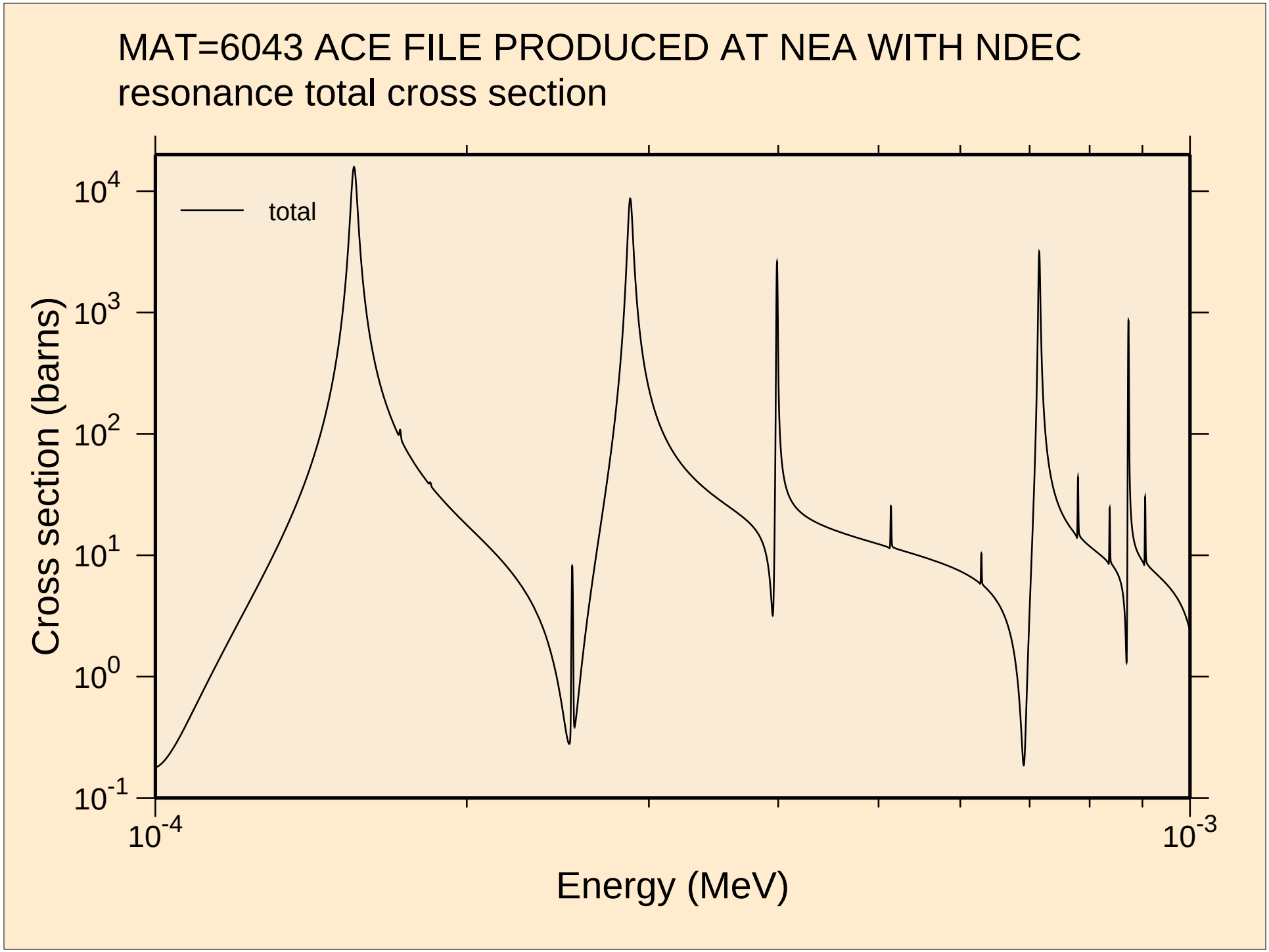
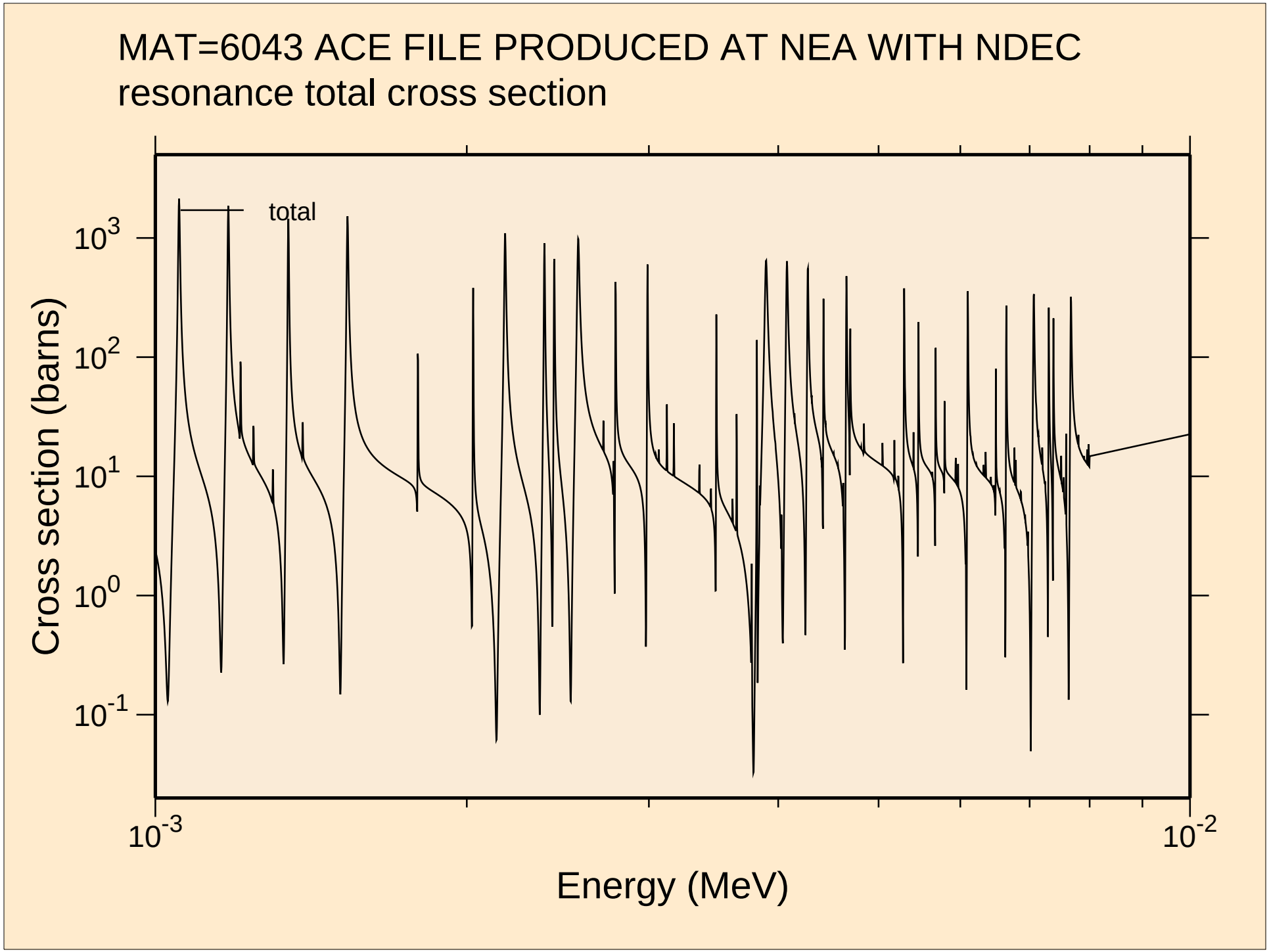
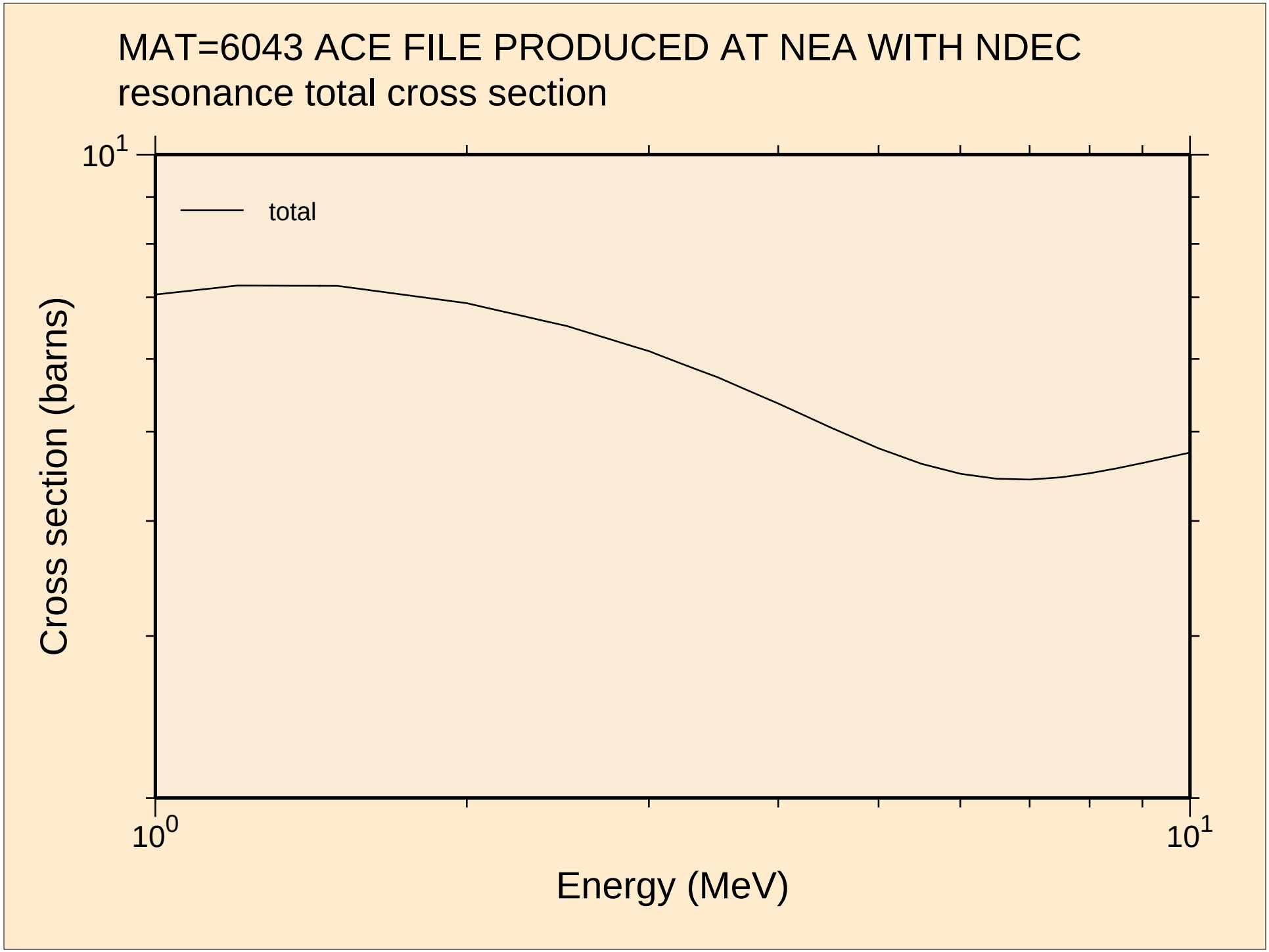

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production

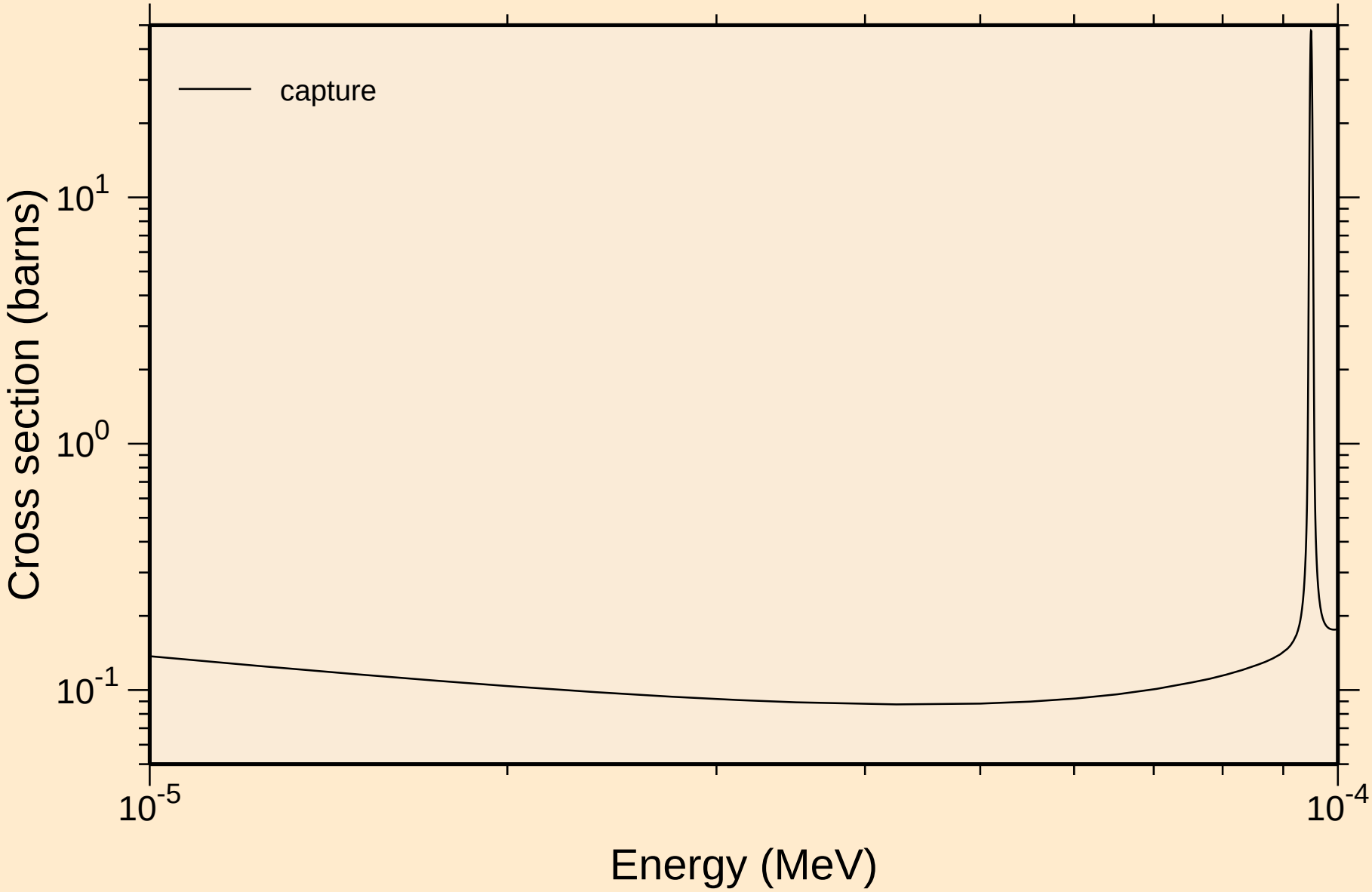

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
resonance total cross section
total
Cross section (barns)
10^1
10^0
10^-1
10^-5
10^-4
Energy (MeV)


MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
resonance total cross section
total
Cross section (barns)
10^4
10^3
10^2
10^1
10^0
10^-1
10^-4
10^-3
Energy (MeV)

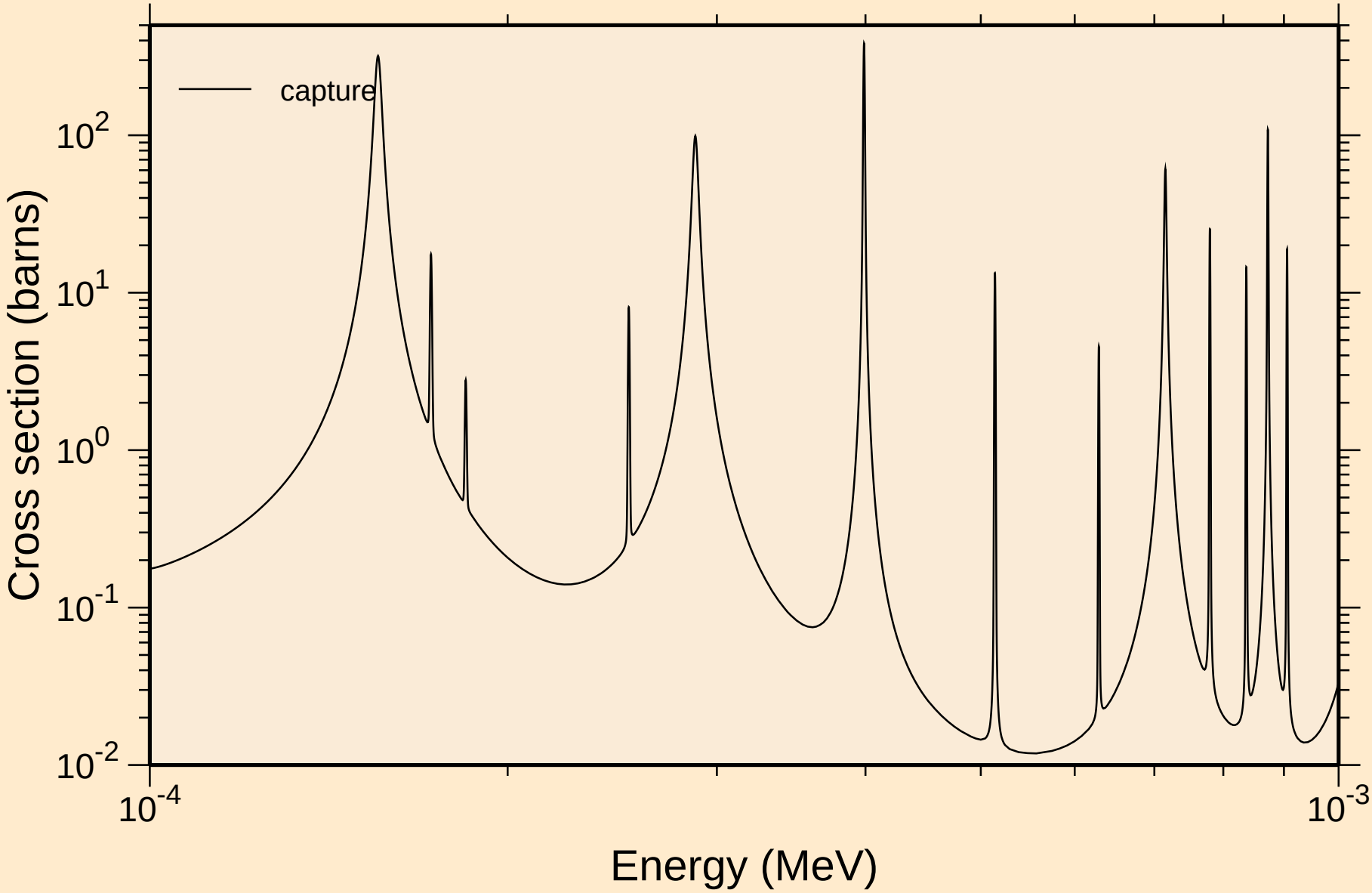

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
resonance total cross section
total
Cross section (barns)
10^3
10^2
10^1
10^0
10^-1
10^-3
10^-2
Energy (MeV)


MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
resonance total cross section
10^1
total
Cross section (barns)
10^0
10^1
Energy (MeV)

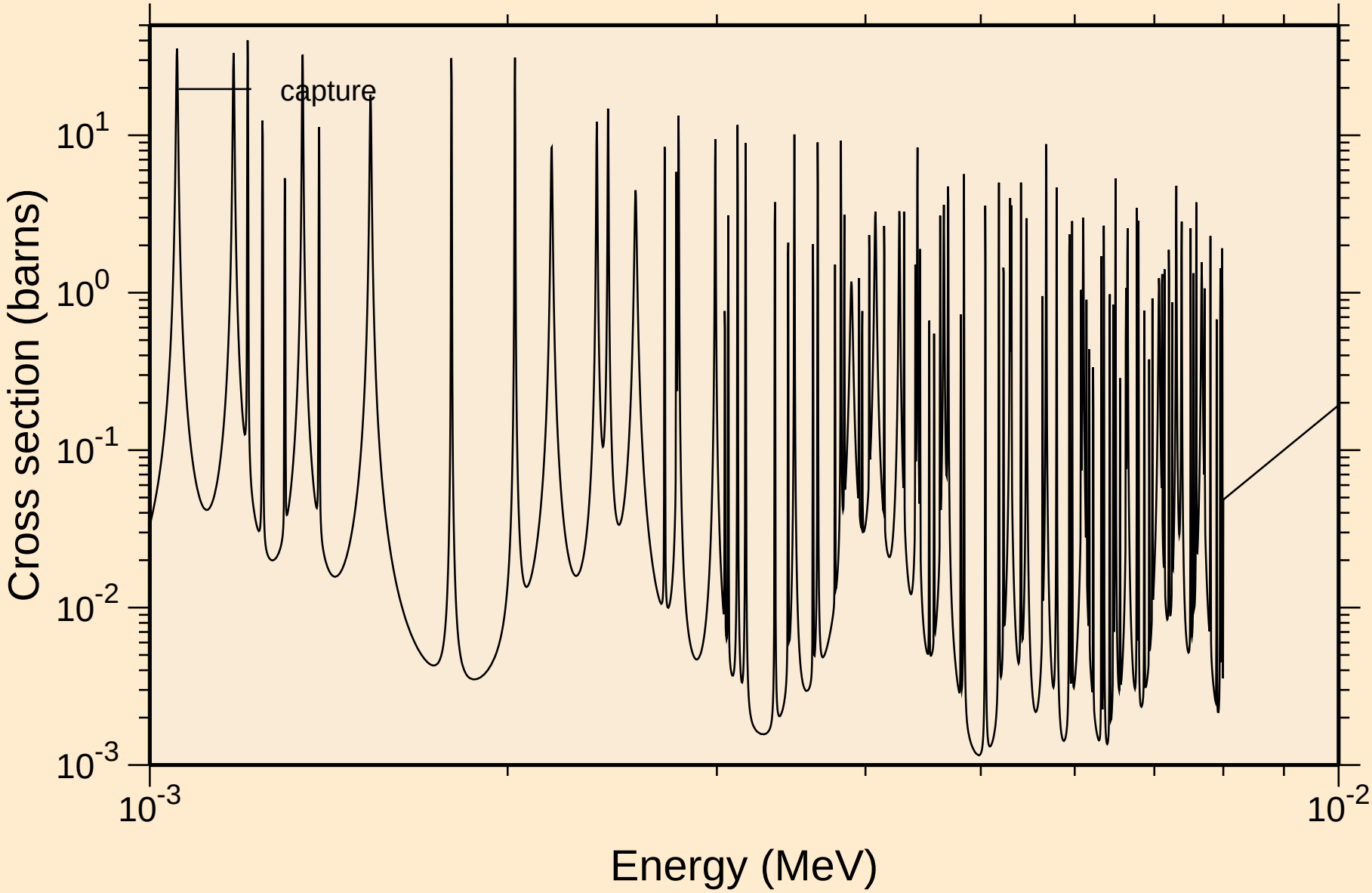
MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
resonance absorption cross sections



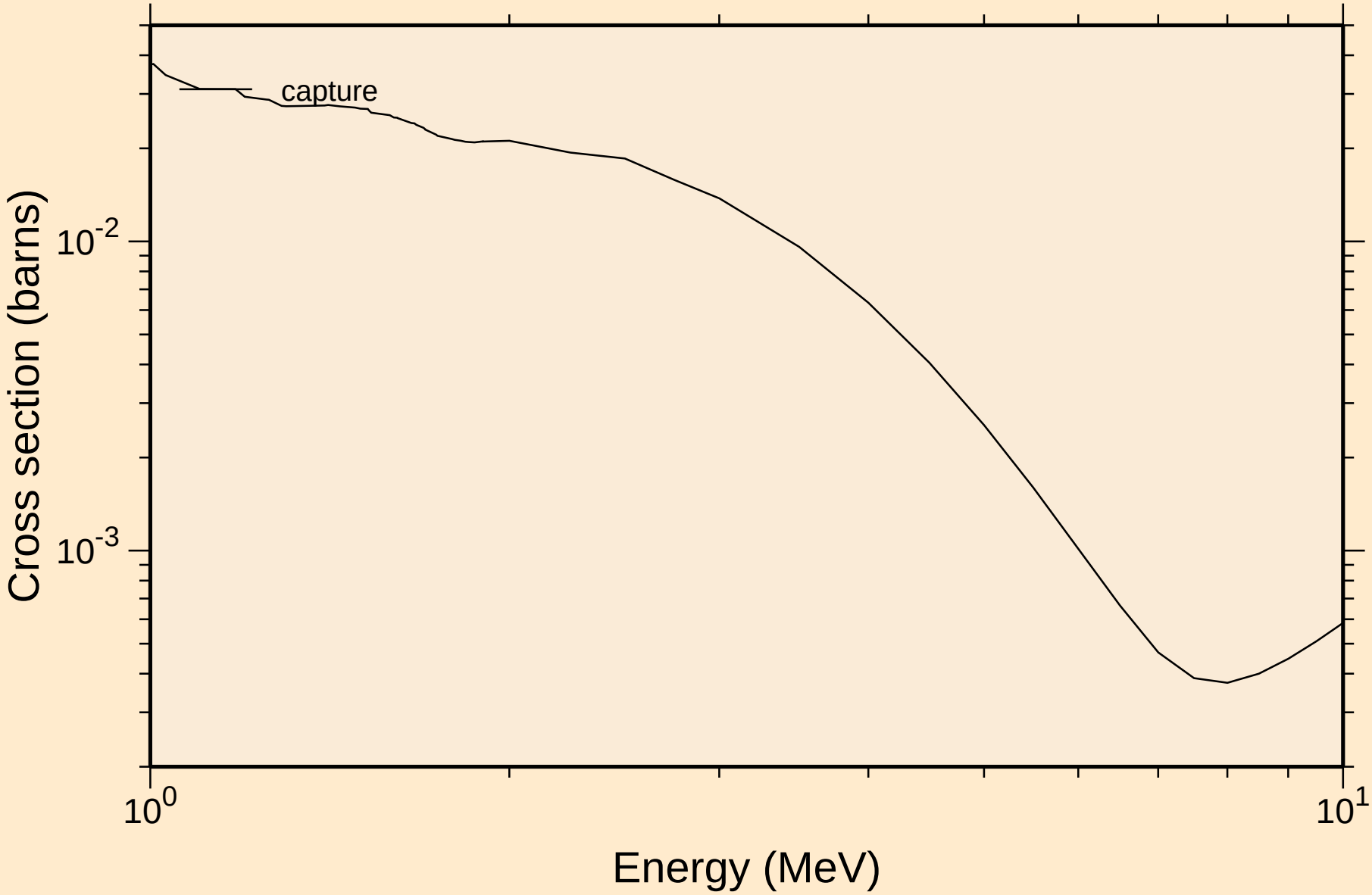
MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
resonance absorption cross sections



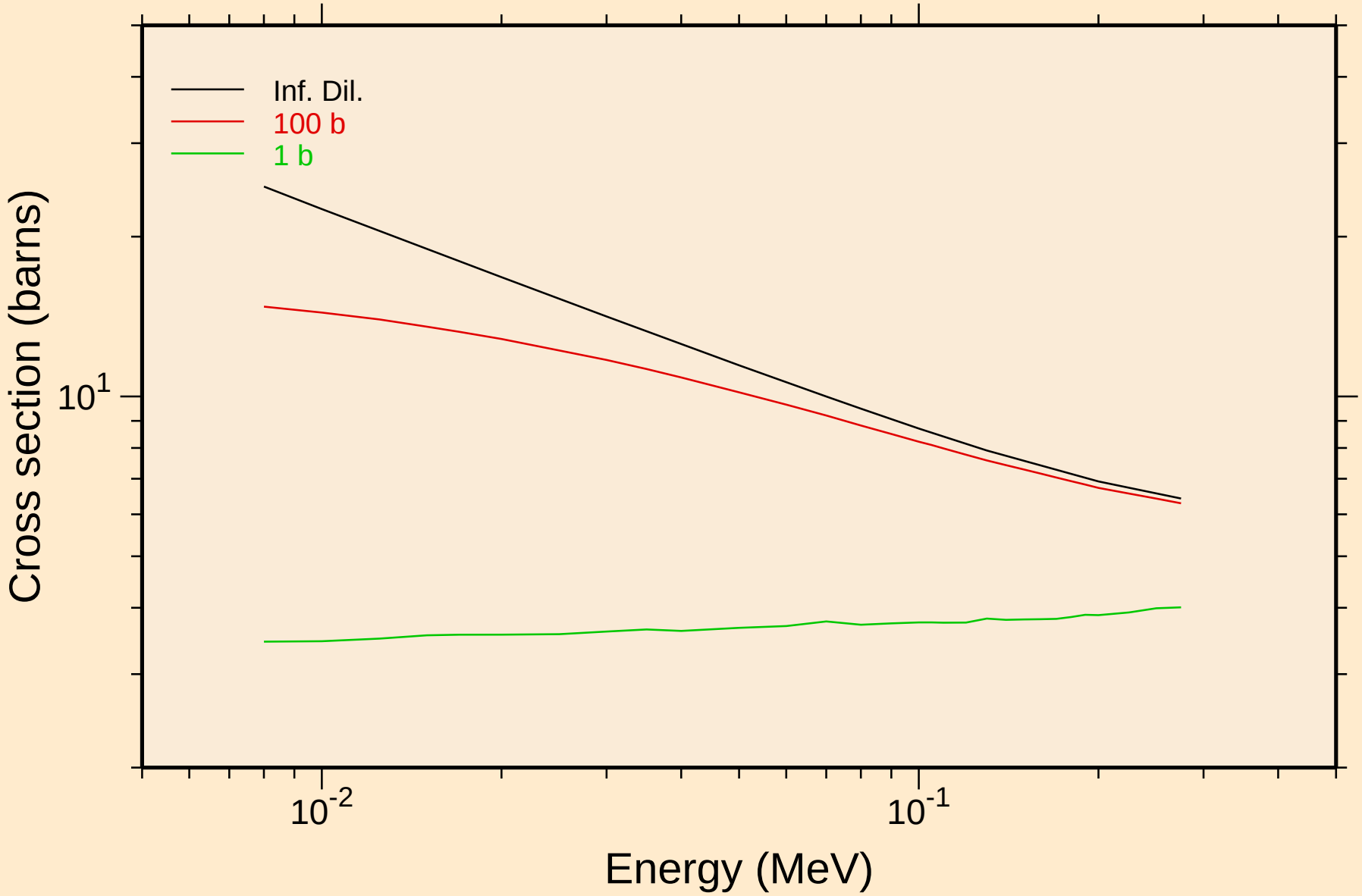
MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
resonance absorption cross sections



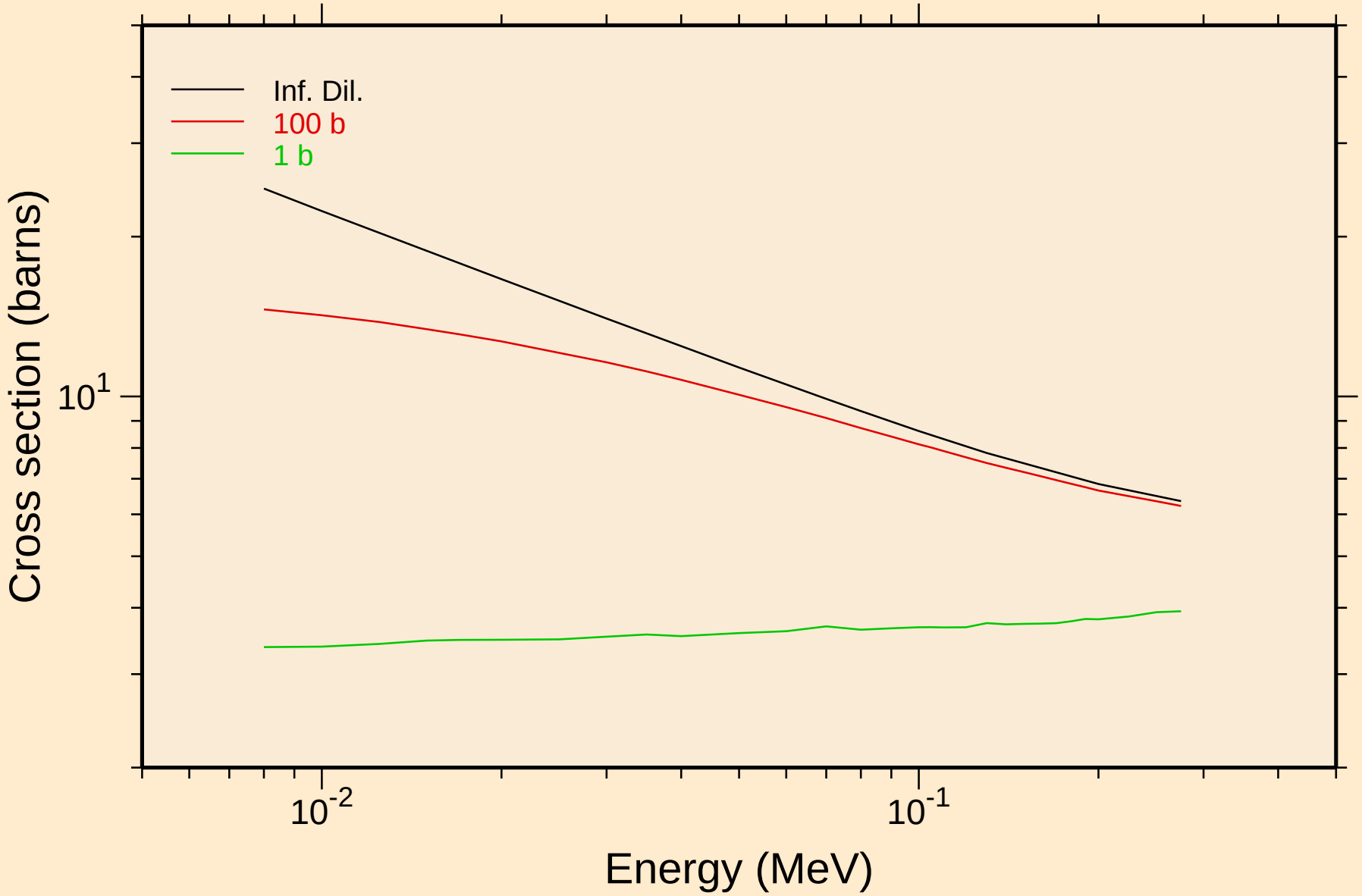
MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
resonance absorption cross sections



MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
UR total cross section

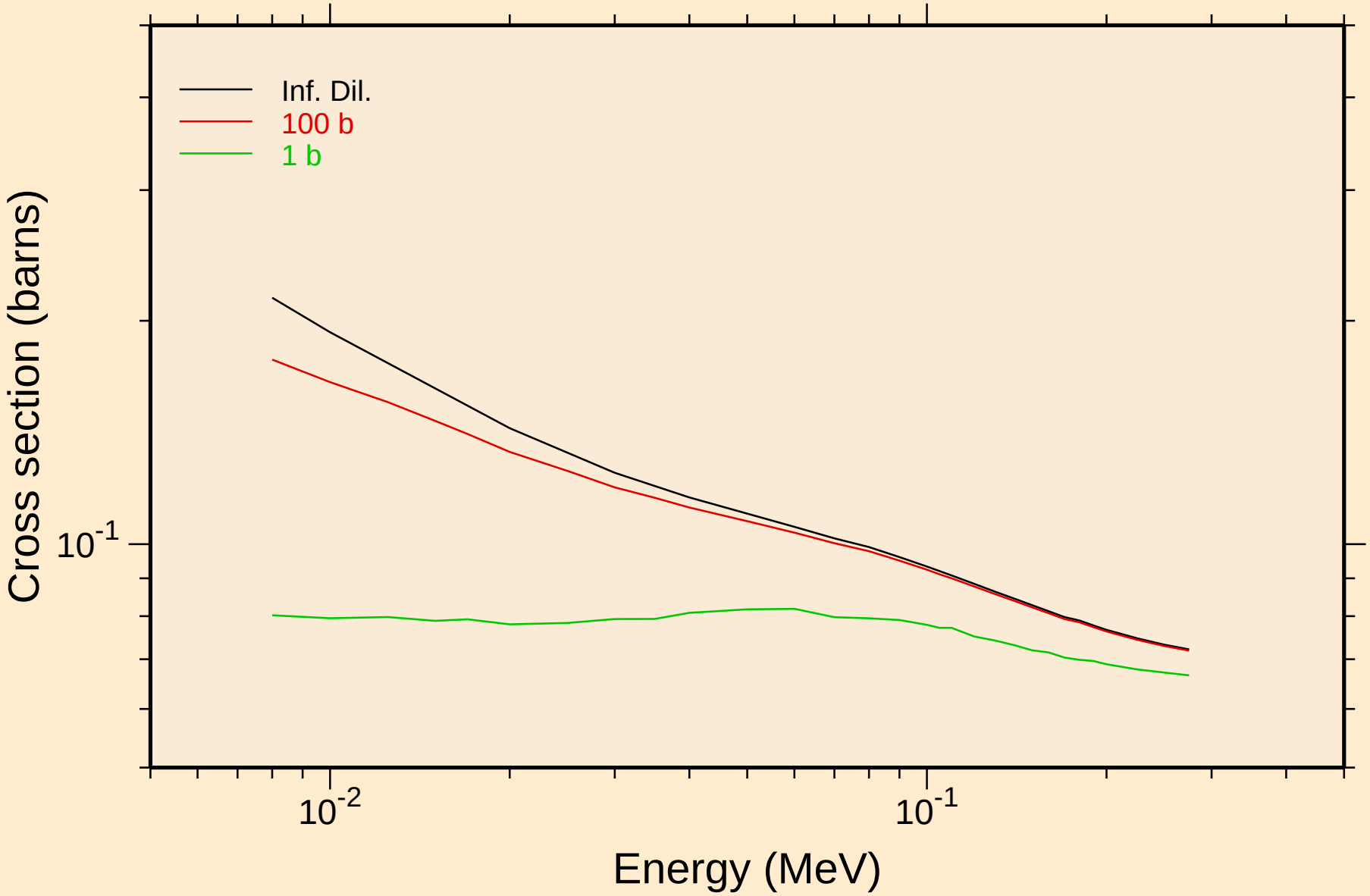


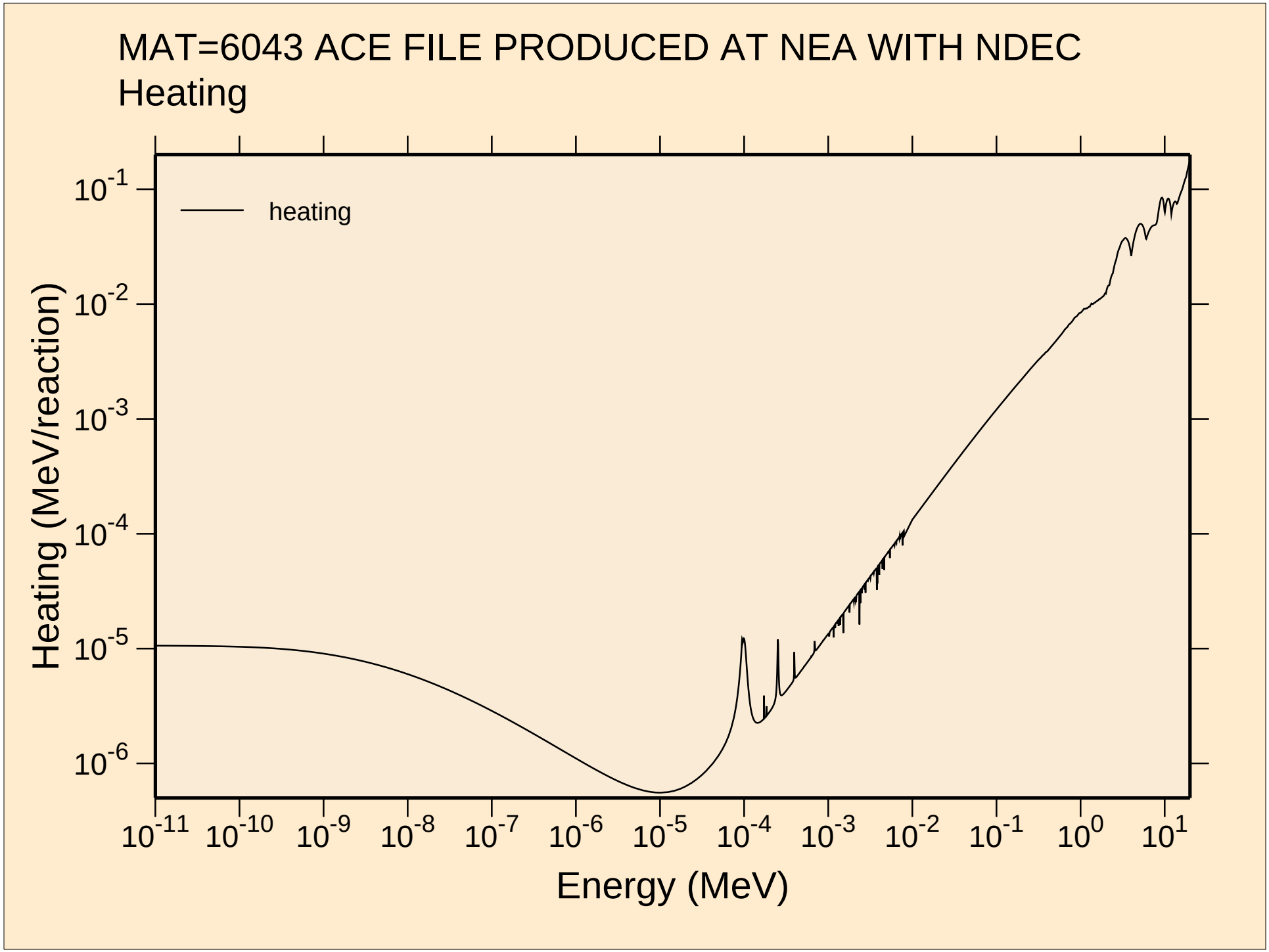
MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
UR elastic cross section

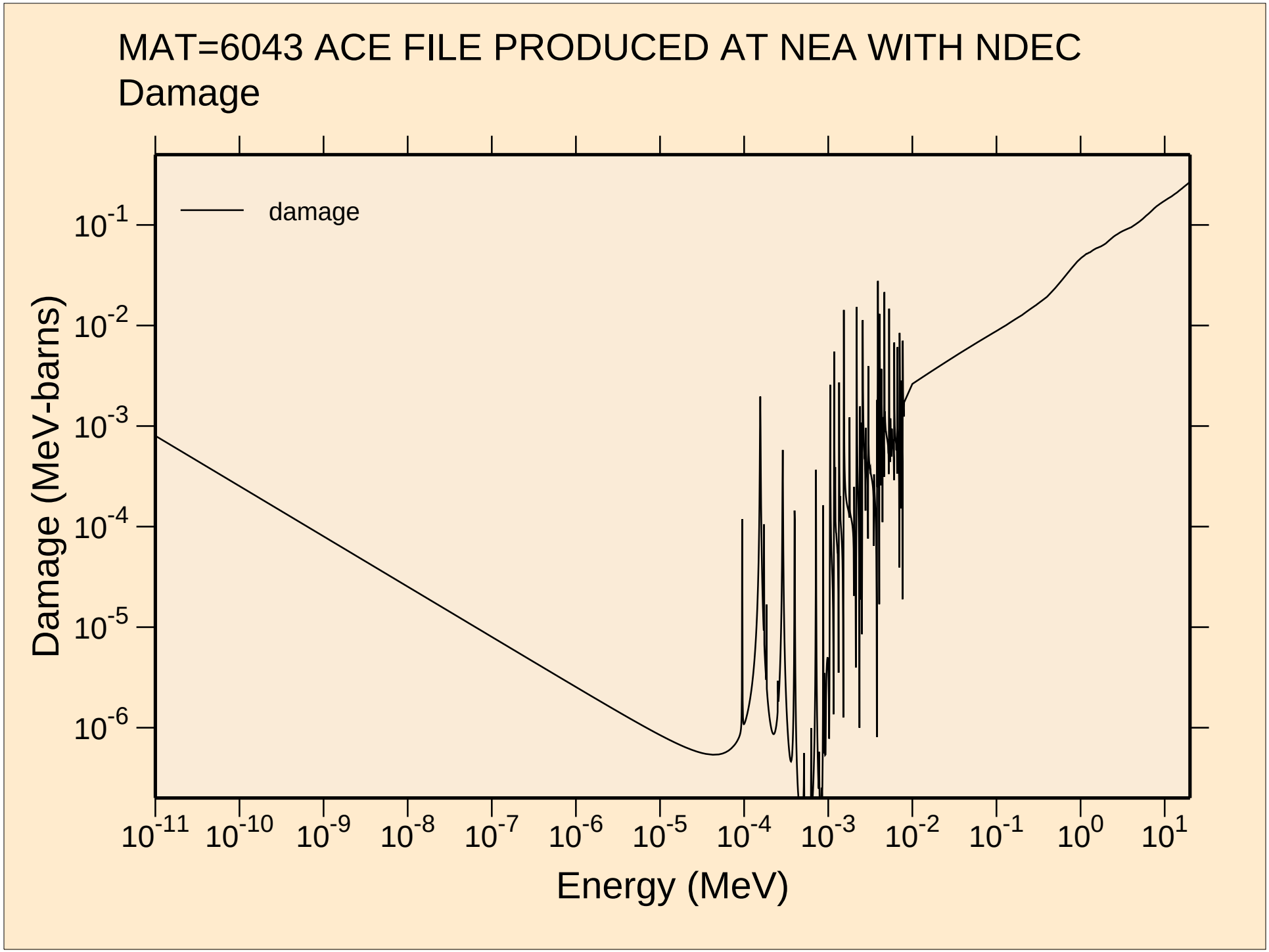


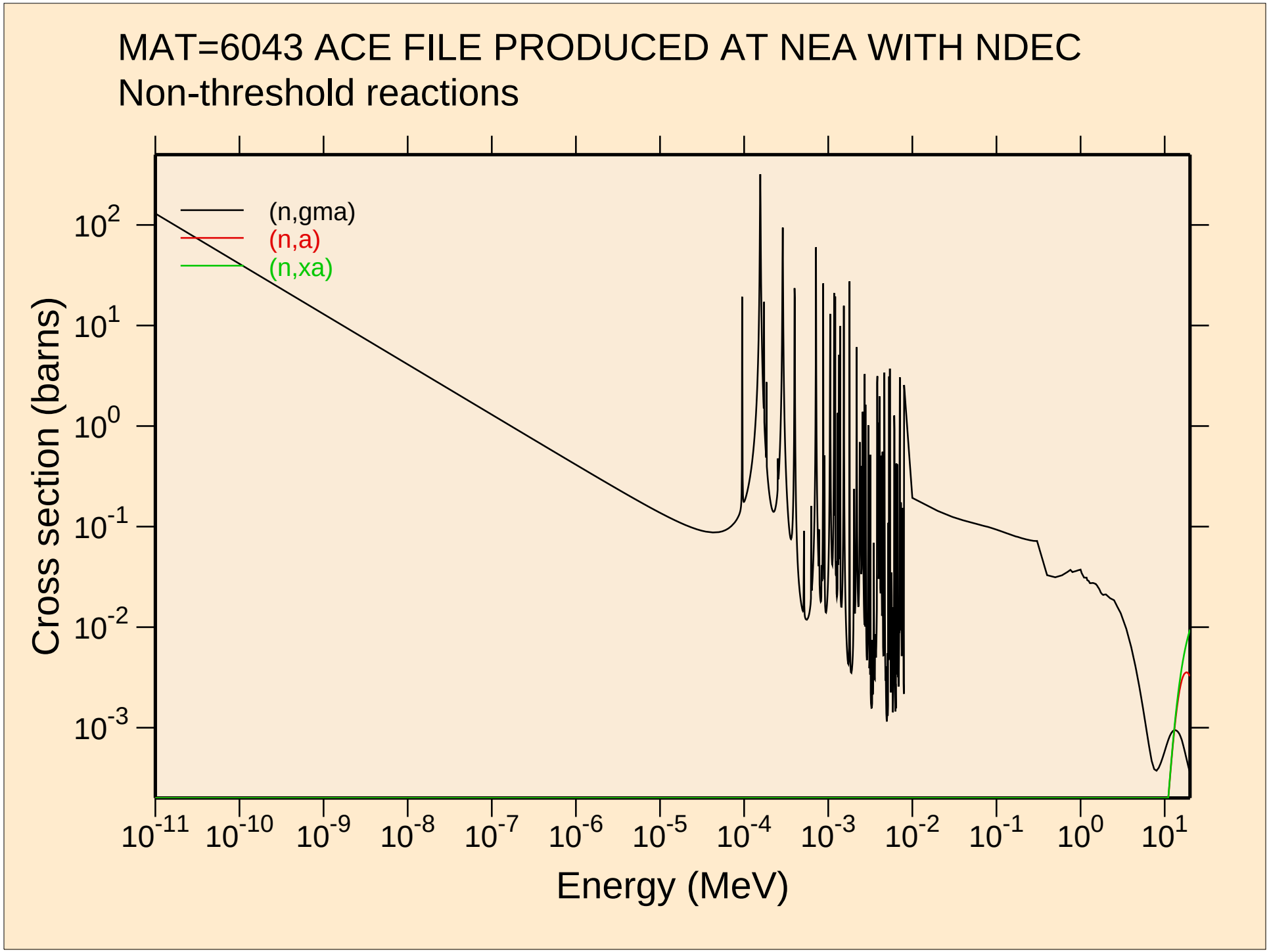
MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC

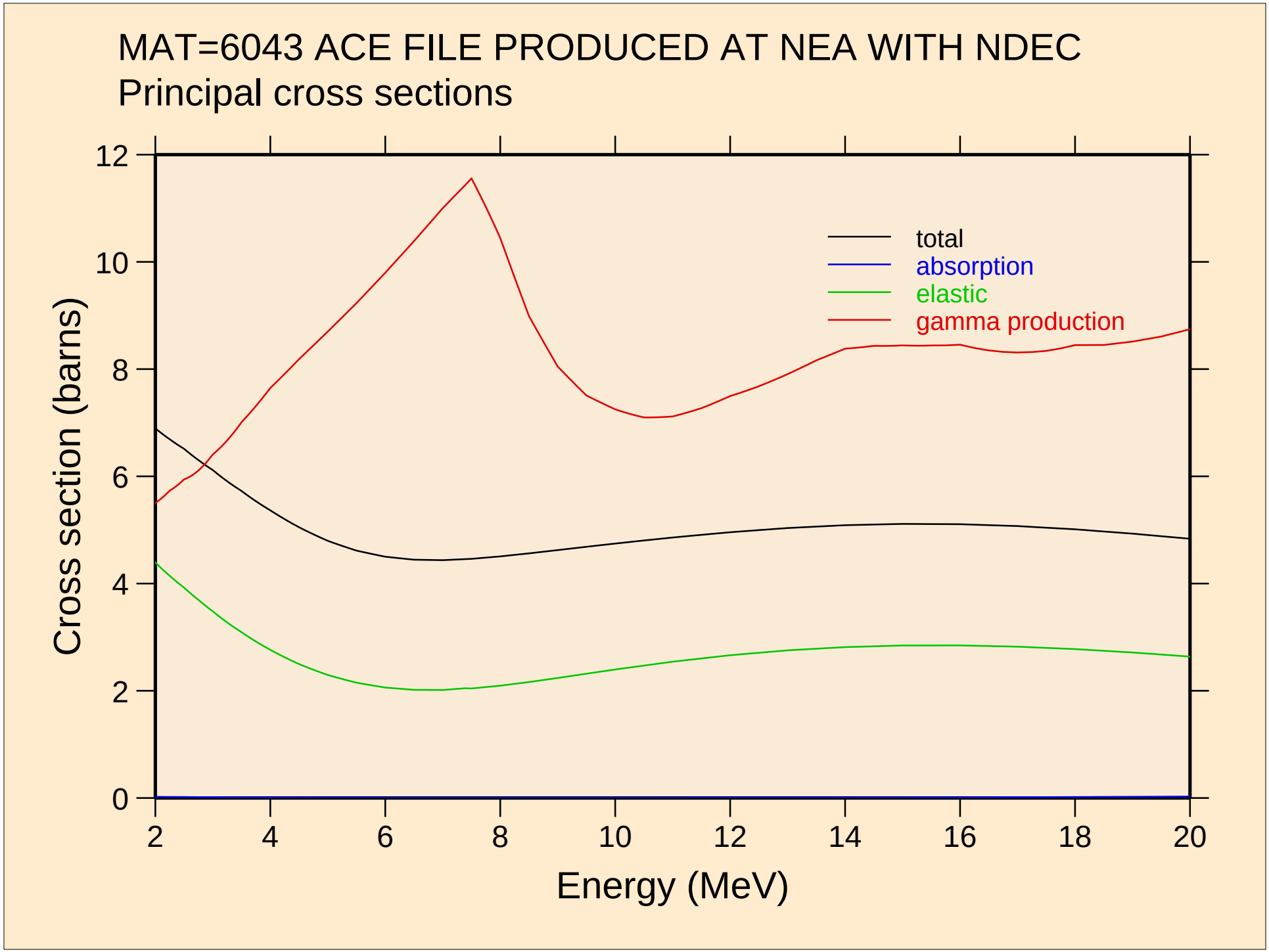
UR capture cross section

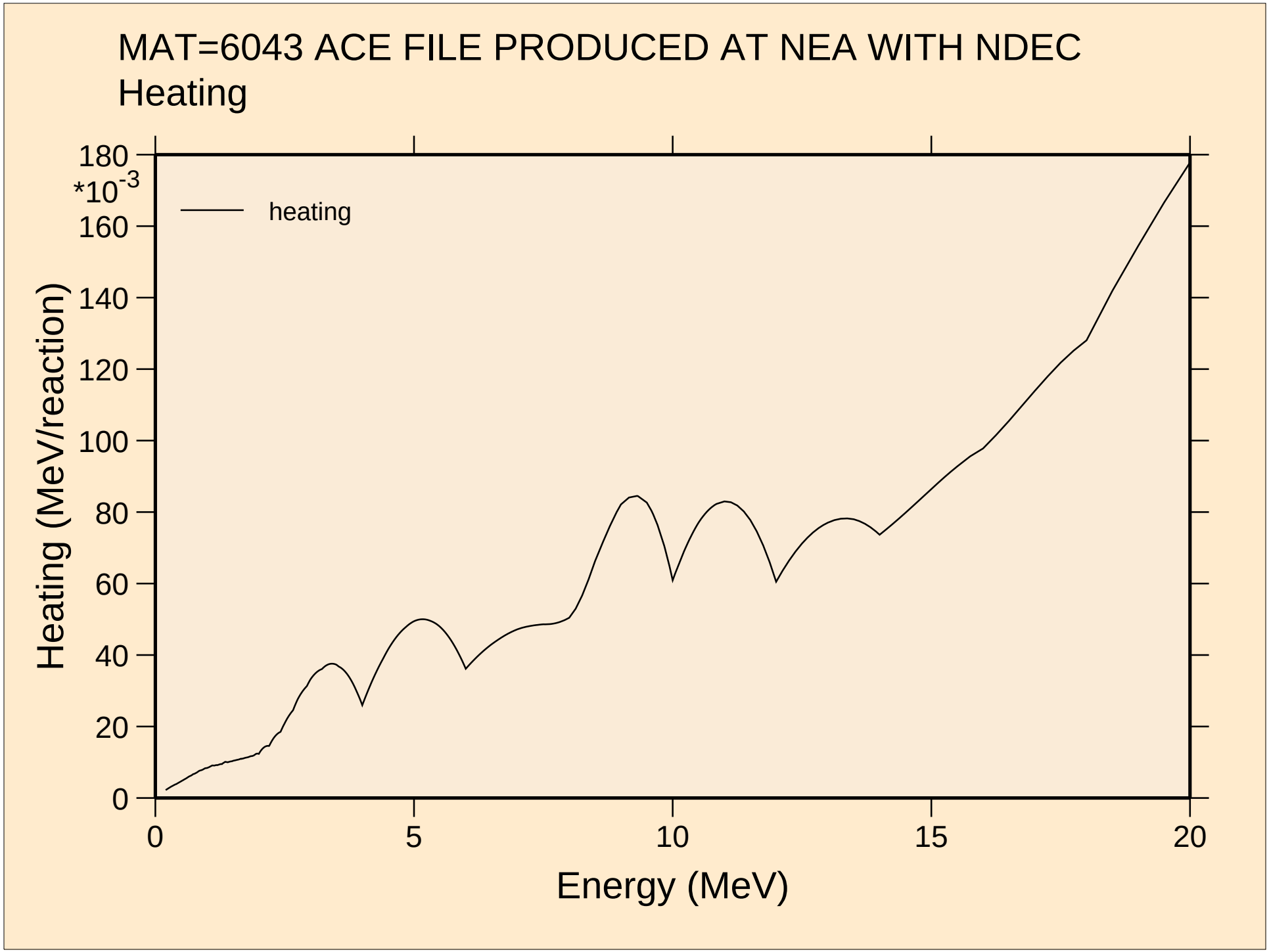


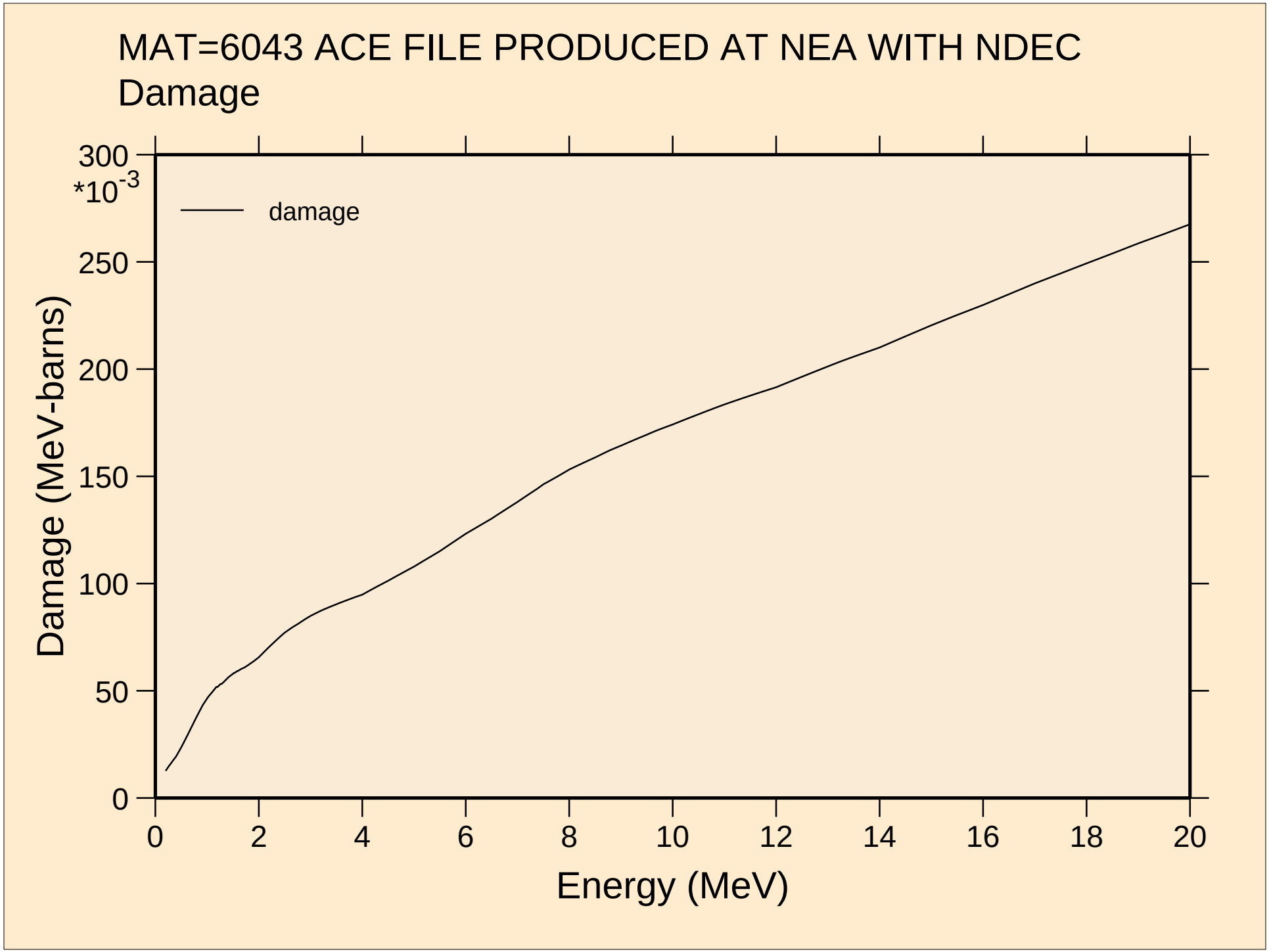

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Heating
heating
Heating (MeV/reaction)
10-1
10-2
10-3
10-4
10-5
10-6
10-11 10-10 10-9 10-8 10-7 10-6 10-5 10-4 10-3 10-2 10-1 100 101
Energy (MeV)

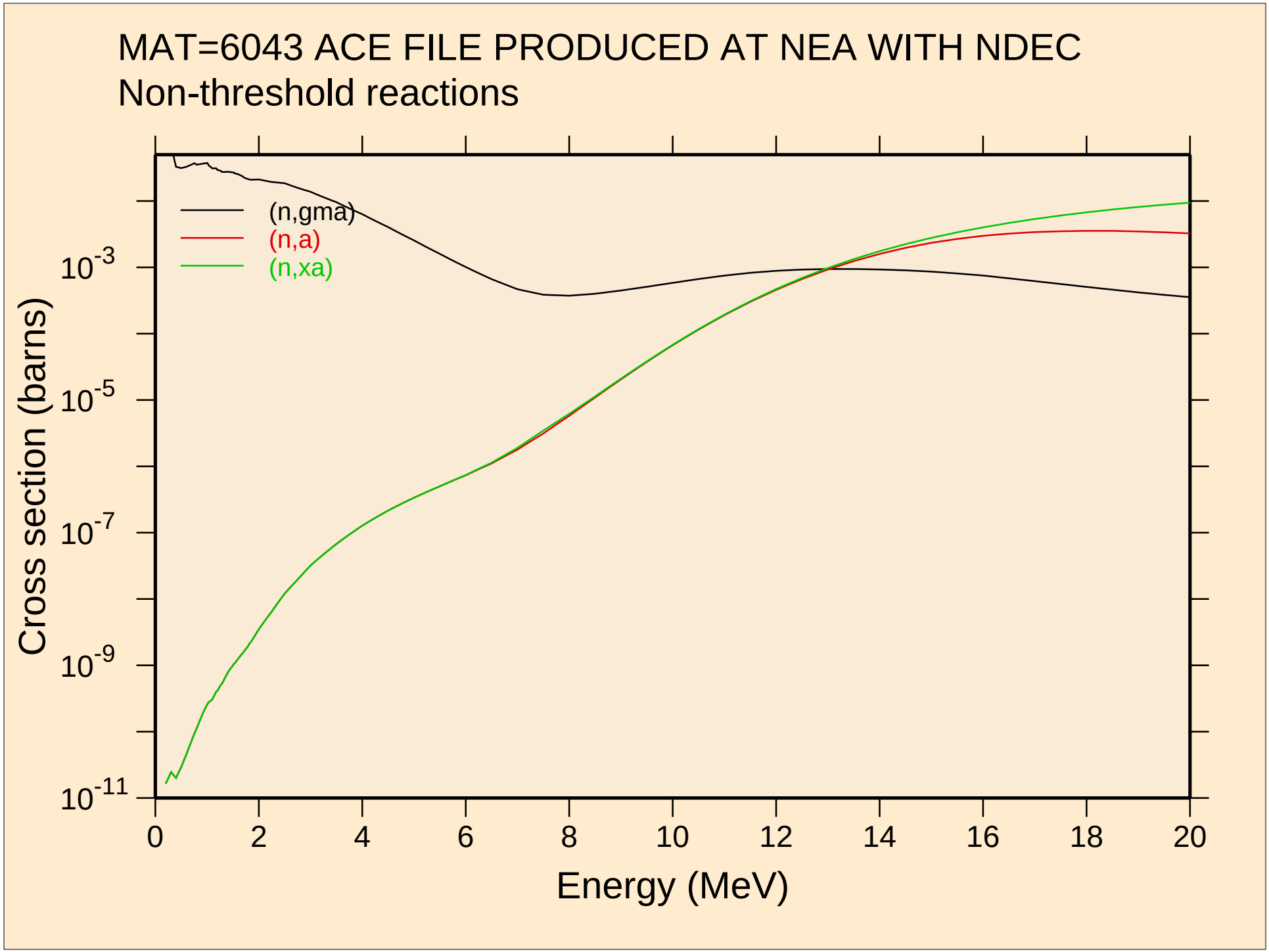

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Damage
damage
Damage (MeV-barns)
10-1
10-2
10-3
10-4
10-5
10-6
10-11 10-10 10-9 10-8 10-7 10-6 10-5 10-4 10-3 10-2 10-1 100 101
Energy (MeV)

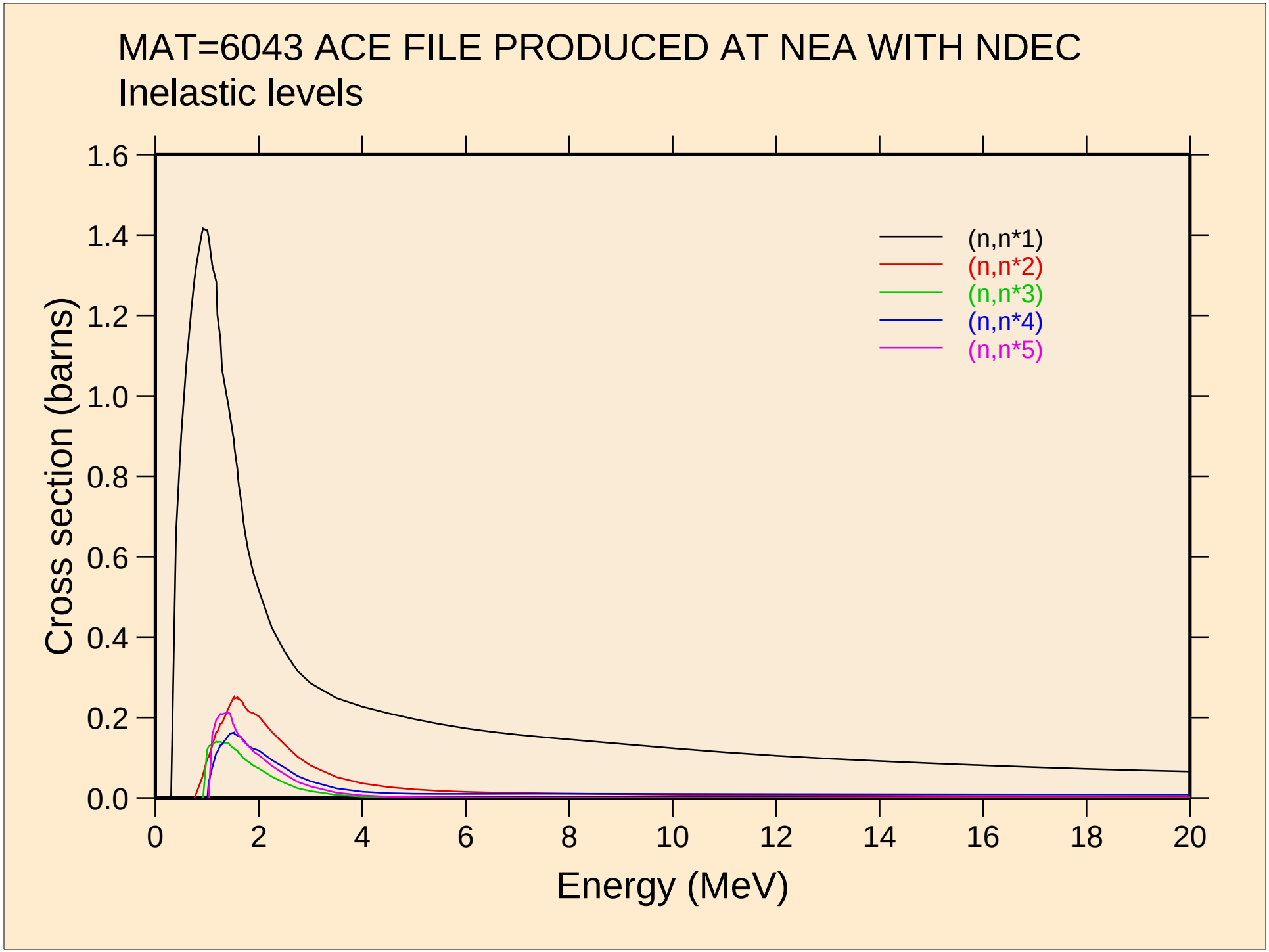

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Non-threshold reactions
(n,gma)
(n,a)
(n,xa)
Cross section (barns)
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^-11 10^-10 10^-9 10^-8 10^-7 10^-6 10^-5 10^-4 10^-3 10^-2 10^-1 10^0 10^1
Energy (MeV)

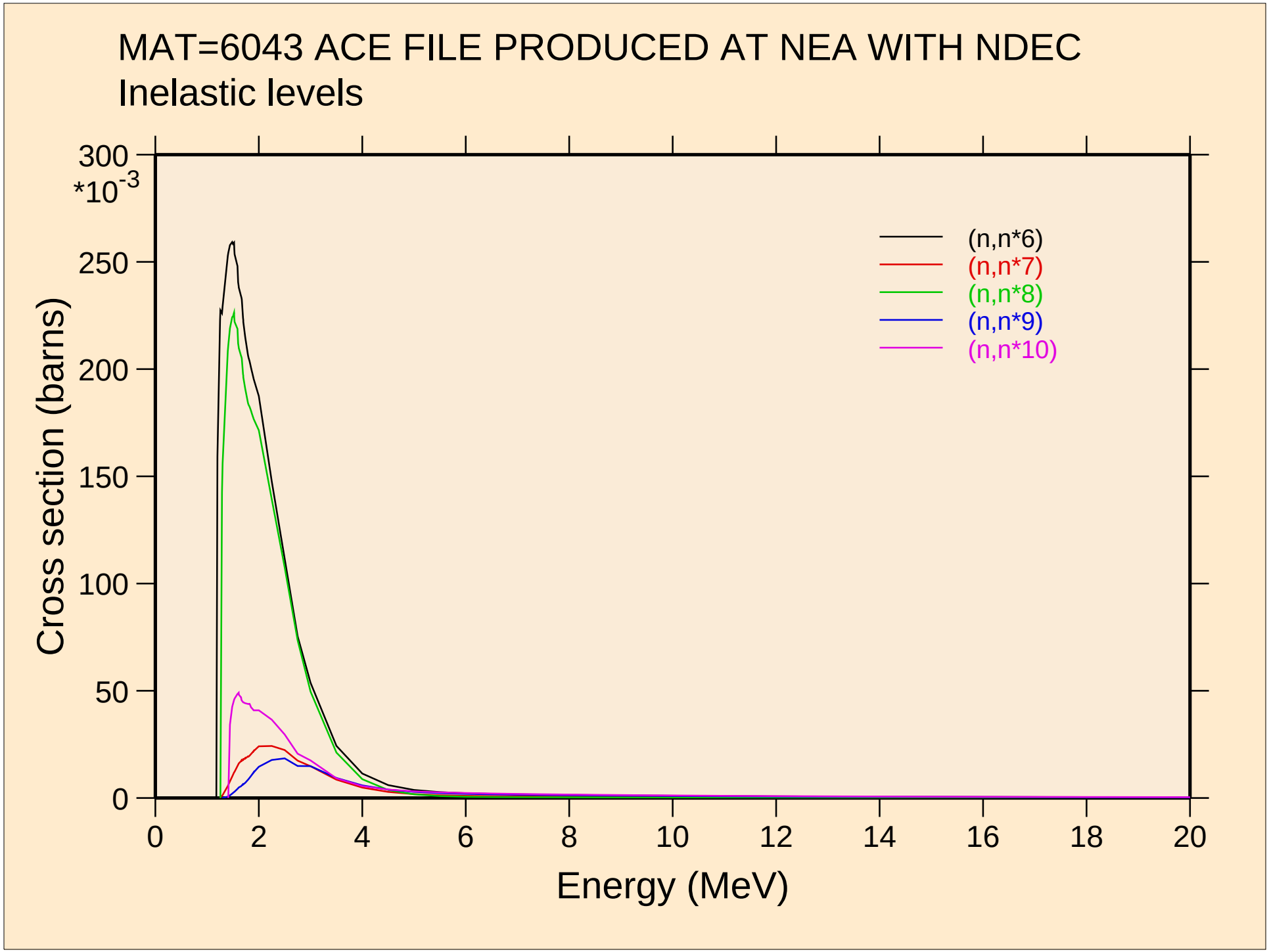

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production
0
2
4
6
8
10
12
2
4
6
8
10
12
14
16
18
20

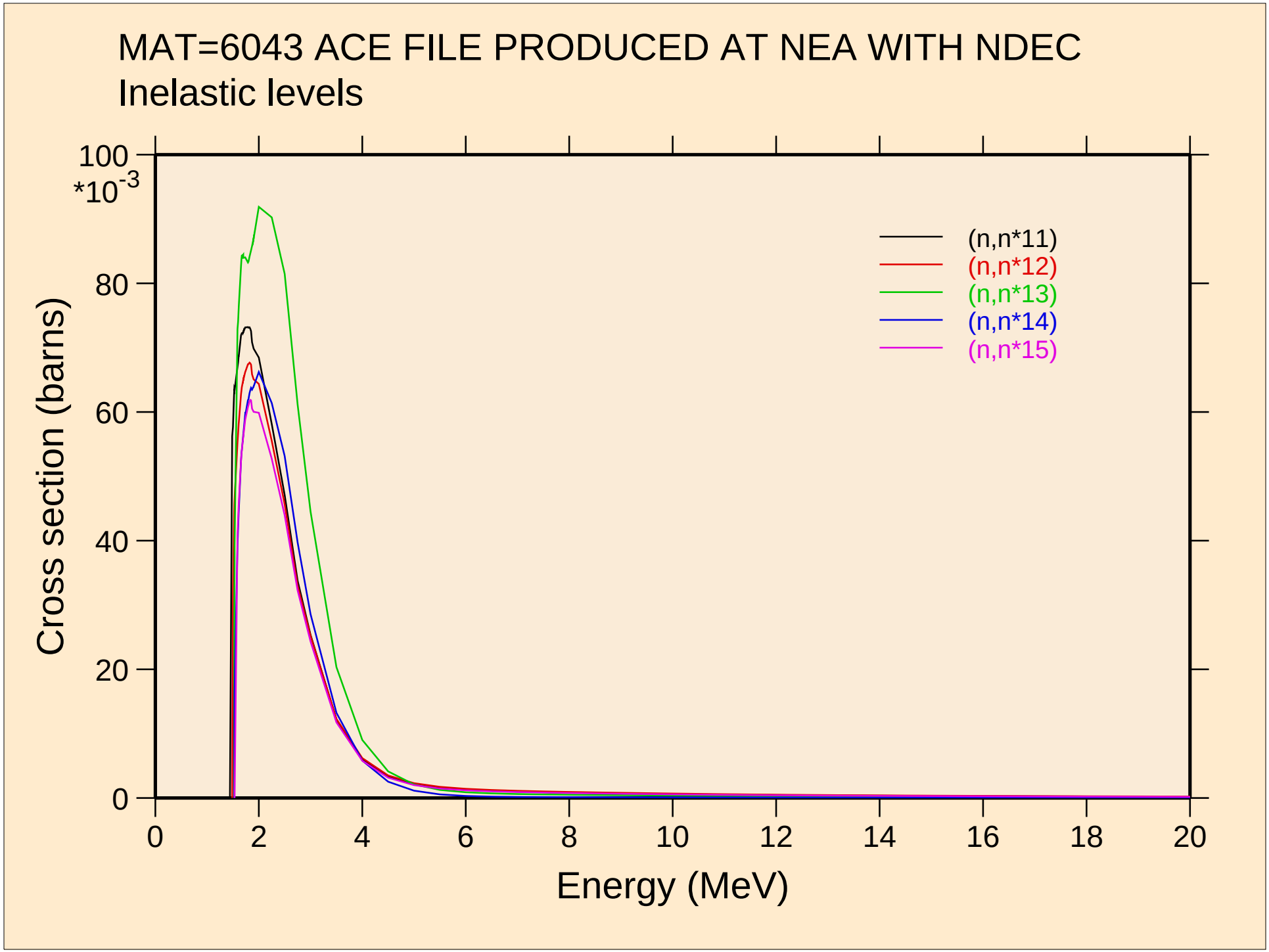

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Heating
heating
*10-3
180
160
140
120
100
80
60
40
20
0
Heating (MeV/reaction)
0
5
10
15
20
Energy (MeV)

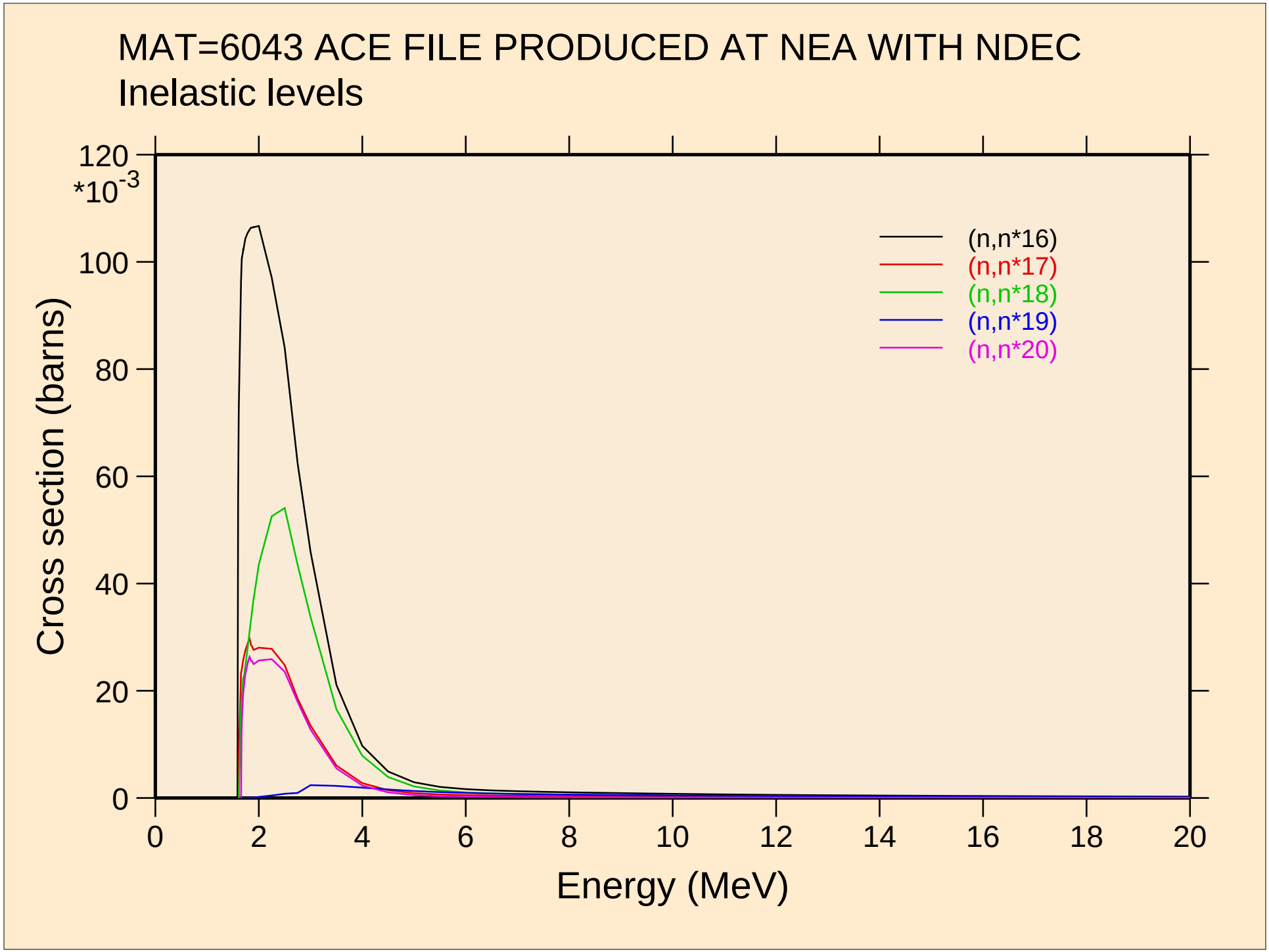

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Damage
300
*10-3
250
200
150
100
50
0
damage
Damage (MeV-barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

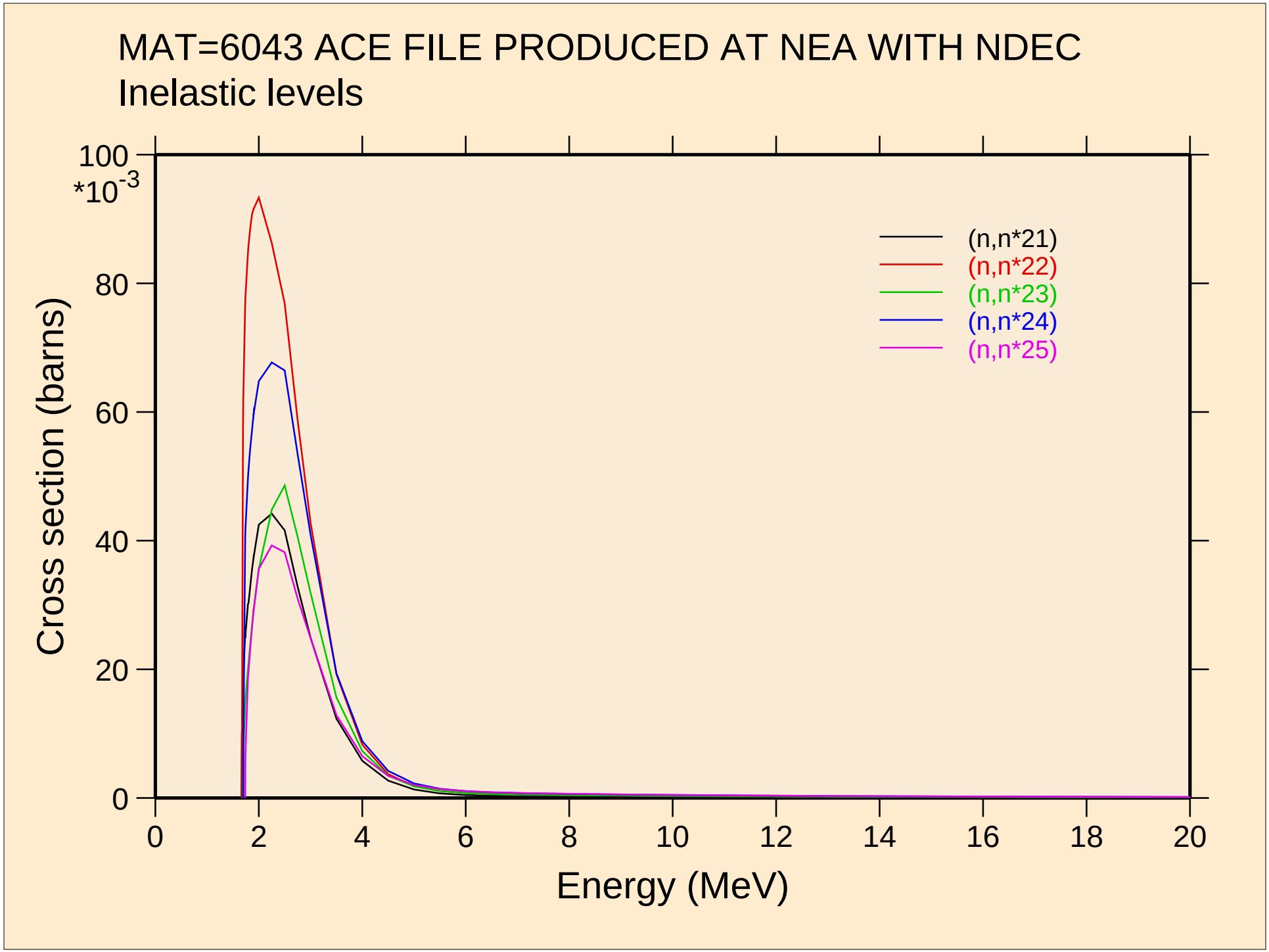

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Non-threshold reactions
(n,gma)
(n,a)
(n,xa)
Cross section (barns)
10-3
10-5
10-7
10-9
10-11
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

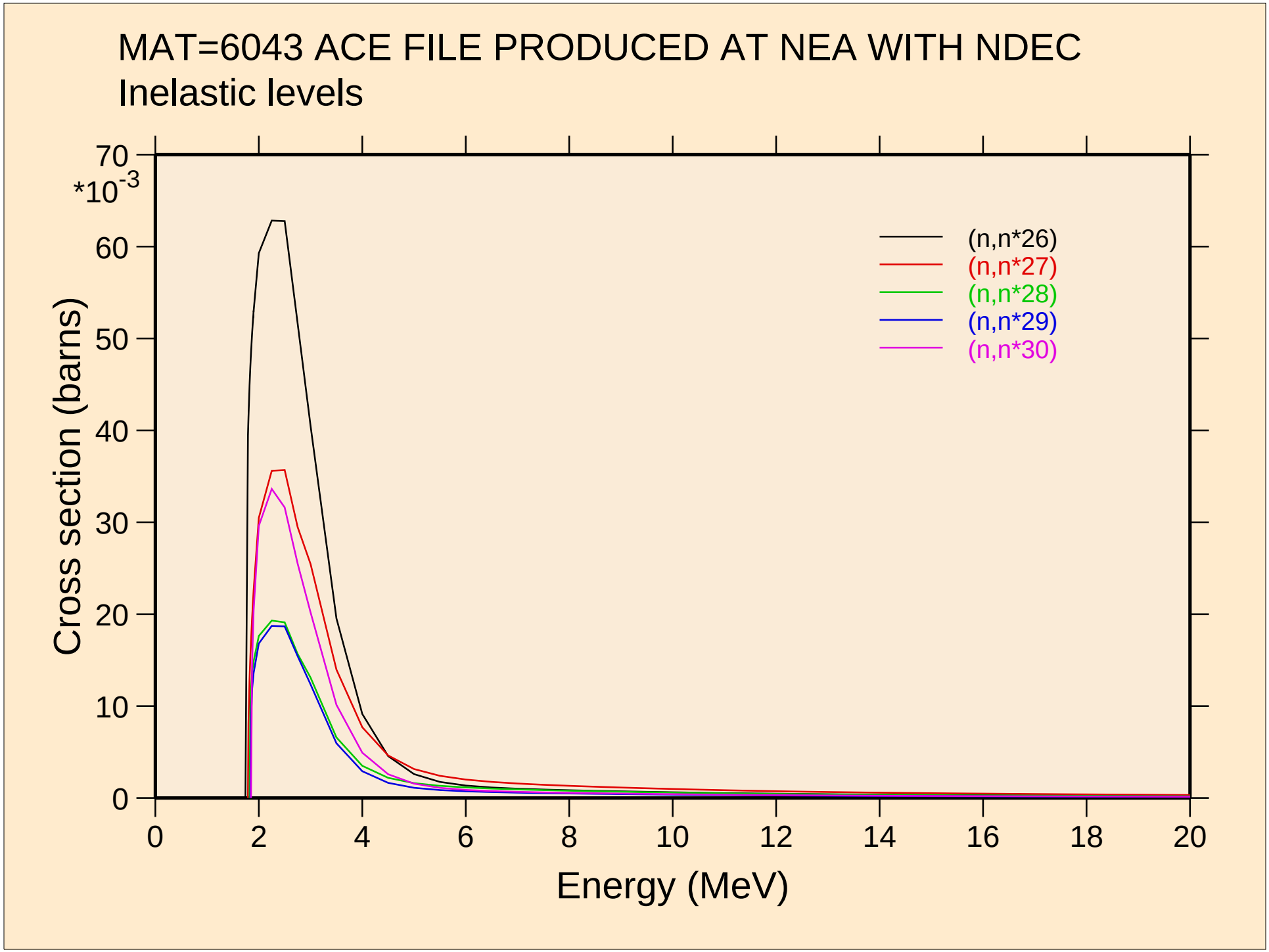

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Inelastic levels
Cross section (barns)
Energy (MeV)
(n,n*1)
(n,n*2)
(n,n*3)
(n,n*4)
(n,n*5)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
0
2
4
6
8
10
12
14
16
18
20

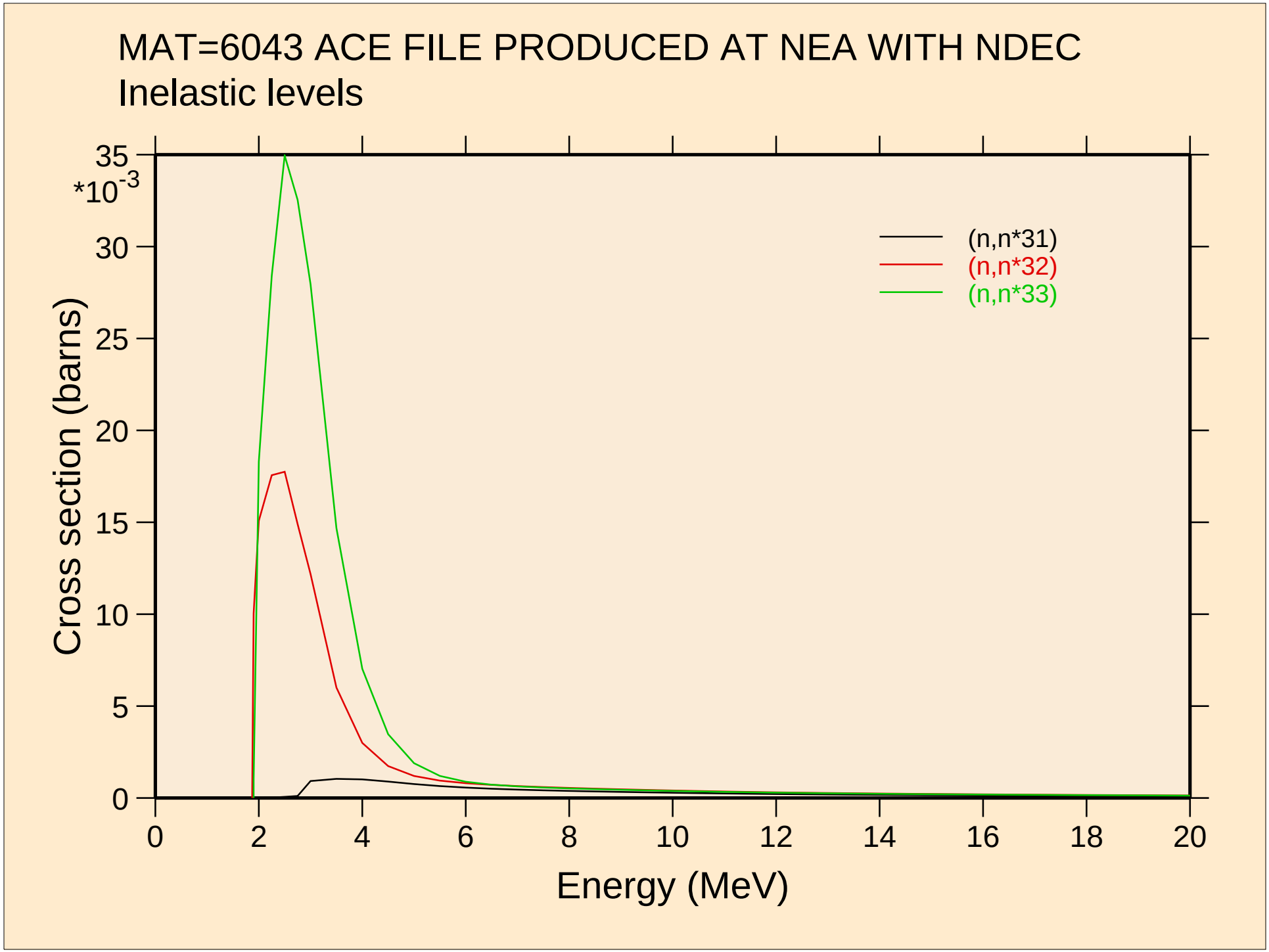

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Inelastic levels
300
*10-3
250
200
150
100
50
0
Cross section (barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*6)
(n,n*7)
(n,n*8)
(n,n*9)
(n,n*10)

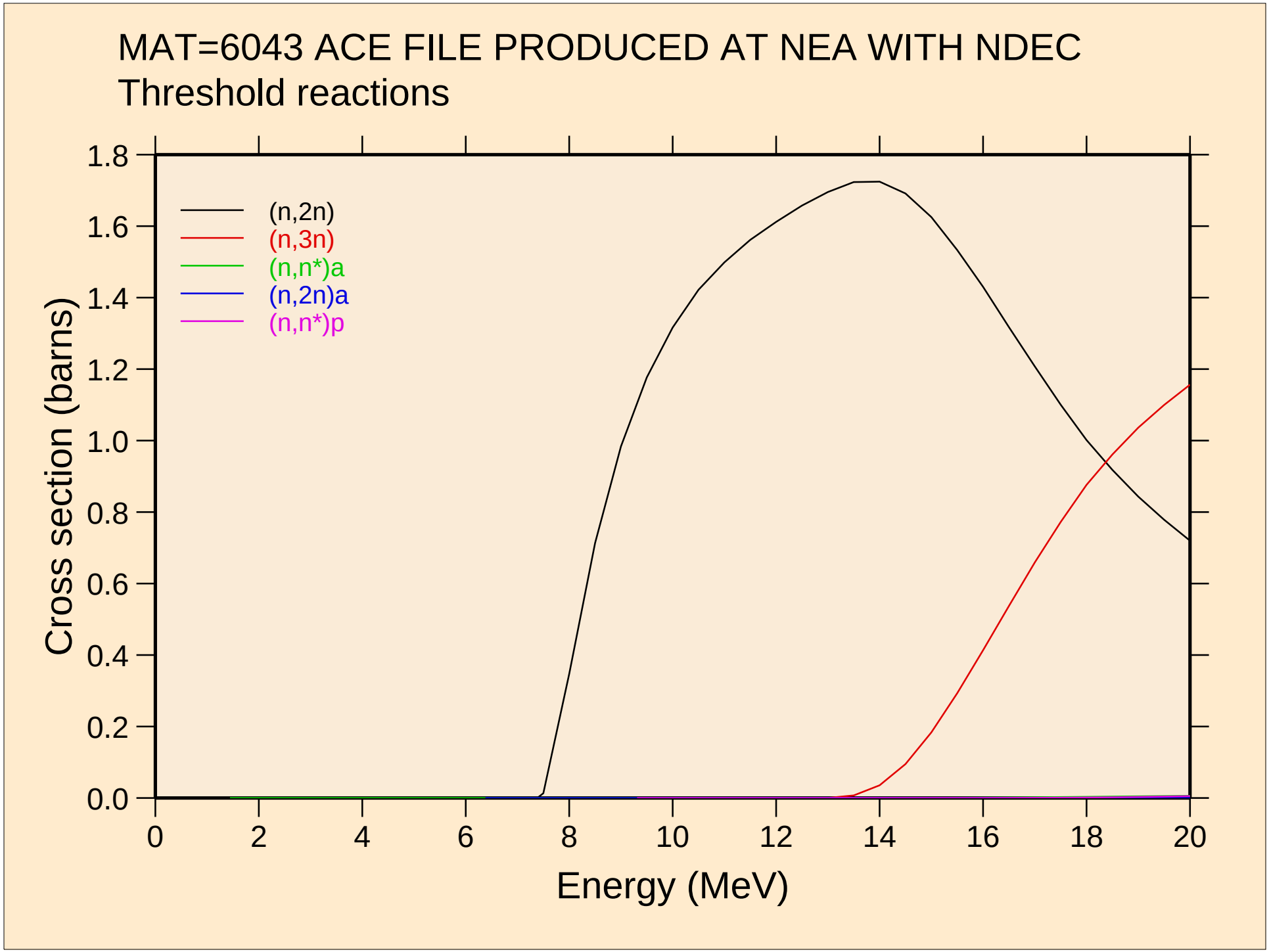

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Inelastic levels
100
*10-3
80
60
40
20
0
Cross section (barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*11)
(n,n*12)
(n,n*13)
(n,n*14)
(n,n*15)

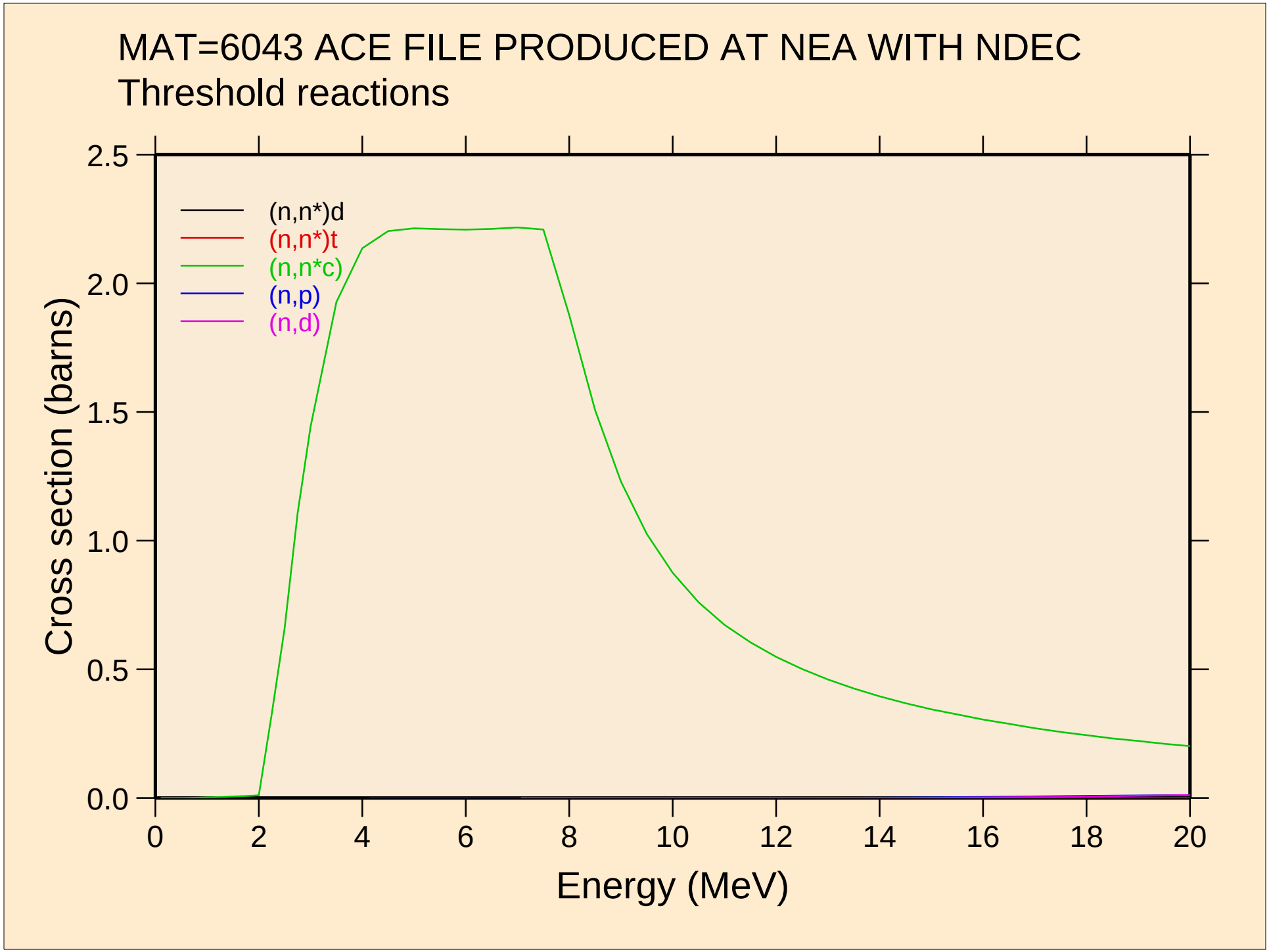

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Inelastic levels
120
*10-3
100
80
60
40
20
0
Cross section (barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*16)
(n,n*17)
(n,n*18)
(n,n*19)
(n,n*20)

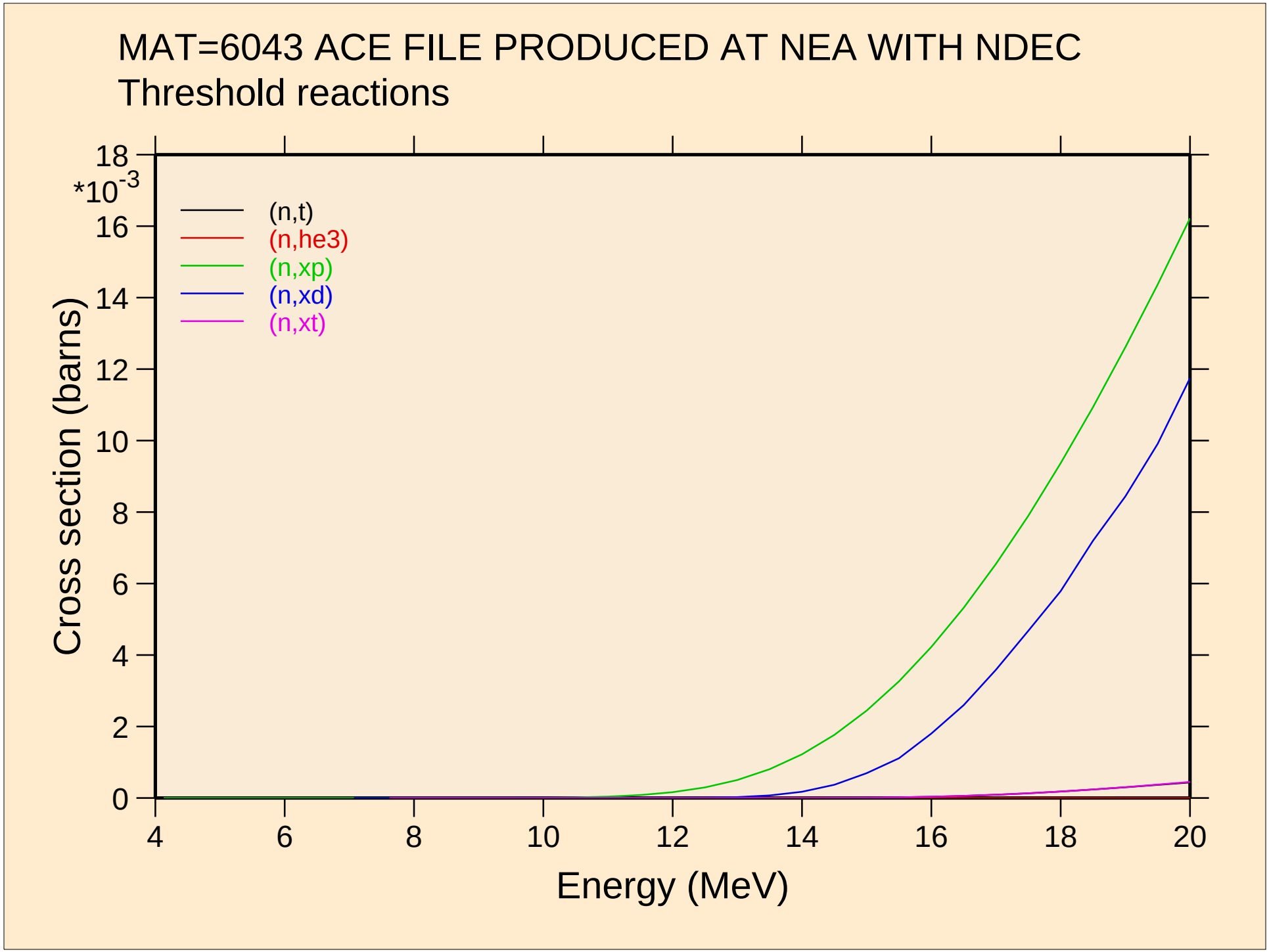

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Inelastic levels
100
*10-3
80
60
40
20
0
Cross section (barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*21)
(n,n*22)
(n,n*23)
(n,n*24)
(n,n*25)

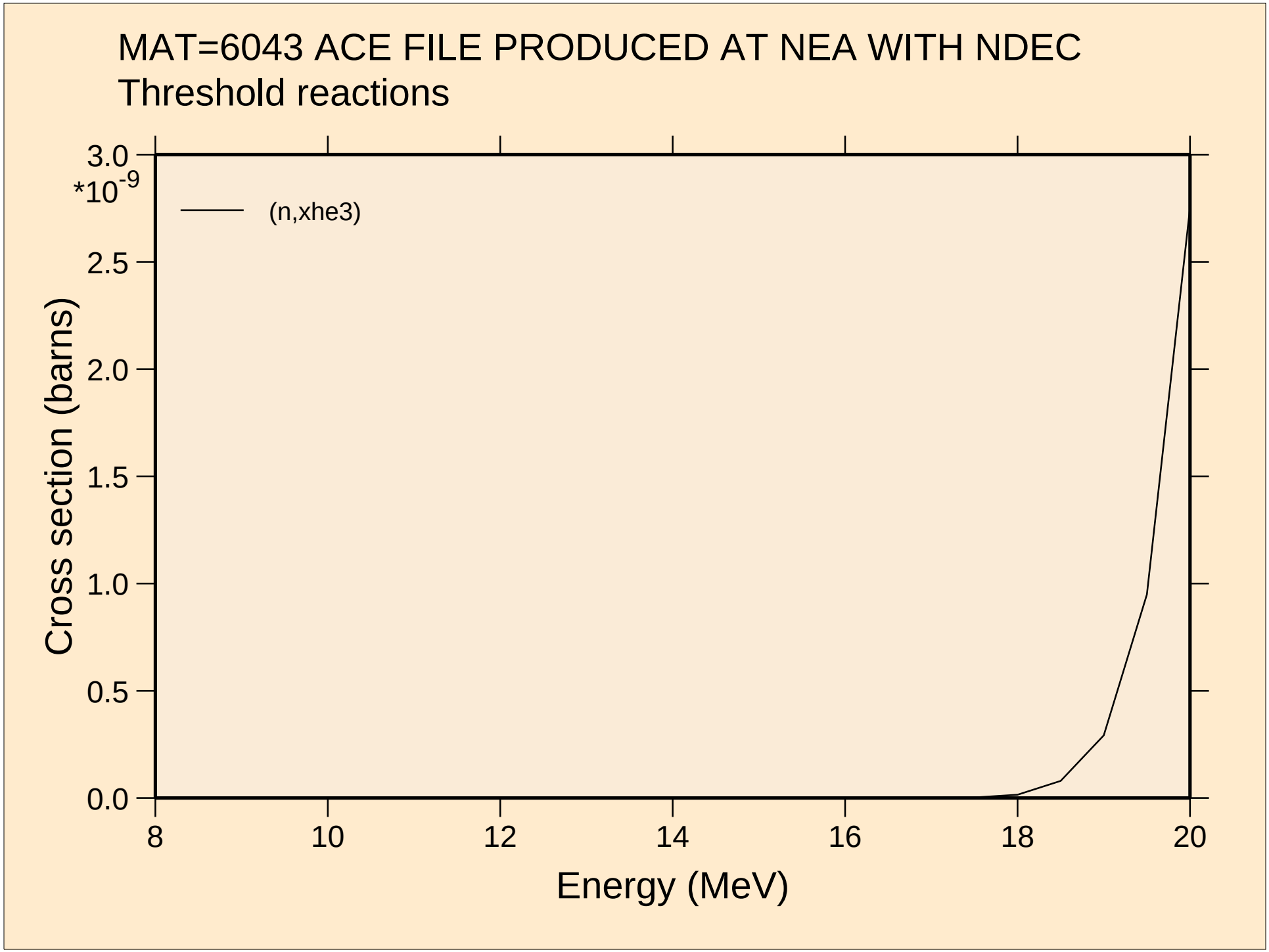

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Inelastic levels
Cross section (barns)
*10-3
70
60
50
40
30
20
10
0
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*26)
(n,n*27)
(n,n*28)
(n,n*29)
(n,n*30)

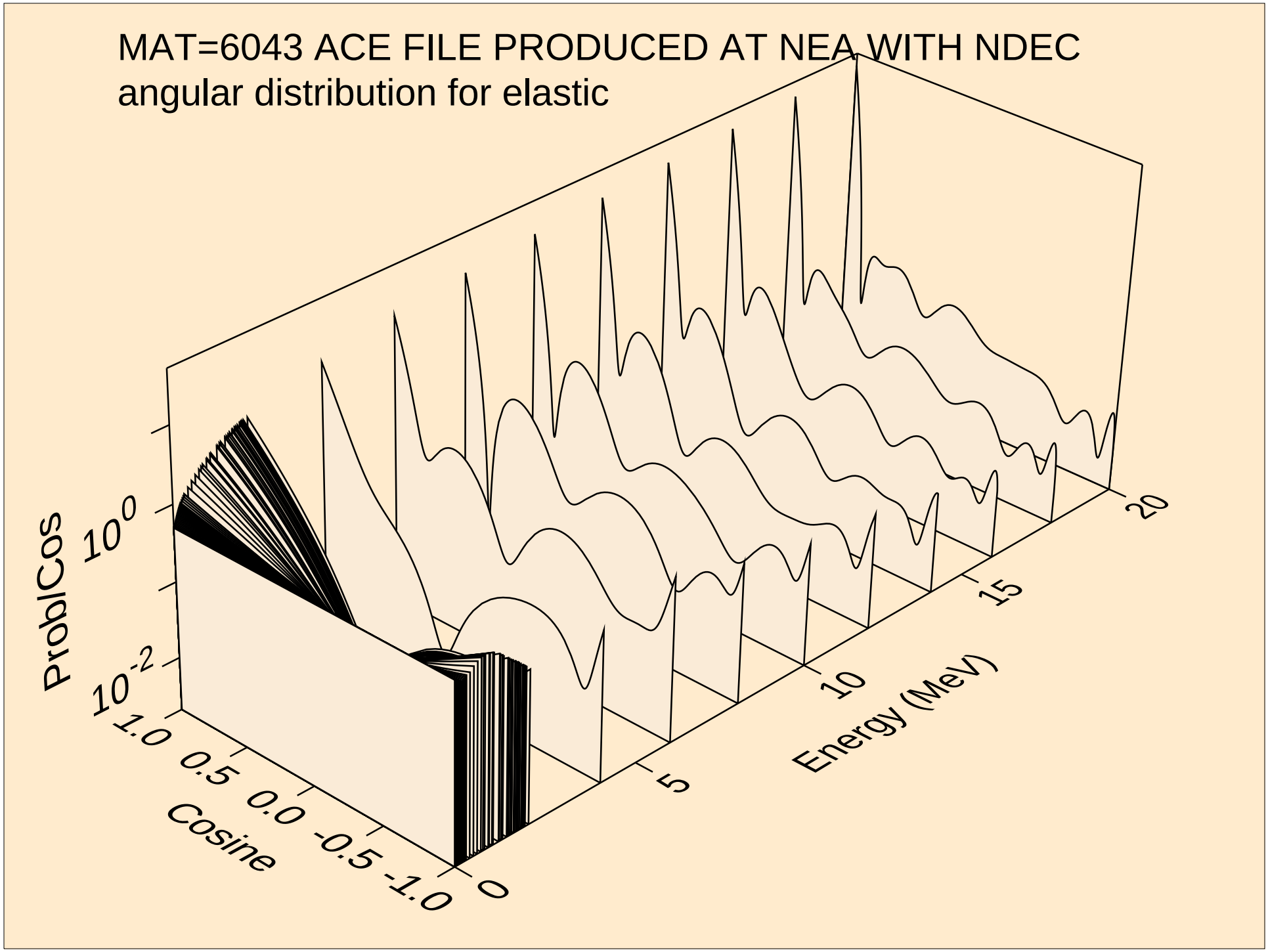

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Inelastic levels
Cross section (barns)
*10-3
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*31)
(n,n*32)
(n,n*33)

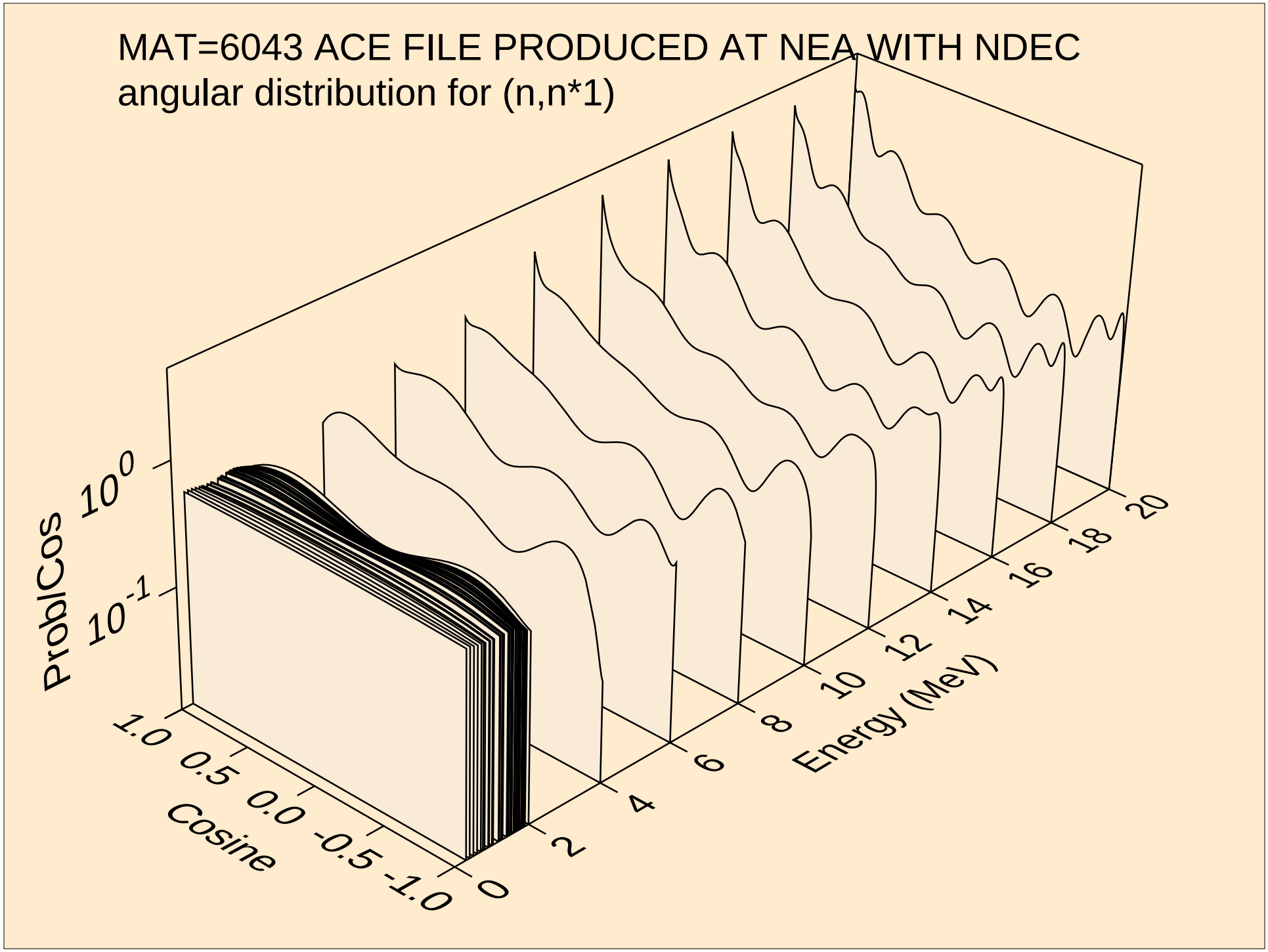

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Threshold reactions
(n,2n)
(n,3n)
(n,n*)a
(n,2n)a
(n,n*)p
Cross section (barns)
Energy (MeV)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
0
2
4
6
8
10
12
14
16
18
20

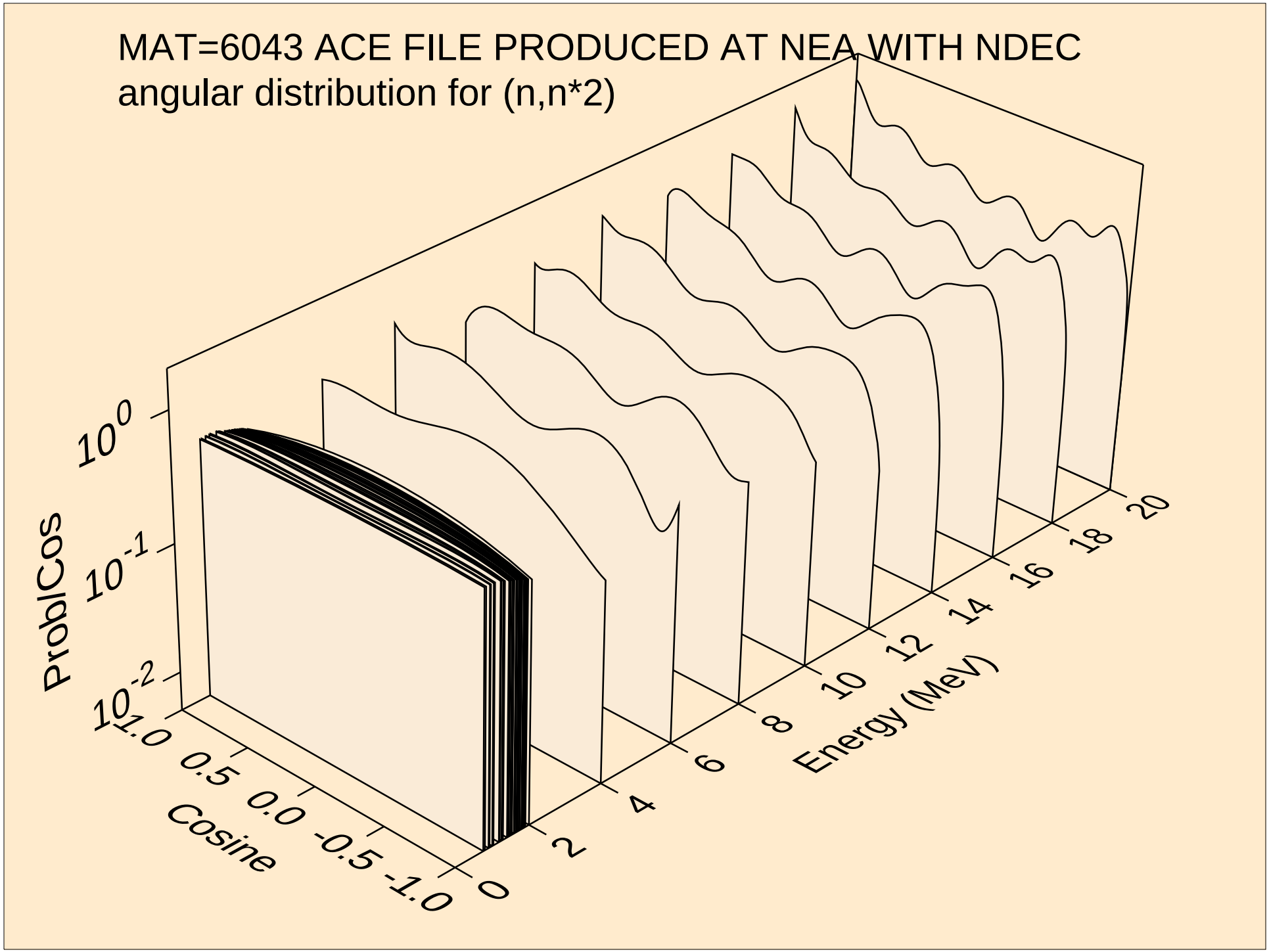

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Threshold reactions
(n,n*)d
(n,n*)t
(n,n*c)
(n,p)
(n,d)
Cross section (barns)
Energy (MeV)
0.0
0.5
1.0
1.5
2.0
2.5
0
2
4
6
8
10
12
14
16
18
20

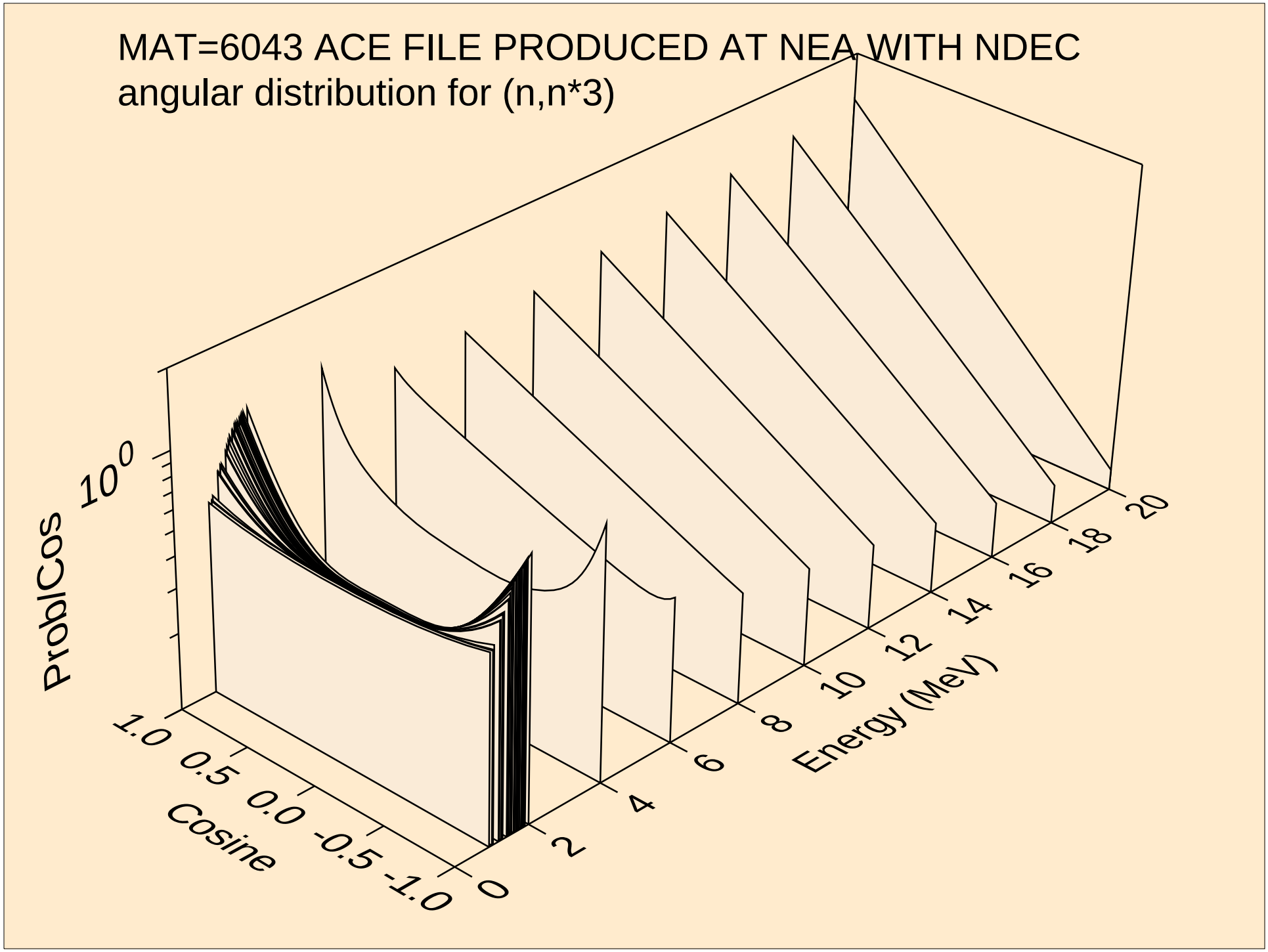

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Threshold reactions
*10-3
Cross section (barns)
Energy (MeV)
(n,t)
(n,he3)
(n,xp)
(n,xd)
(n,xt)
0
2
4
6
8
10
12
14
16
18
4
6
8
10
12
14
16
18
20

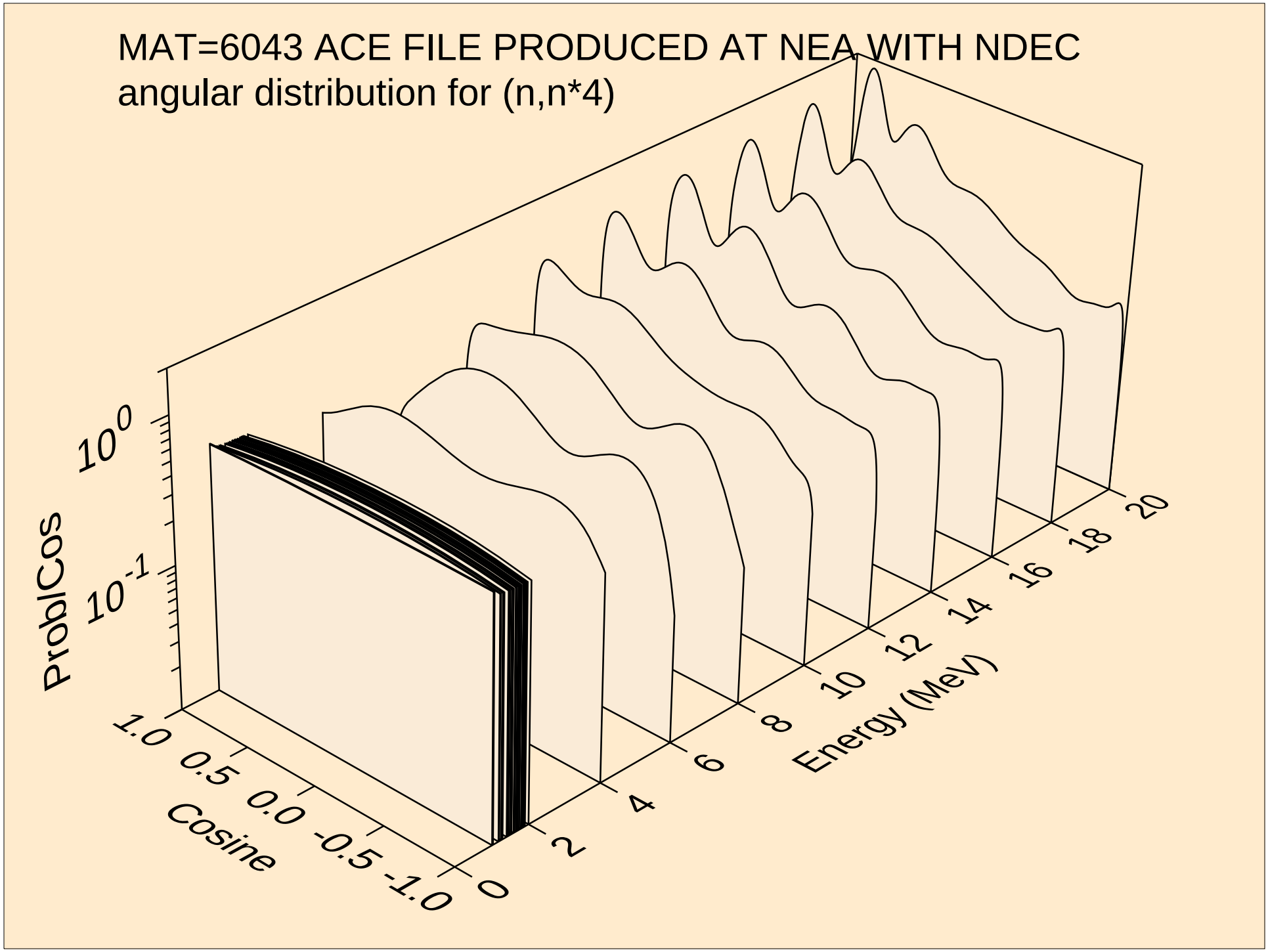

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Threshold reactions
3.0
*10-9
2.5
2.0
1.5
1.0
0.5
0.0
(n,xhe3)
Cross section (barns)
8
10
12
14
16
18
20
Energy (MeV)

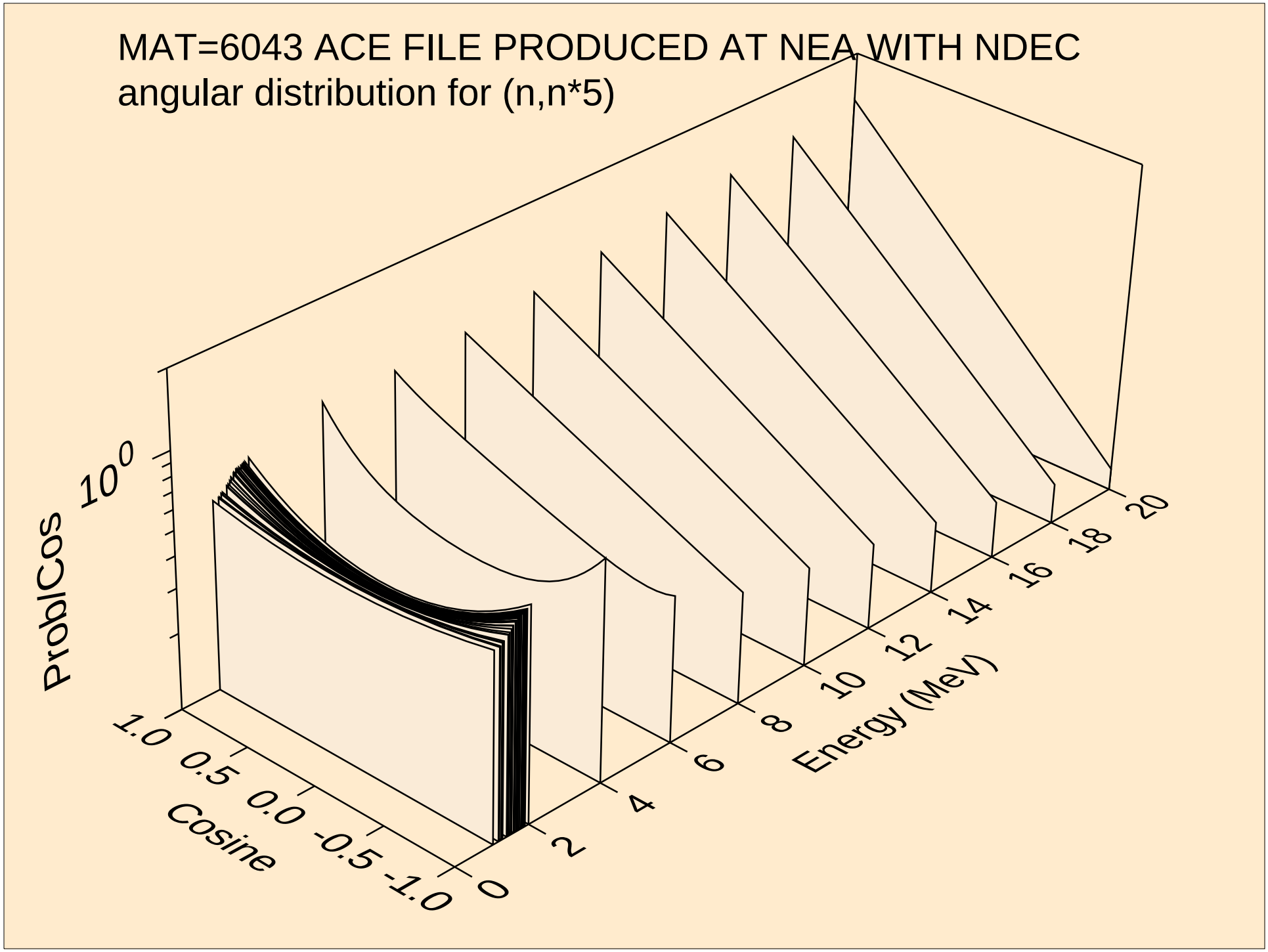

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for elastic
ProbICos
10^0
10^-2
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)

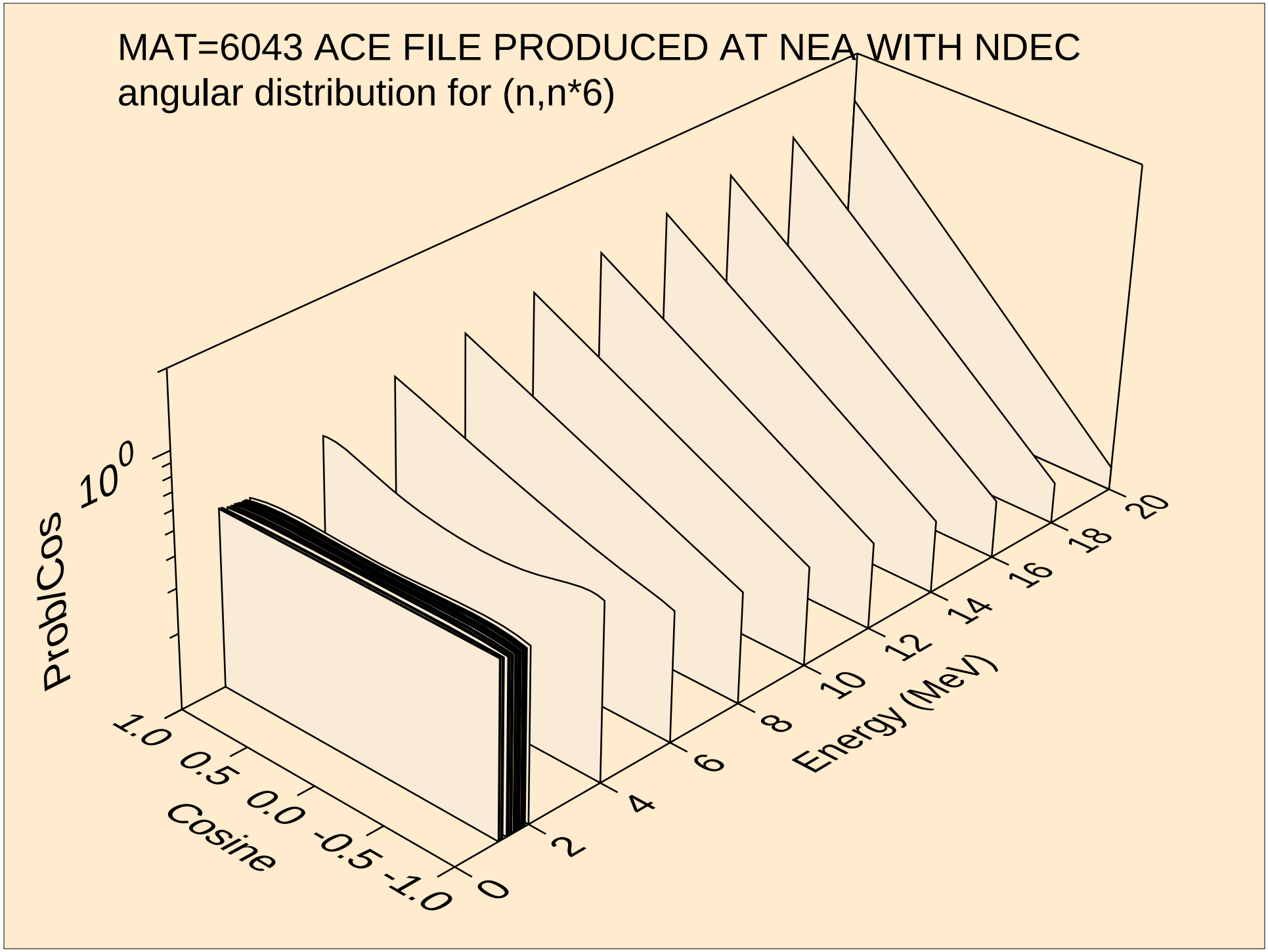

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*1)
ProbICos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

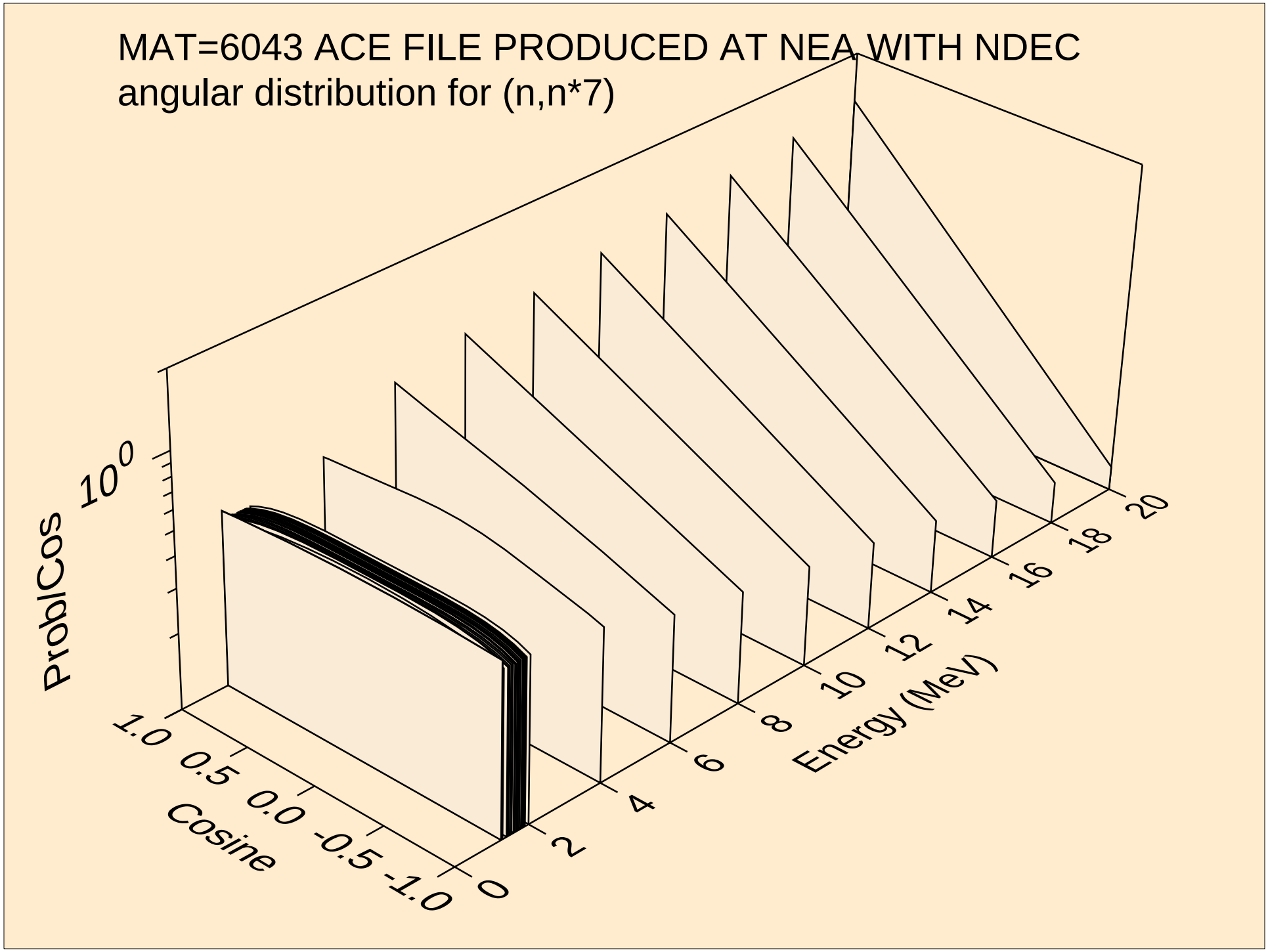

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*2)
ProbCos
10^{0}
10^{-1}
10^{-2}
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

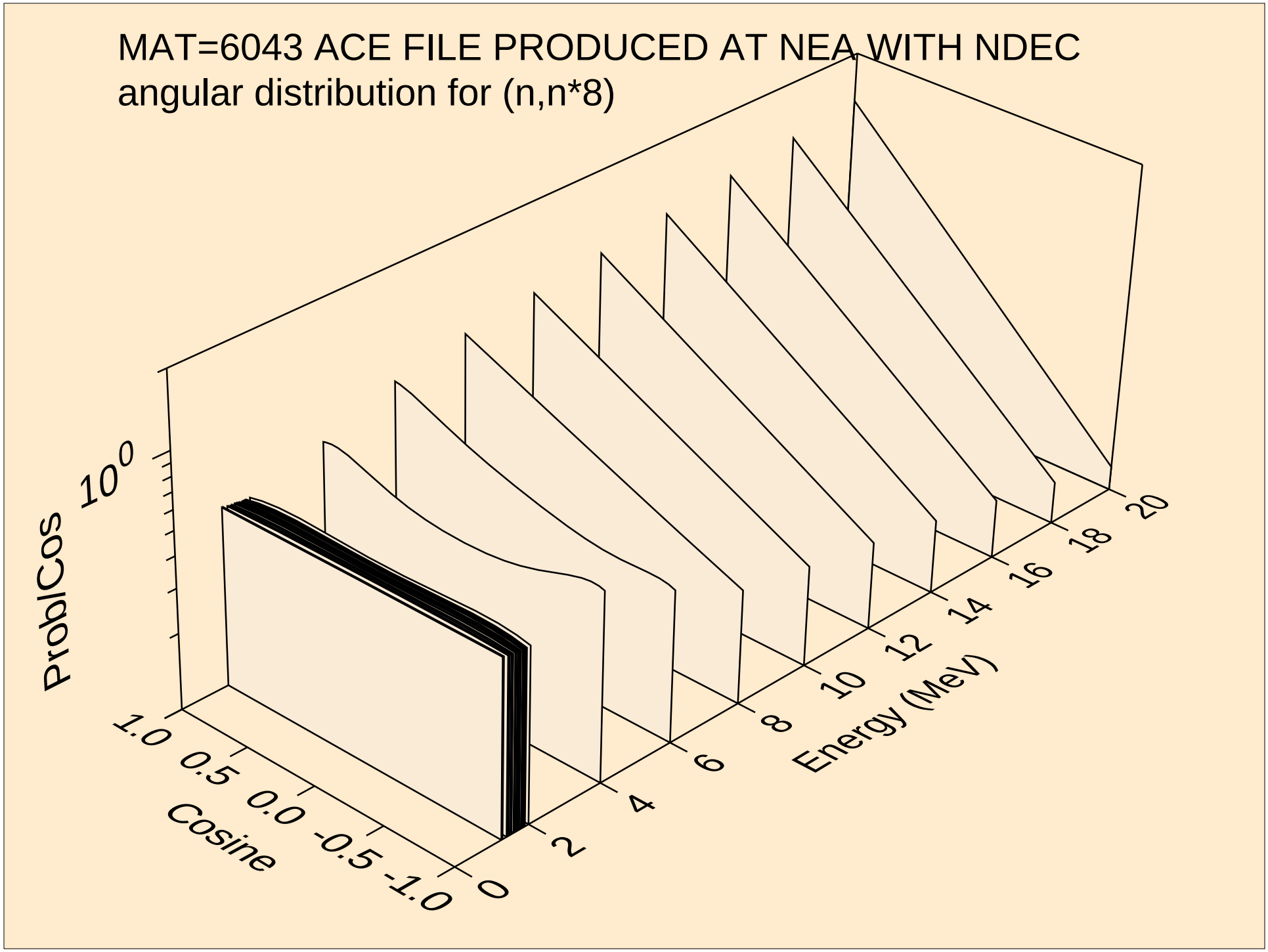

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*3)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

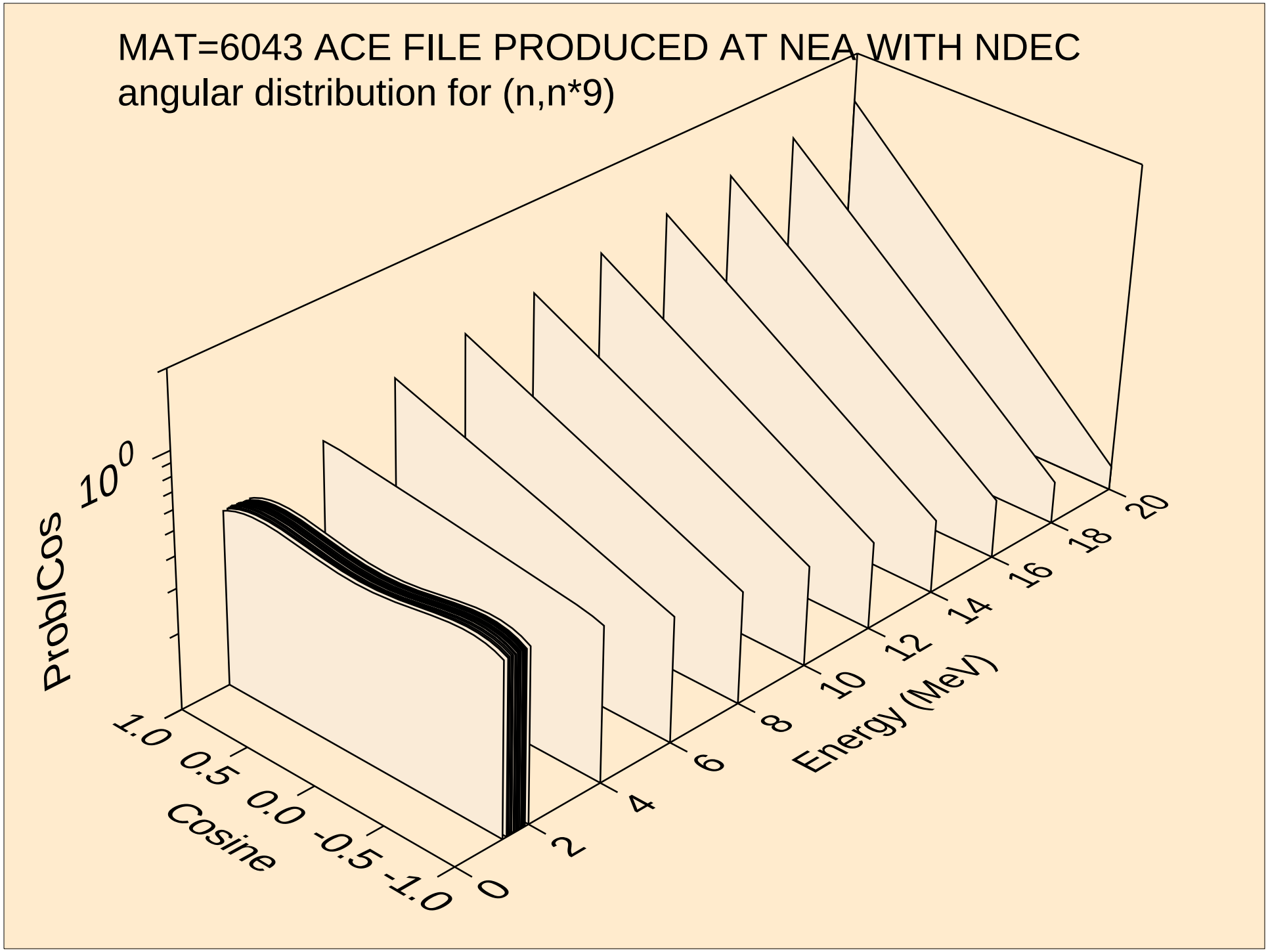

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*4)
ProbICos
10^0
10^-1
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

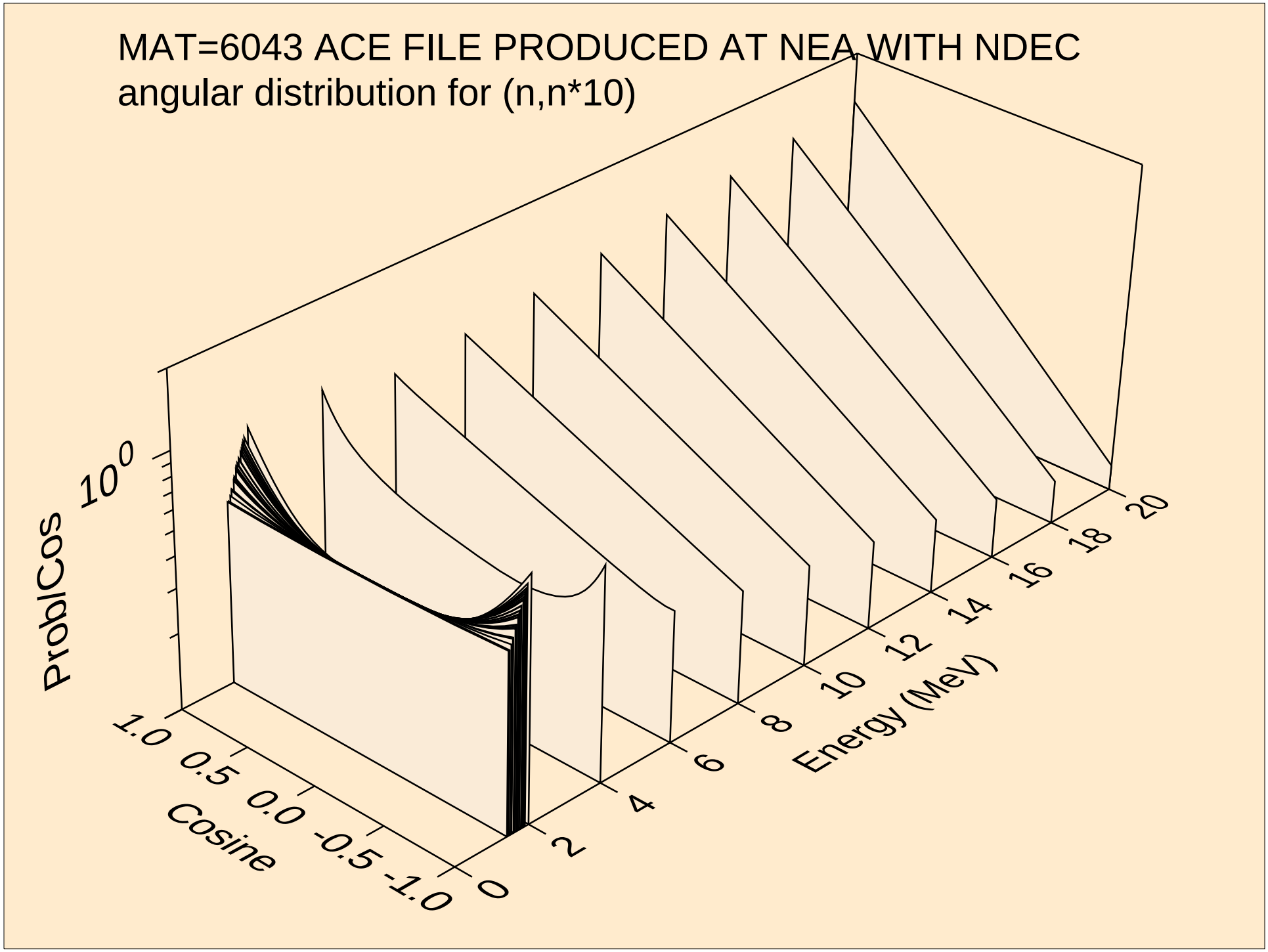

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*5)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

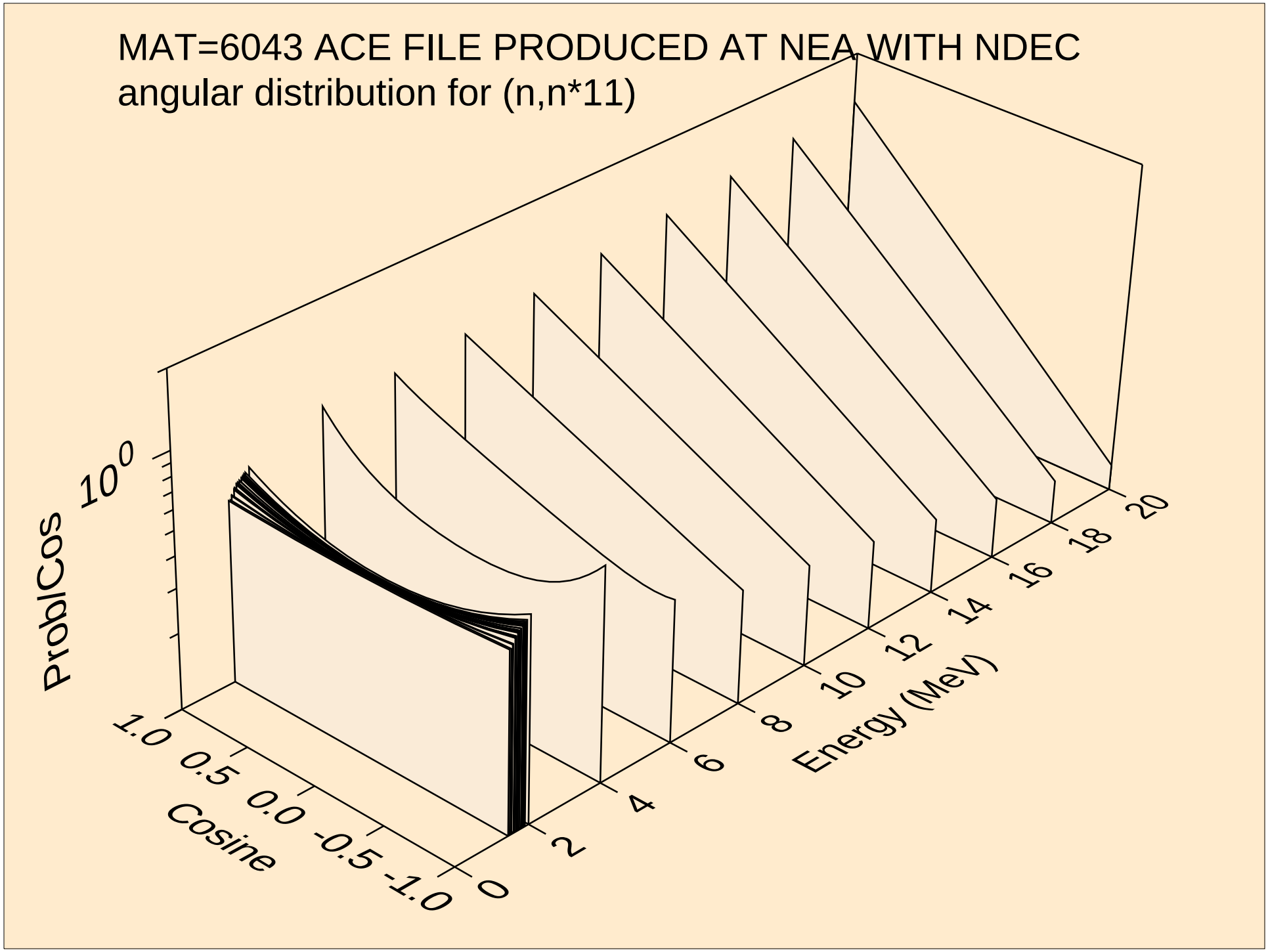

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*6)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

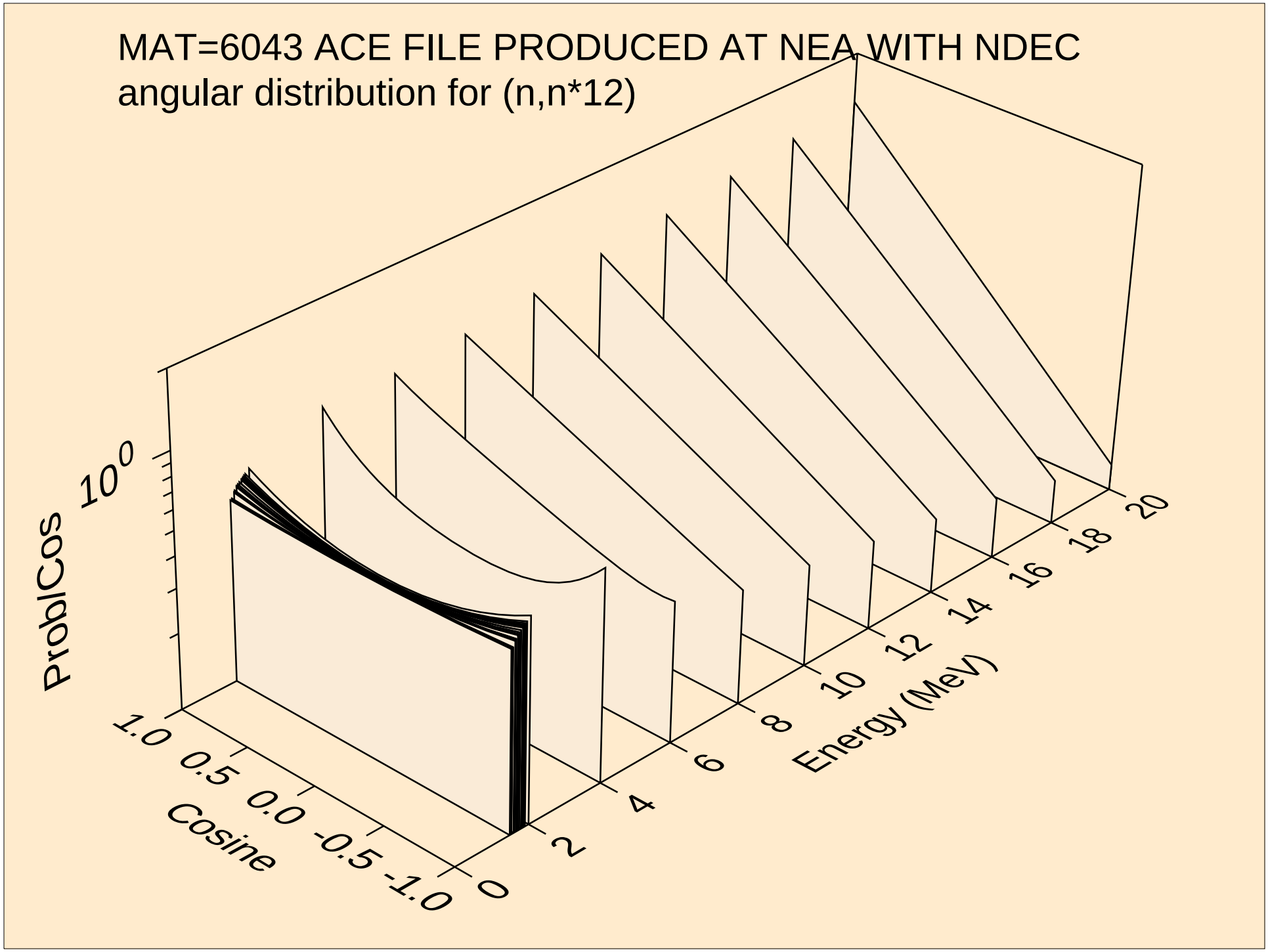

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*7)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

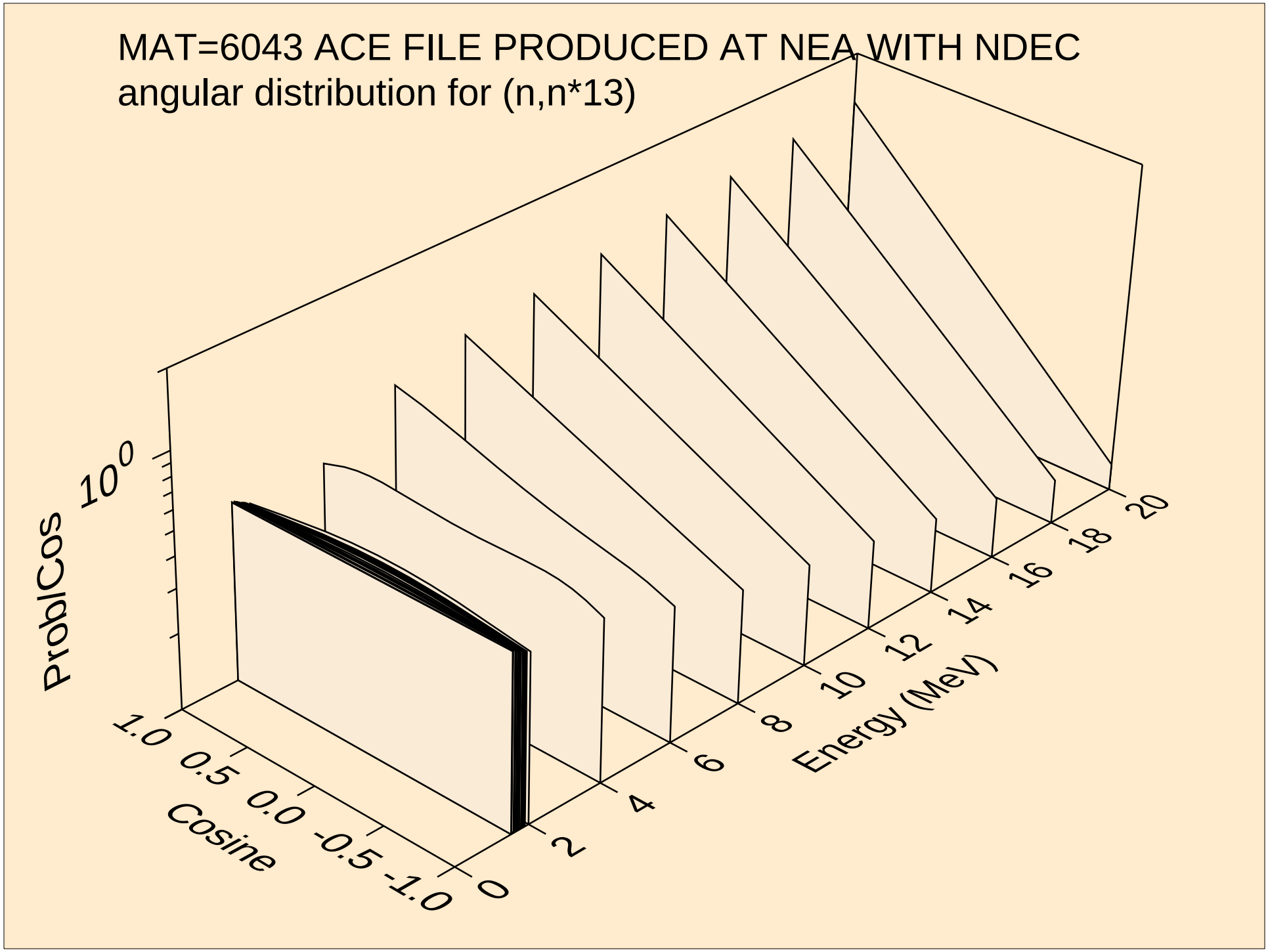

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*8)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

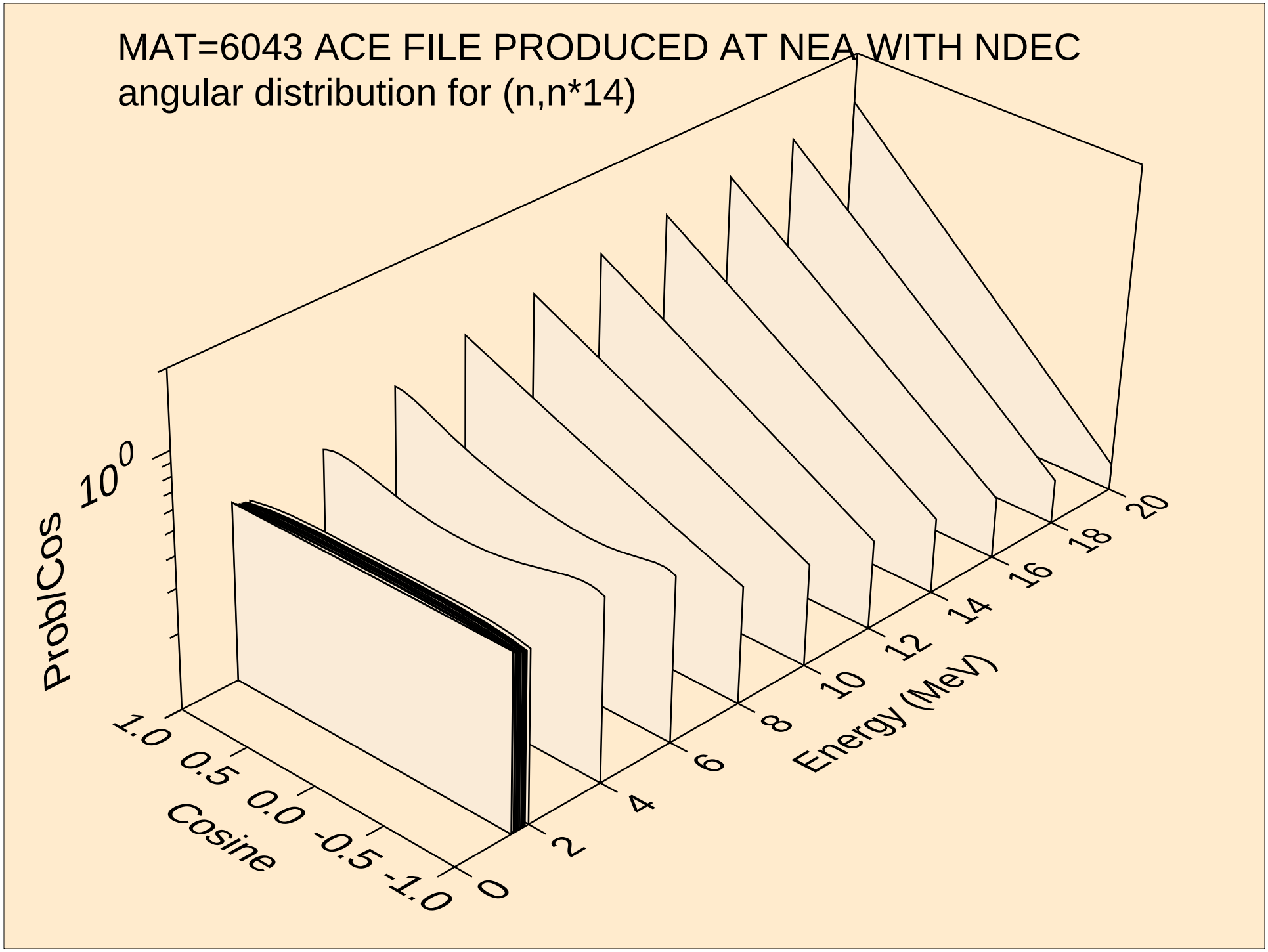

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*9)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

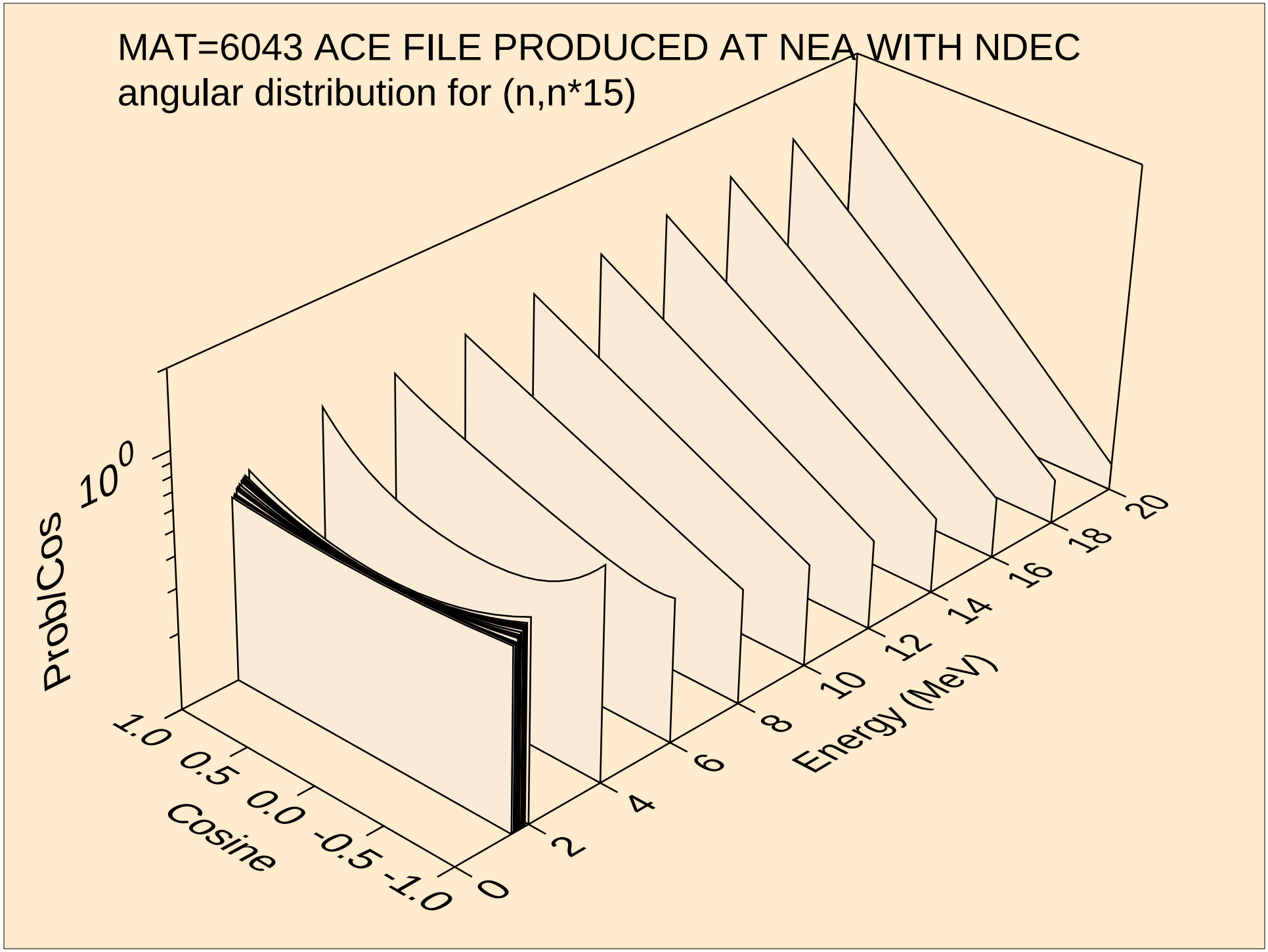

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*10)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

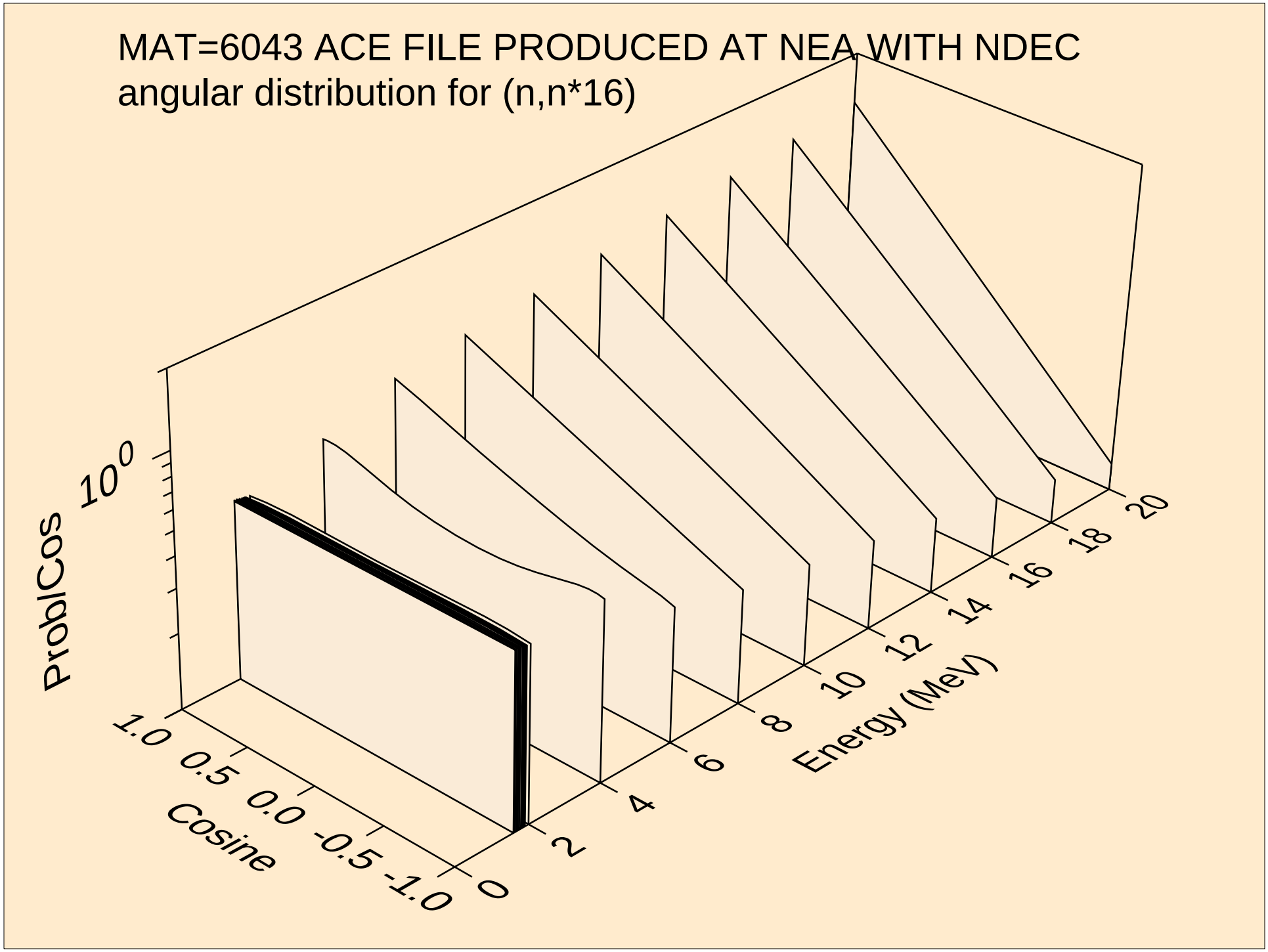

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*11)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

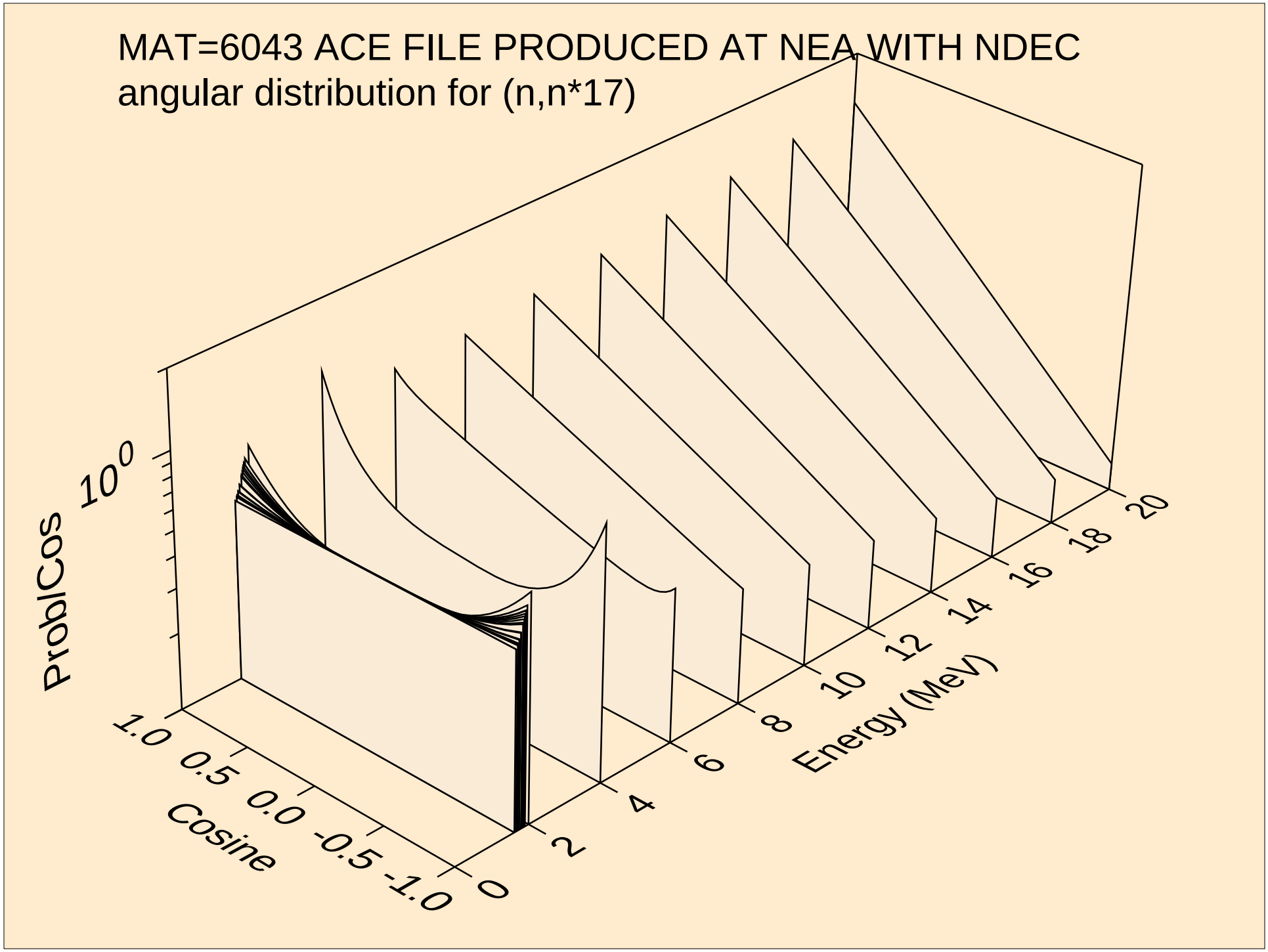

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*12)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

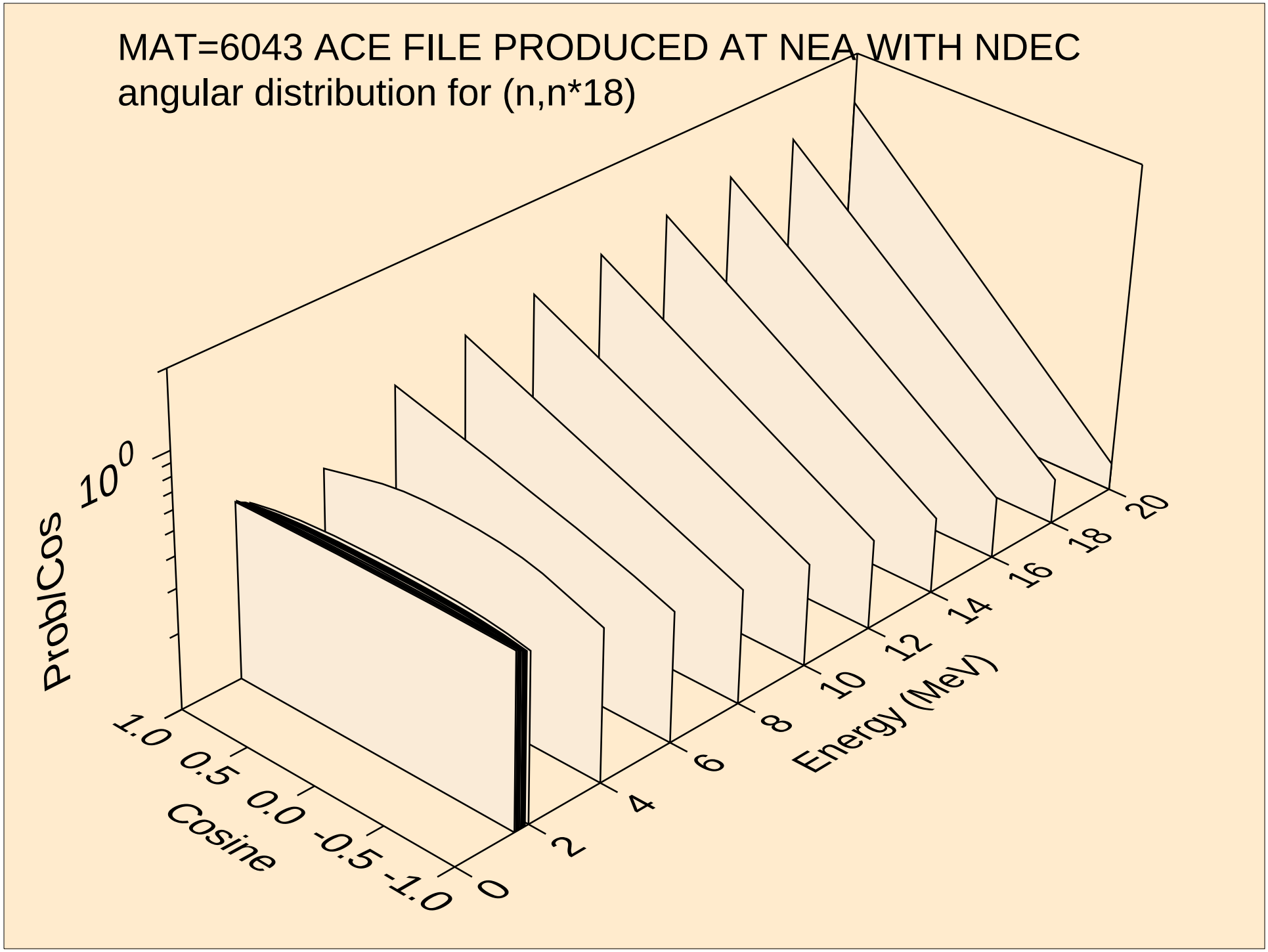

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*13)
ProbICos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

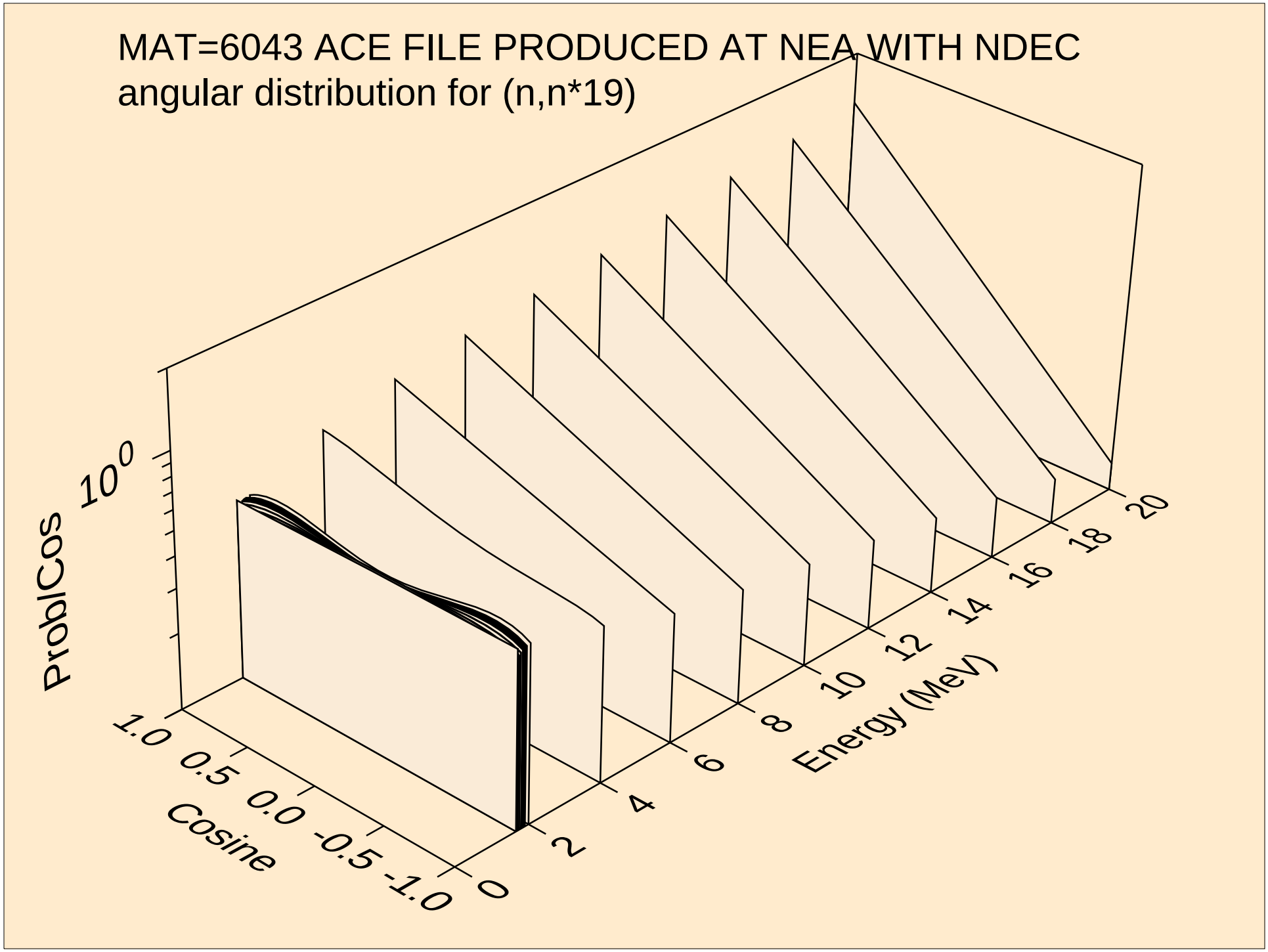

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*14)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

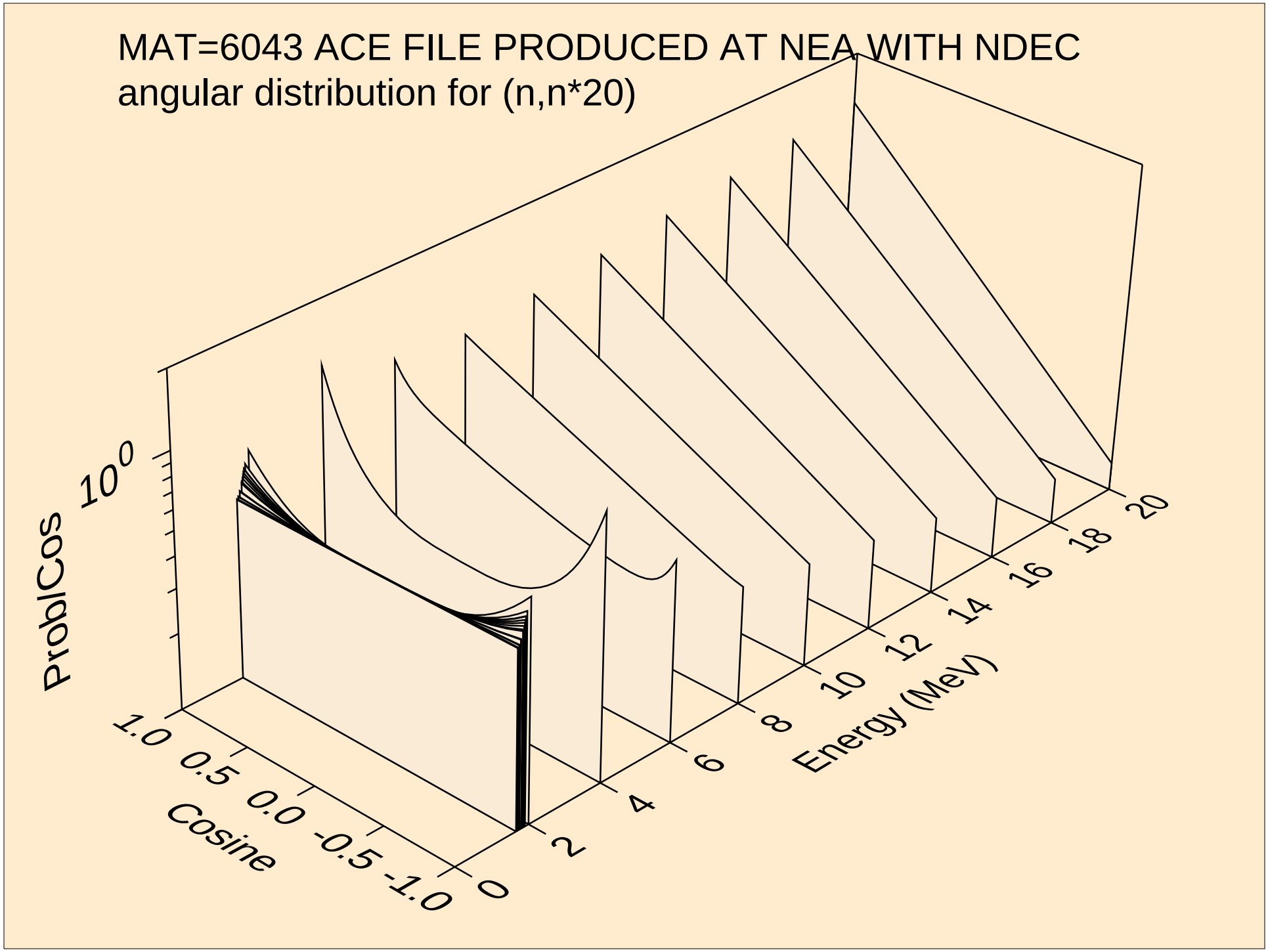

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*15)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

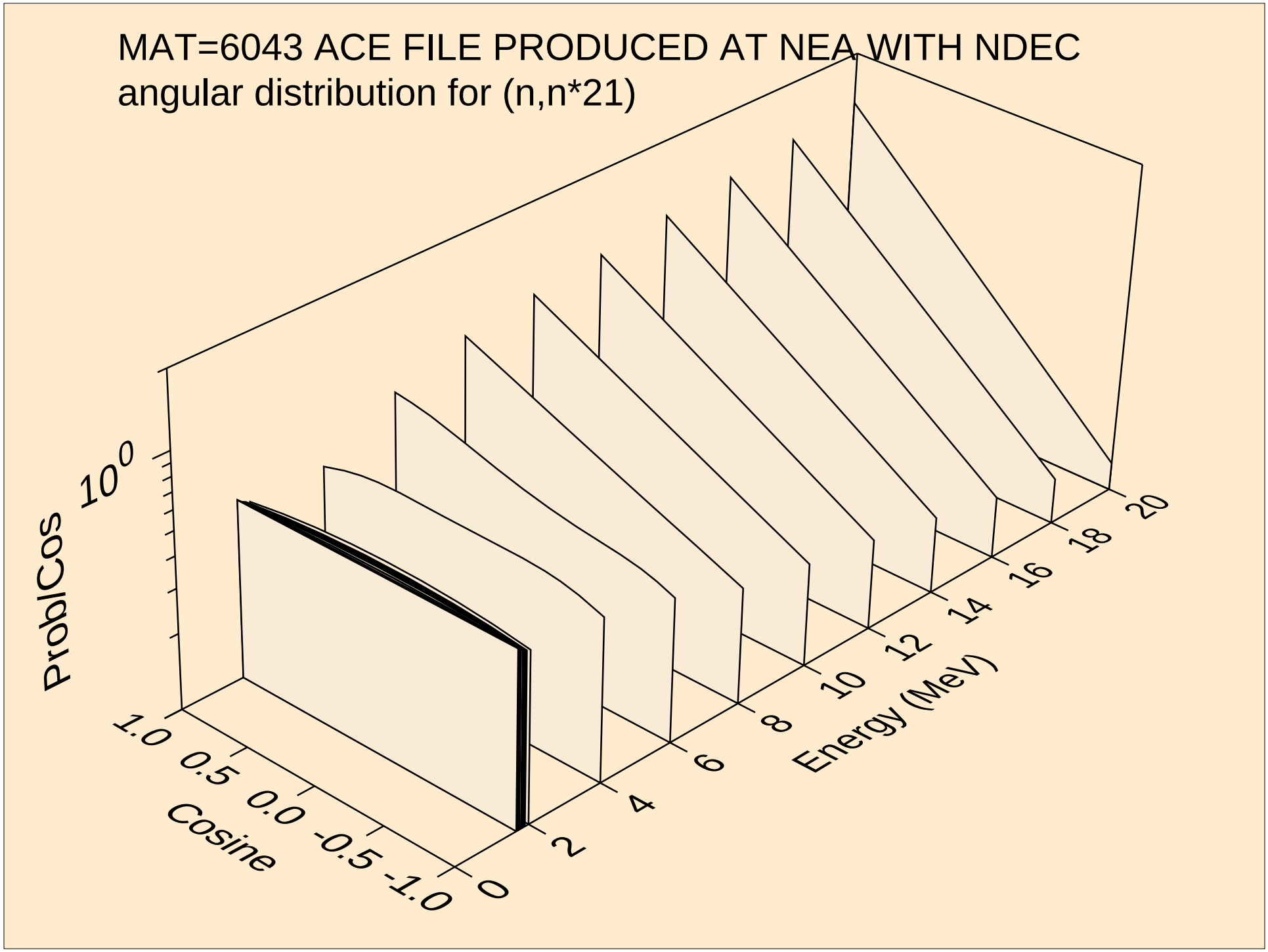

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*16)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

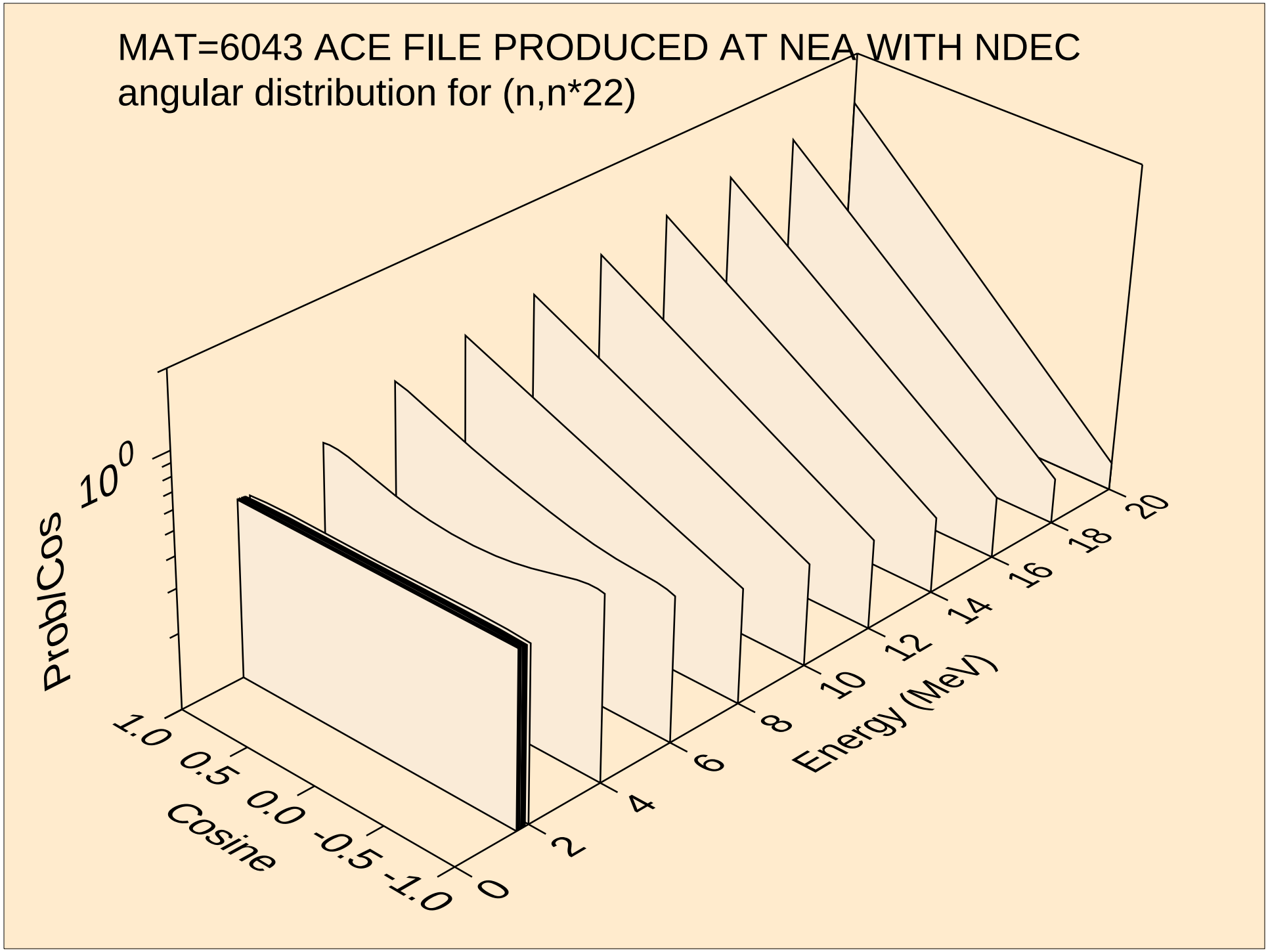

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*17)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

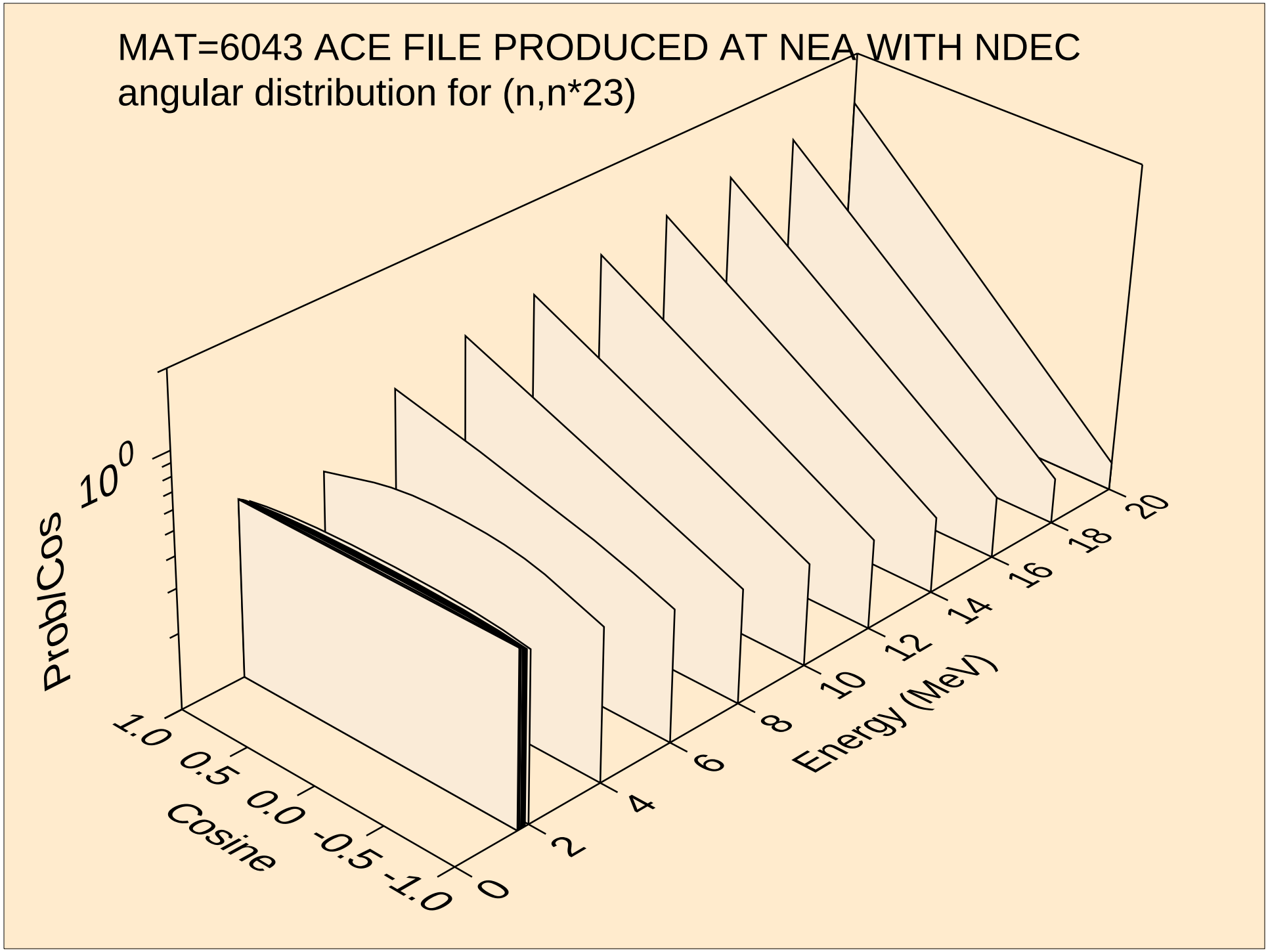

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*18)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

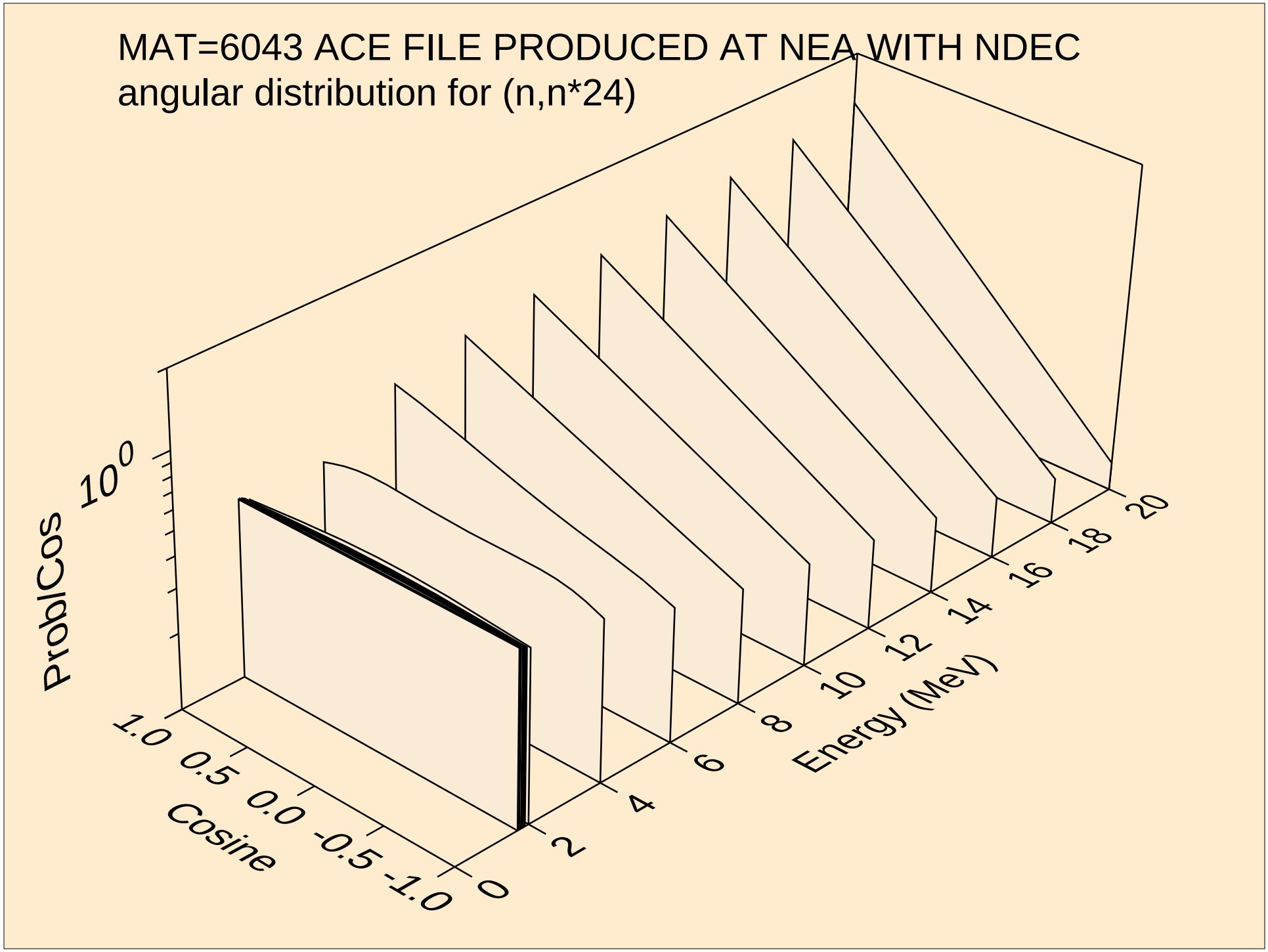

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*19)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

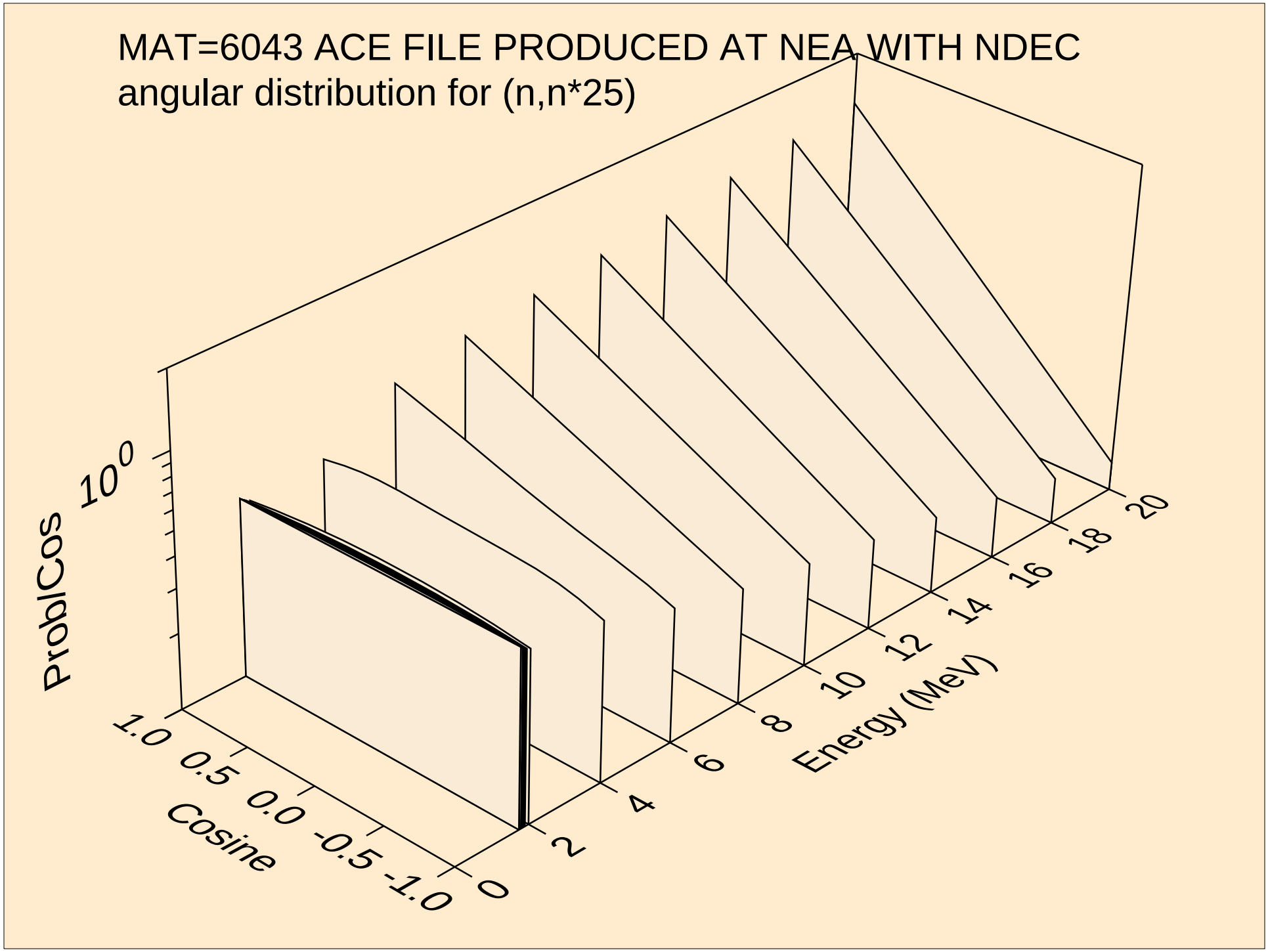

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*20)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

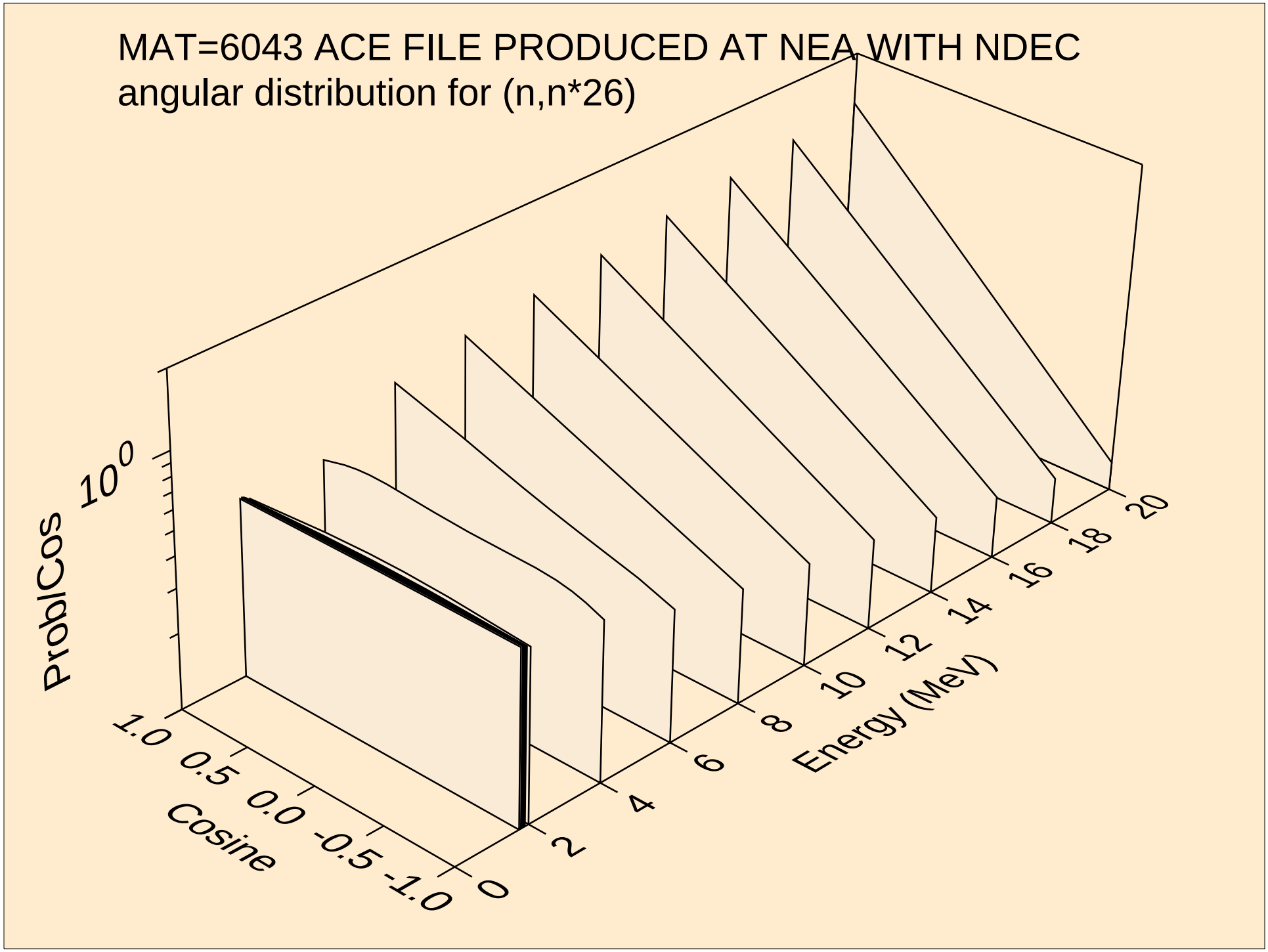

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*21)
ProbICos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

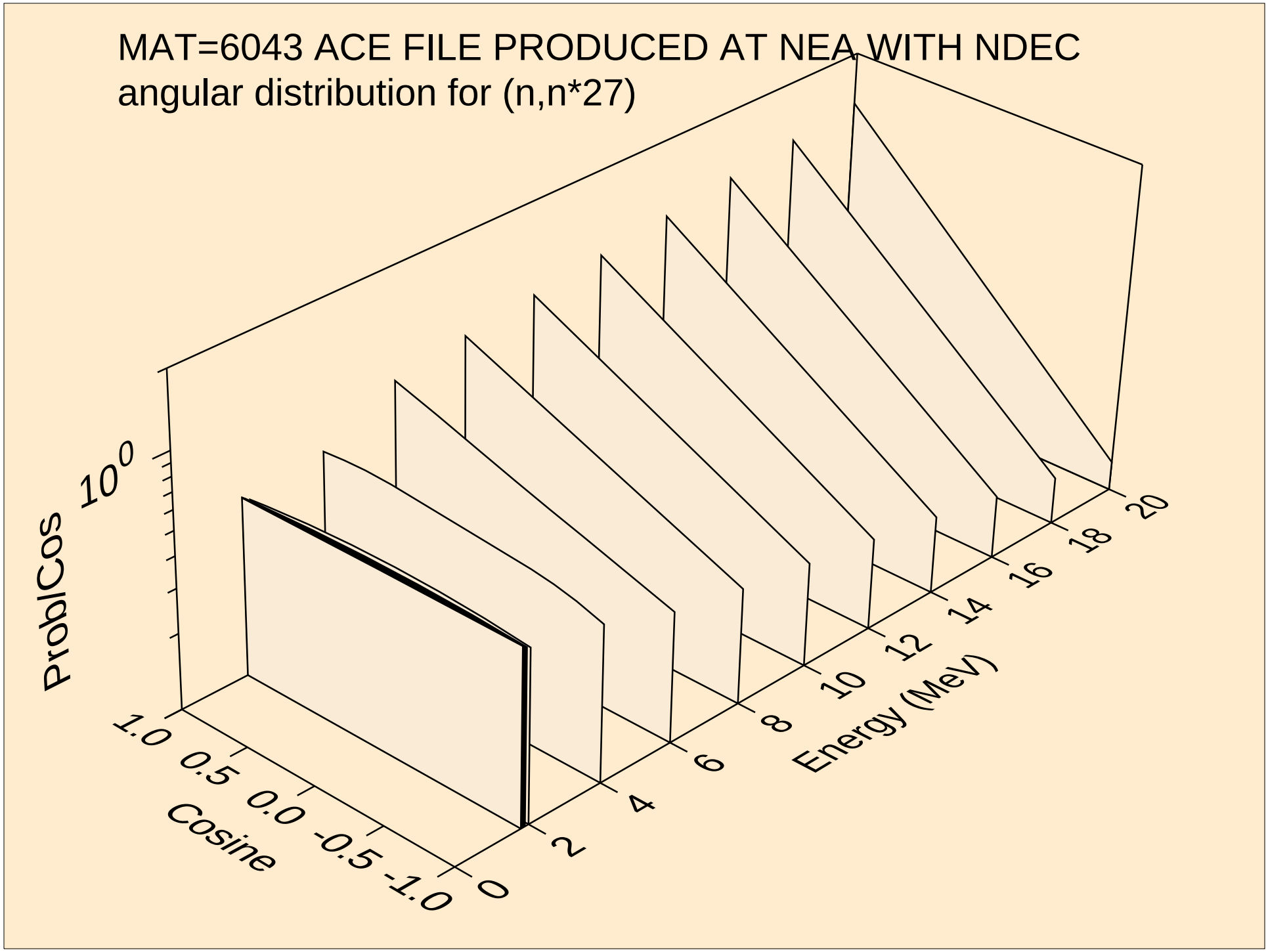

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*22)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

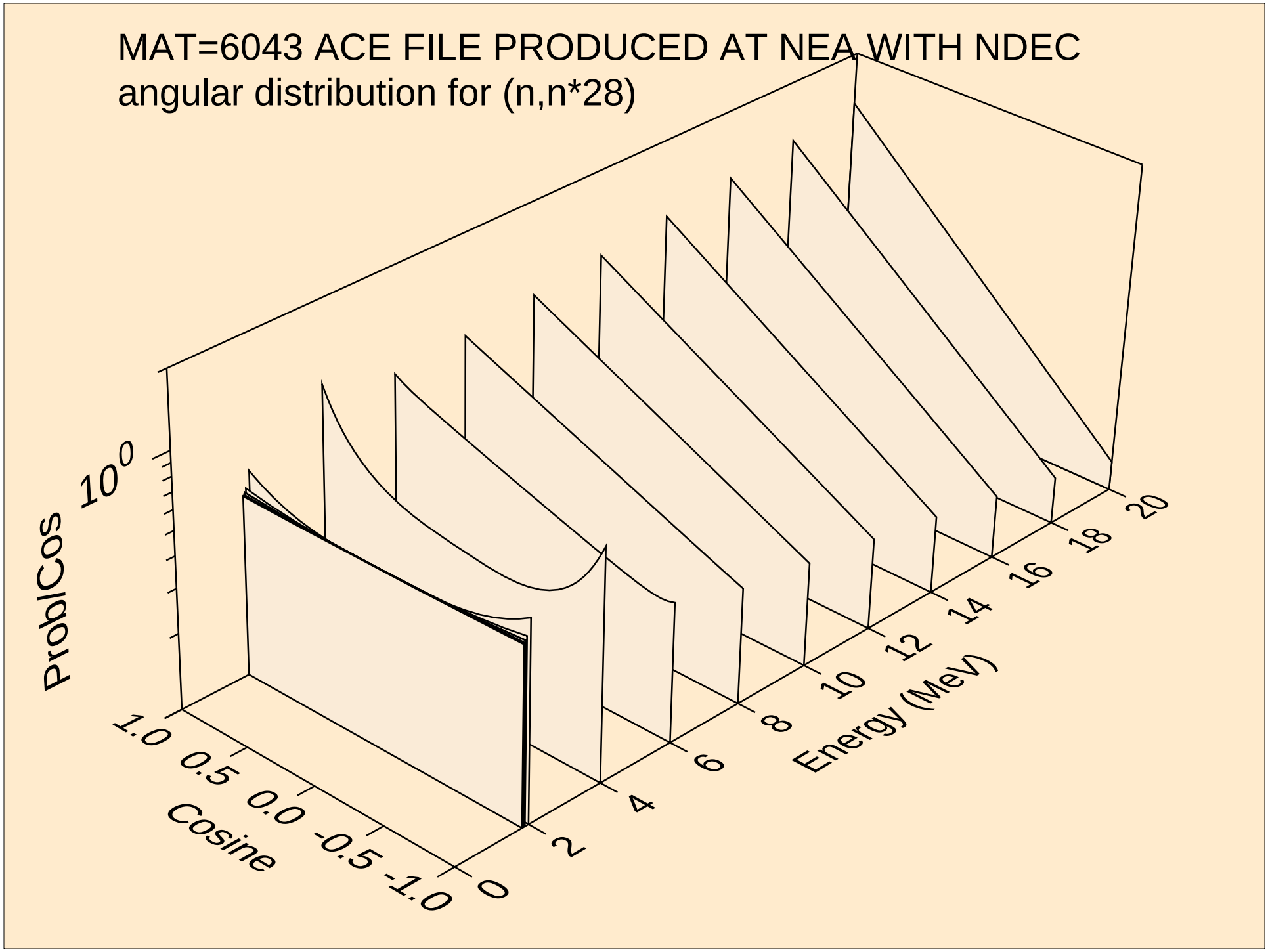

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*23)
ProbICos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

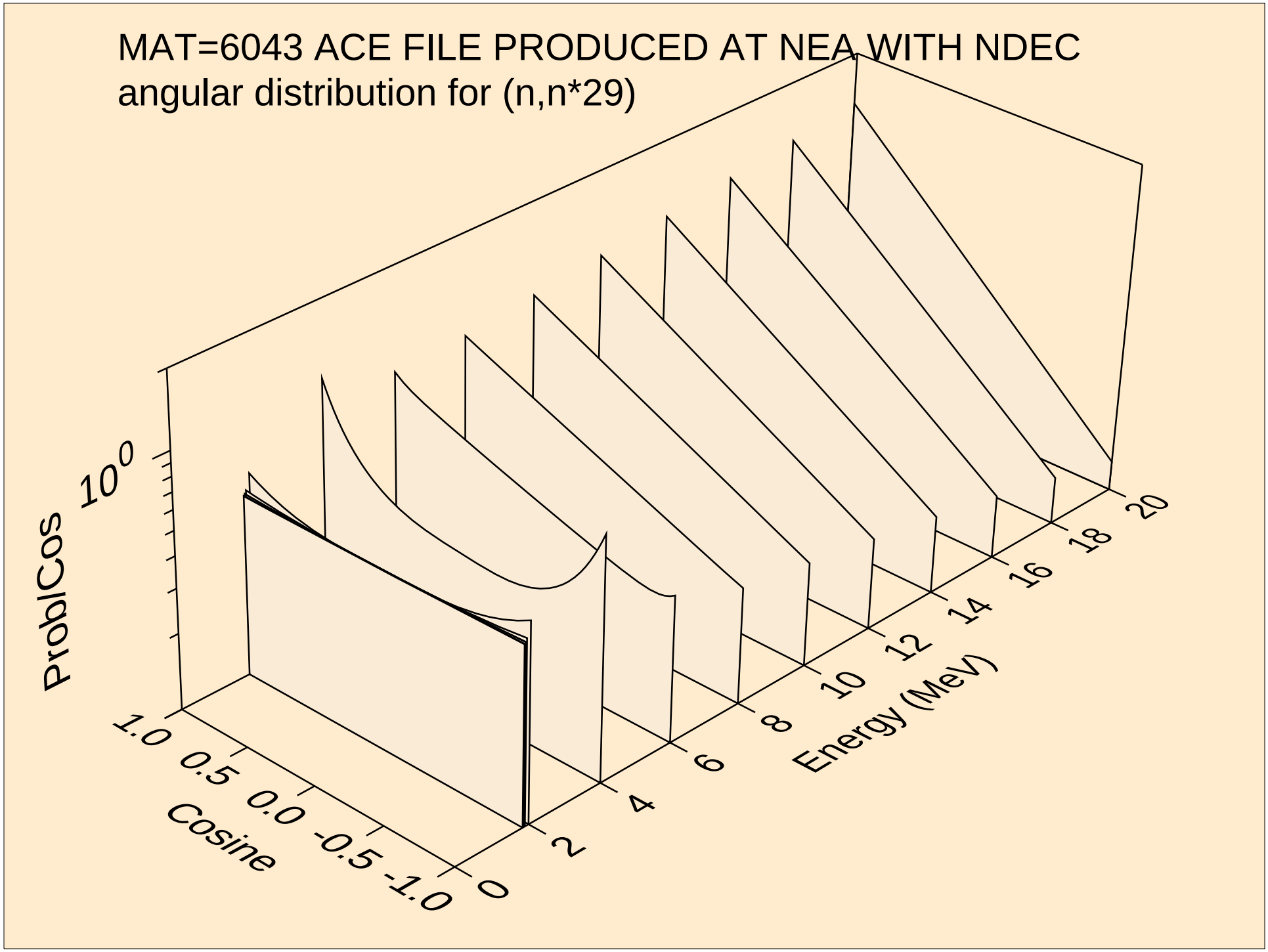

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*24)
ProbICos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

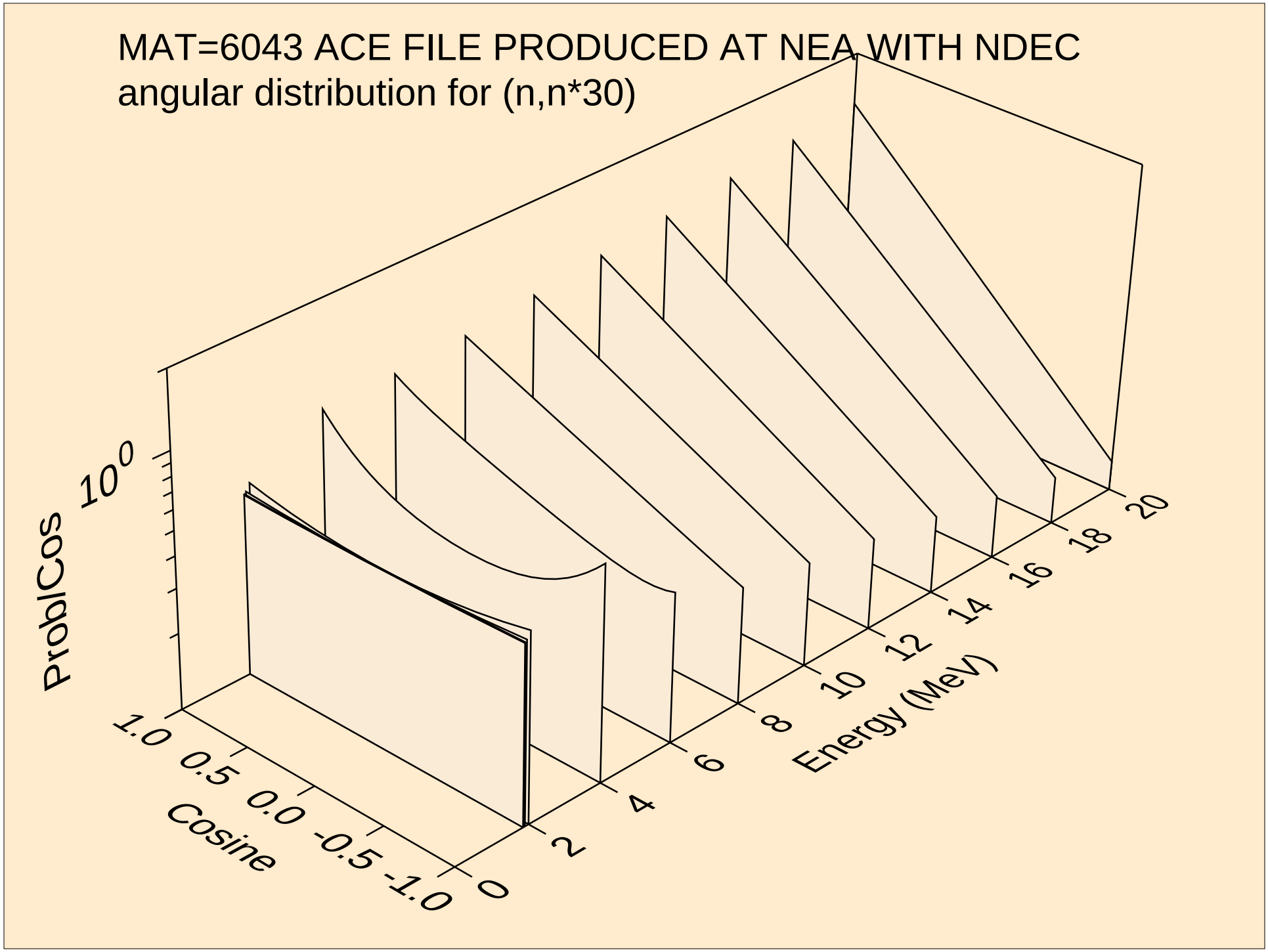

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*25)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

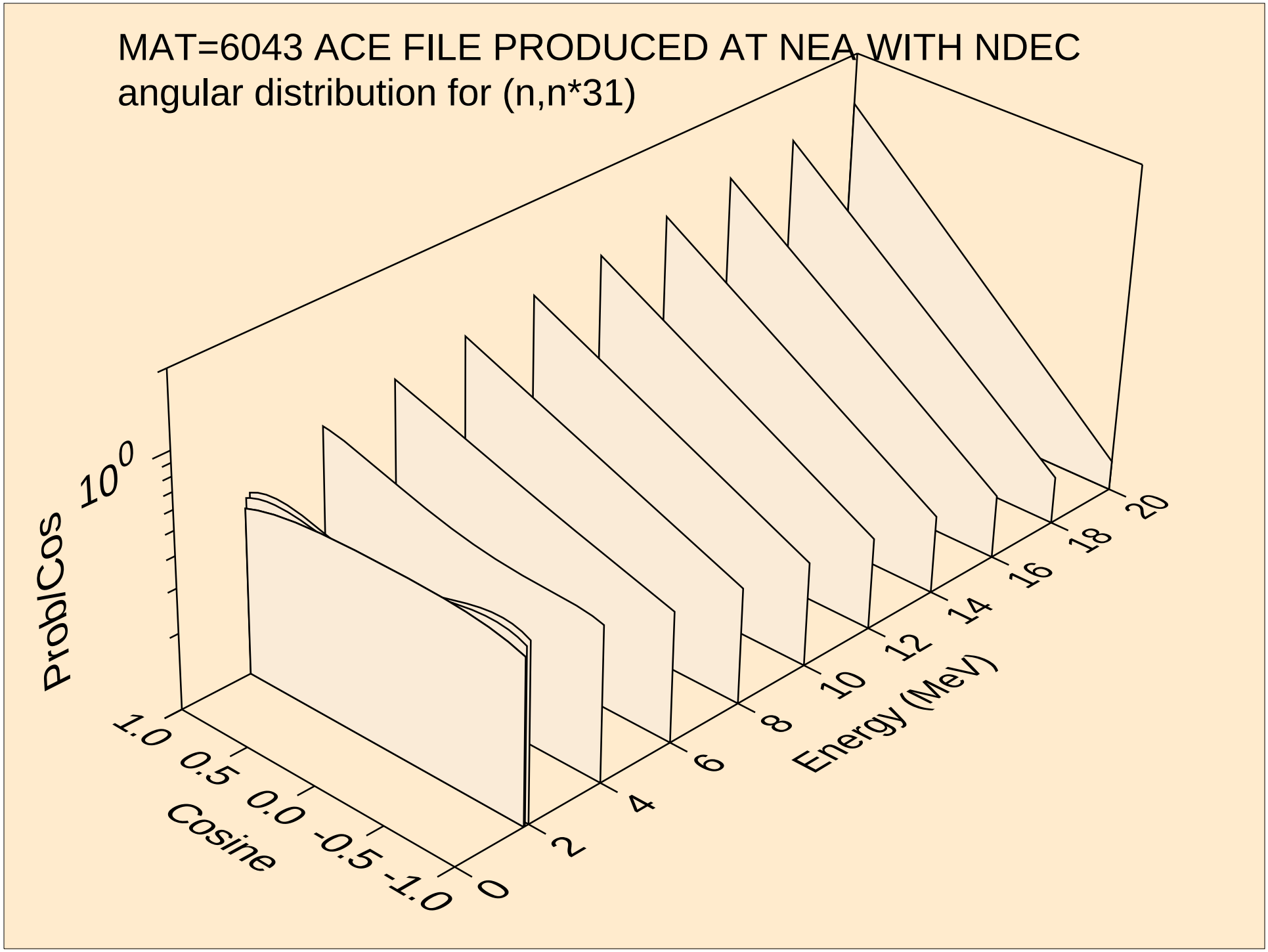

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*26)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

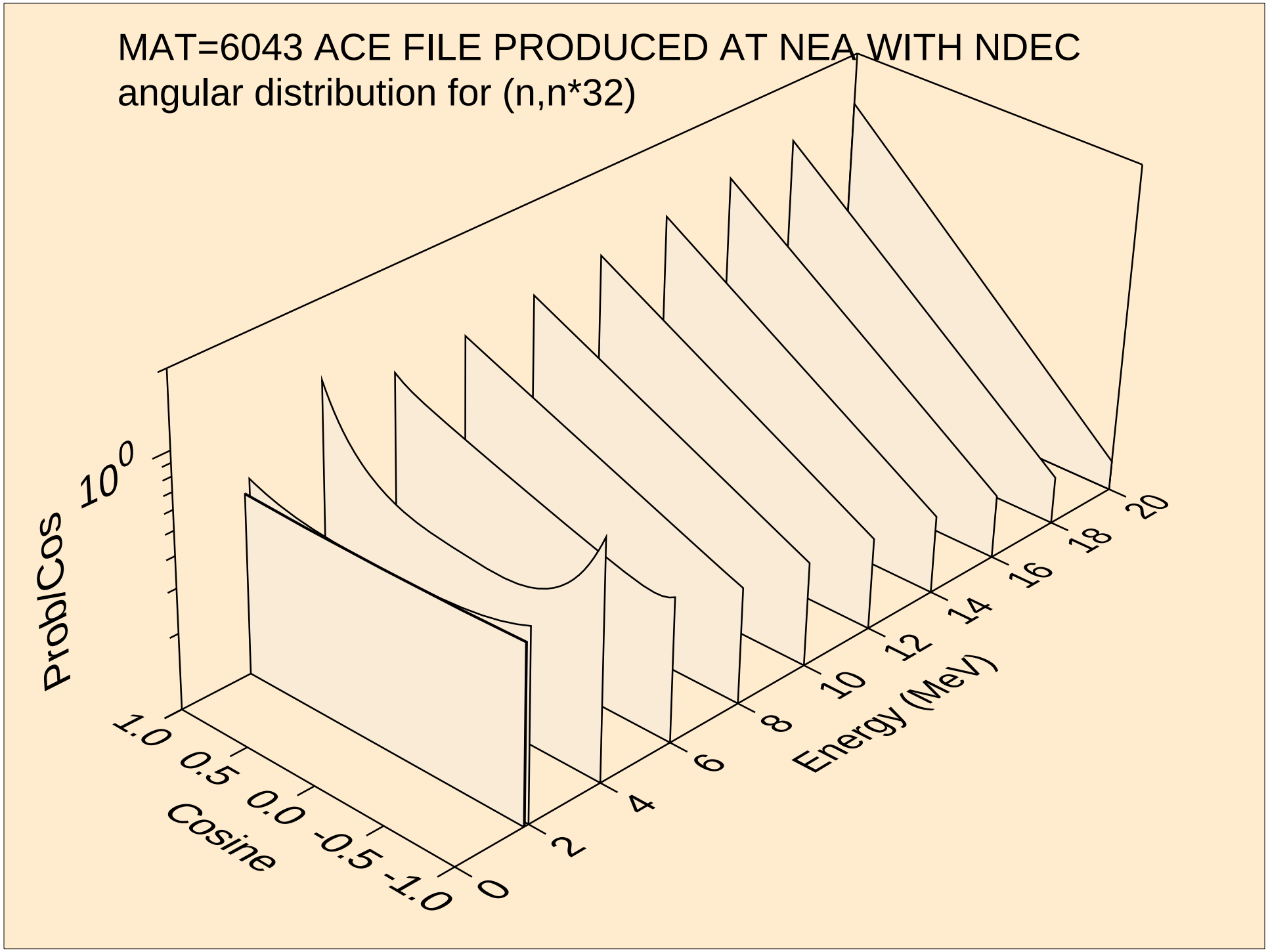

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*27)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

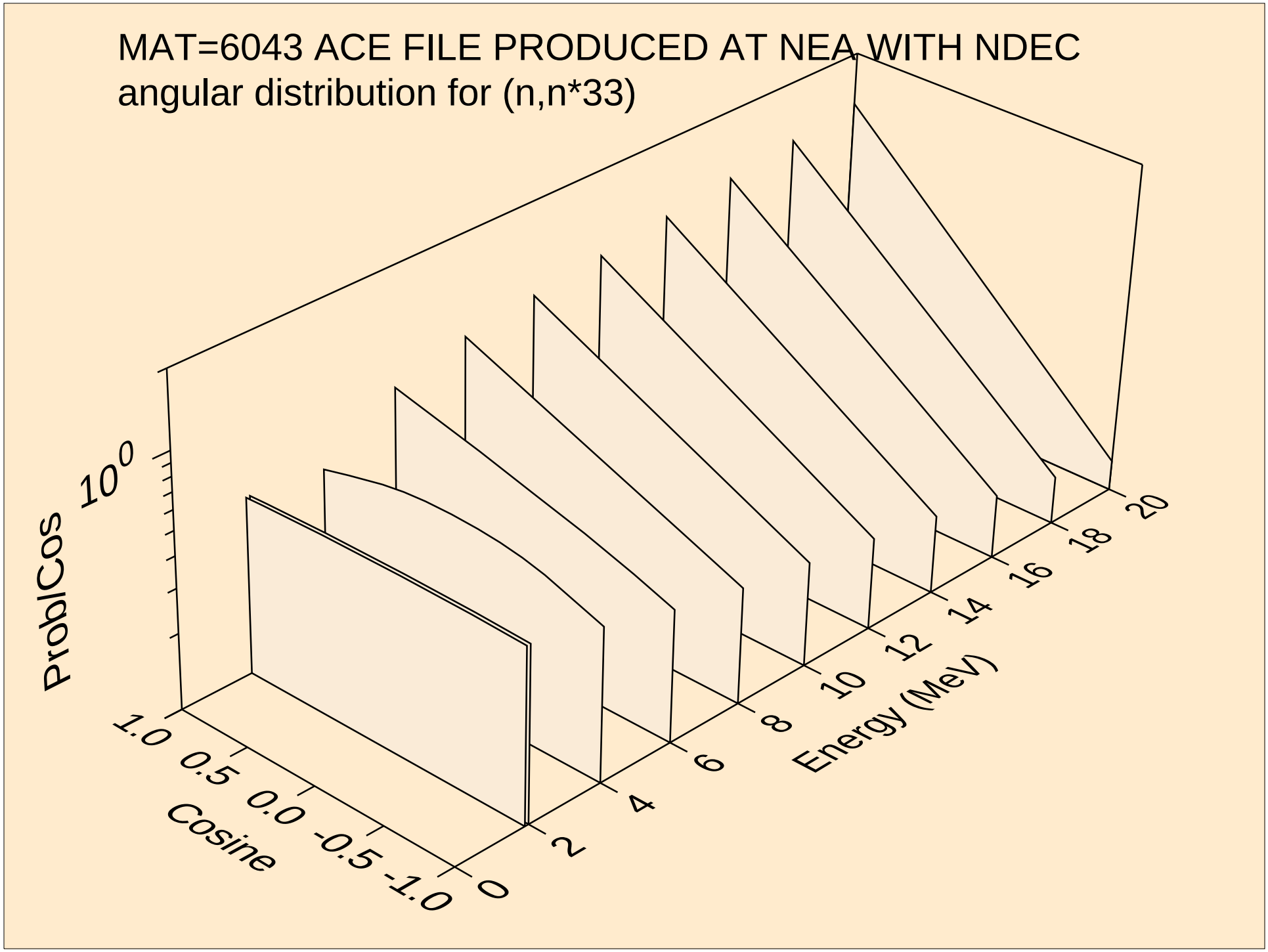

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*28)
ProbICos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

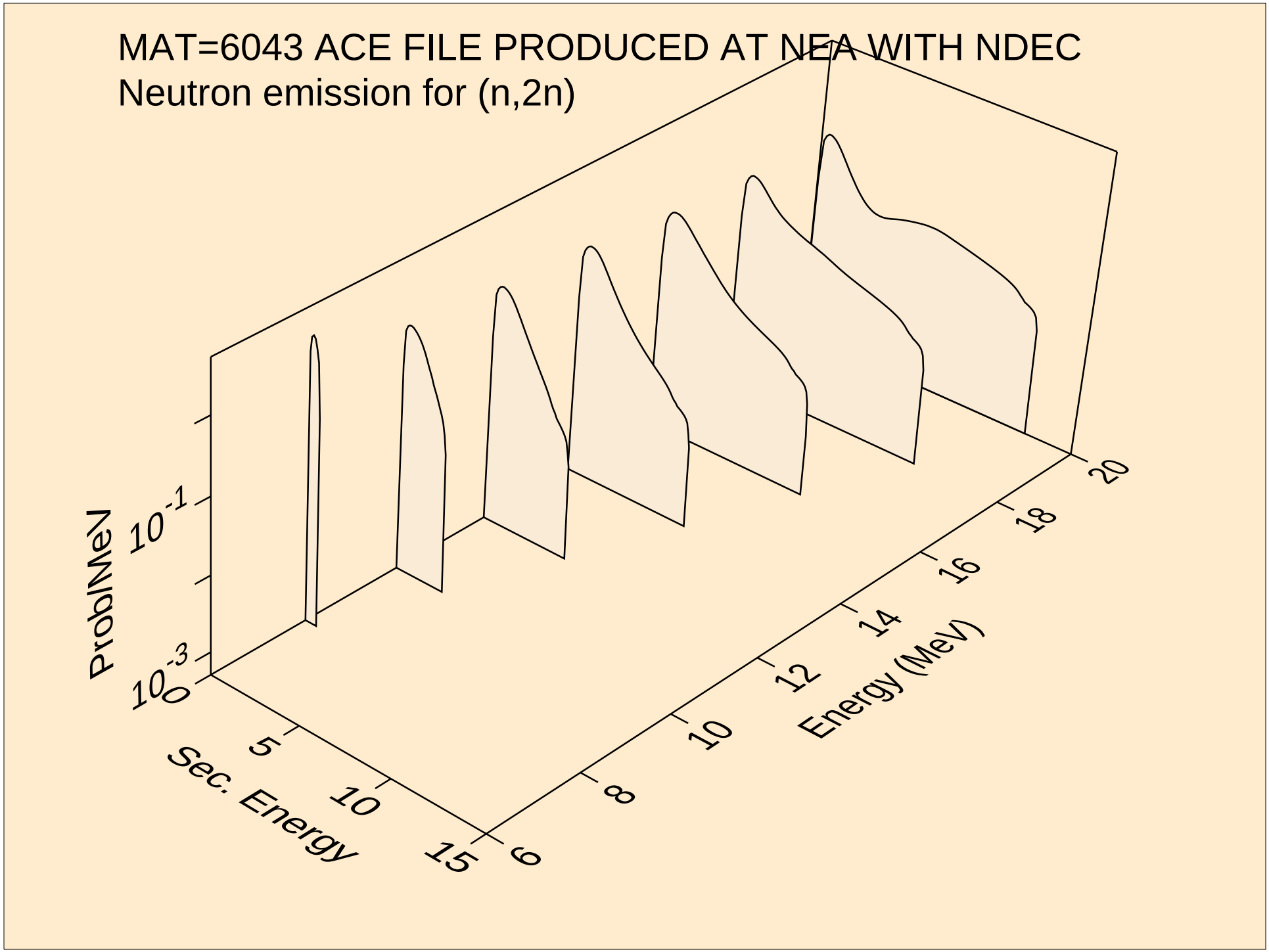

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*29)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

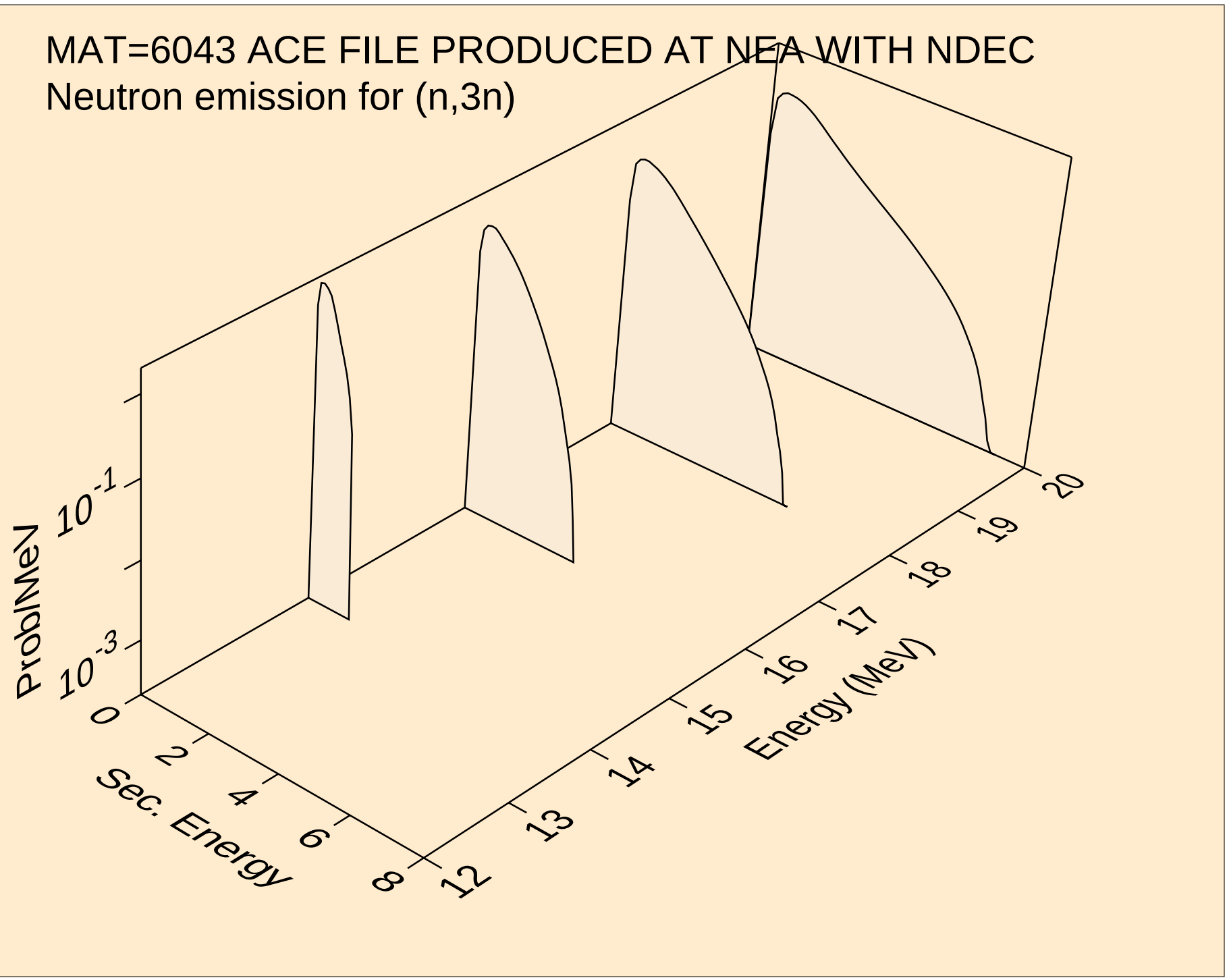

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*30)
ProbICos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

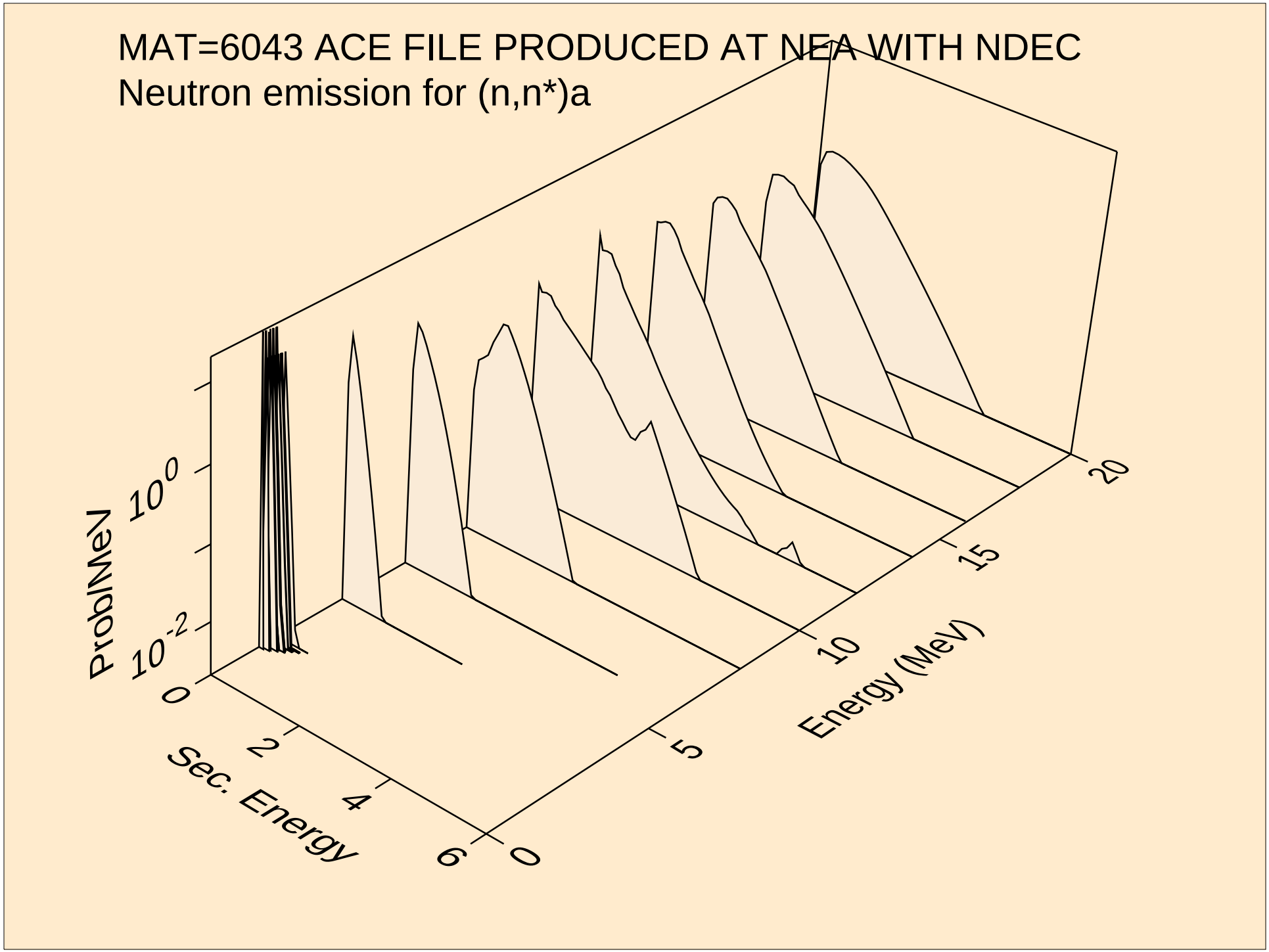

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*31)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

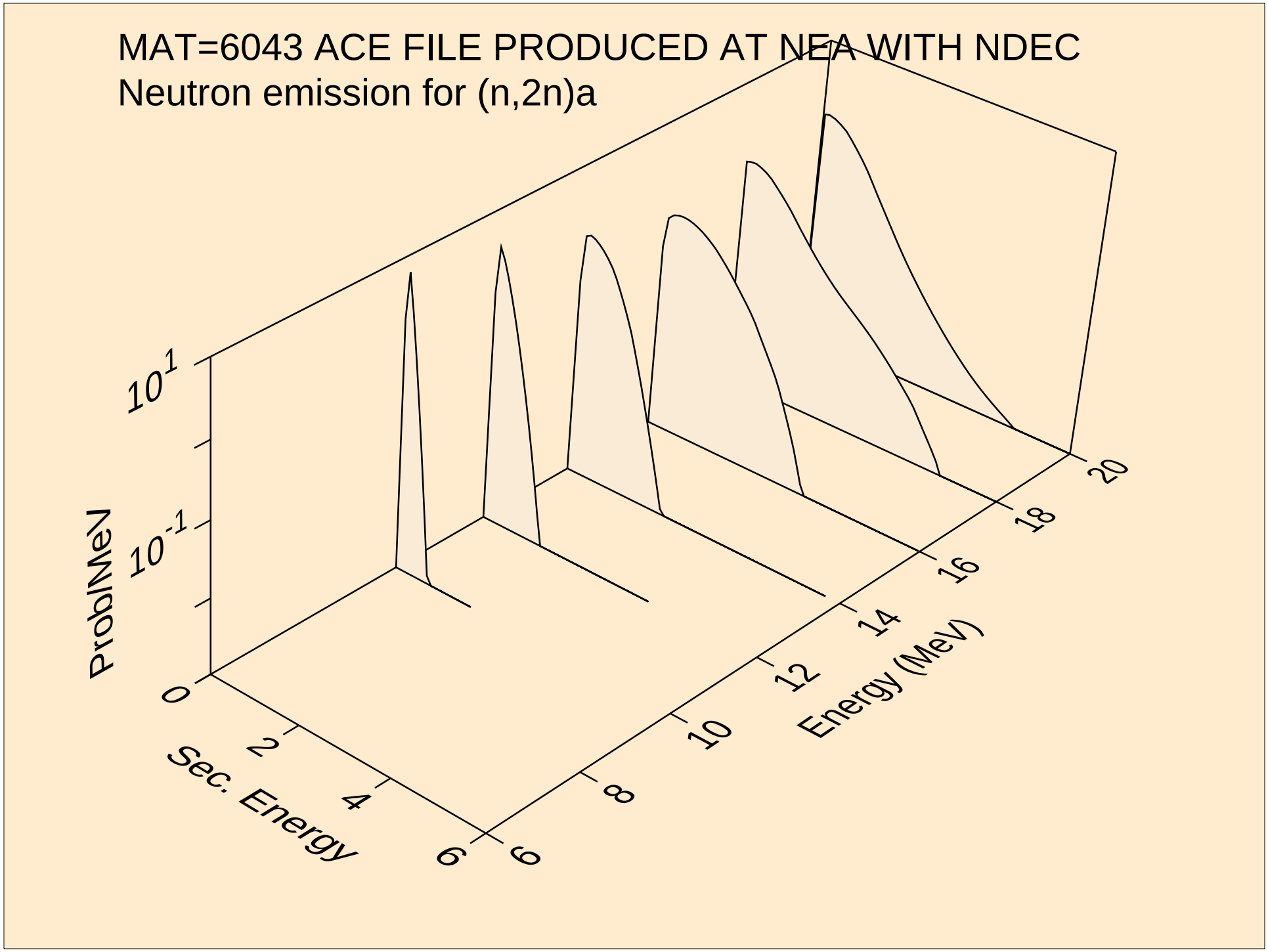

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*32)
ProbICos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

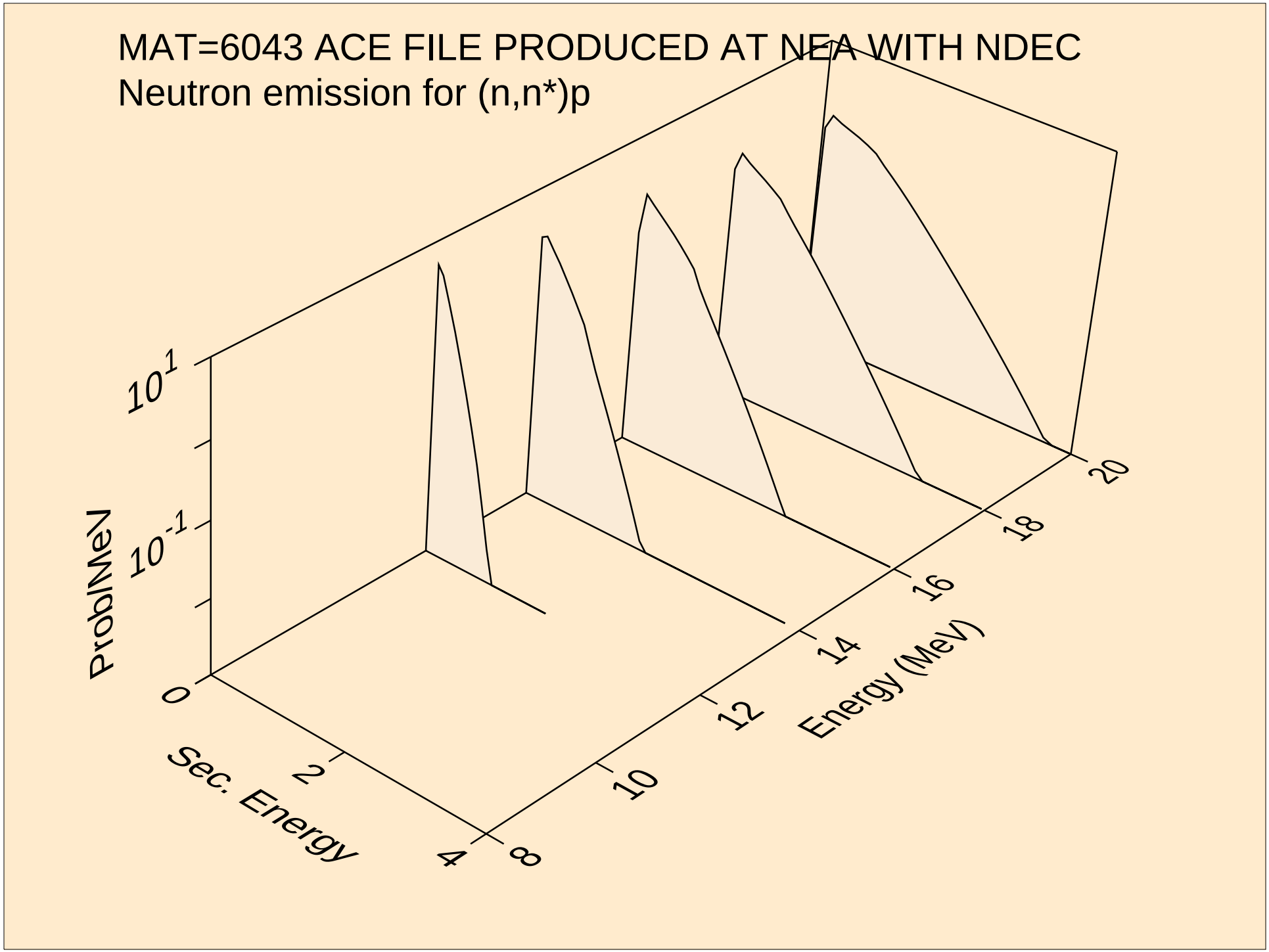

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
angular distribution for (n,n*33)
ProbICos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

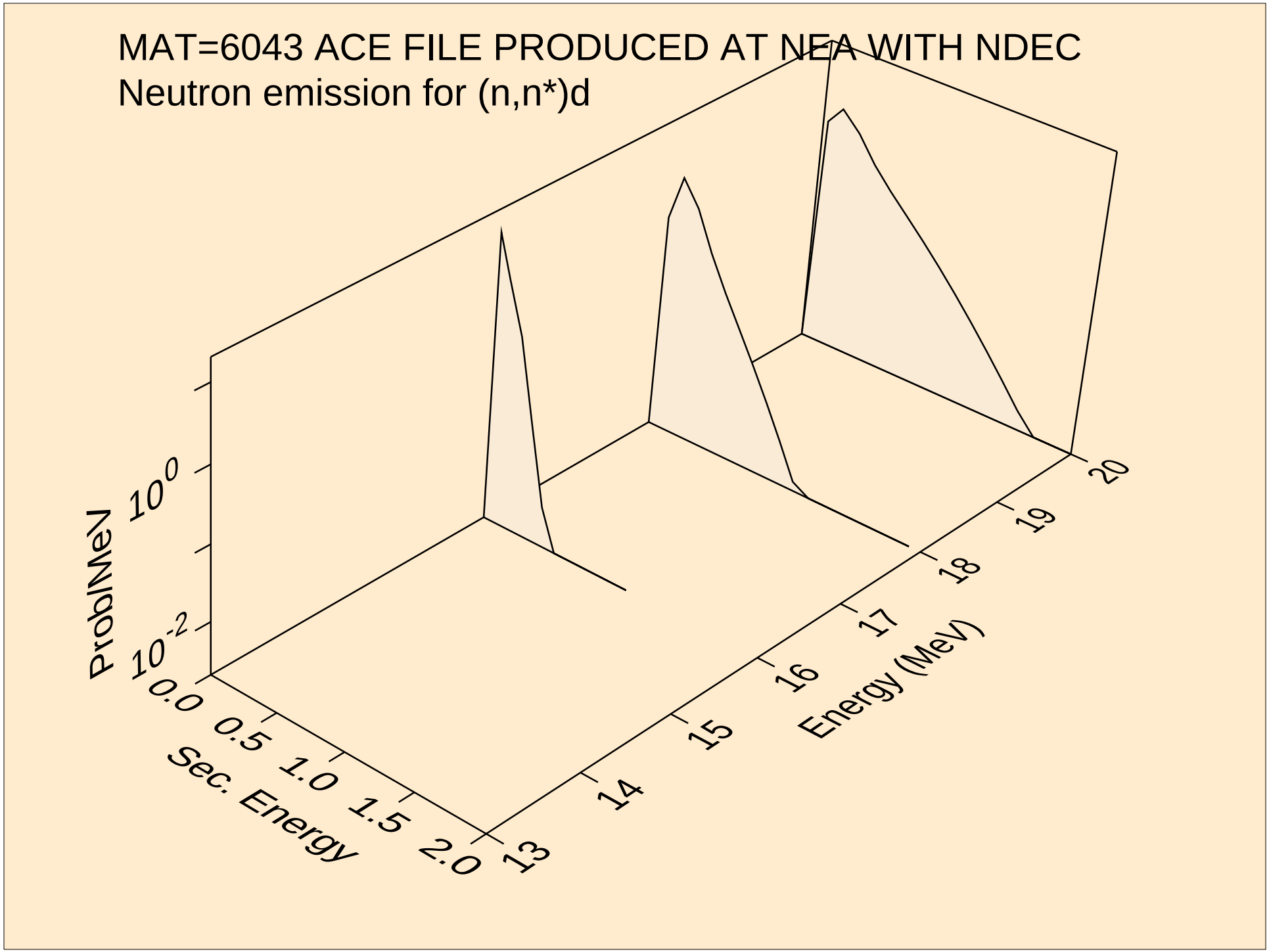

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Neutron emission for (n,2n)
Prob/MeV
10-1
10-3
0
5
10
15
Sec. Energy
6
8
10
12
14
16
18
20
Energy (MeV)

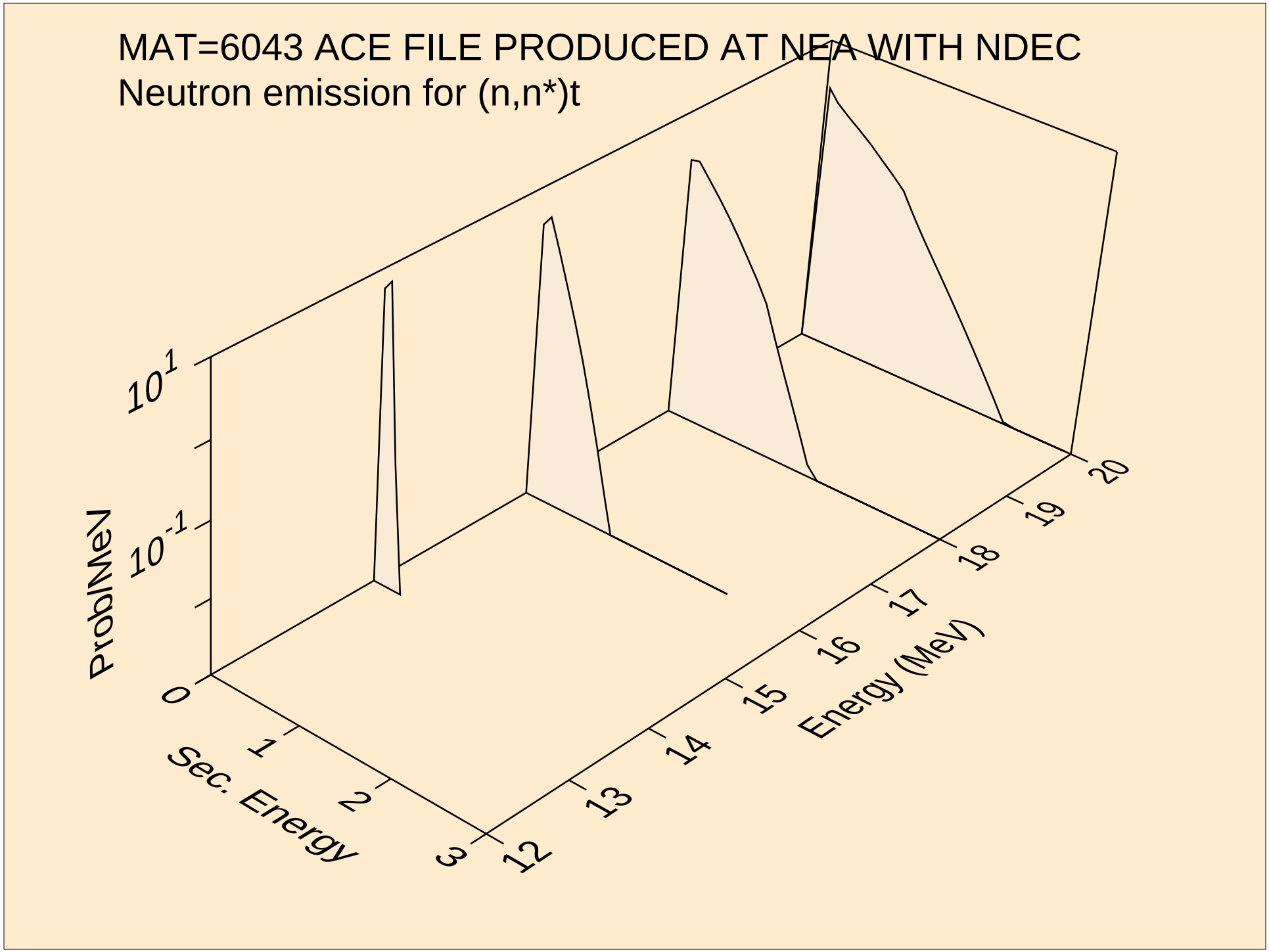

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Neutron emission for (n,3n)
Prob/MeV
10-1
10-3
0
2
4
6
8
Sec. Energy
12
13
14
15
16
17
18
19
20
Energy (MeV)

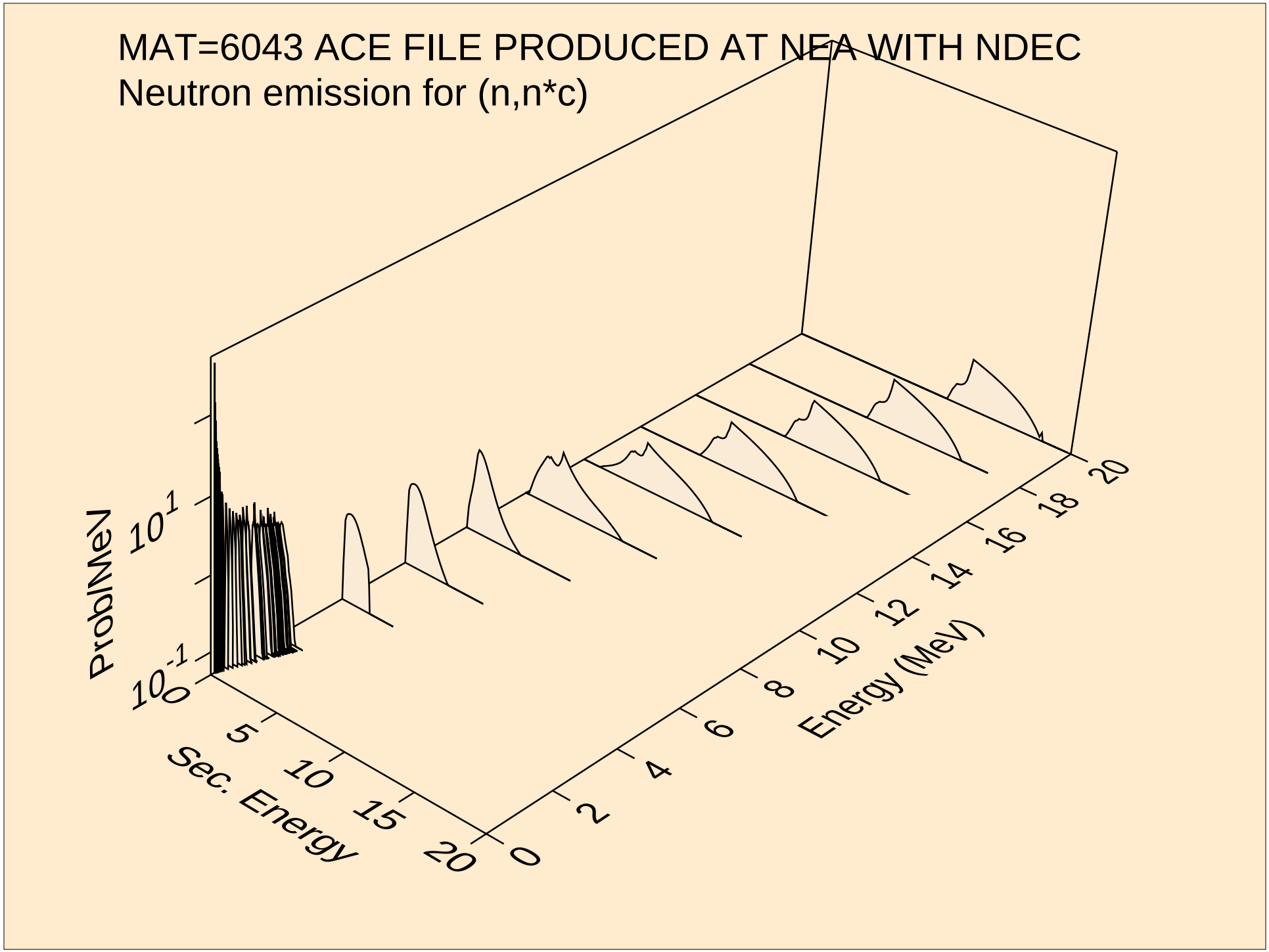

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Neutron emission for (n,n*)a
Prob/MeV
10^0
10^-2
0
2
4
6
Sec. Energy
0
5
10
15
20
Energy (MeV)

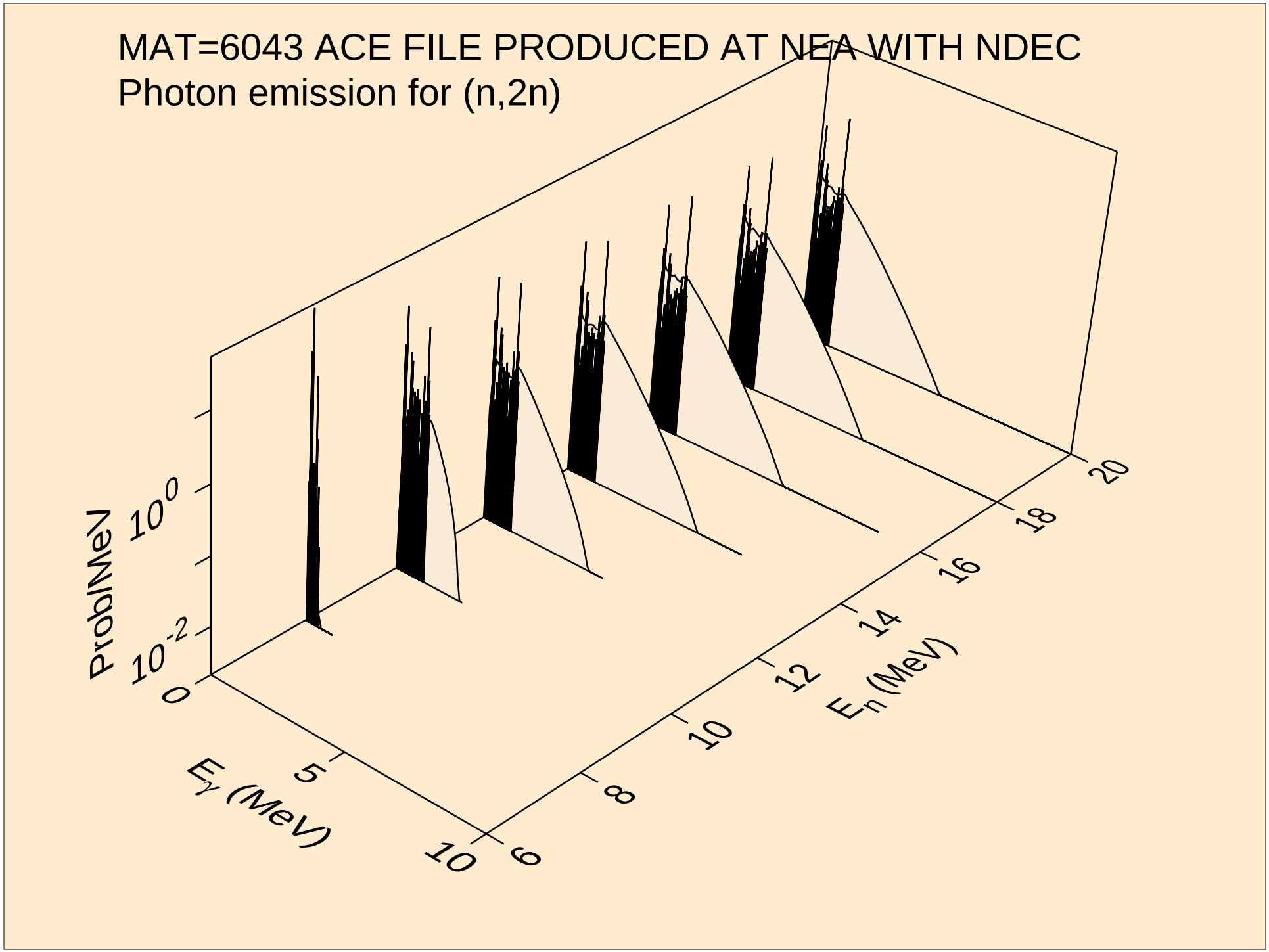

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Neutron emission for (n,2n)a
Prob/MeV
10^1
10^-1
0
Sec. Energy
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

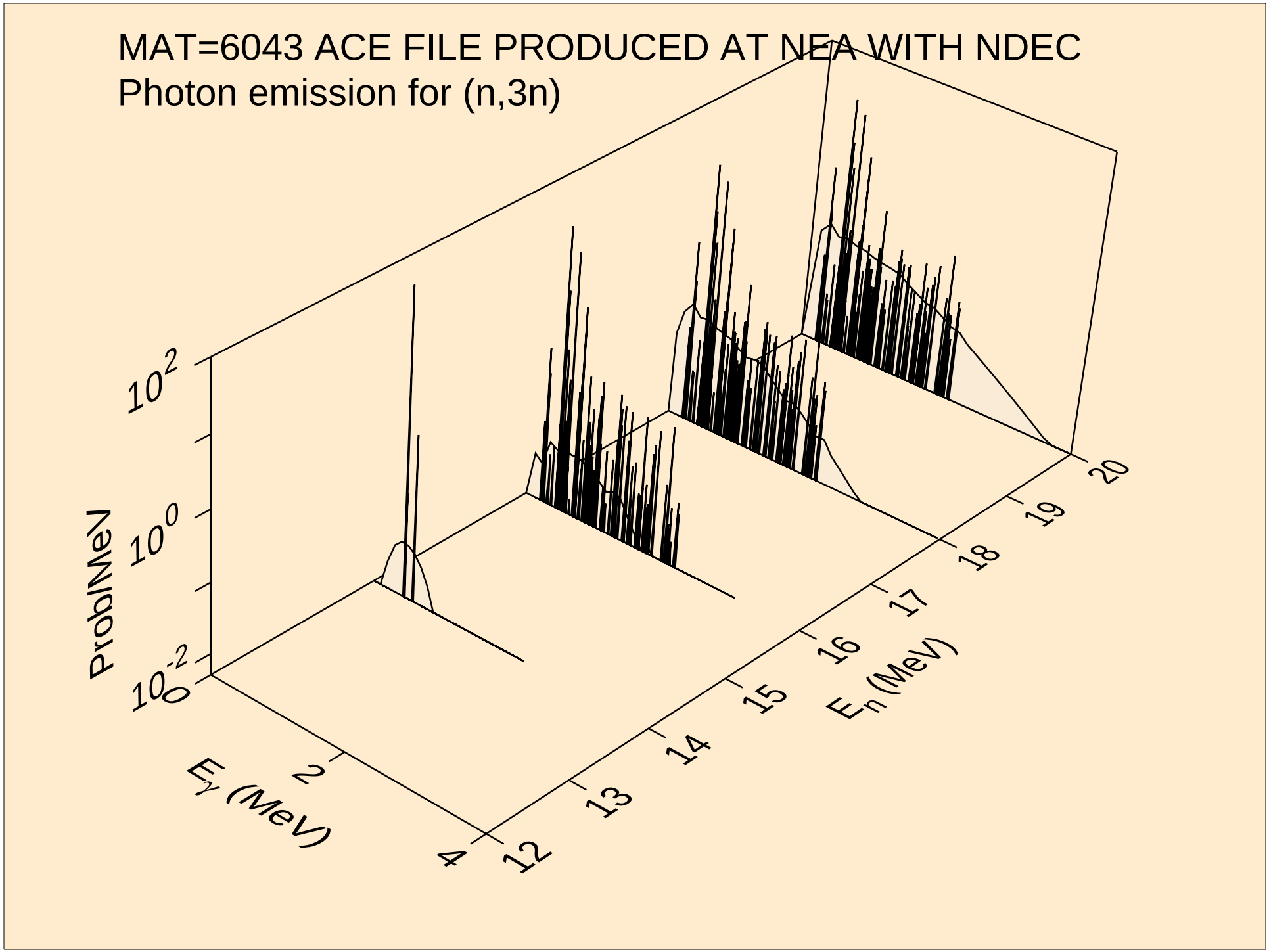

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Neutron emission for (n,n*)p
Prob/MeV
10^1
10^-1
0
2
4
Sec. Energy
8
10
12
14
16
18
20
Energy (MeV)

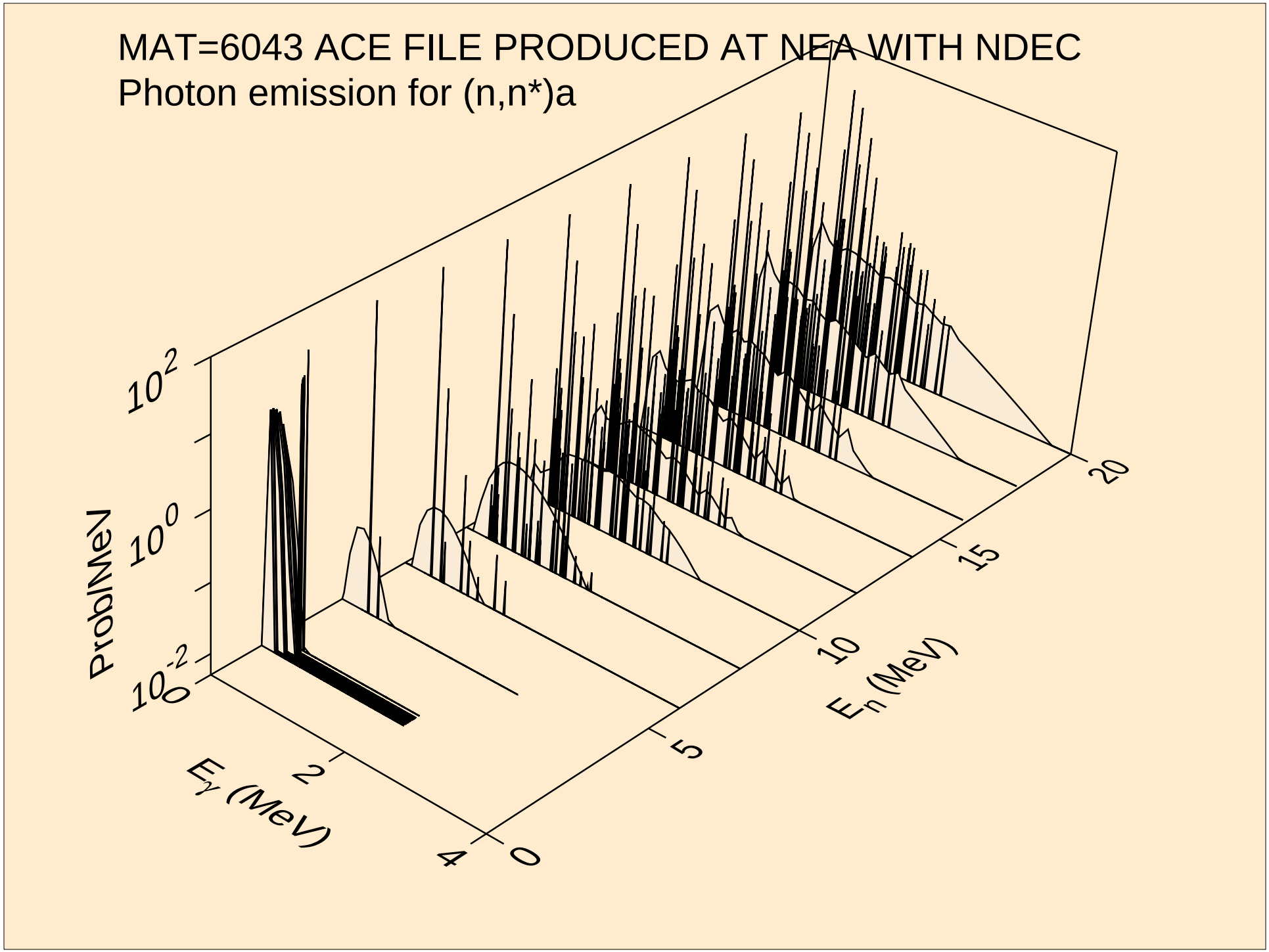

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Neutron emission for (n,n*)d
Prob/MeV
10^{0}
10^{-2}
0.0
0.5
1.0
1.5
2.0
Sec. Energy
13
14
15
16
17
18
19
20
Energy (MeV)

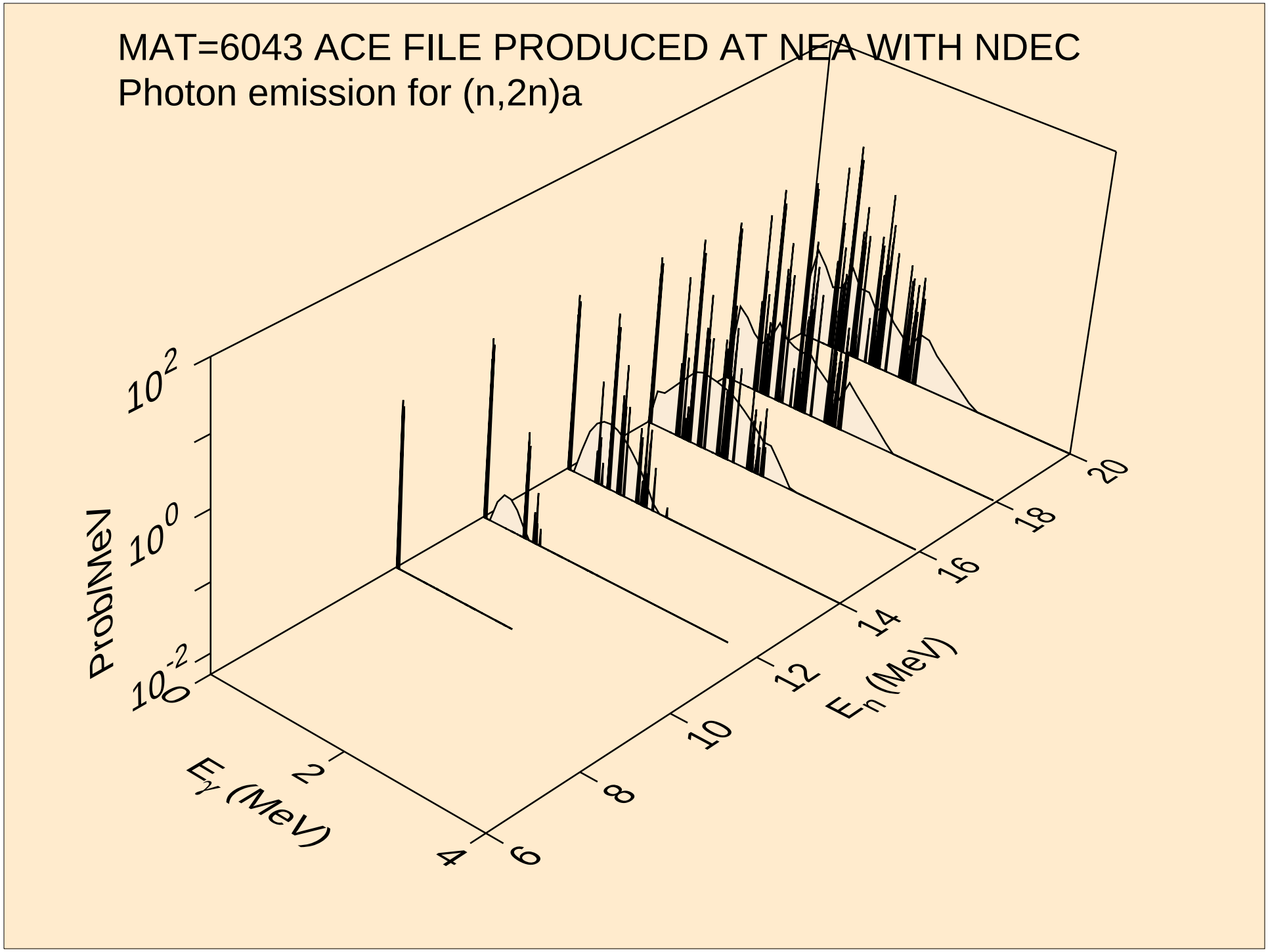

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Neutron emission for (n,n*)t
Prob/MeV
10^1
10^-1
0
Sec. Energy
1
2
3
Energy (MeV)
12
13
14
15
16
17
18
19
20

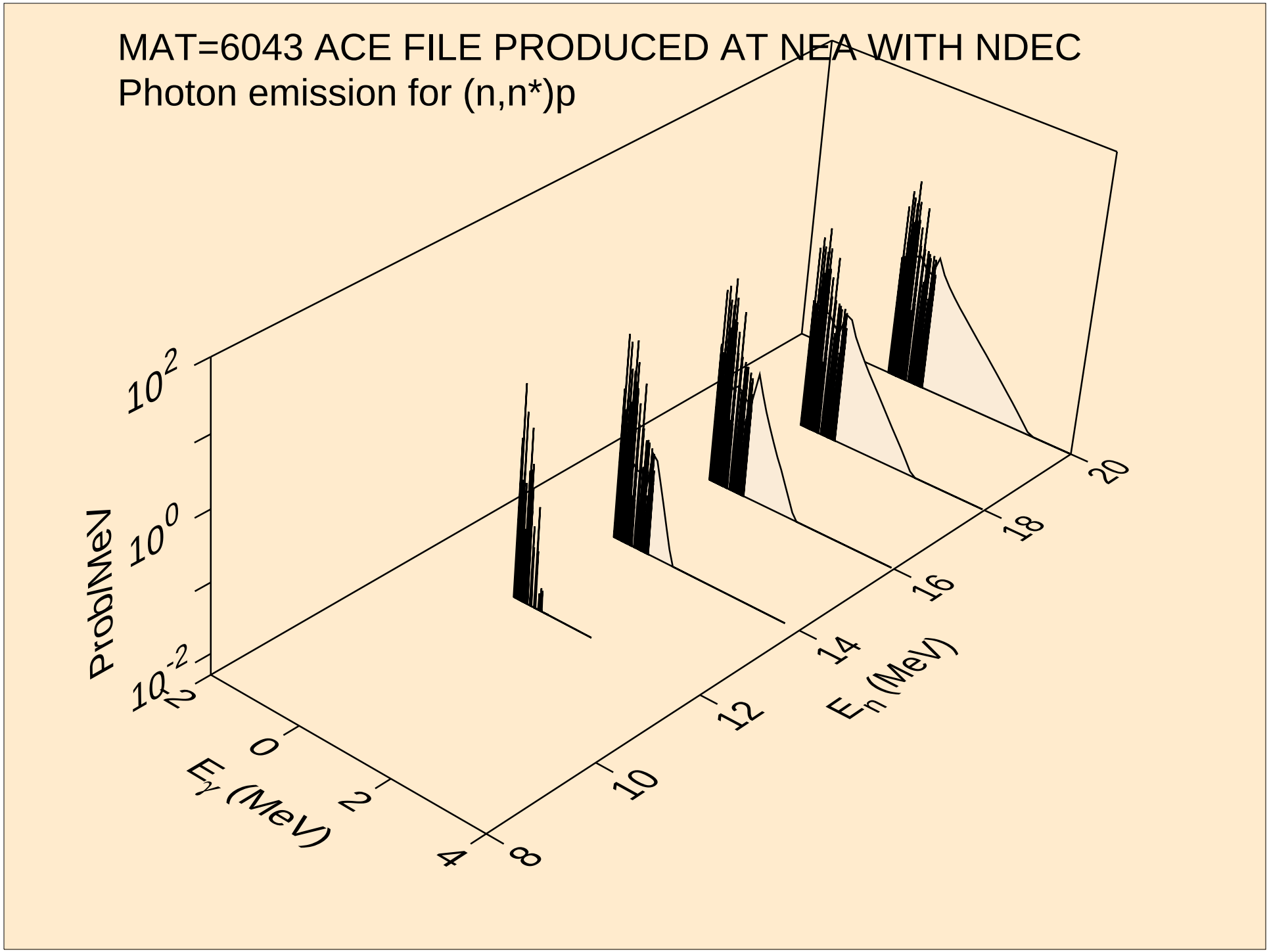

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Neutron emission for (n,n*c)
Prob/MeV
10^1
10^-1
0
5
10
15
20
Sec. Energy
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

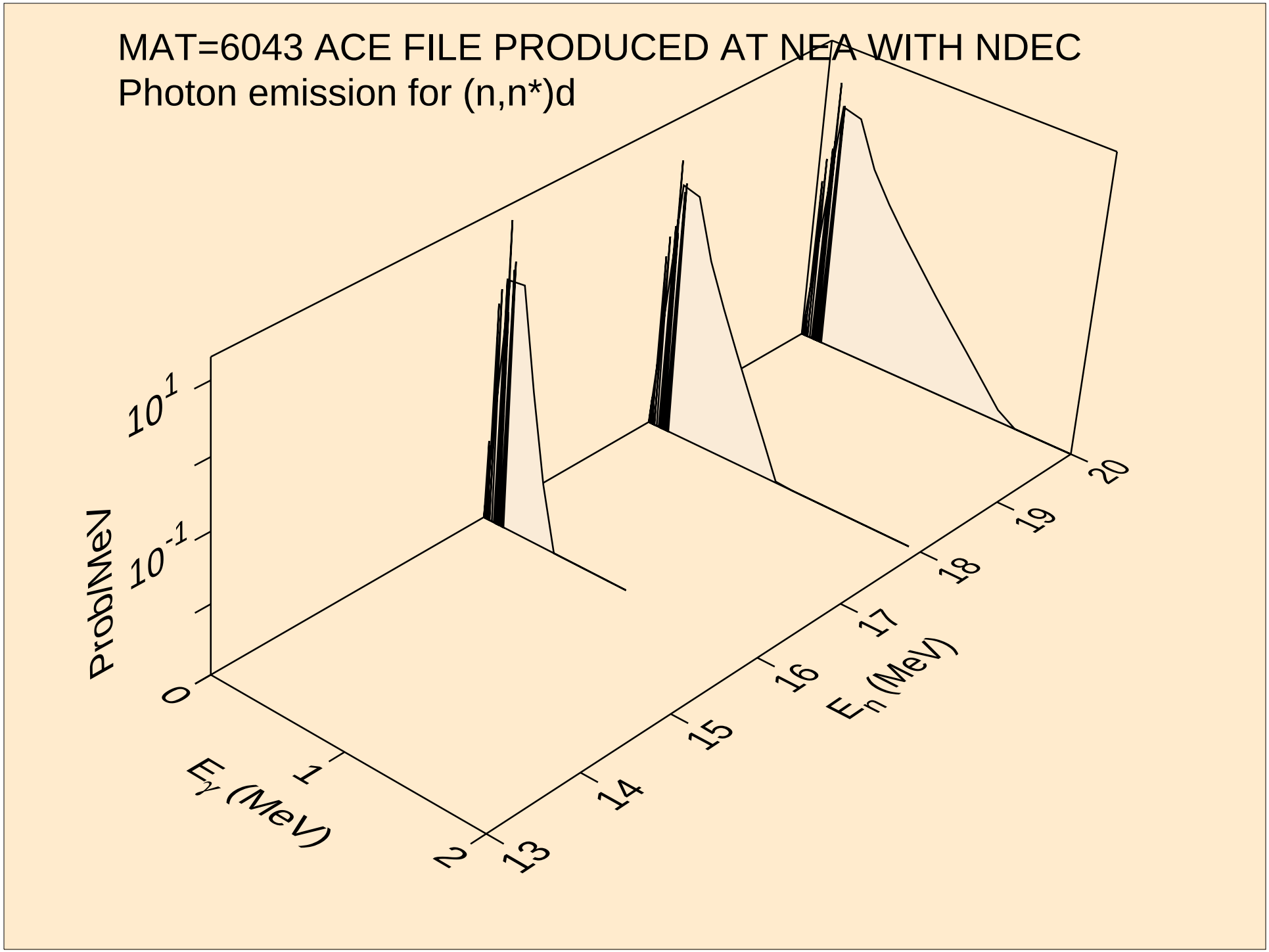

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Photon emission for (n,2n)
Prob/MeV
10^{0}
10^{-2}
0
E_γ (MeV)
5
10
6
8
10
12
14
16
18
20
E_n (MeV)

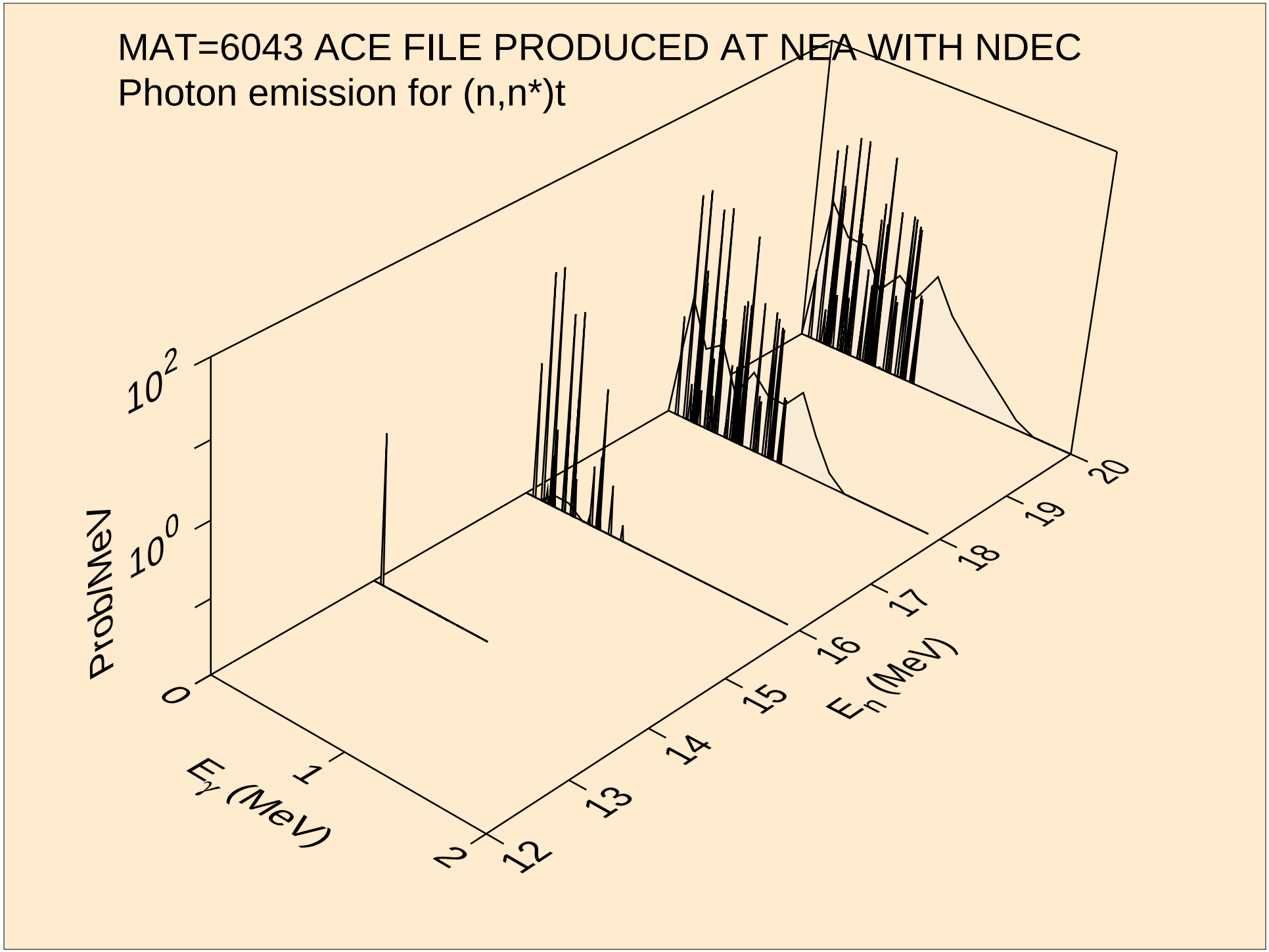

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Photon emission for (n,3n)
Prob/MeV
10^{2}
10^{0}
10^{-2}
E_γ (MeV)
0
2
4
E_n (MeV)
12
13
14
15
16
17
18
19
20

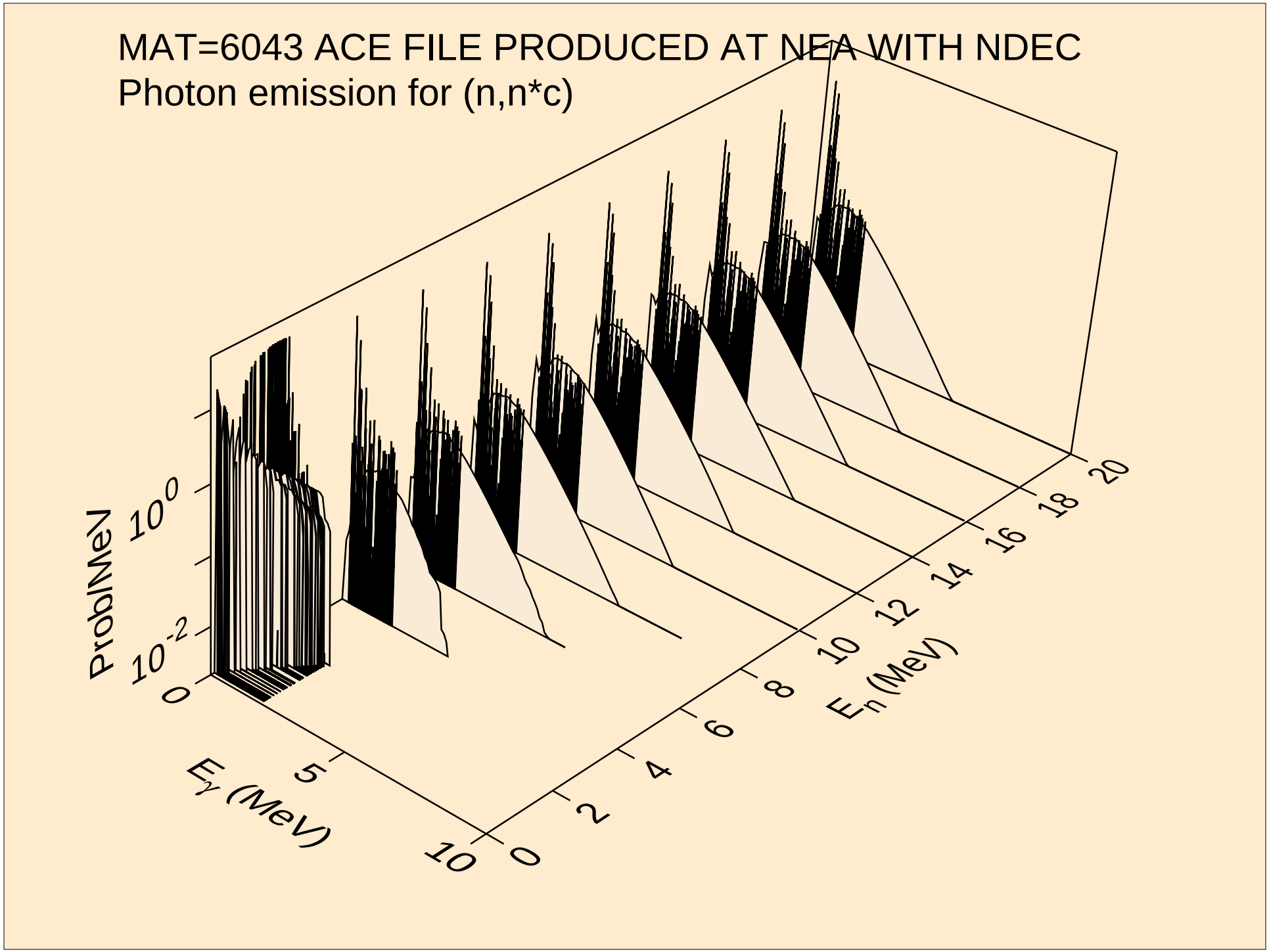

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Photon emission for (n,n*)a
Prob/MeV
10^{2}
10^{0}
10^{-2}
0
2
4
E_γ (MeV)
5
10
15
20
E_n (MeV)

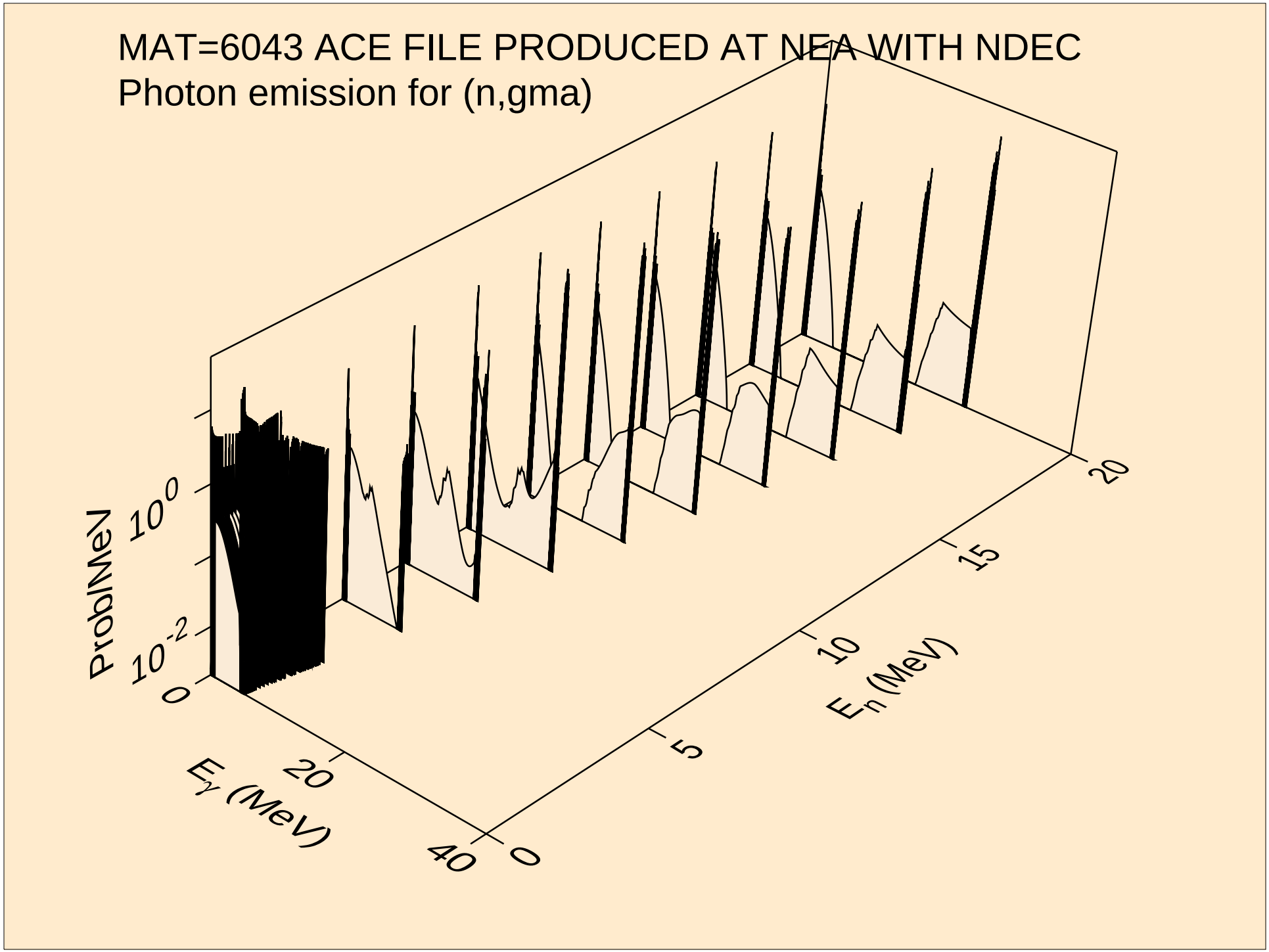

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Photon emission for (n,2n)a
Prob/MeV
10^{2}
10^{0}
10^{-2}
0
2
4
6
8
10
12
14
16
18
20
E_γ (MeV)
E_n (MeV)

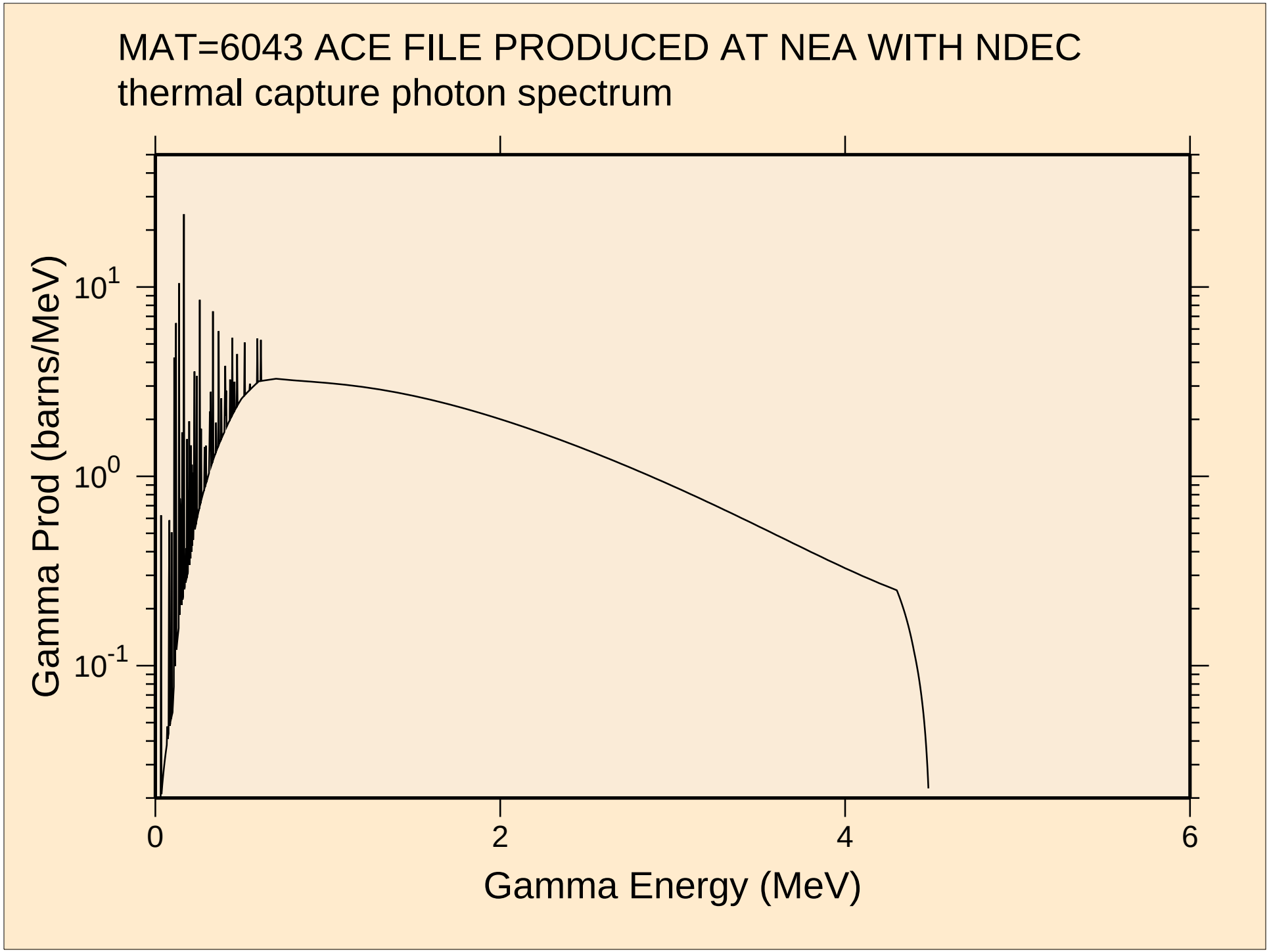

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Photon emission for (n,n*)p
Prob/MeV
10^{2}
10^{0}
10^{-2}
E_γ (MeV)
-2
0
2
4
8
10
12
14
16
18
20
E_n (MeV)

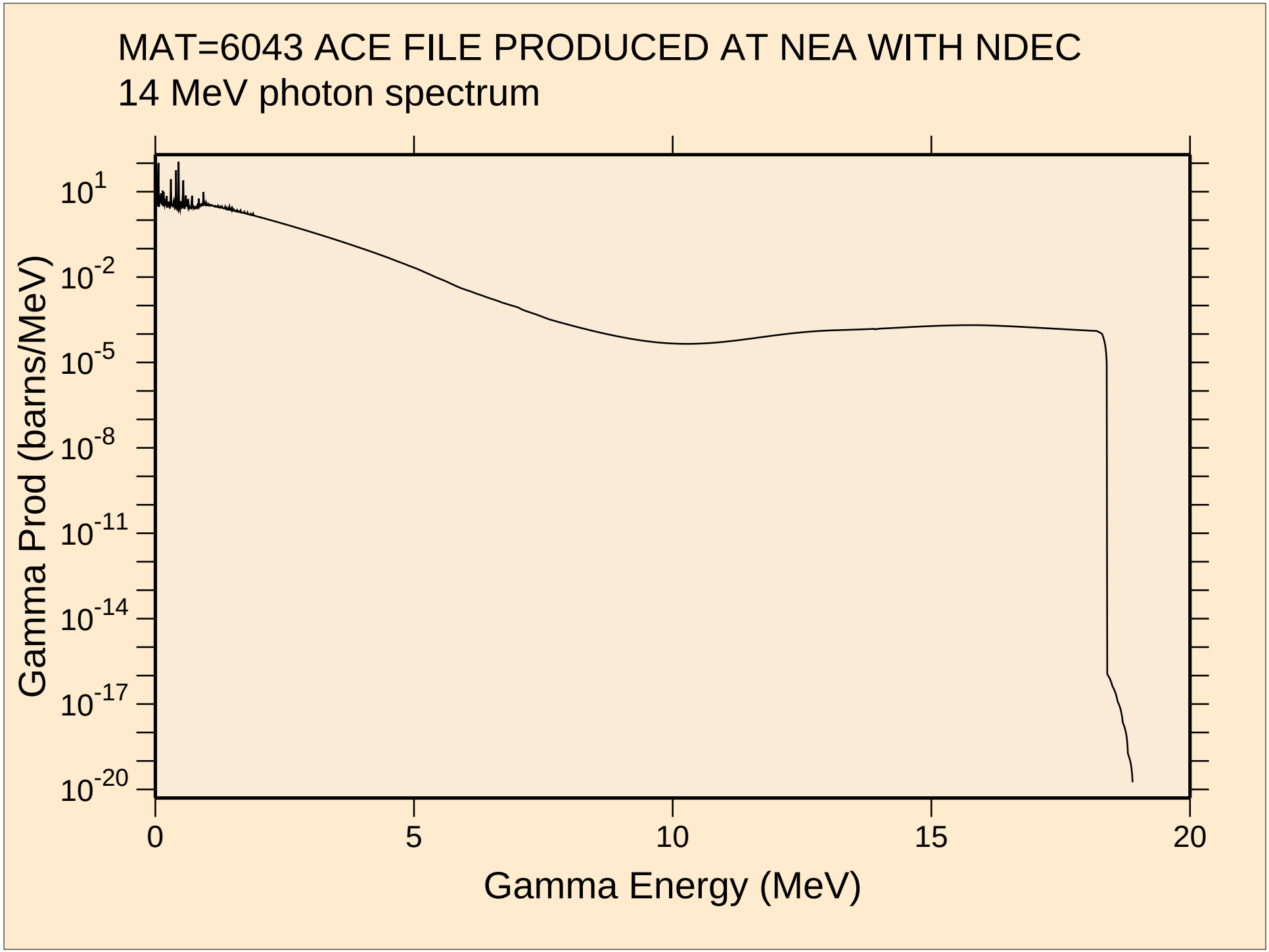

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Photon emission for (n,n*)d
Prob/MeV
10^{1}
10^{-1}
0
1
2
E_γ (MeV)
13
14
15
16
17
18
19
20
E_n (MeV)

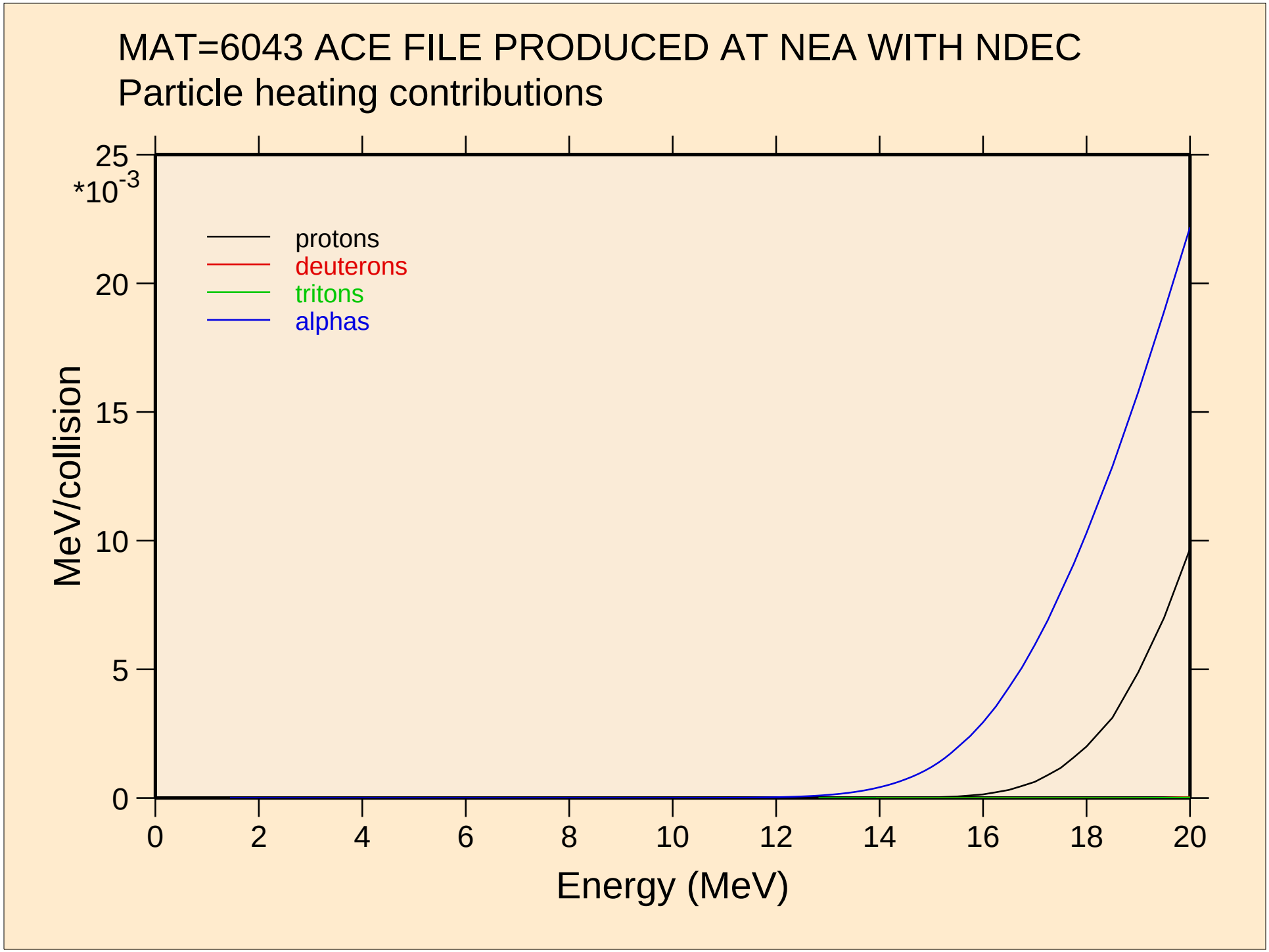

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Photon emission for (n,n*)t
Prob/MeV
10^2
10^0
0
1
2
E_γ (MeV)
12
13
14
15
16
17
18
19
20
E_n (MeV)

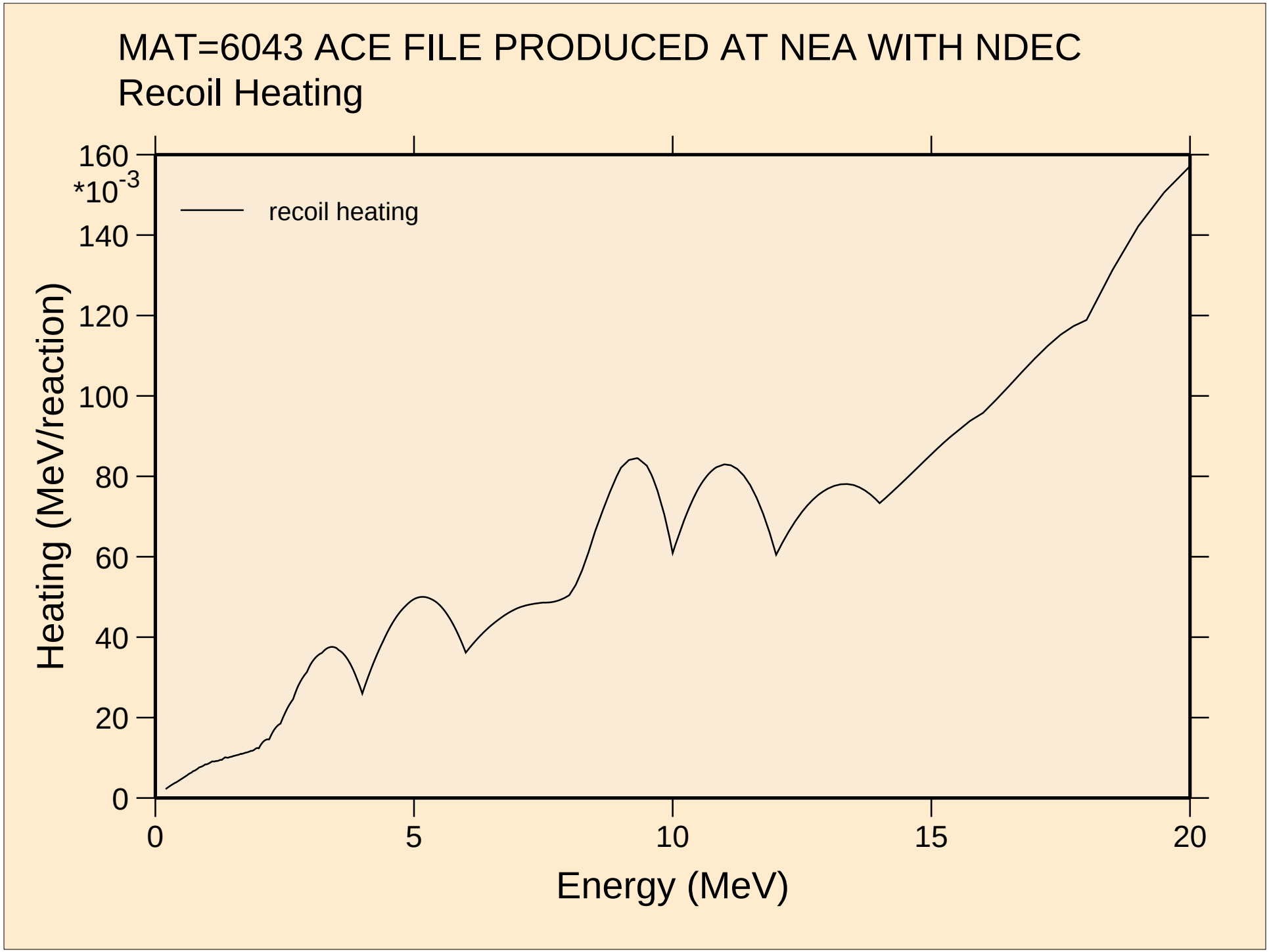

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Photon emission for (n,n*c)
Prob/MeV
10^0
10^-2
0
5
10
E_γ (MeV)
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

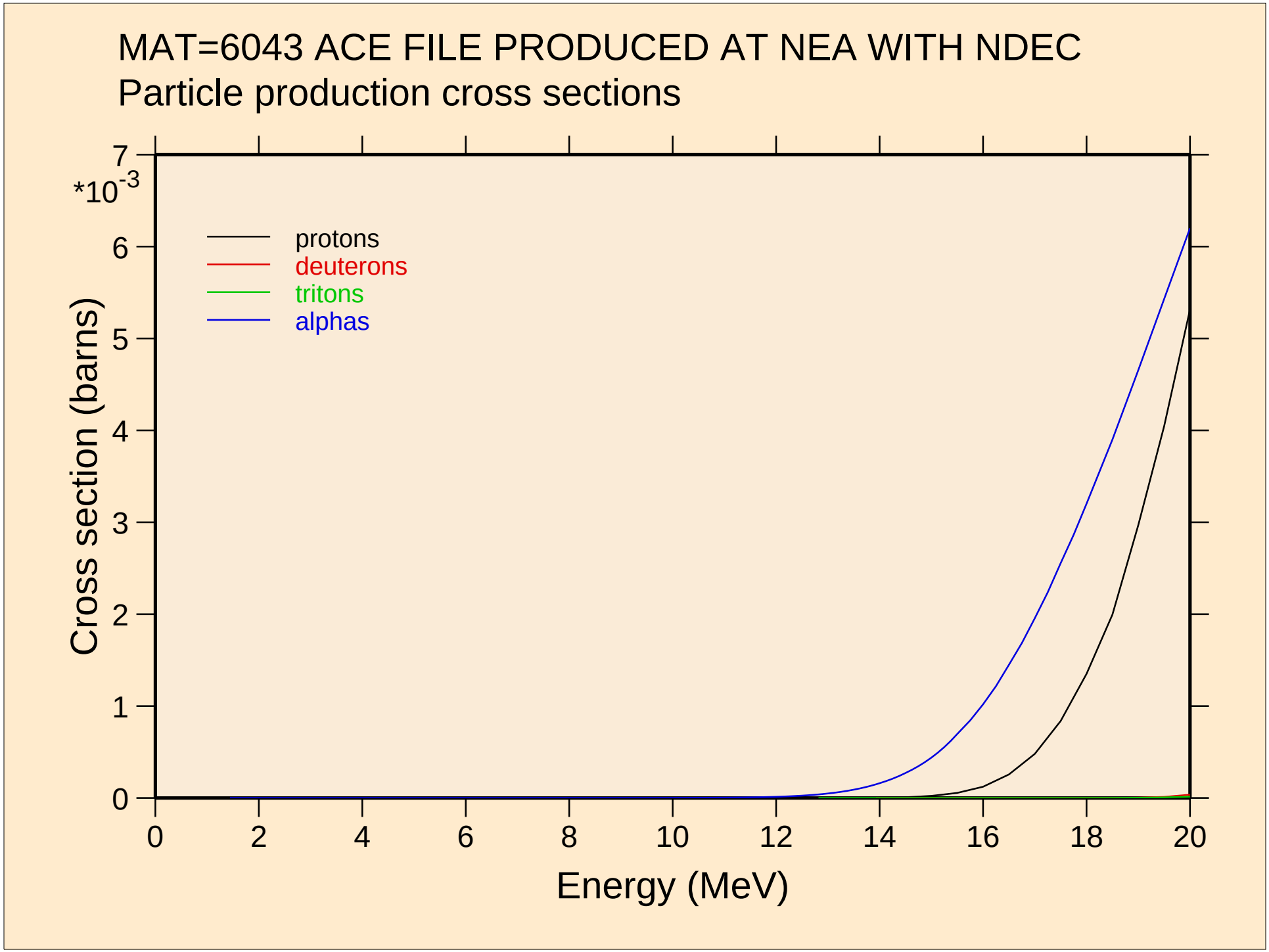

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Photon emission for (n,gma)
Prob/MeV
10^0
10^-2
0
20
40
E_γ (MeV)
0
5
10
15
20
E_n (MeV)

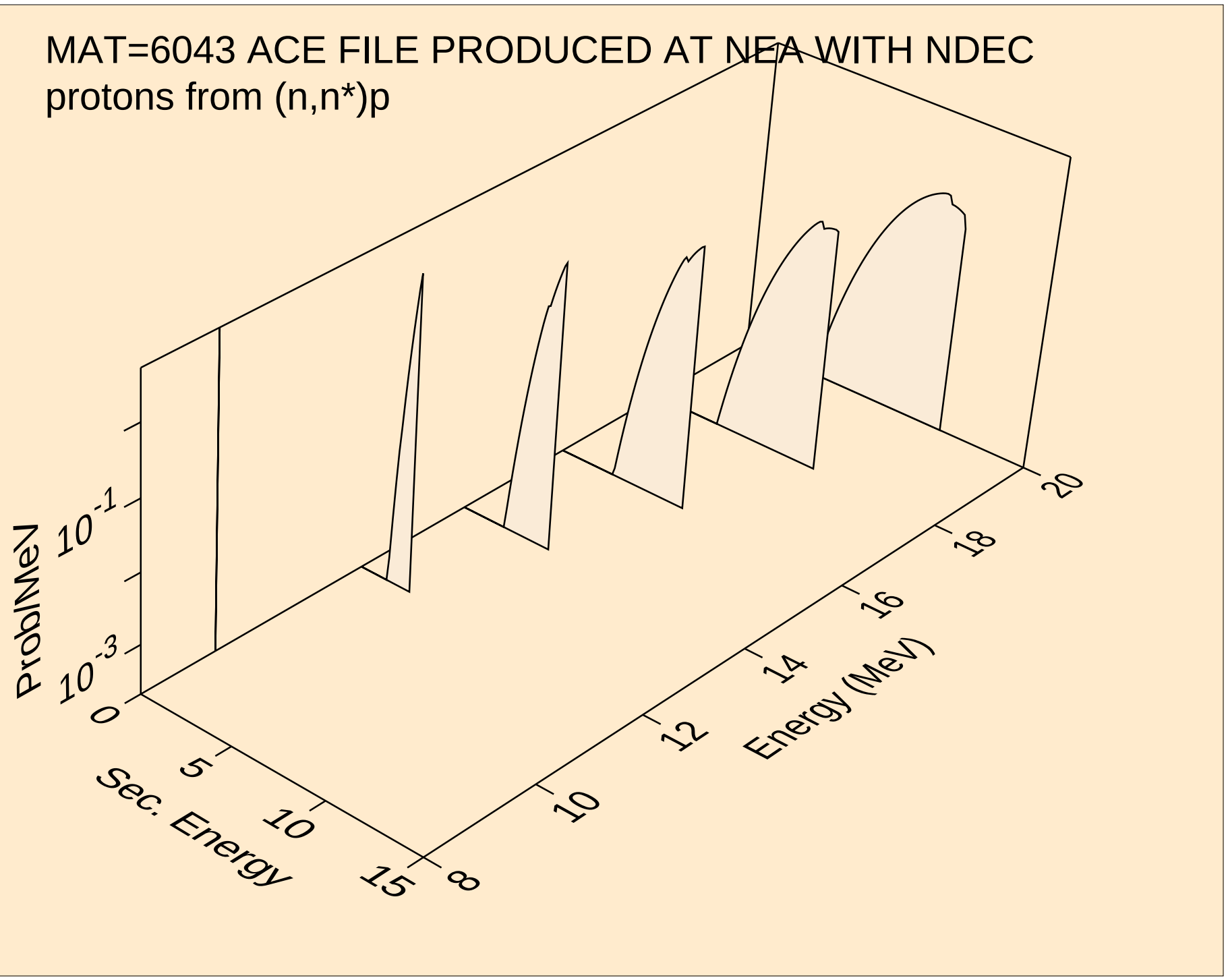

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
thermal capture photon spectrum
Gamma Prod (barns/MeV)
10^1
10^0
10^-1
0
2
4
6
Gamma Energy (MeV)

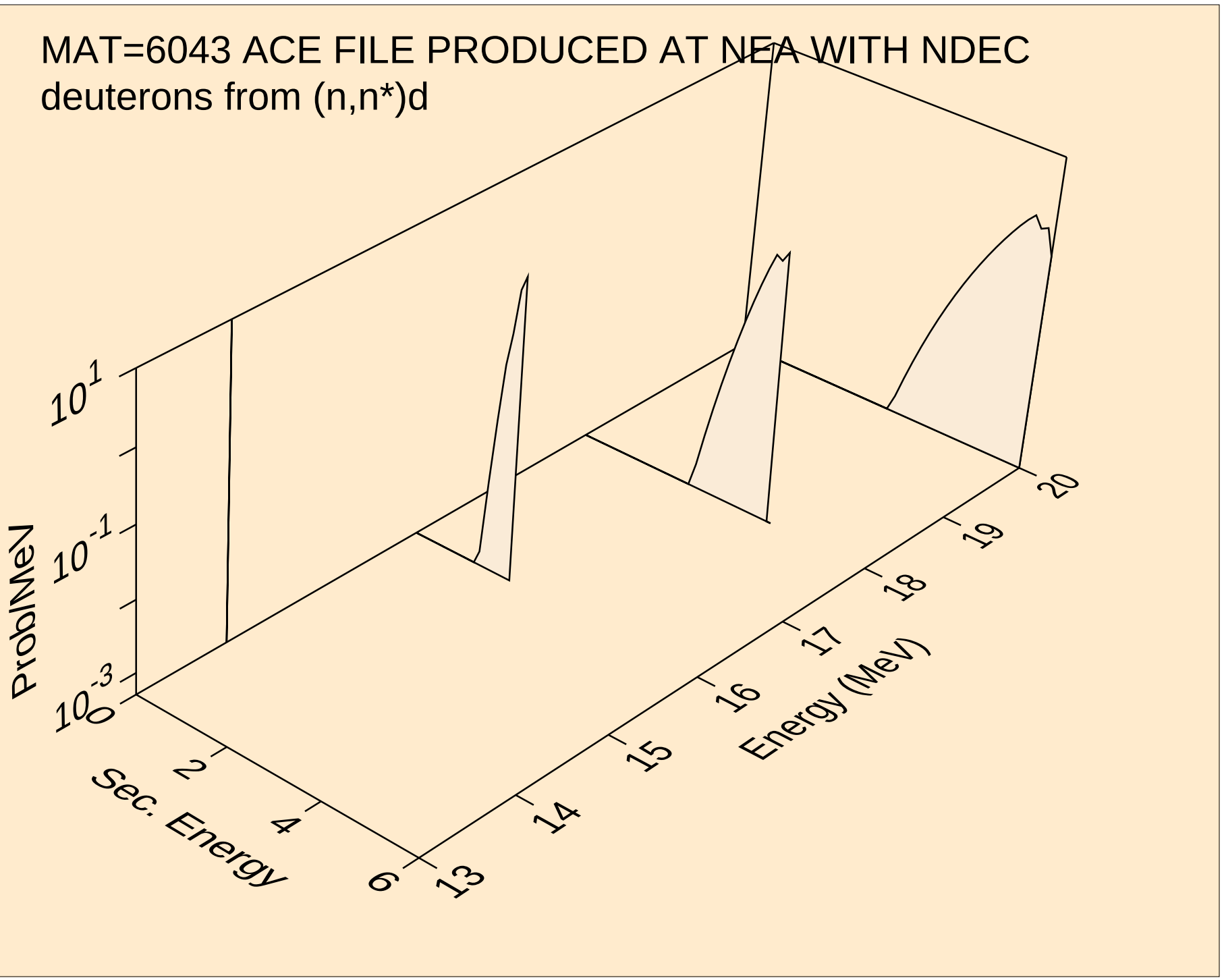

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
14 MeV photon spectrum
Gamma Prod (barns/MeV)
10^1
10^-2
10^-5
10^-8
10^-11
10^-14
10^-17
10^-20
0
5
10
15
20
Gamma Energy (MeV)

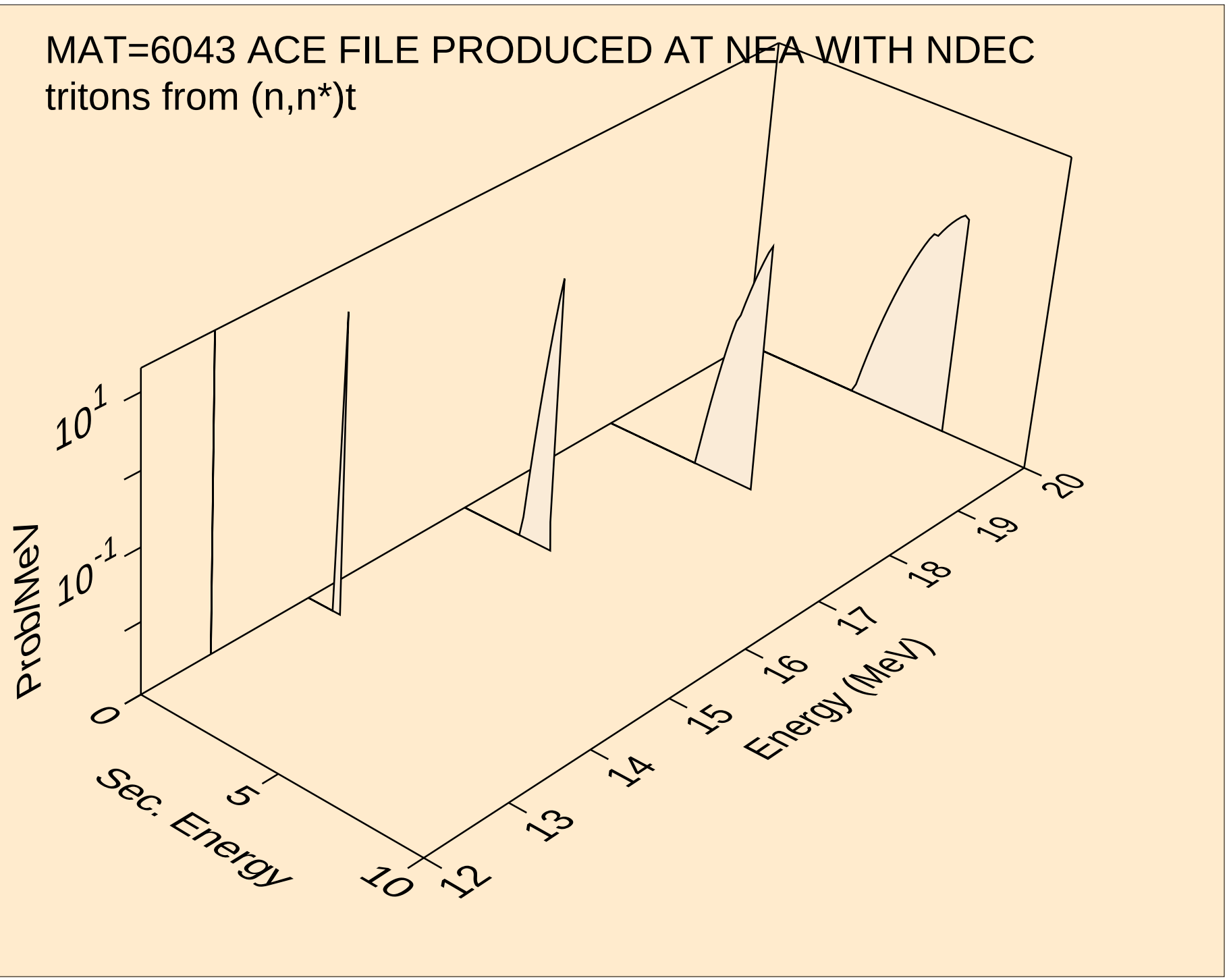

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Particle heating contributions
protons
deuterons
tritons
alphas
MeV/collision
*10-3
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

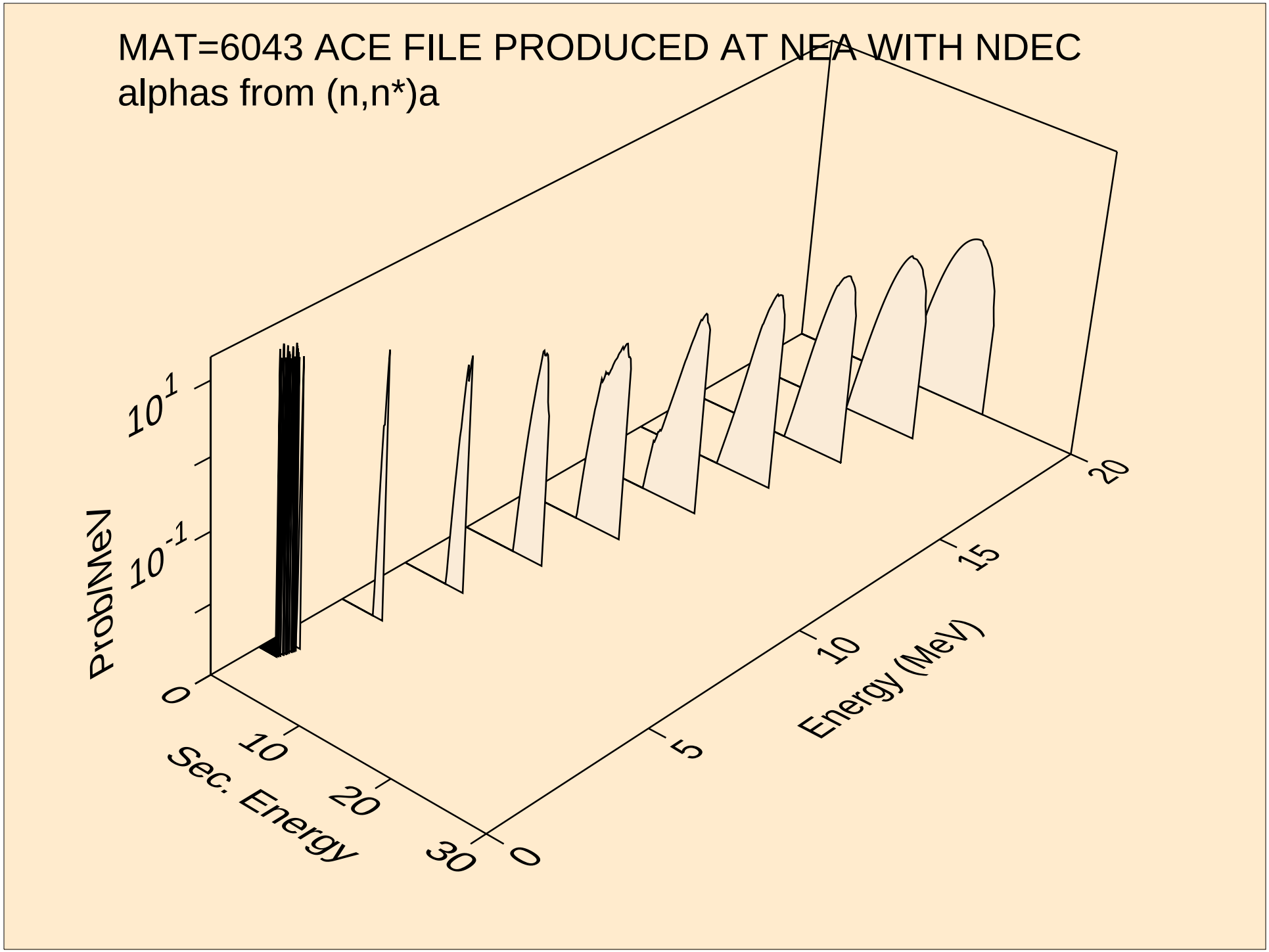

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Recoil Heating
recoil heating
Heating (MeV/reaction)
*10-3
160
140
120
100
80
60
40
20
0
0
5
10
15
20
Energy (MeV)

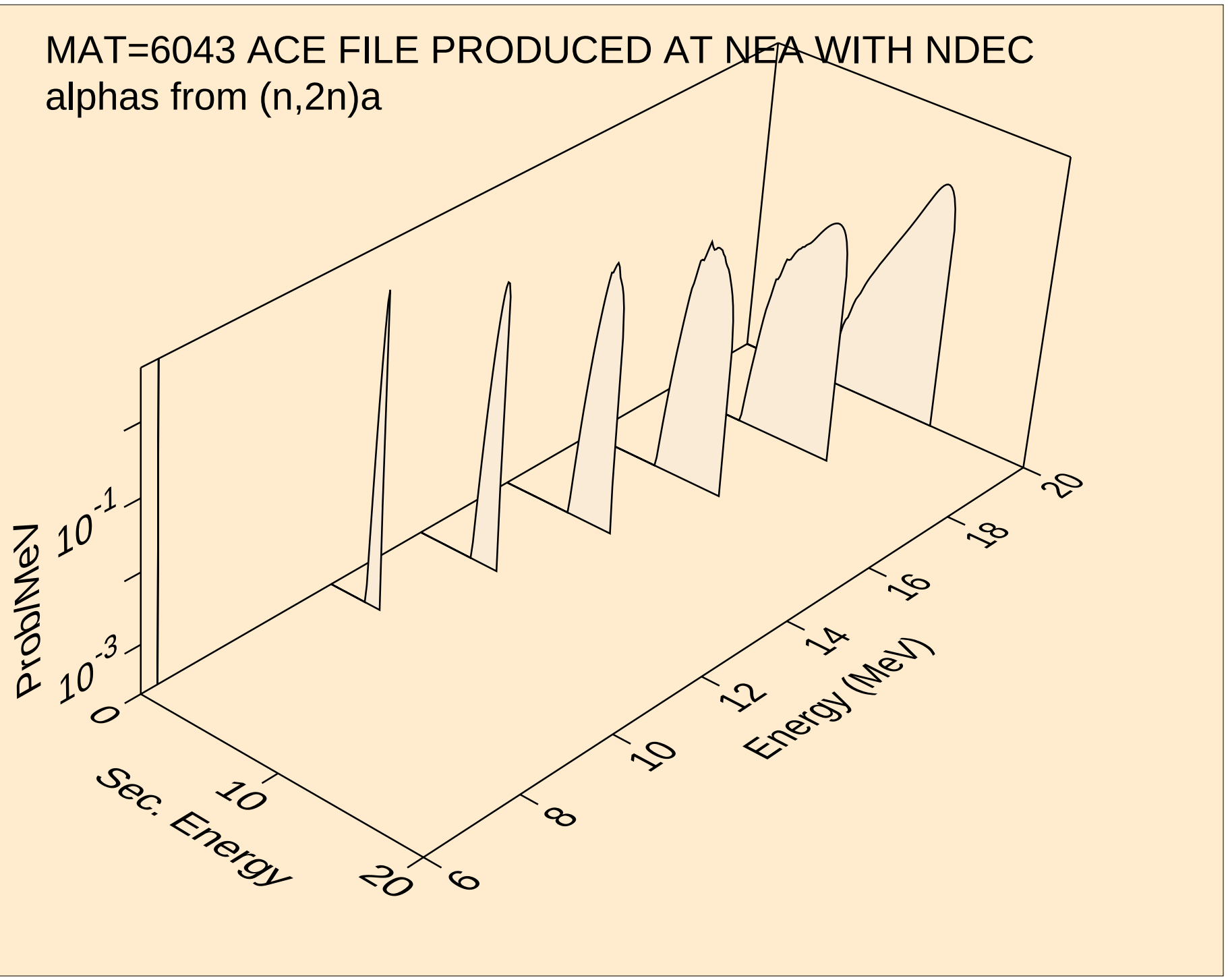

MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
Particle production cross sections
*10-3
Cross section (barns)
protons
deuterons
tritons
alphas
0
1
2
3
4
5
6
7
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)


MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
protons from (n,n*)p
Prob/MeV
10-1
10-3
0
5
10
15
Sec. Energy
8
10
12
14
16
18
20
Energy (MeV)


MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
deuterons from (n,n*)d
Prob/MeV
10^1
10^-1
10^-3
0
2
4
6
Sec. Energy
13
14
15
16
17
18
19
20
Energy (MeV)


MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
tritons from (n,n*)t
Prob/MeV
10^1
10^-1
0
Sec. Energy
5
10
12
13
14
15
16
17
18
19
20
Energy (MeV)


MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
alphas from (n,n*)a
Prob/MeV
10^1
10^-1
0
10
20
30
Sec. Energy
0
5
10
15
20
Energy (MeV)


MAT=6043 ACE FILE PRODUCED AT NEA WITH NDEC
alphas from (n,2n)a
Prob/MeV
10^-1
10^-3
0
Sec. Energy
10
20
Energy (MeV)
6
8
10
12
14
16
18
20