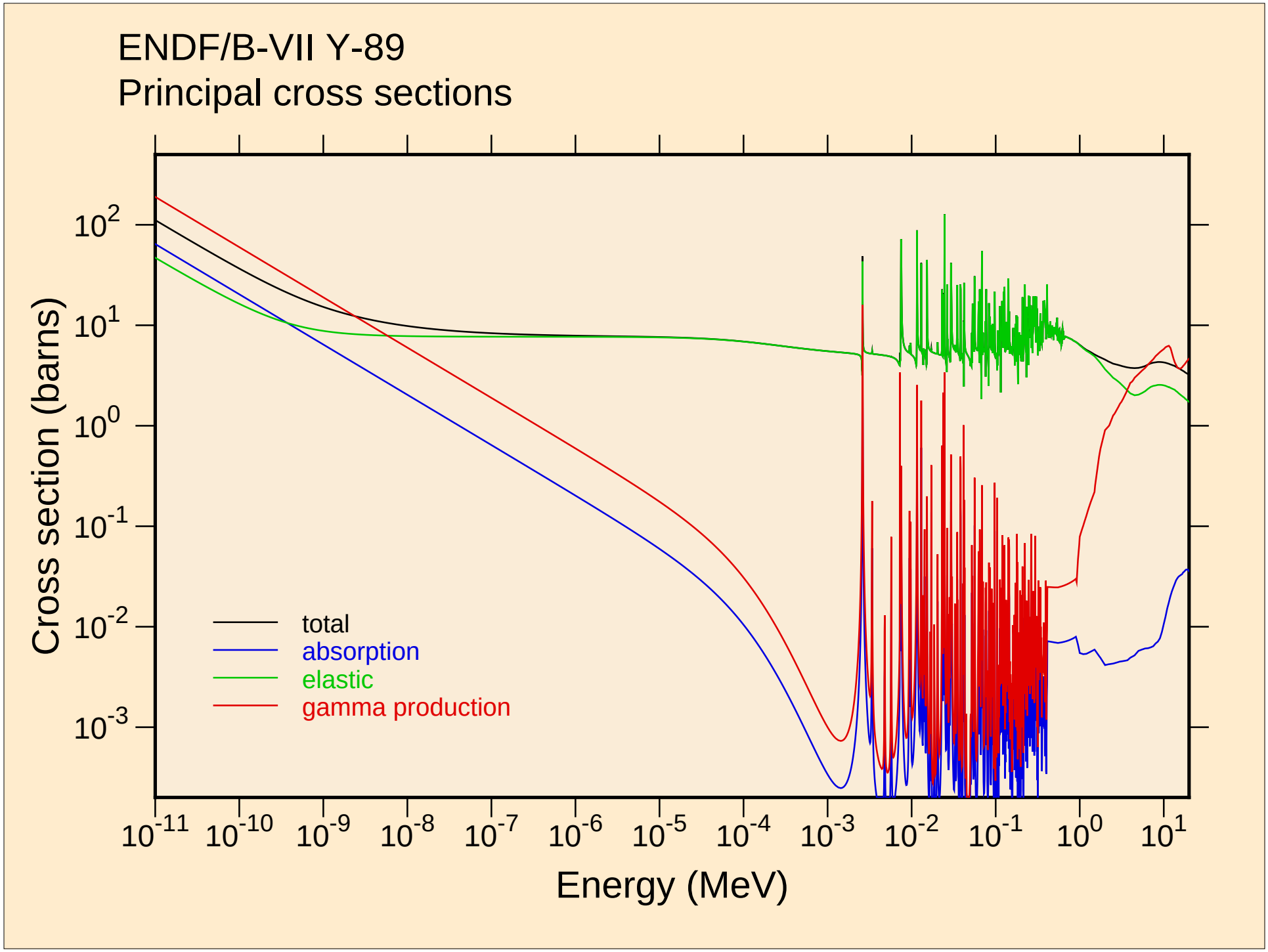
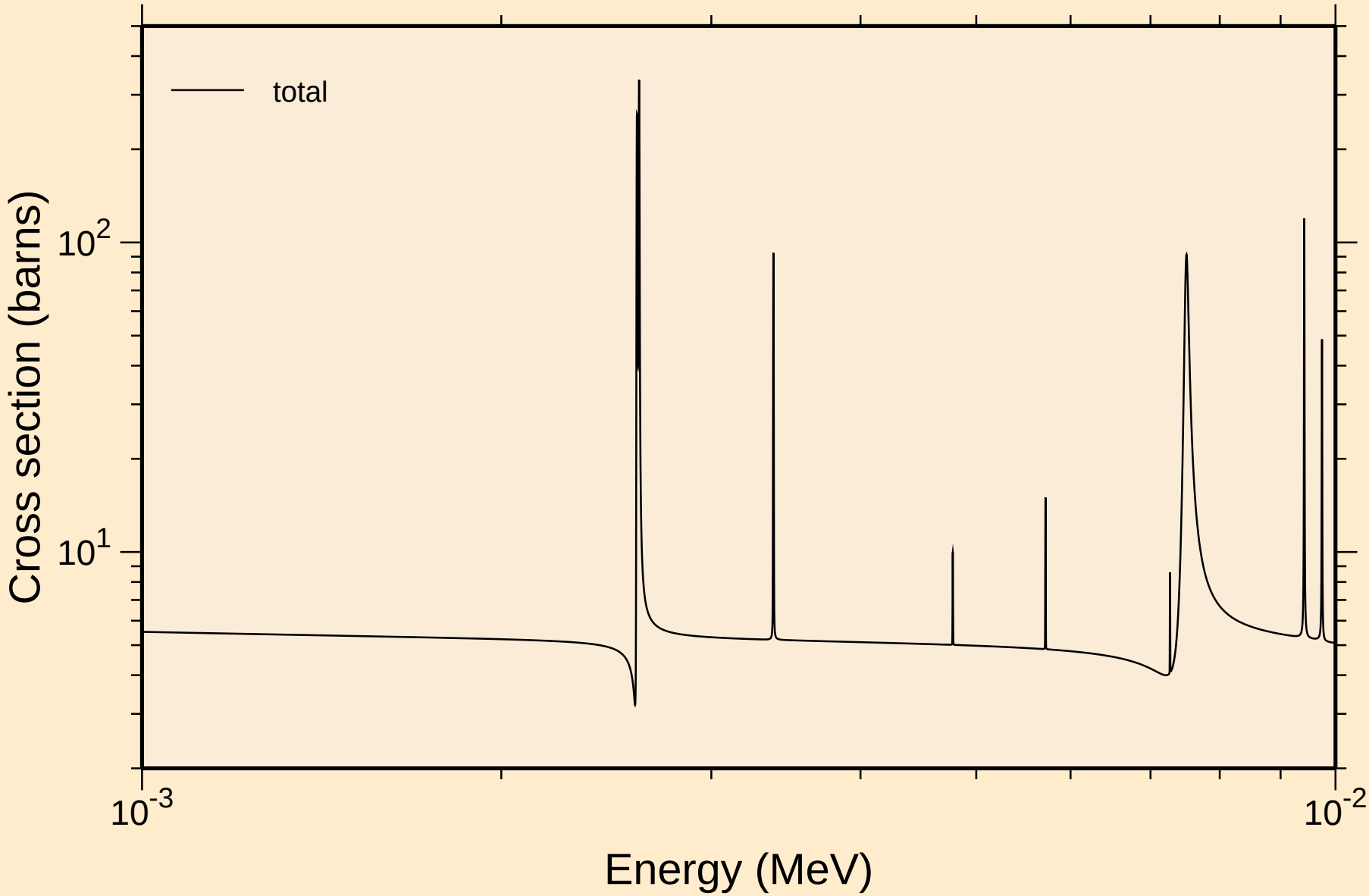
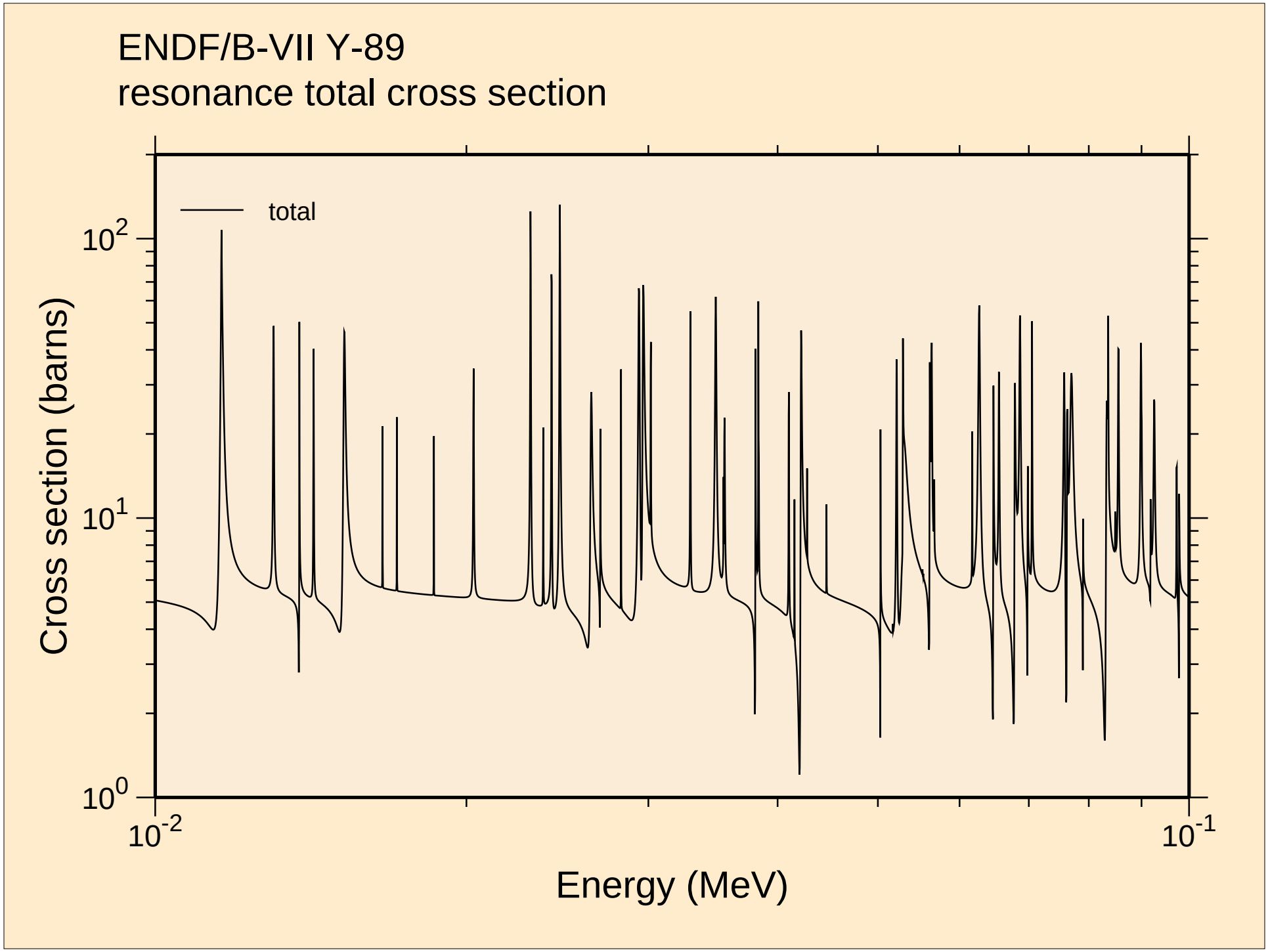
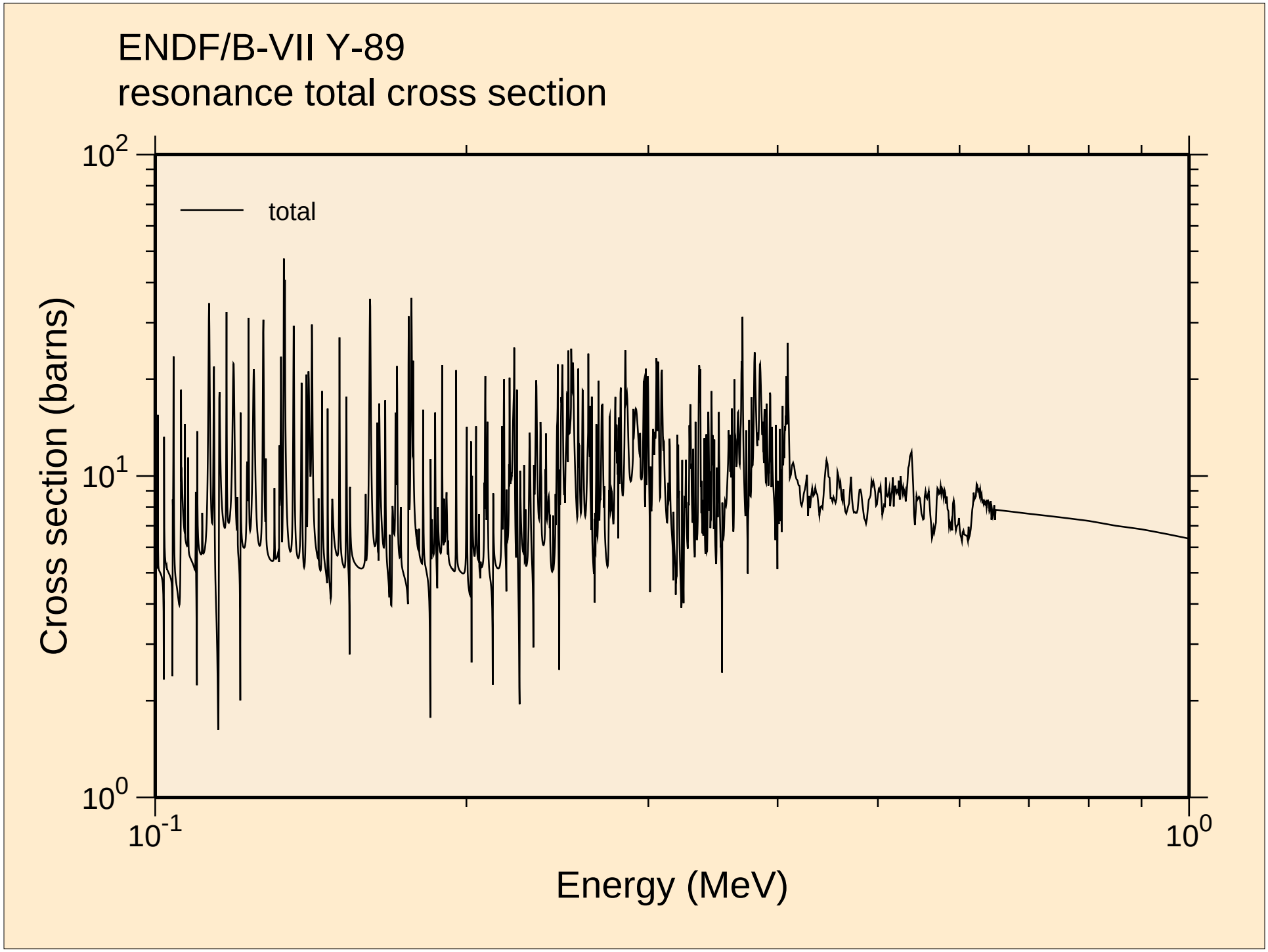
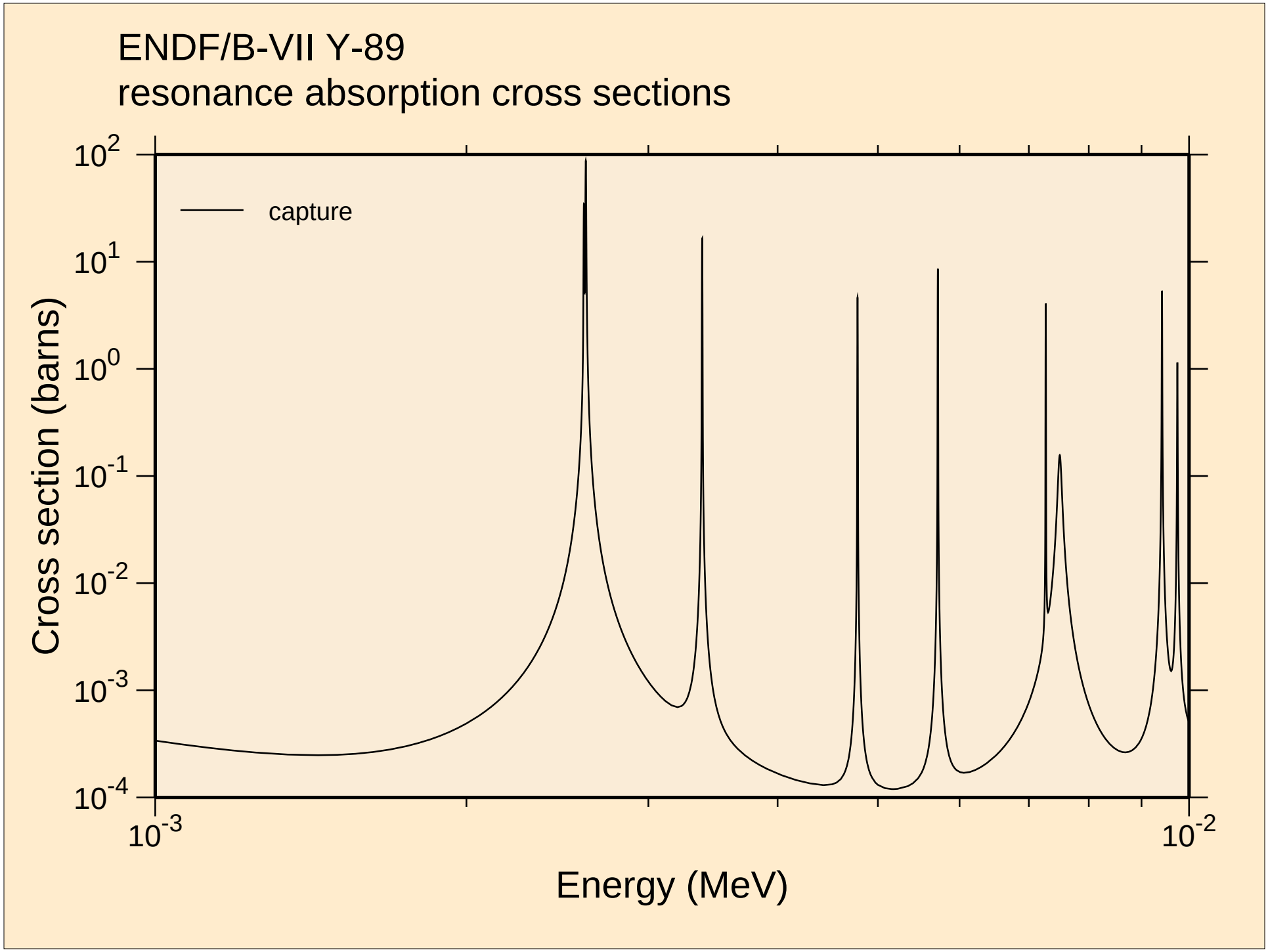

ENDF/B-VII Y-89
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production
10^{2}
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-11}
10^{-10}
10^{-9}
10^{-8}
10^{-7}
10^{-6}
10^{-5}
10^{-4}
10^{-3}
10^{-2}
10^{-1}
10^{0}
10^{1}

ENDF/B-VII Y-89
resonance total cross section

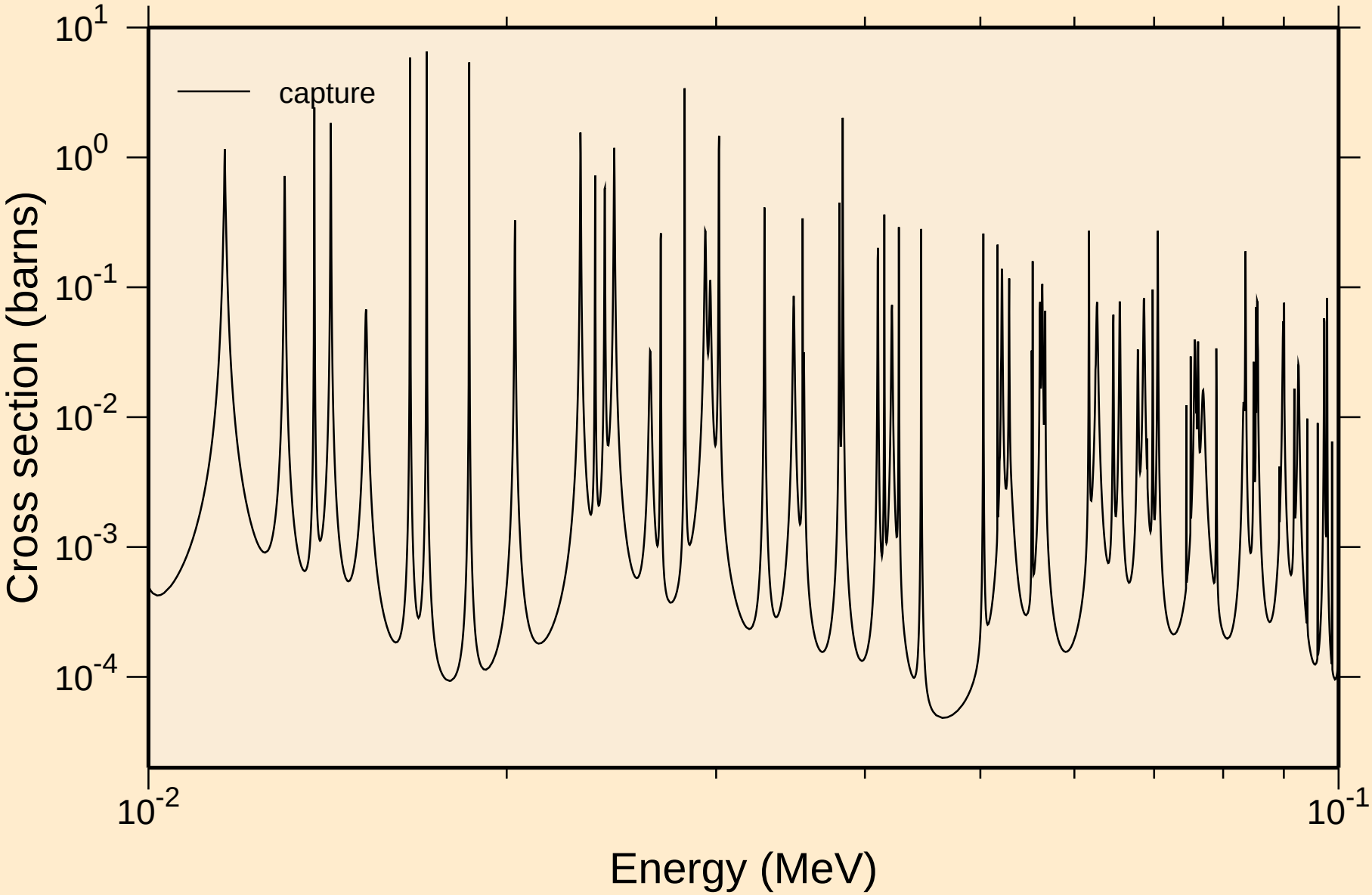



ENDF/B-VII Y-89
resonance total cross section
total
Cross section (barns)
10^2
10^1
10^0
10^{-2}
10^{-1}
Energy (MeV)

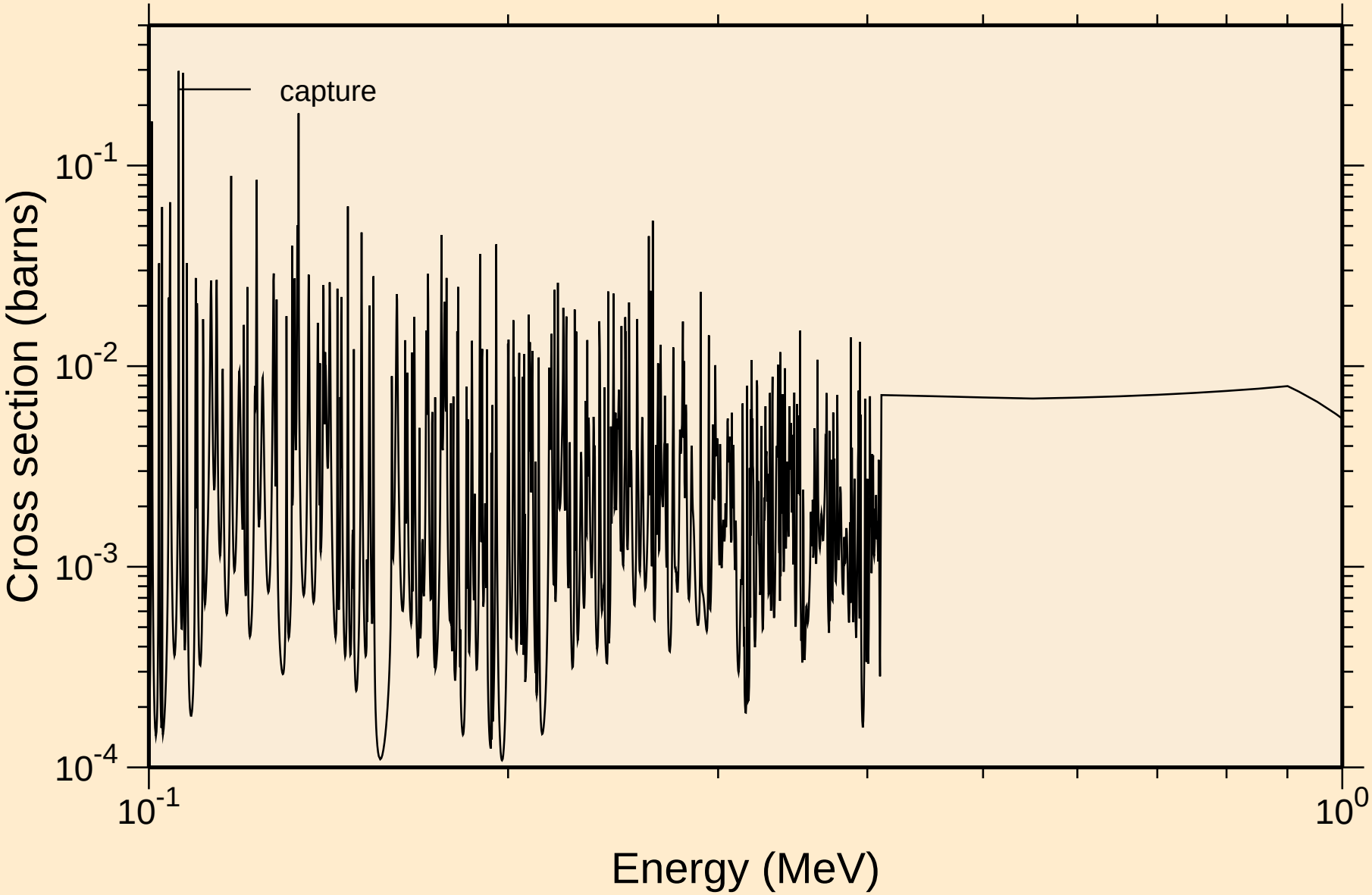

ENDF/B-VII Y-89
resonance total cross section
total
Cross section (barns)
Energy (MeV)
10^2
10^1
10^0
10^{-1}
10^0

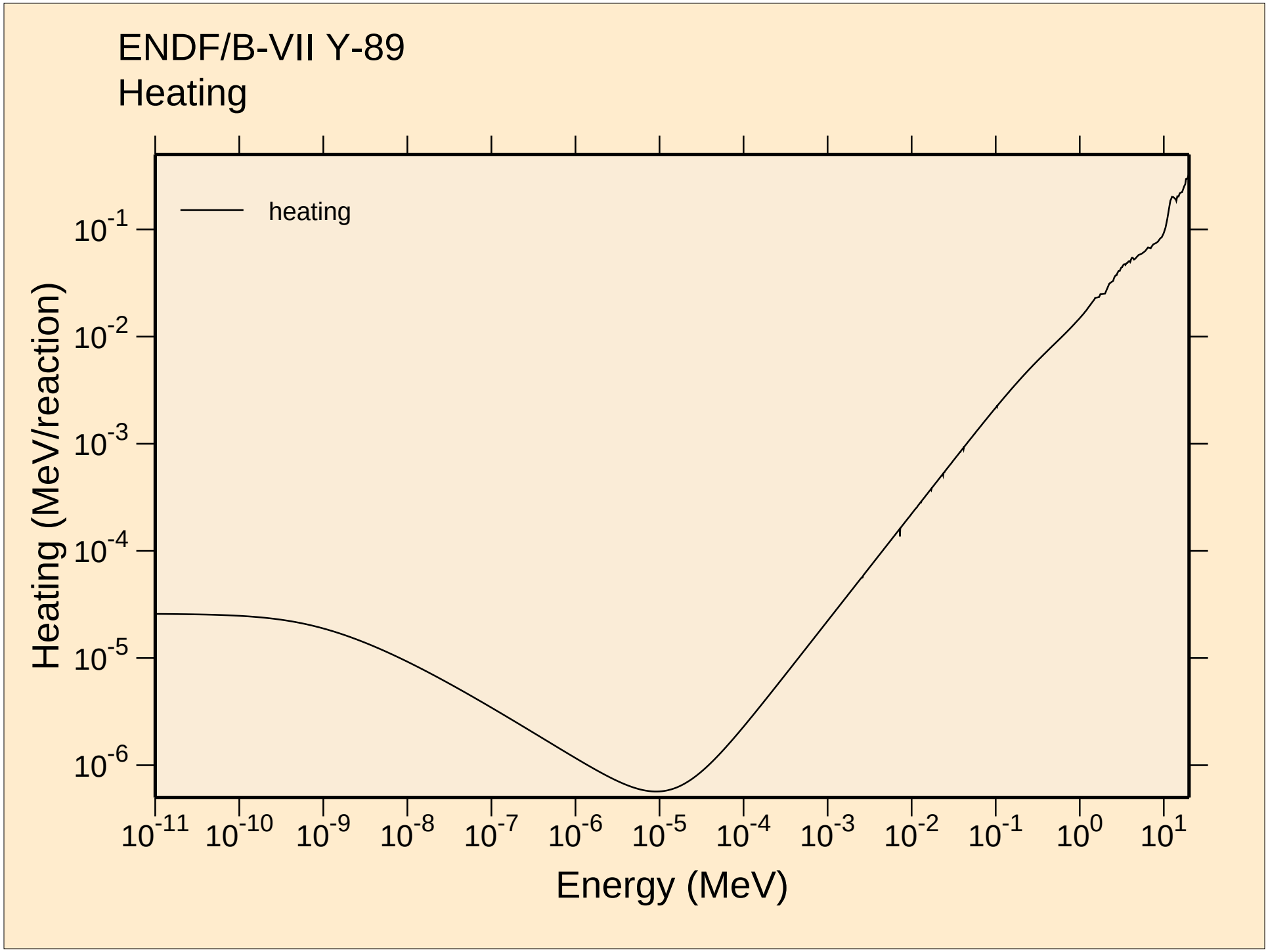

ENDF/B-VII Y-89
resonance absorption cross sections
capture
Cross section (barns)
Energy (MeV)
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^-4
10^-3
10^-2

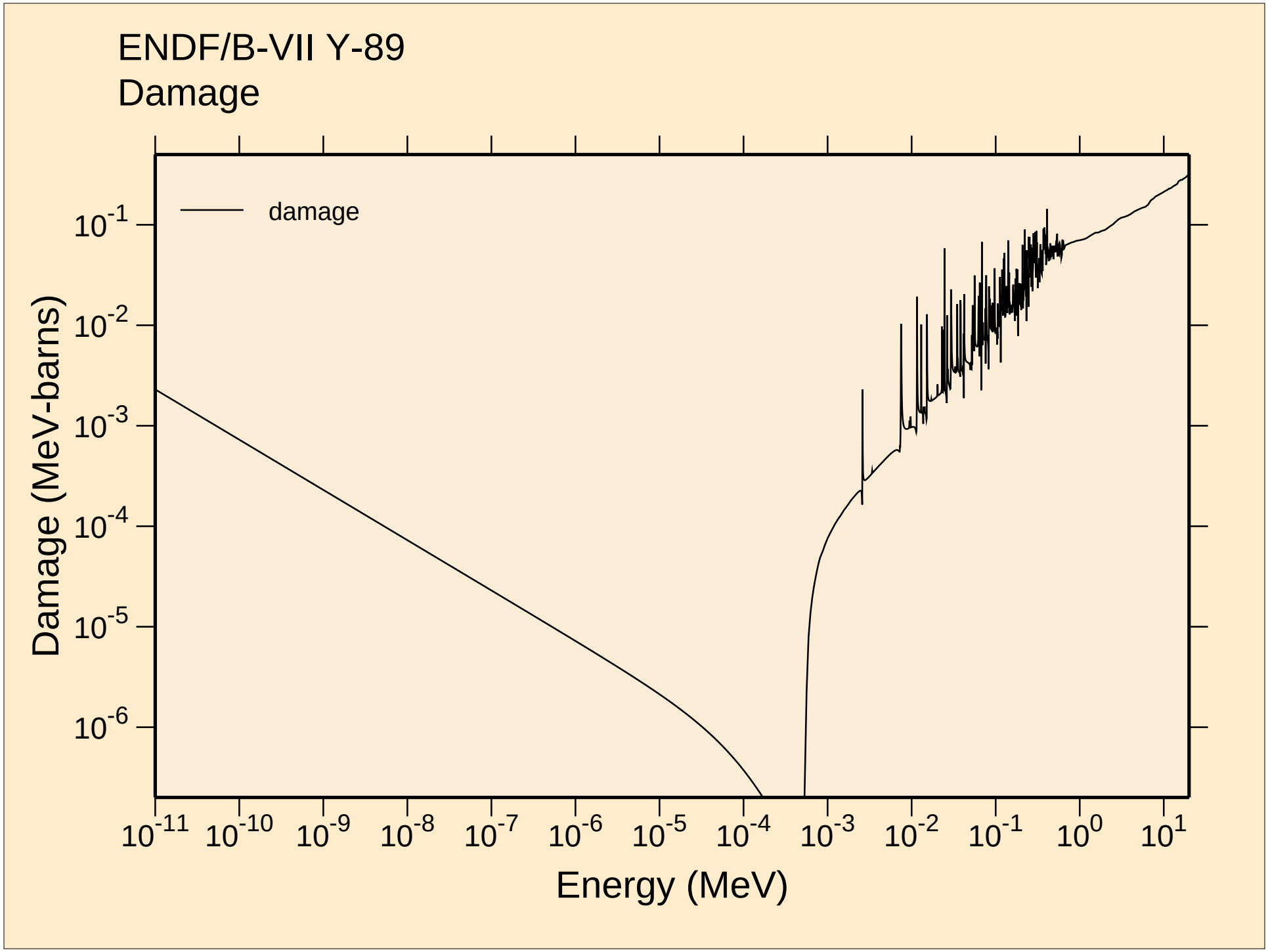
ENDF/B-VII Y-89
resonance absorption cross sections

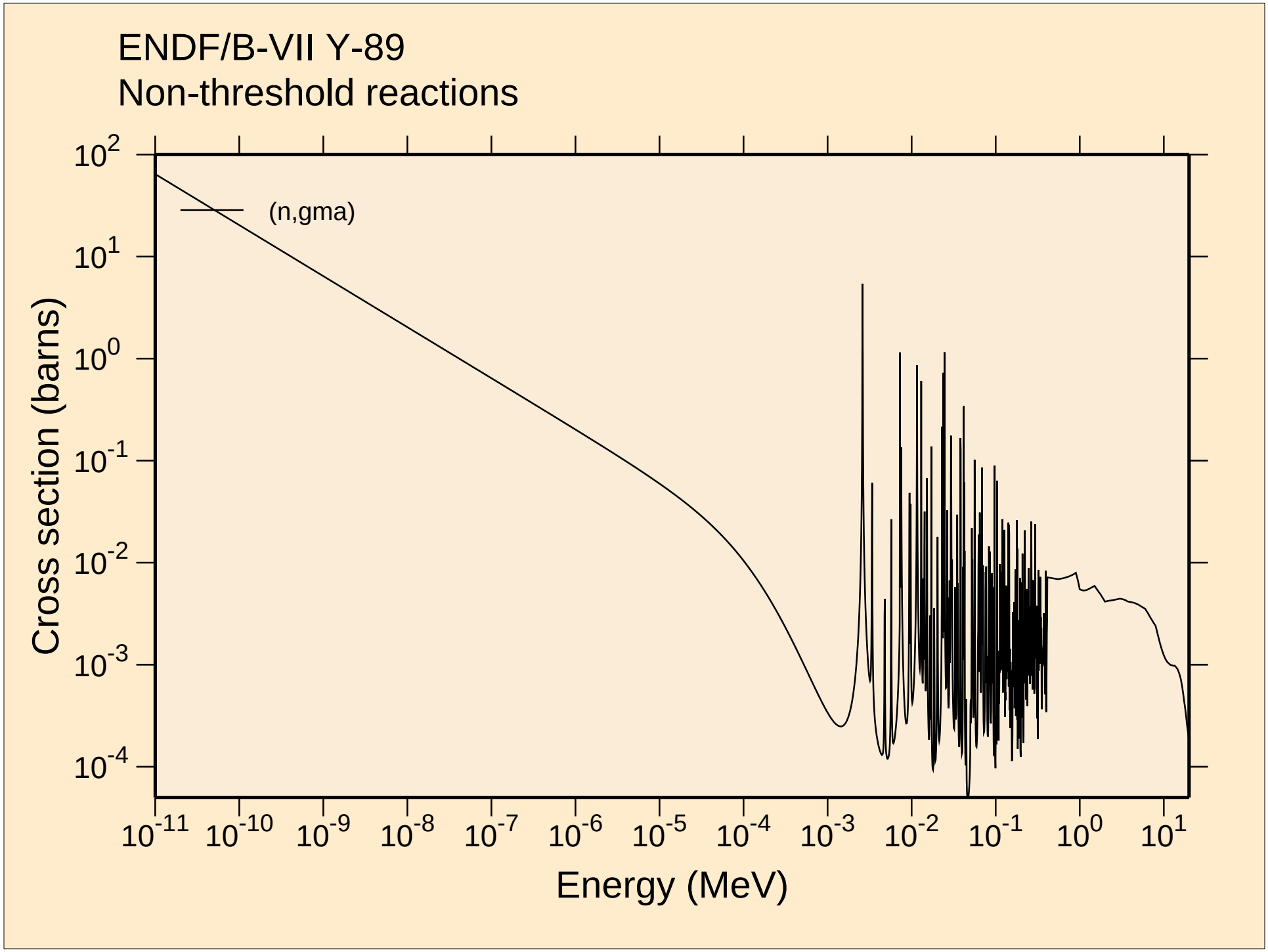


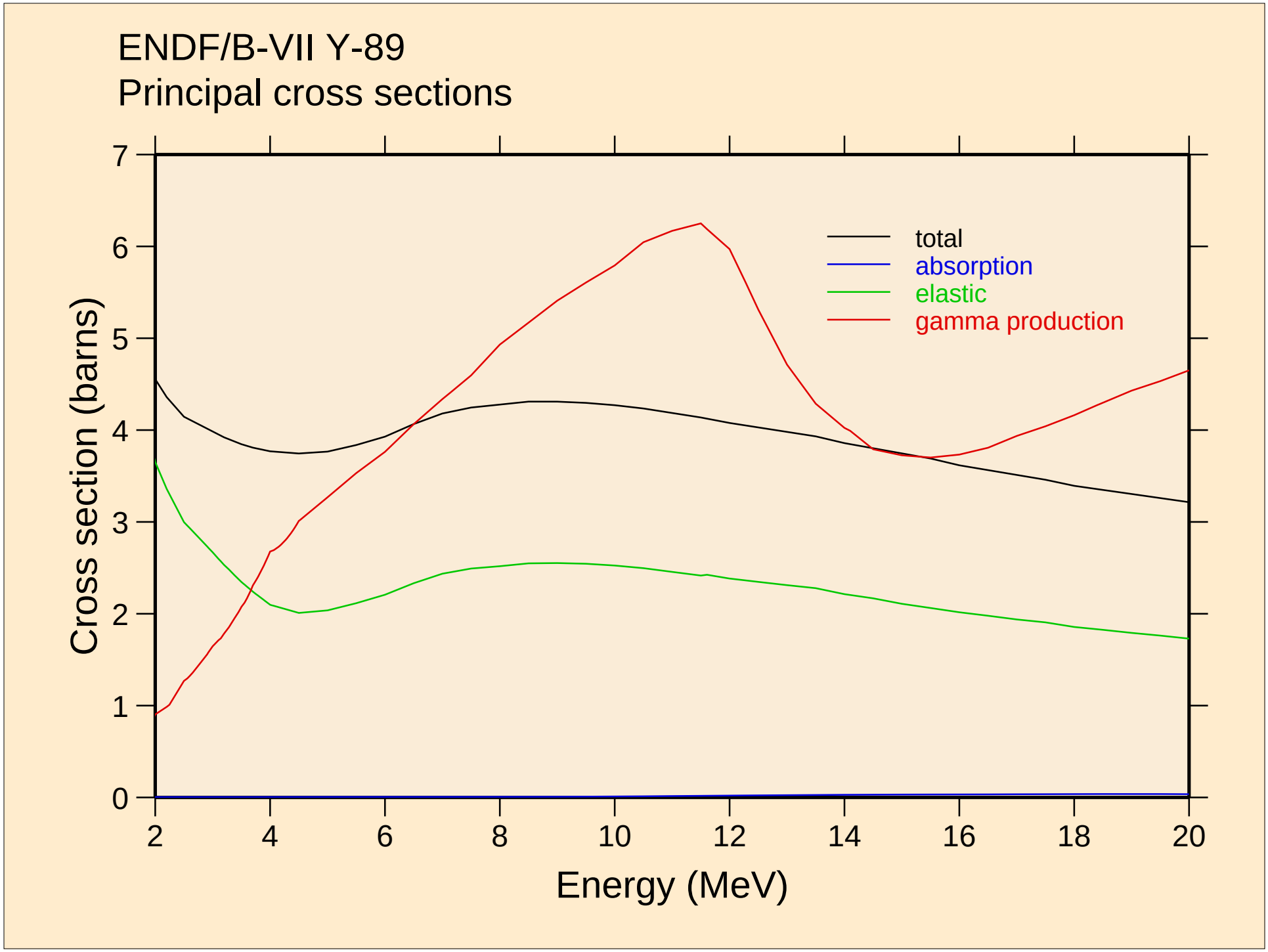
ENDF/B-VII Y-89
resonance absorption cross sections

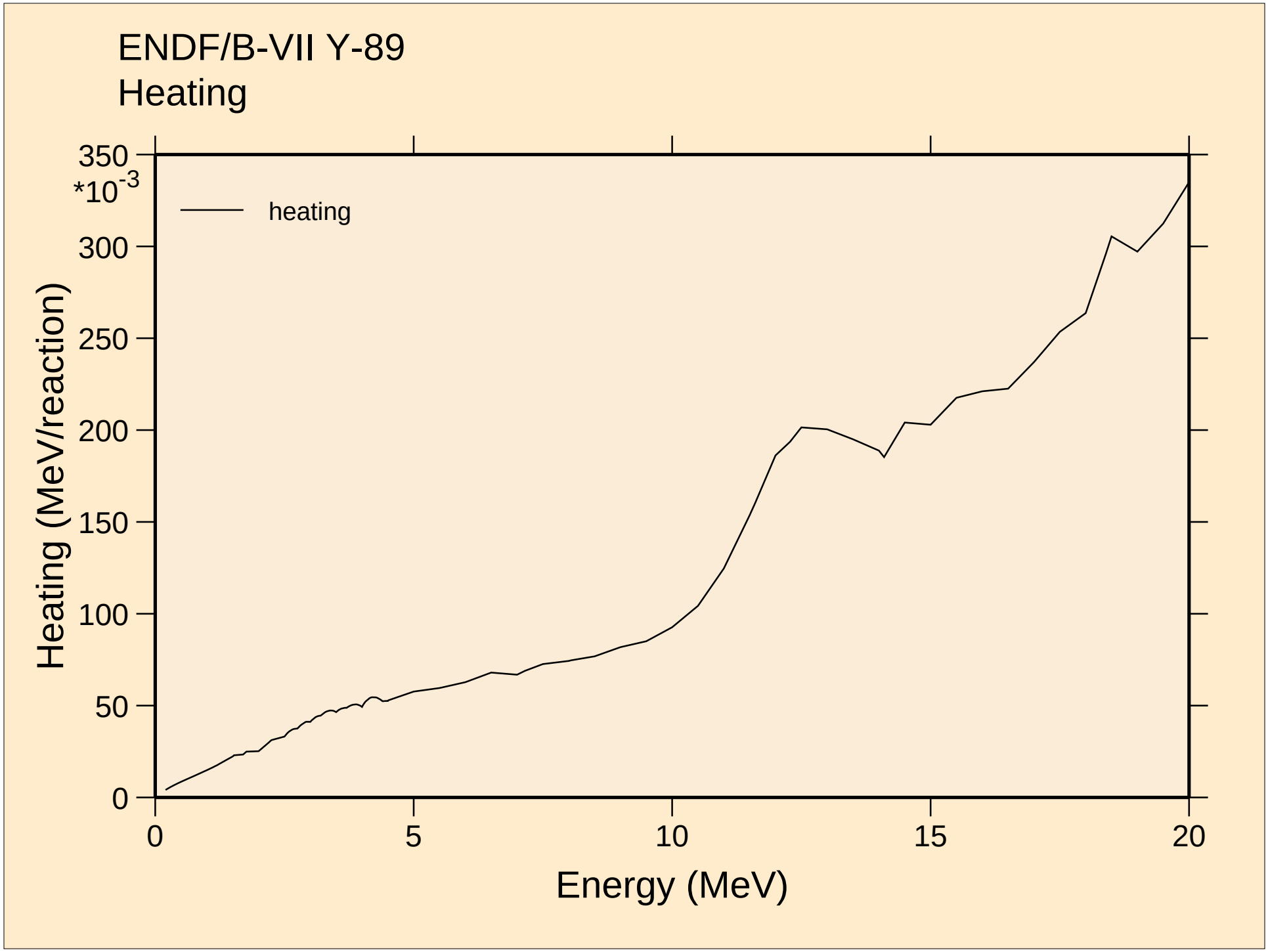


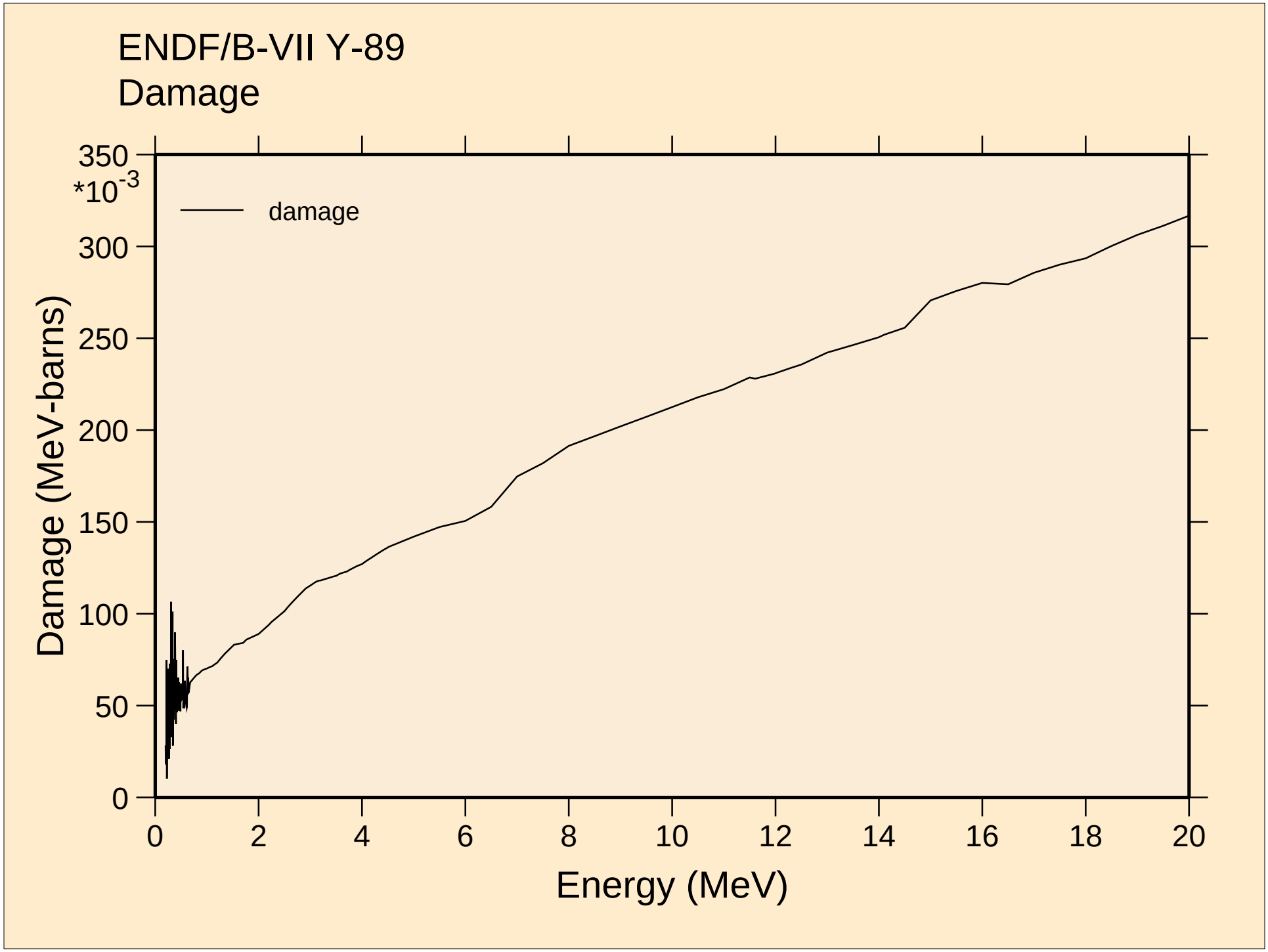

ENDF/B-VII Y-89
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
10^-1
10^-2
10^-3
10^-4
10^-5
10^-6
10^-11
10^-10
10^-9
10^-8
10^-7
10^-6
10^-5
10^-4
10^-3
10^-2
10^-1
10^0
10^1

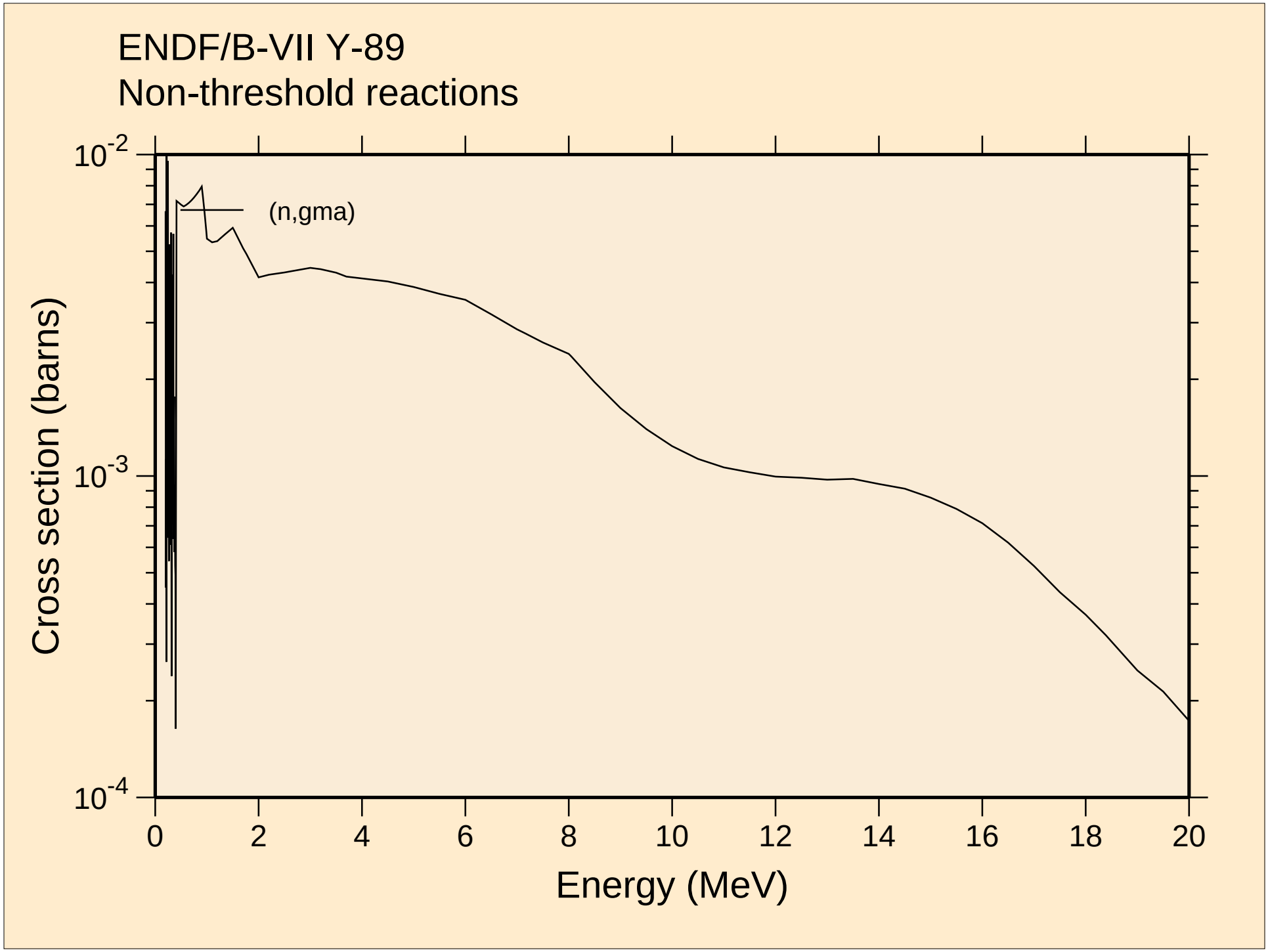

ENDF/B-VII Y-89
Damage
damage
Damage (MeV-barns)
Energy (MeV)
10^-1
10^-2
10^-3
10^-4
10^-5
10^-6
10^-11
10^-10
10^-9
10^-8
10^-7
10^-6
10^-5
10^-4
10^-3
10^-2
10^-1
10^0
10^1

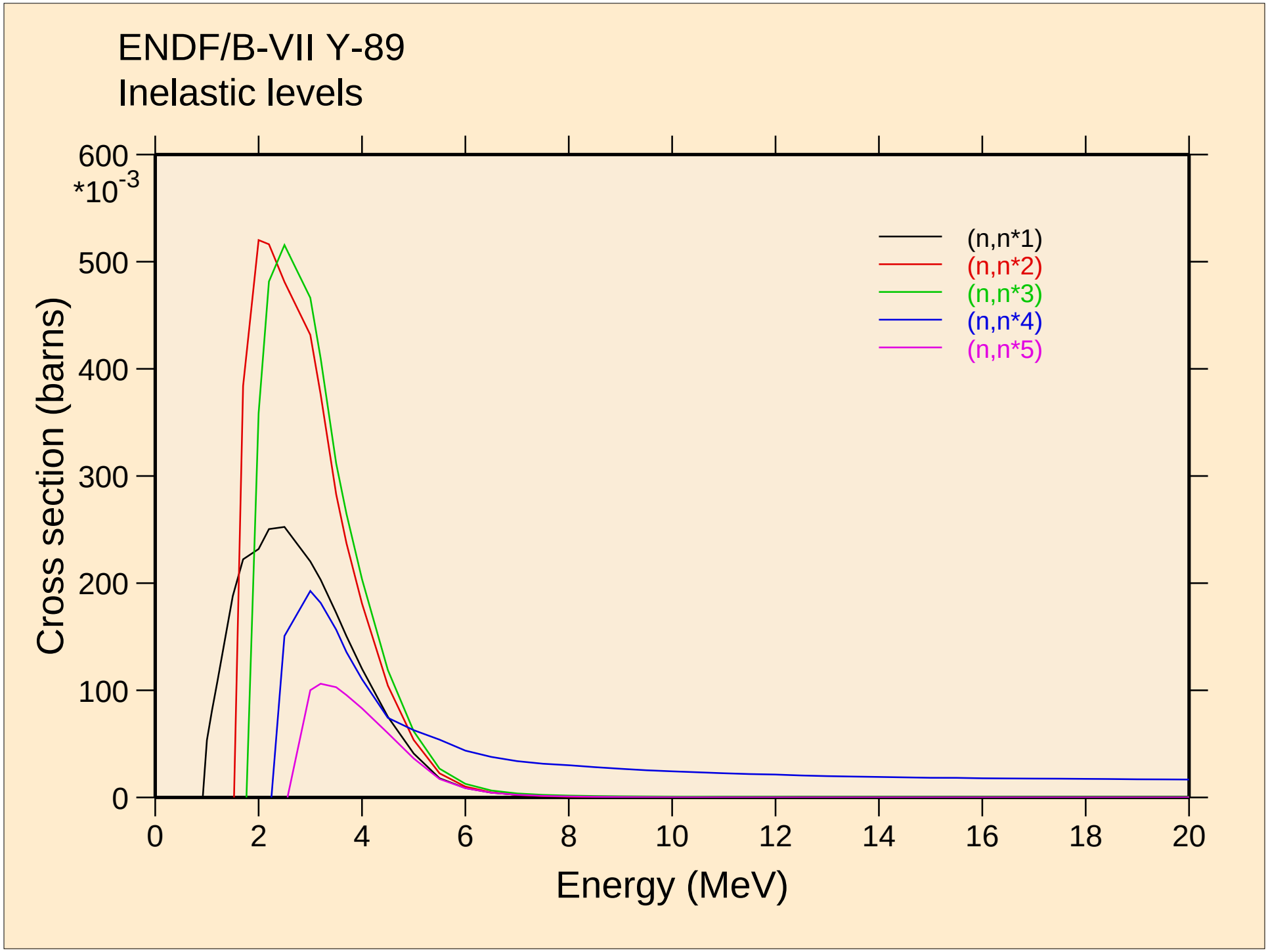

ENDF/B-VII Y-89
Non-threshold reactions
(n,gma)
Cross section (barns)
Energy (MeV)
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^-4
10^-11
10^-10
10^-9
10^-8
10^-7
10^-6
10^-5
10^-4
10^-3
10^-2
10^-1
10^0
10^1

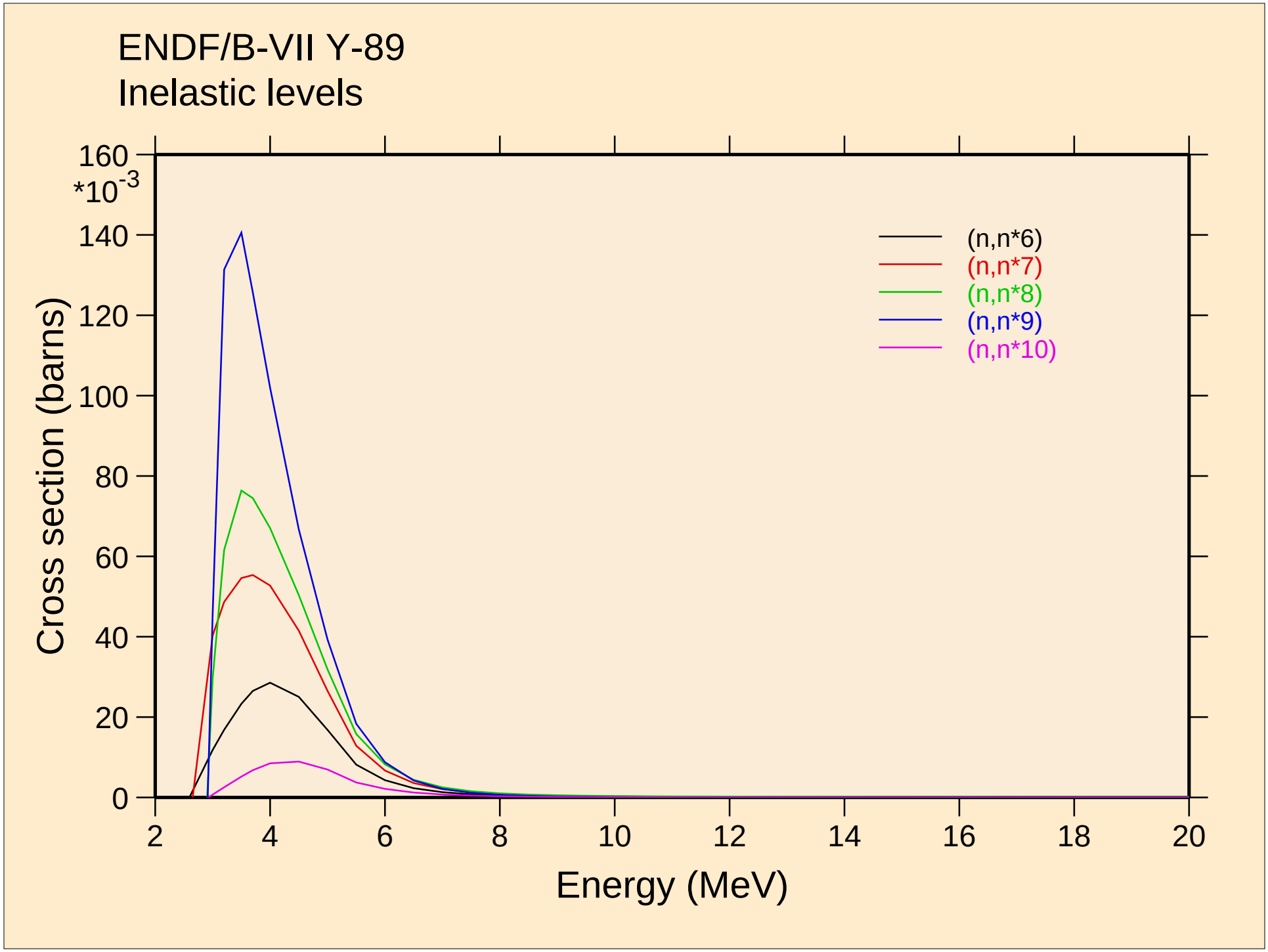

ENDF/B-VII Y-89
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production
0
1
2
3
4
5
6
7
2
4
6
8
10
12
14
16
18
20

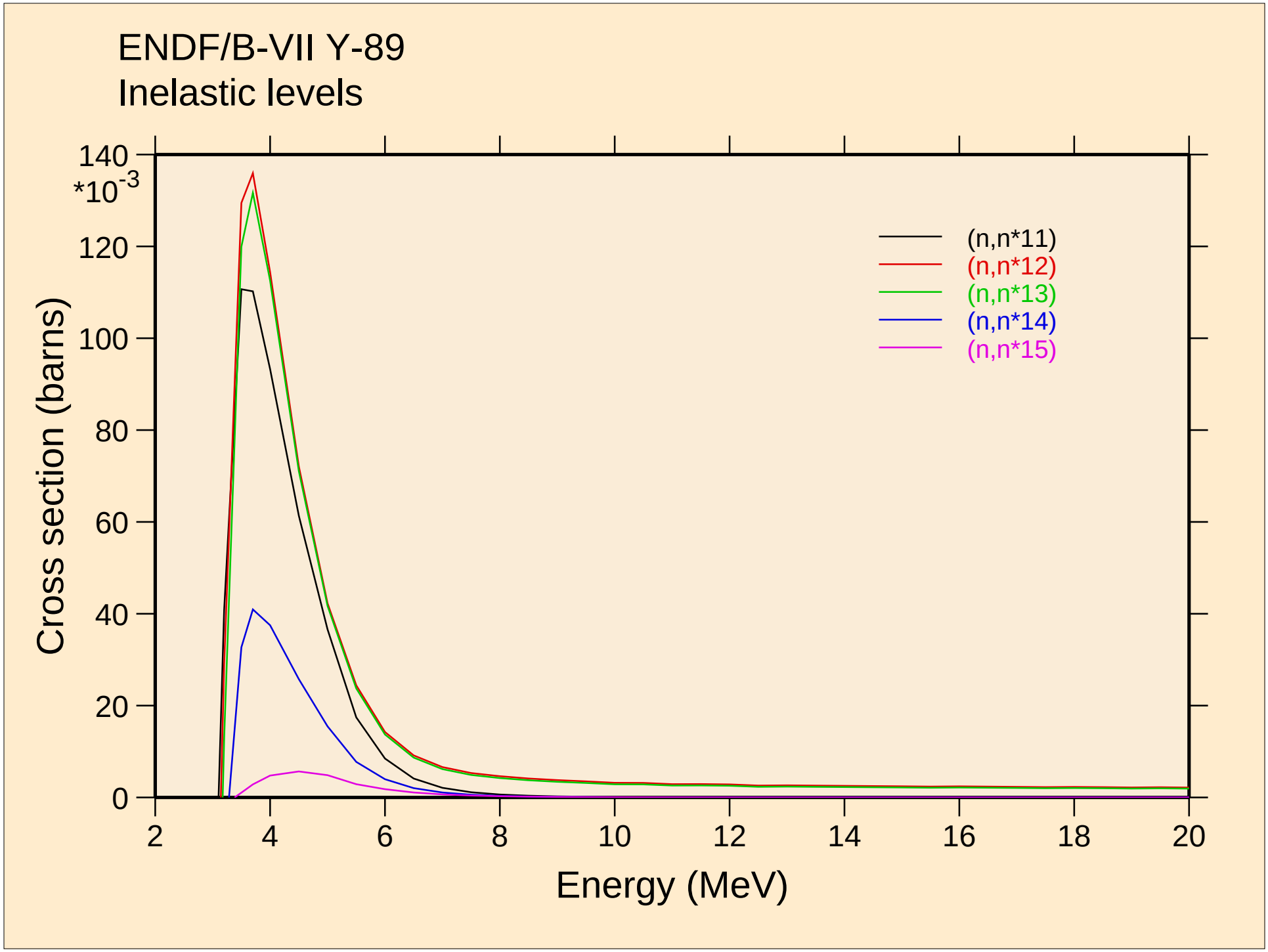

ENDF/B-VII Y-89
Heating
heating
*10-3
350
300
250
200
150
100
50
0
Heating (MeV/reaction)
0
5
10
15
20
Energy (MeV)

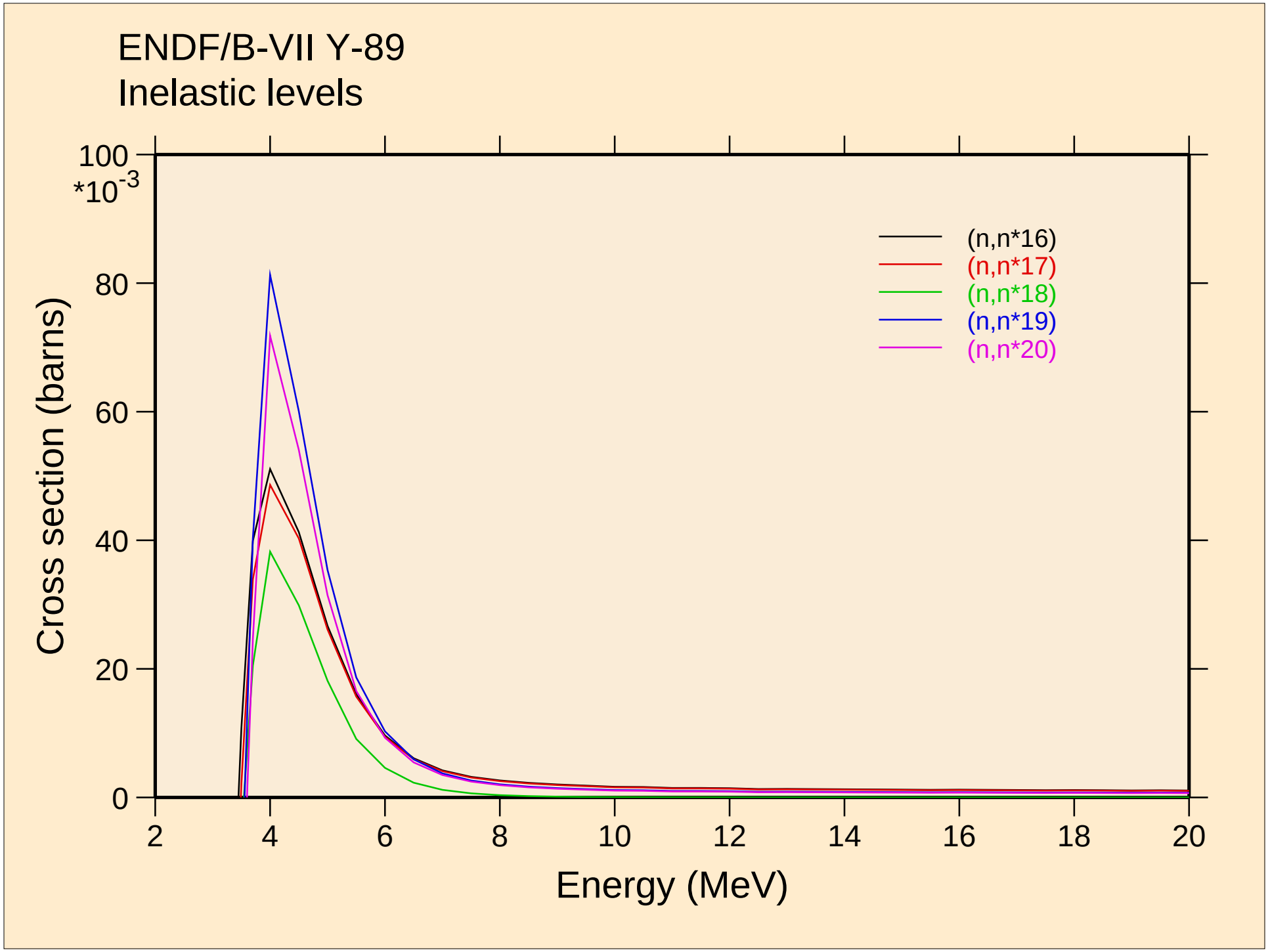

ENDF/B-VII Y-89
Damage
damage
*10-3
350
300
250
200
150
100
50
0
Damage (MeV-barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

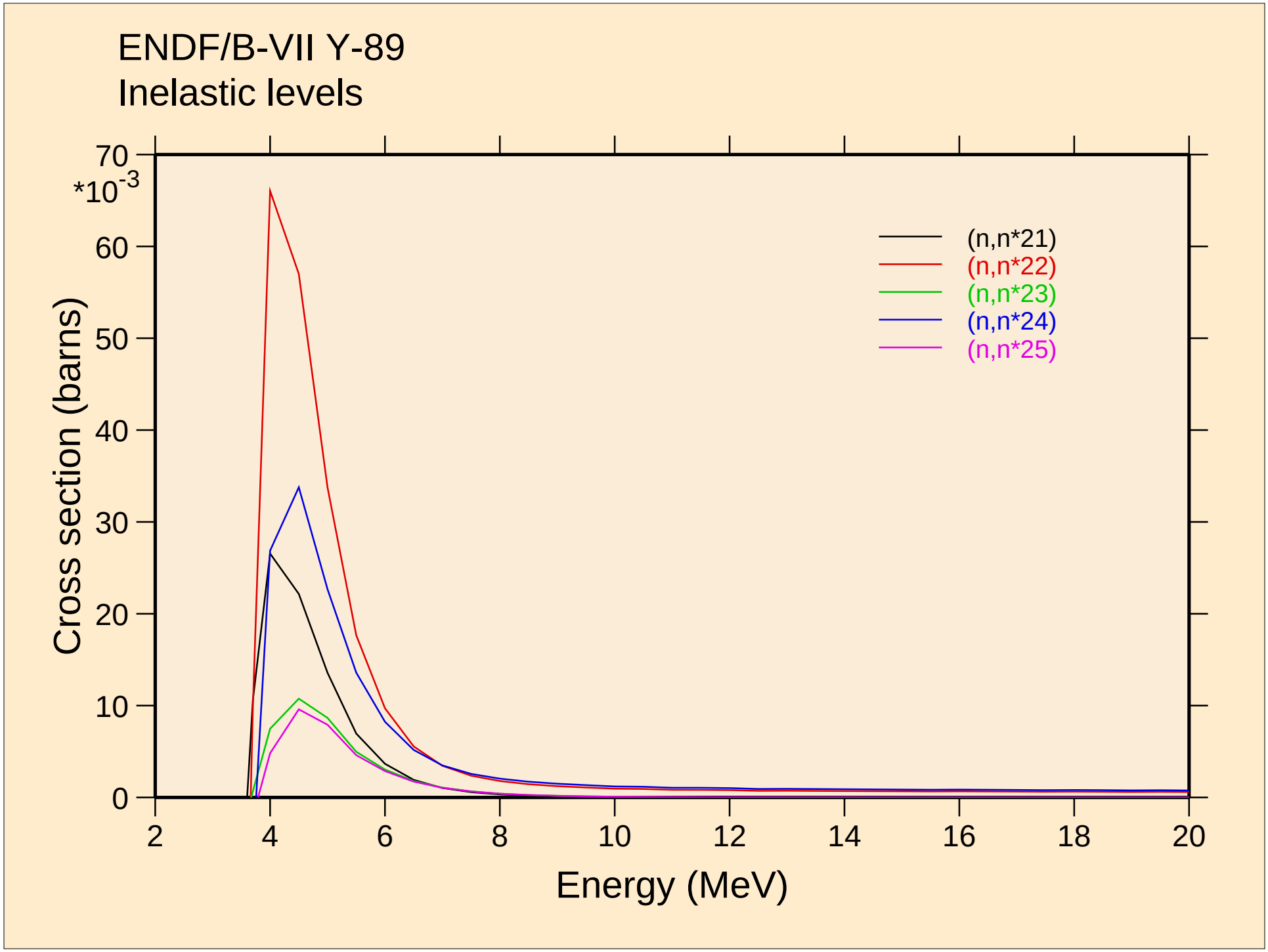

ENDF/B-VII Y-89
Non-threshold reactions
(n,gma)
Cross section (barns)
Energy (MeV)
10-2
10-3
10-4
0
2
4
6
8
10
12
14
16
18
20

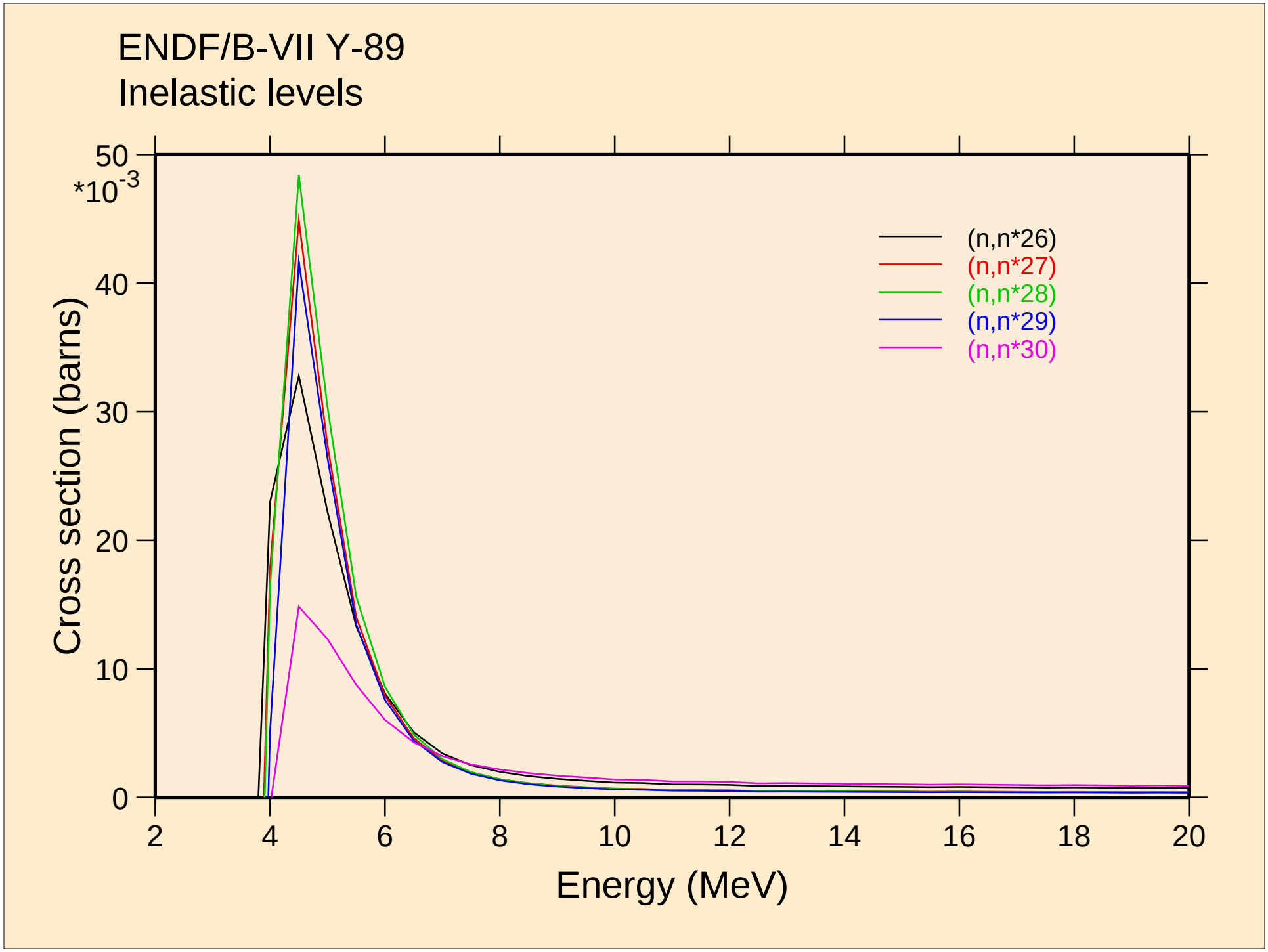

ENDF/B-VII Y-89
Inelastic levels
600
*10-3
500
400
300
200
100
0
Cross section (barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*1)
(n,n*2)
(n,n*3)
(n,n*4)
(n,n*5)

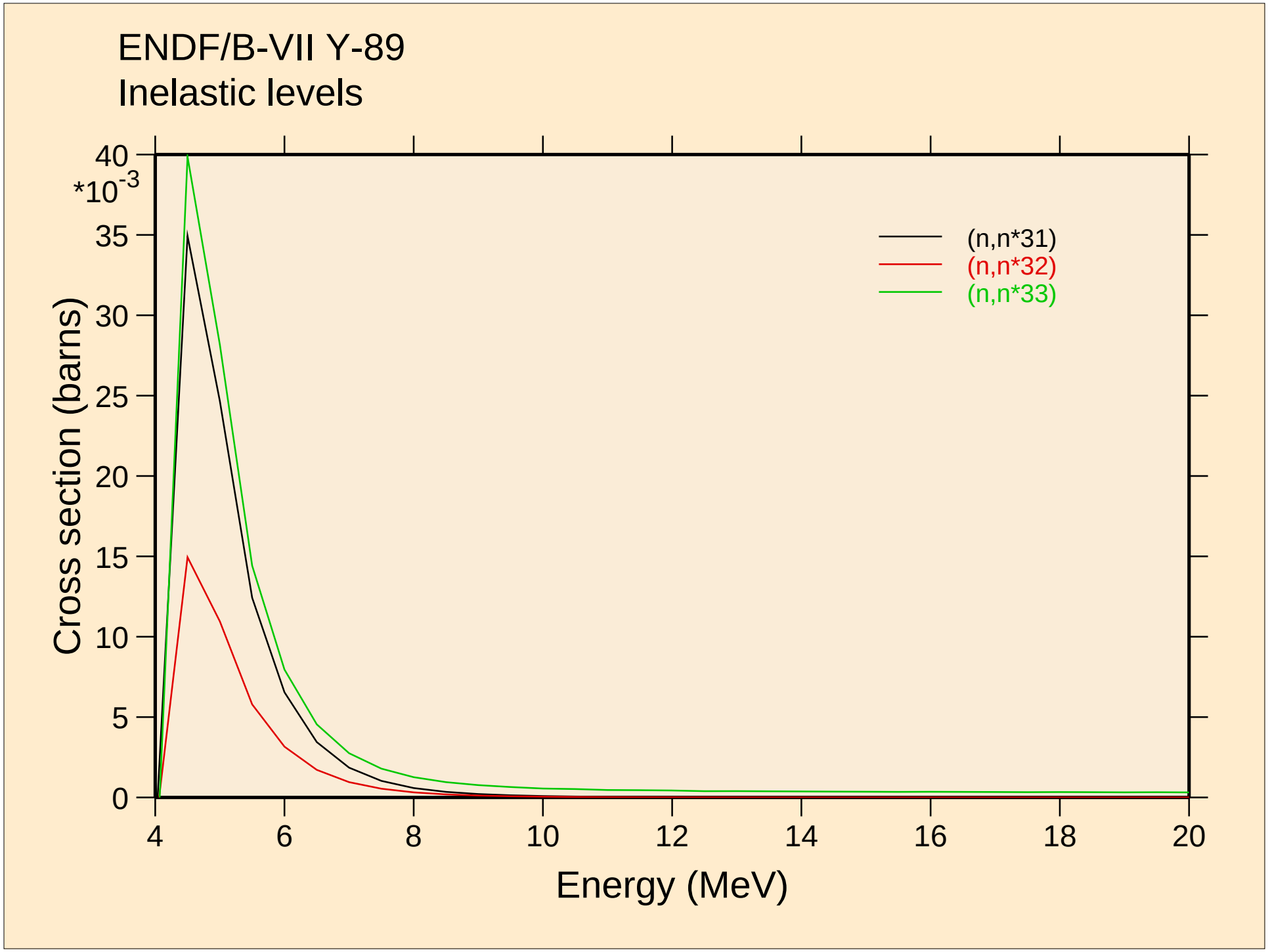

ENDF/B-VII Y-89
Inelastic levels
Cross section (barns)
*10^-3
160
140
120
100
80
60
40
20
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*6)
(n,n*7)
(n,n*8)
(n,n*9)
(n,n*10)

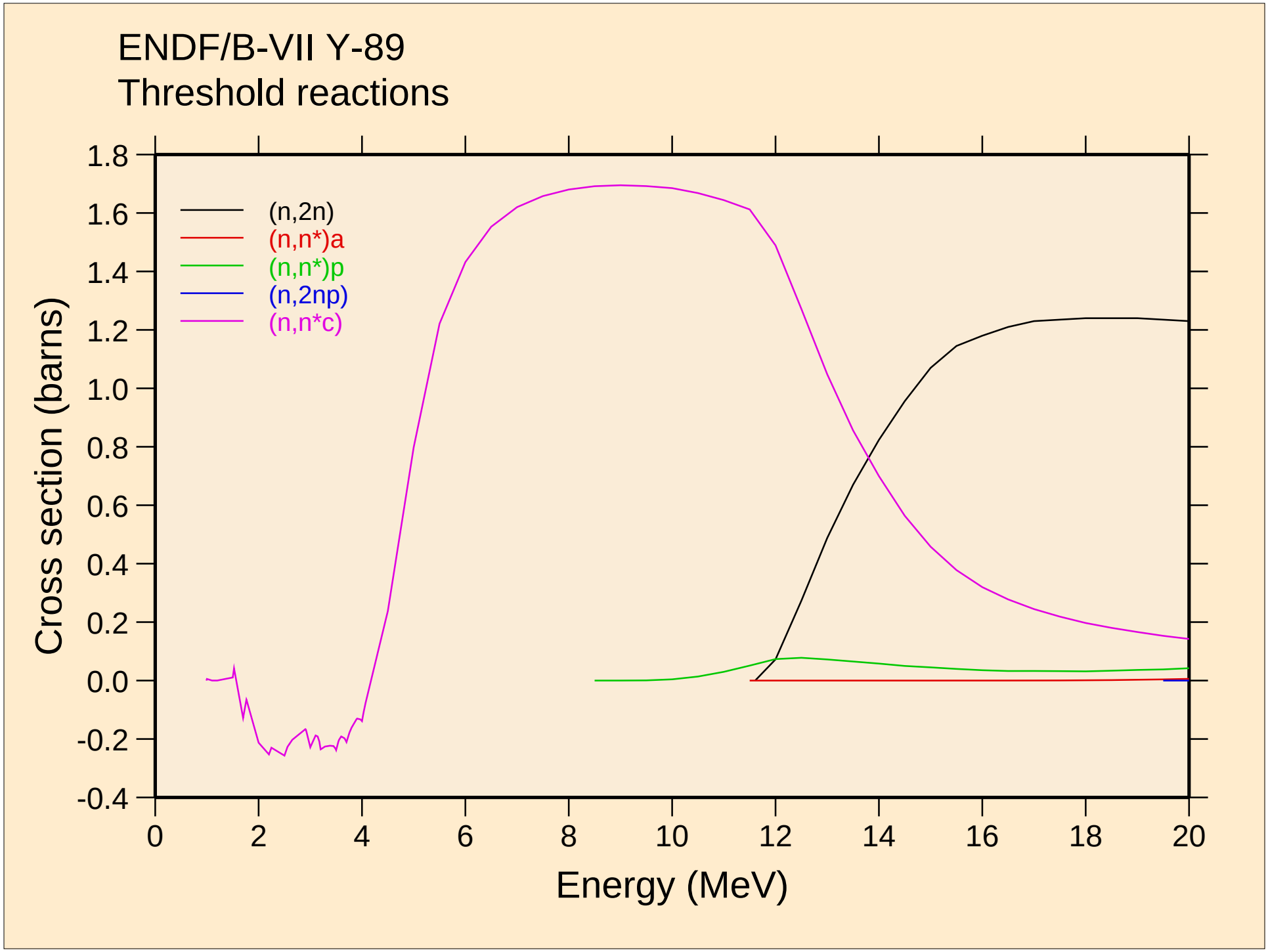

ENDF/B-VII Y-89
Inelastic levels
Cross section (barns)
*10^-3
140
120
100
80
60
40
20
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*11)
(n,n*12)
(n,n*13)
(n,n*14)
(n,n*15)

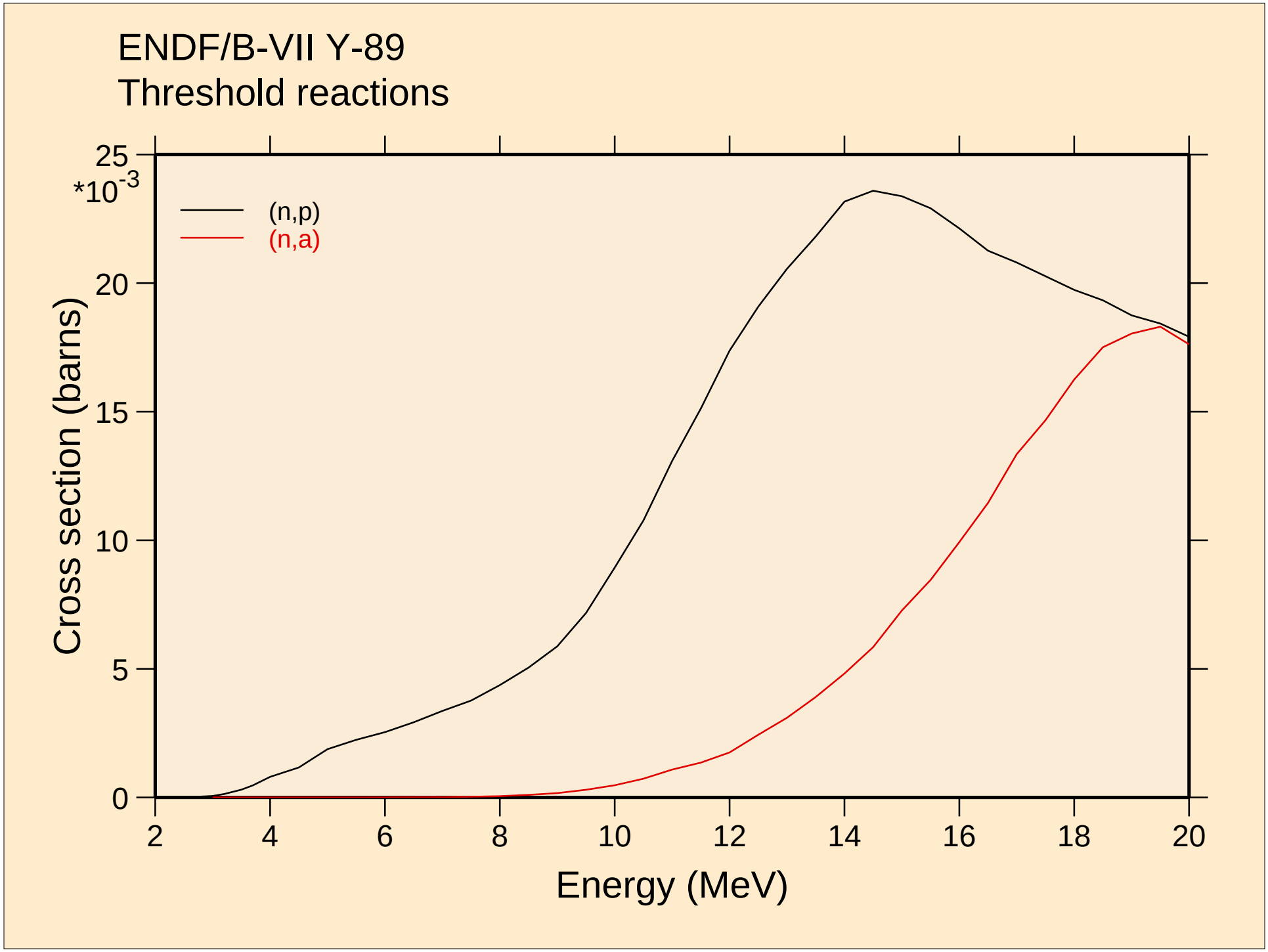

ENDF/B-VII Y-89
Inelastic levels
100
*10-3
80
60
40
20
0
Cross section (barns)
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*16)
(n,n*17)
(n,n*18)
(n,n*19)
(n,n*20)

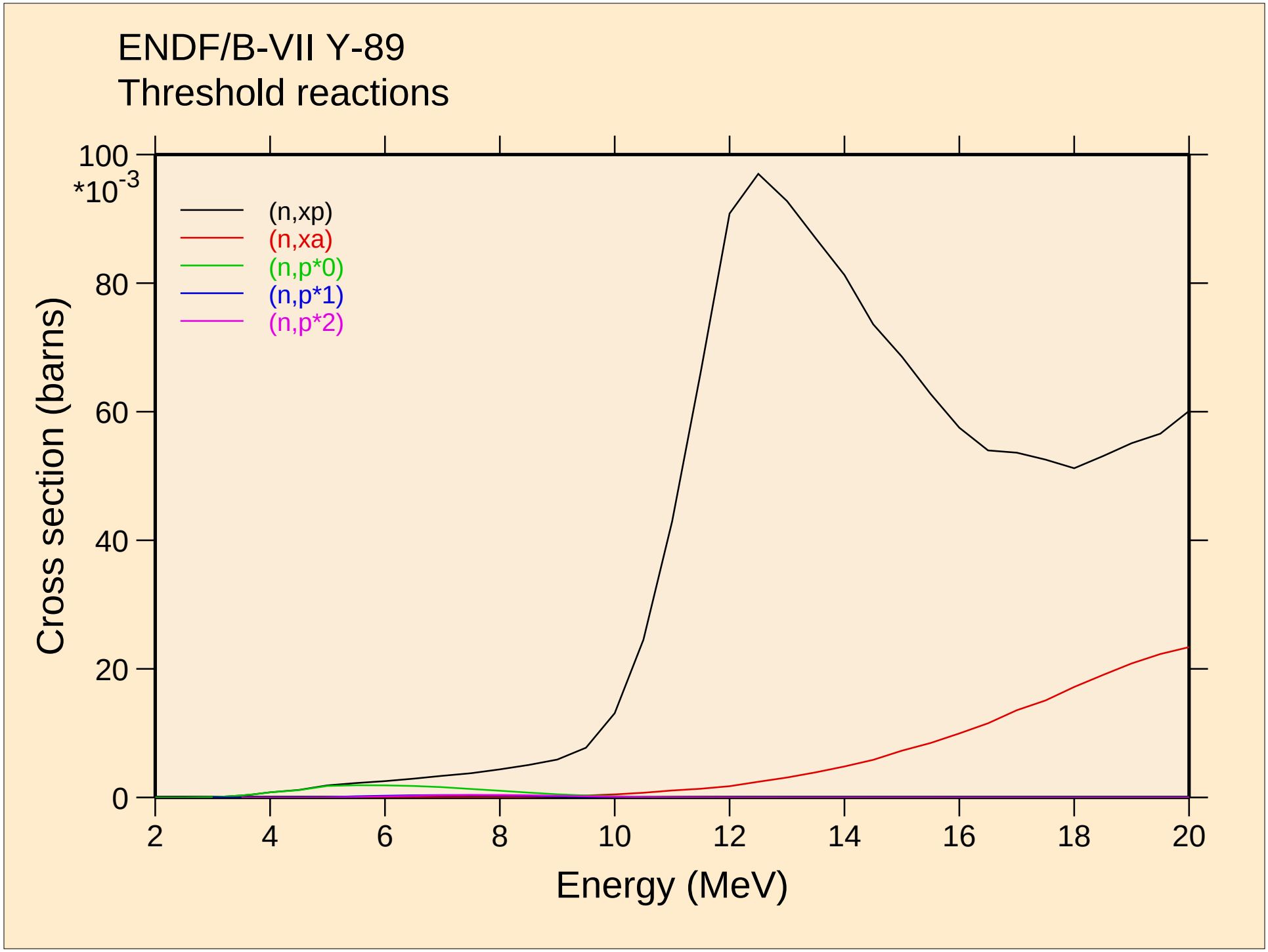

ENDF/B-VII Y-89
Inelastic levels
Cross section (barns)
*10^-3
70
60
50
40
30
20
10
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*21)
(n,n*22)
(n,n*23)
(n,n*24)
(n,n*25)

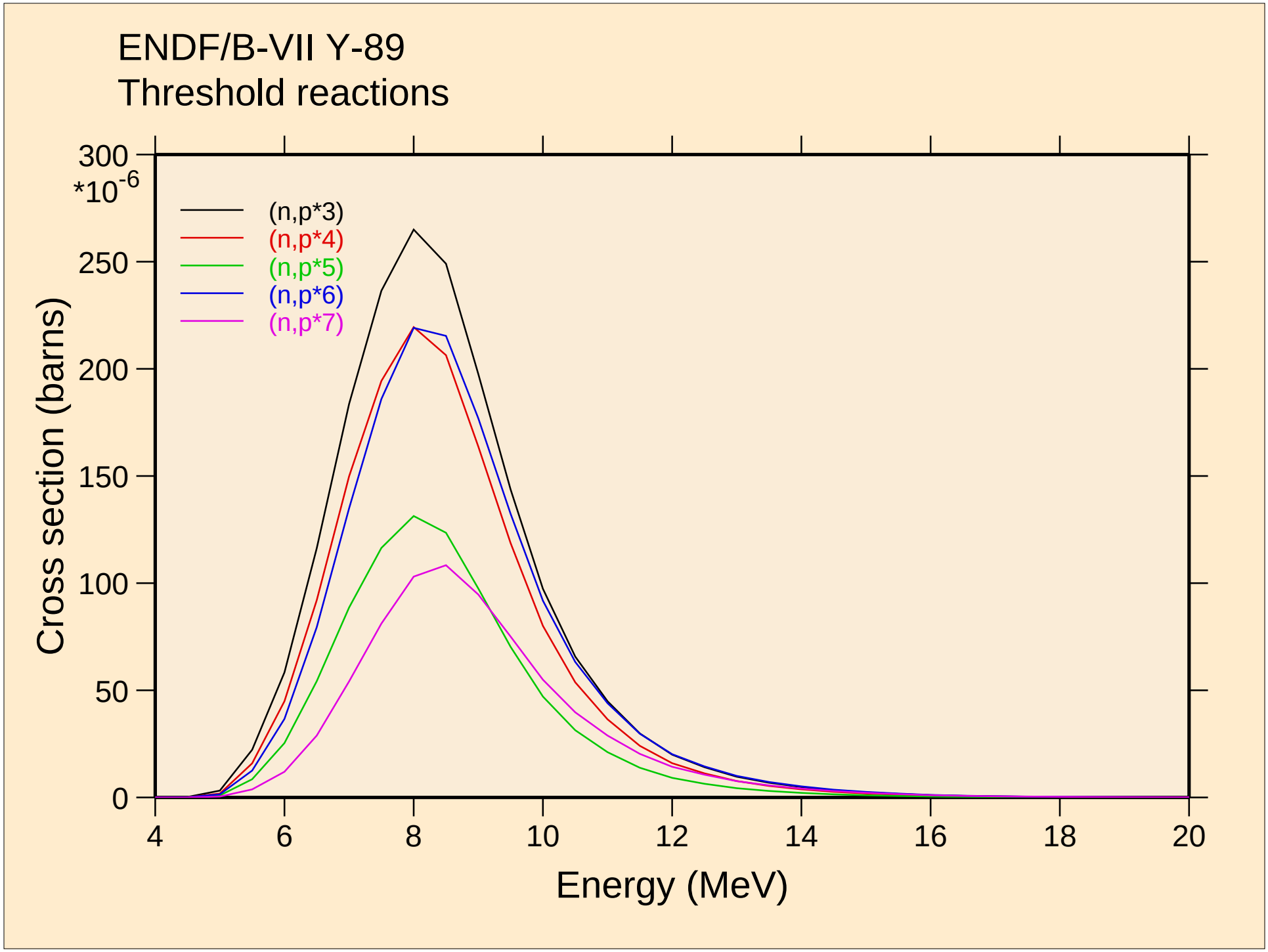

ENDF/B-VII Y-89
Inelastic levels
Cross section (barns)
*10^-3
50
40
30
20
10
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*26)
(n,n*27)
(n,n*28)
(n,n*29)
(n,n*30)

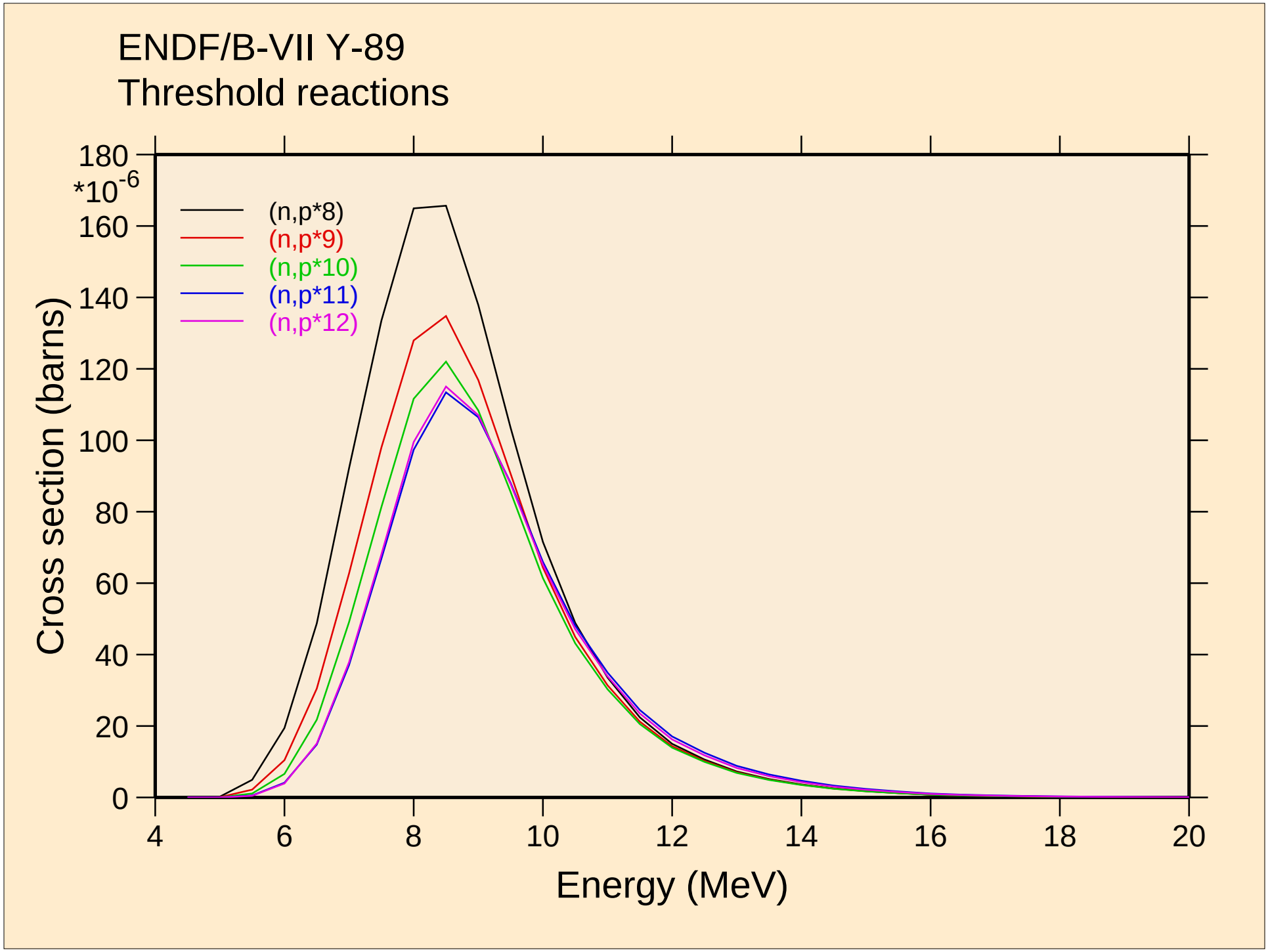

ENDF/B-VII Y-89
Inelastic levels
Cross section (barns)
*10^-3
40
35
30
25
20
15
10
5
0
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*31)
(n,n*32)
(n,n*33)

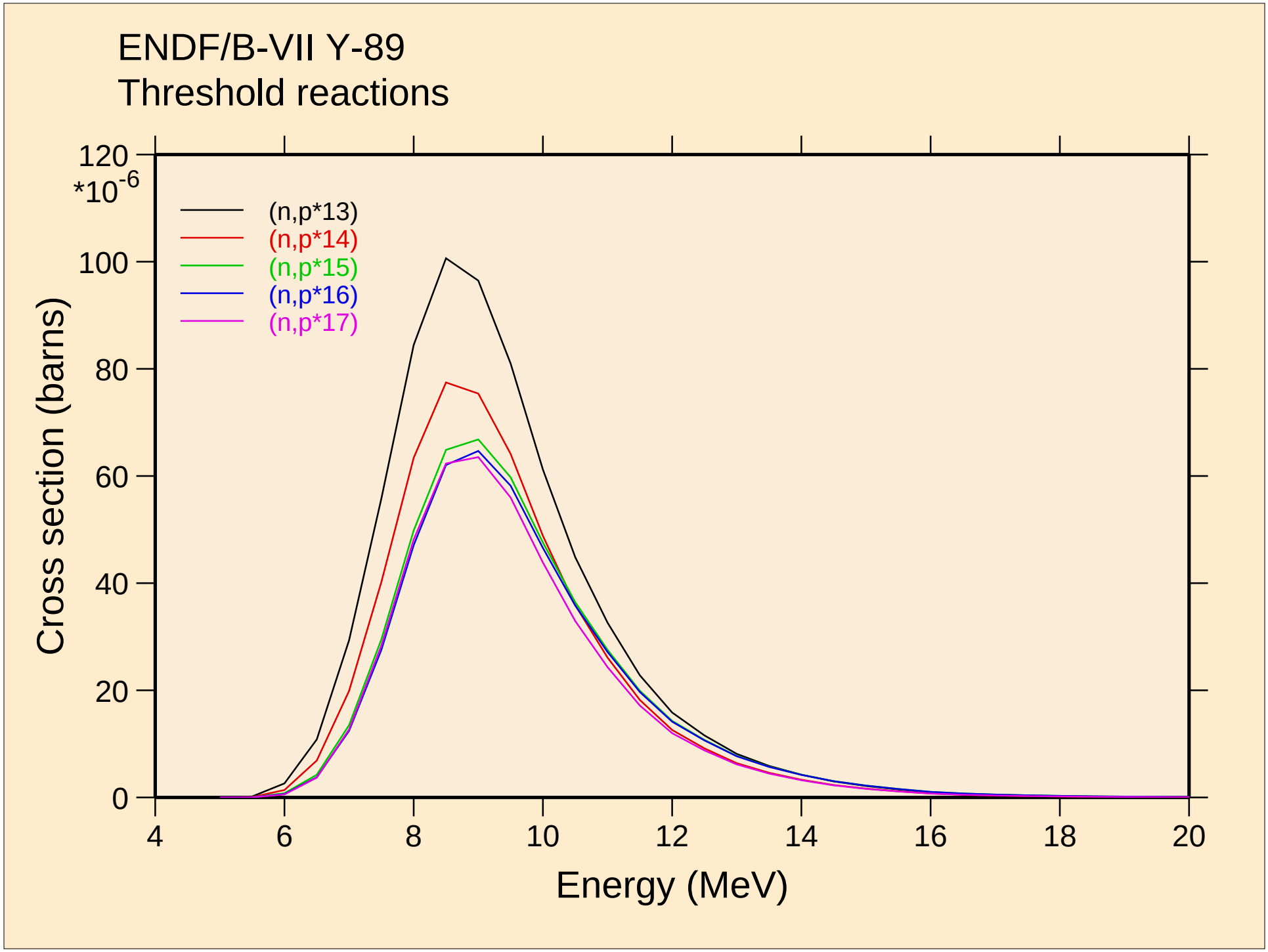

ENDF/B-VII Y-89
Threshold reactions
(n,2n)
(n,n*)a
(n,n*)p
(n,2np)
(n,n*c)
Cross section (barns)
Energy (MeV)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
0
2
4
6
8
10
12
14
16
18
20

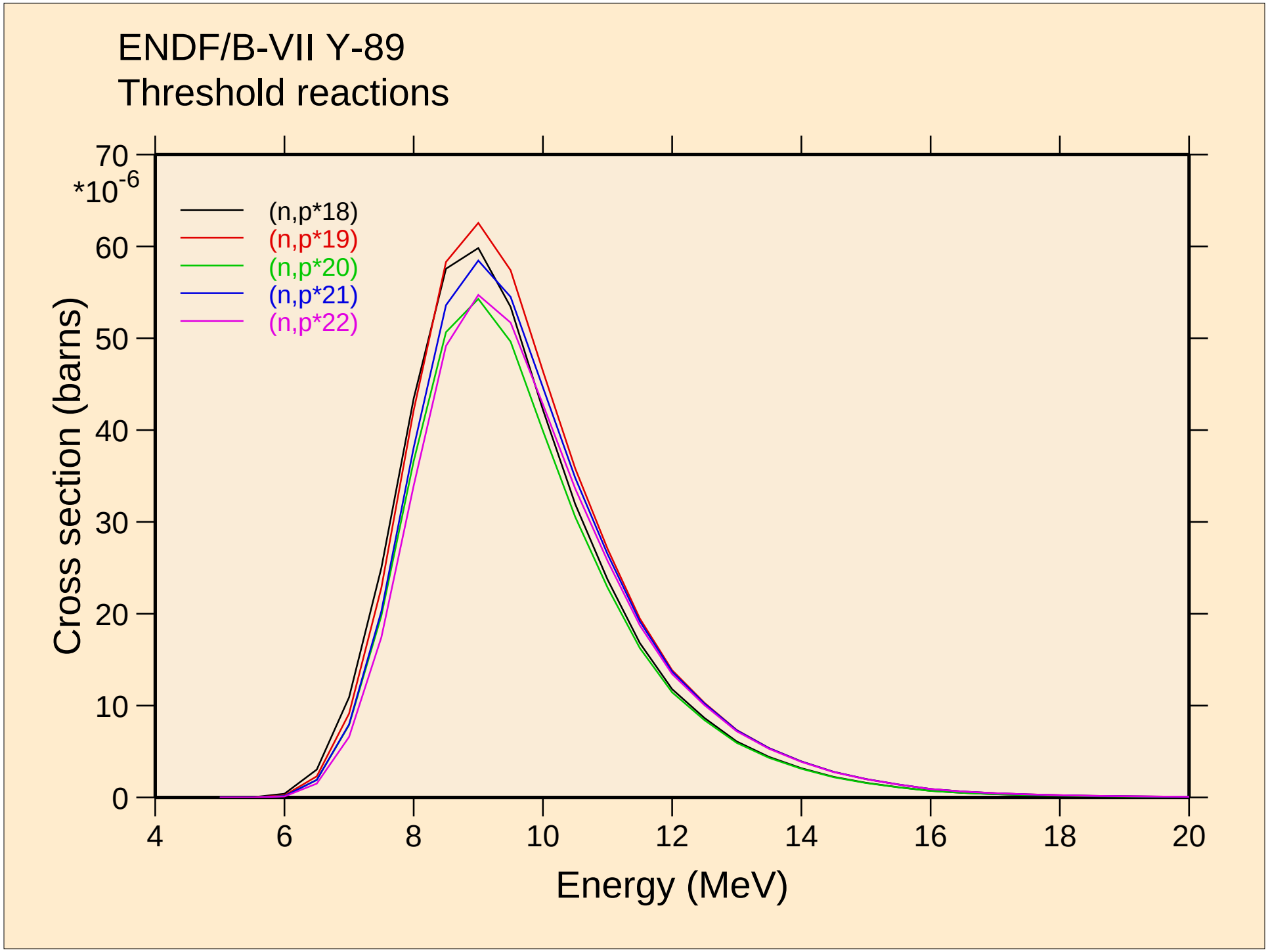

ENDF/B-VII Y-89
Threshold reactions
(n,p)
(n,a)
*10^-3
Cross section (barns)
Energy (MeV)
0
5
10
15
20
25
2
4
6
8
10
12
14
16
18
20

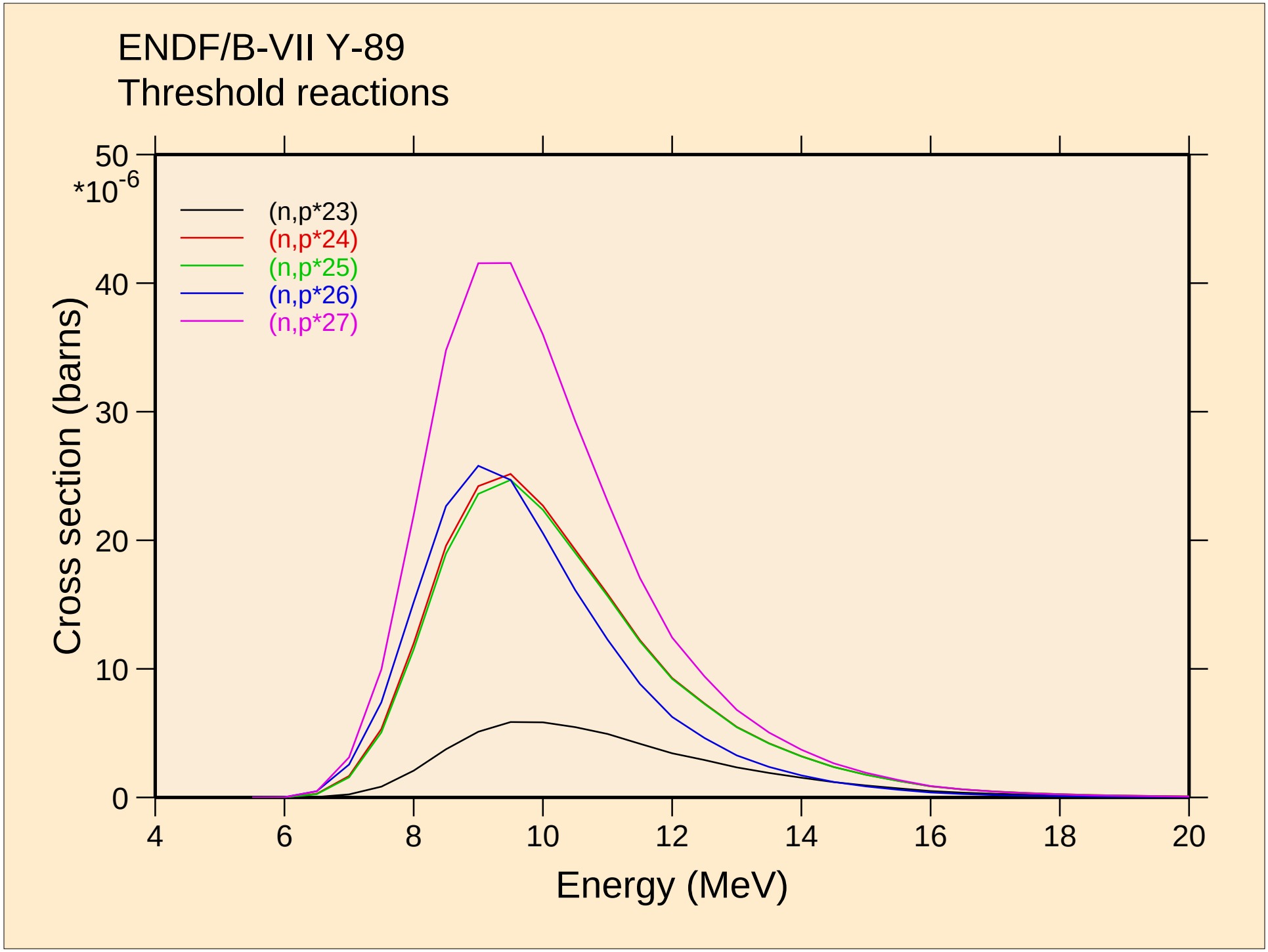

ENDF/B-VII Y-89
Threshold reactions
100
*10-3
80
60
40
20
0
Cross section (barns)
(n,xp)
(n,xa)
(n,p*0)
(n,p*1)
(n,p*2)
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

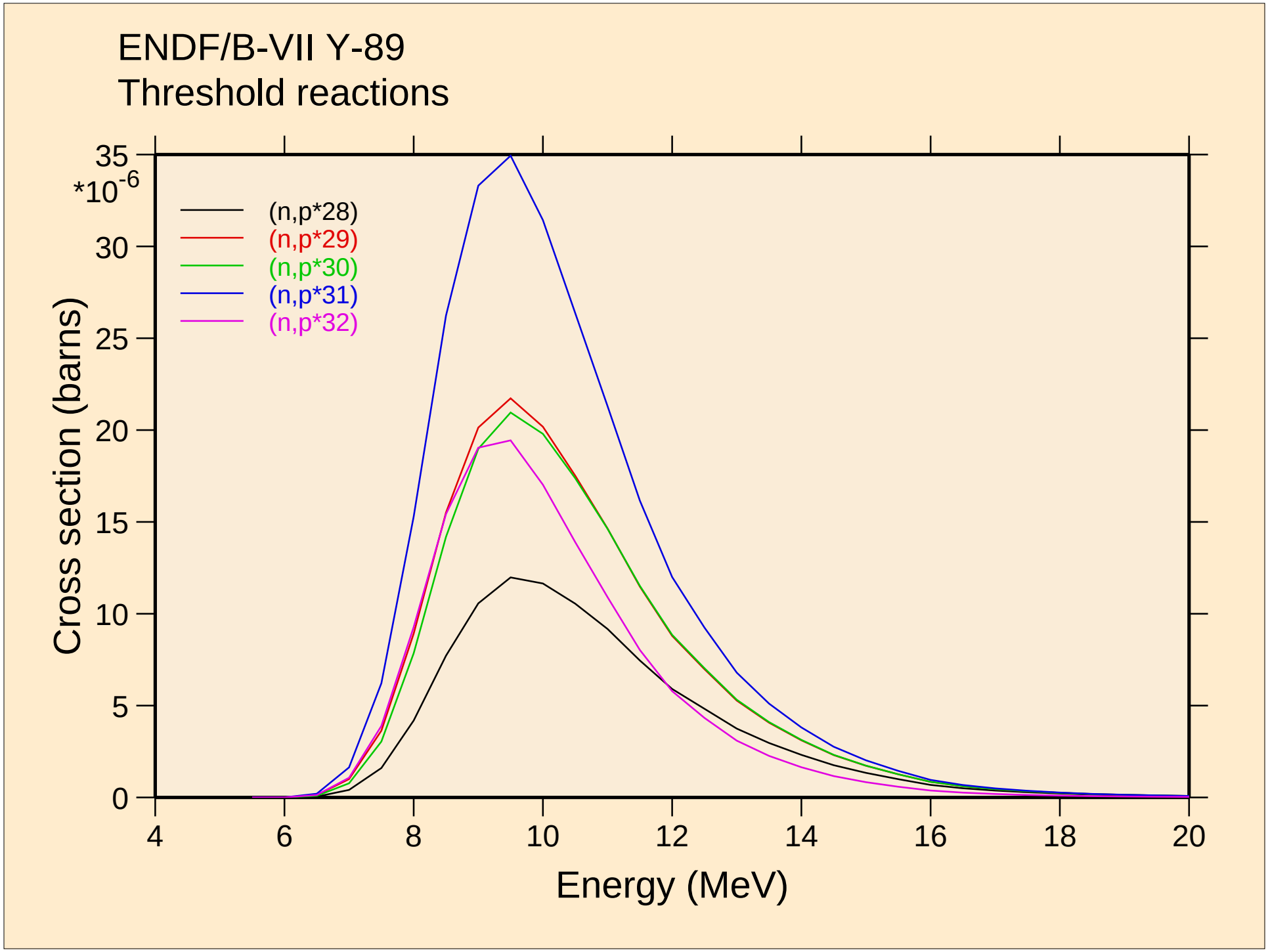

ENDF/B-VII Y-89
Threshold reactions
(n,p*3)
(n,p*4)
(n,p*5)
(n,p*6)
(n,p*7)
Cross section (barns)
*10-6
300
250
200
150
100
50
0
4
6
8
10
12
14
16
18
20
Energy (MeV)

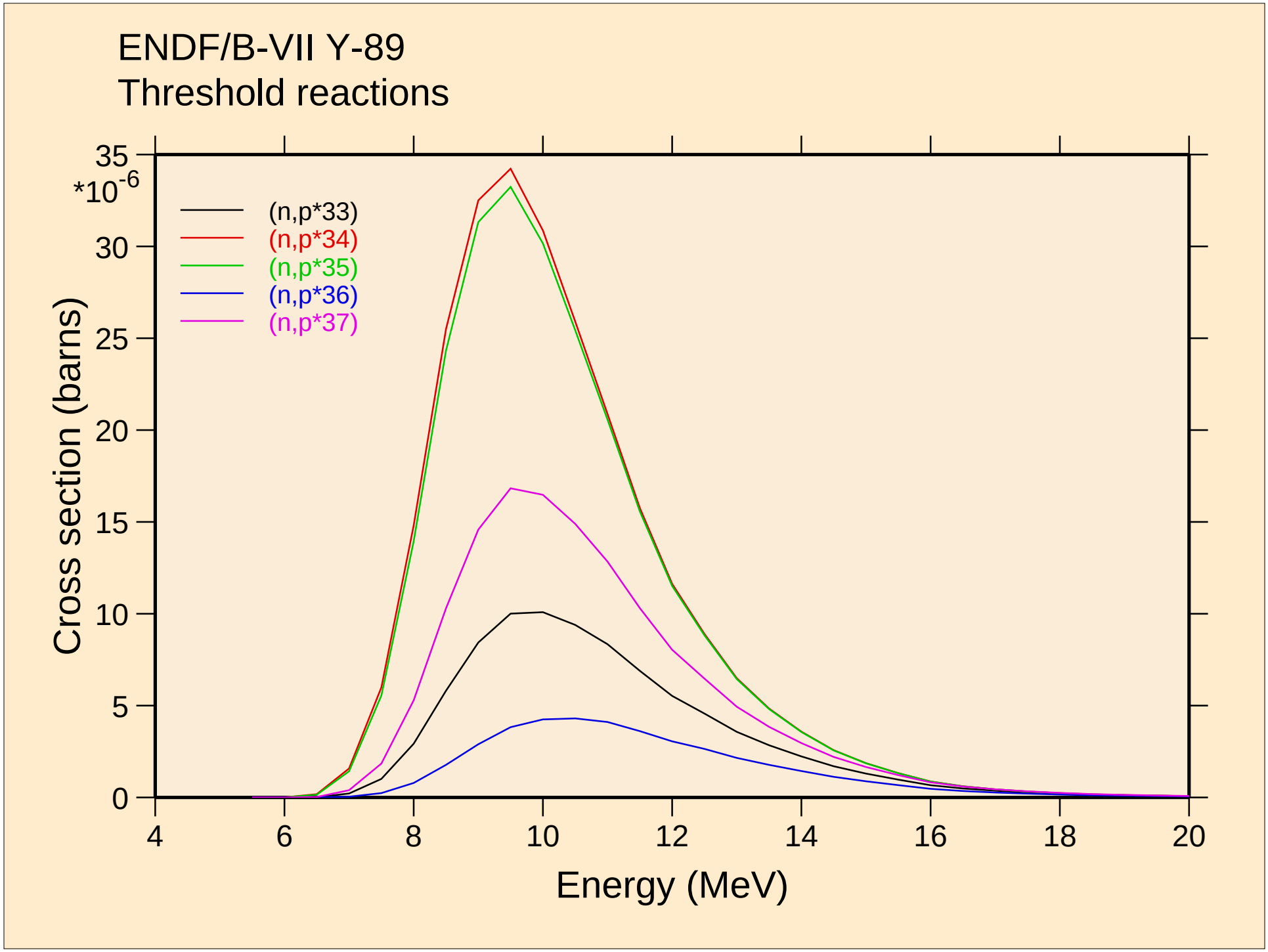

ENDF/B-VII Y-89
Threshold reactions
*10^-6
(n,p*8)
(n,p*9)
(n,p*10)
(n,p*11)
(n,p*12)
Cross section (barns)
Energy (MeV)
0
20
40
60
80
100
120
140
160
180
4
6
8
10
12
14
16
18
20

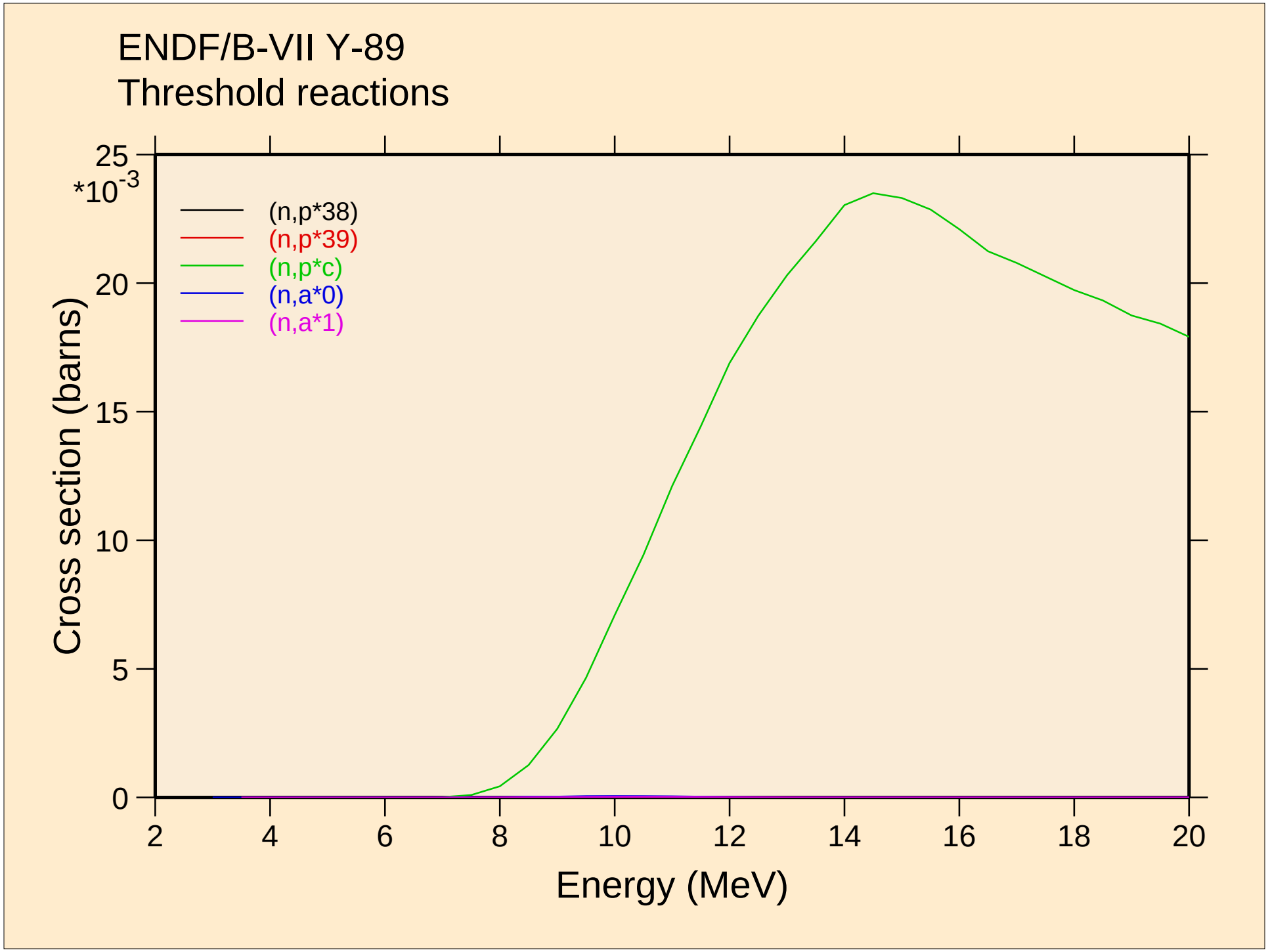

ENDF/B-VII Y-89
Threshold reactions
*10^-6
(n,p*13)
(n,p*14)
(n,p*15)
(n,p*16)
(n,p*17)
Cross section (barns)
Energy (MeV)
0
20
40
60
80
100
120
4
6
8
10
12
14
16
18
20

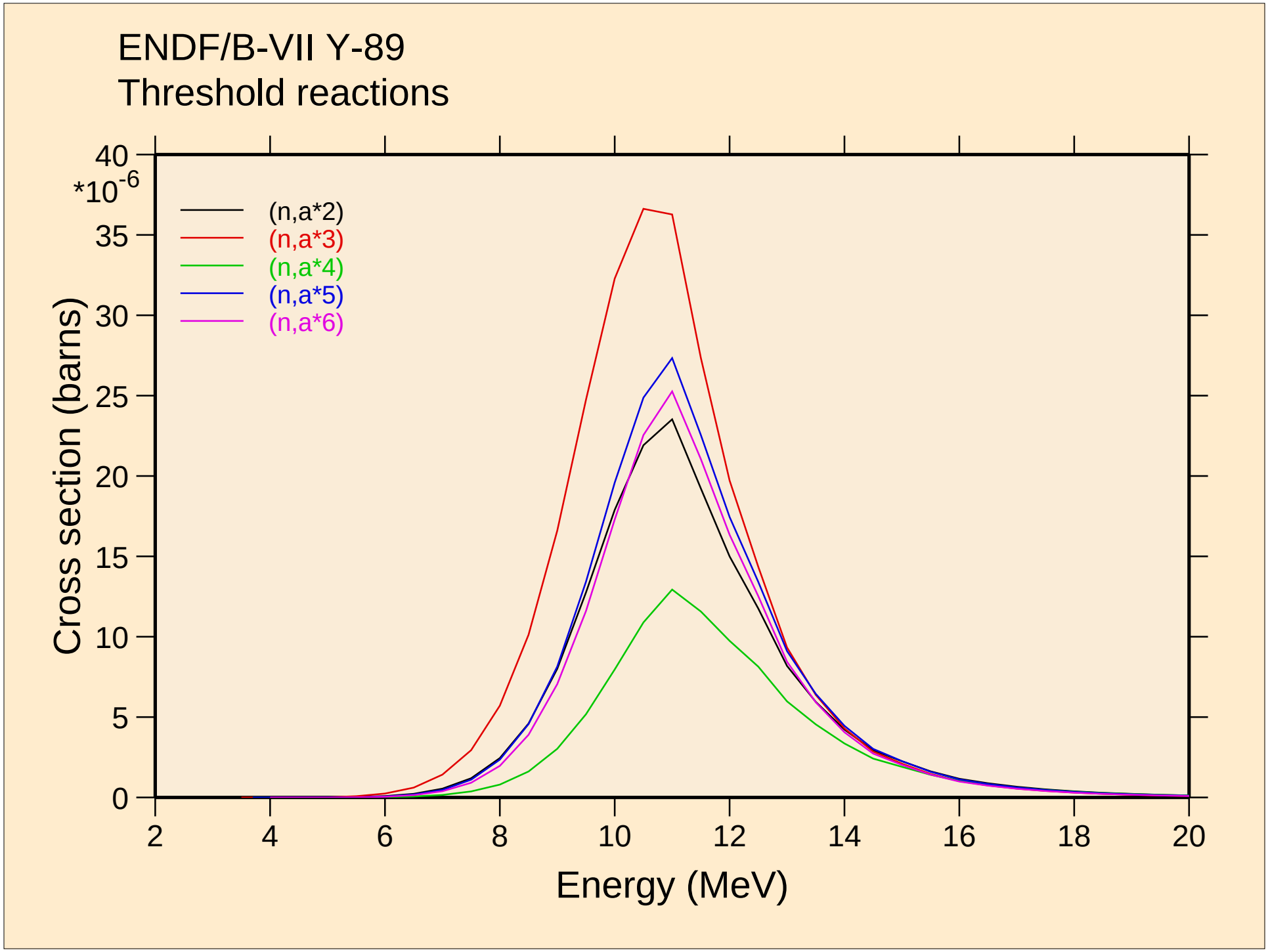

ENDF/B-VII Y-89
Threshold reactions
*10-6
(n,p*18)
(n,p*19)
(n,p*20)
(n,p*21)
(n,p*22)
Cross section (barns)
Energy (MeV)
0
10
20
30
40
50
60
70
4
6
8
10
12
14
16
18
20

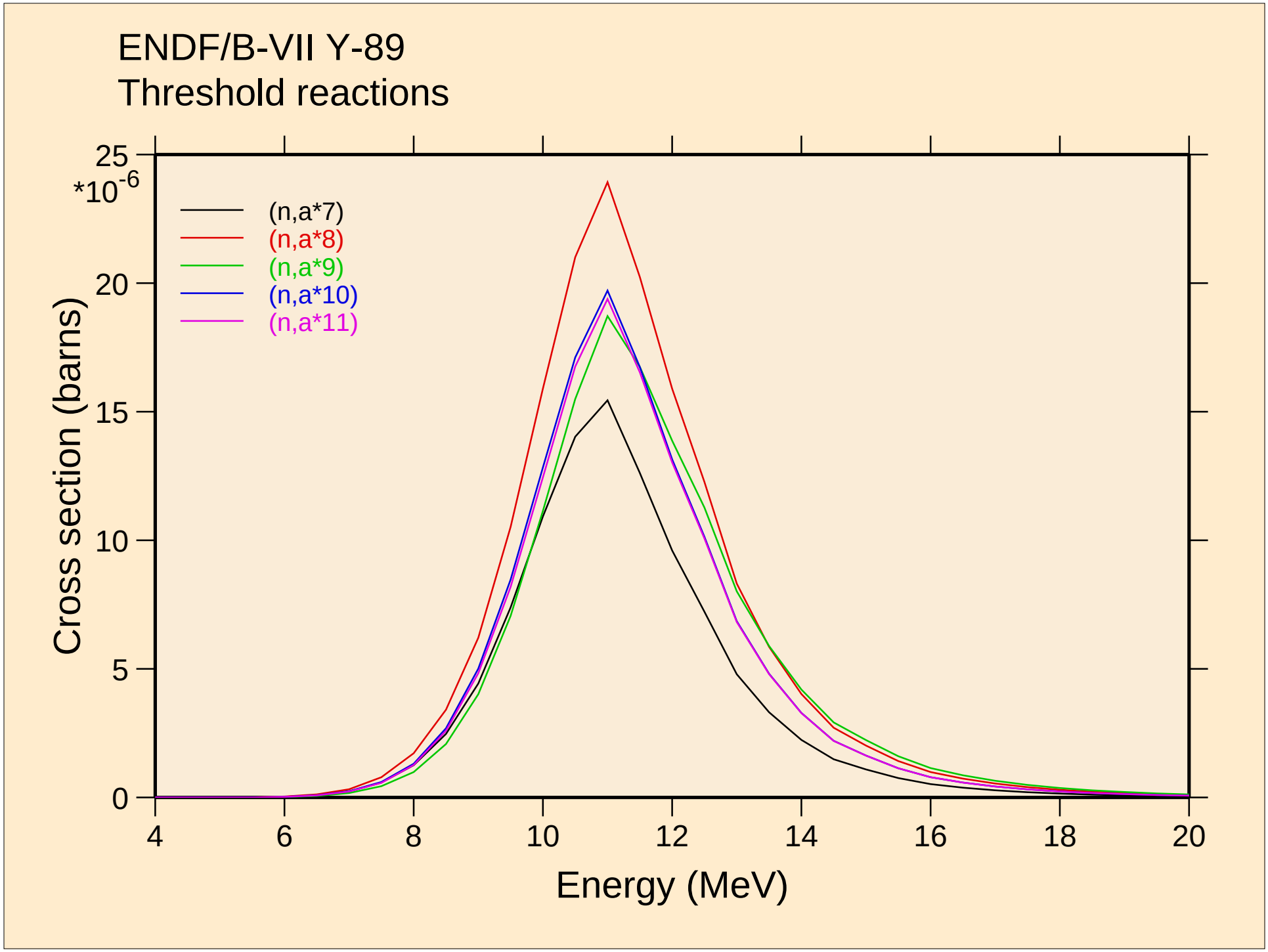

ENDF/B-VII Y-89
Threshold reactions
*10^-6
(n,p*23)
(n,p*24)
(n,p*25)
(n,p*26)
(n,p*27)
Cross section (barns)
Energy (MeV)
0
10
20
30
40
50
4
6
8
10
12
14
16
18
20

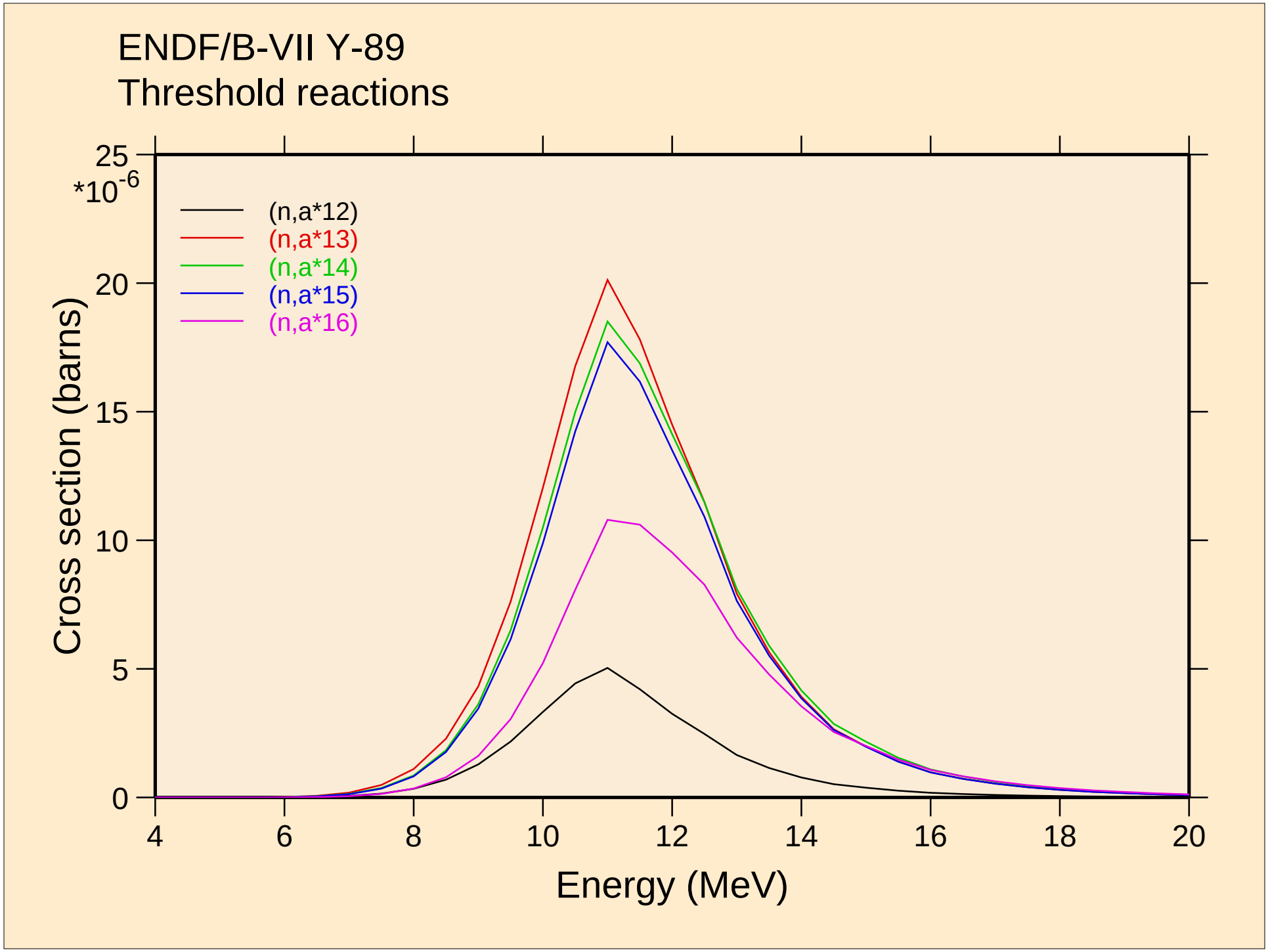

ENDF/B-VII Y-89
Threshold reactions
*10^-6
(n,p*28)
(n,p*29)
(n,p*30)
(n,p*31)
(n,p*32)
Cross section (barns)
Energy (MeV)
0
5
10
15
20
25
30
35
4
6
8
10
12
14
16
18
20

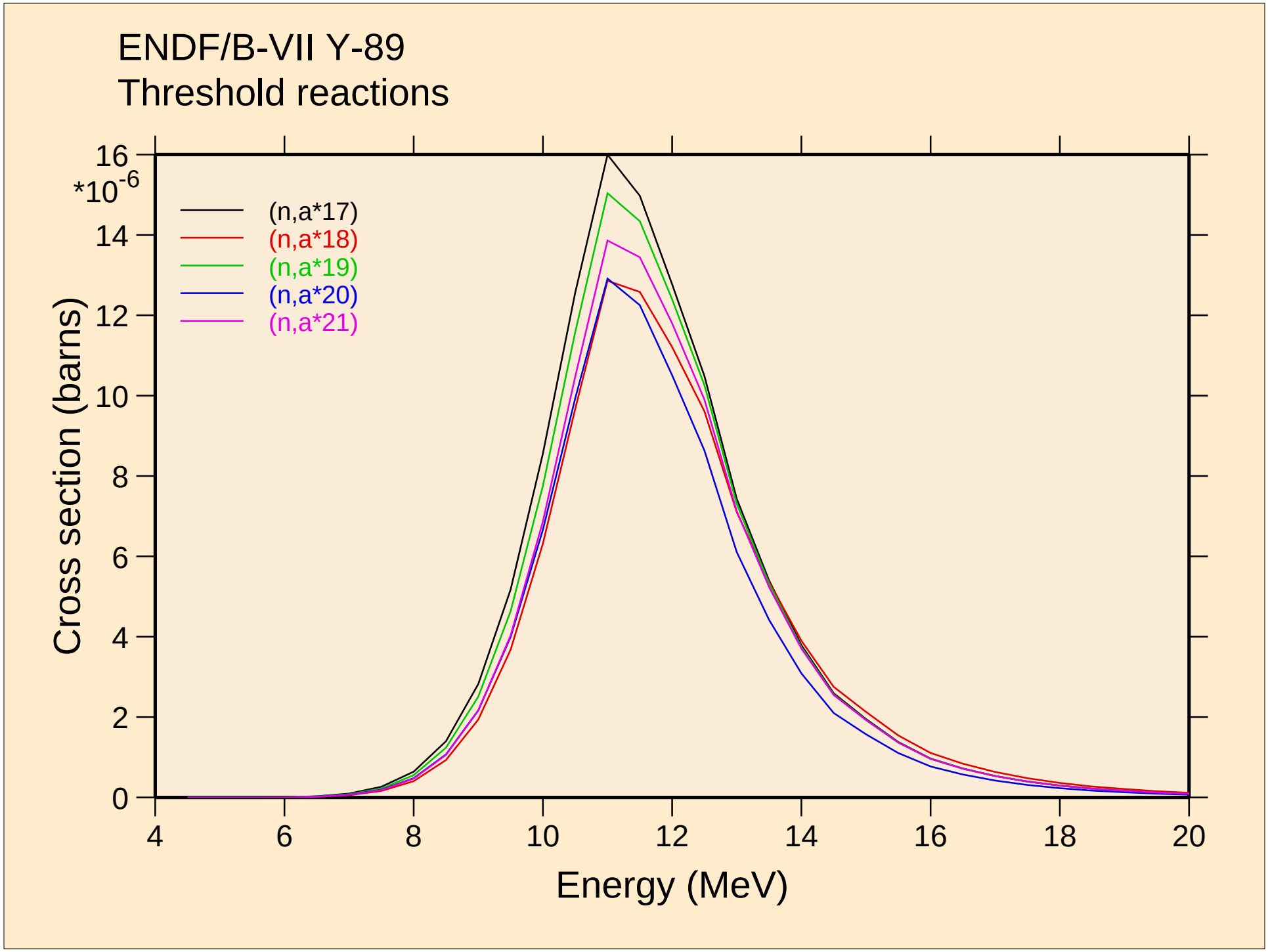

ENDF/B-VII Y-89
Threshold reactions
*10^-6
(n,p*33)
(n,p*34)
(n,p*35)
(n,p*36)
(n,p*37)
Cross section (barns)
Energy (MeV)
0
5
10
15
20
25
30
35
4
6
8
10
12
14
16
18
20

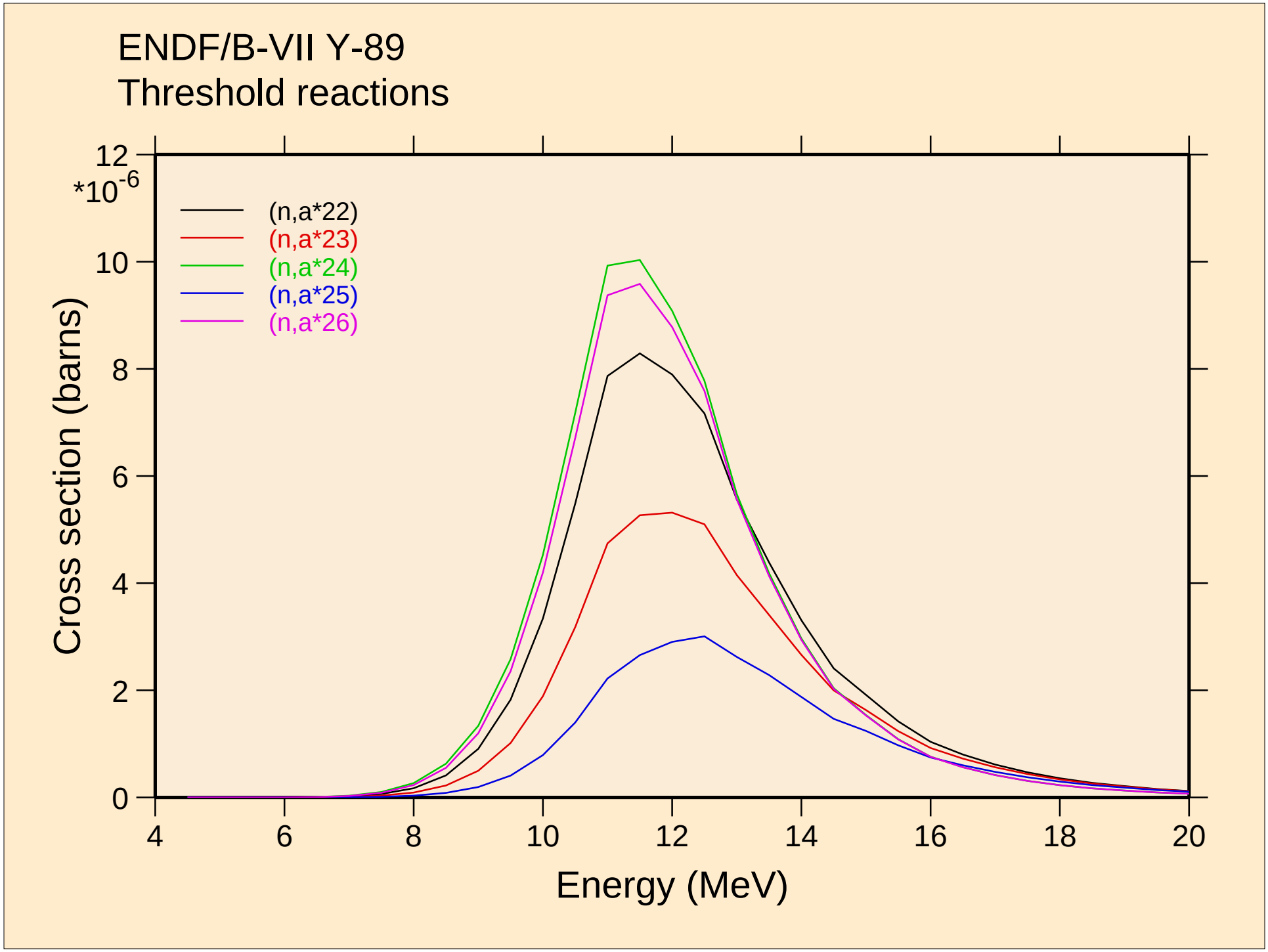

ENDF/B-VII Y-89
Threshold reactions
*10^-3
(n,p*38)
(n,p*39)
(n,p*c)
(n,a*0)
(n,a*1)
Cross section (barns)
Energy (MeV)
0
5
10
15
20
25
2
4
6
8
10
12
14
16
18
20

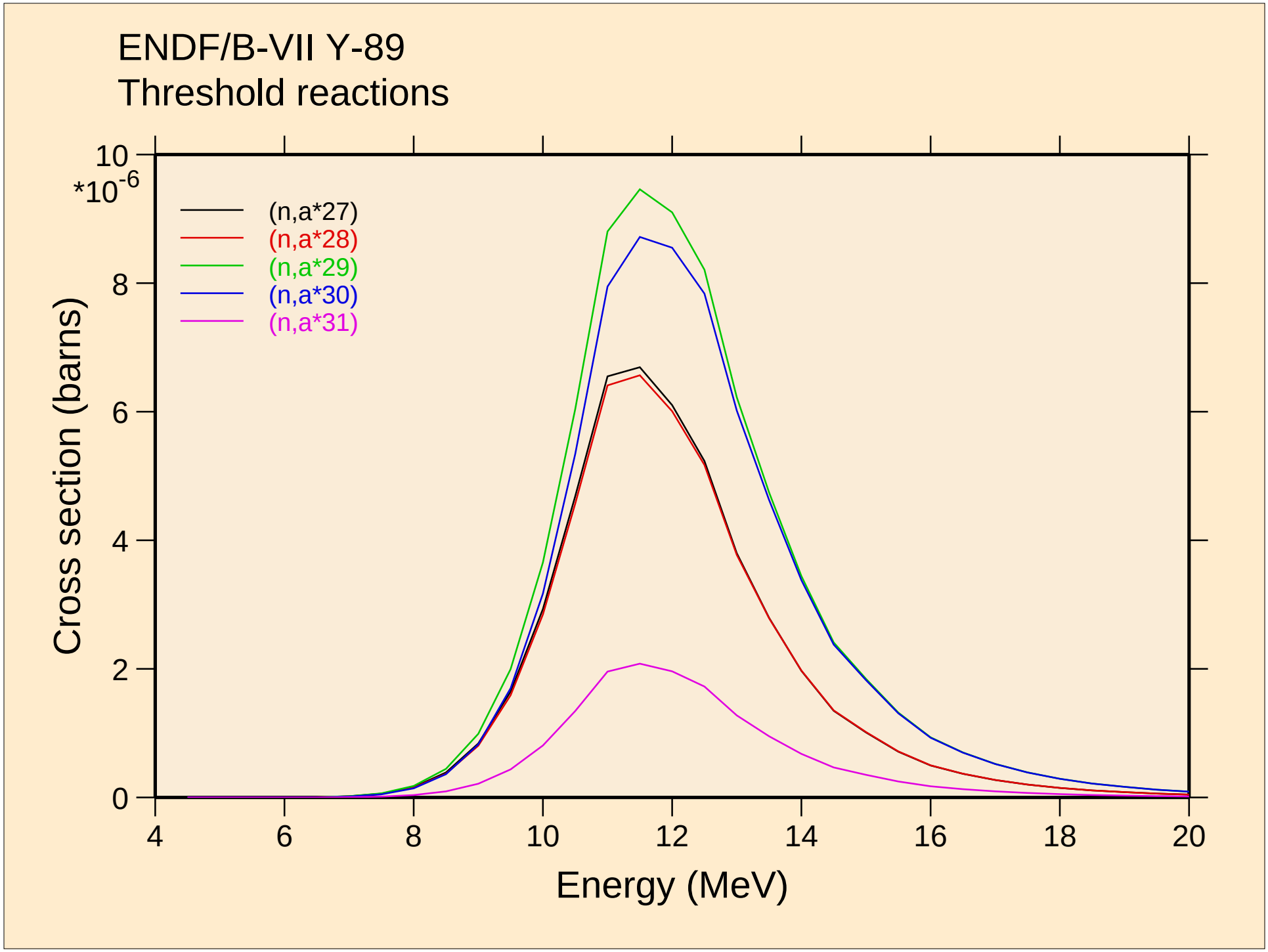

ENDF/B-VII Y-89
Threshold reactions
*10^-6
(n,a*2)
(n,a*3)
(n,a*4)
(n,a*5)
(n,a*6)
Cross section (barns)
Energy (MeV)
0
5
10
15
20
25
30
35
40
2
4
6
8
10
12
14
16
18
20

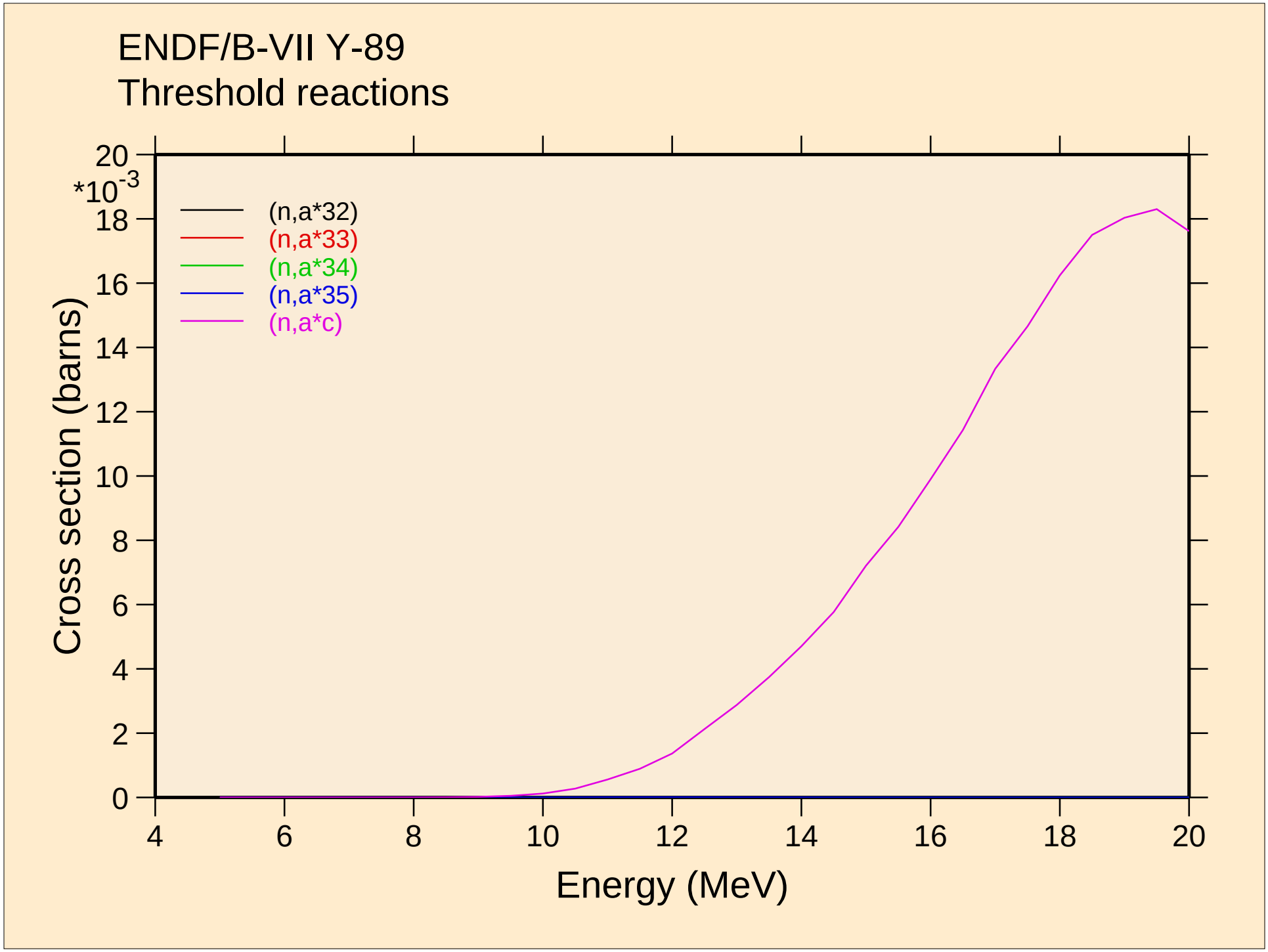

ENDF/B-VII Y-89
Threshold reactions
*10^-6
(n,a*7)
(n,a*8)
(n,a*9)
(n,a*10)
(n,a*11)
Cross section (barns)
Energy (MeV)
0
5
10
15
20
25
4
6
8
10
12
14
16
18
20


ENDF/B-VII Y-89
Threshold reactions
*10^-6
(n,a*12)
(n,a*13)
(n,a*14)
(n,a*15)
(n,a*16)
Cross section (barns)
Energy (MeV)
0
5
10
15
20
25
4
6
8
10
12
14
16
18
20

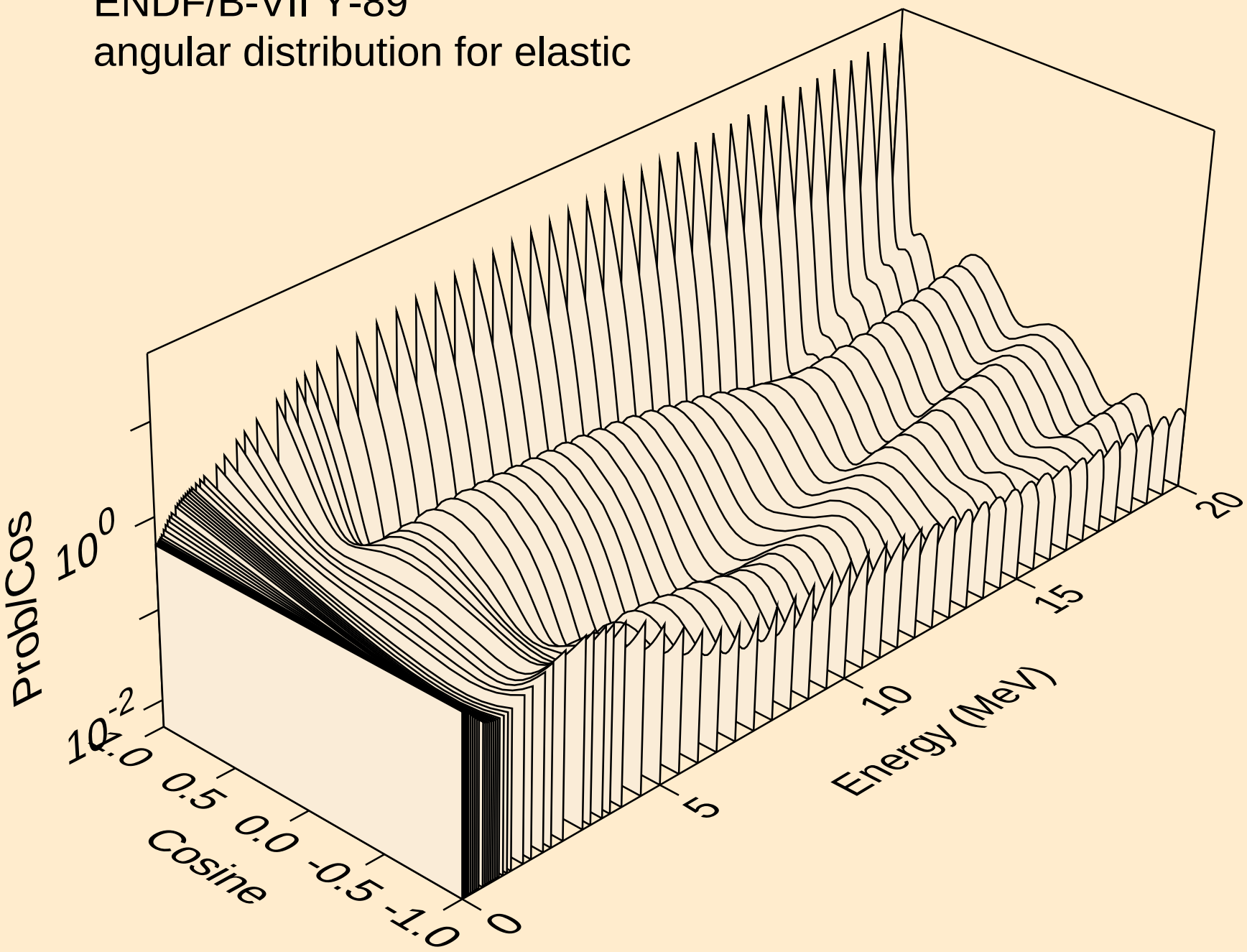

ENDF/B-VII Y-89
Threshold reactions
*10^-6
(n,a*17)
(n,a*18)
(n,a*19)
(n,a*20)
(n,a*21)
Cross section (barns)
Energy (MeV)
0
2
4
6
8
10
12
14
16
4
6
8
10
12
14
16
18
20

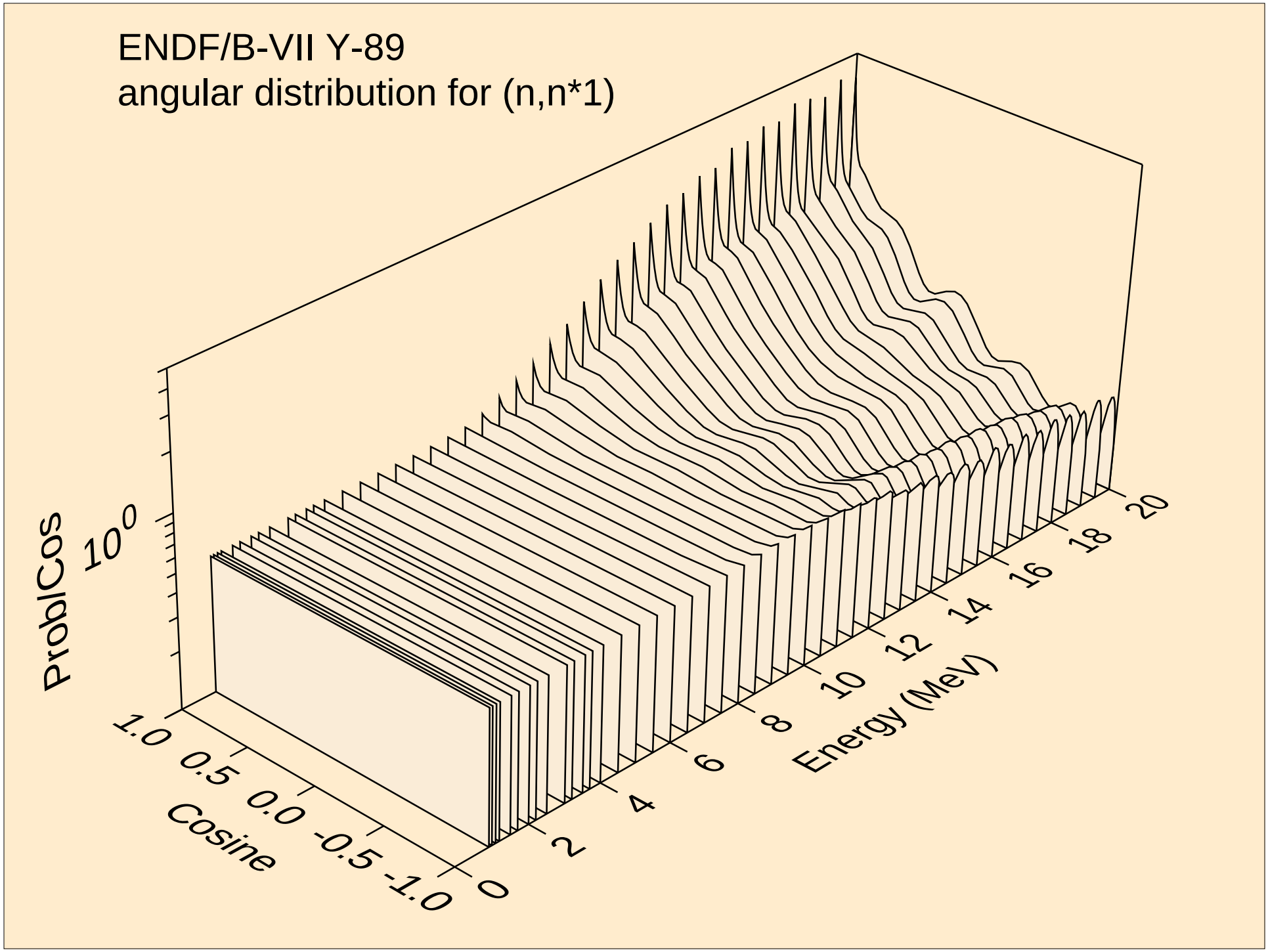

ENDF/B-VII Y-89
Threshold reactions
*10^-6
(n,a*22)
(n,a*23)
(n,a*24)
(n,a*25)
(n,a*26)
Cross section (barns)
Energy (MeV)
0
2
4
6
8
10
12
4
6
8
10
12
14
16
18
20

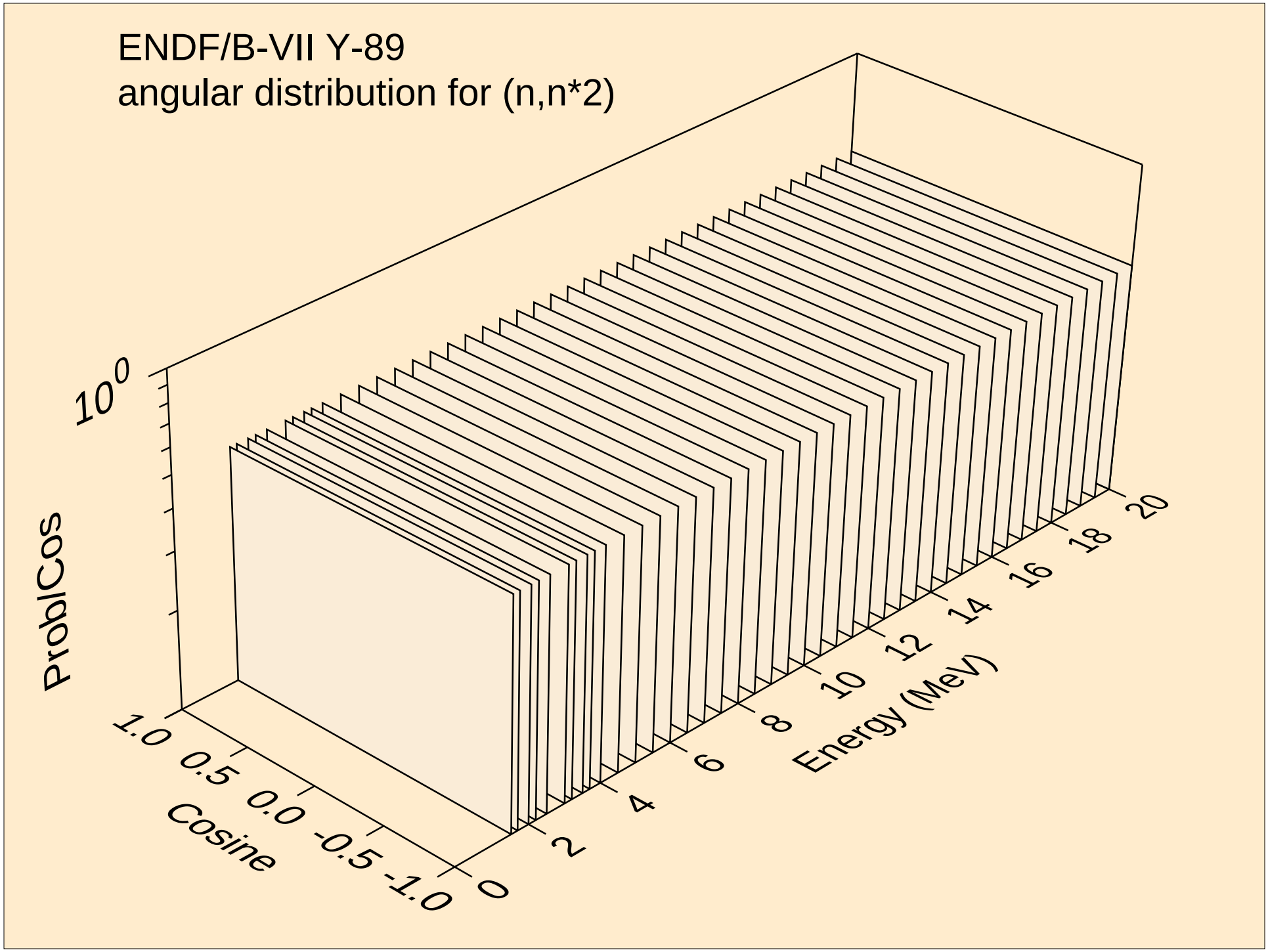

ENDF/B-VII Y-89
Threshold reactions
(n,a*27)
(n,a*28)
(n,a*29)
(n,a*30)
(n,a*31)
*10-6
10
8
6
4
2
0
Cross section (barns)
4
6
8
10
12
14
16
18
20
Energy (MeV)

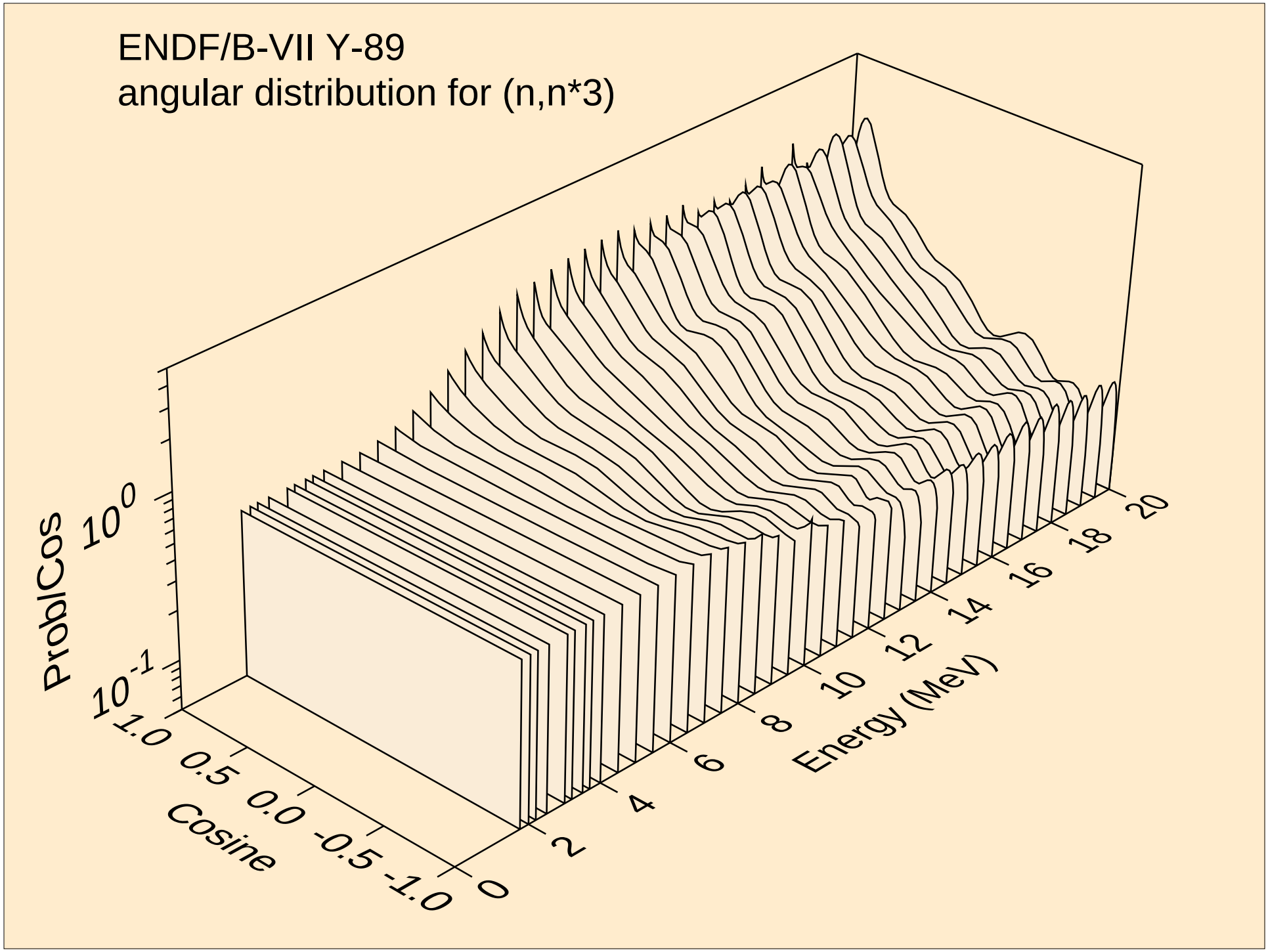

ENDF/B-VII Y-89
Threshold reactions
*10-3
(n,a*32)
(n,a*33)
(n,a*34)
(n,a*35)
(n,a*c)
Cross section (barns)
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20
4
6
8
10
12
14
16
18
20

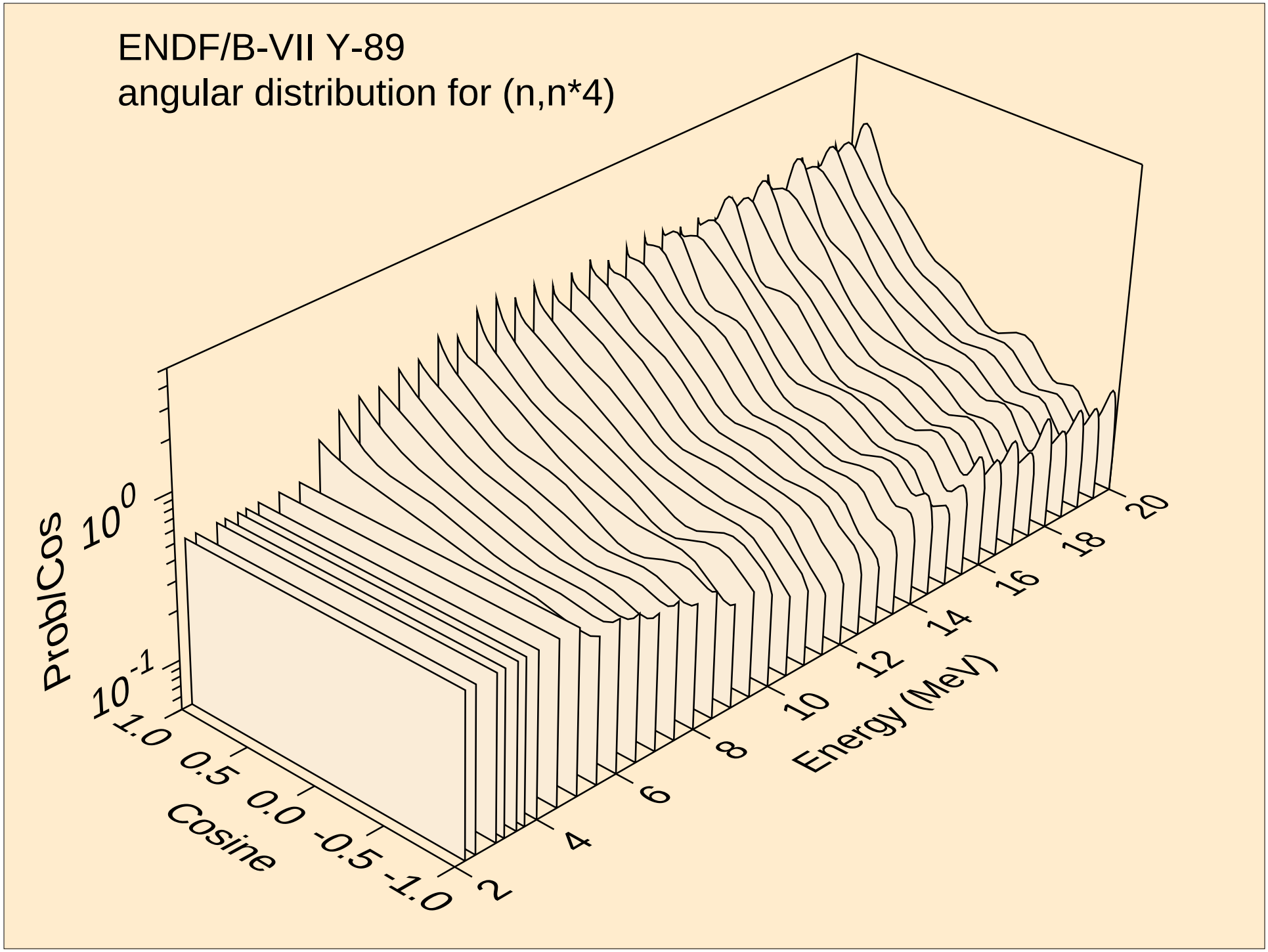
ENDF/B-VII Y-89
angular distribution for elastic

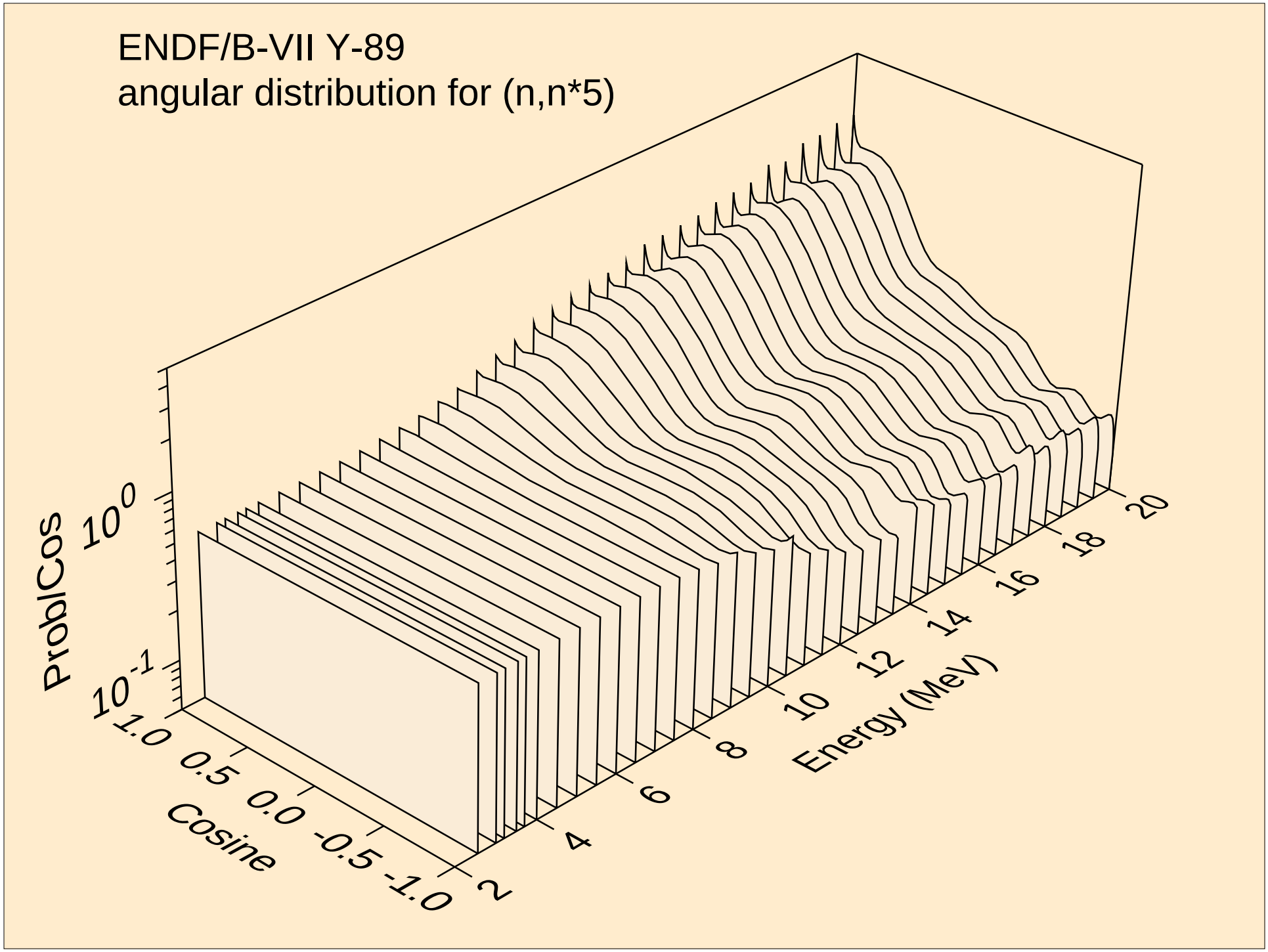


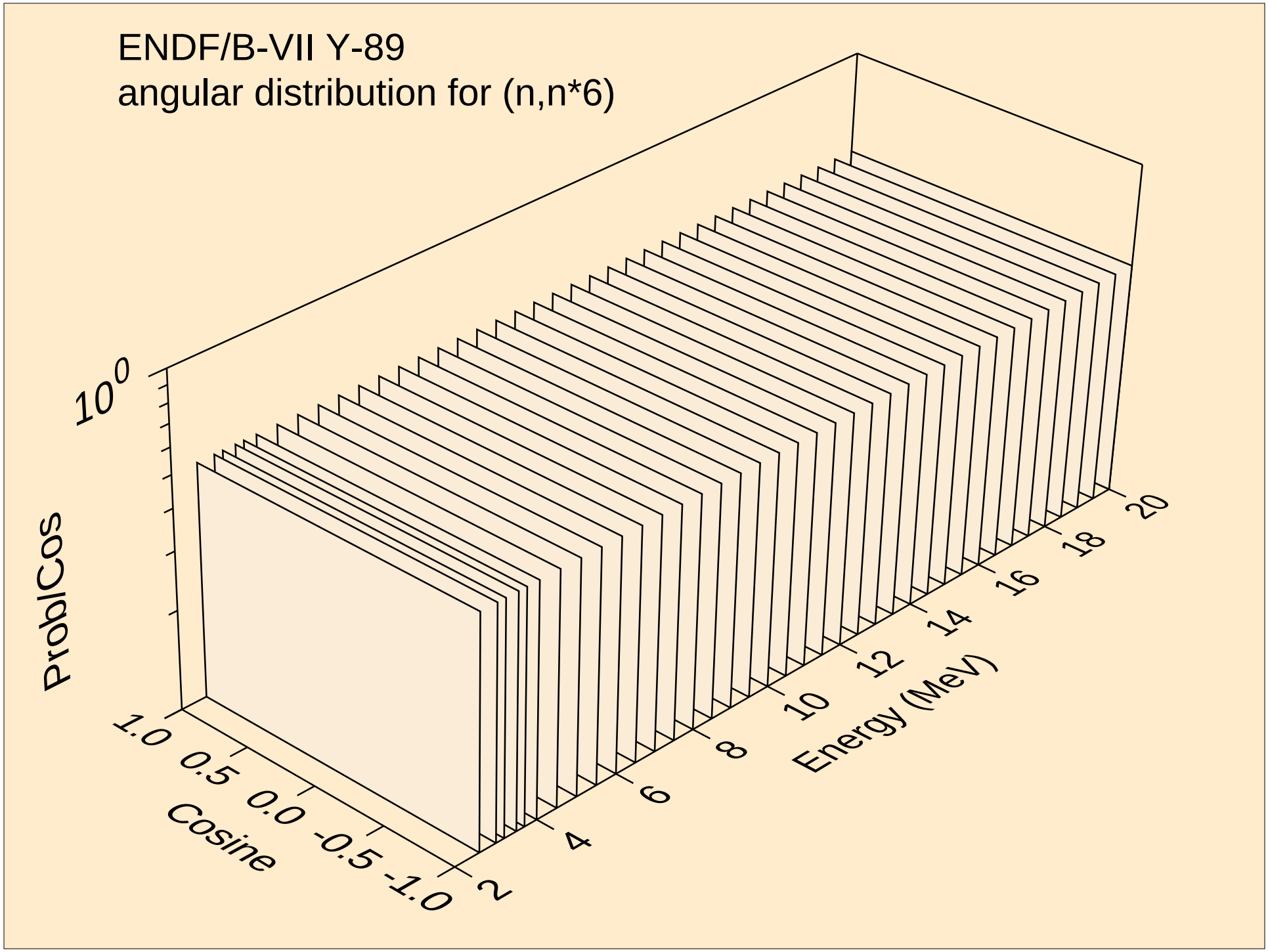

ENDF/B-VII Y-89
angular distribution for (n,n*1)
ProbCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

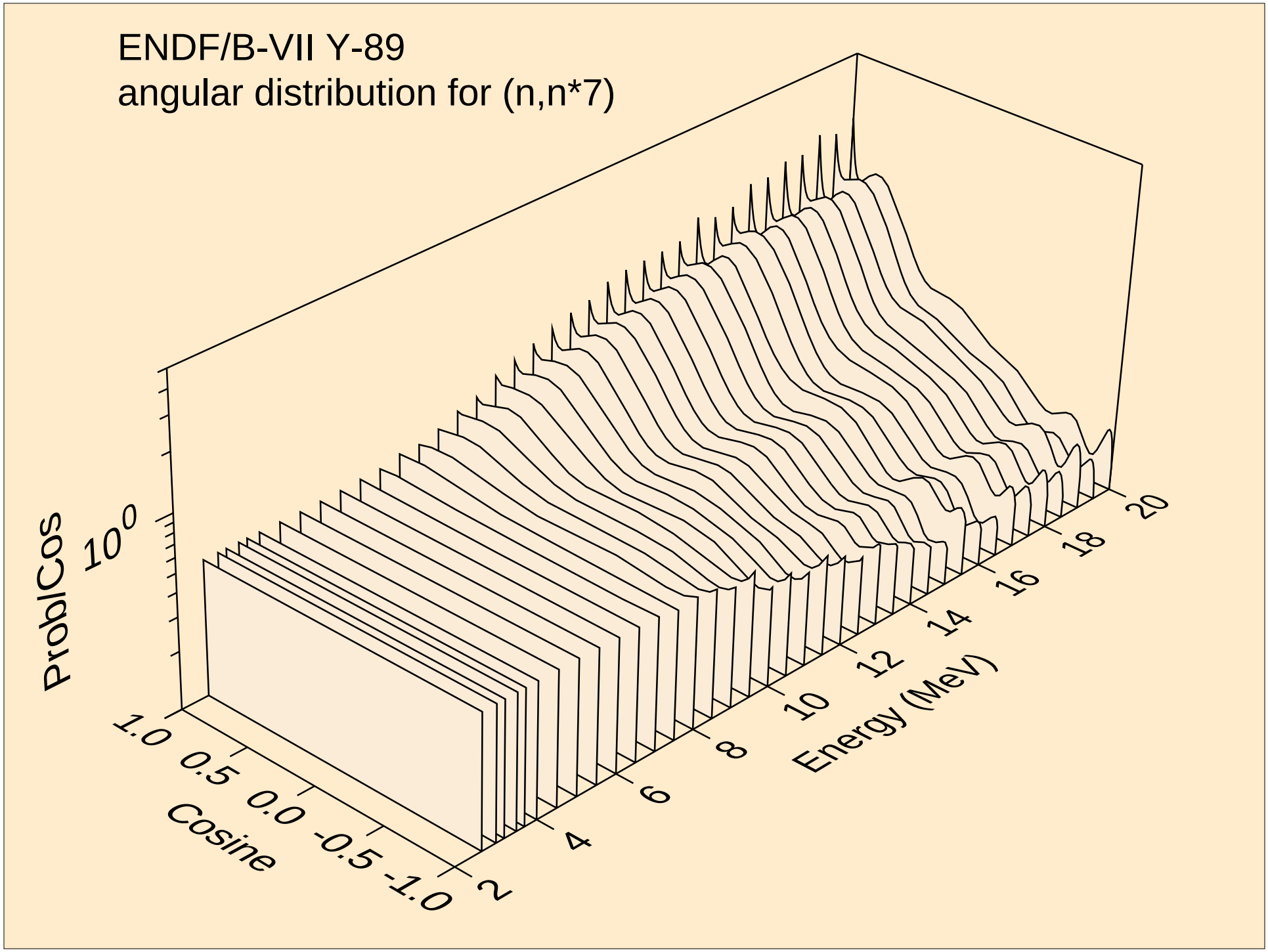

ENDF/B-VII Y-89
angular distribution for (n,n*2)
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

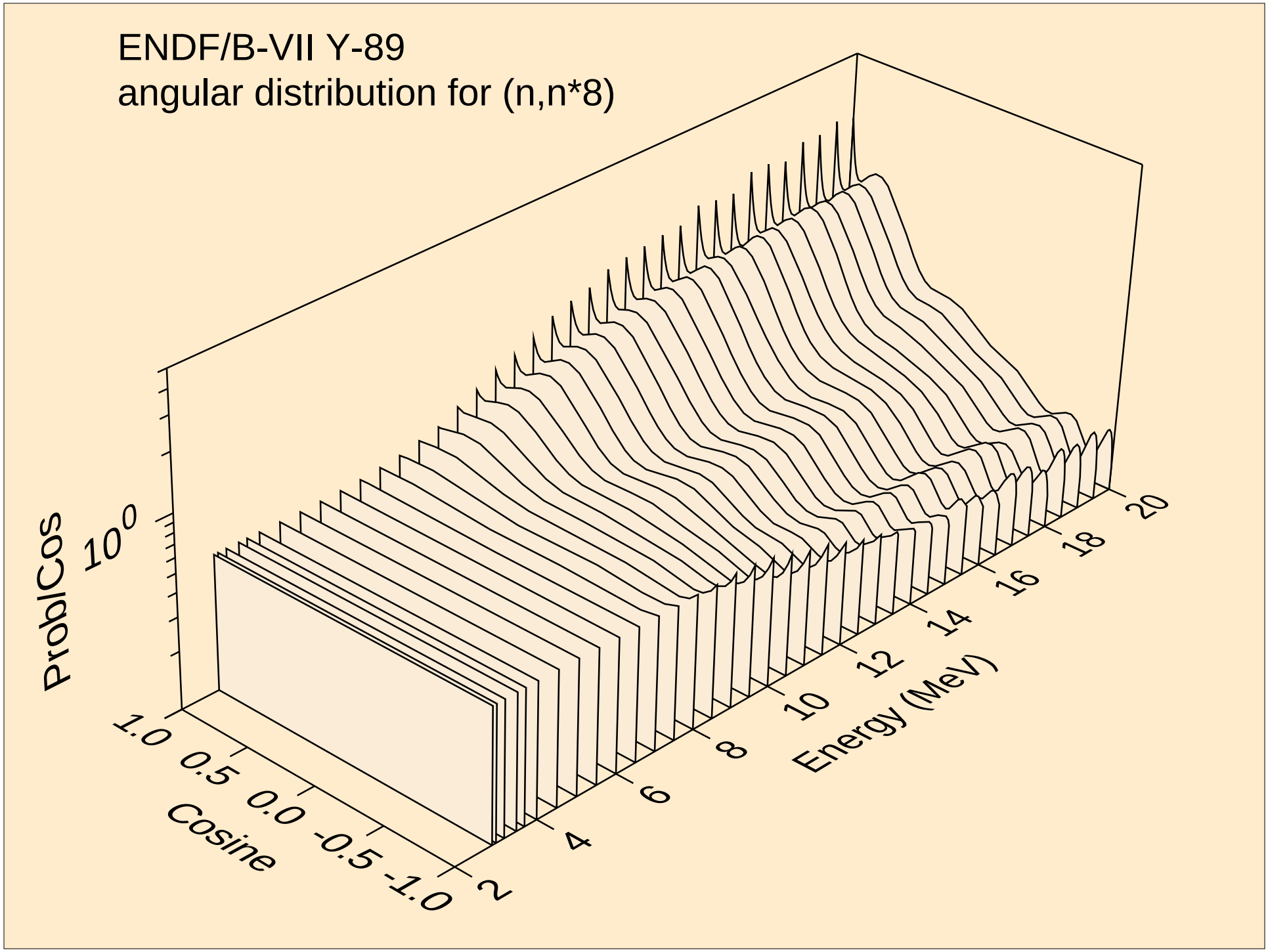

ENDF/B-VII Y-89
angular distribution for (n,n*3)
ProbCos
10^0
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

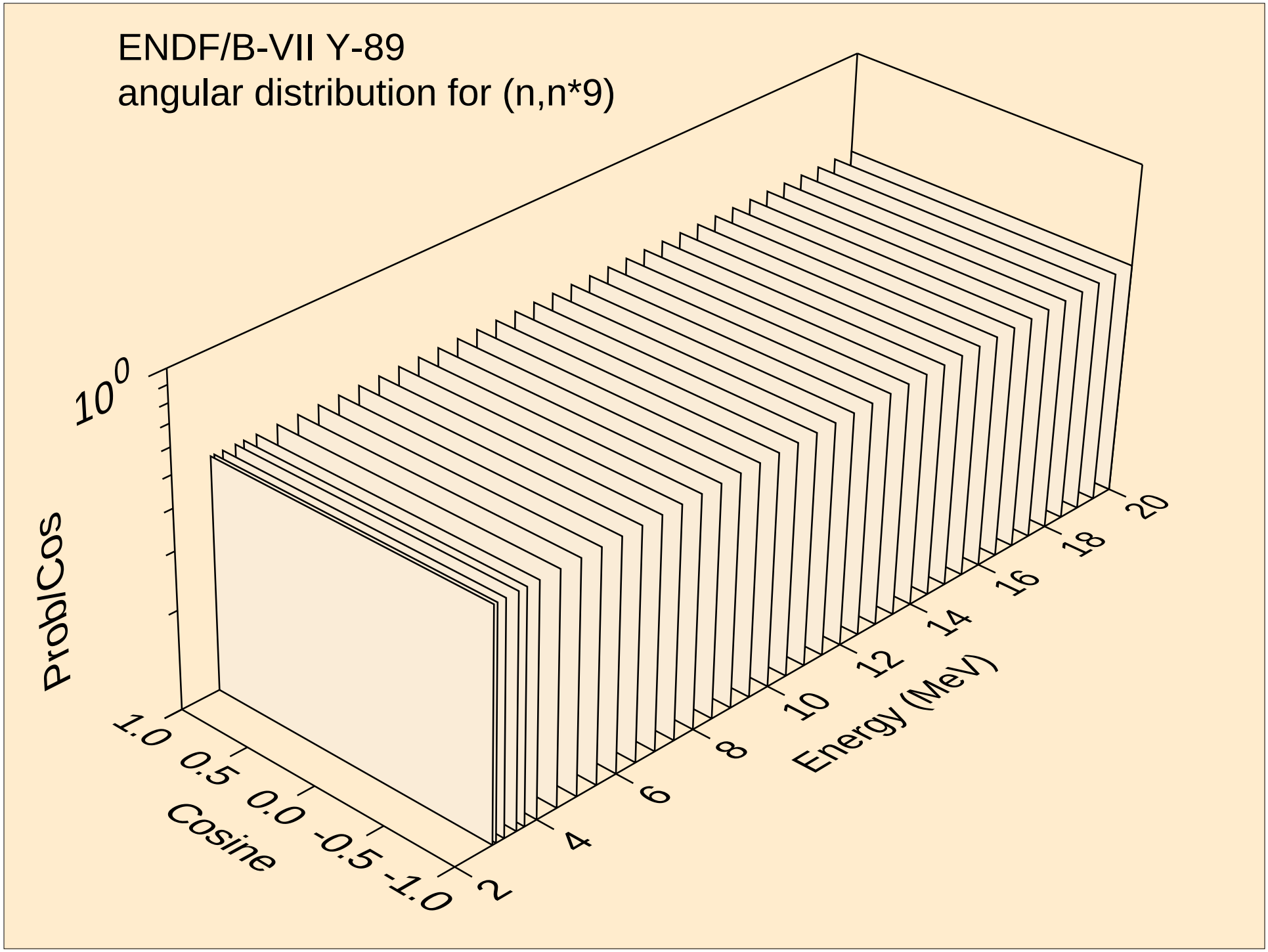

ENDF/B-VII Y-89
angular distribution for (n,n*4)
Prob/Cos
10^0
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

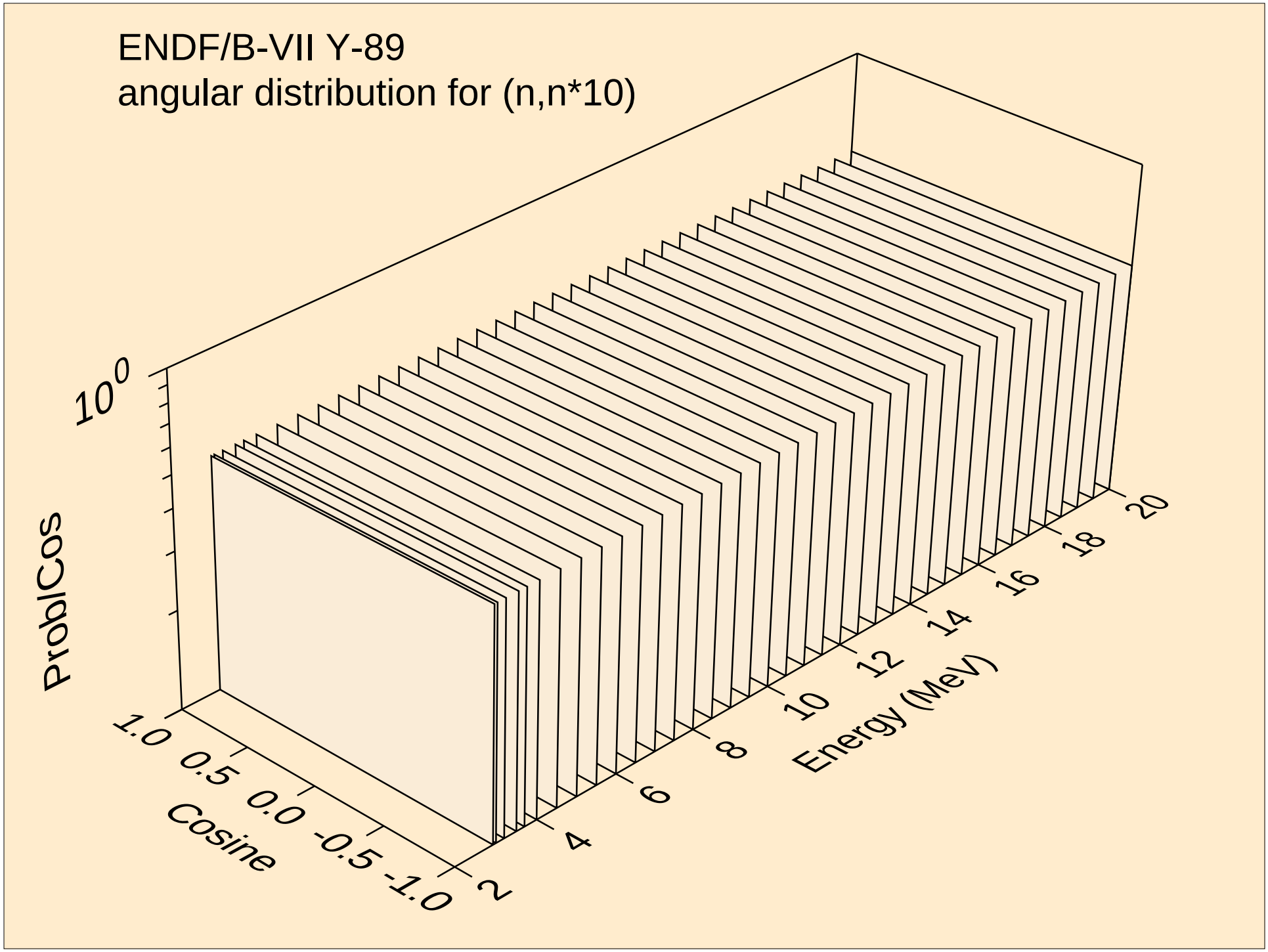

ENDF/B-VII Y-89
angular distribution for (n,n*5)
Prob/Cos
10^0
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

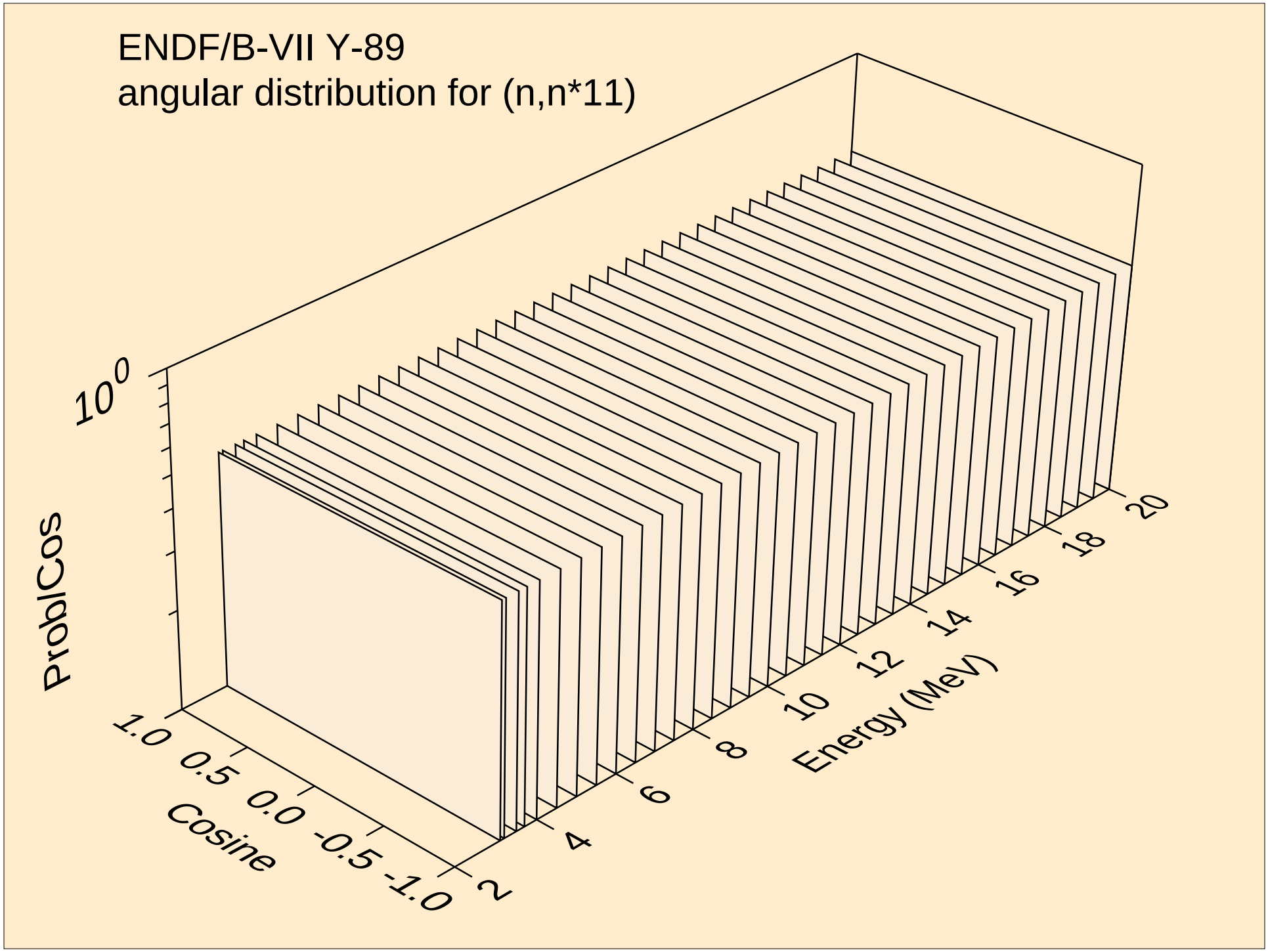

ENDF/B-VII Y-89
angular distribution for (n,n*6)
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

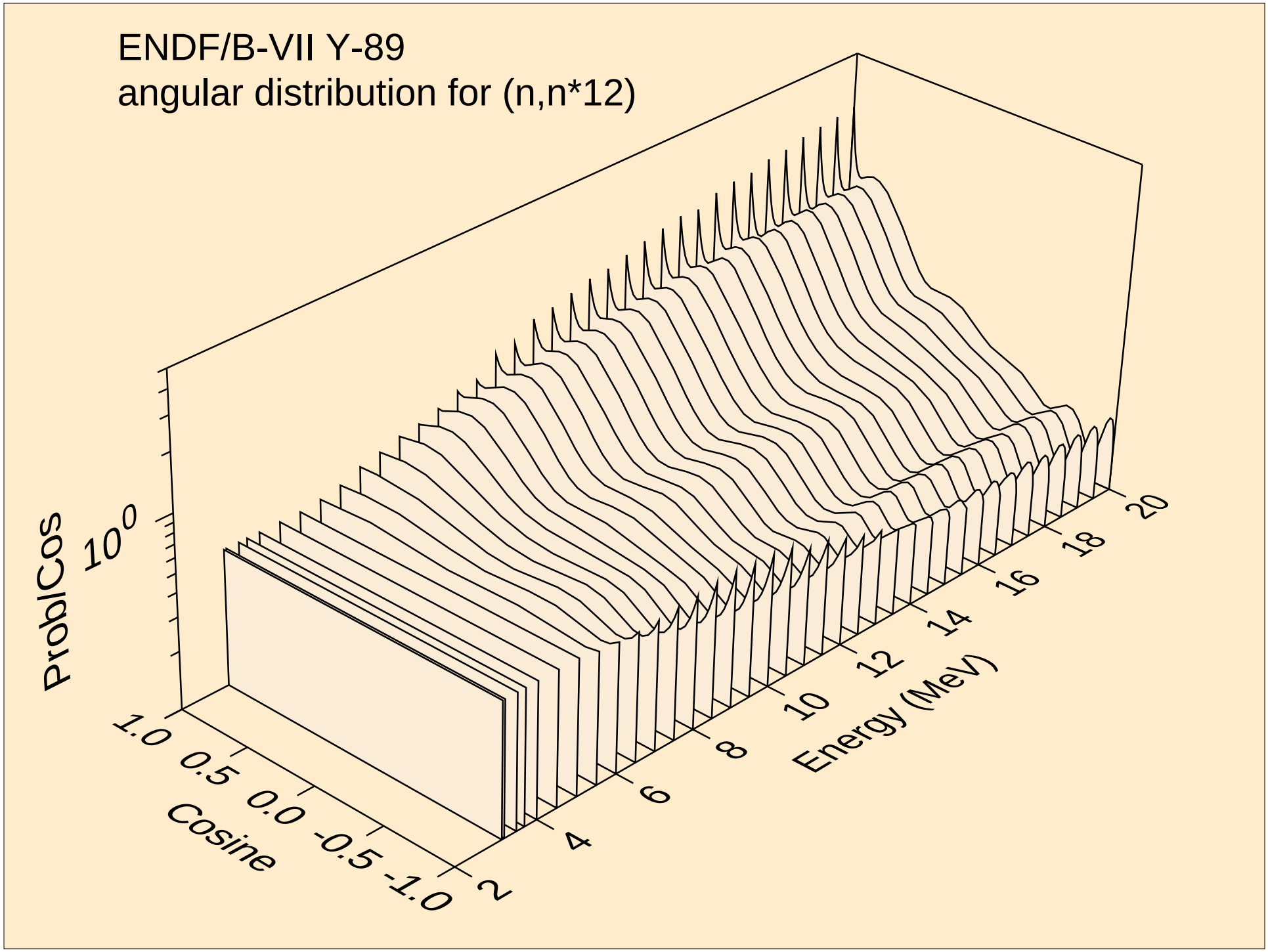

ENDF/B-VII Y-89
angular distribution for (n,n*7)
ProbCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

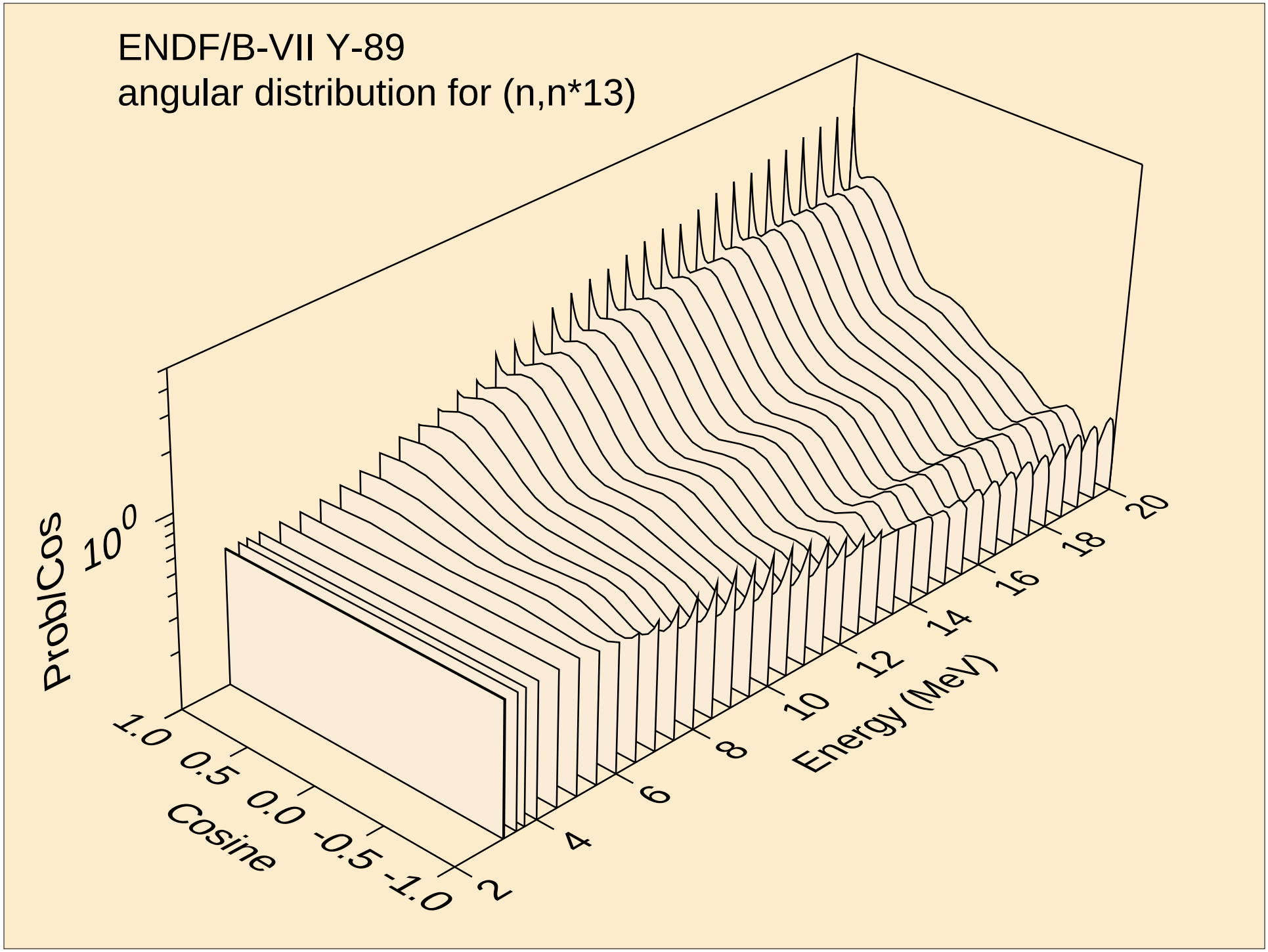

ENDF/B-VII Y-89
angular distribution for (n,n*8)
ProbCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

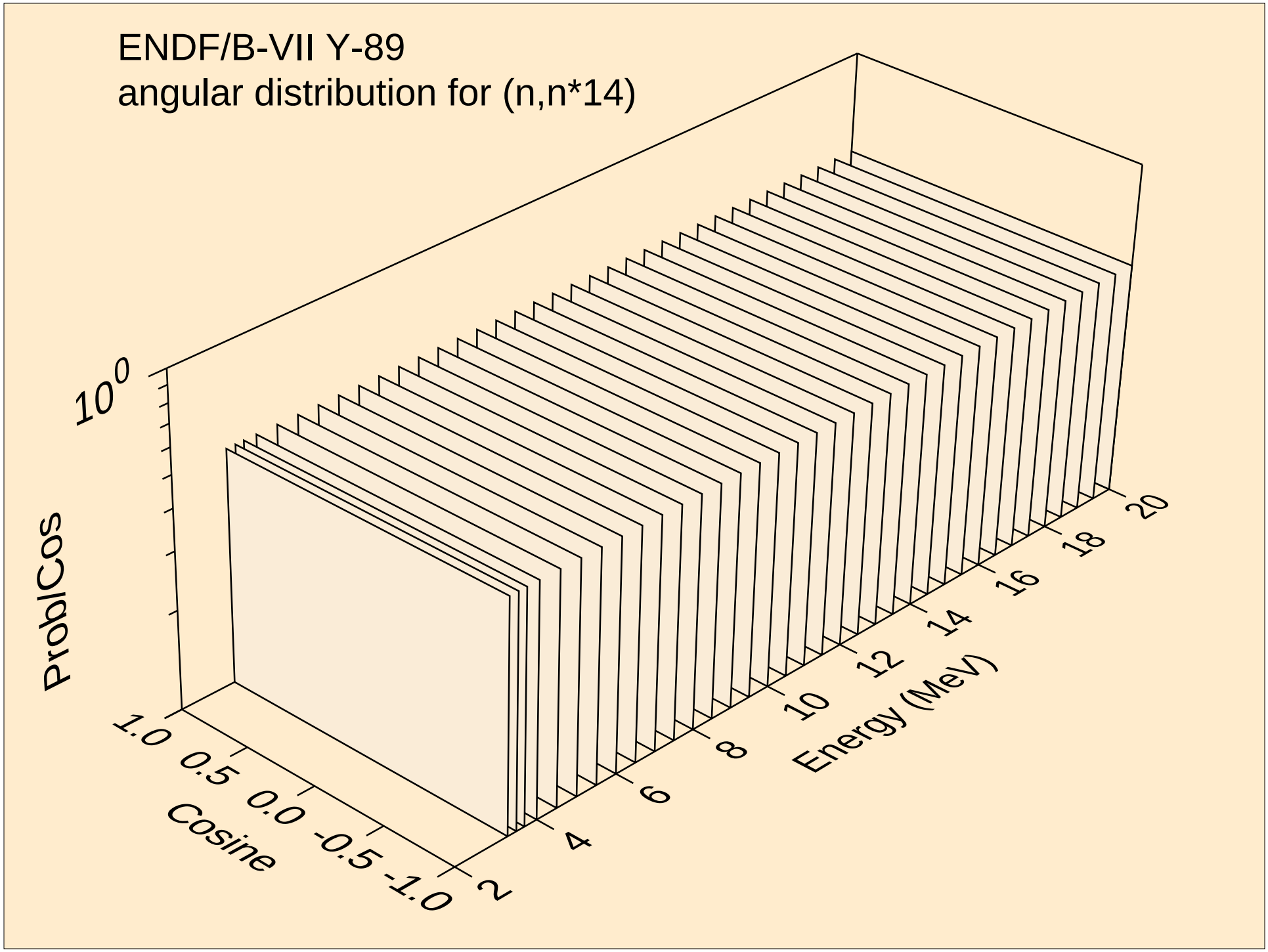

ENDF/B-VII Y-89
angular distribution for (n,n*9)
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

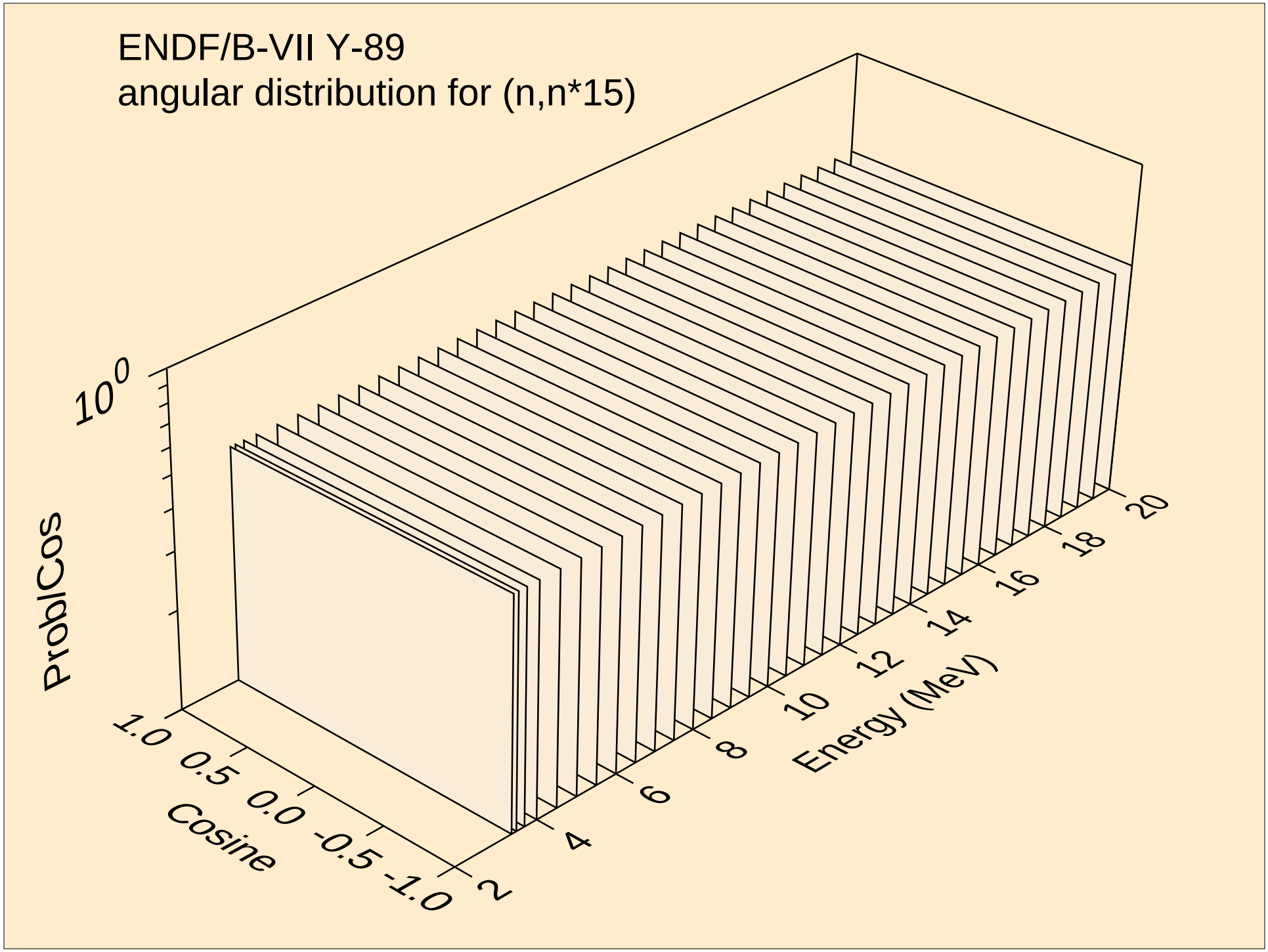

ENDF/B-VII Y-89
angular distribution for (n,n*10)
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

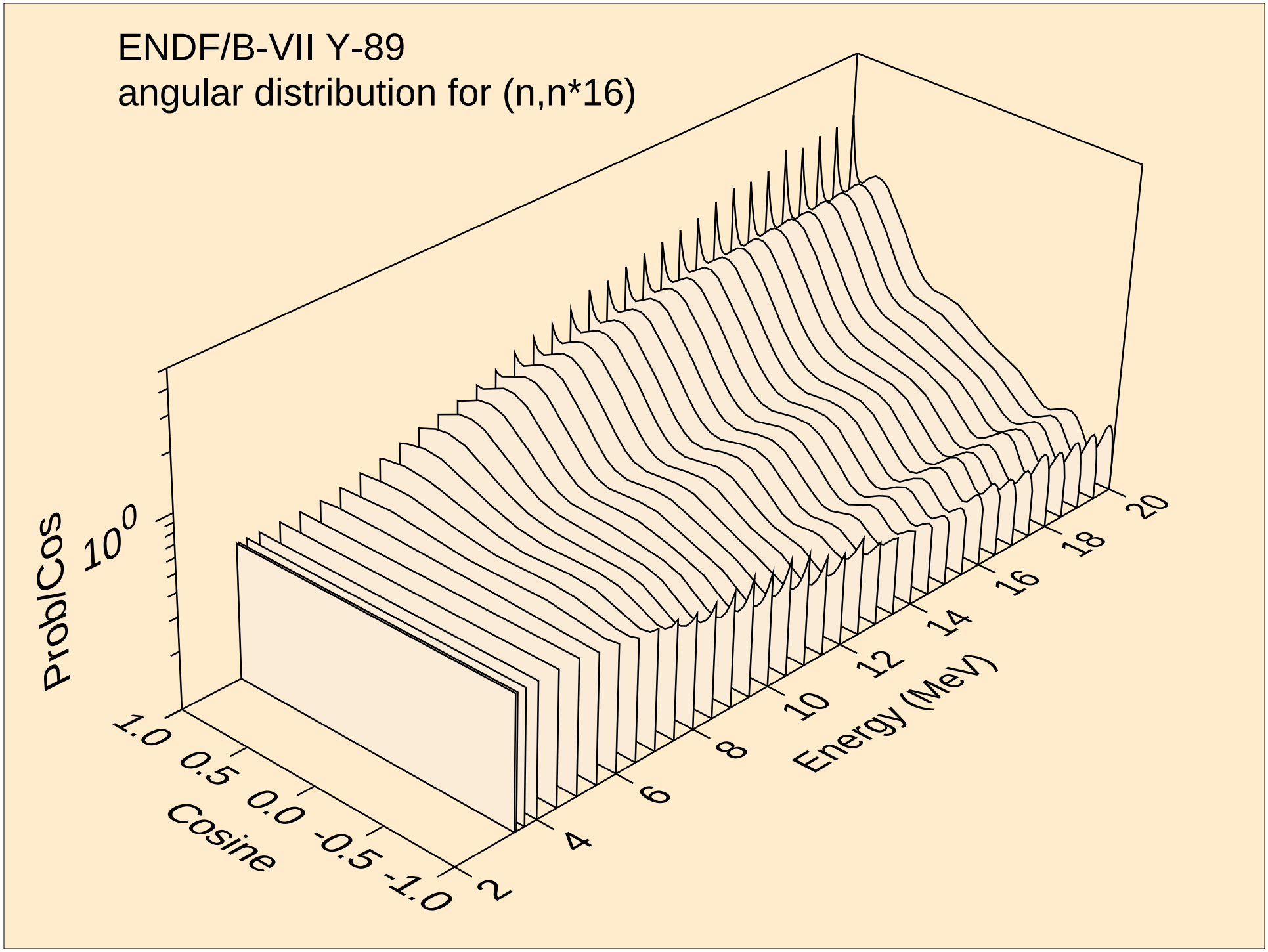

ENDF/B-VII Y-89
angular distribution for (n,n*11)
10^0
ProblCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

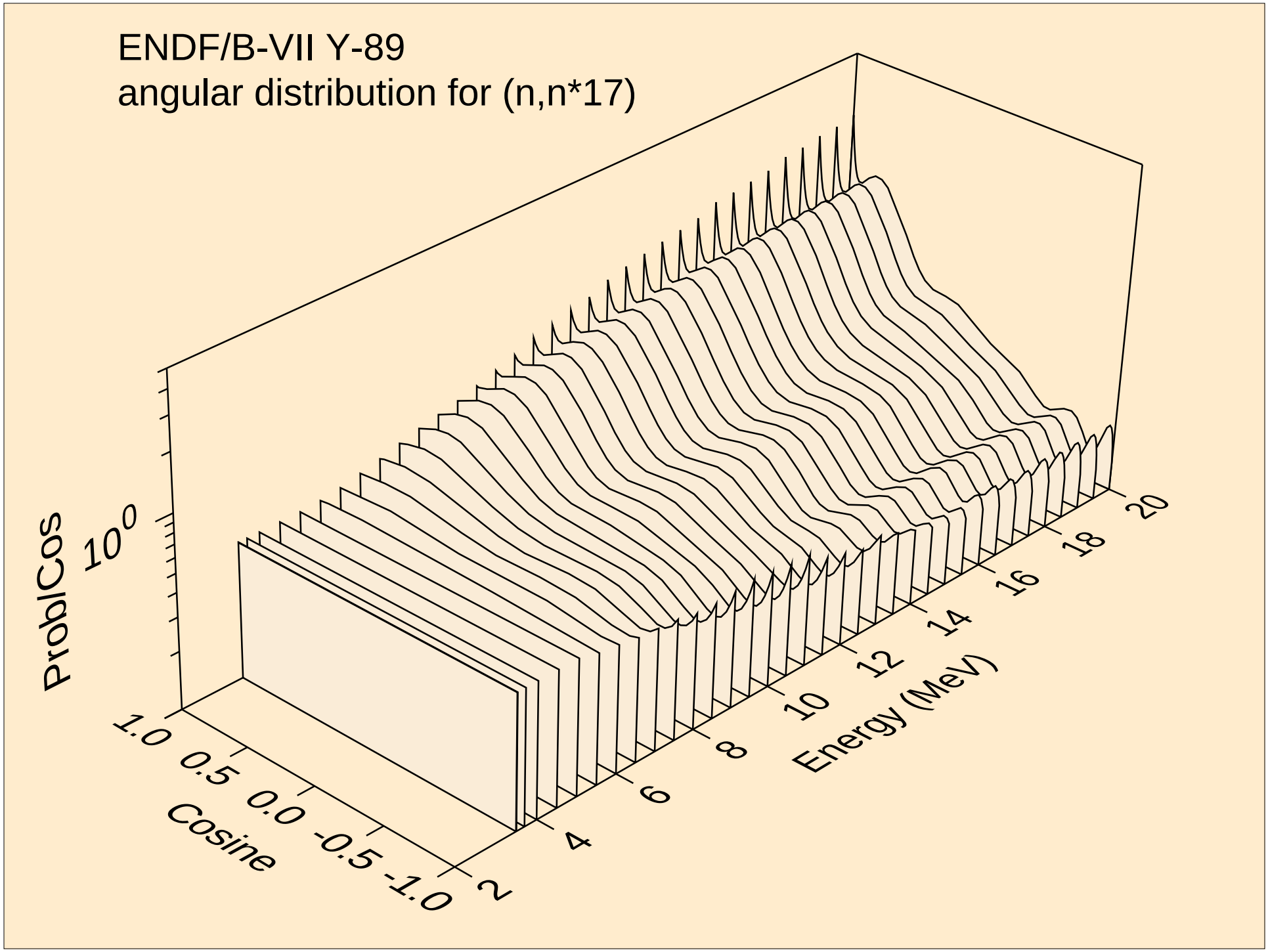

ENDF/B-VII Y-89
angular distribution for (n,n*12)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

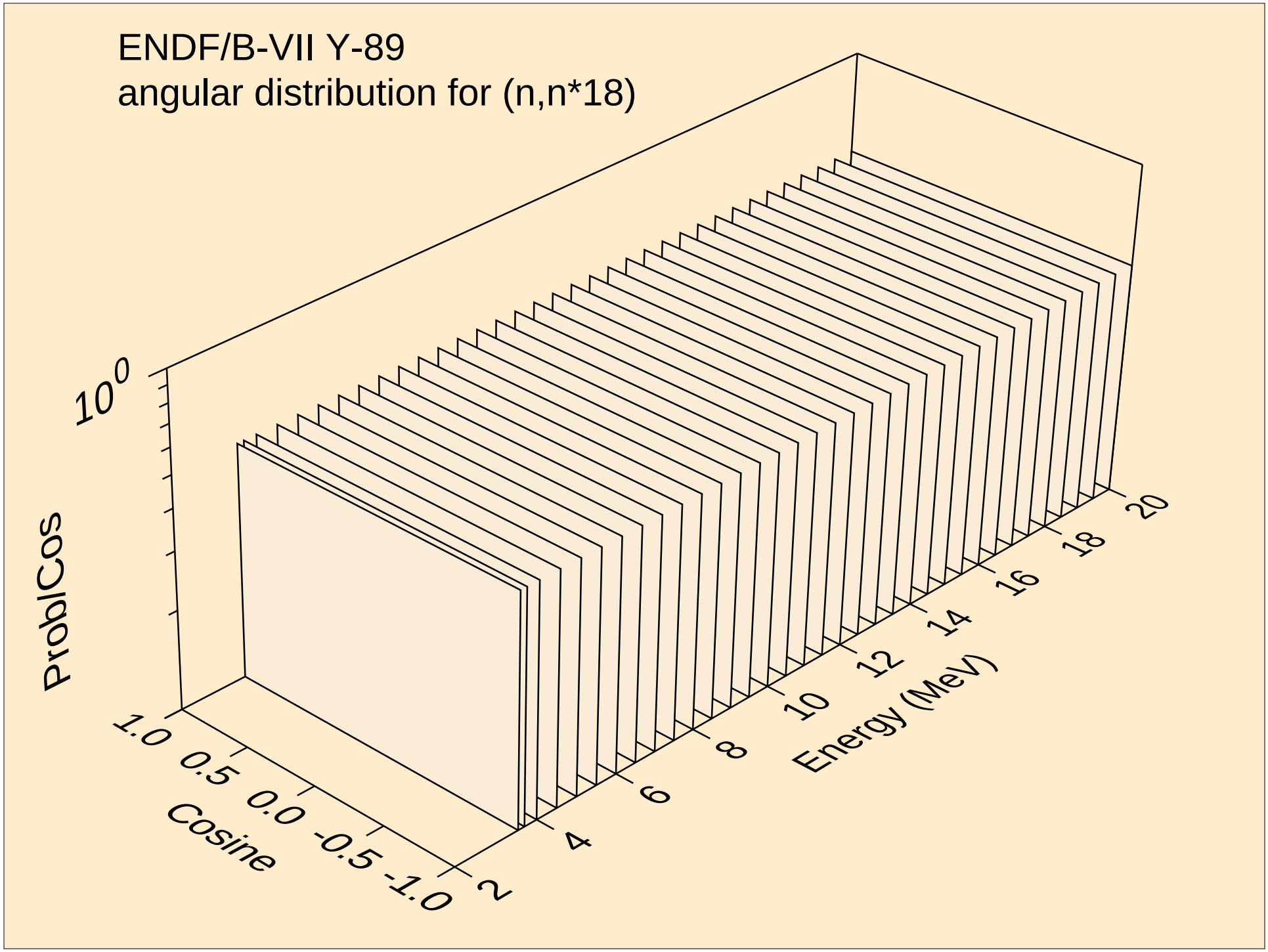

ENDF/B-VII Y-89
angular distribution for (n,n*13)
ProbCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

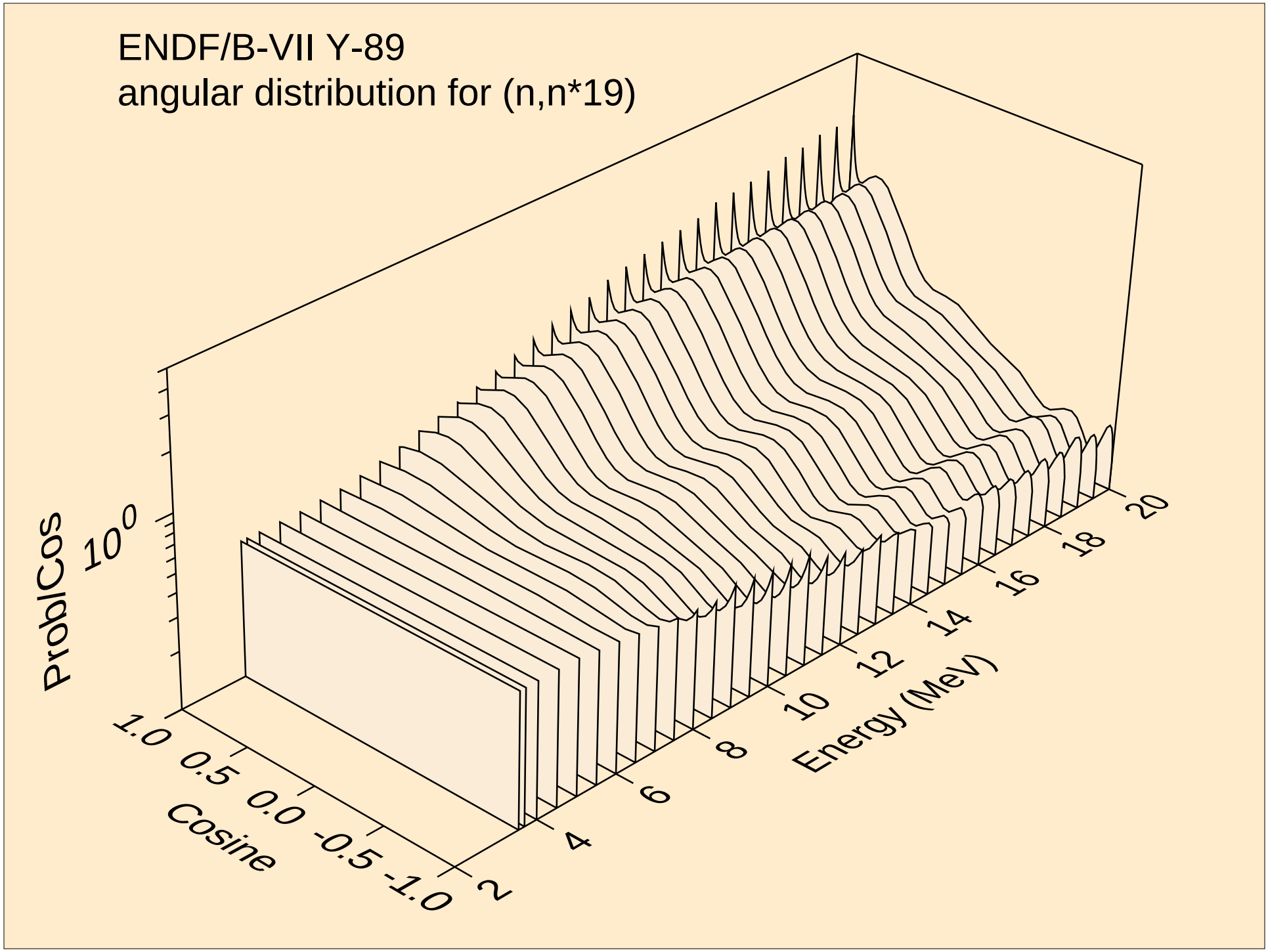

ENDF/B-VII Y-89
angular distribution for (n,n*14)
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

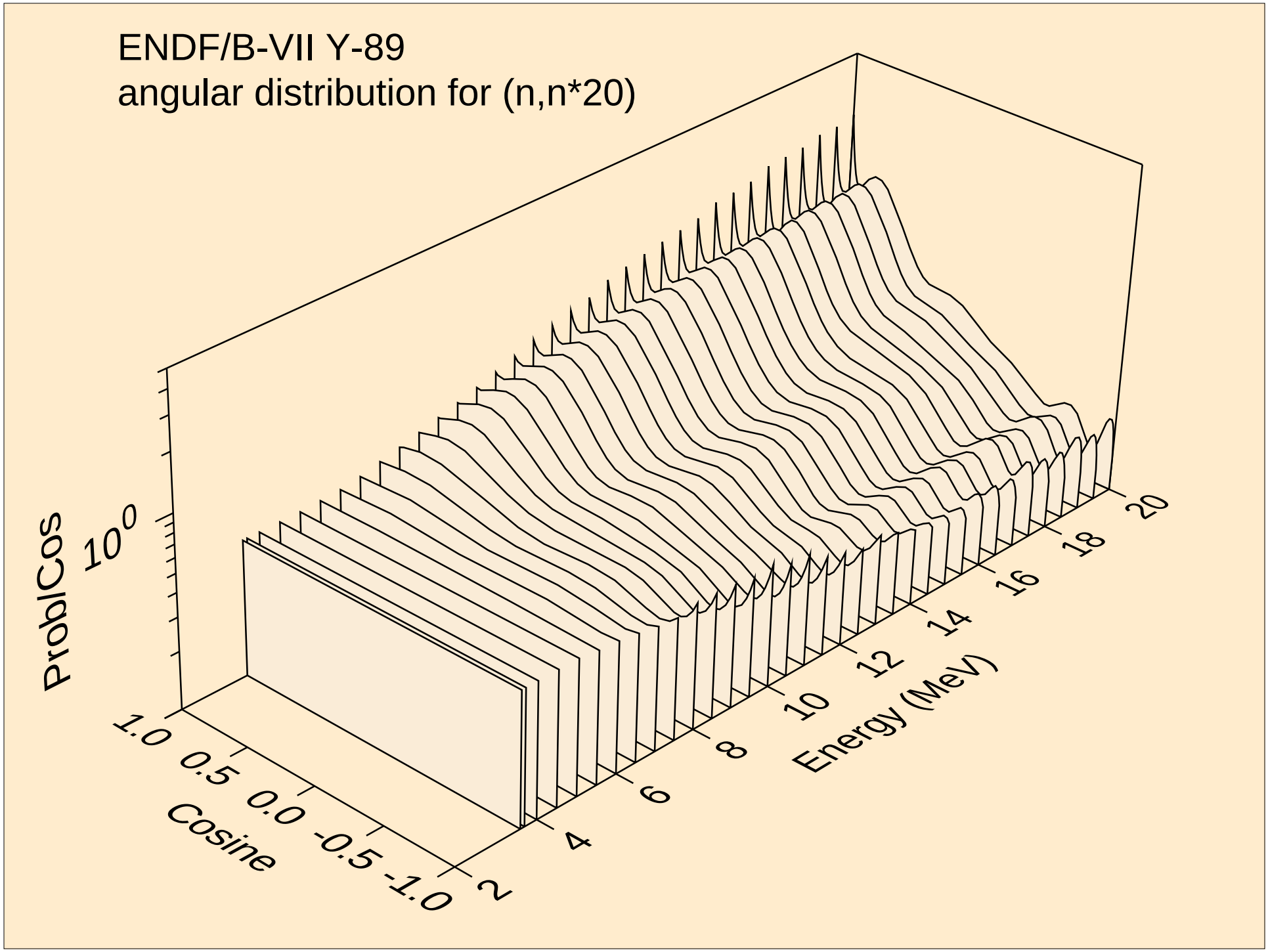

ENDF/B-VII Y-89
angular distribution for (n,n*15)
10^0
ProblCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

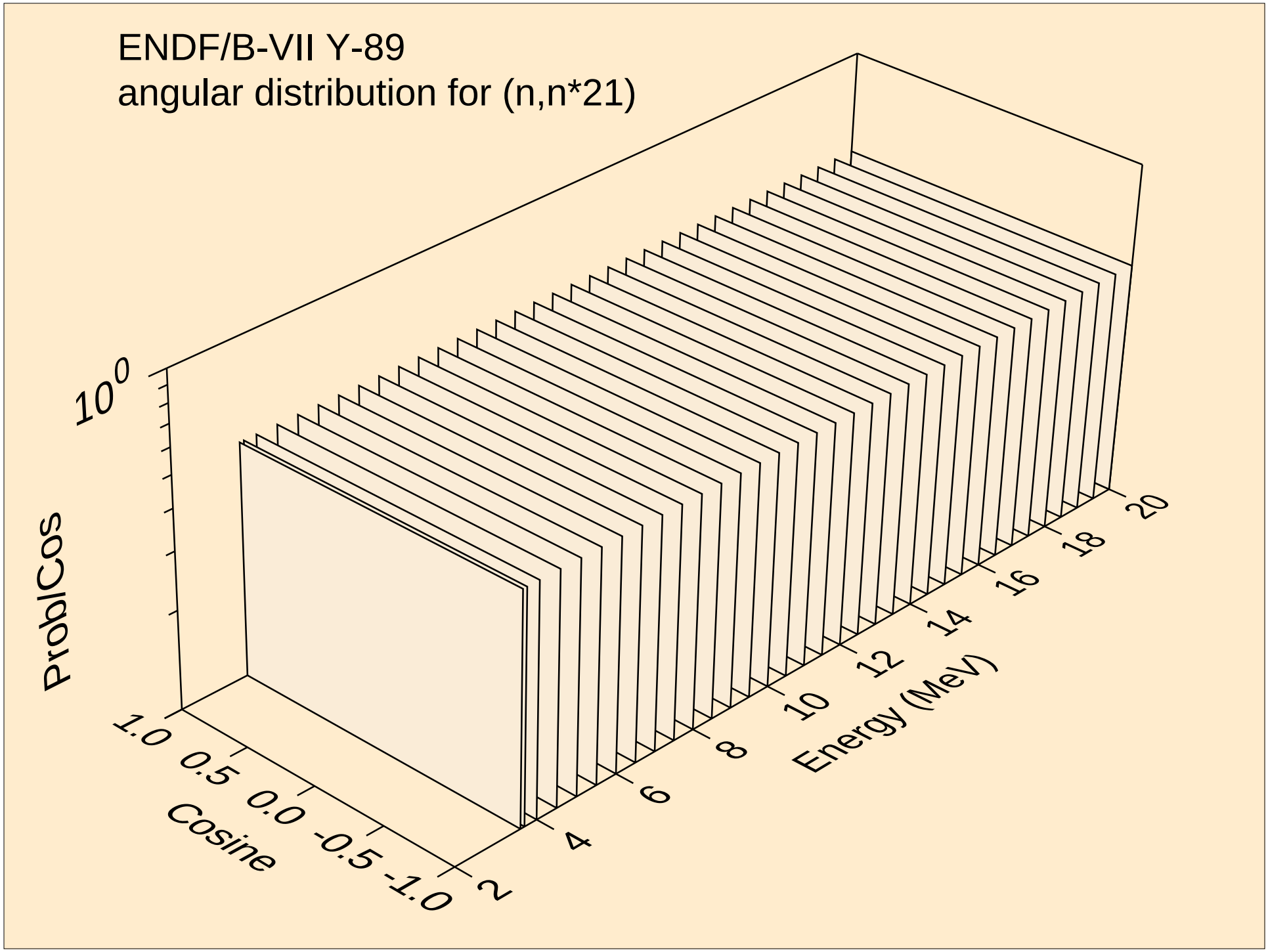

ENDF/B-VII Y-89
angular distribution for (n,n*16)
ProbCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

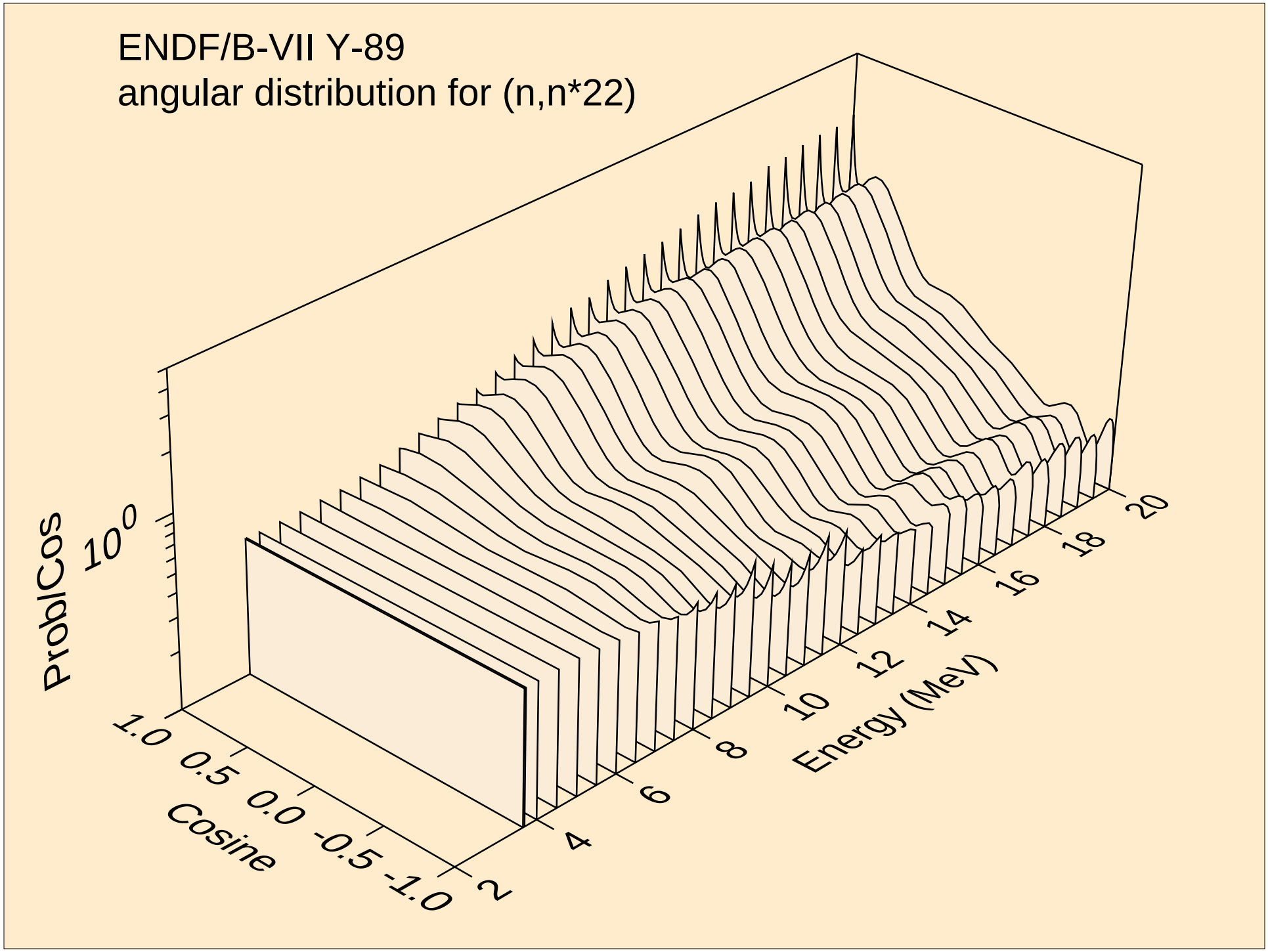

ENDF/B-VII Y-89
angular distribution for (n,n*17)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

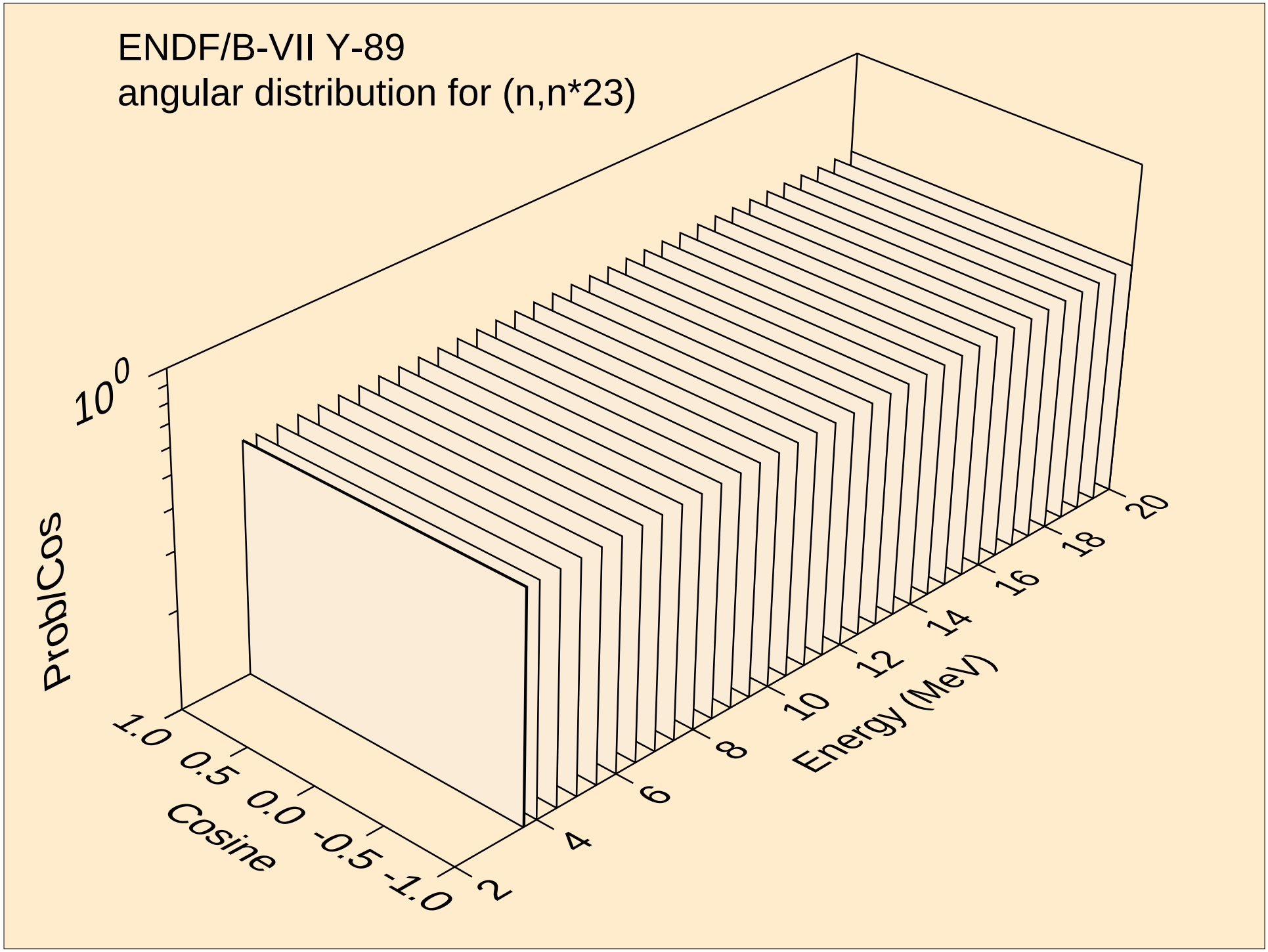

ENDF/B-VII Y-89
angular distribution for (n,n*18)
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

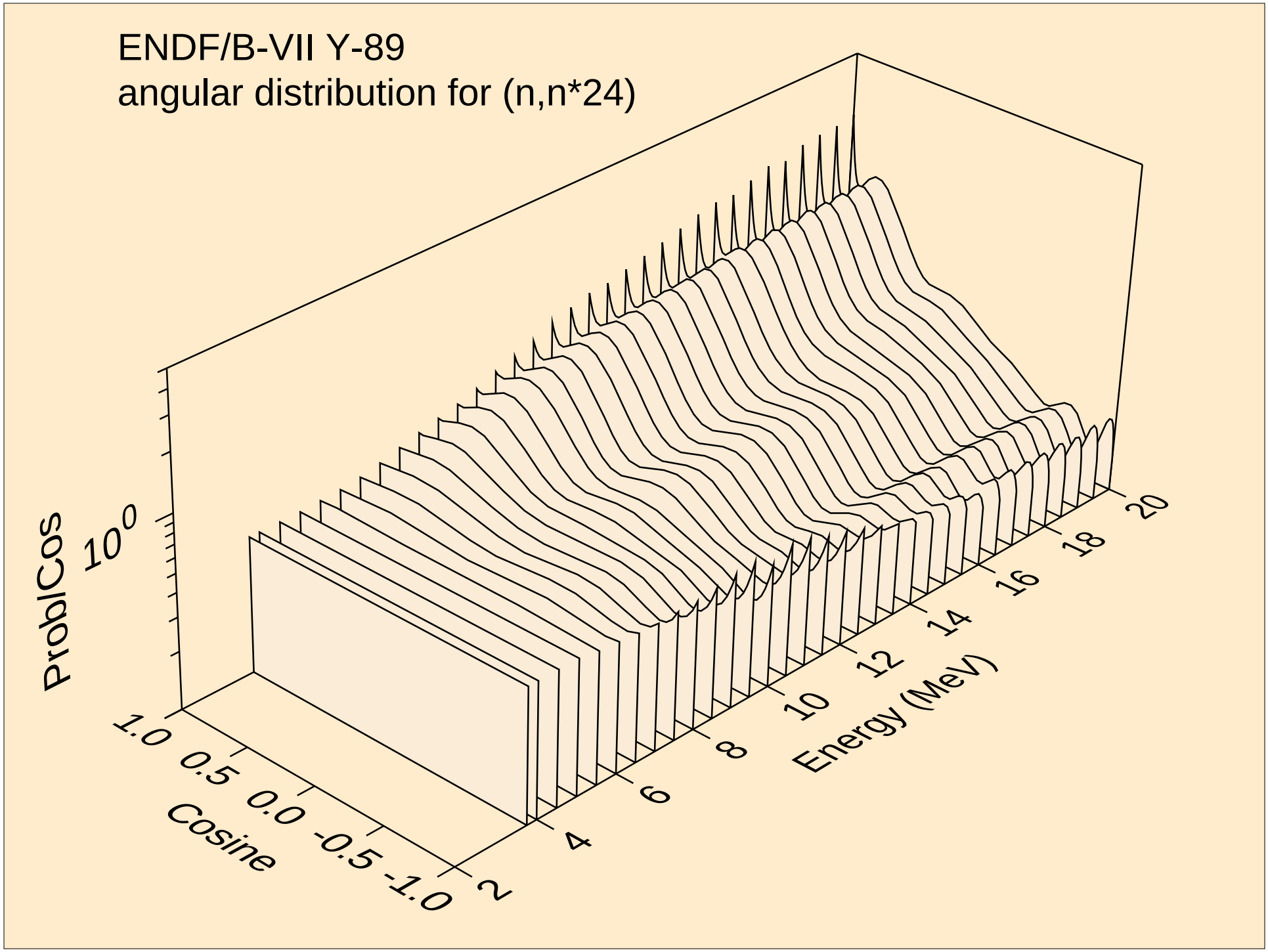

ENDF/B-VII Y-89
angular distribution for (n,n*19)
ProbCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

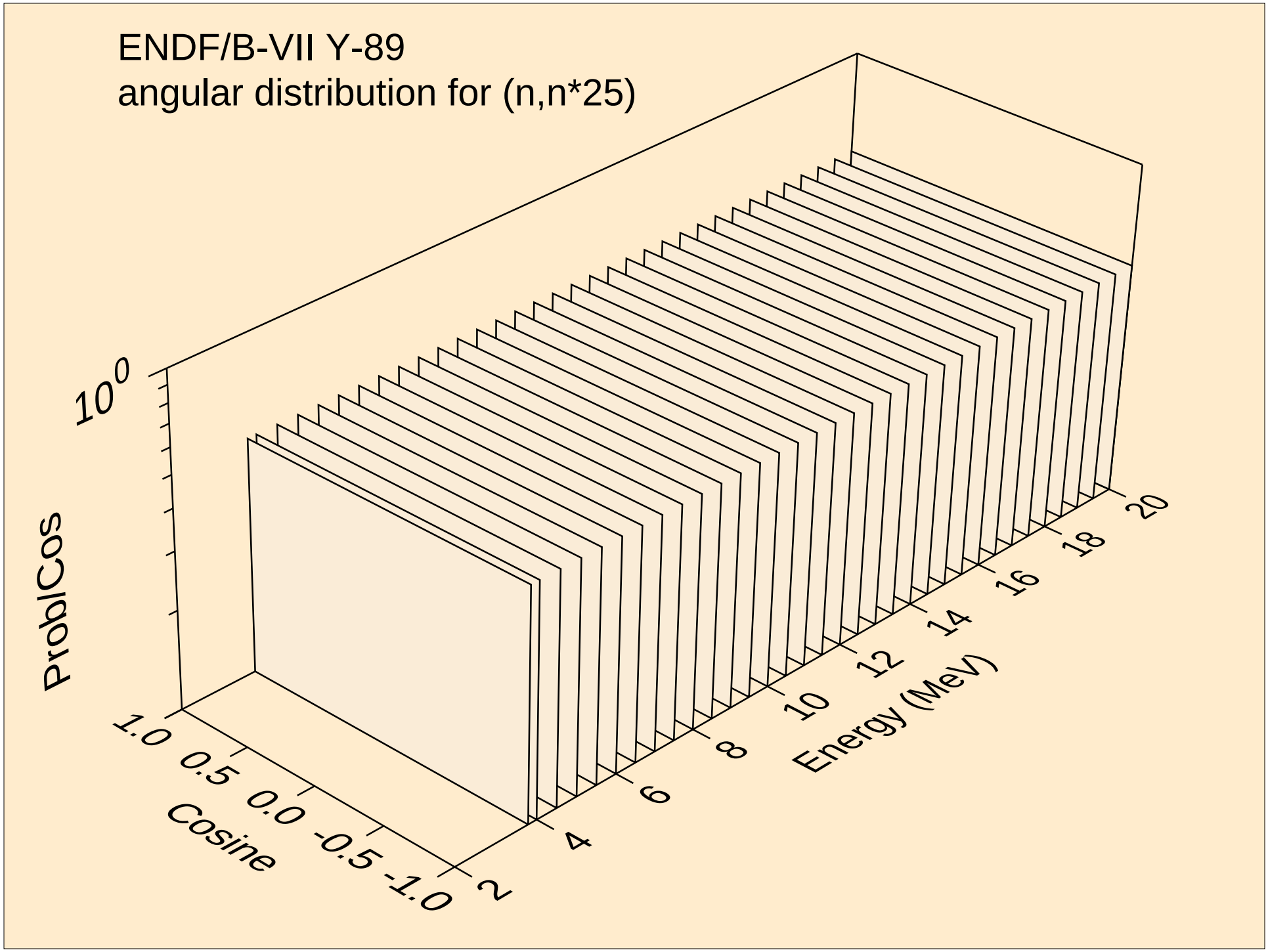

ENDF/B-VII Y-89
angular distribution for (n,n*20)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

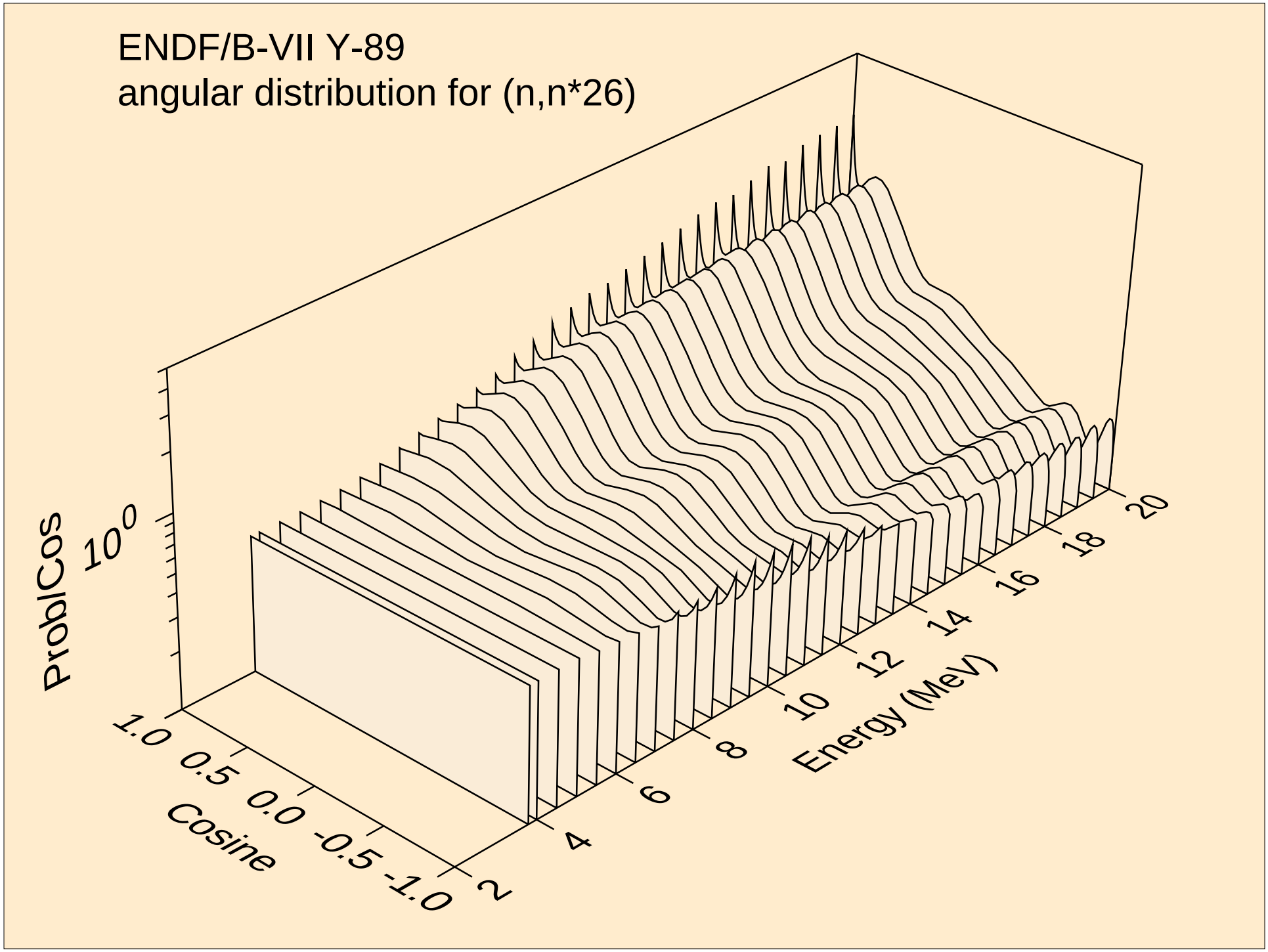

ENDF/B-VII Y-89
angular distribution for (n,n*21)
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

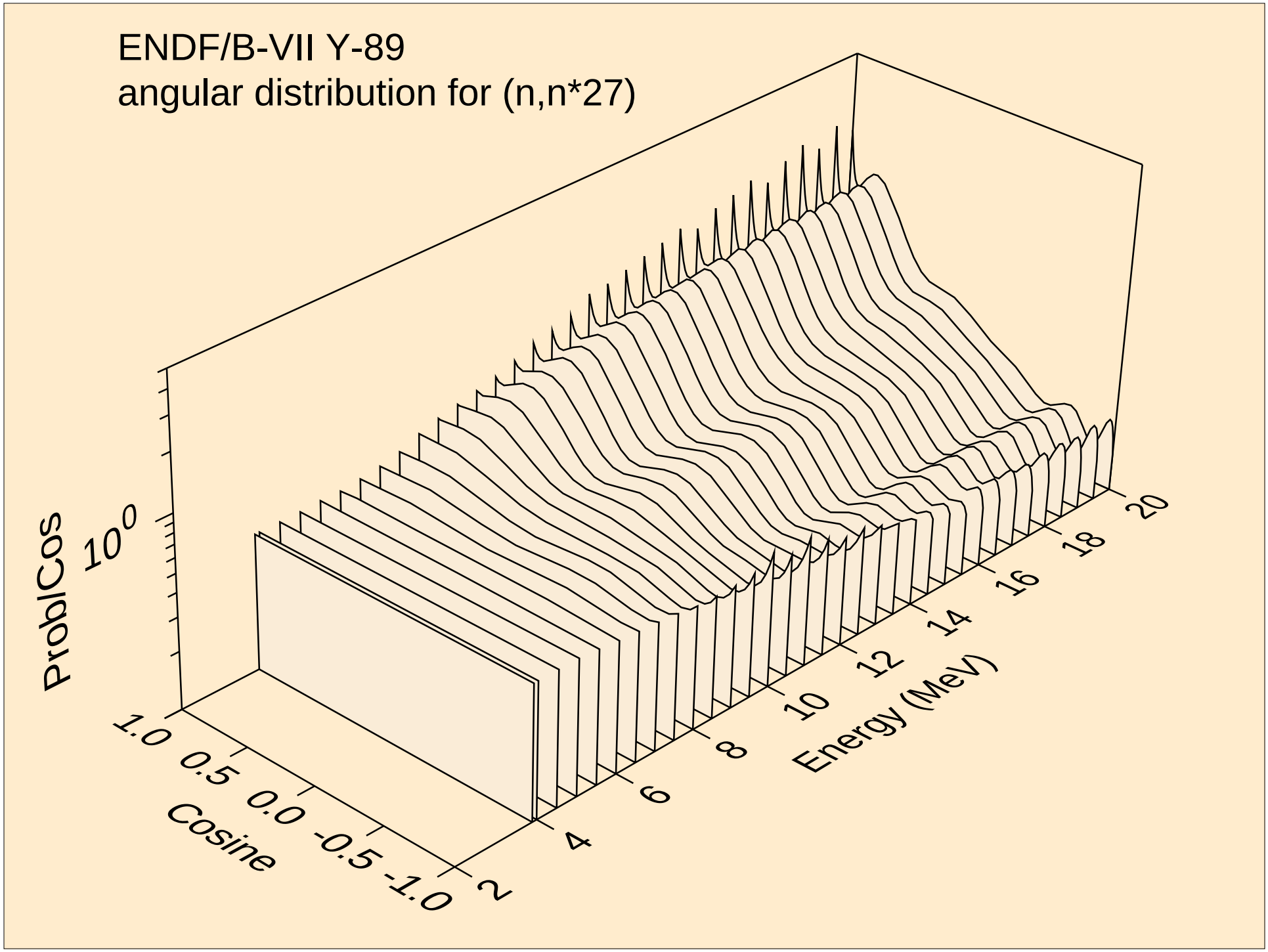

ENDF/B-VII Y-89
angular distribution for (n,n*22)
ProbCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

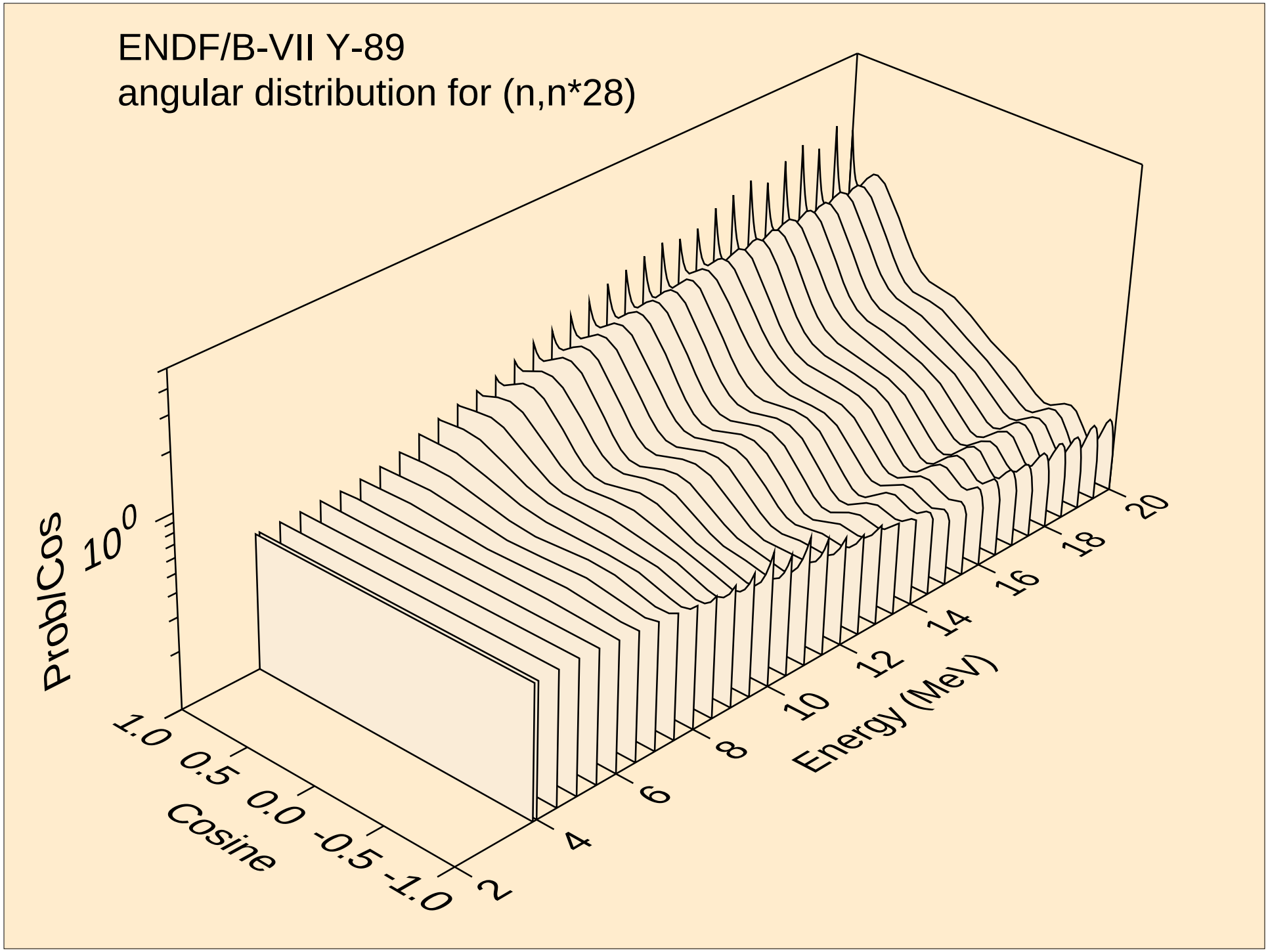

ENDF/B-VII Y-89
angular distribution for (n,n*23)
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

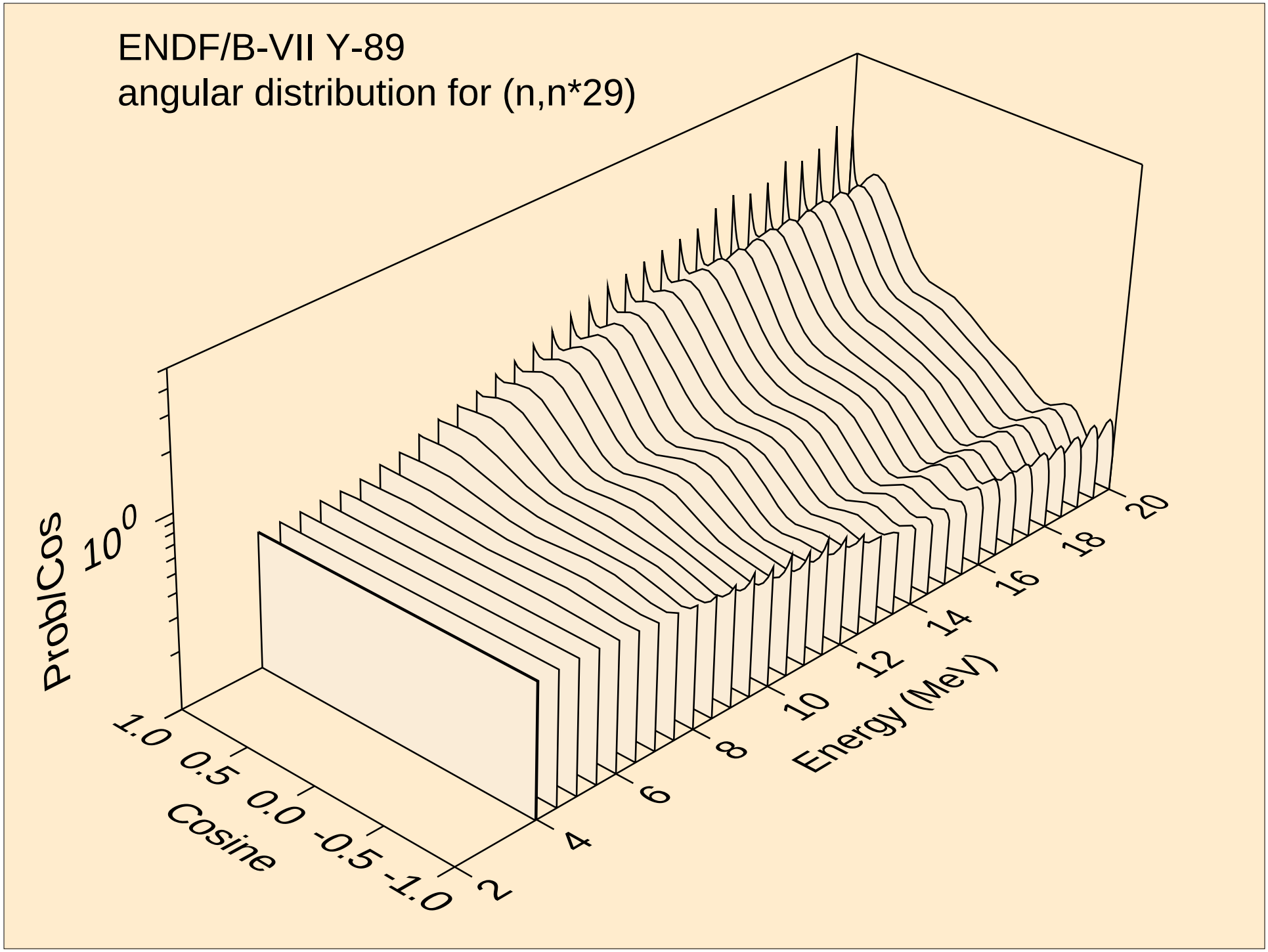

ENDF/B-VII Y-89
angular distribution for (n,n*24)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

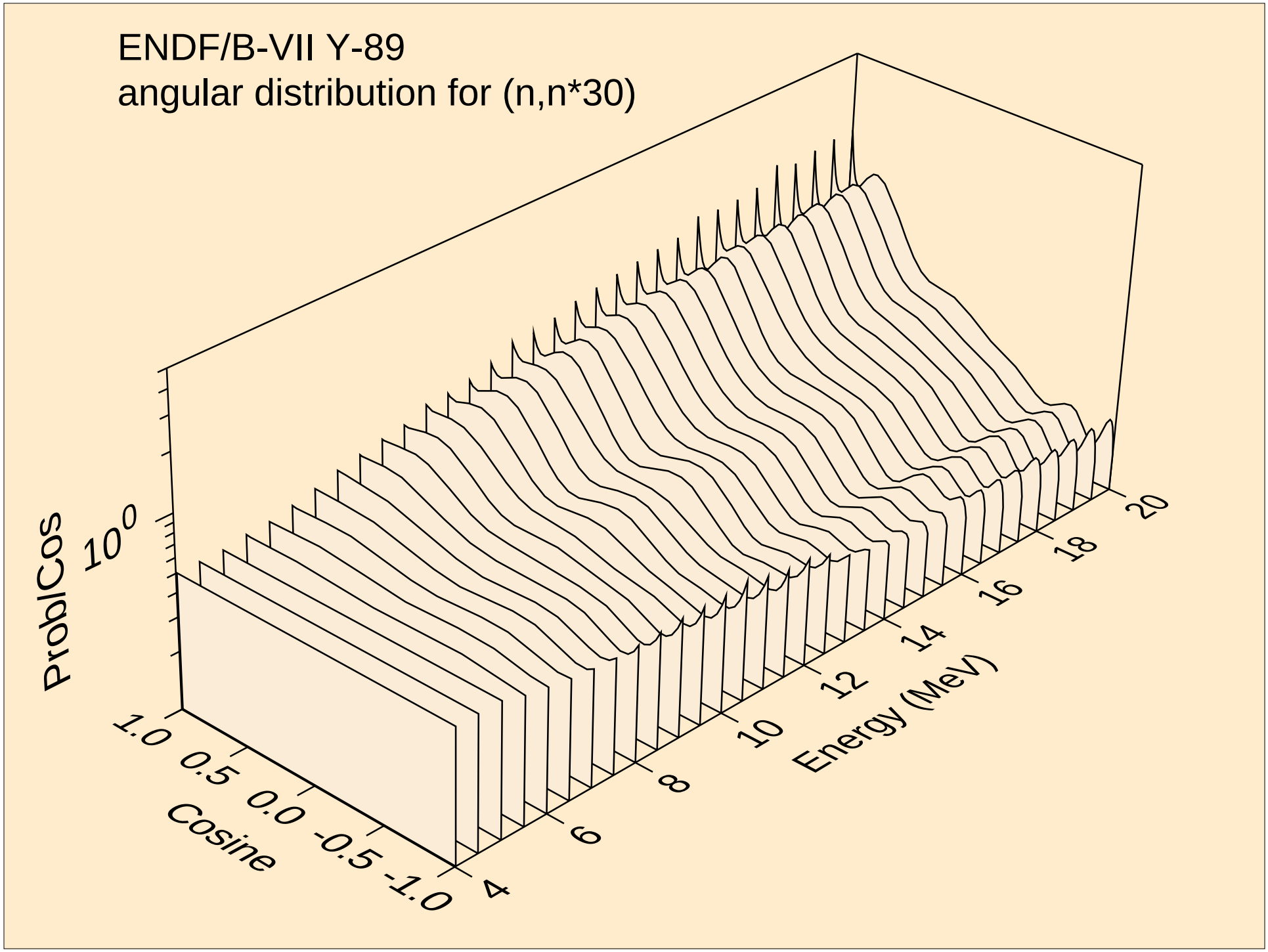

ENDF/B-VII Y-89
angular distribution for (n,n*25)
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

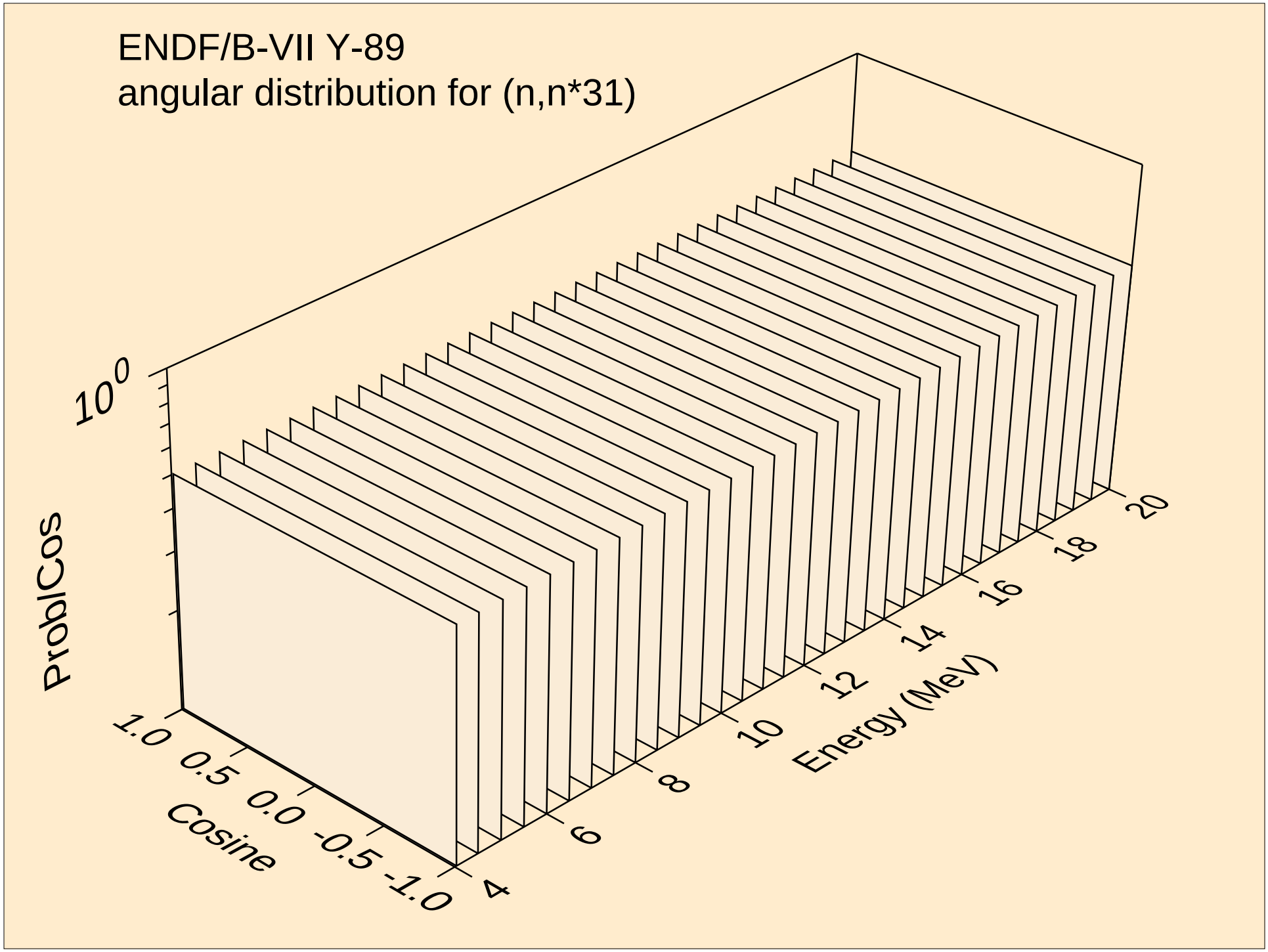

ENDF/B-VII Y-89
angular distribution for (n,n*26)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

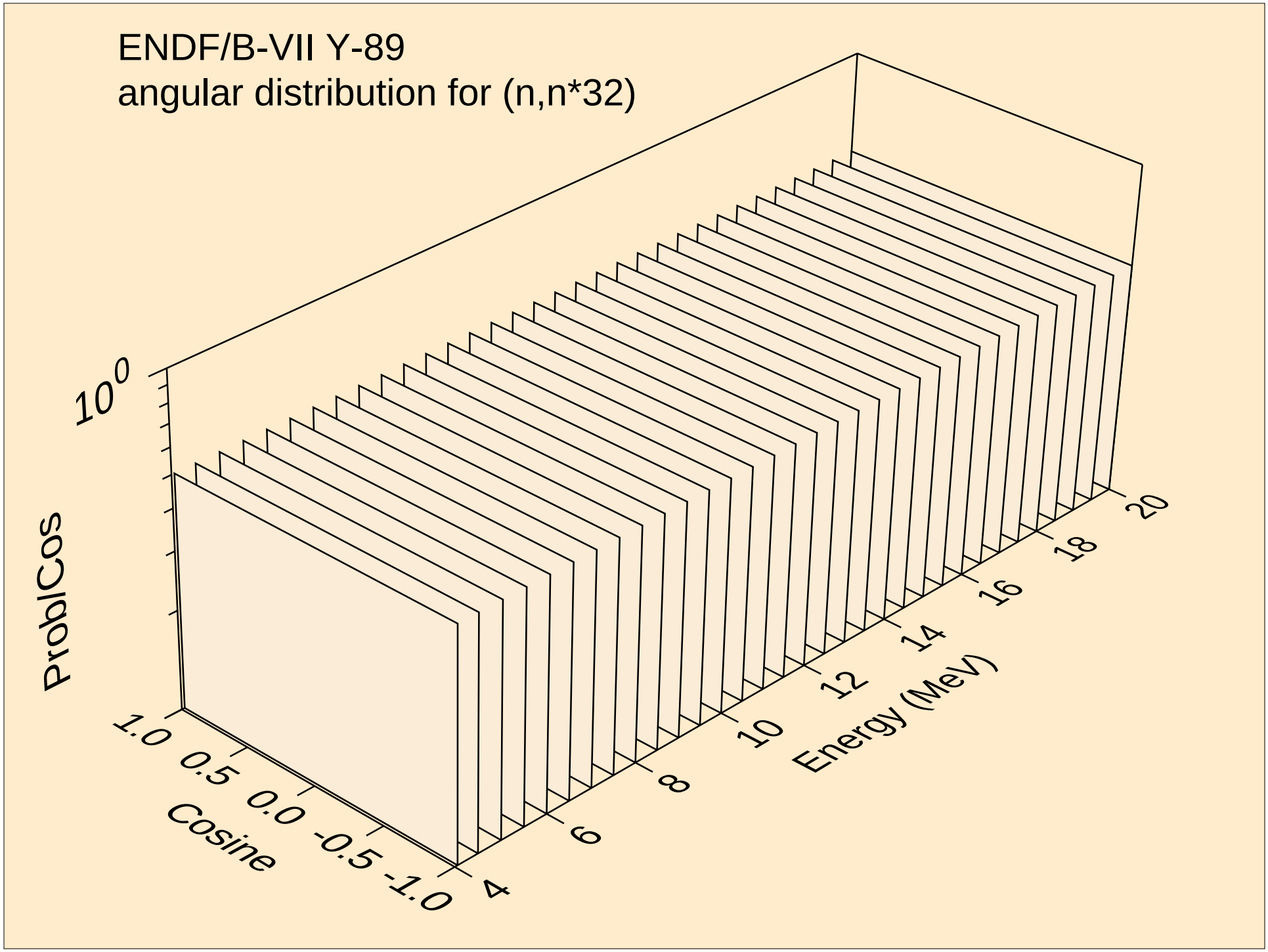

ENDF/B-VII Y-89
angular distribution for (n,n*27)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

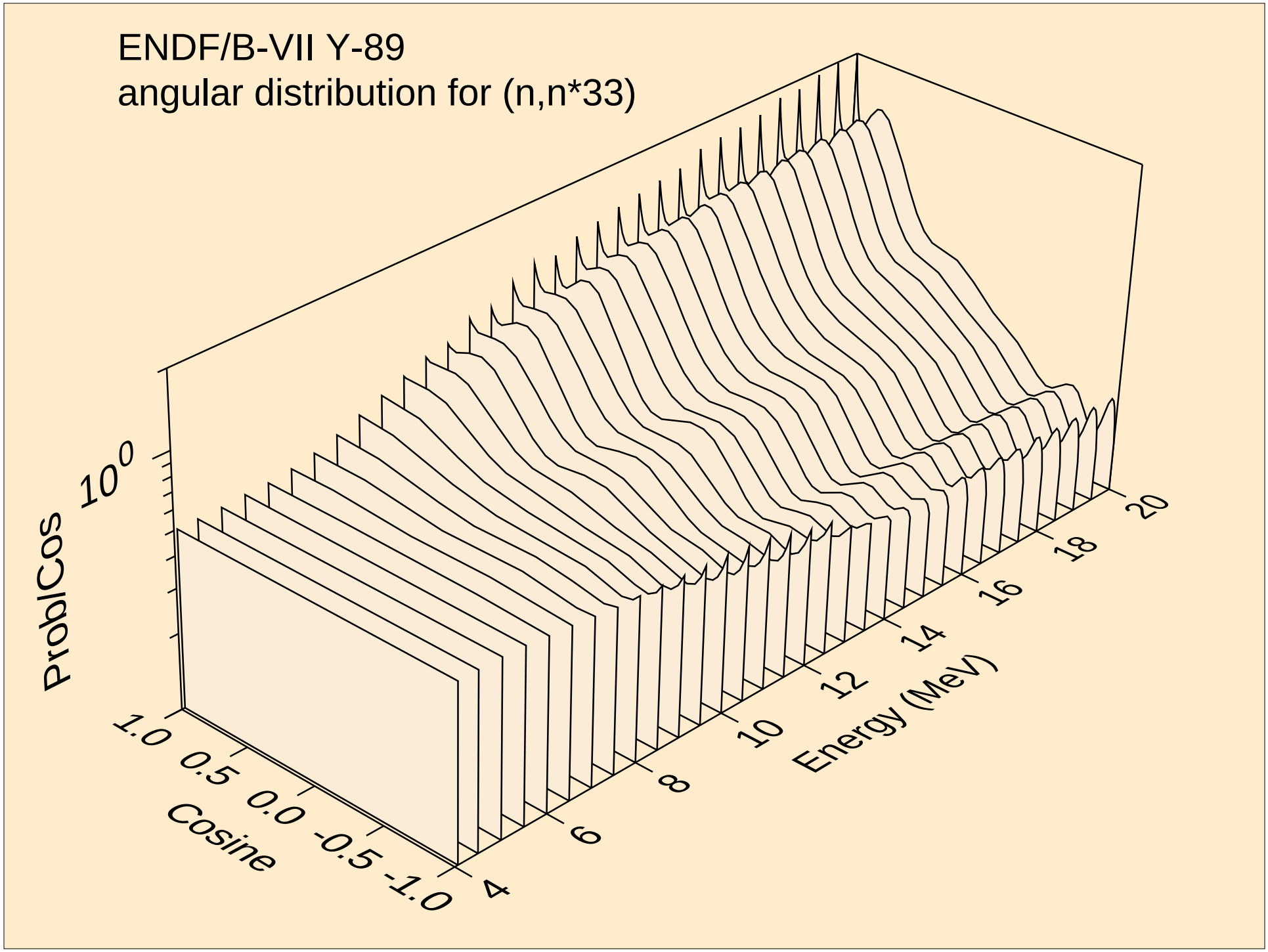

ENDF/B-VII Y-89
angular distribution for (n,n*28)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

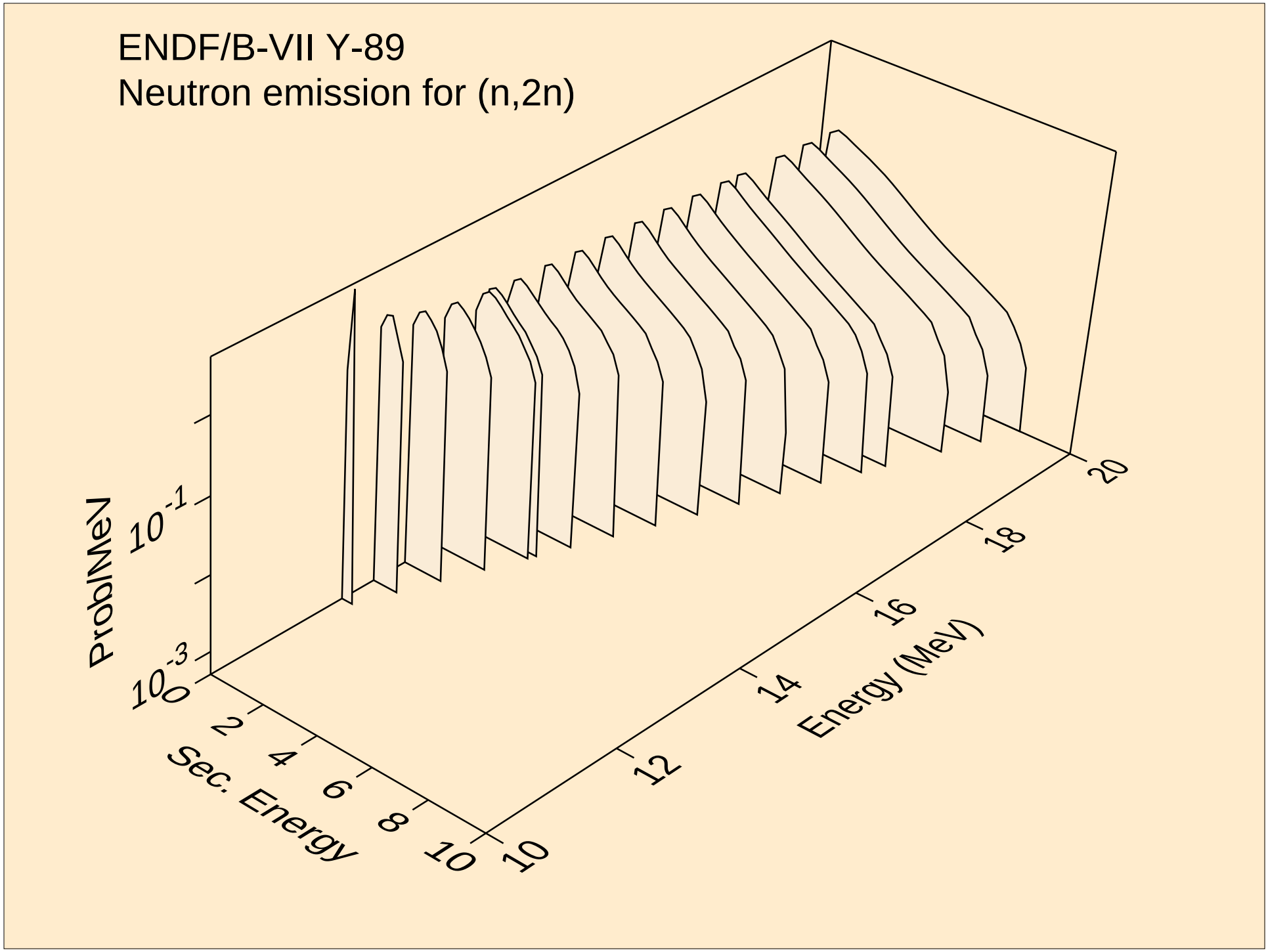

ENDF/B-VII Y-89
angular distribution for (n,n*29)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

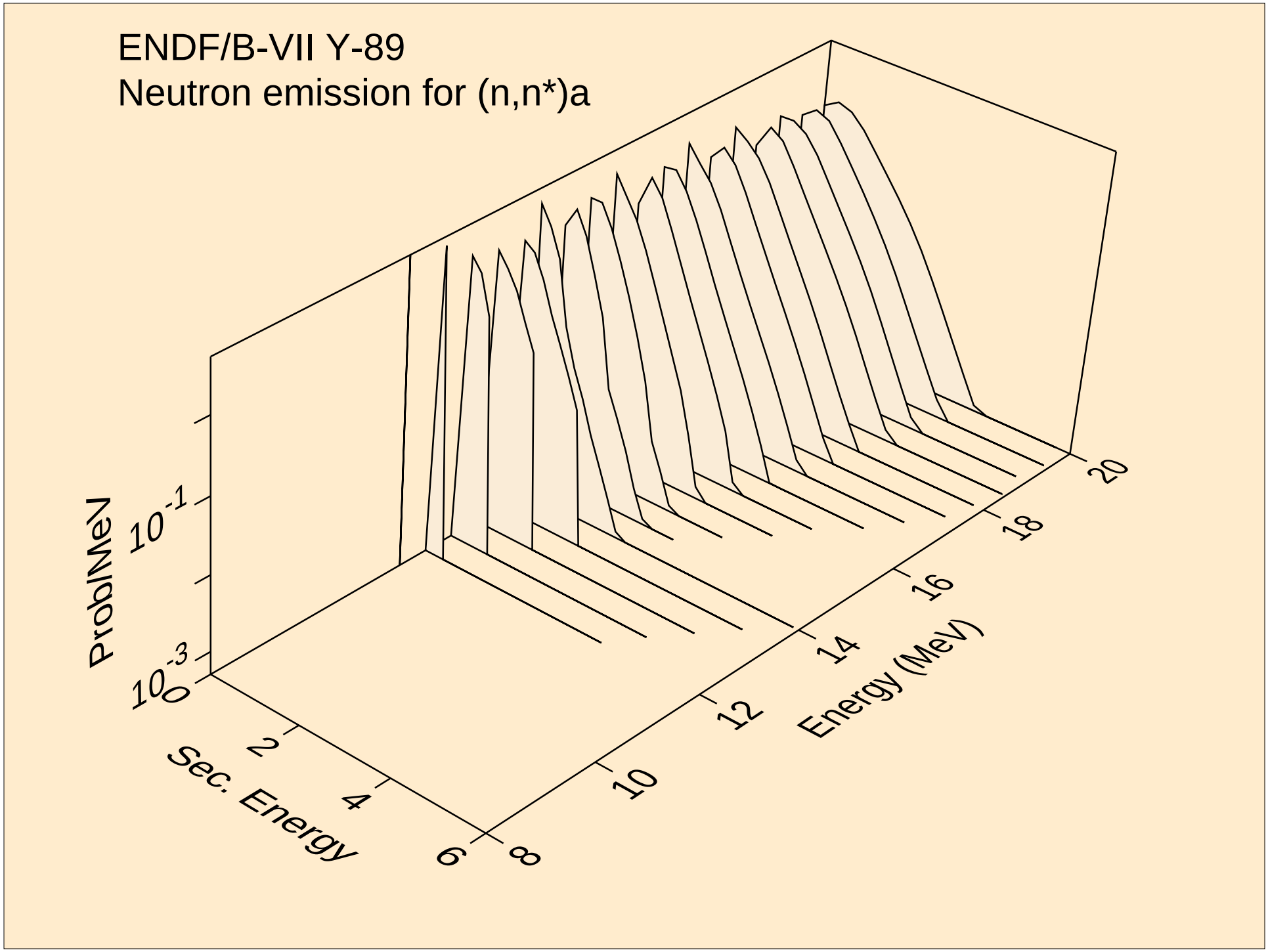

ENDF/B-VII Y-89
angular distribution for (n,n*30)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

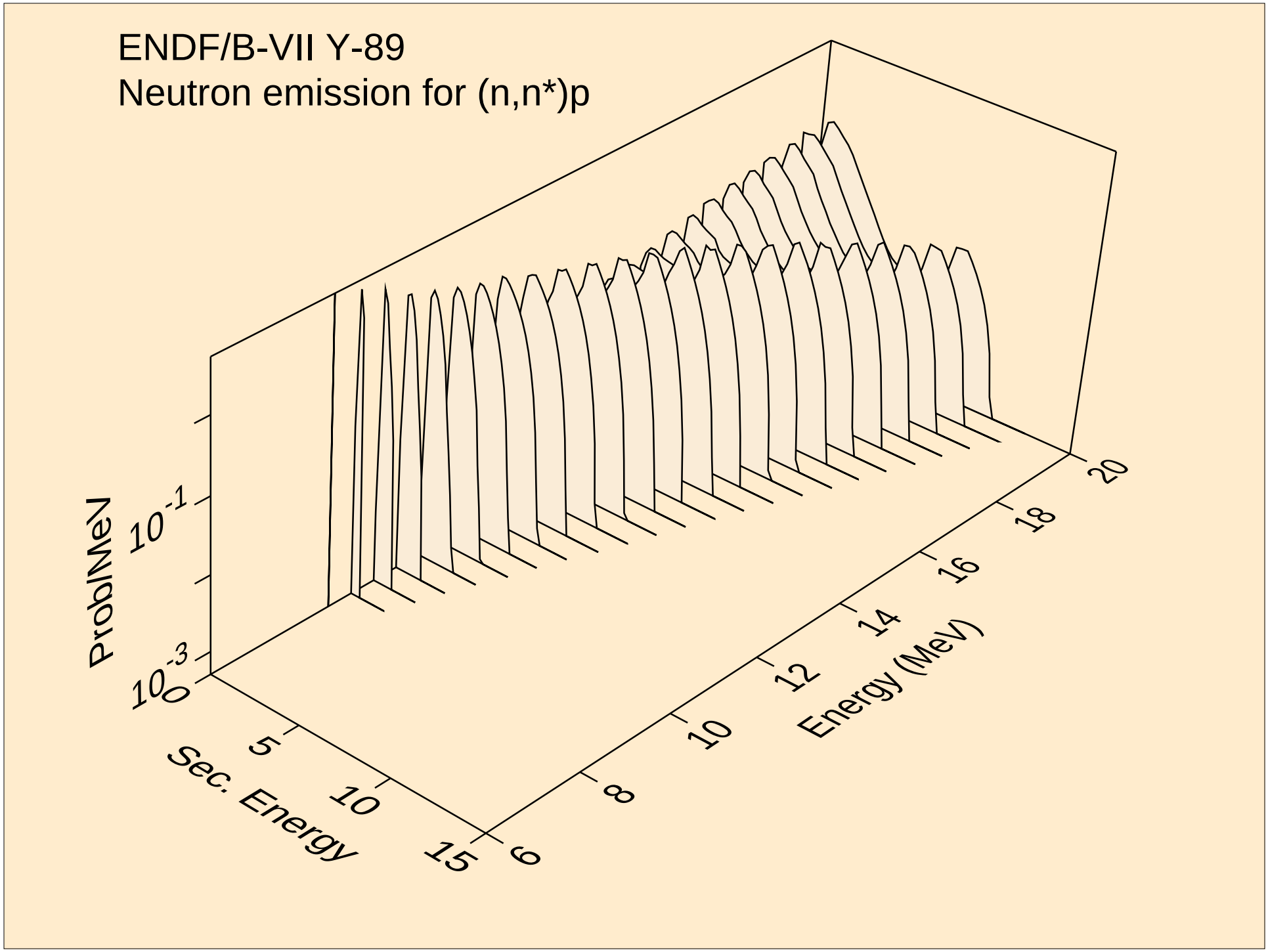

ENDF/B-VII Y-89
angular distribution for (n,n*31)
10^0
Prob/Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

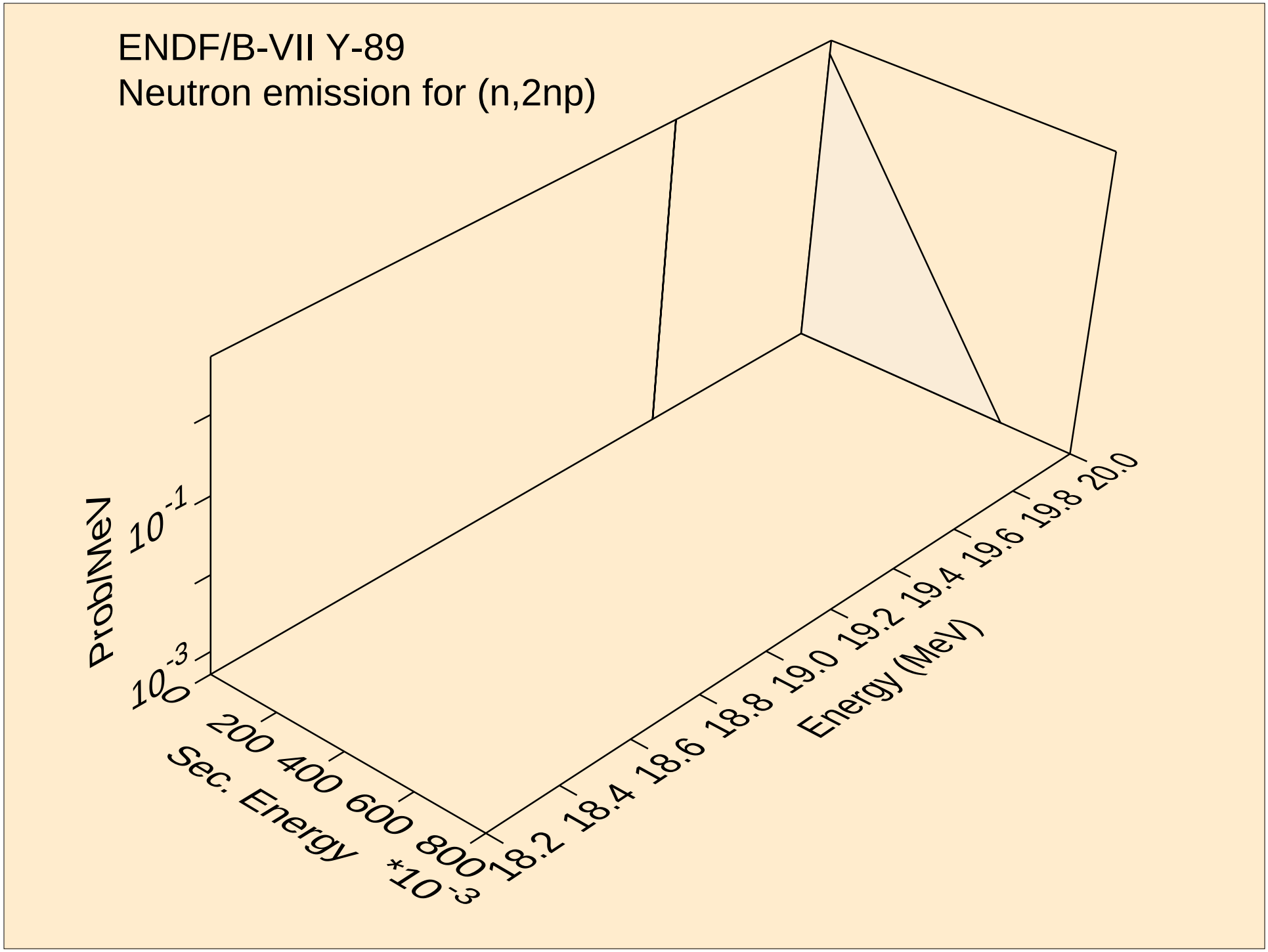

ENDF/B-VII Y-89
angular distribution for (n,n*32)
10^0
Prob/Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

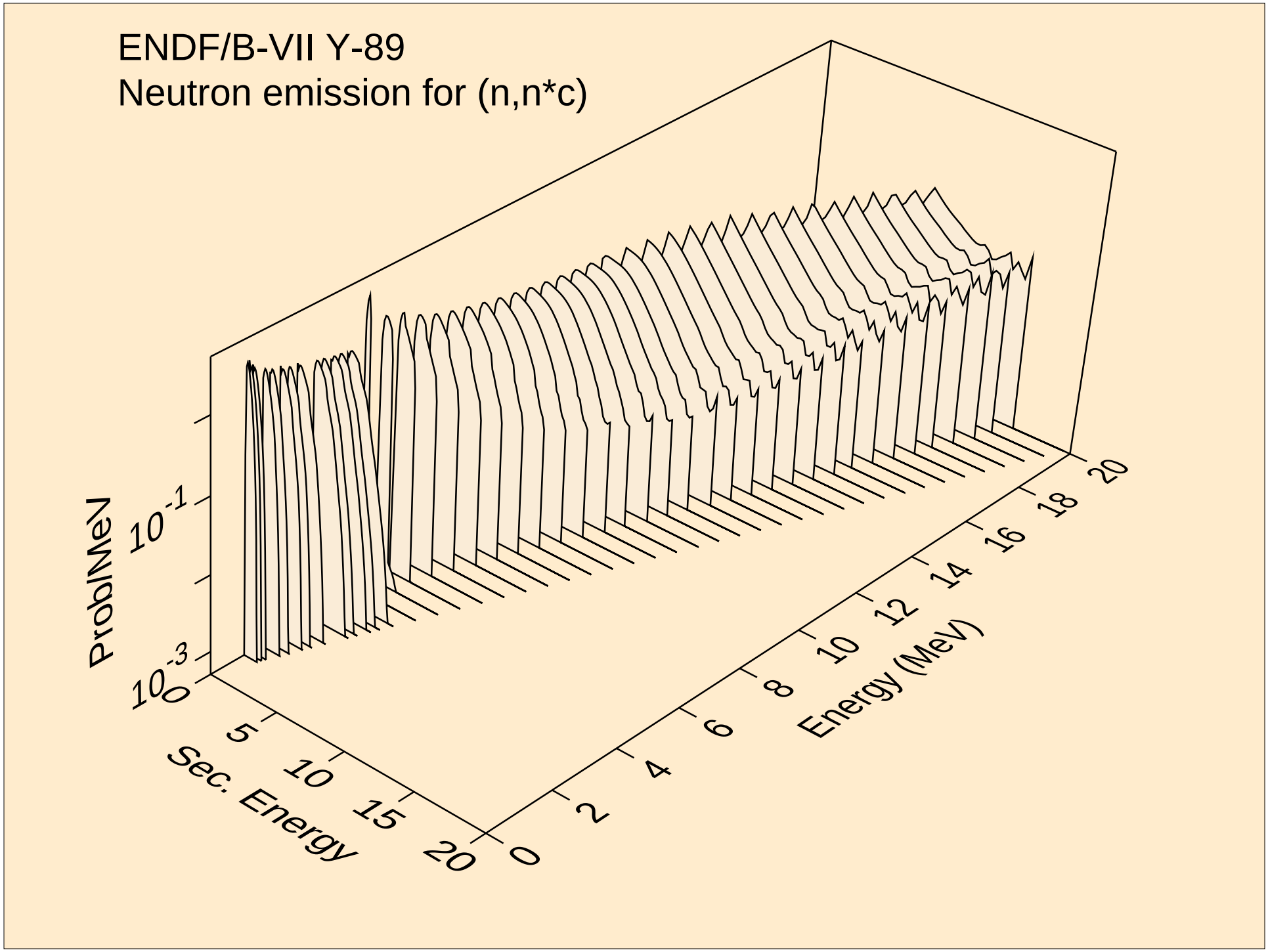

ENDF/B-VII Y-89
angular distribution for (n,n*33)
ProbCos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
4
6
8
10
12
14
16
18
20

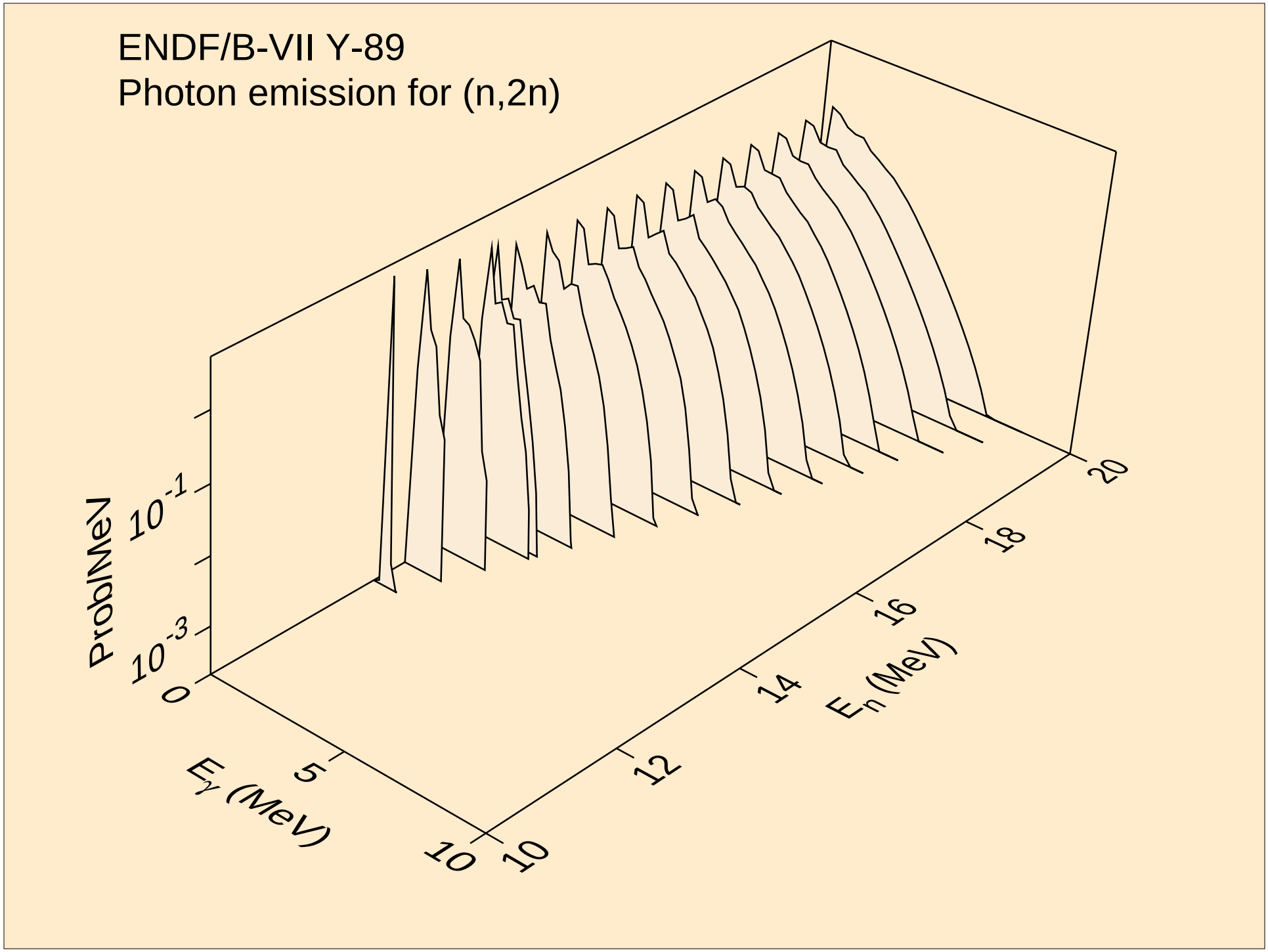

ENDF/B-VII Y-89
Neutron emission for (n,2n)
Prob/MeV
10^-1
10^-3
0
2
4
6
8
10
Sec. Energy
10
12
14
16
18
20
Energy (MeV)

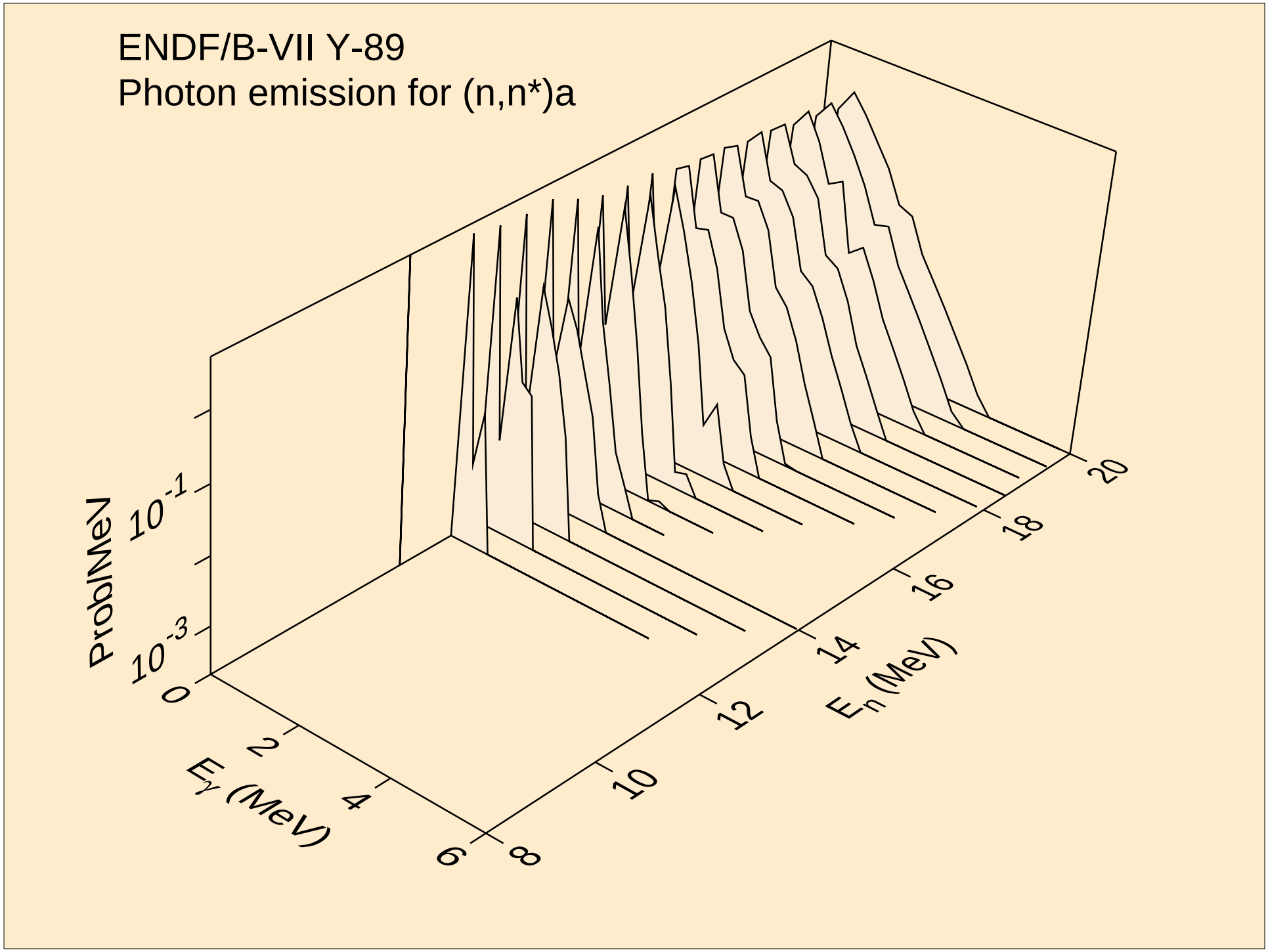

ENDF/B-VII Y-89
Neutron emission for (n,n*)a
Prob/MeV
10^{-1}
10^{-3}
0
2
4
6
8
Sec. Energy
10
12
14
16
18
20
Energy (MeV)


ENDF/B-VII Y-89
Neutron emission for (n,n*)p
Prob/MeV
10^-1
10^-3
0
5
10
15
Sec. Energy
6
8
10
12
14
16
18
20
Energy (MeV)

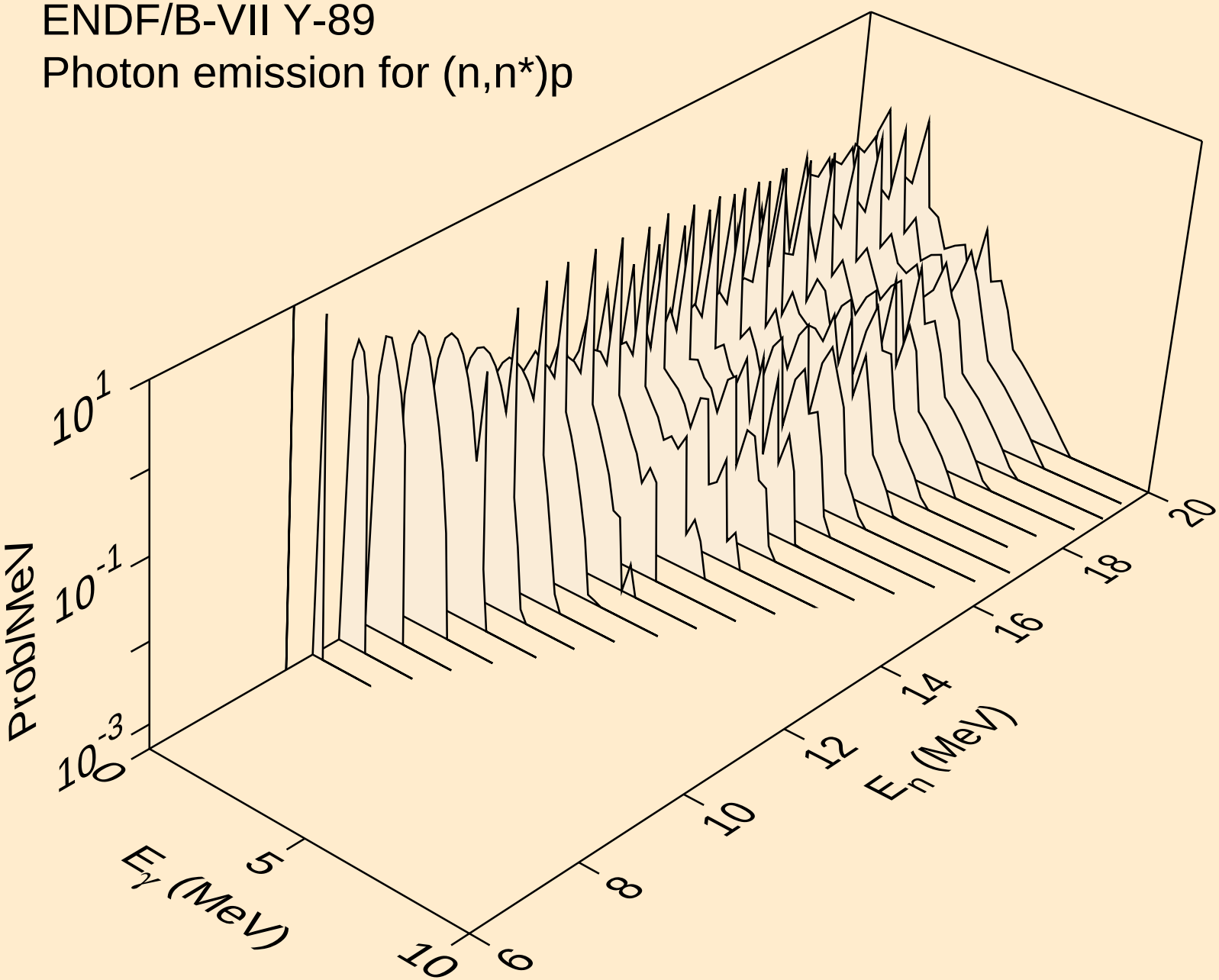

ENDF/B-VII Y-89
Neutron emission for (n,2np)
Prob/MeV
10^-1
10^-3
0
200 400 600 800
Sec. Energy
*10^-3
18.2 18.4 18.6 18.8 19.0 19.2 19.4 19.6 19.8 20.0
Energy (MeV)

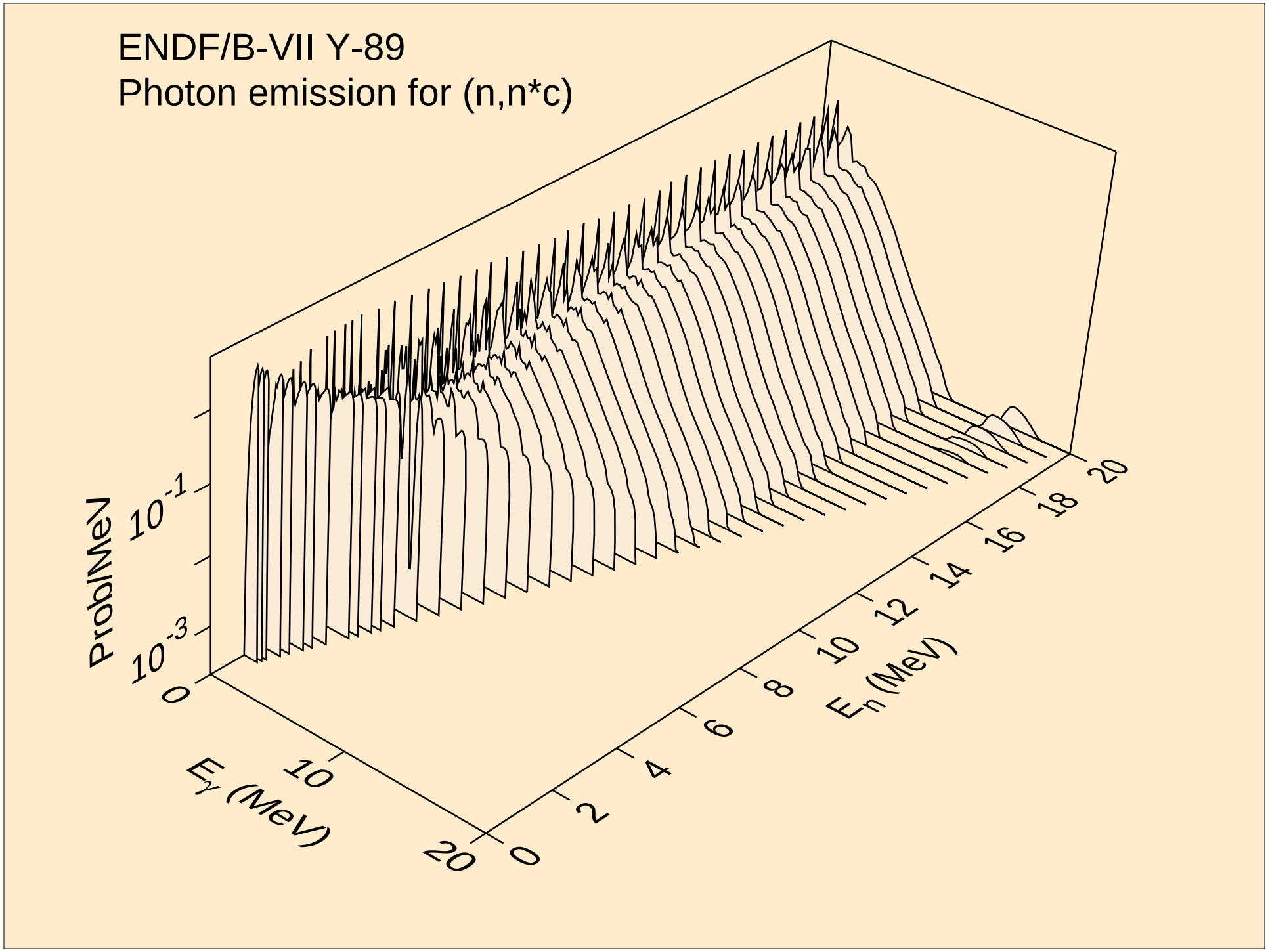

ENDF/B-VII Y-89
Neutron emission for (n,n*c)
Prob/MeV
10^{-1}
10^{-3}
0
5
10
15
20
Sec. Energy
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

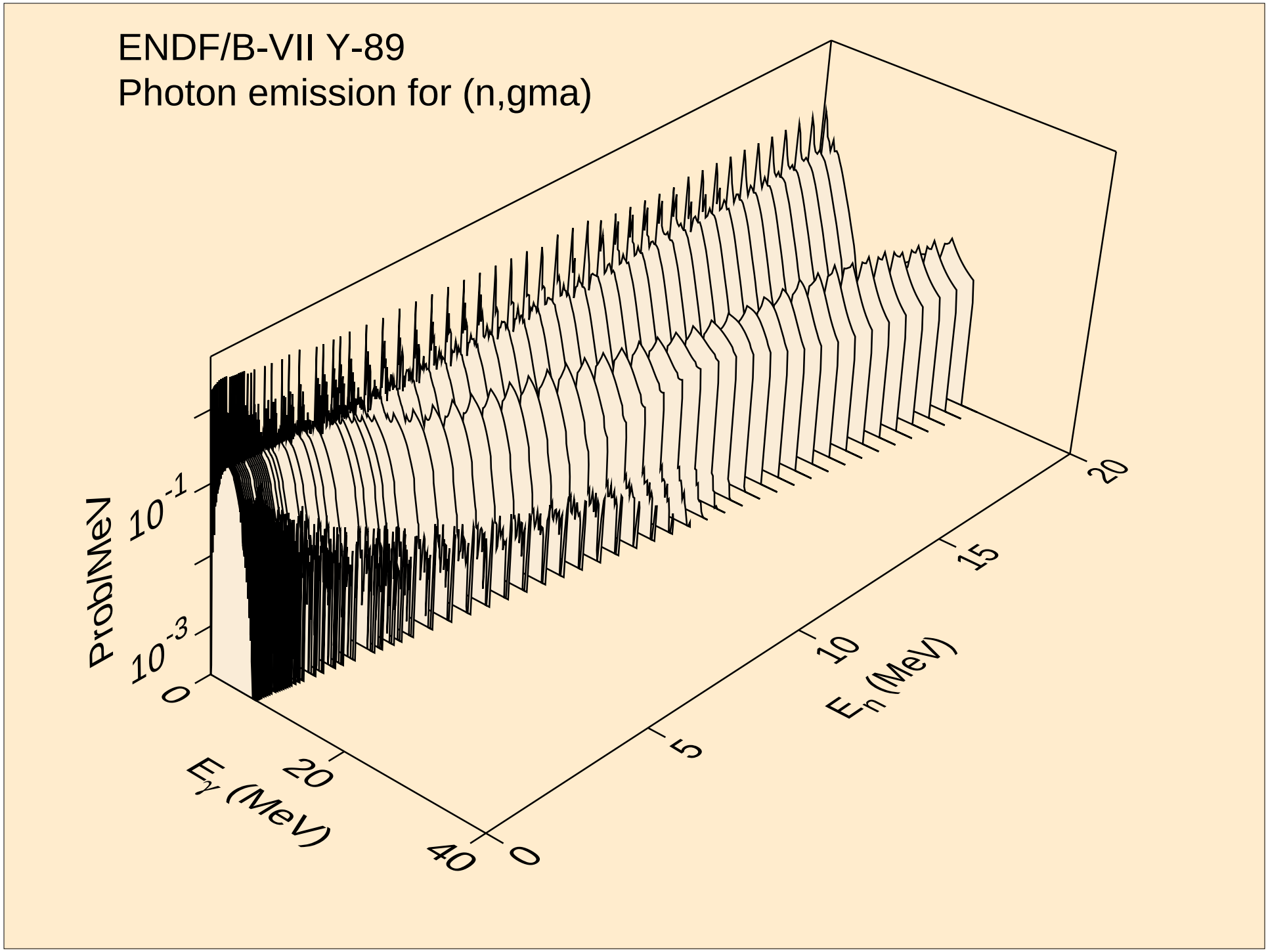

ENDF/B-VII Y-89
Photon emission for (n,2n)
Prob/MeV
10^{-1}
10^{-3}
0
5
10
E_γ (MeV)
10
12
14
16
18
20
E_n (MeV)

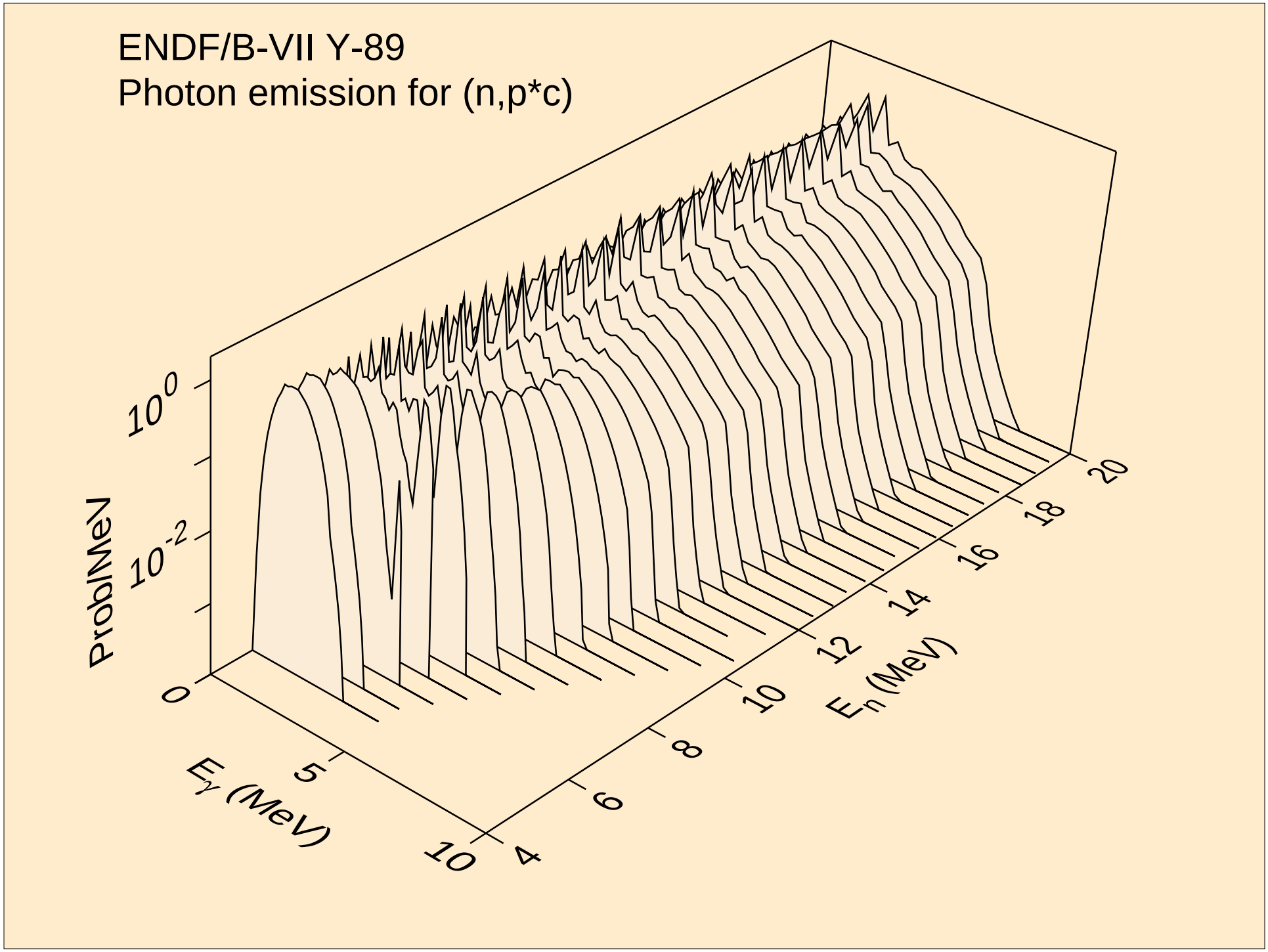

ENDF/B-VII Y-89
Photon emission for (n,n*)a
Prob/MeV
10^-1
10^-3
0
2
4
6
8
10
12
14
16
18
20
Eγ (MeV)
En (MeV)

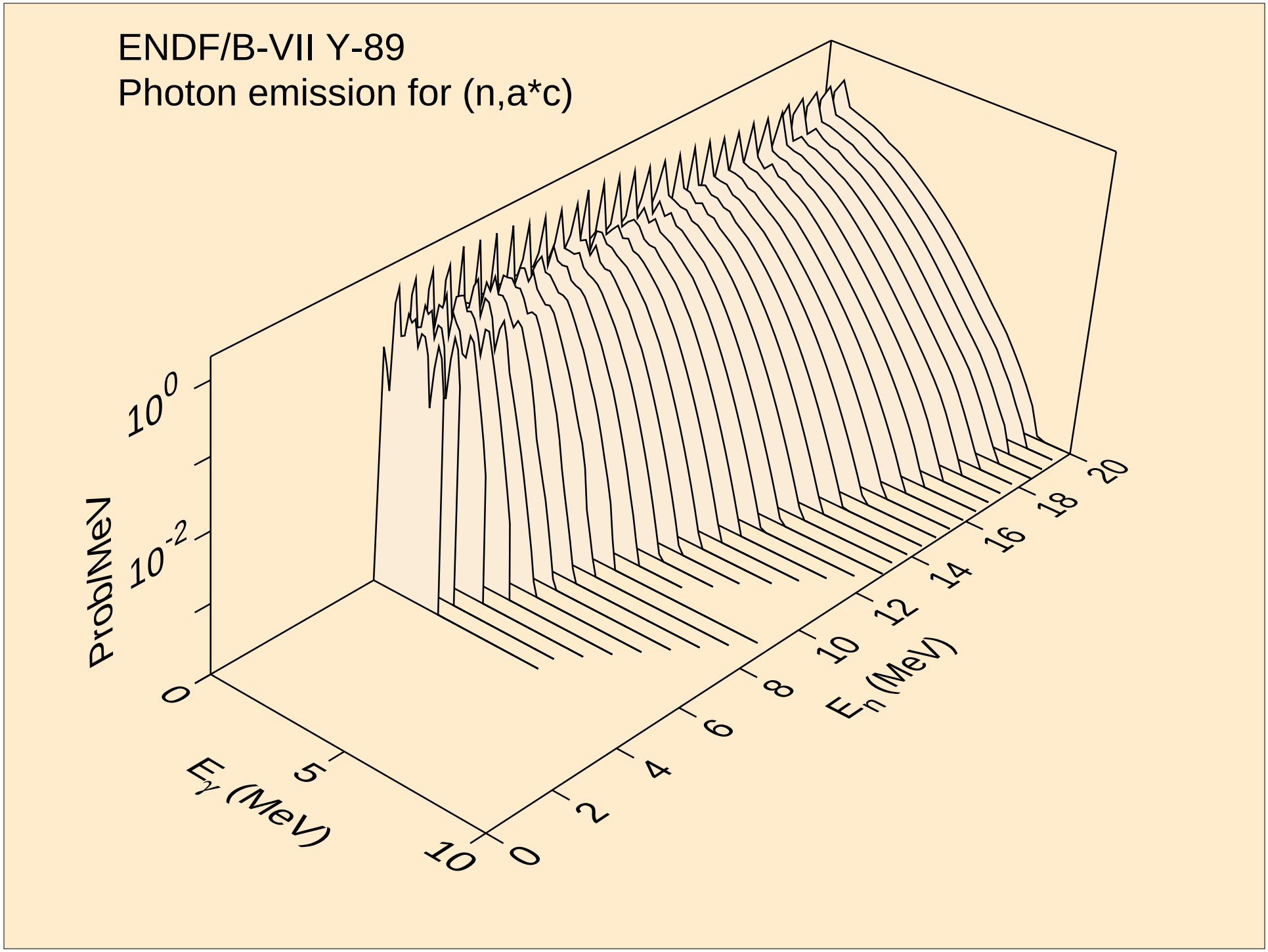
ENDF/B-VII Y-89
Photon emission for (n,n*)p

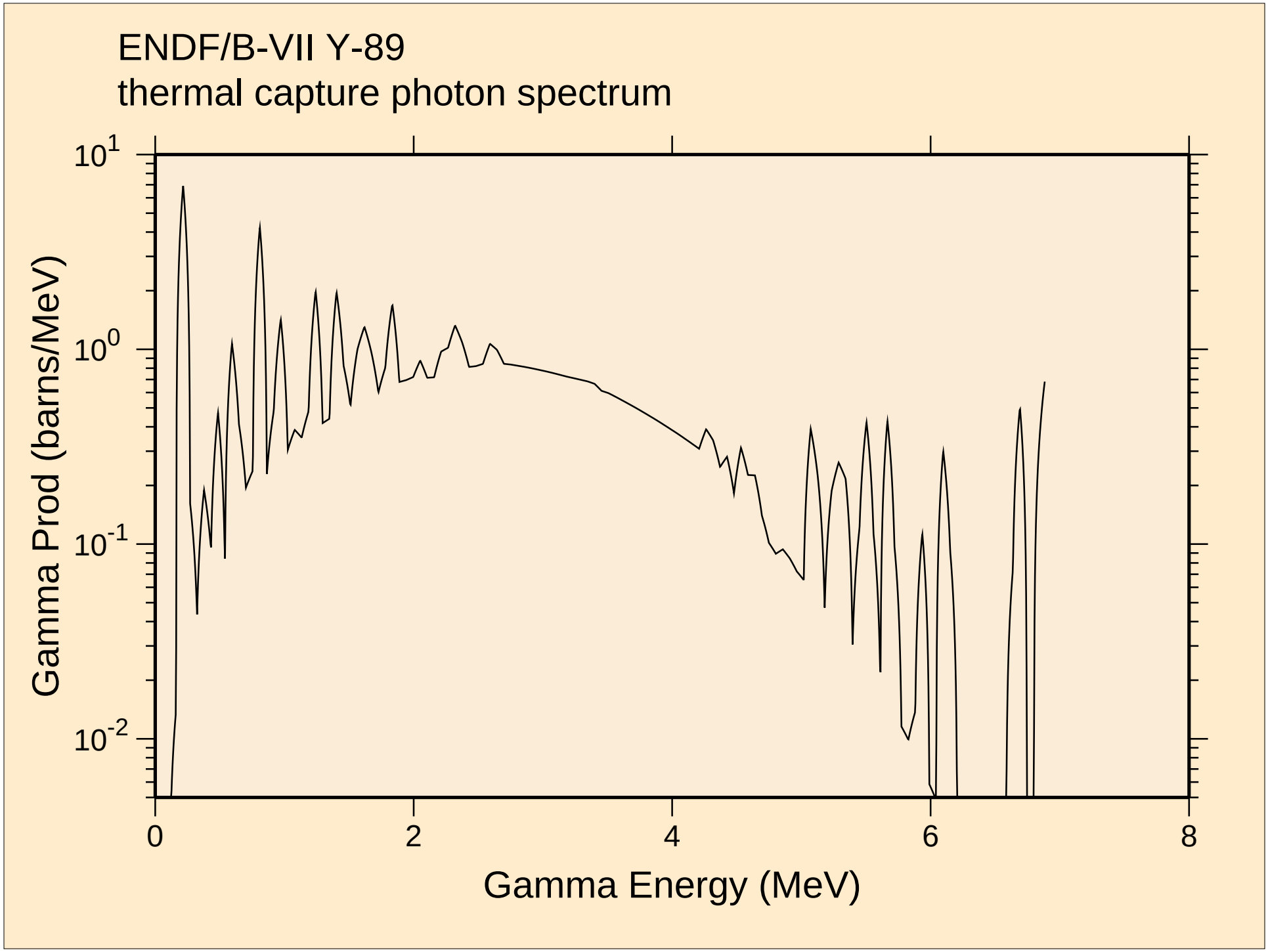


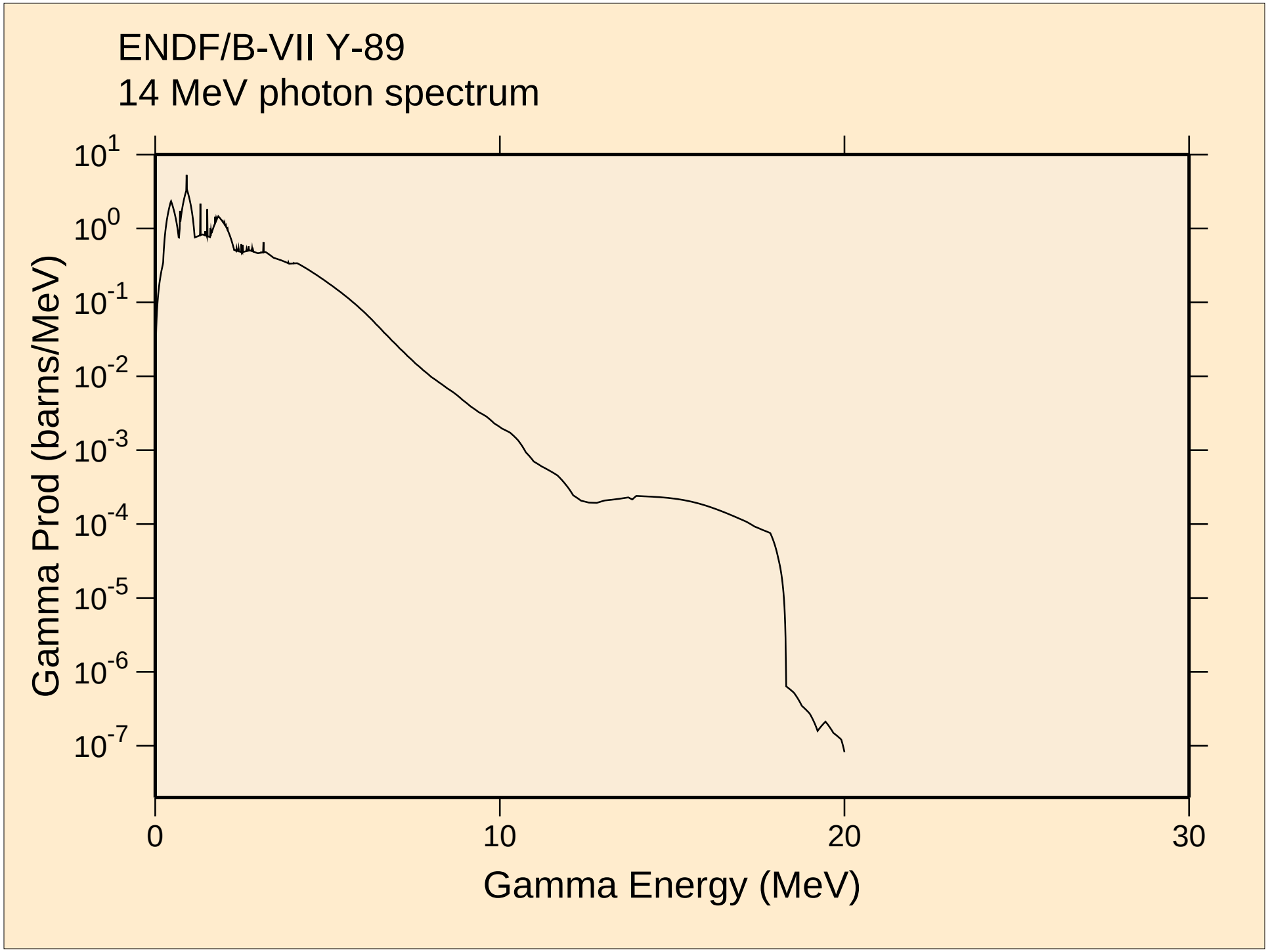

ENDF/B-VII Y-89
Photon emission for (n,n*c)
Prob/MeV
10^{-1}
10^{-3}
0
10
20
E_γ (MeV)
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

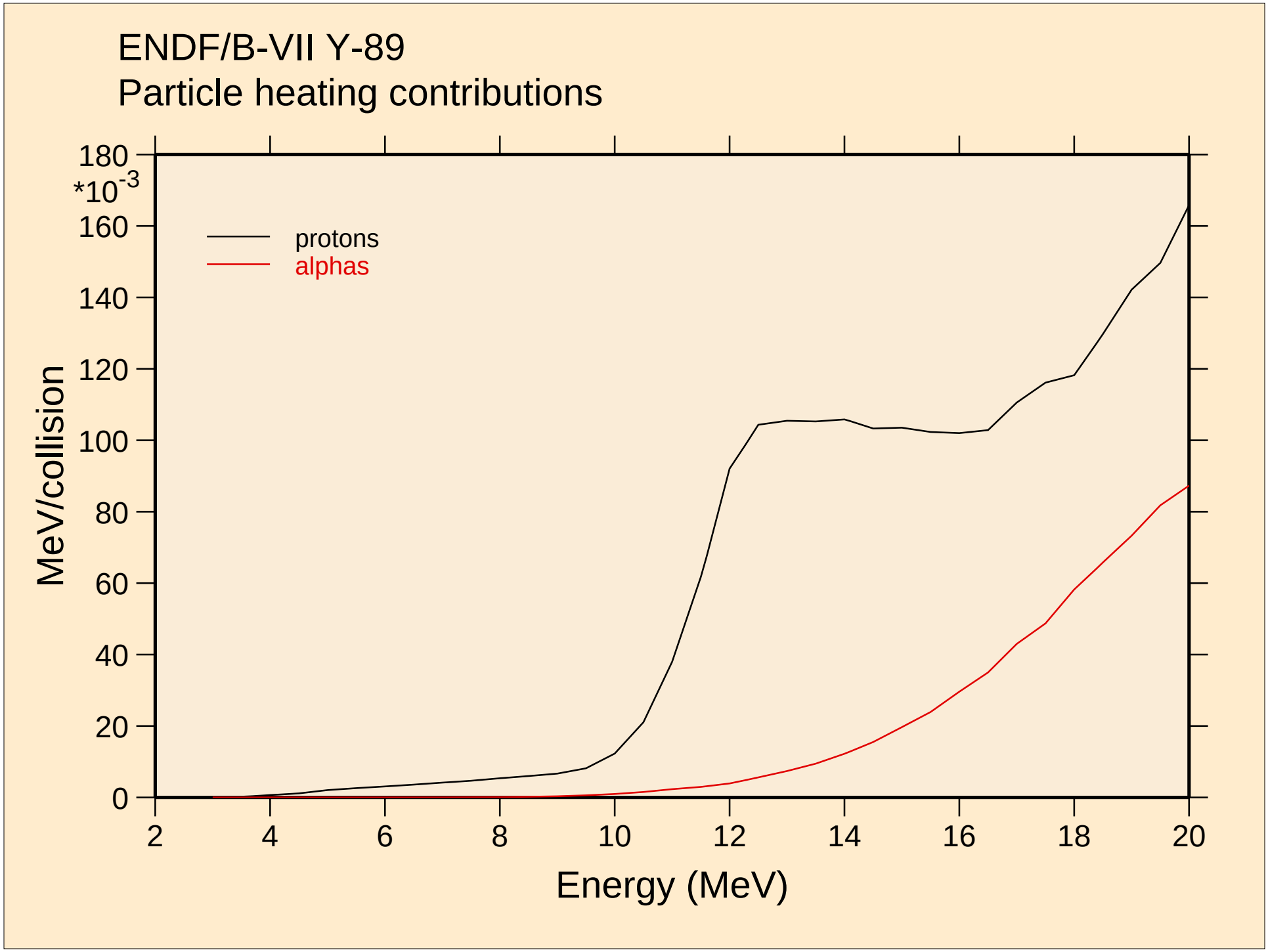

ENDF/B-VII Y-89
Photon emission for (n,gma)
Prob/MeV
10^{-1}
10^{-3}
0
20
40
E_γ (MeV)
0
5
10
15
20
E_n (MeV)

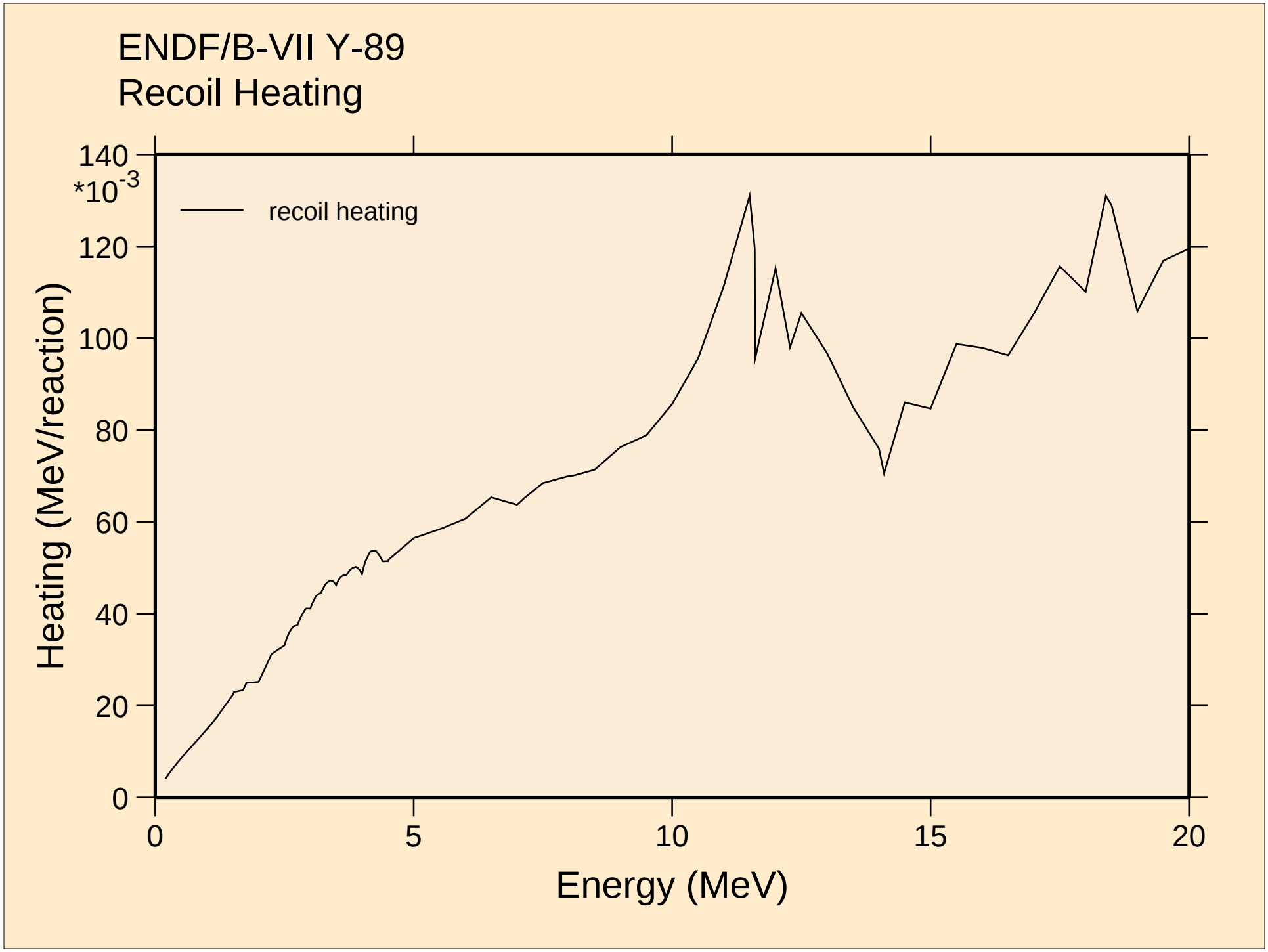

ENDF/B-VII Y-89
Photon emission for (n,p*c)
Prob/MeV
10^0
10^{-2}
0
5
10
E_γ (MeV)
4
6
8
10
12
14
16
18
20
E_n (MeV)

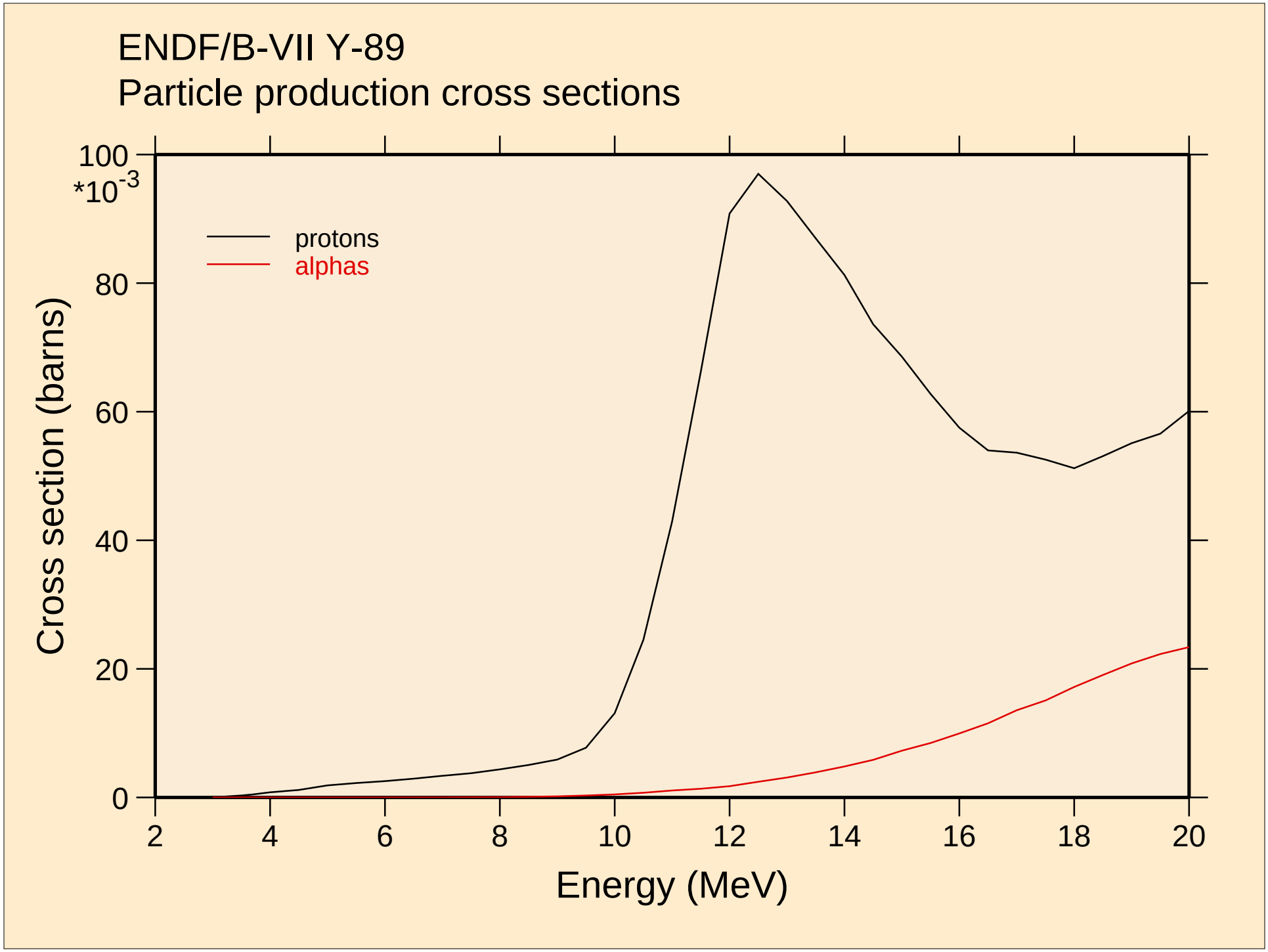

ENDF/B-VII Y-89
Photon emission for (n,a*c)
Prob/MeV
10^0
10^{-2}
0
5
10
E_γ (MeV)
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

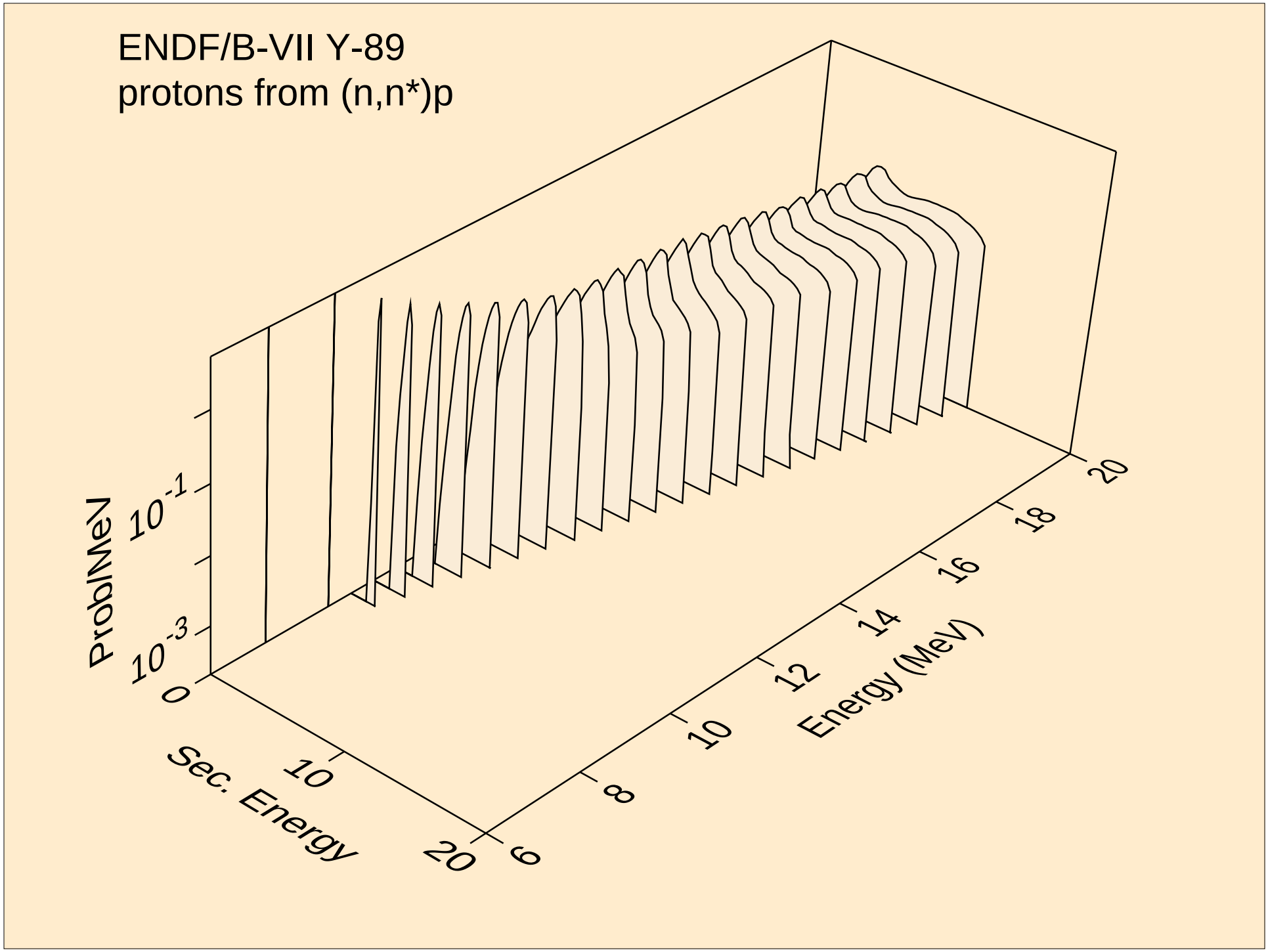

ENDF/B-VII Y-89
thermal capture photon spectrum
Gamma Prod (barns/MeV)
10^1
10^0
10^-1
10^-2
0
2
4
6
8
Gamma Energy (MeV)

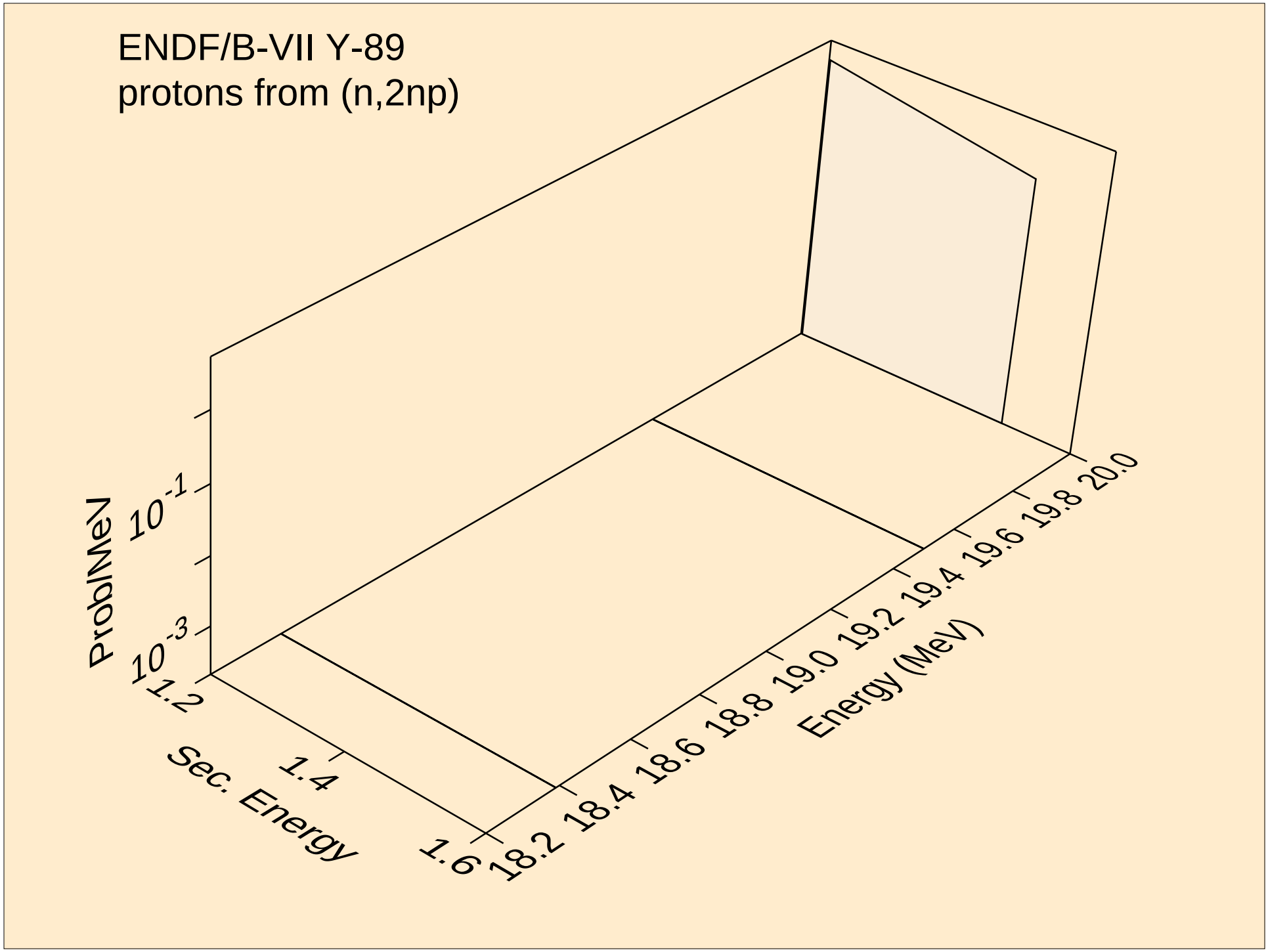

ENDF/B-VII Y-89
14 MeV photon spectrum
Gamma Prod (barns/MeV)
10^1
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
10^-6
10^-7
0
10
20
30
Gamma Energy (MeV)

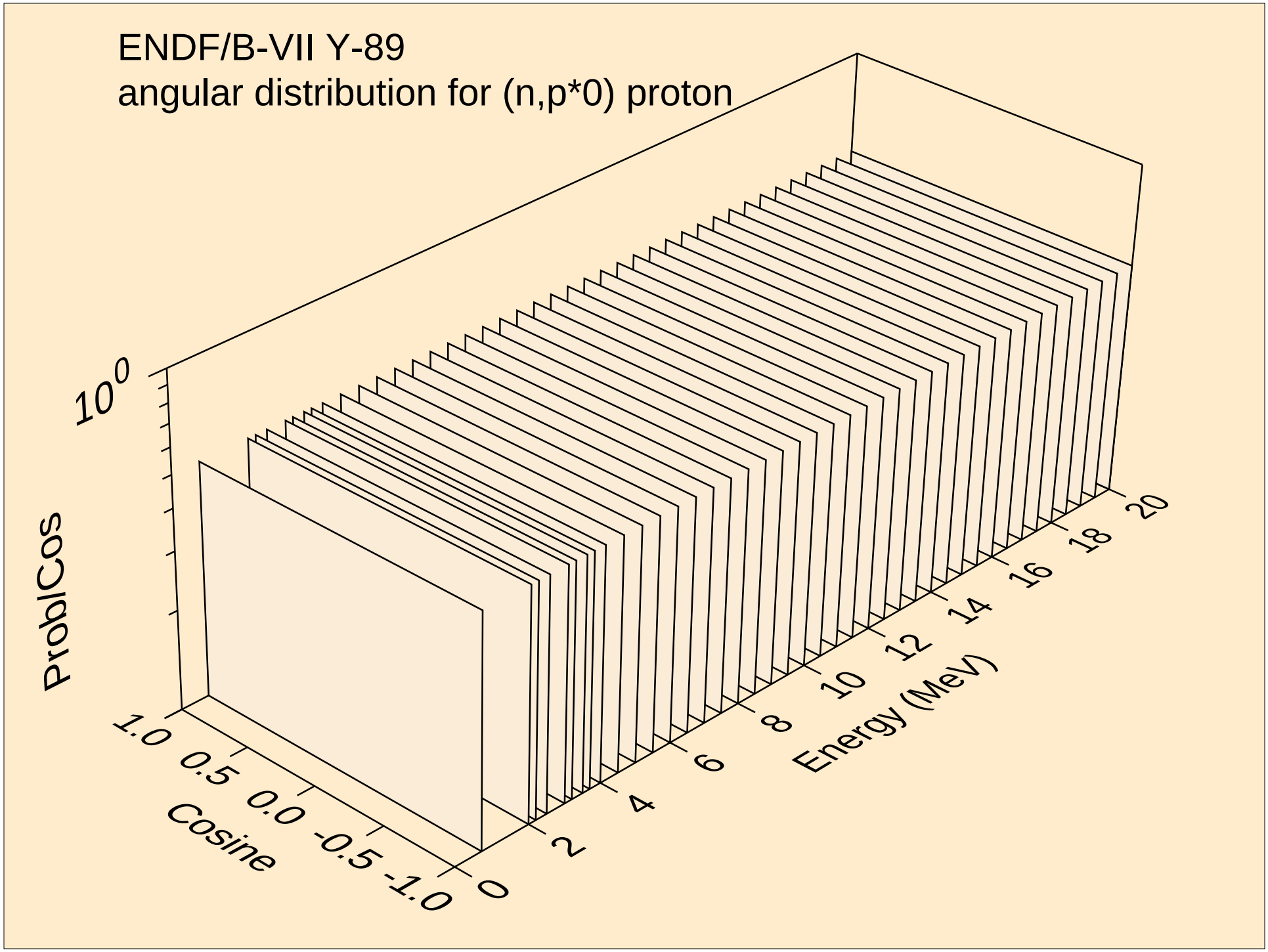

ENDF/B-VII Y-89
Particle heating contributions
protons
alphas
MeV/collision
*10-3
180
160
140
120
100
80
60
40
20
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

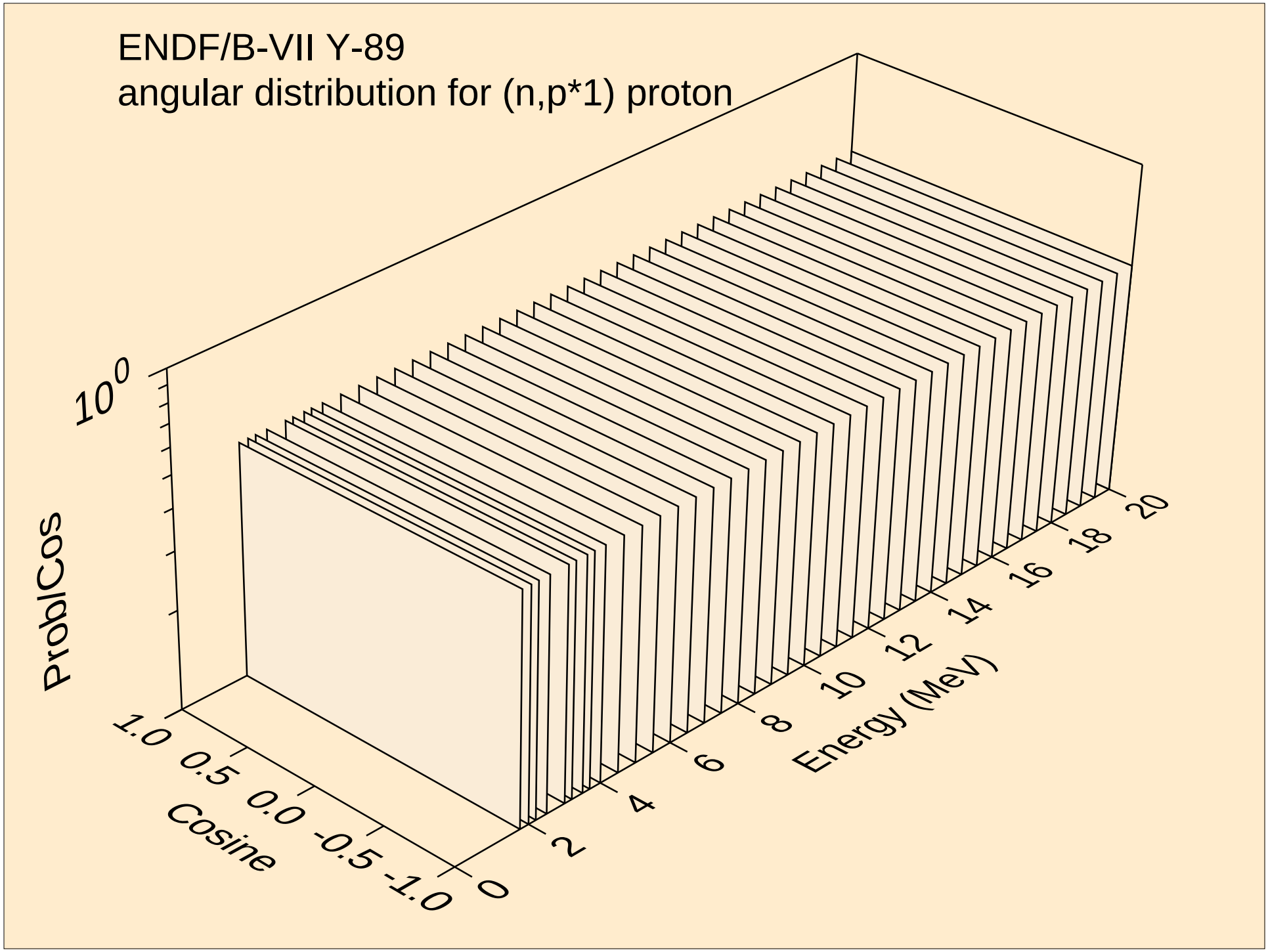

ENDF/B-VII Y-89
Recoil Heating
recoil heating
Heating (MeV/reaction)
*10^-3
140
120
100
80
60
40
20
0
0
5
10
15
20
Energy (MeV)

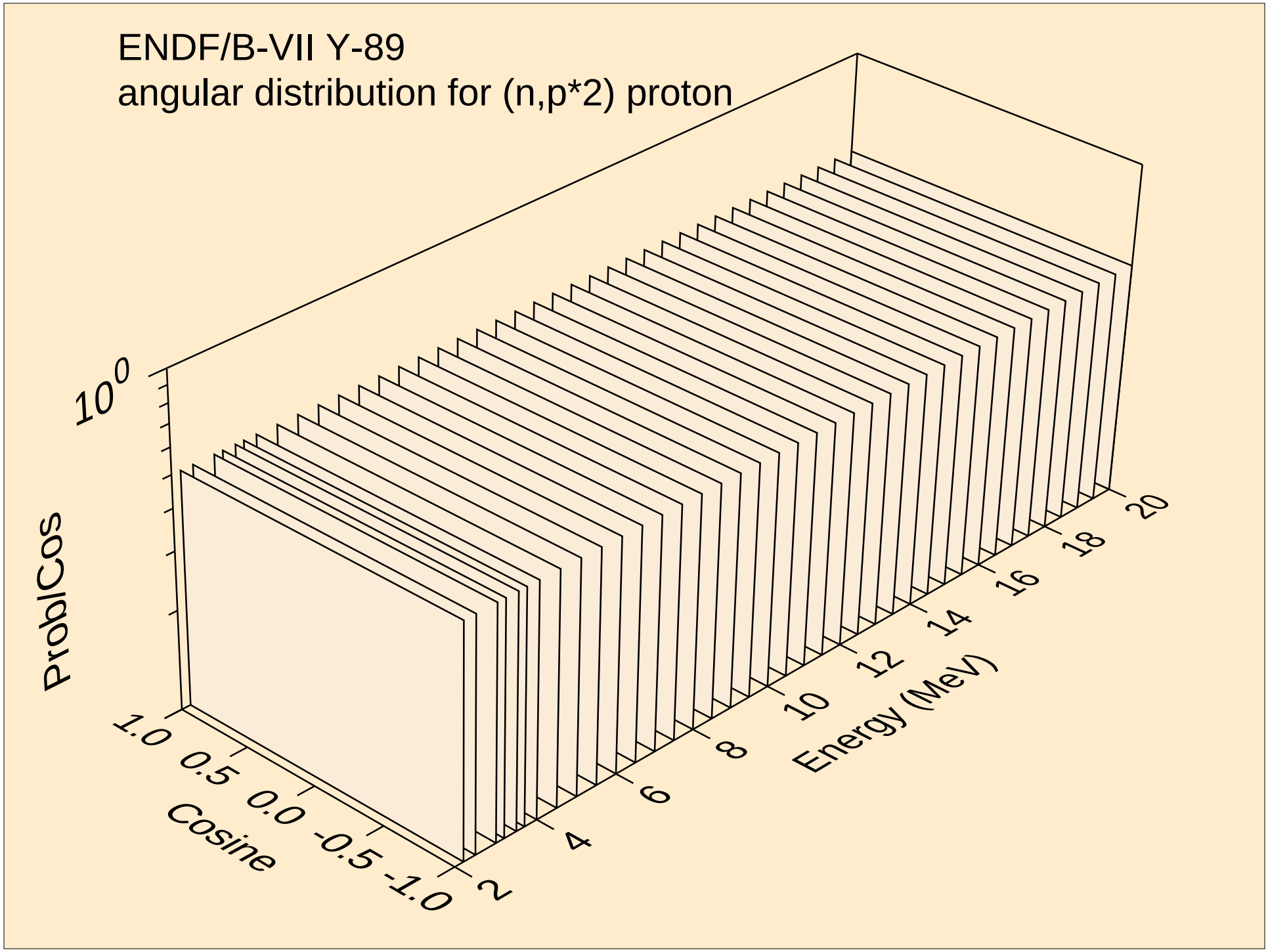

ENDF/B-VII Y-89
Particle production cross sections
protons
alphas
Cross section (barns)
*10-3
100
80
60
40
20
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

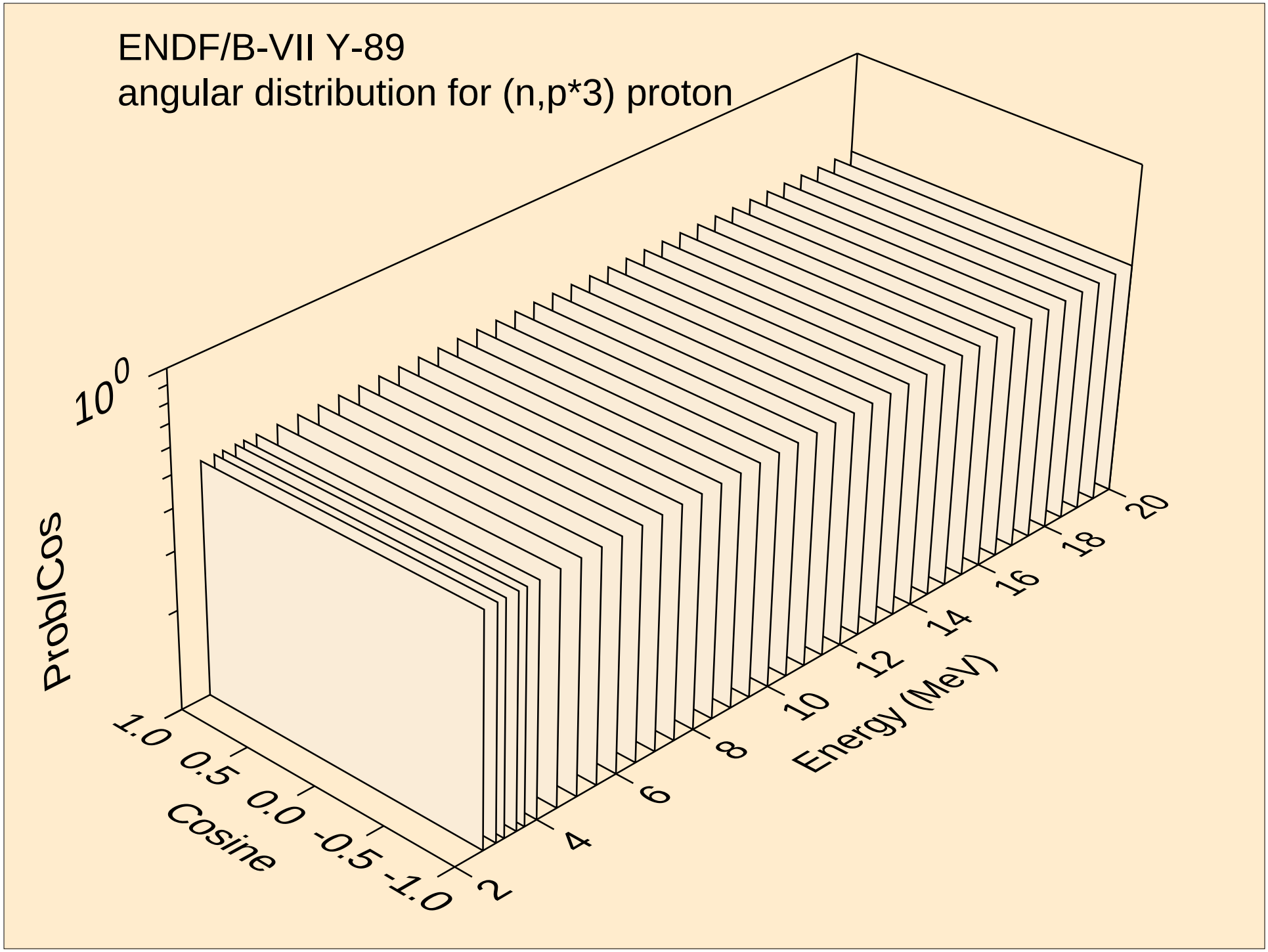

ENDF/B-VII Y-89
protons from (n,n*)p
Prob/MeV
10^-1
10^-3
0
Sec. Energy
10
20
6
8
10
12
14
16
18
20
Energy (MeV)

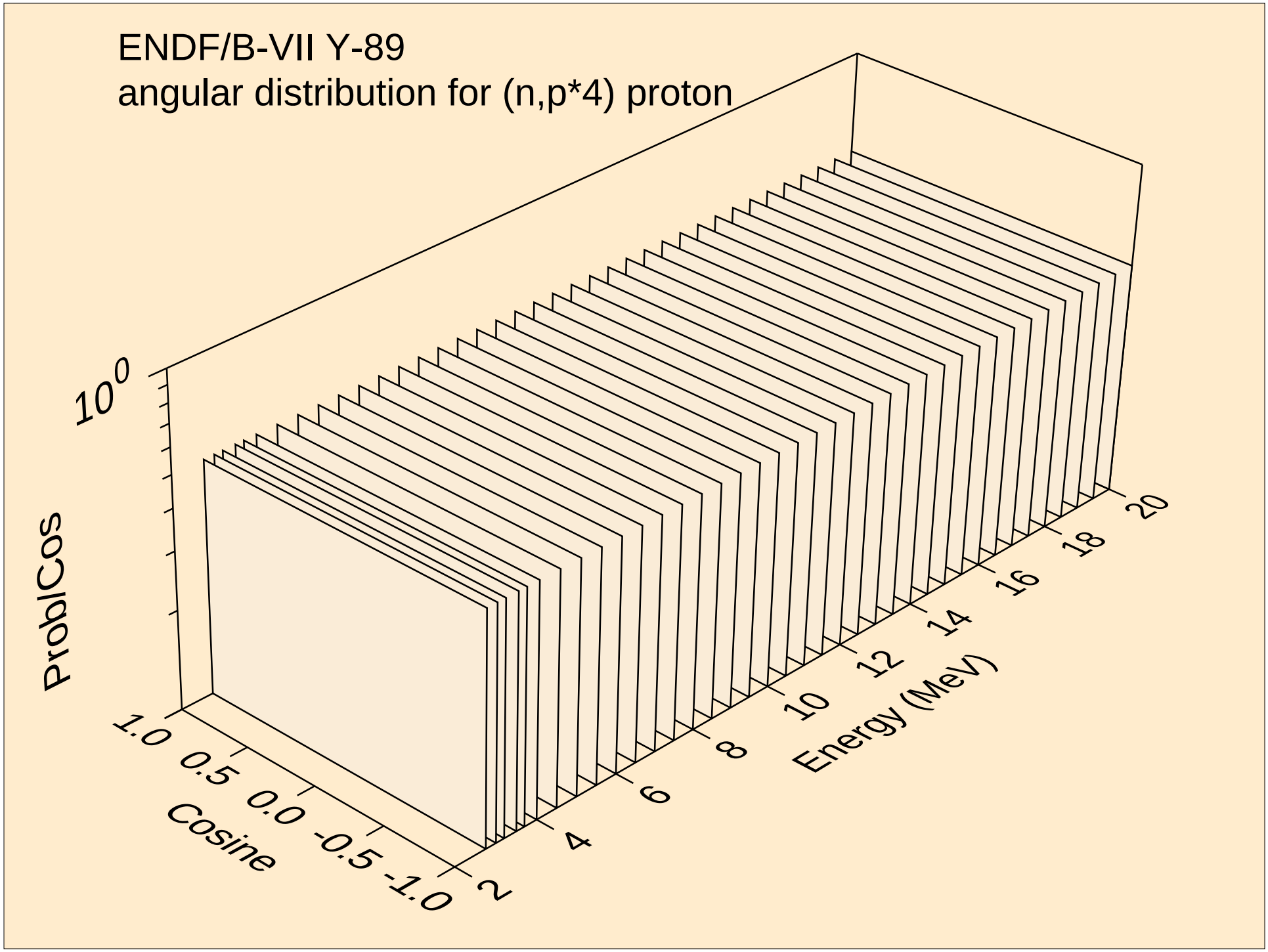

ENDF/B-VII Y-89
protons from (n,2np)
Prob/MeV
10^-1
10^-3
1.2
1.4
1.6
Sec. Energy
18.2
18.4
18.6
18.8
19.0
19.2
19.4
19.6
19.8
20.0
Energy (MeV)

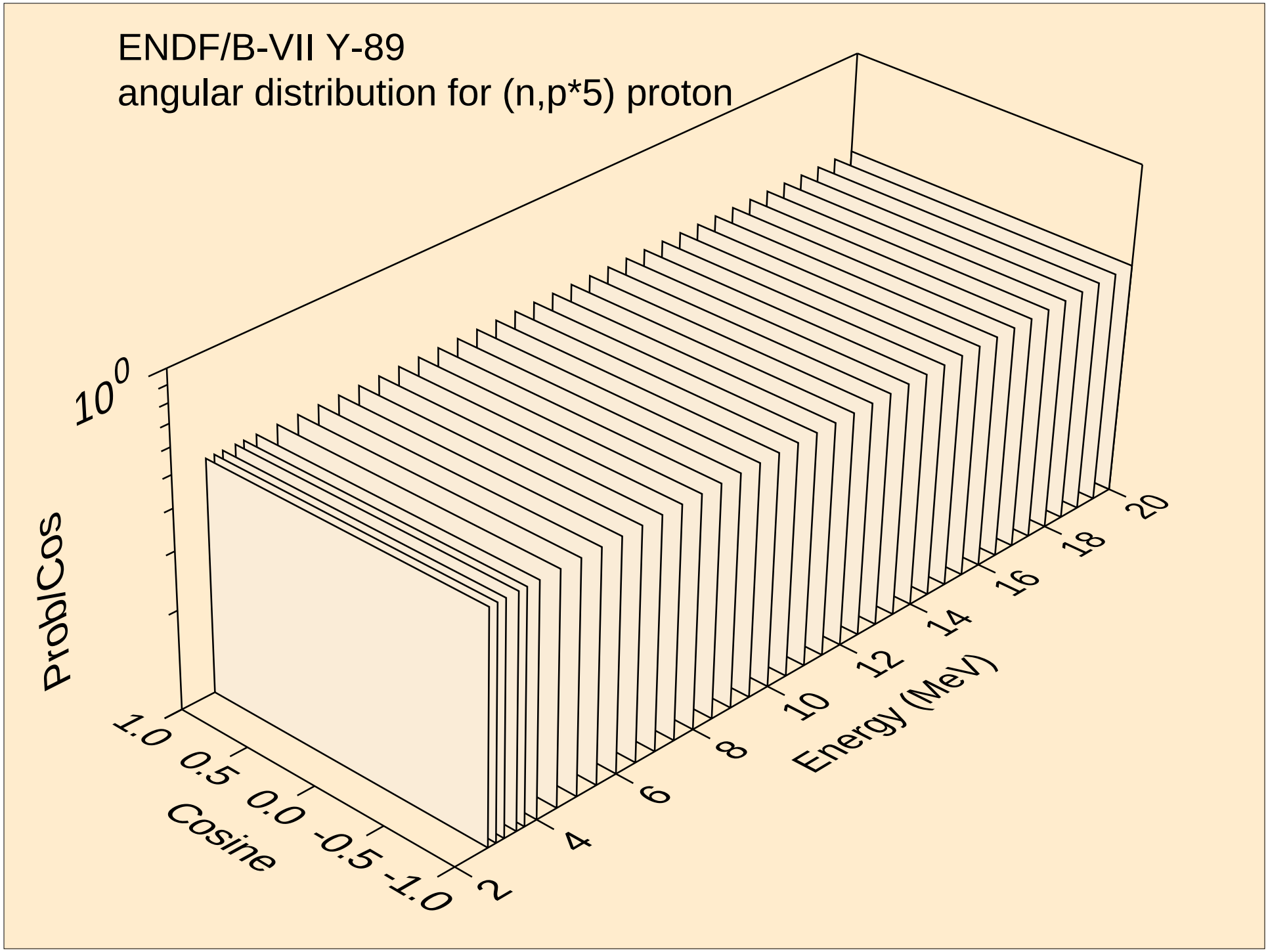

ENDF/B-VII Y-89
angular distribution for (n,p*0) proton
10^0
Prob/Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

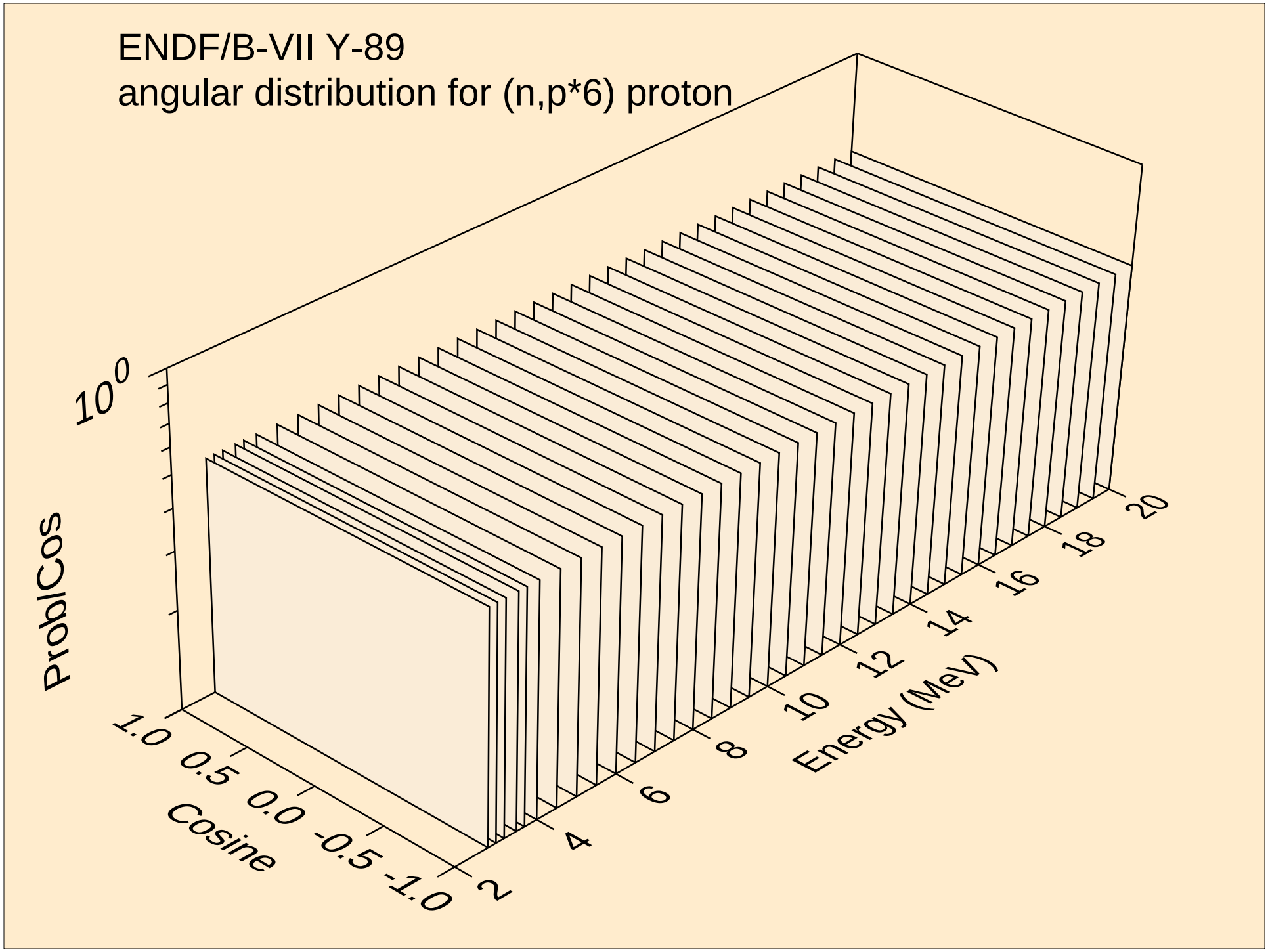

ENDF/B-VII Y-89
angular distribution for (n,p*1) proton
10^0
Prob/Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

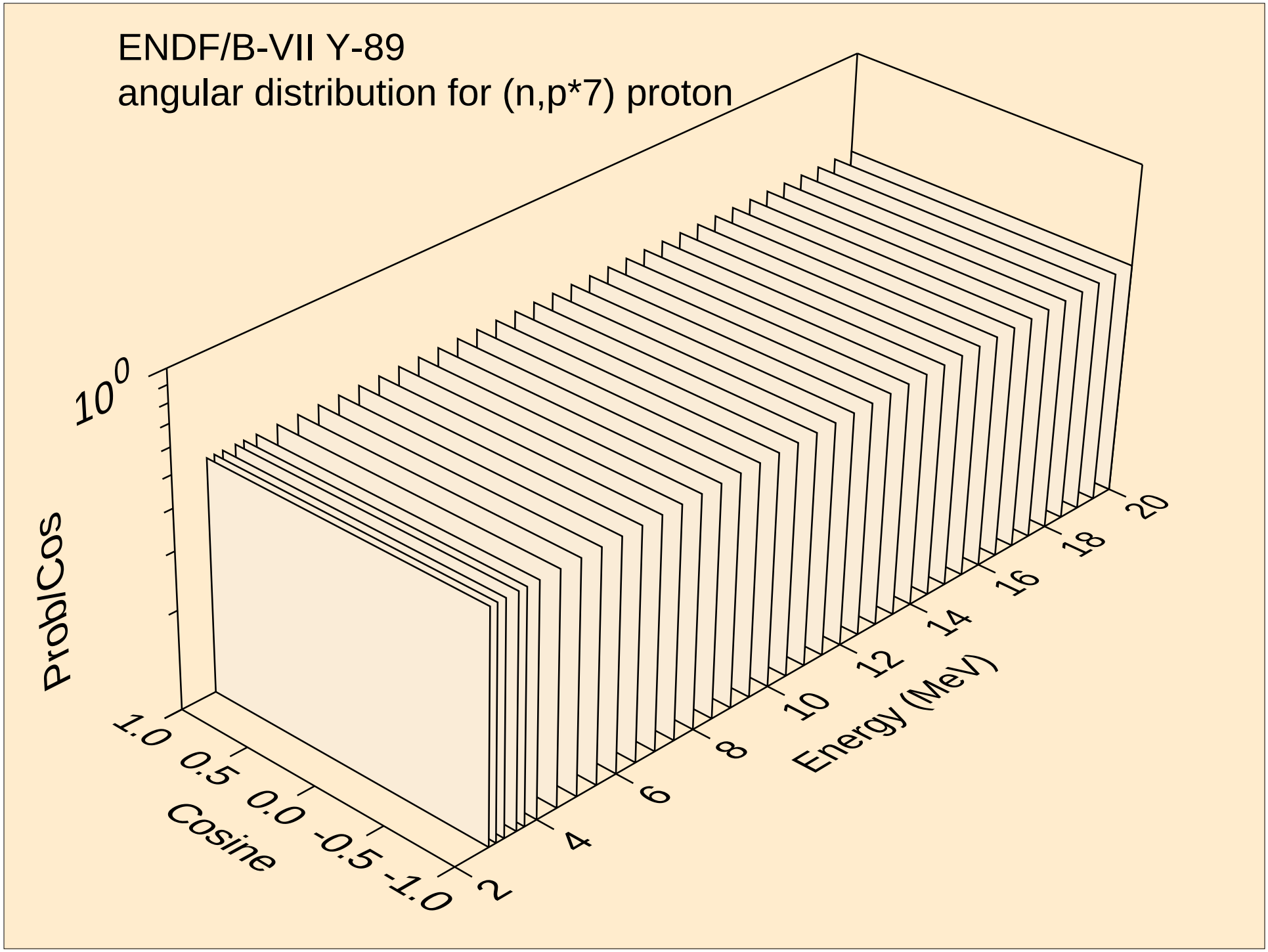

ENDF/B-VII Y-89
angular distribution for (n,p*2) proton
10^0
ProblCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

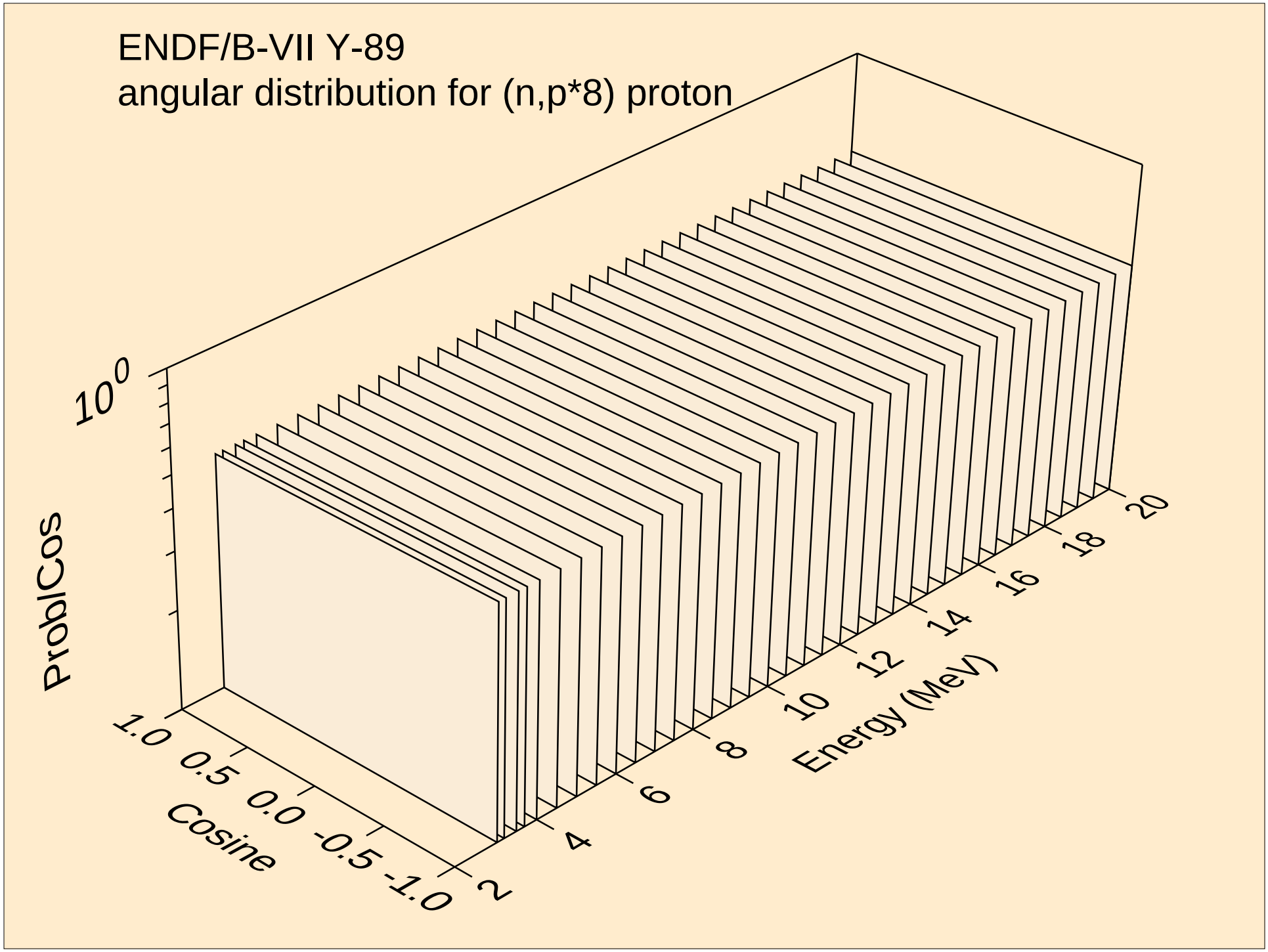

ENDF/B-VII Y-89
angular distribution for (n,p*3) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

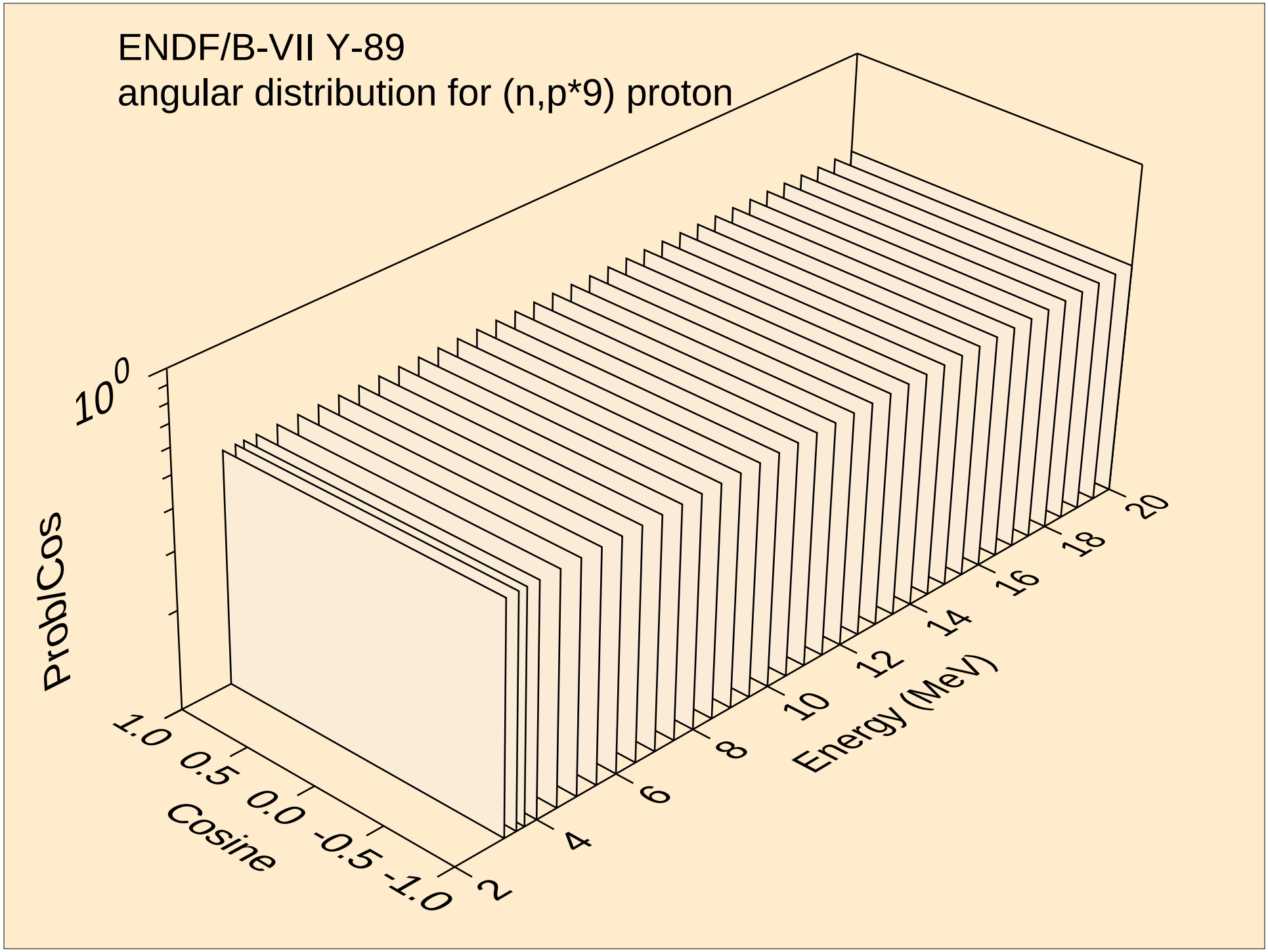

ENDF/B-VII Y-89
angular distribution for (n,p*4) proton
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

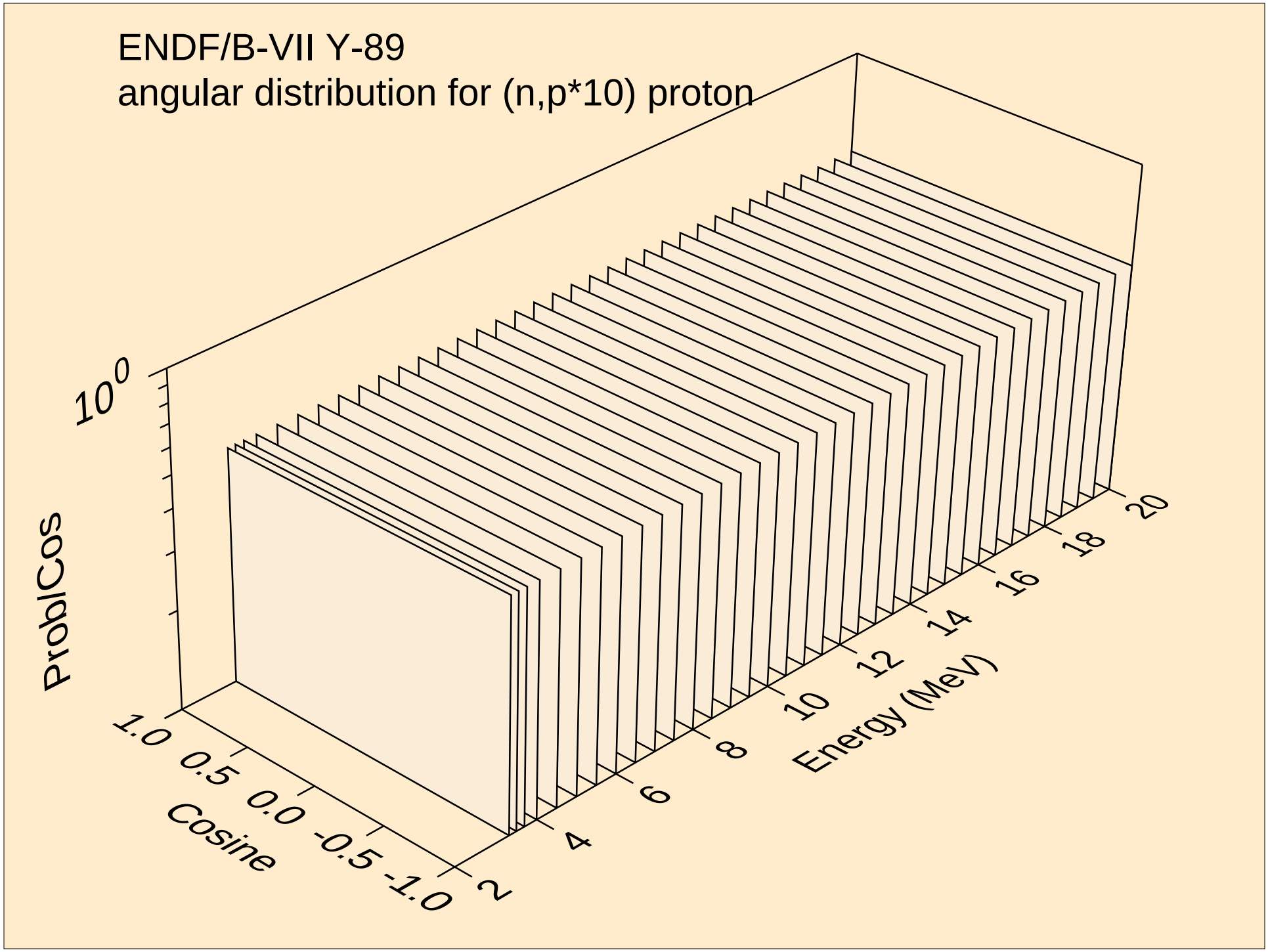

ENDF/B-VII Y-89
angular distribution for (n,p*5) proton
10^0
ProblCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

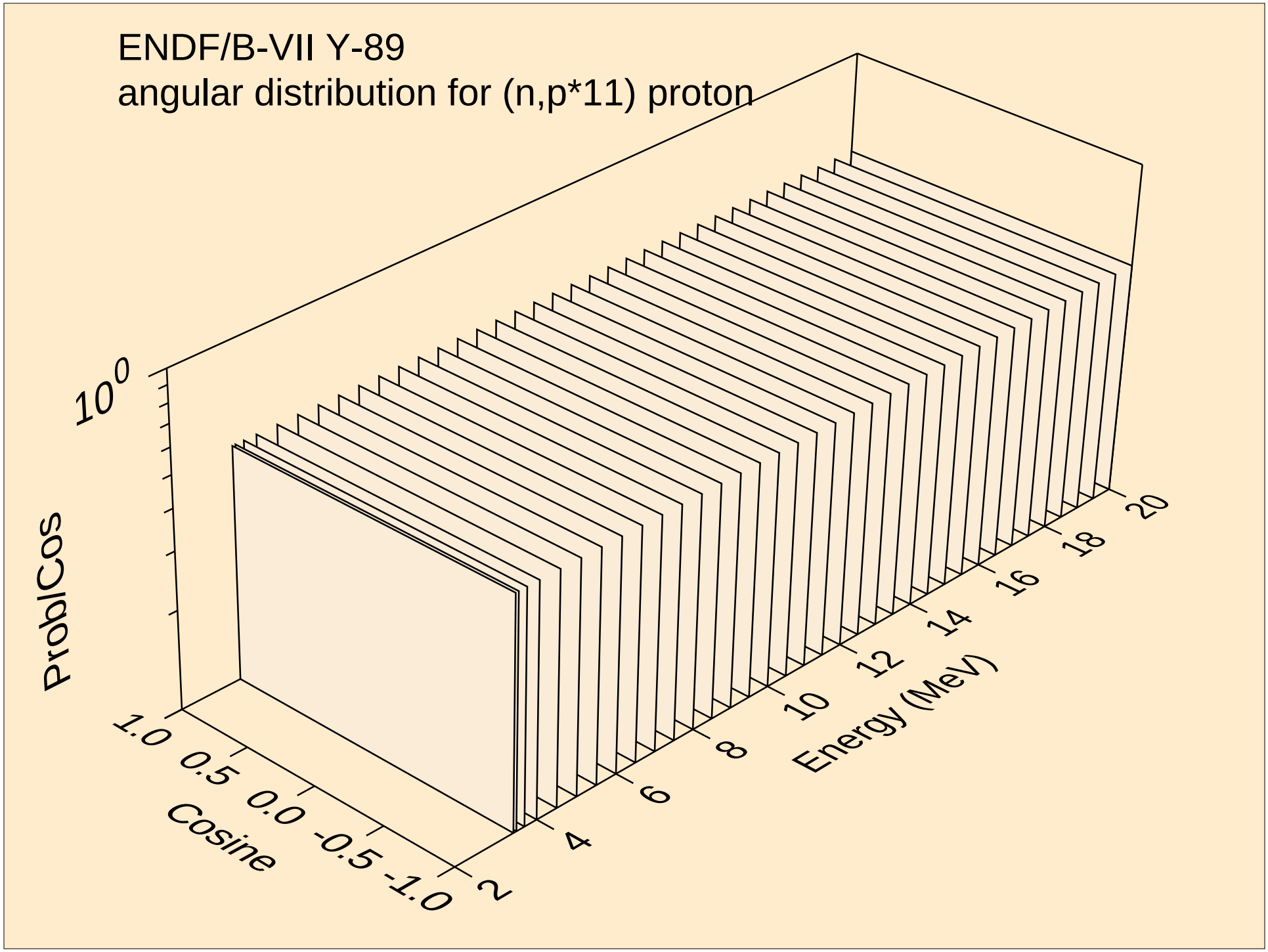

ENDF/B-VII Y-89
angular distribution for (n,p*6) proton
10^0
ProblCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

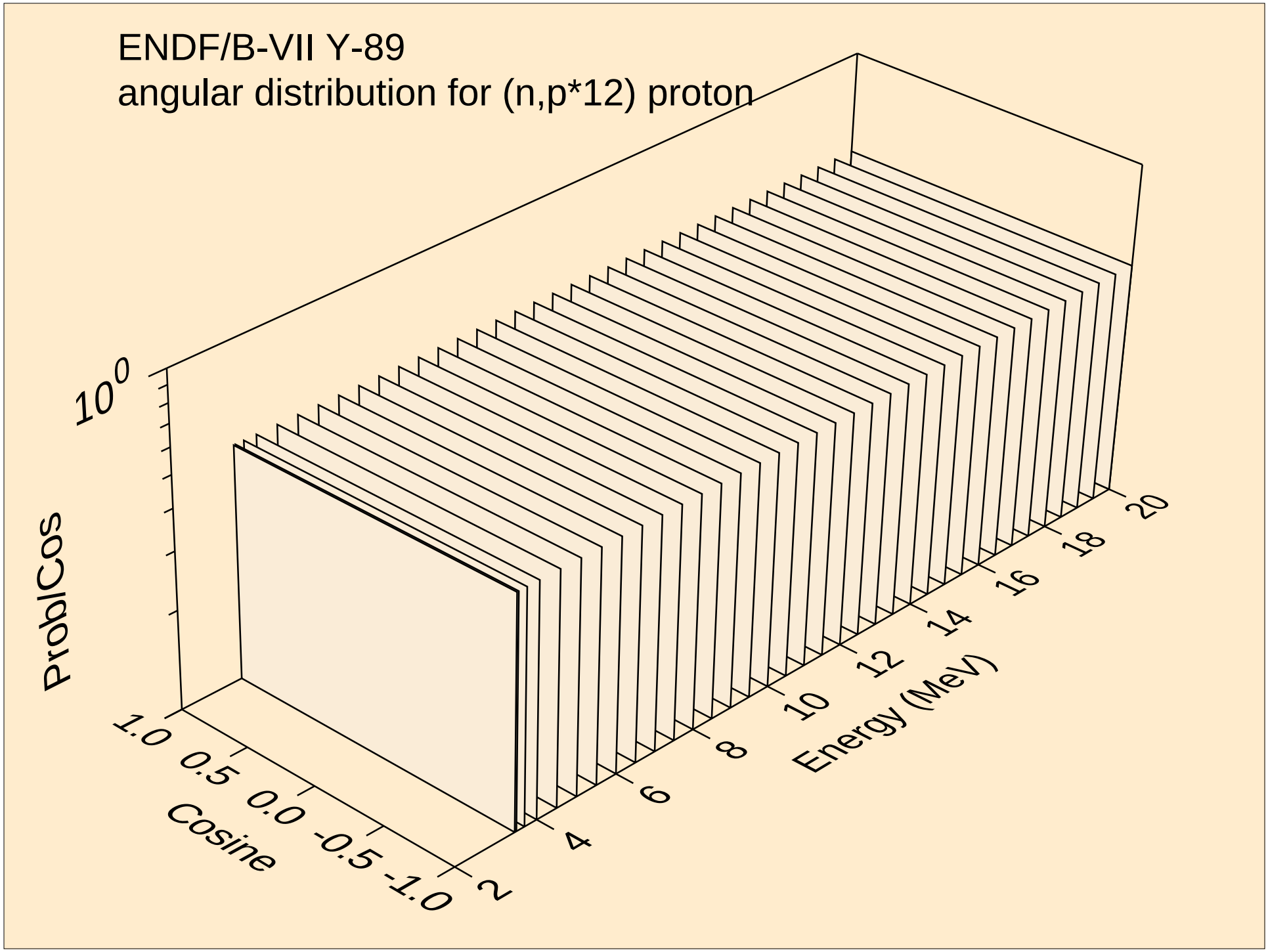

ENDF/B-VII Y-89
angular distribution for (n,p*7) proton
10^0
ProblCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

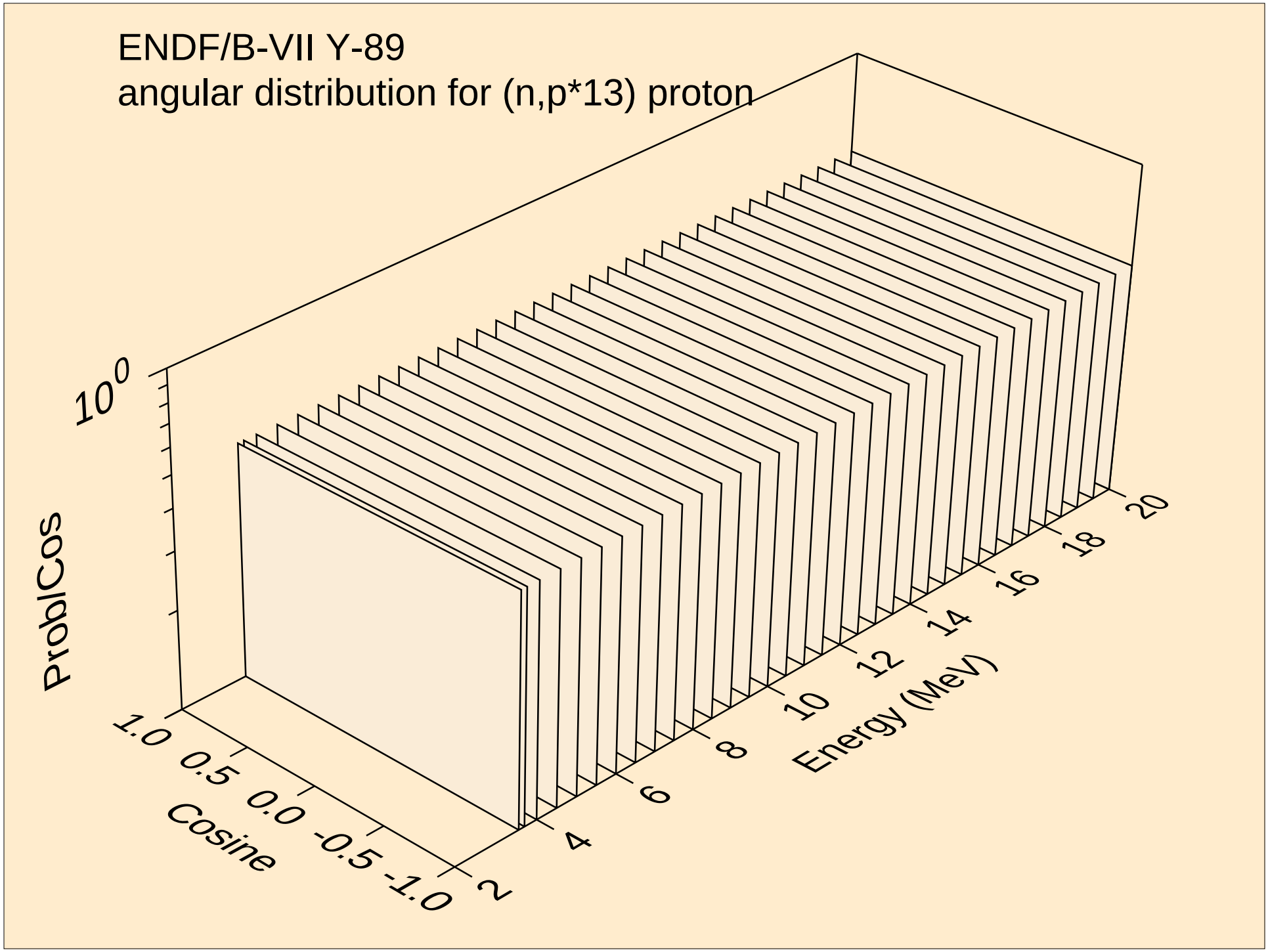

ENDF/B-VII Y-89
angular distribution for (n,p*8) proton
10^0
ProblCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

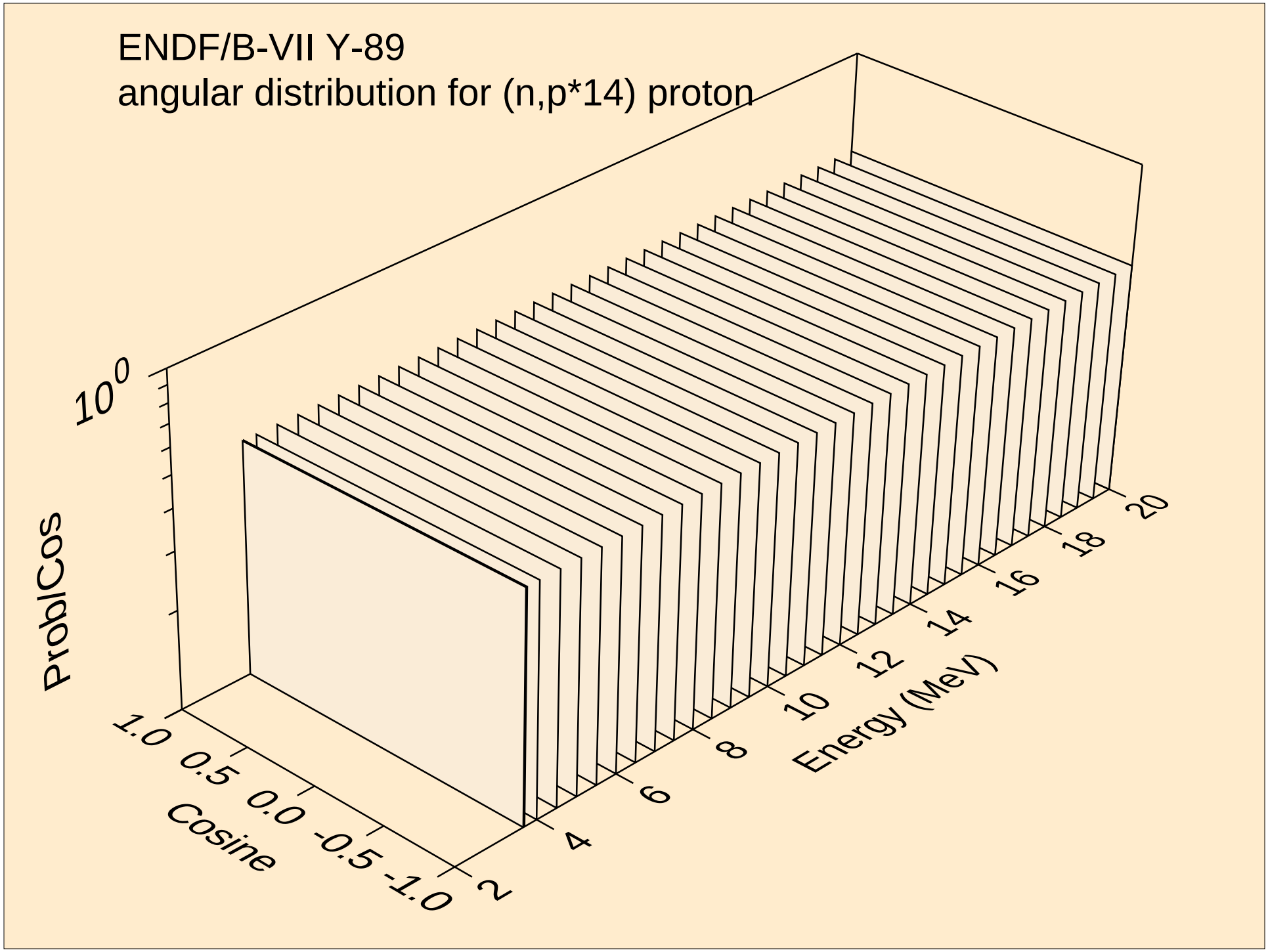

ENDF/B-VII Y-89
angular distribution for (n,p*9) proton
10^0
ProblCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

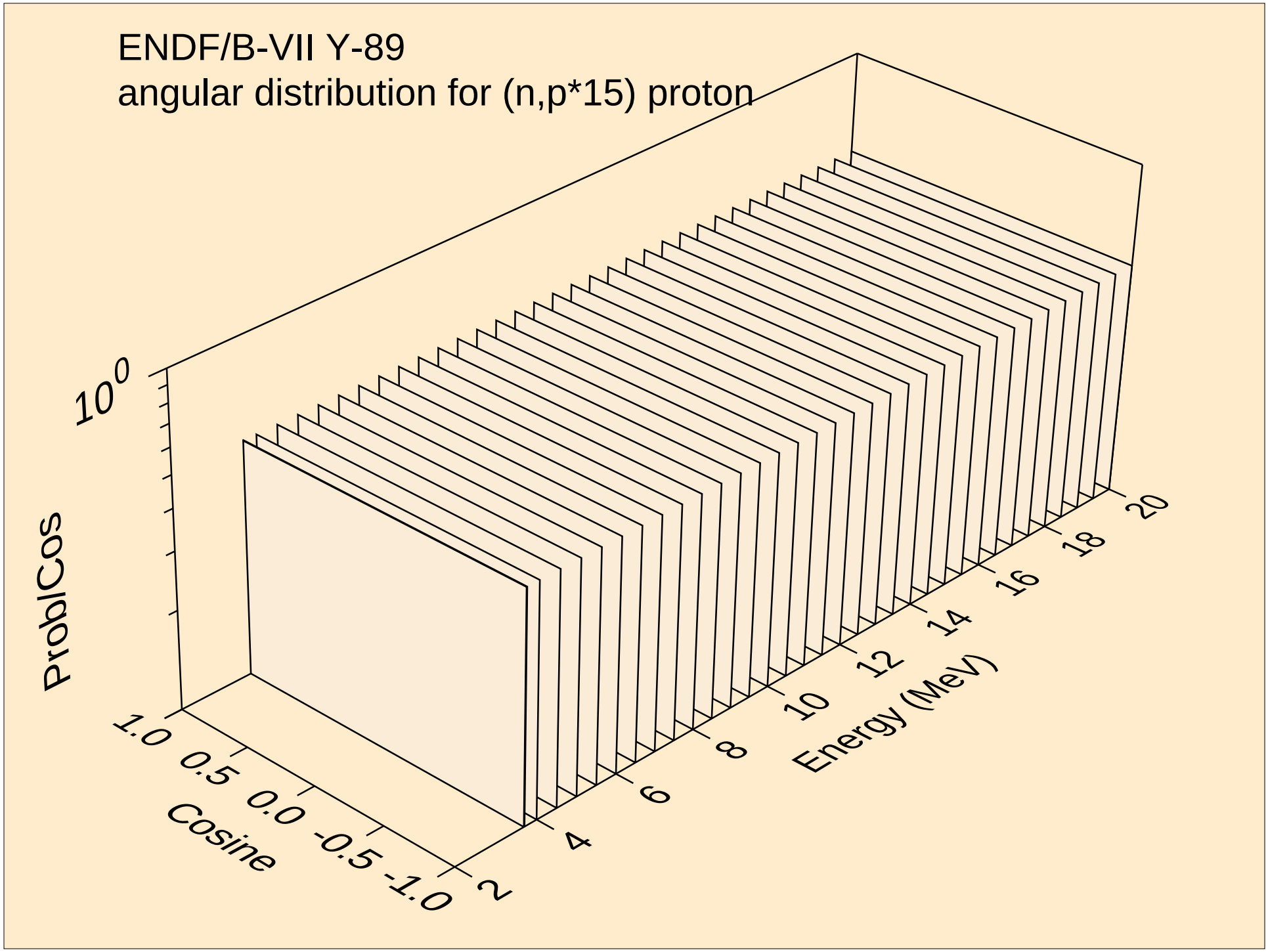

ENDF/B-VII Y-89
angular distribution for (n,p*10) proton
10^0
Prob/Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

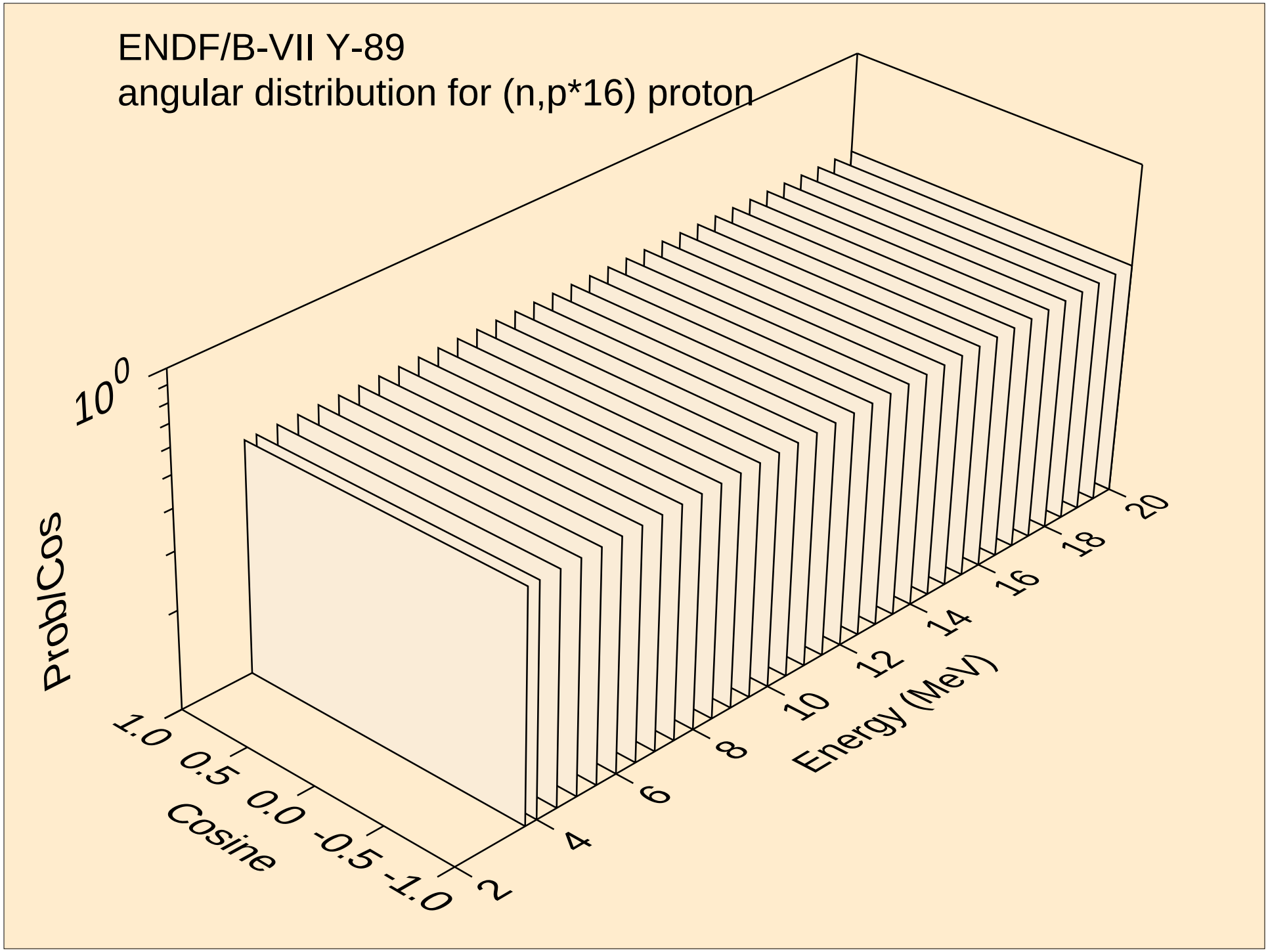

ENDF/B-VII Y-89
angular distribution for (n,p*11) proton
10^0
Prob/Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

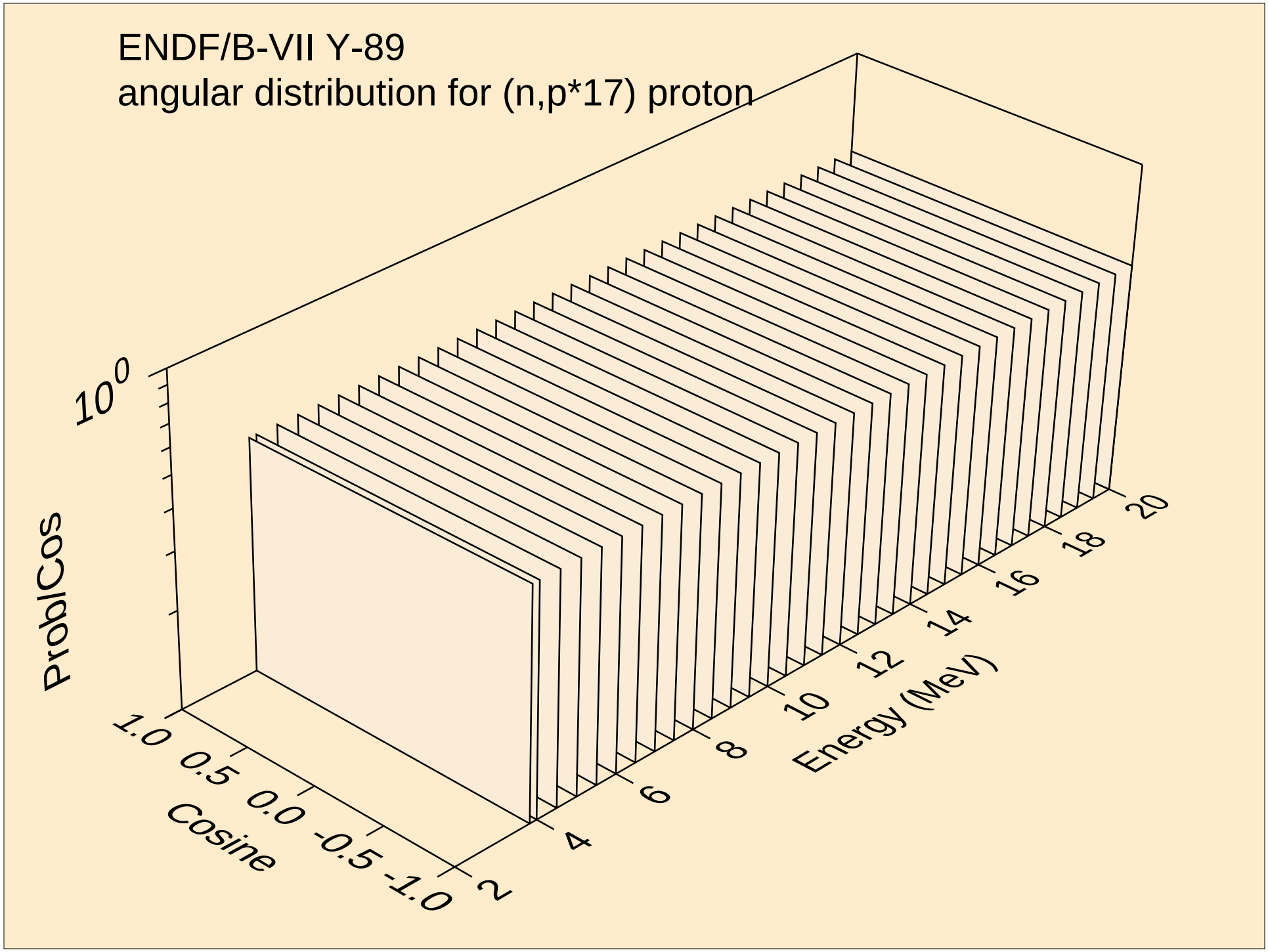

ENDF/B-VII Y-89
angular distribution for (n,p*12) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

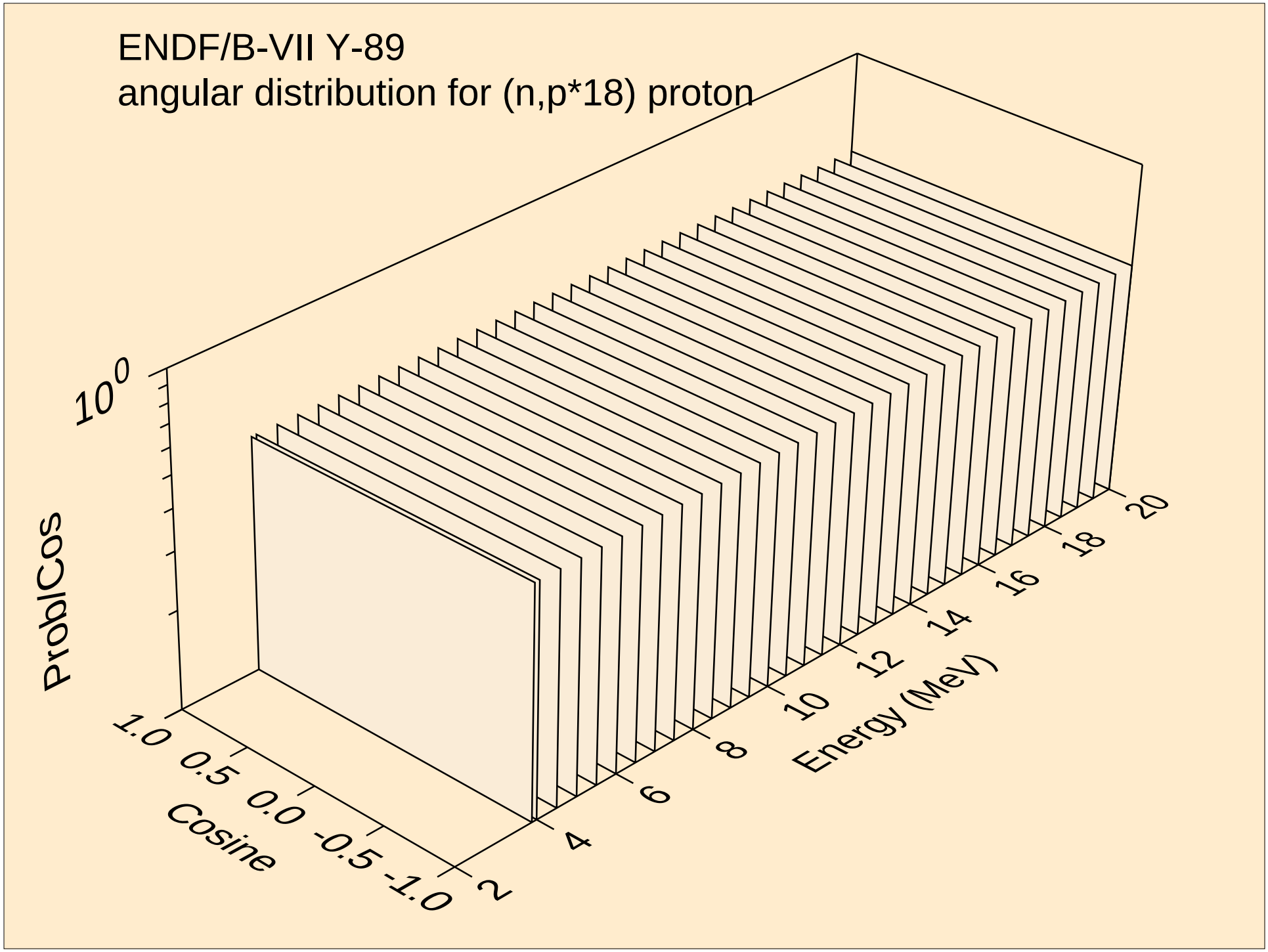

ENDF/B-VII Y-89
angular distribution for (n,p*13) proton
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

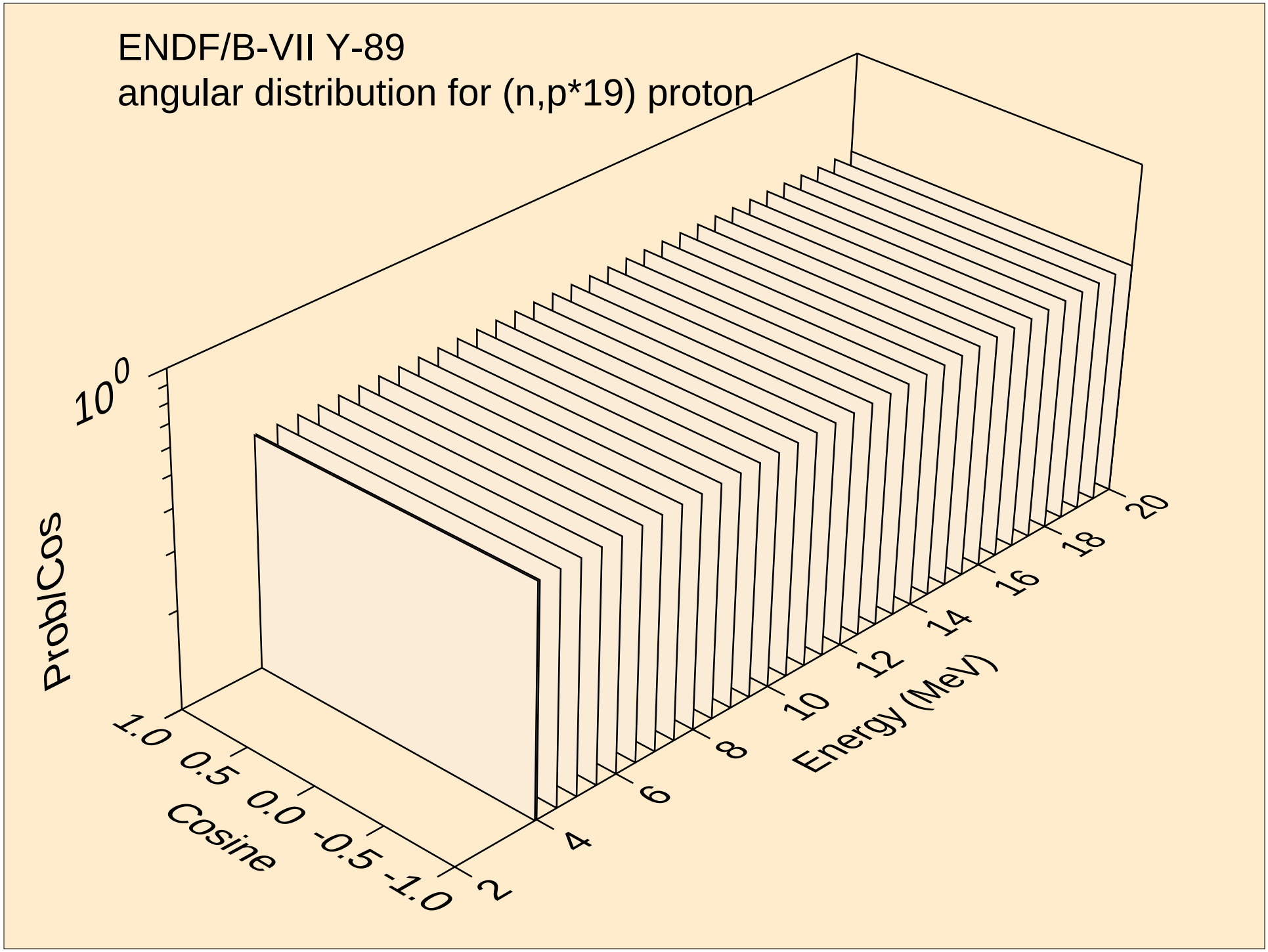

ENDF/B-VII Y-89
angular distribution for (n,p*14) proton
10^0
Prob/Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

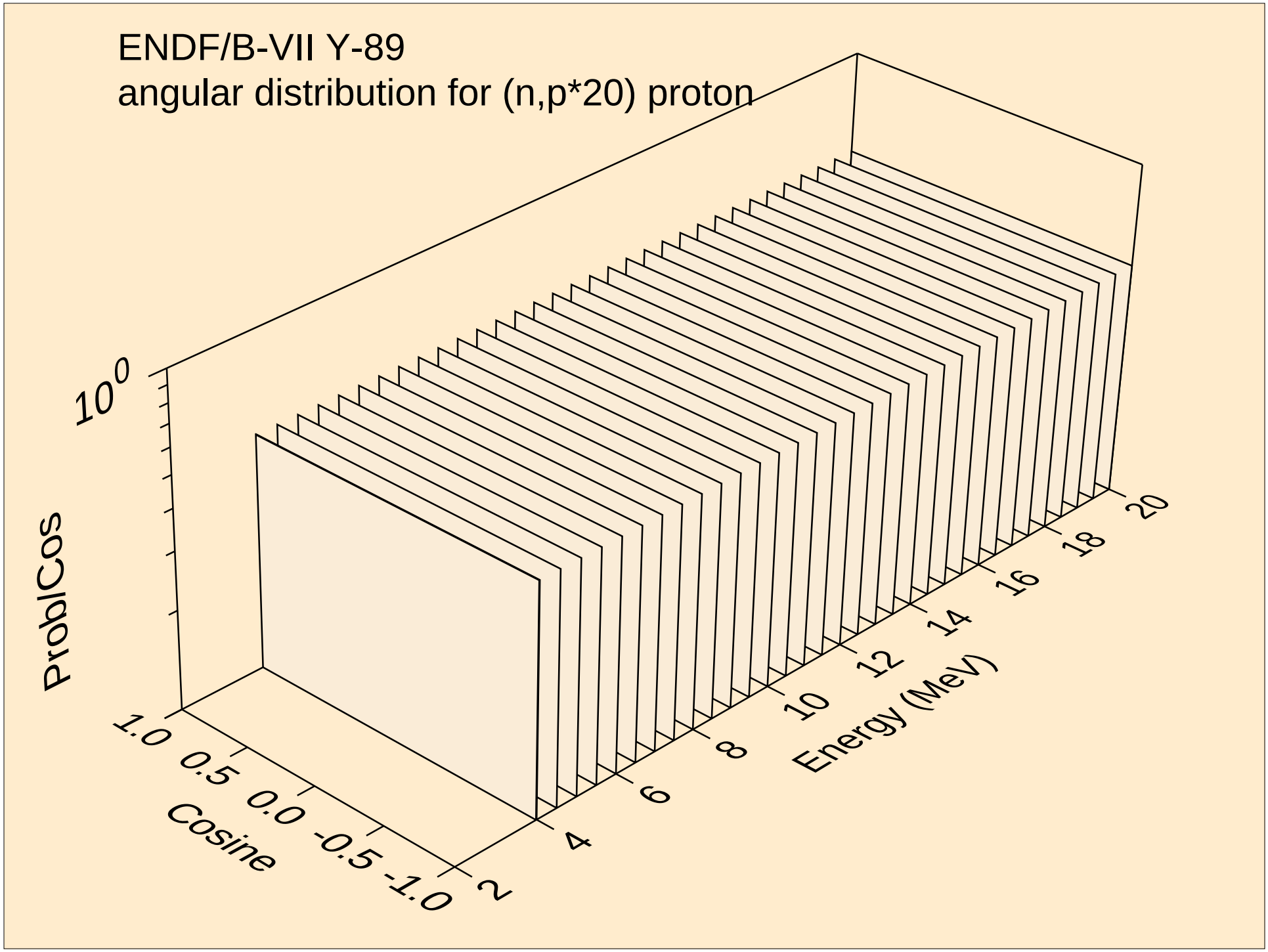

ENDF/B-VII Y-89
angular distribution for (n,p*15) proton
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

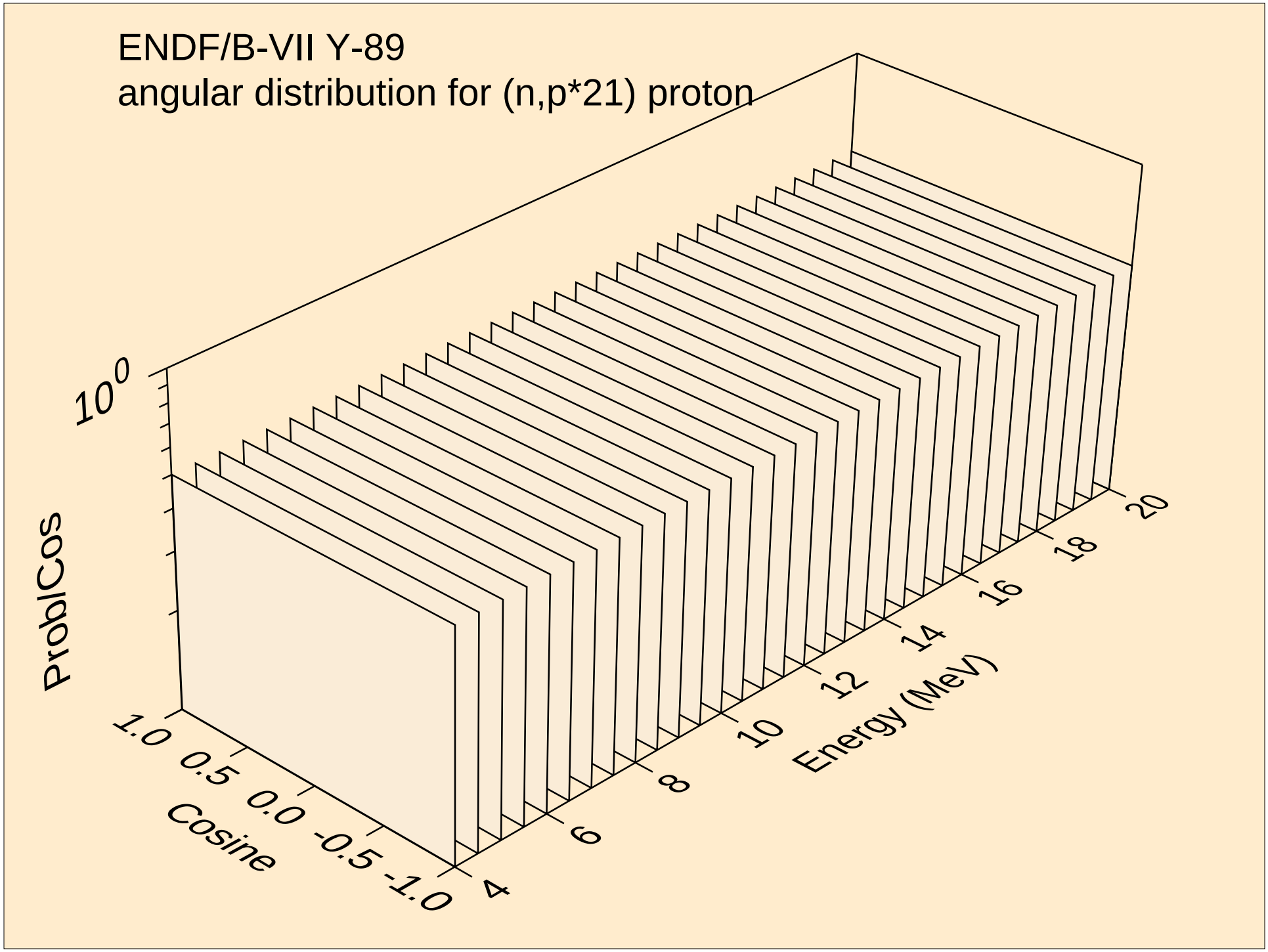

ENDF/B-VII Y-89
angular distribution for (n,p*16) proton
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

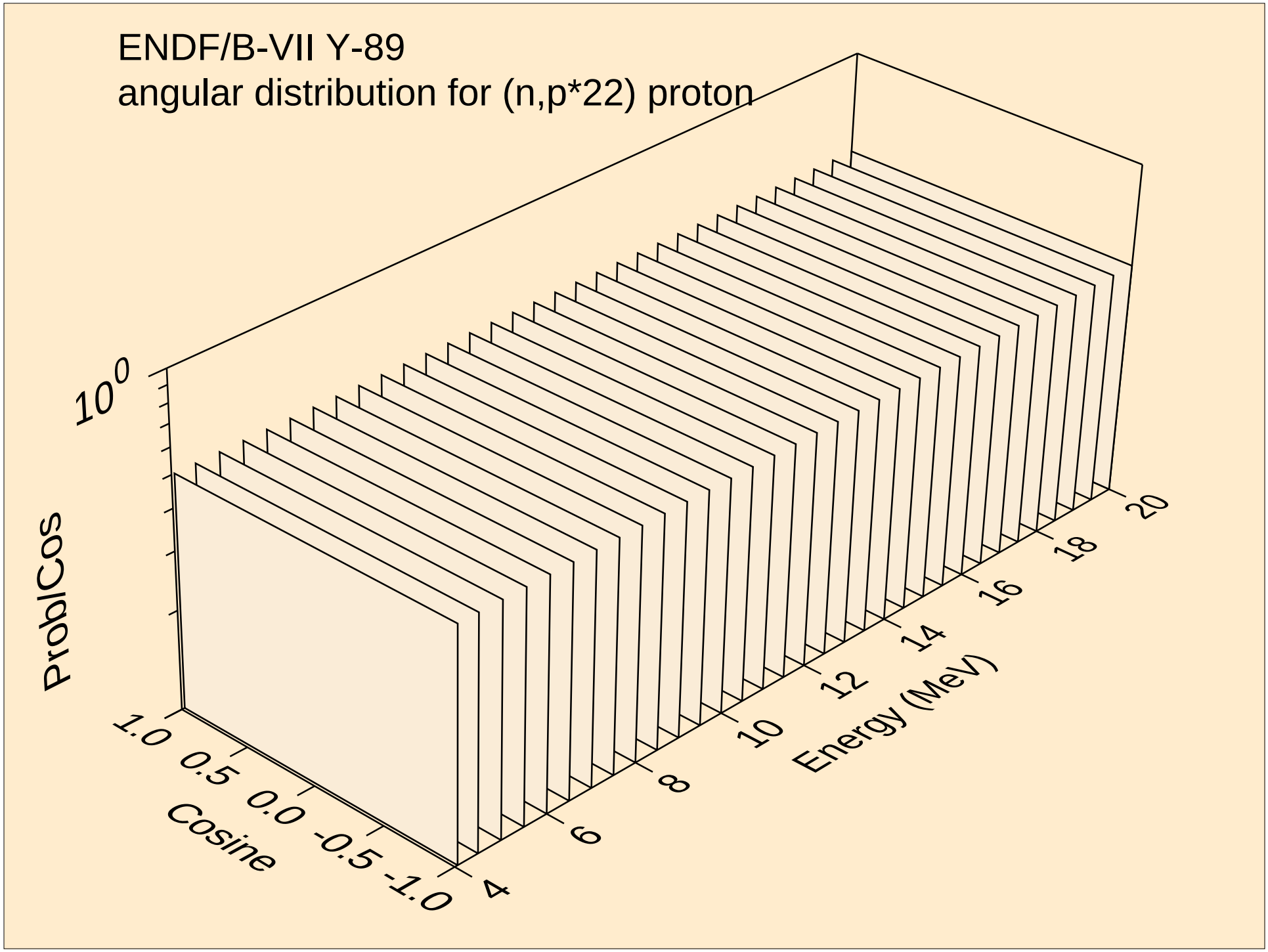

ENDF/B-VII Y-89
angular distribution for (n,p*17) proton
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

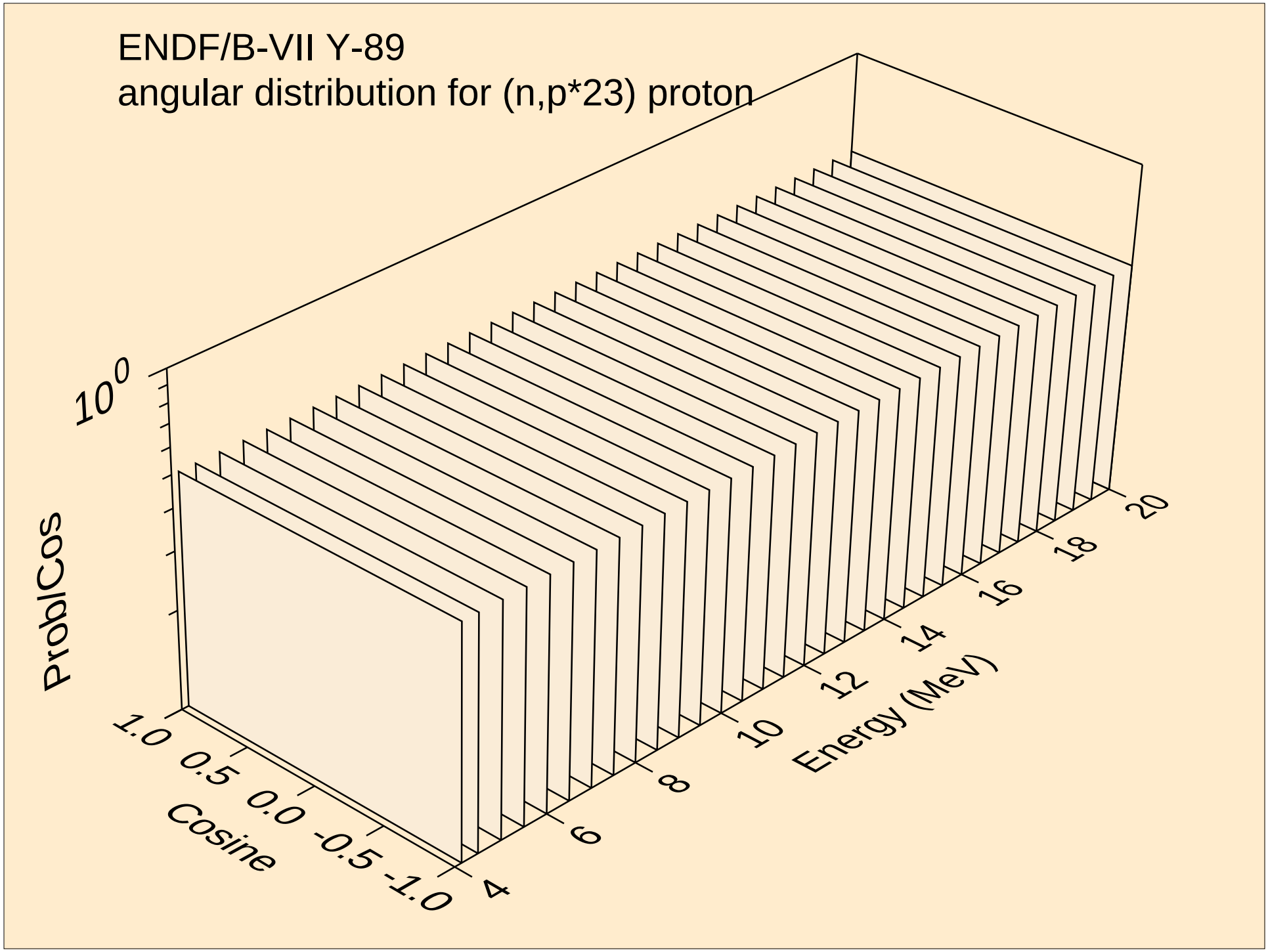

ENDF/B-VII Y-89
angular distribution for (n,p*18) proton
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

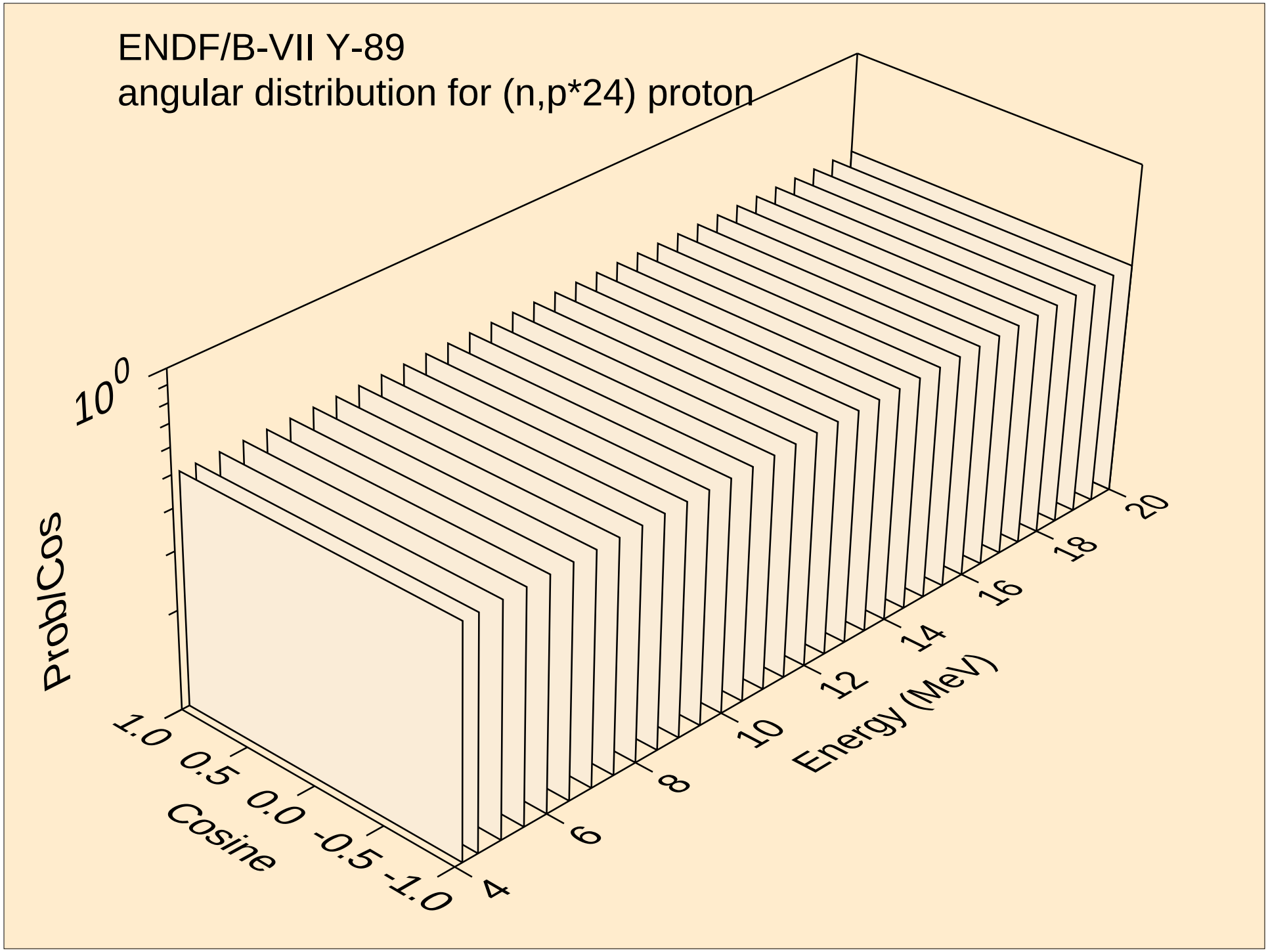

ENDF/B-VII Y-89
angular distribution for (n,p*19) proton
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

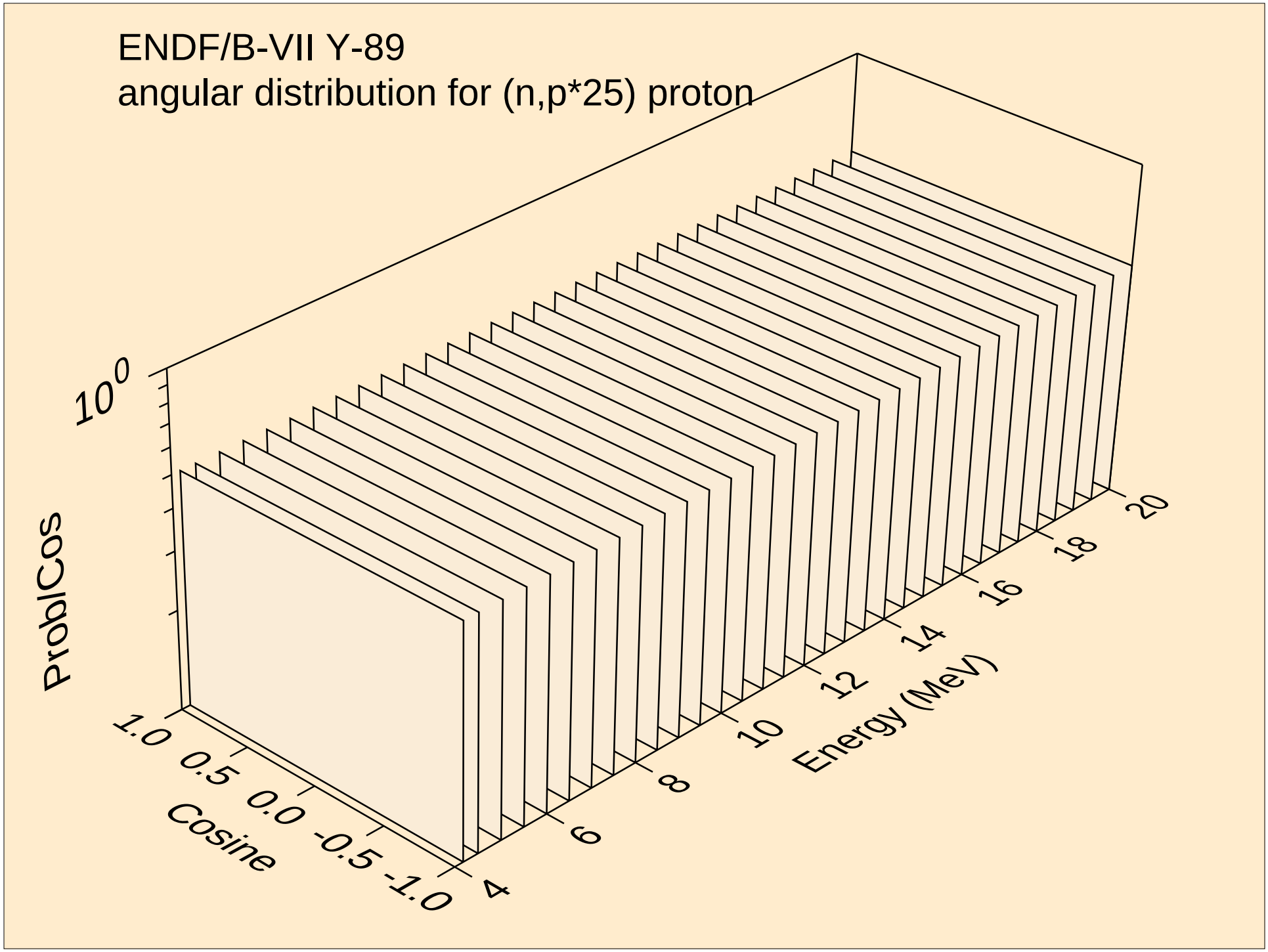

ENDF/B-VII Y-89
angular distribution for (n,p*20) proton
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

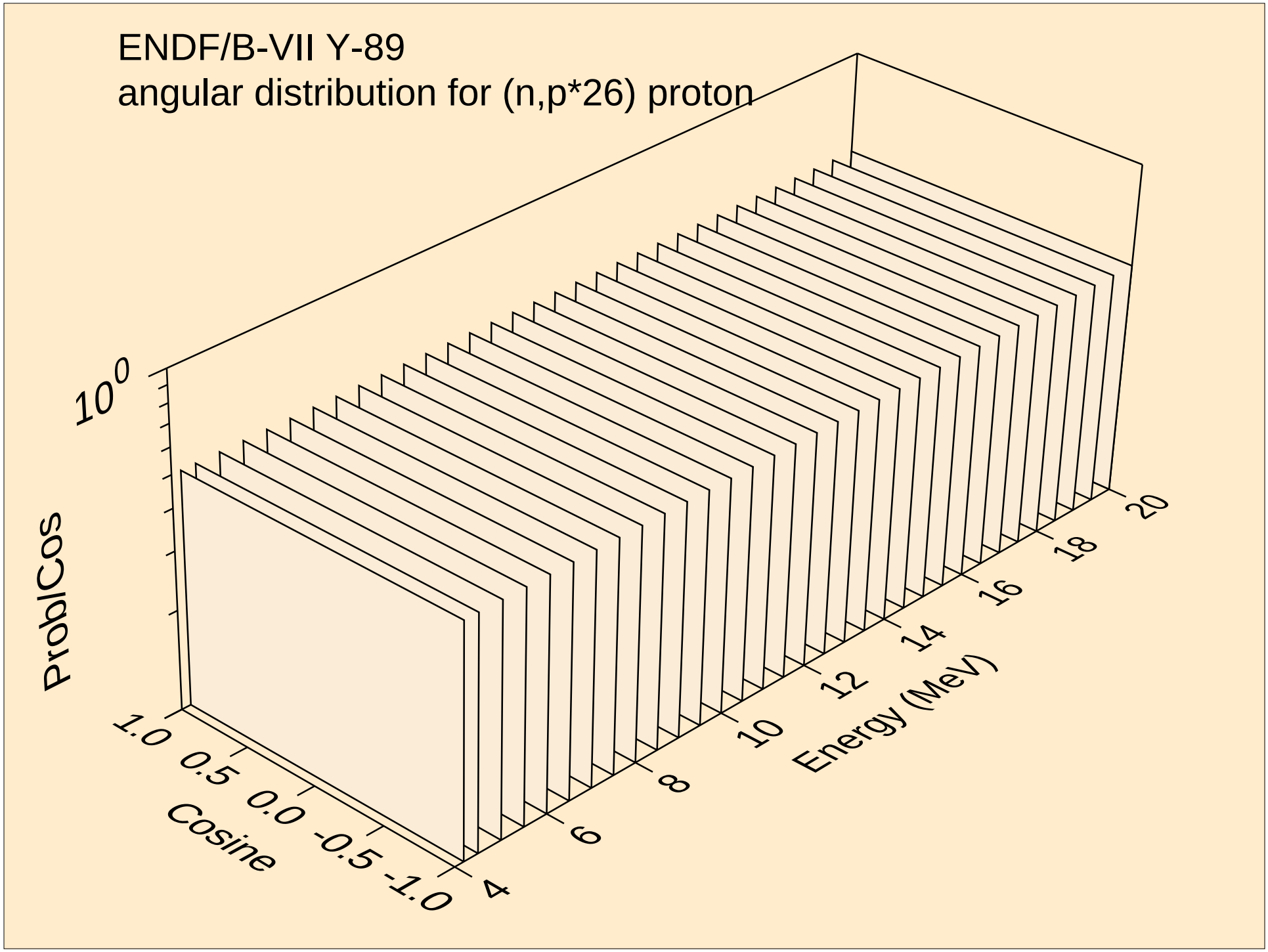

ENDF/B-VII Y-89
angular distribution for (n,p*21) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

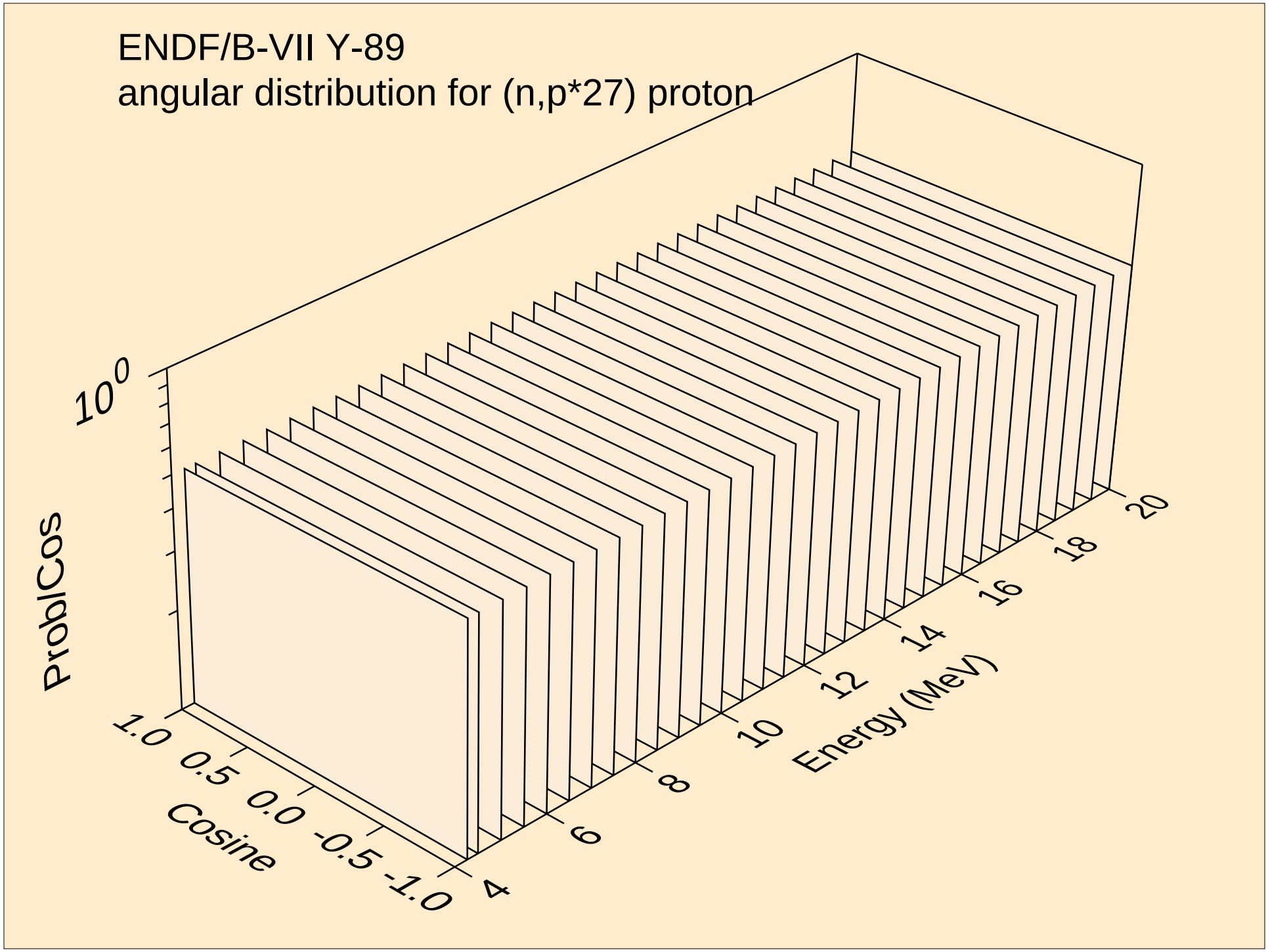

ENDF/B-VII Y-89
angular distribution for (n,p*22) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

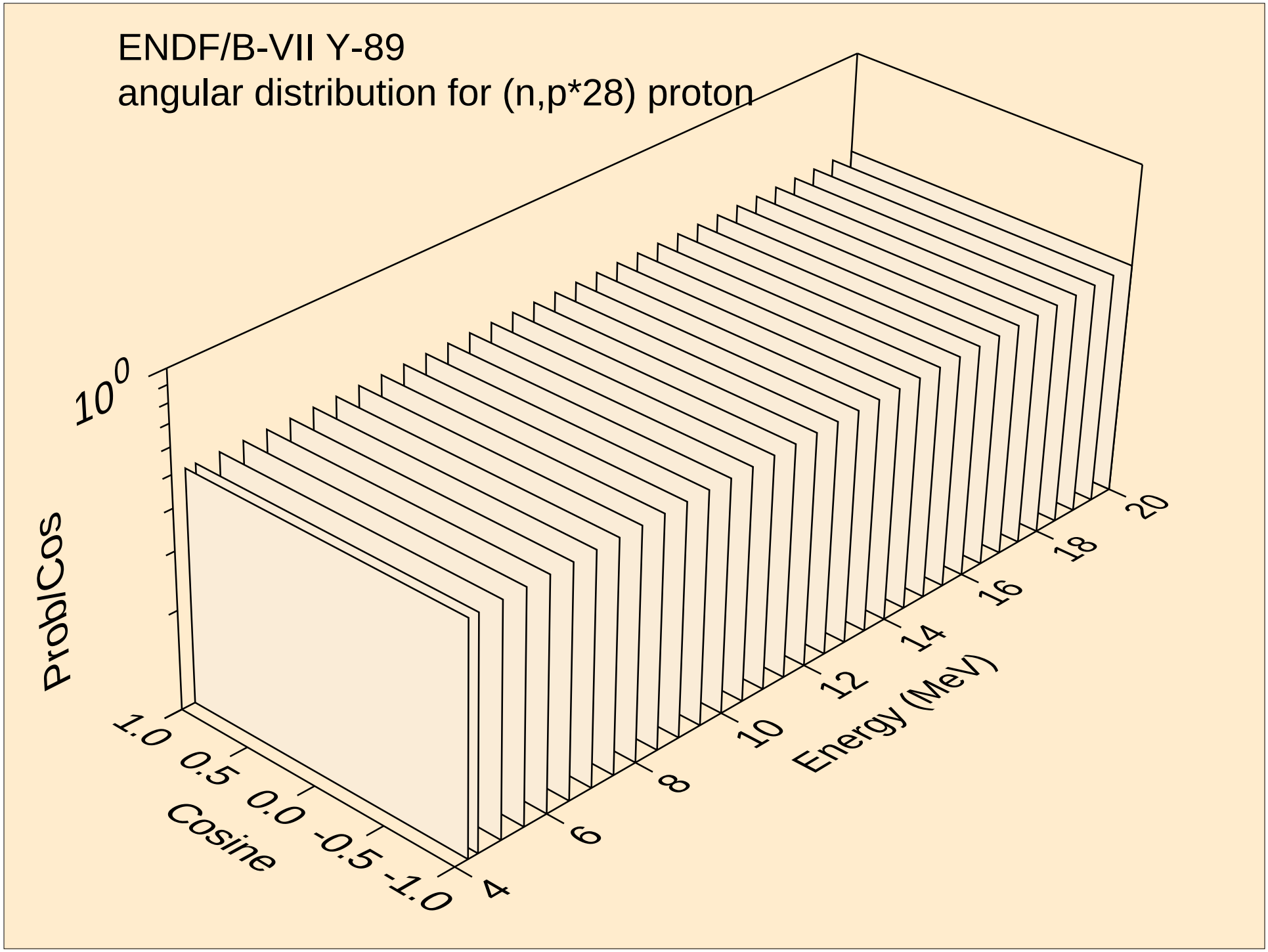

ENDF/B-VII Y-89
angular distribution for (n,p*23) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

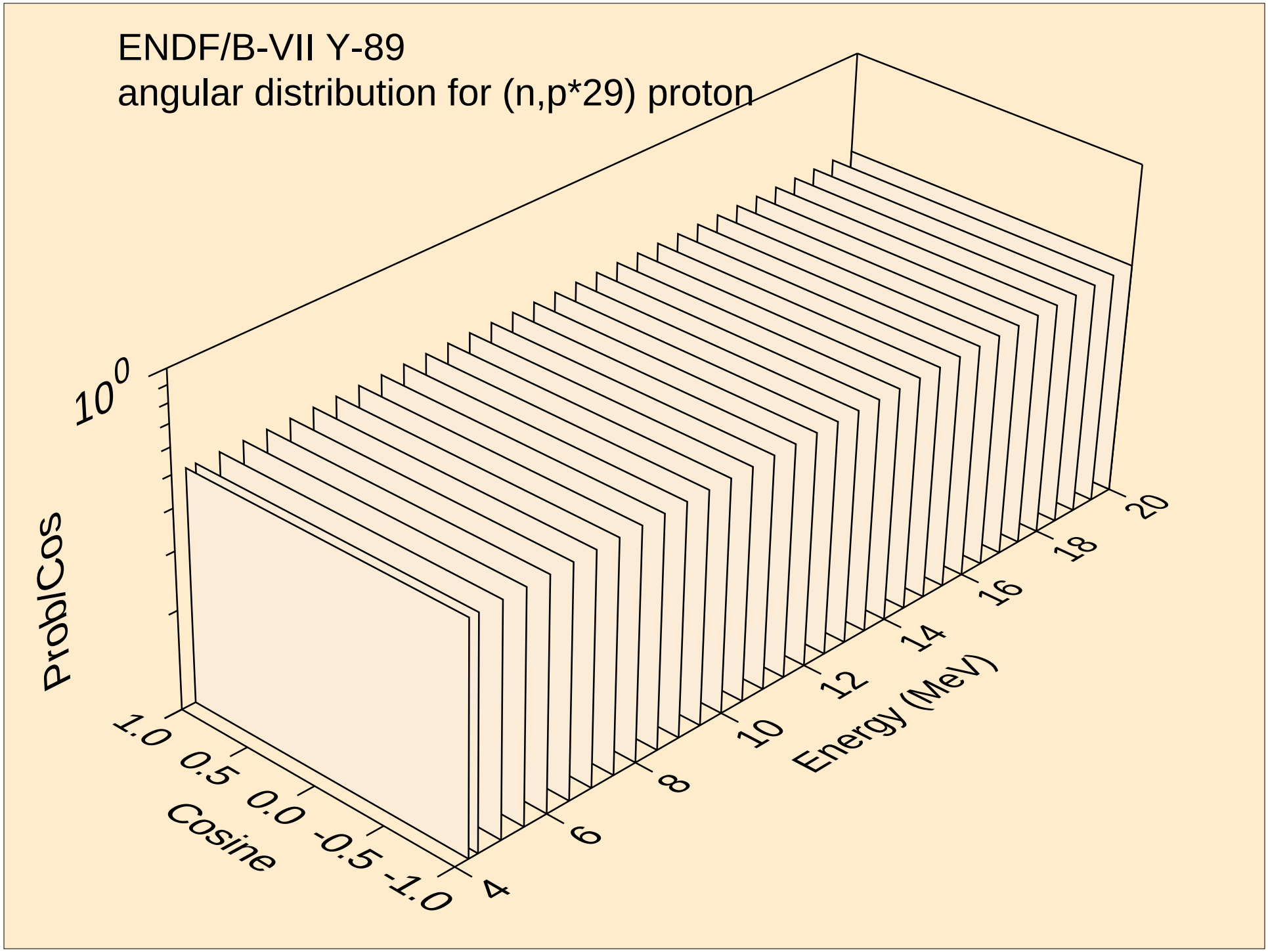

ENDF/B-VII Y-89
angular distribution for (n,p*24) proton
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

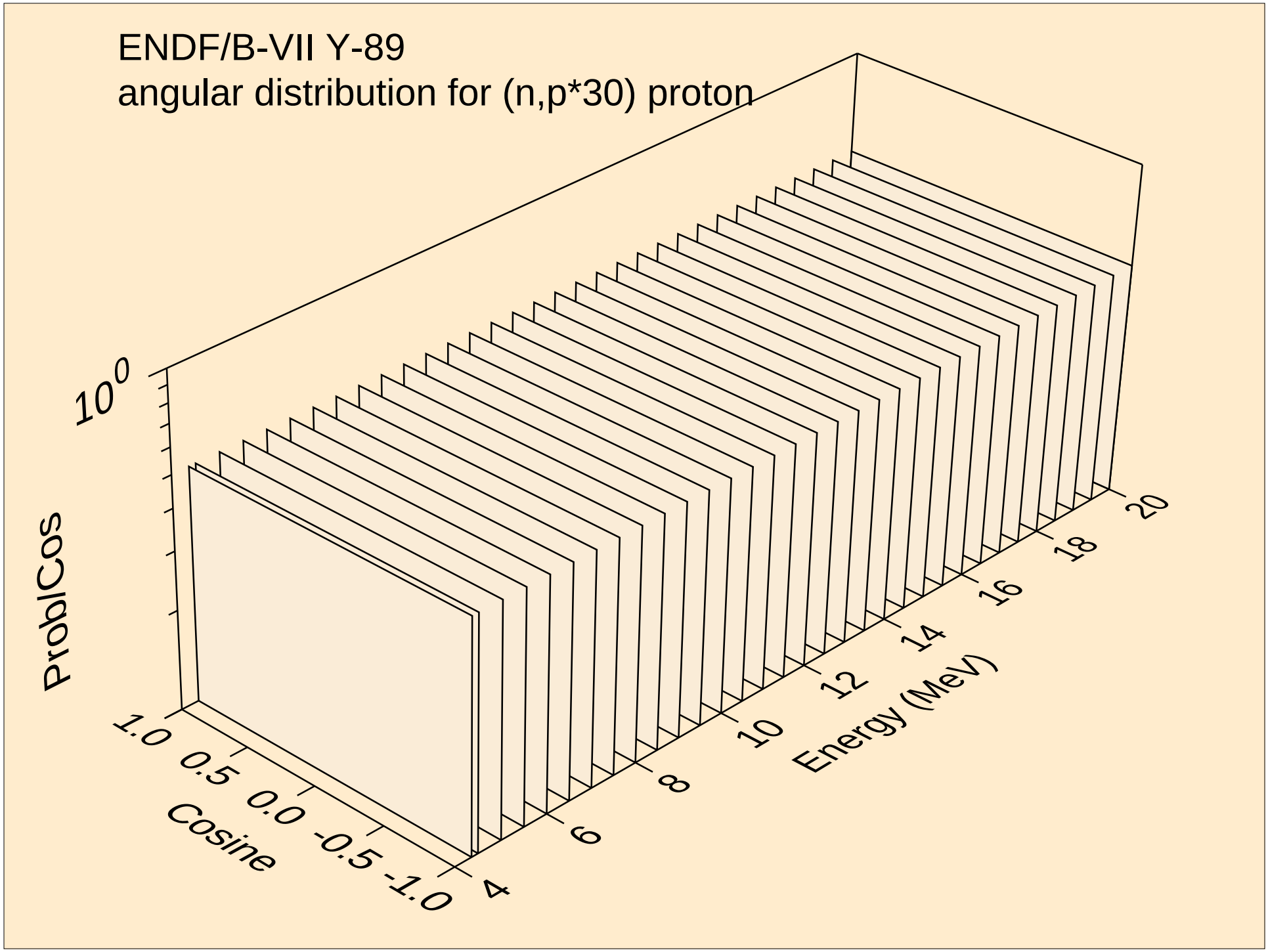

ENDF/B-VII Y-89
angular distribution for (n,p*25) proton
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

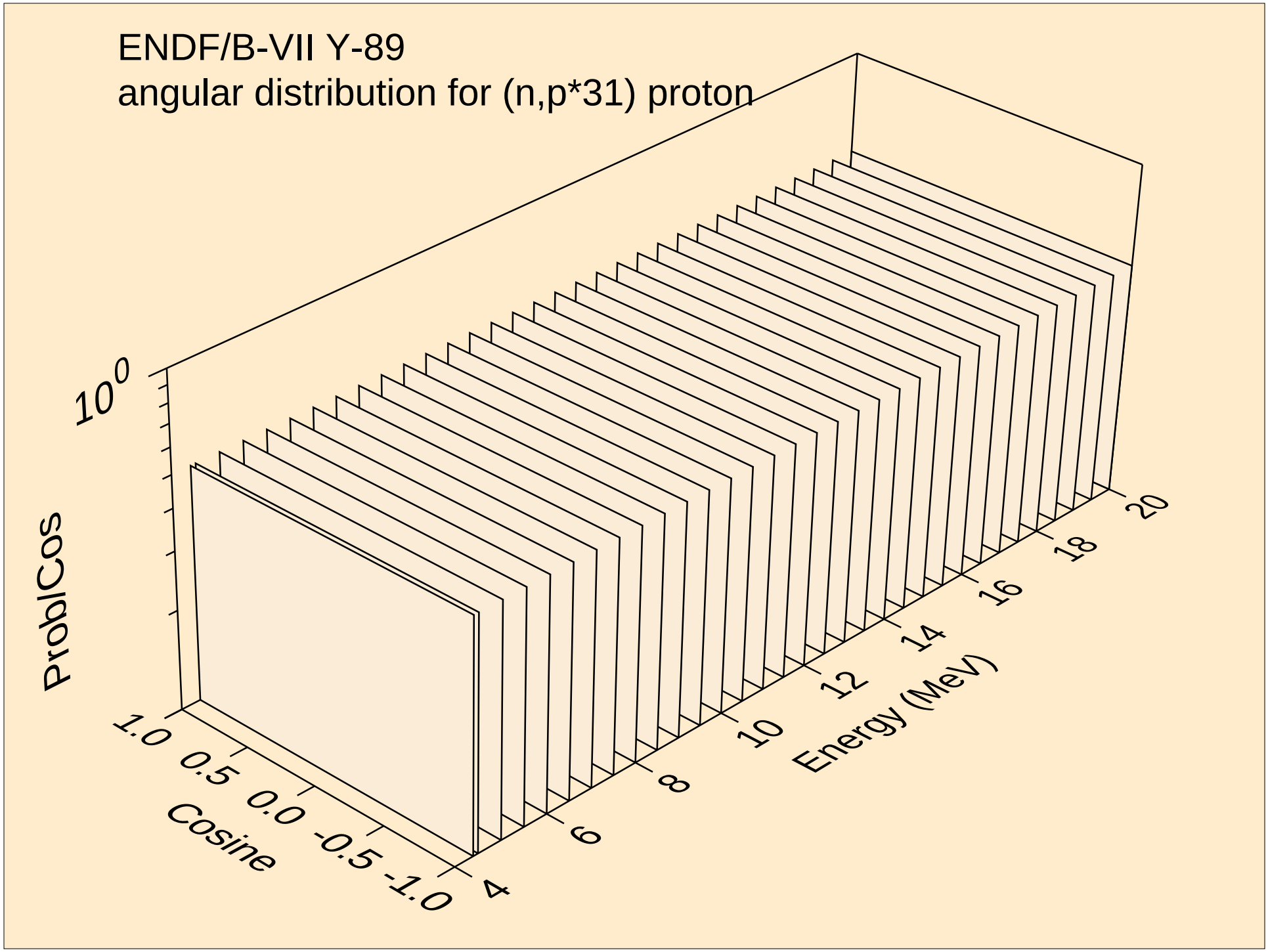

ENDF/B-VII Y-89
angular distribution for (n,p*26) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

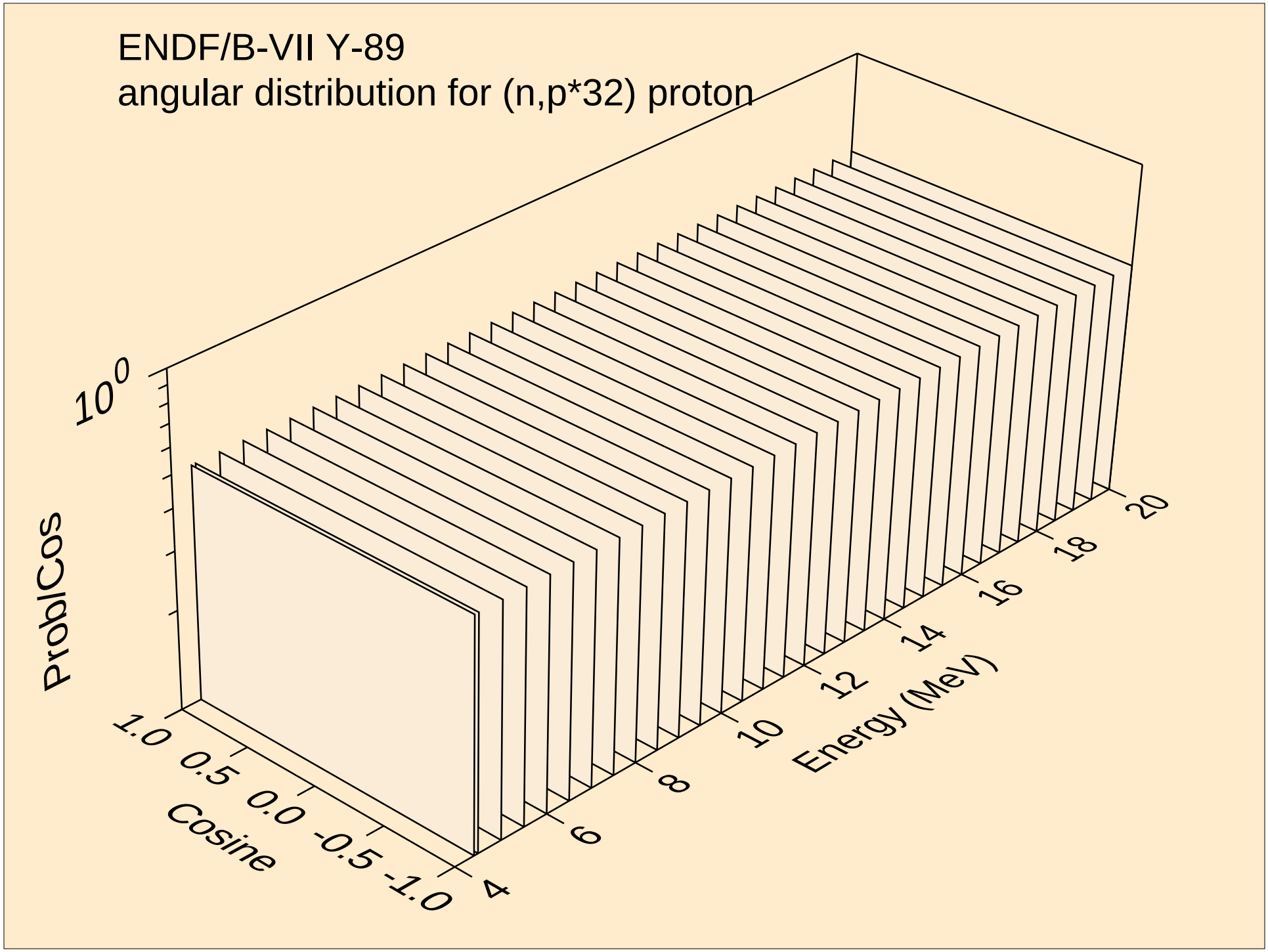

ENDF/B-VII Y-89
angular distribution for (n,p*27) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

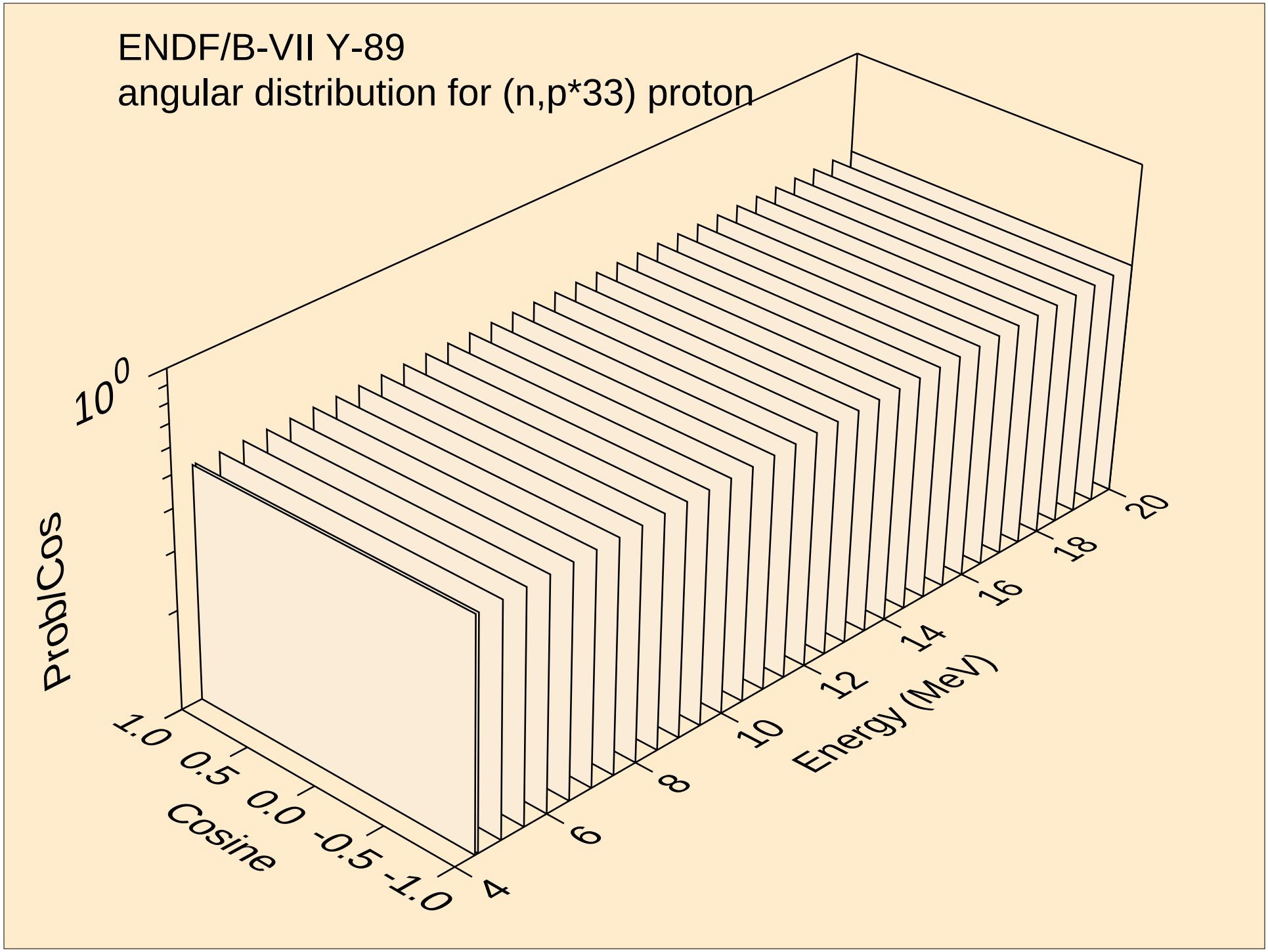

ENDF/B-VII Y-89
angular distribution for (n,p*28) proton
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

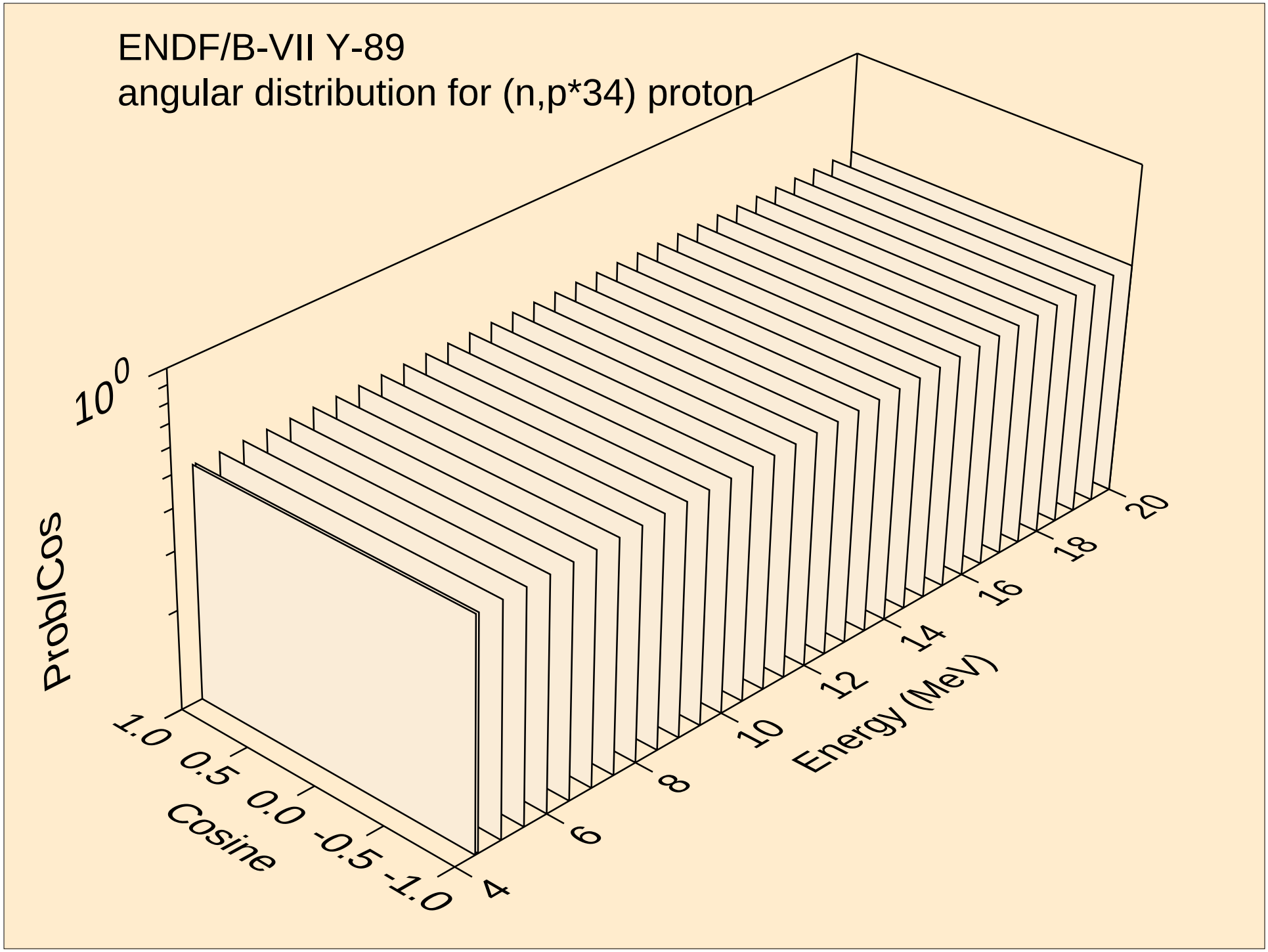

ENDF/B-VII Y-89
angular distribution for (n,p*29) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

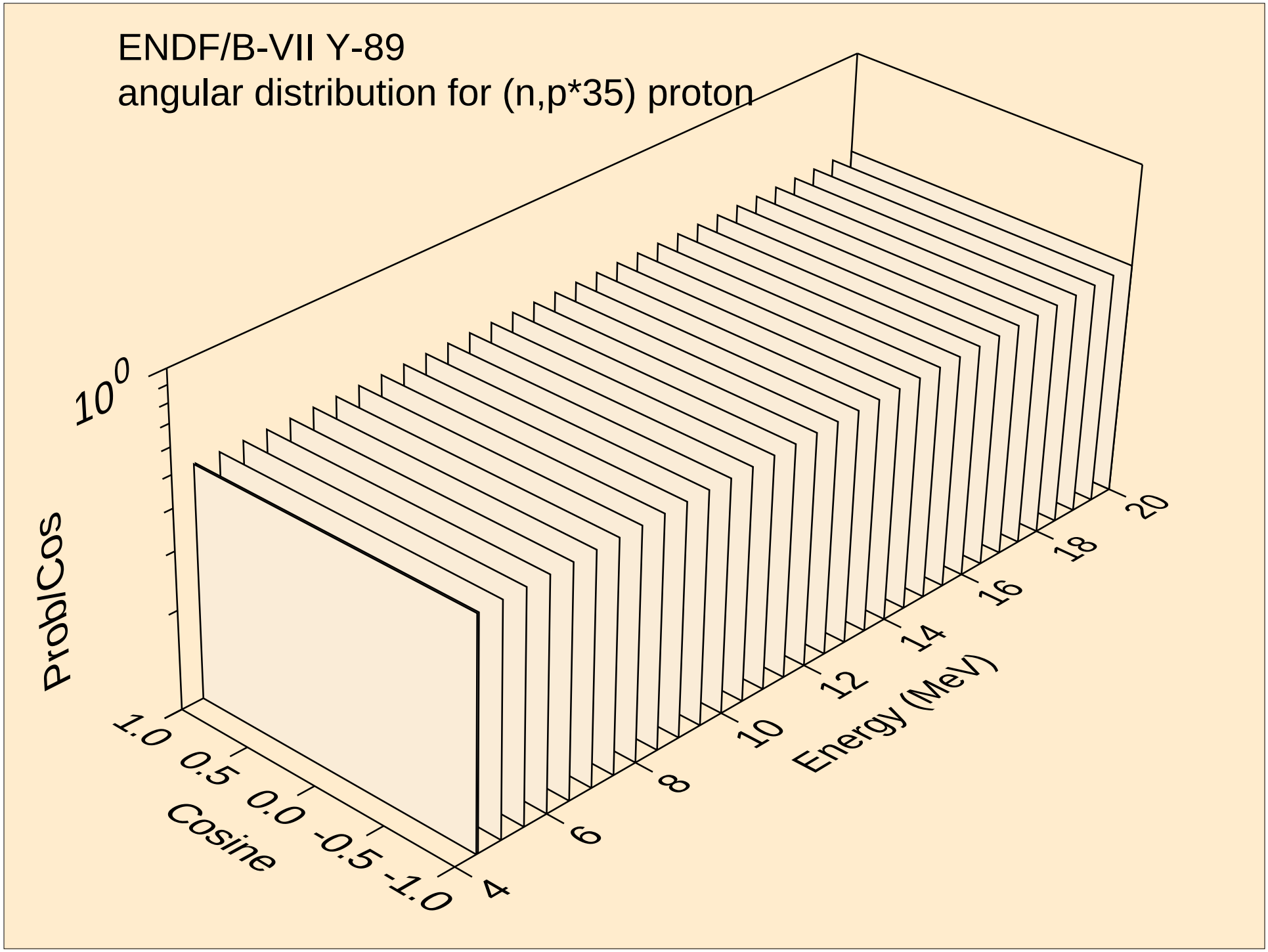

ENDF/B-VII Y-89
angular distribution for (n,p*30) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

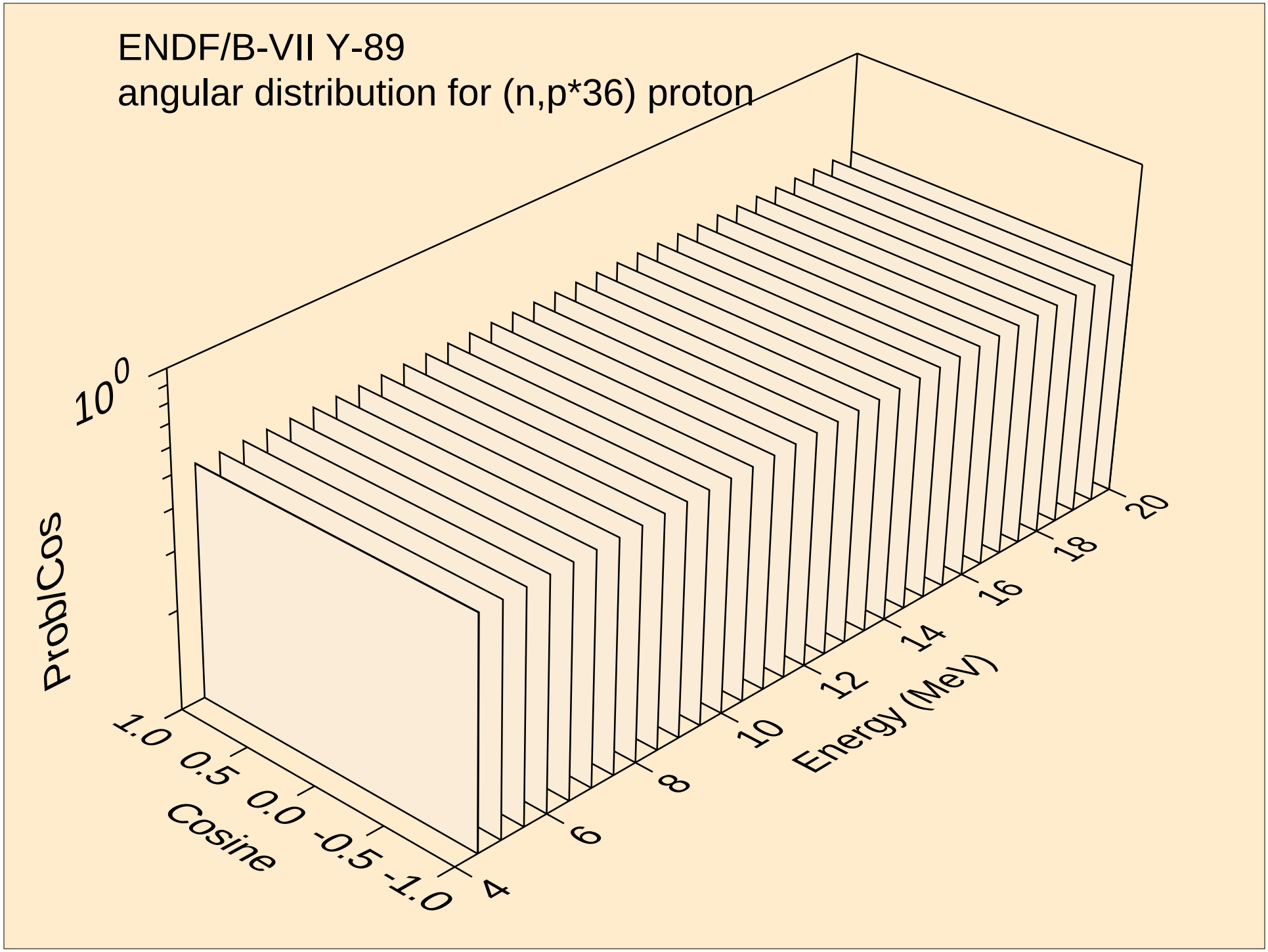

ENDF/B-VII Y-89
angular distribution for (n,p*31) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

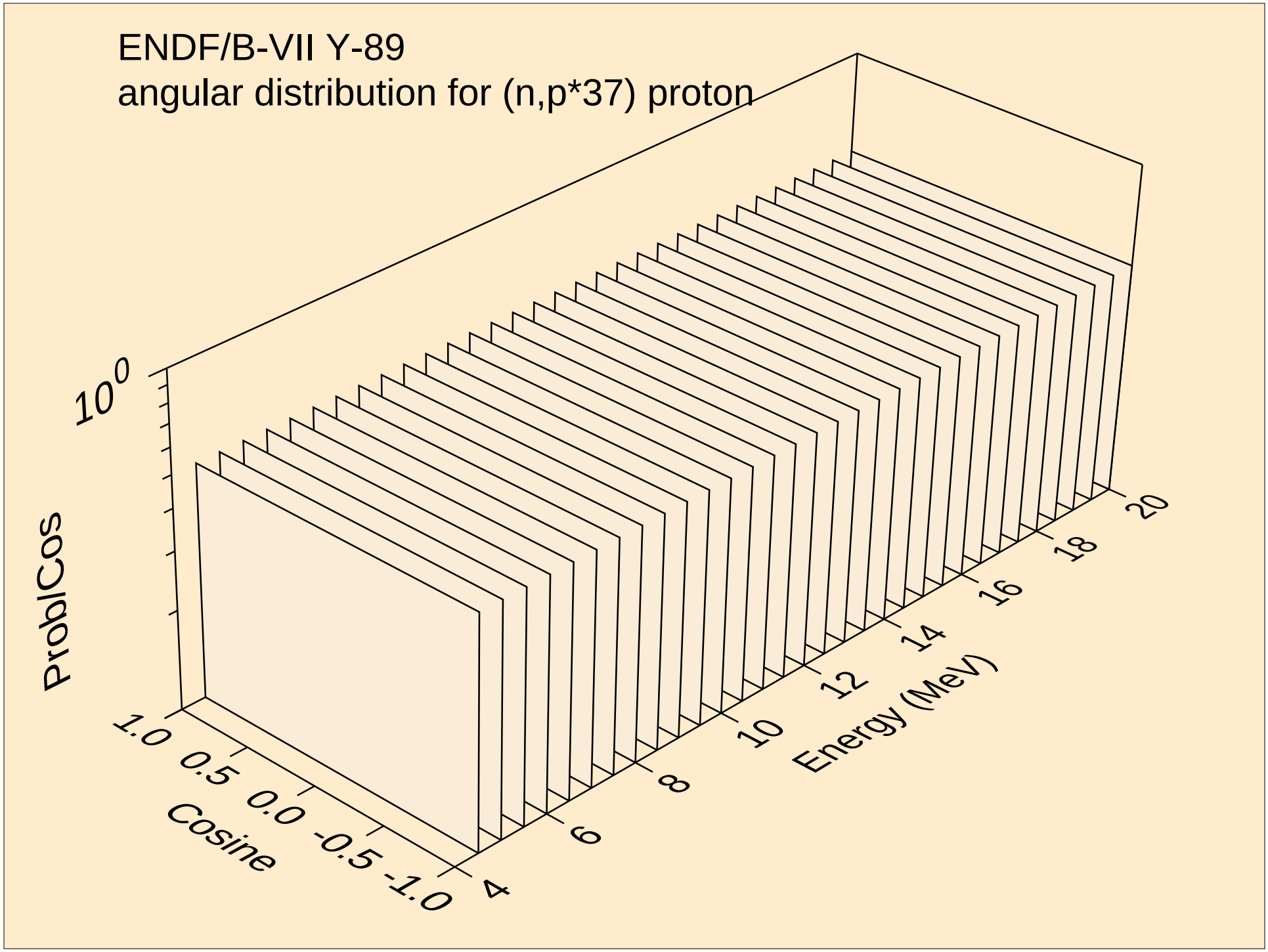

ENDF/B-VII Y-89
angular distribution for (n,p*32) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

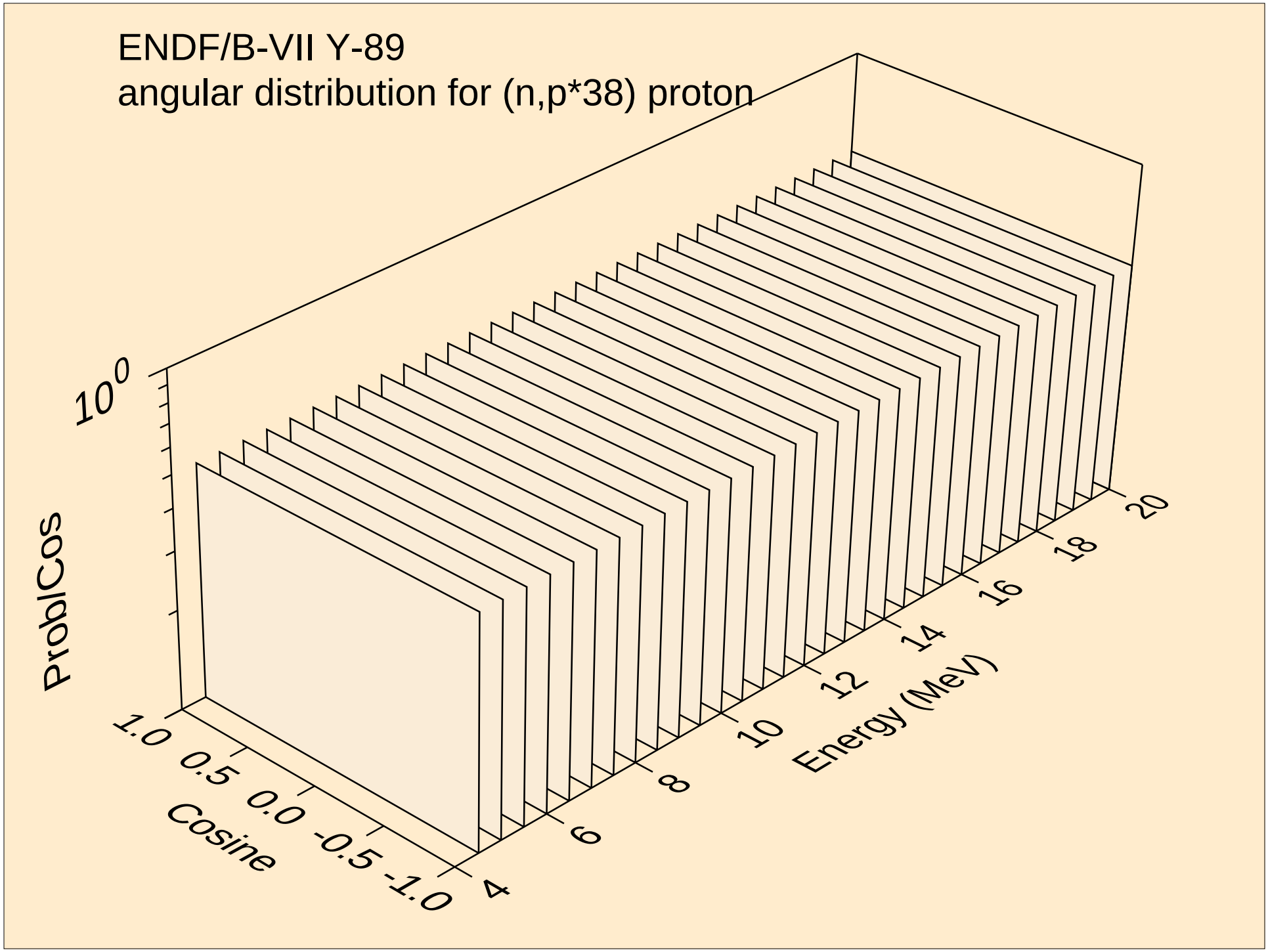

ENDF/B-VII Y-89
angular distribution for (n,p*33) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

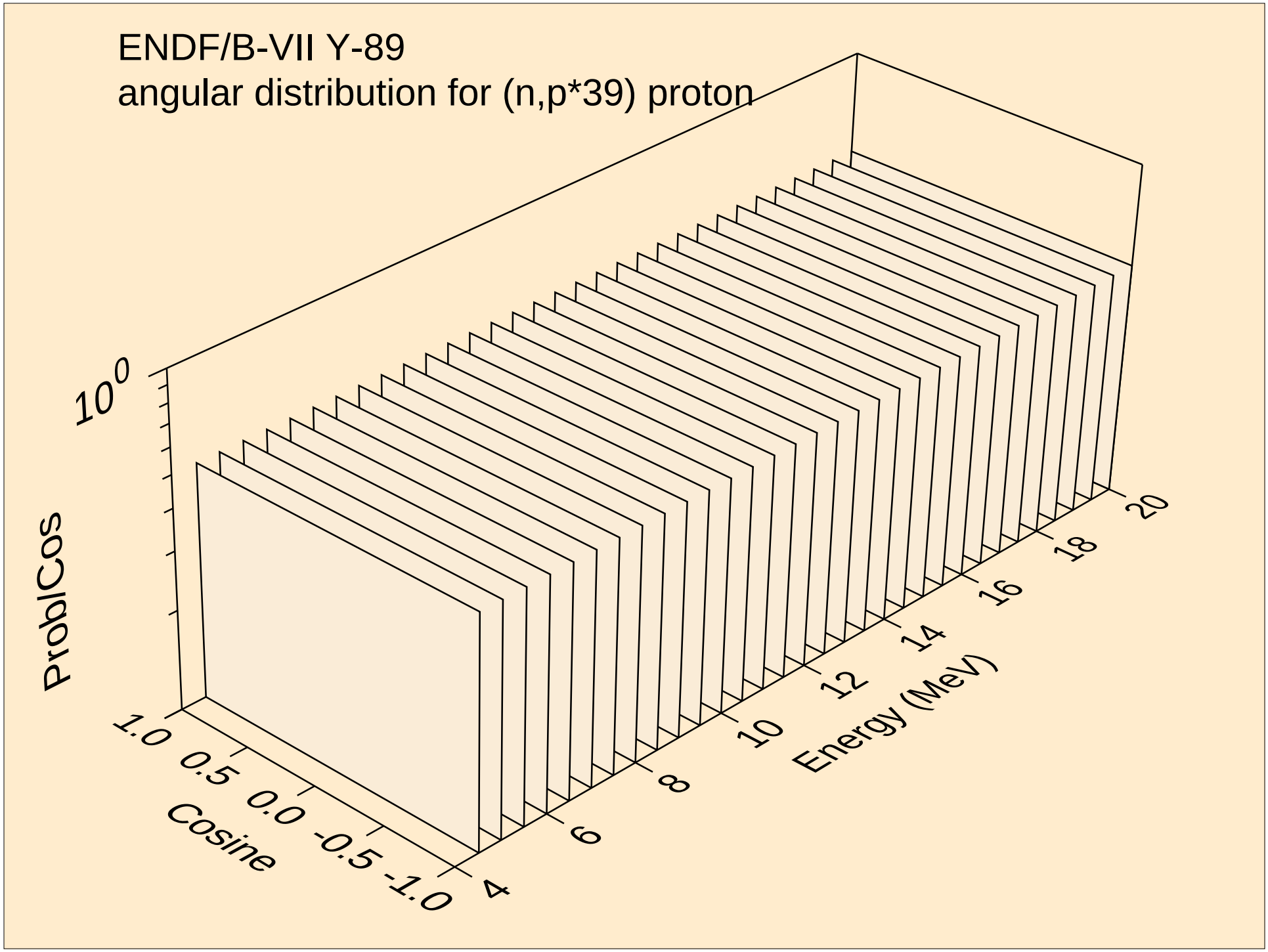

ENDF/B-VII Y-89
angular distribution for (n,p*34) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

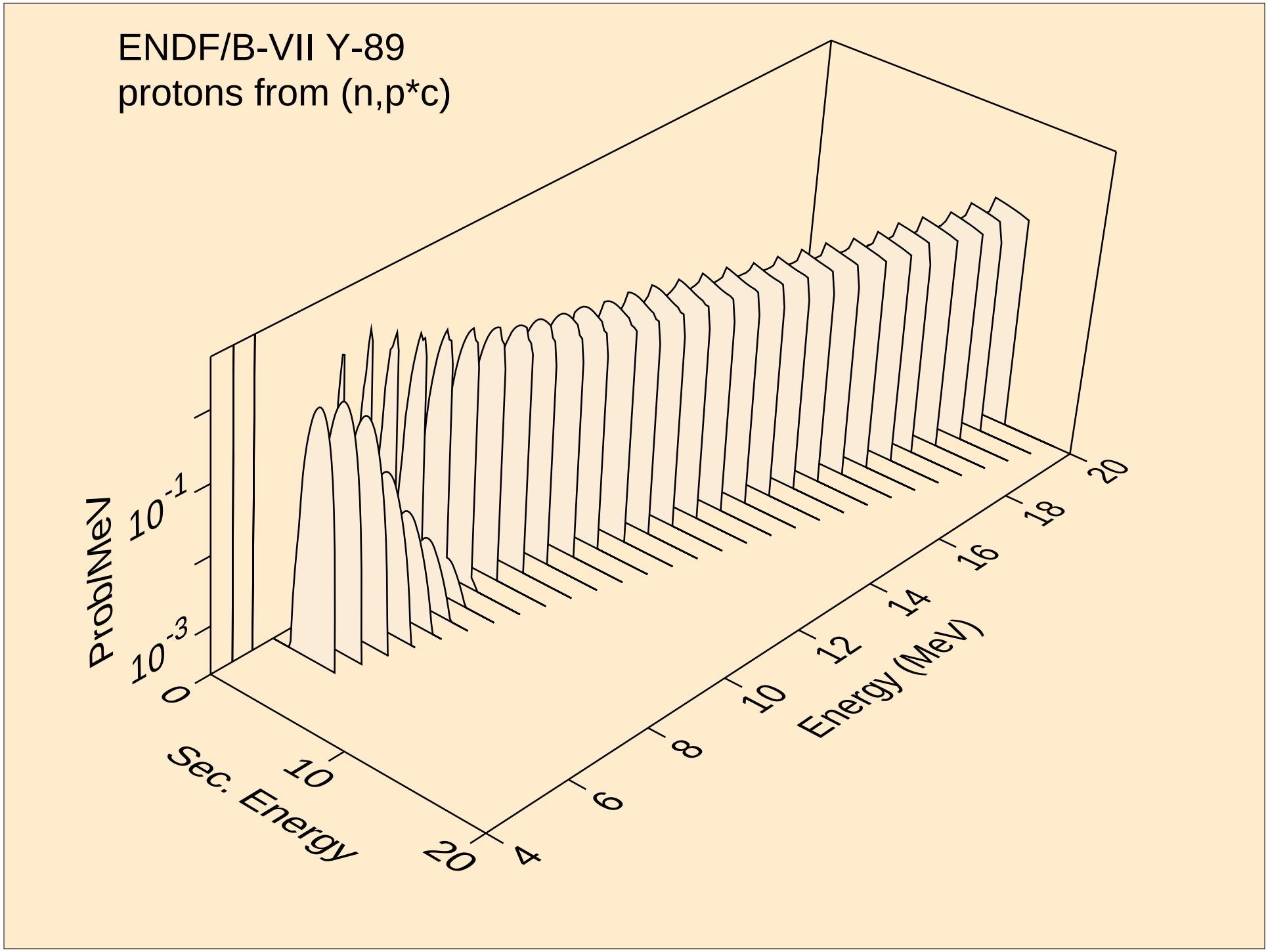

ENDF/B-VII Y-89
angular distribution for (n,p*35) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

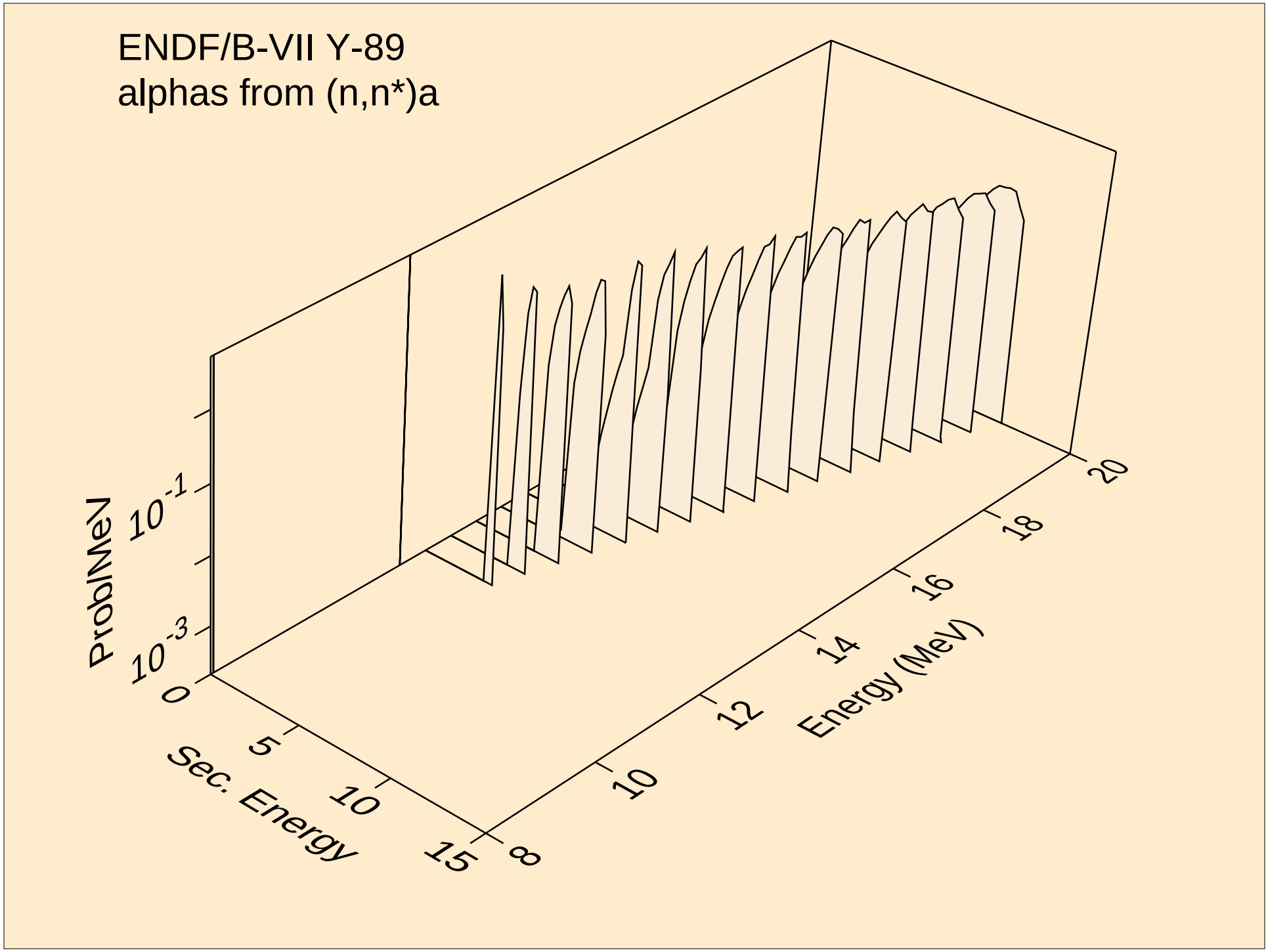

ENDF/B-VII Y-89
angular distribution for (n,p*36) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

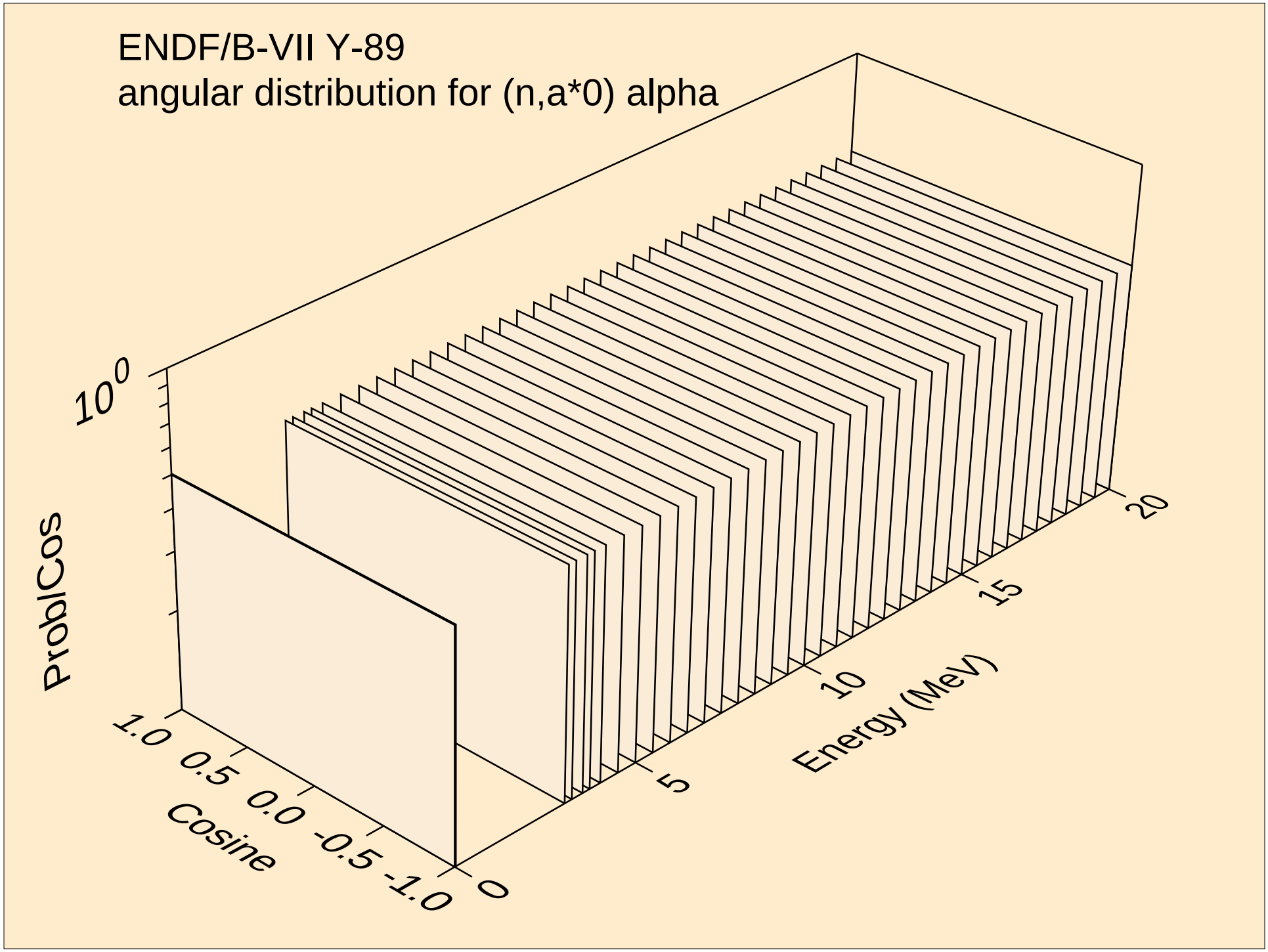

ENDF/B-VII Y-89
angular distribution for (n,p*37) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

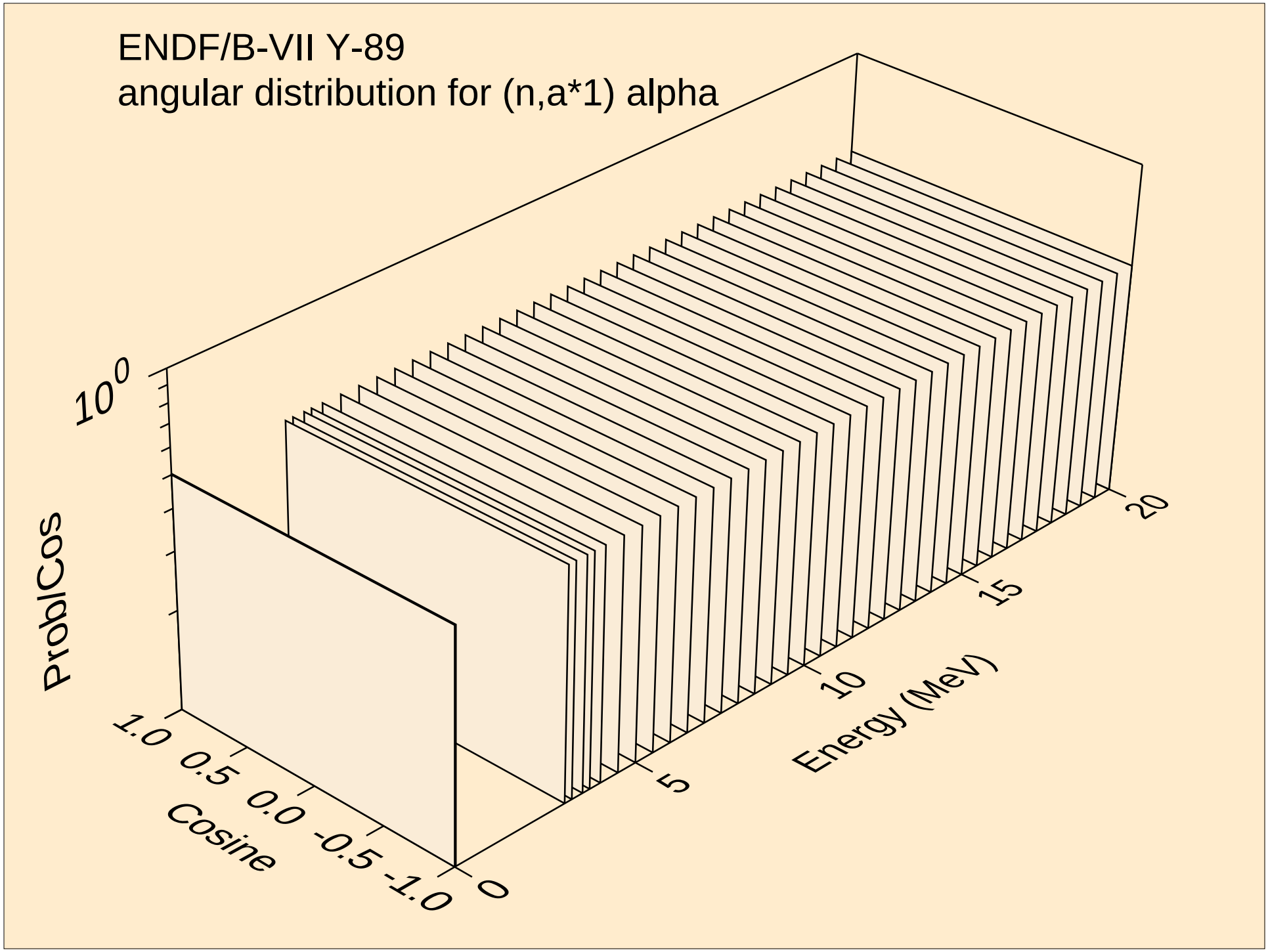

ENDF/B-VII Y-89
angular distribution for (n,p*38) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

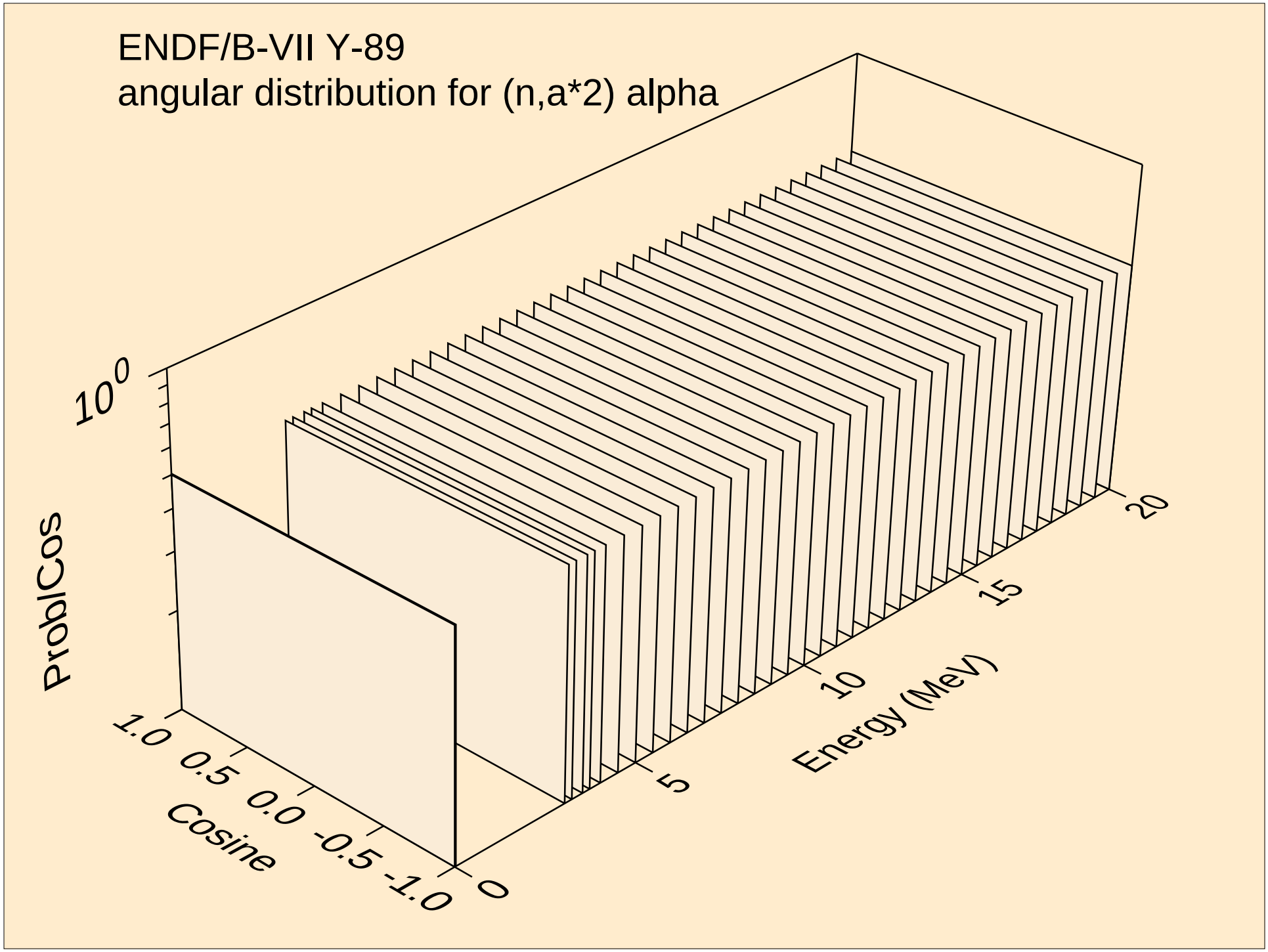

ENDF/B-VII Y-89
angular distribution for (n,p*39) proton
10^0
Prob|Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
4
6
8
10
12
14
16
18
20
Energy (MeV)

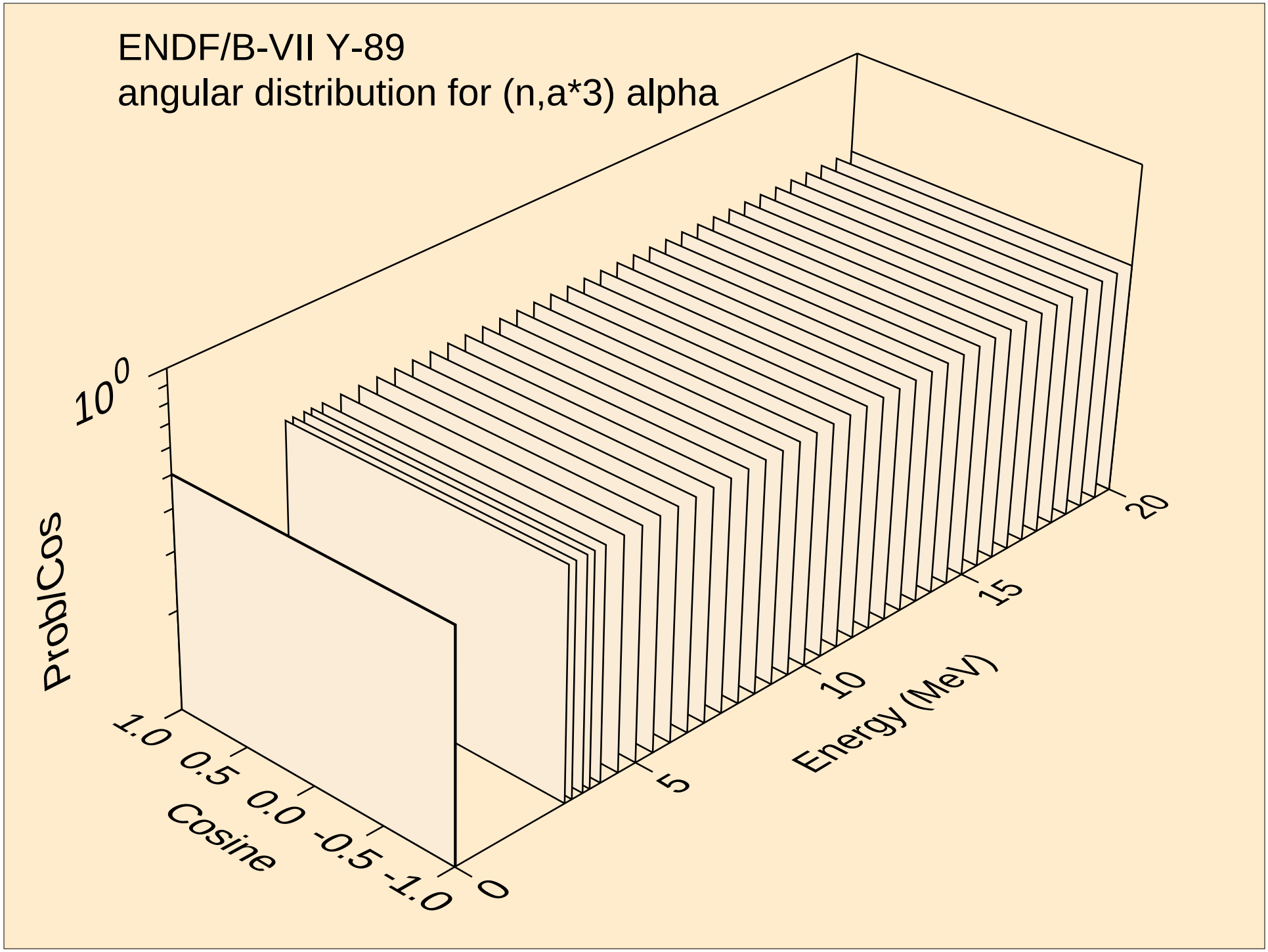

ENDF/B-VII Y-89
protons from (n,p*c)
Prob/MeV
10^-1
10^-3
0
Sec. Energy
10
20
4
6
8
10
12
14
16
18
20
Energy (MeV)

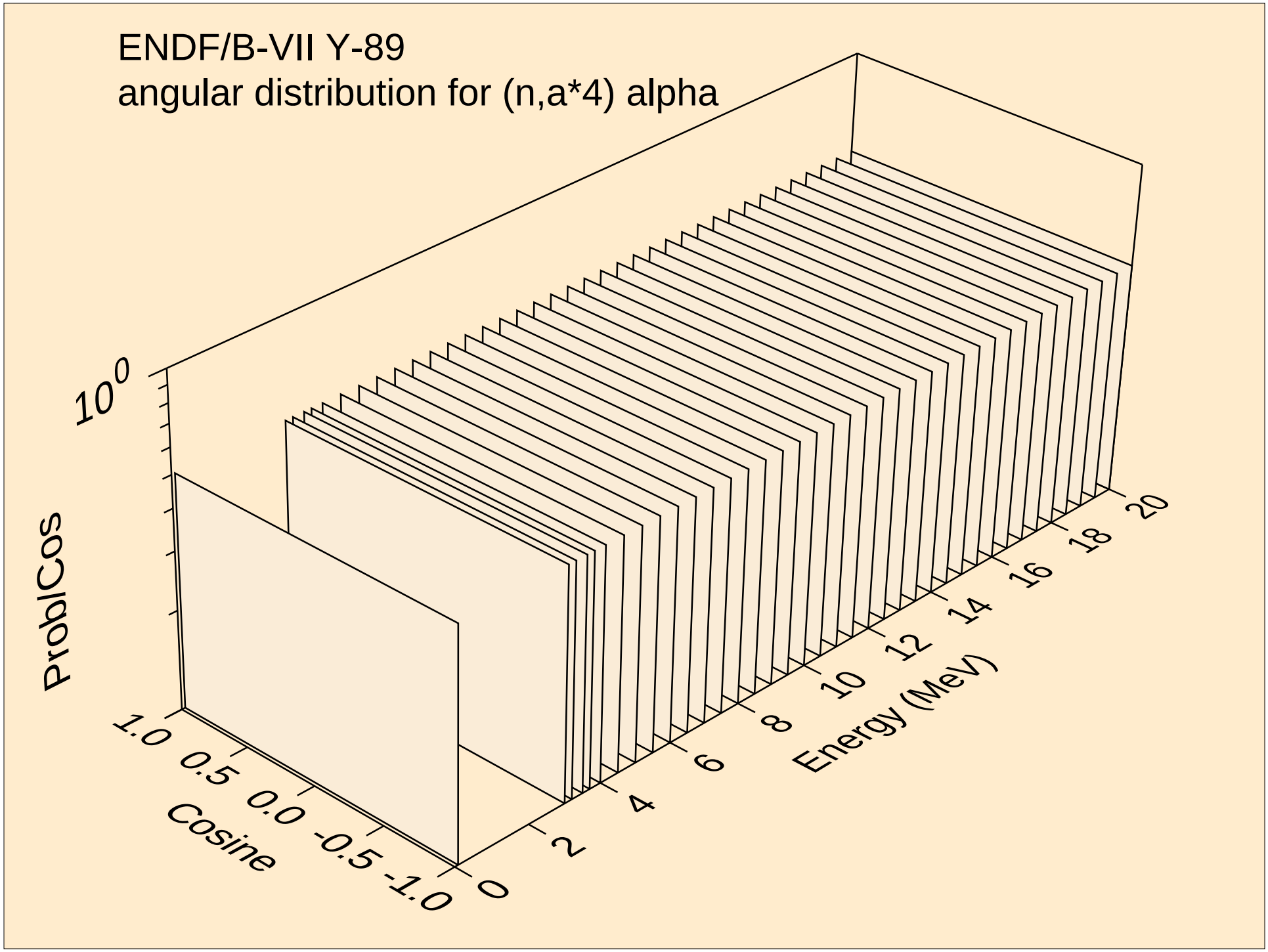

ENDF/B-VII Y-89
alphas from (n,n*)a
Prob/MeV
10^-1
10^-3
0
5
10
15
Sec. Energy
8
10
12
14
16
18
20
Energy (MeV)

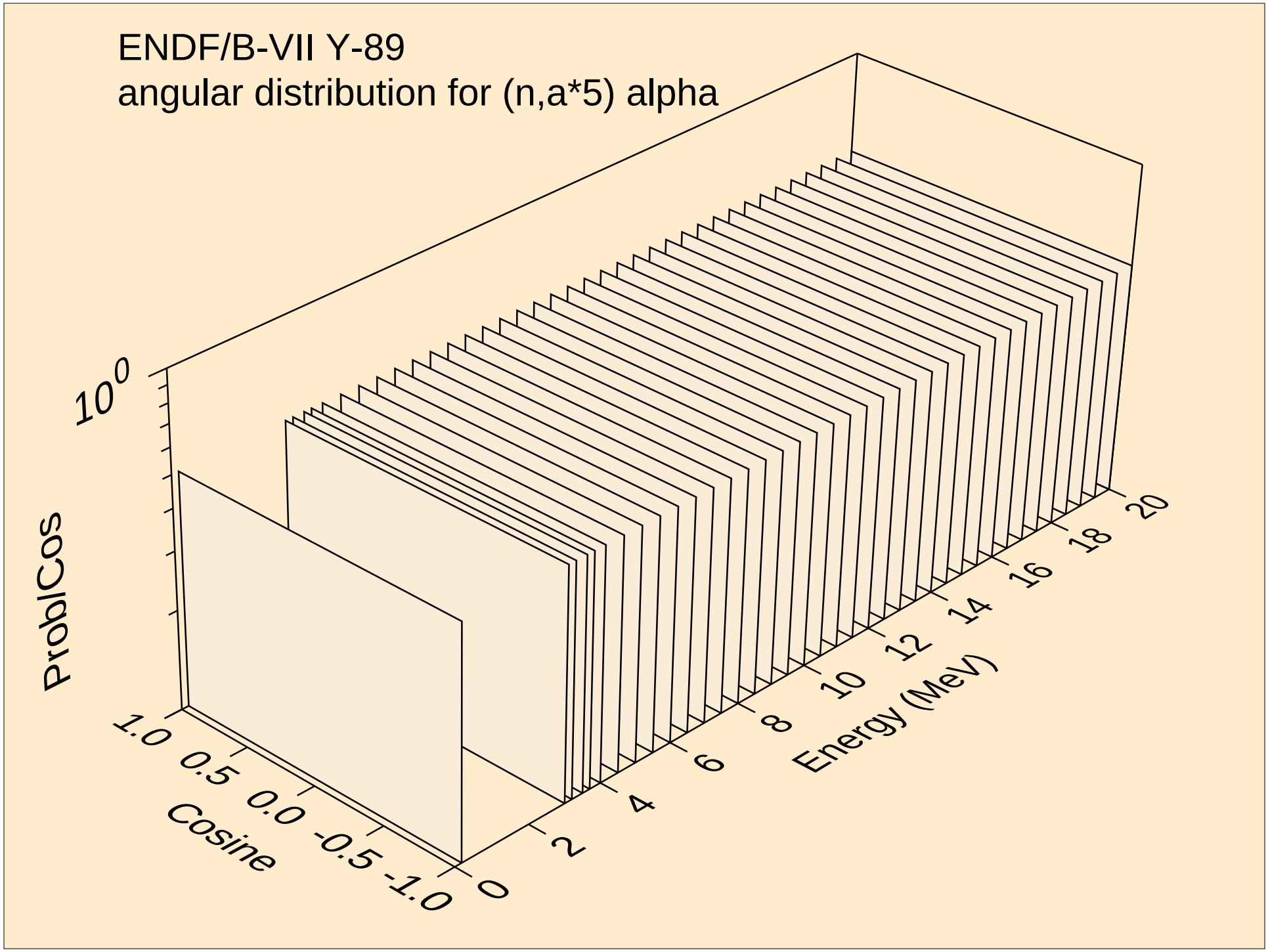

ENDF/B-VII Y-89
angular distribution for (n,a*0) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)

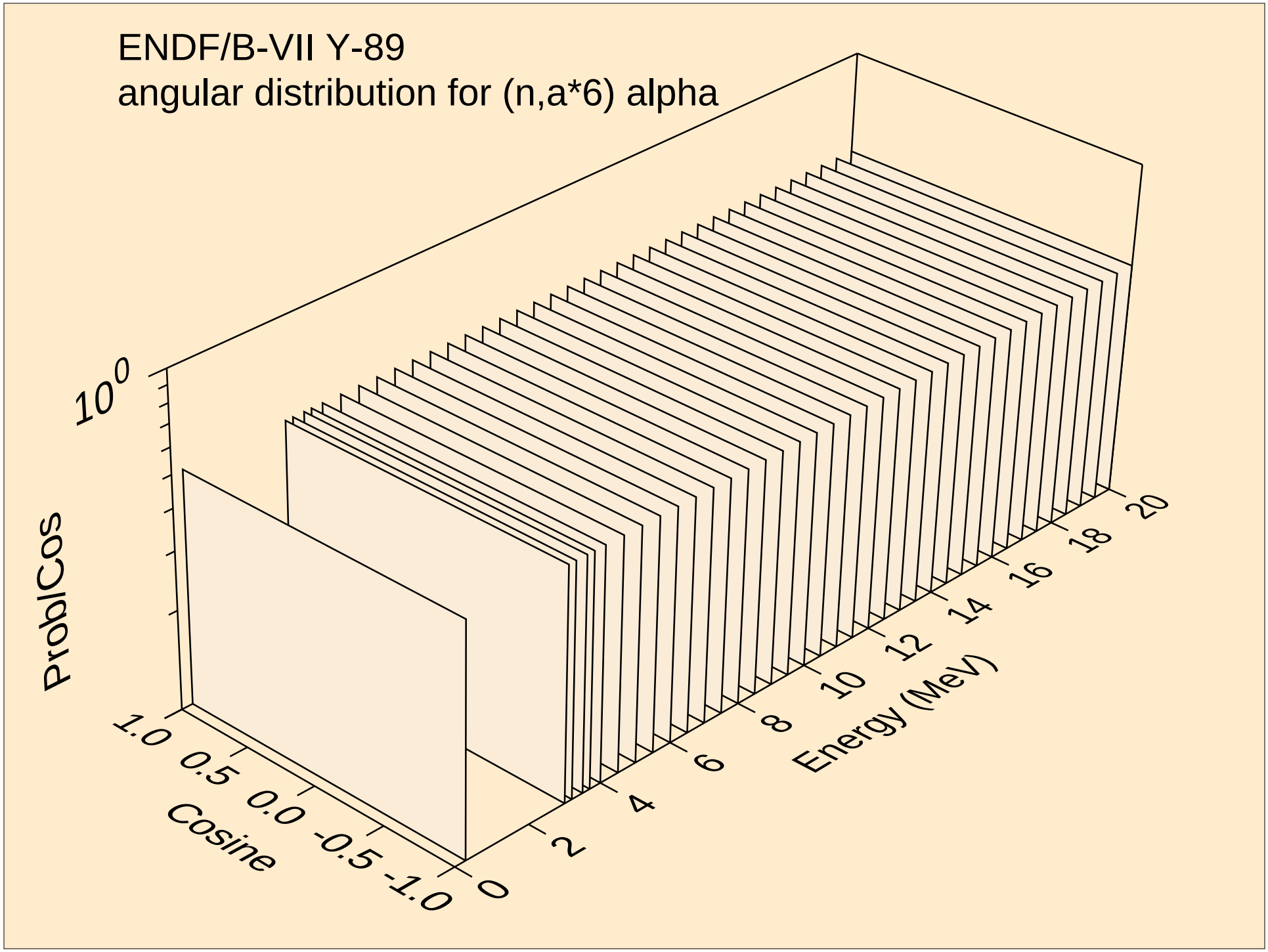

ENDF/B-VII Y-89
angular distribution for (n,a*1) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)

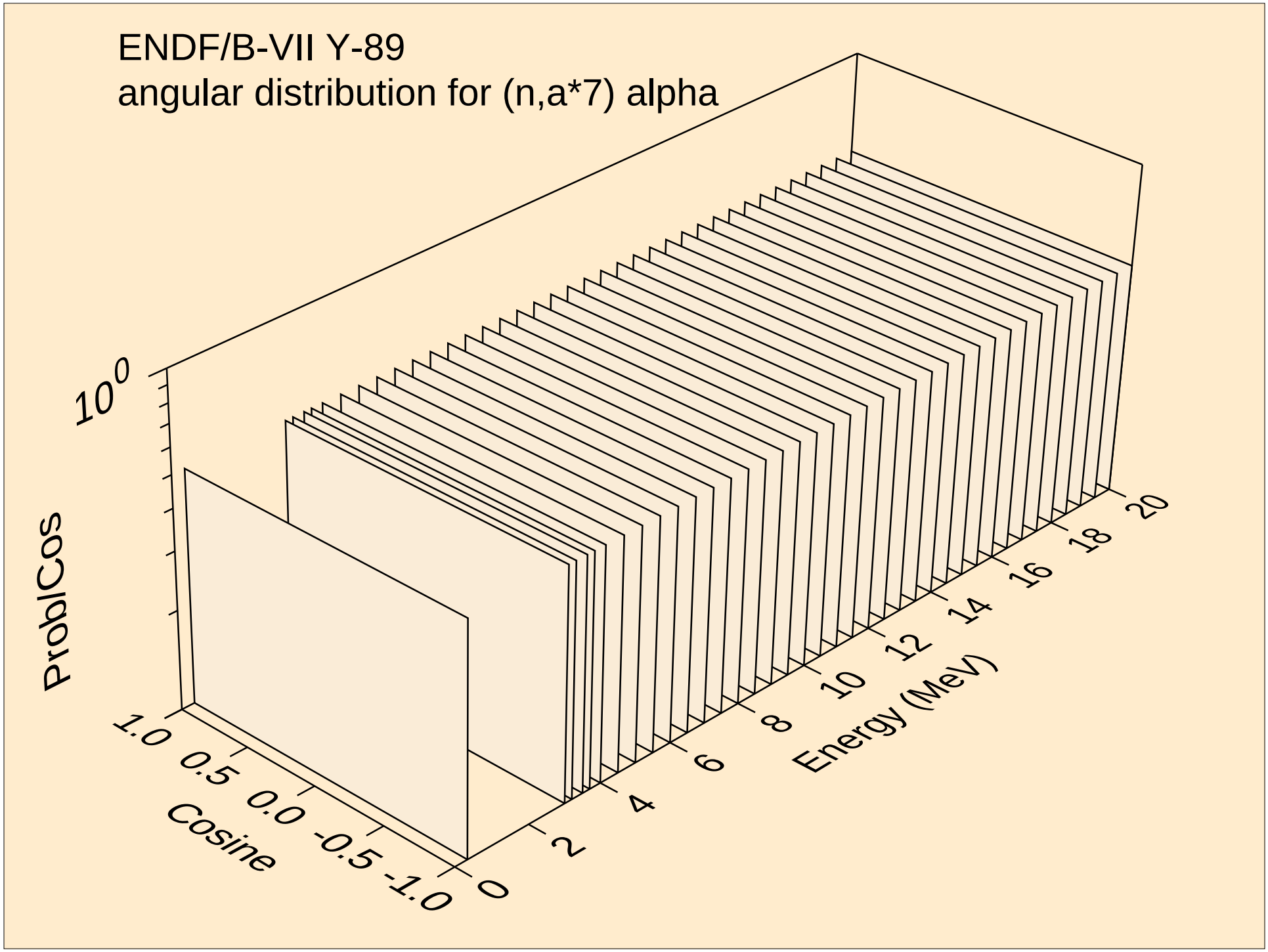

ENDF/B-VII Y-89
angular distribution for (n,a*2) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)

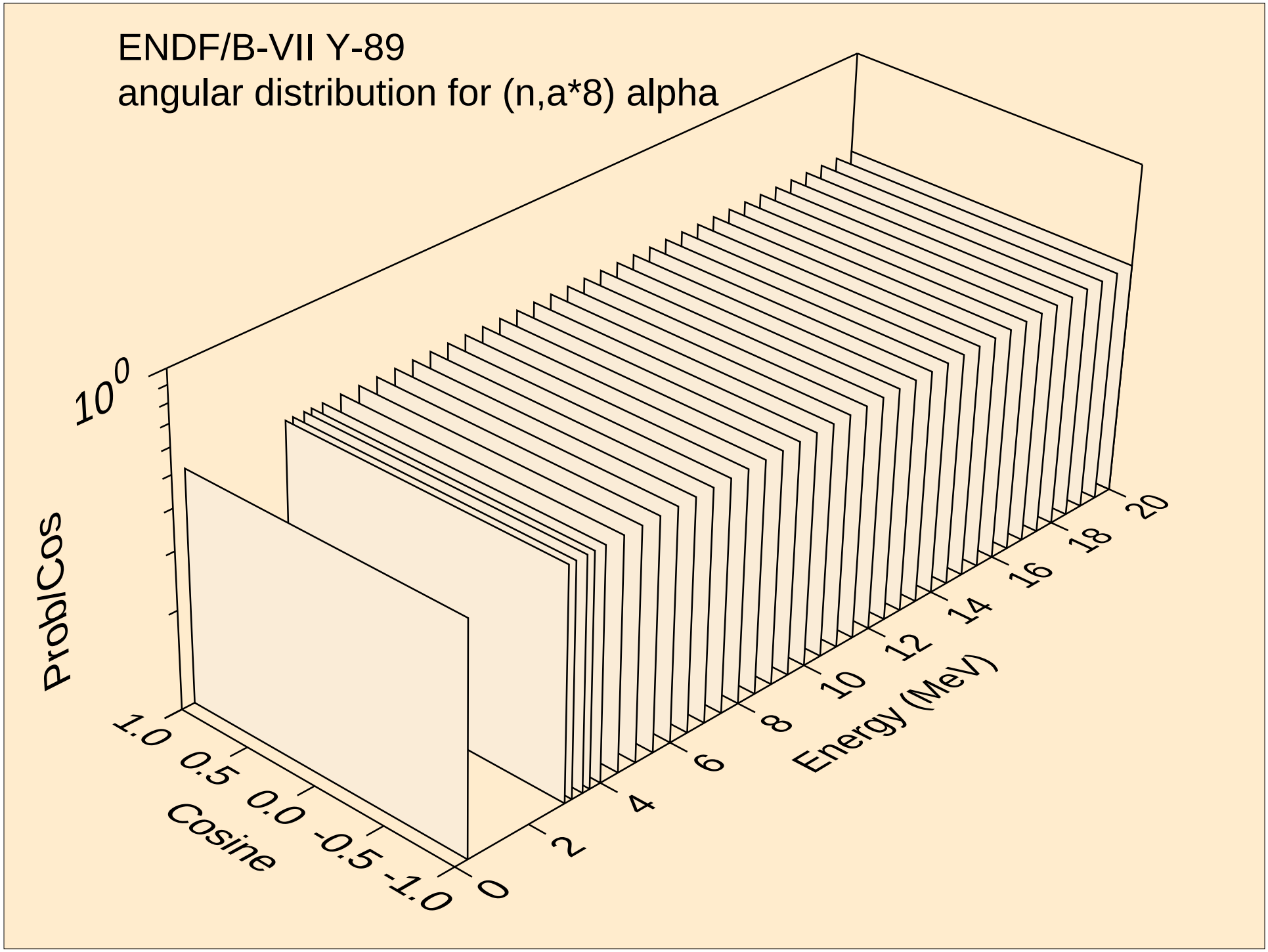

ENDF/B-VII Y-89
angular distribution for (n,a*3) alpha
10^0
ProblCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)

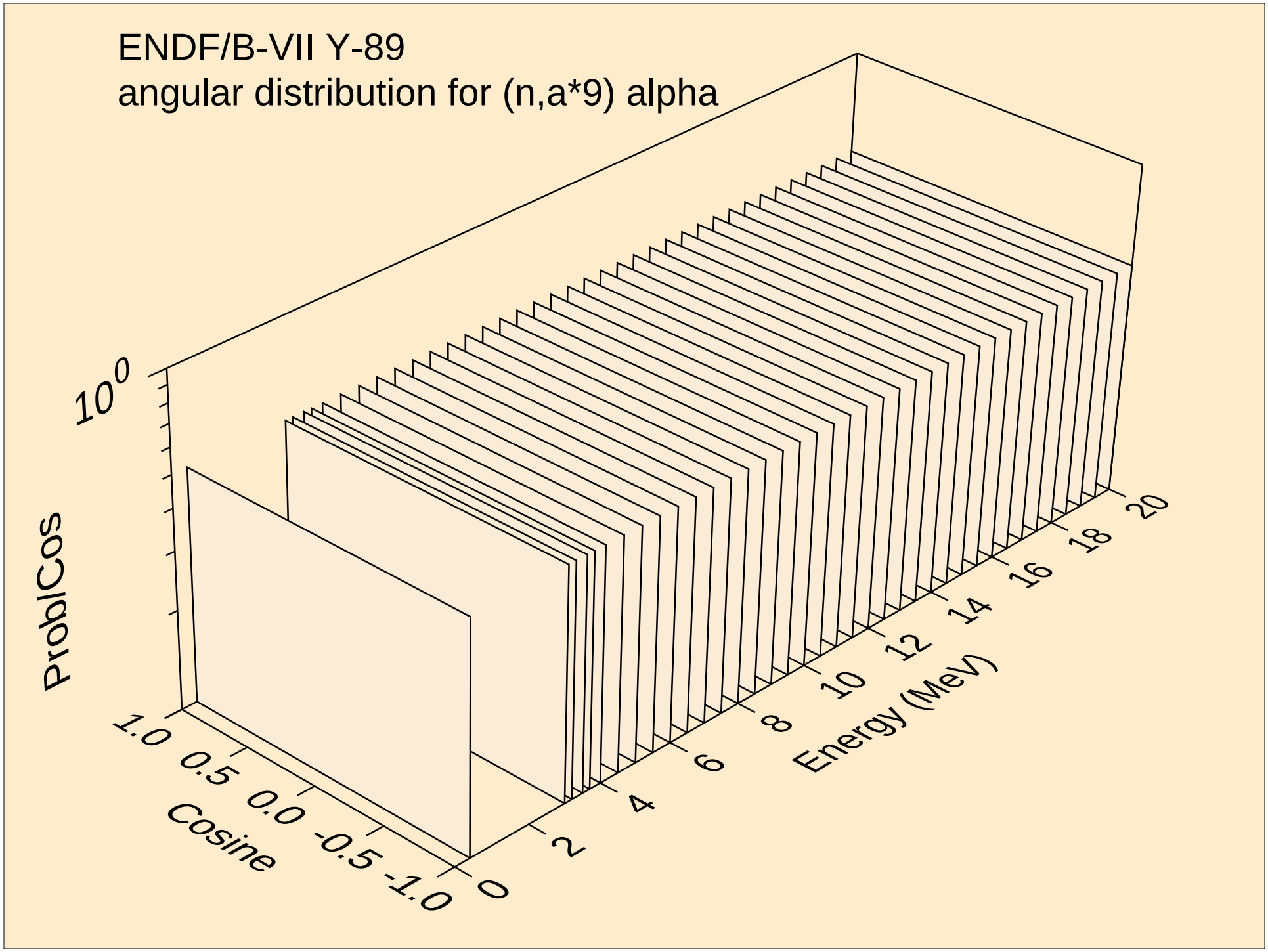

ENDF/B-VII Y-89
angular distribution for (n,a*4) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

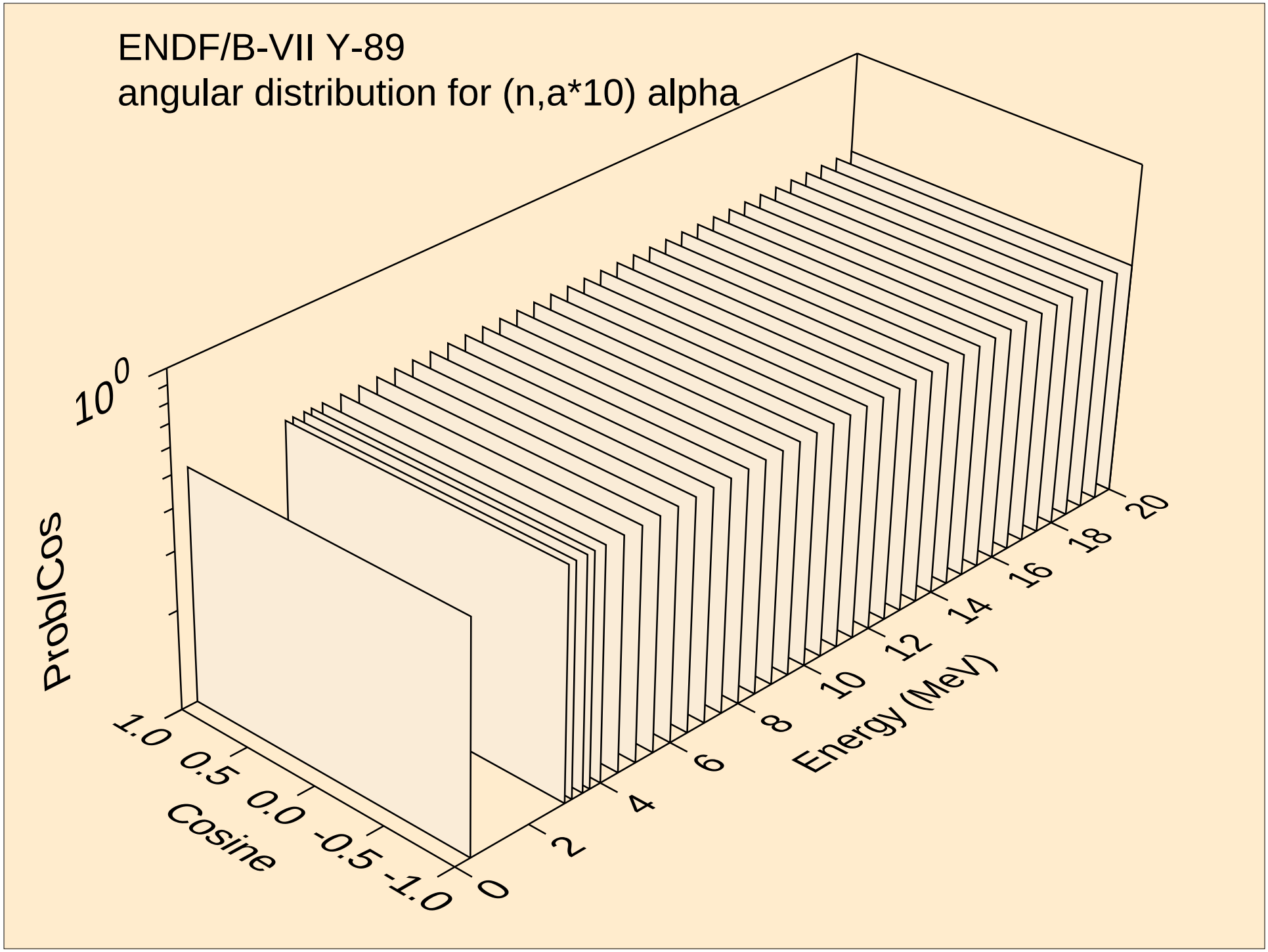

ENDF/B-VII Y-89
angular distribution for (n,a*5) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

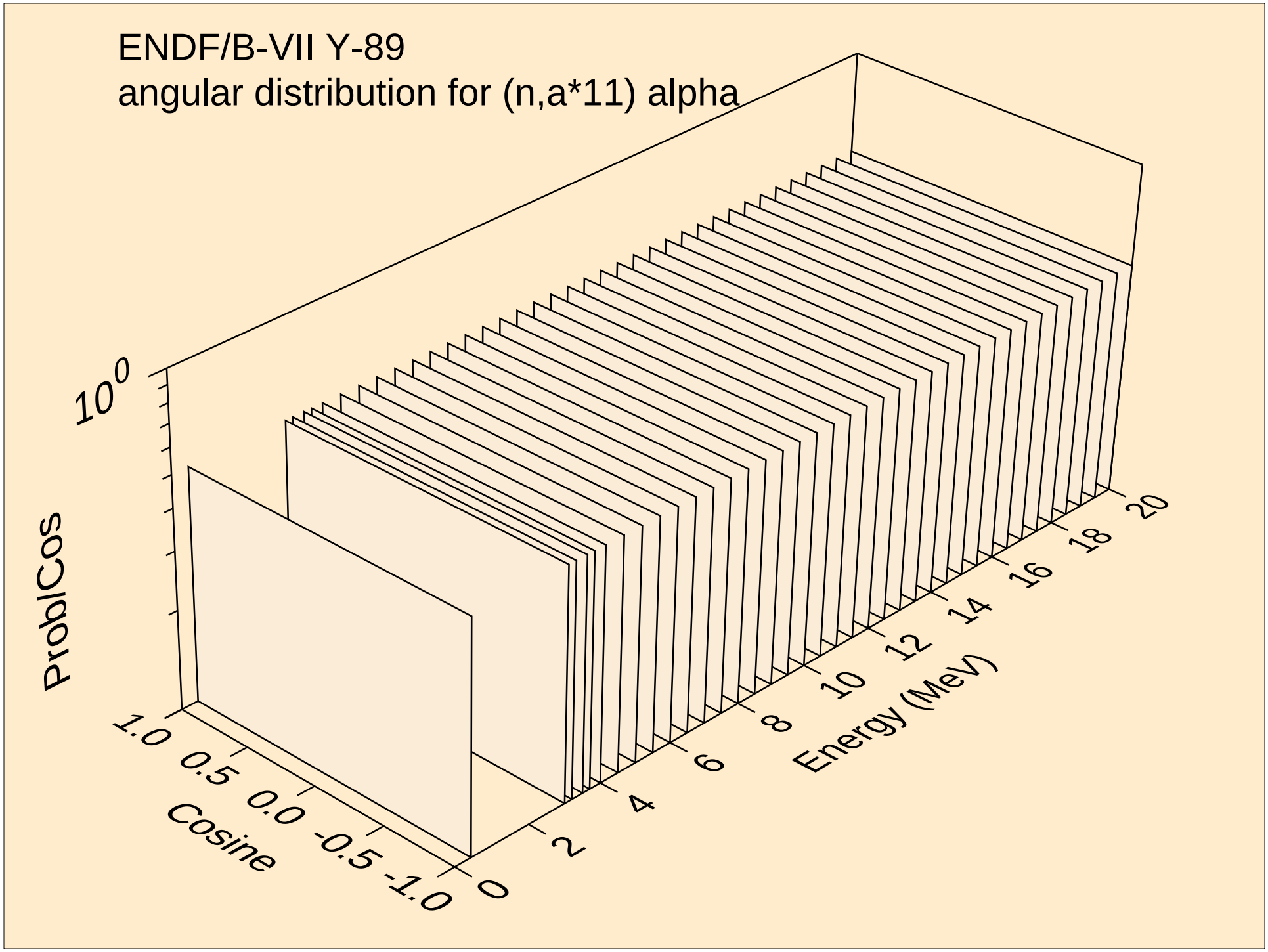

ENDF/B-VII Y-89
angular distribution for (n,a*6) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

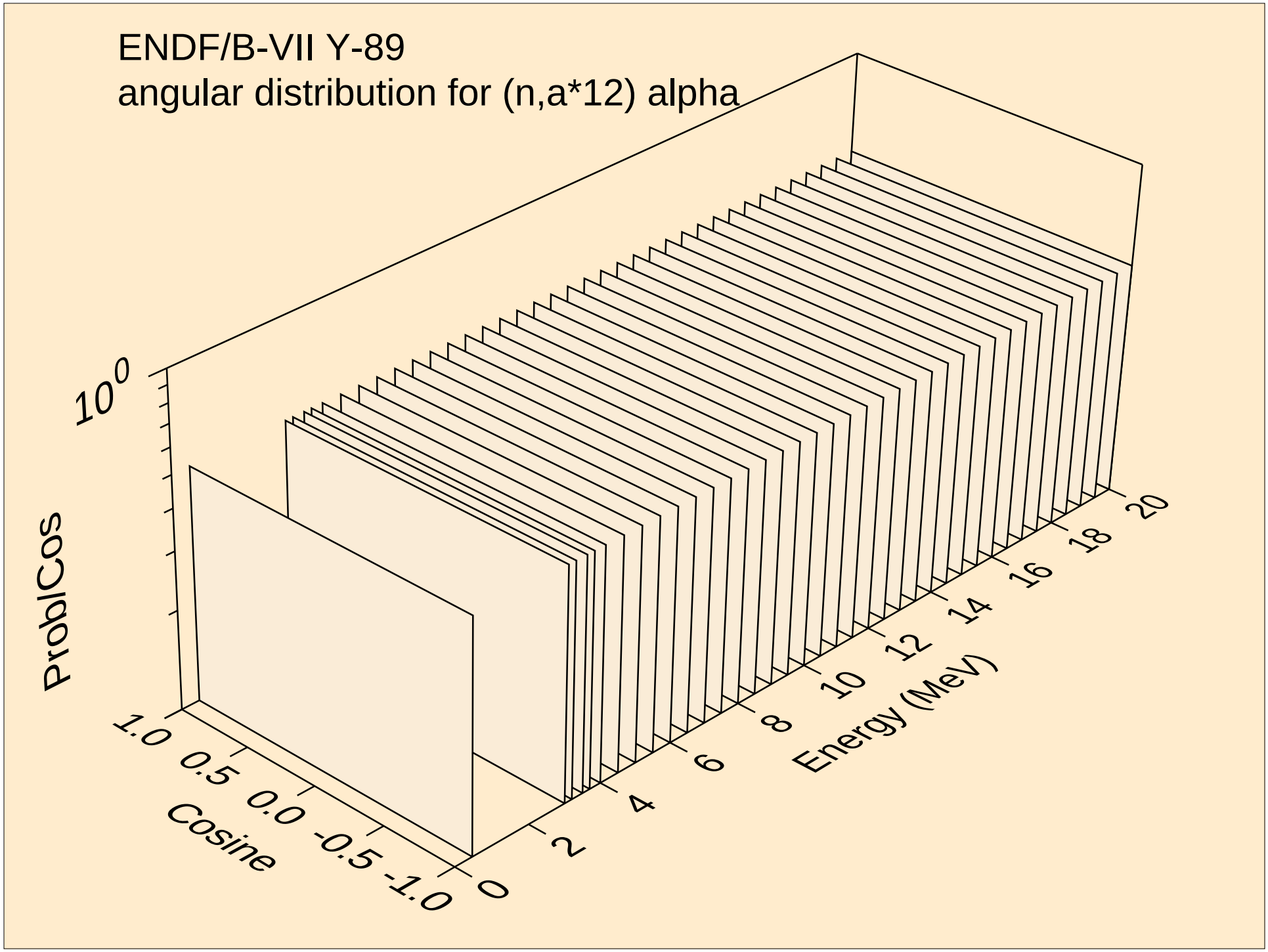

ENDF/B-VII Y-89
angular distribution for (n,a*7) alpha
10^0
ProblCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

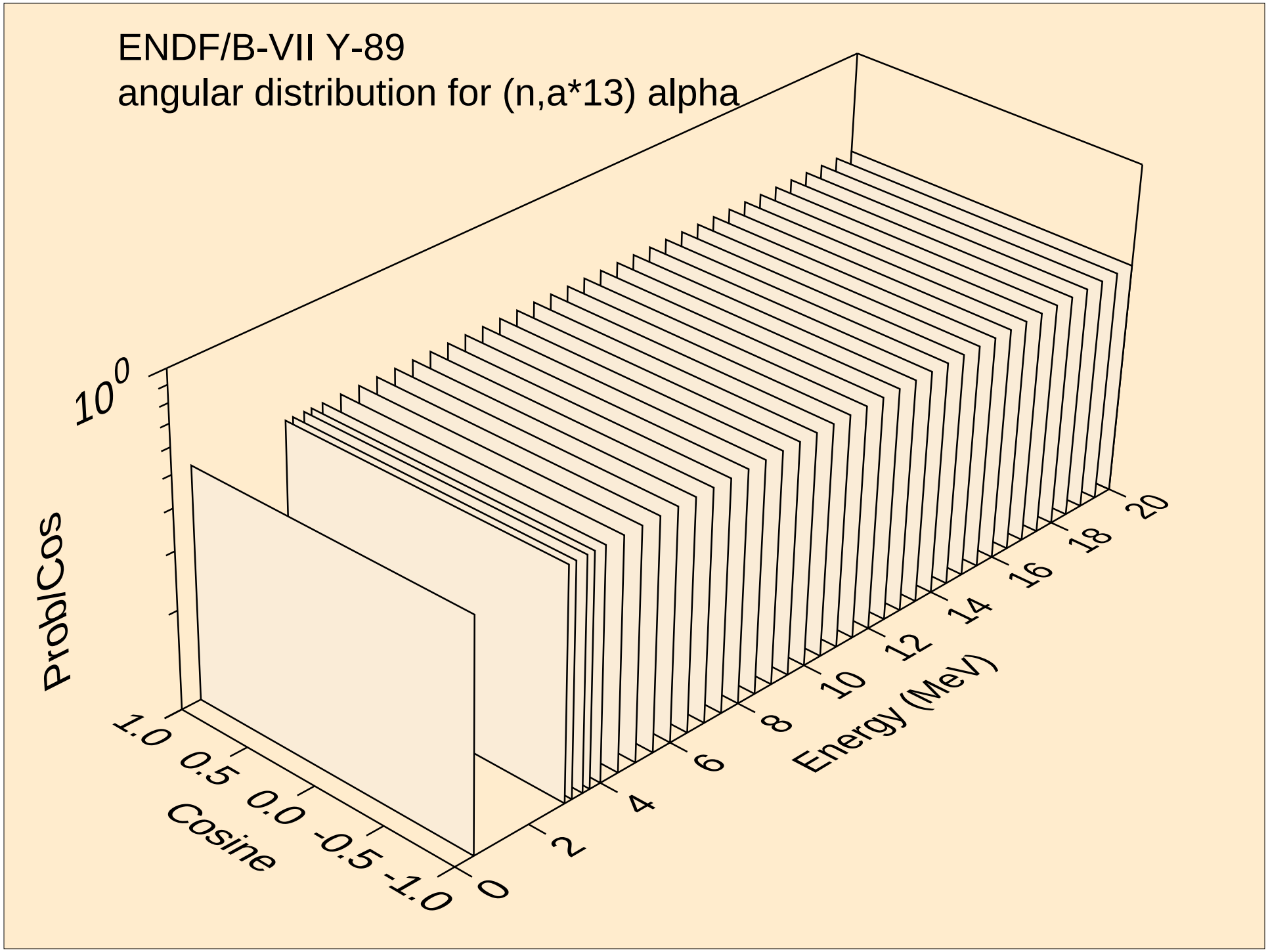

ENDF/B-VII Y-89
angular distribution for (n,a*8) alpha
10^0
Prob/Cos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

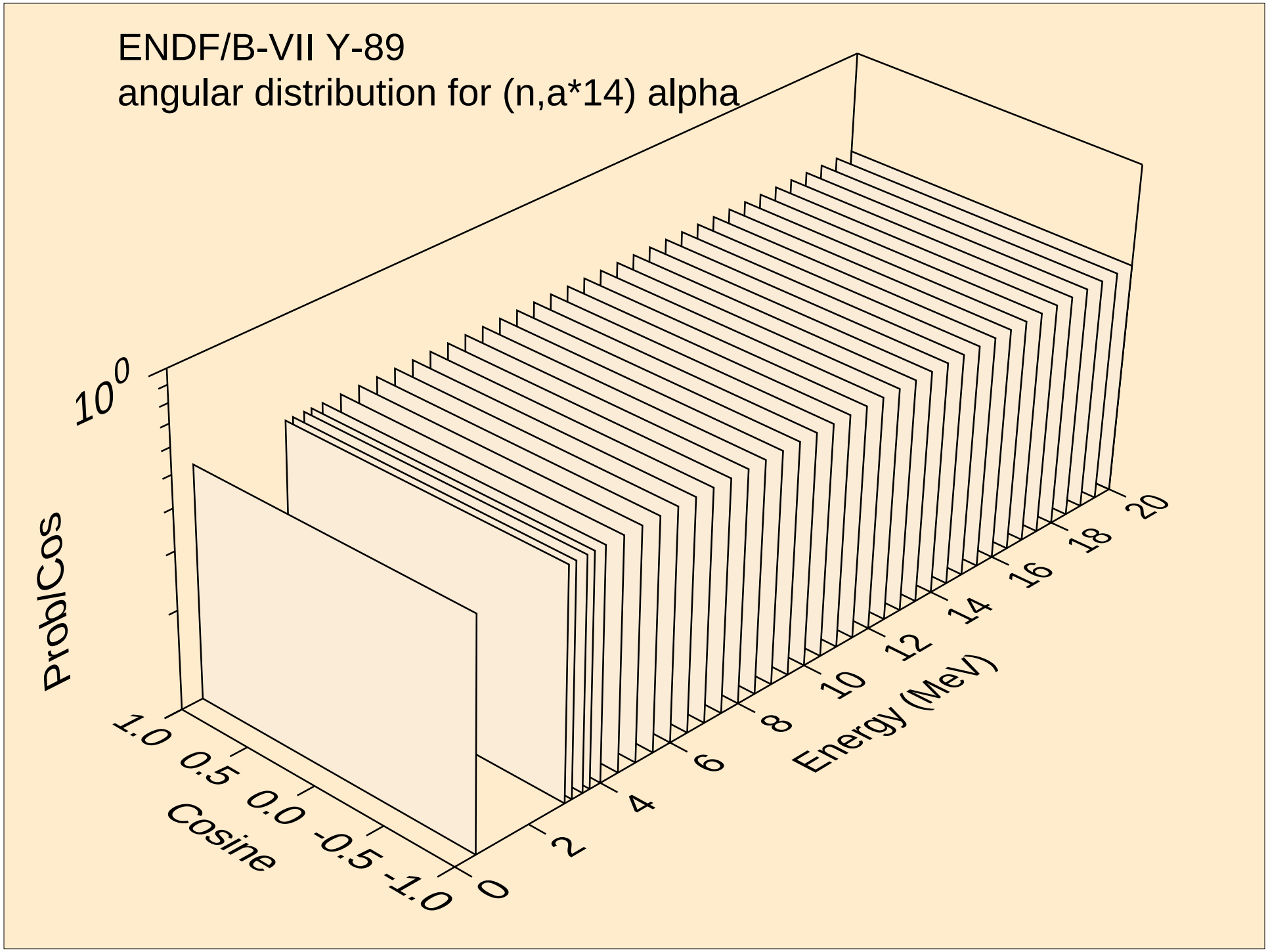

ENDF/B-VII Y-89
angular distribution for (n,a*9) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

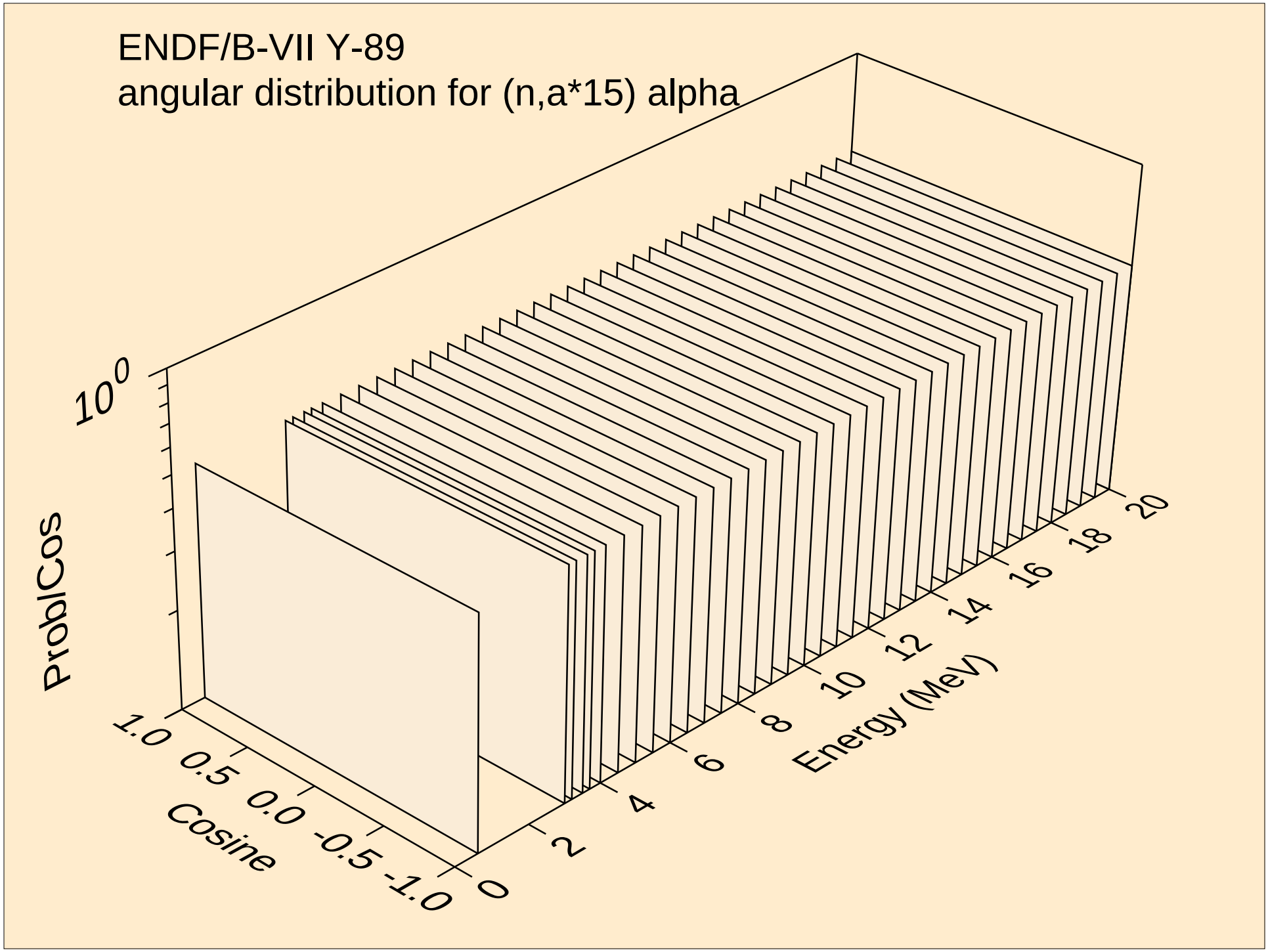

ENDF/B-VII Y-89
angular distribution for (n,a*10) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

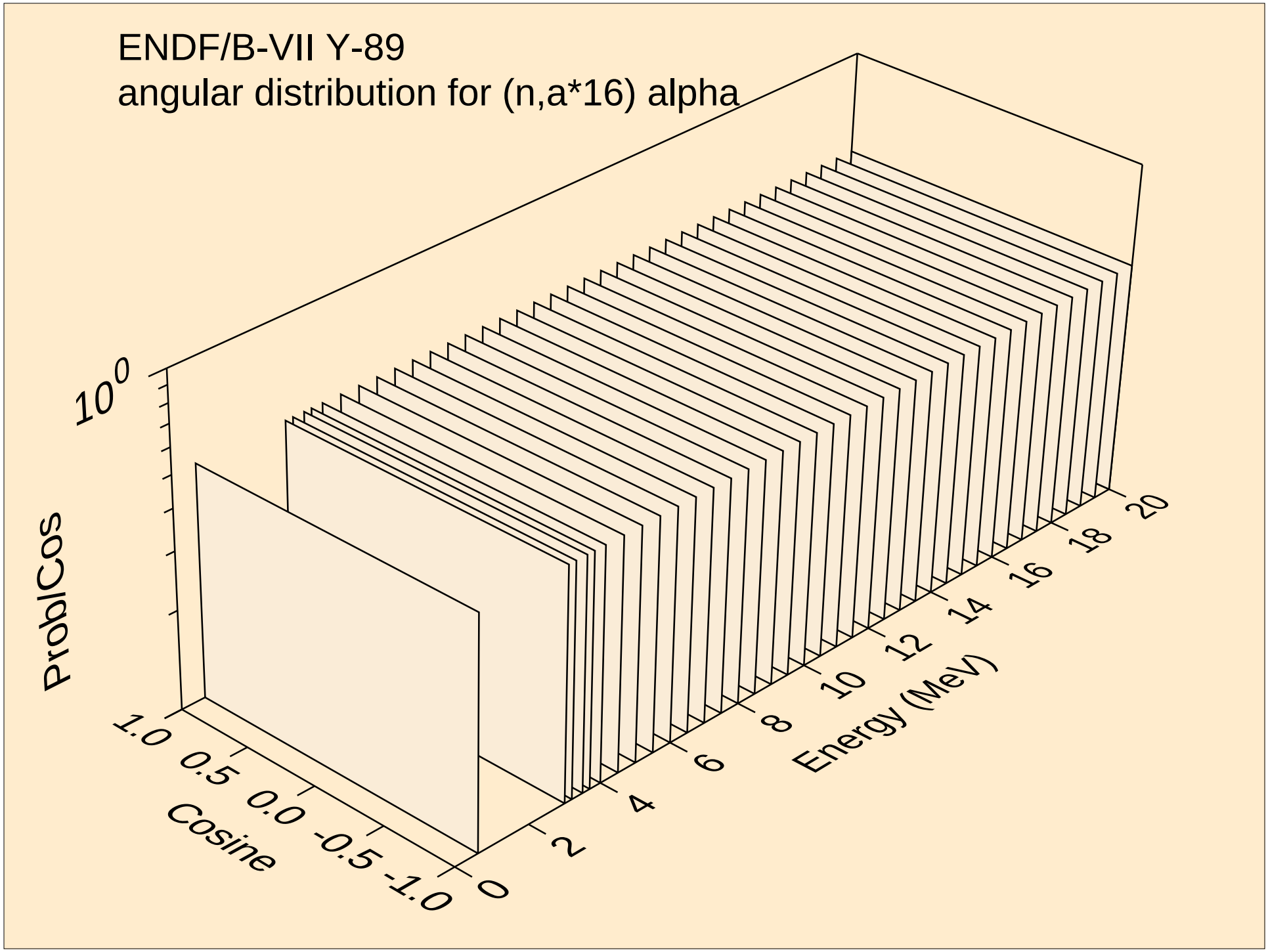

ENDF/B-VII Y-89
angular distribution for (n,a*11) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

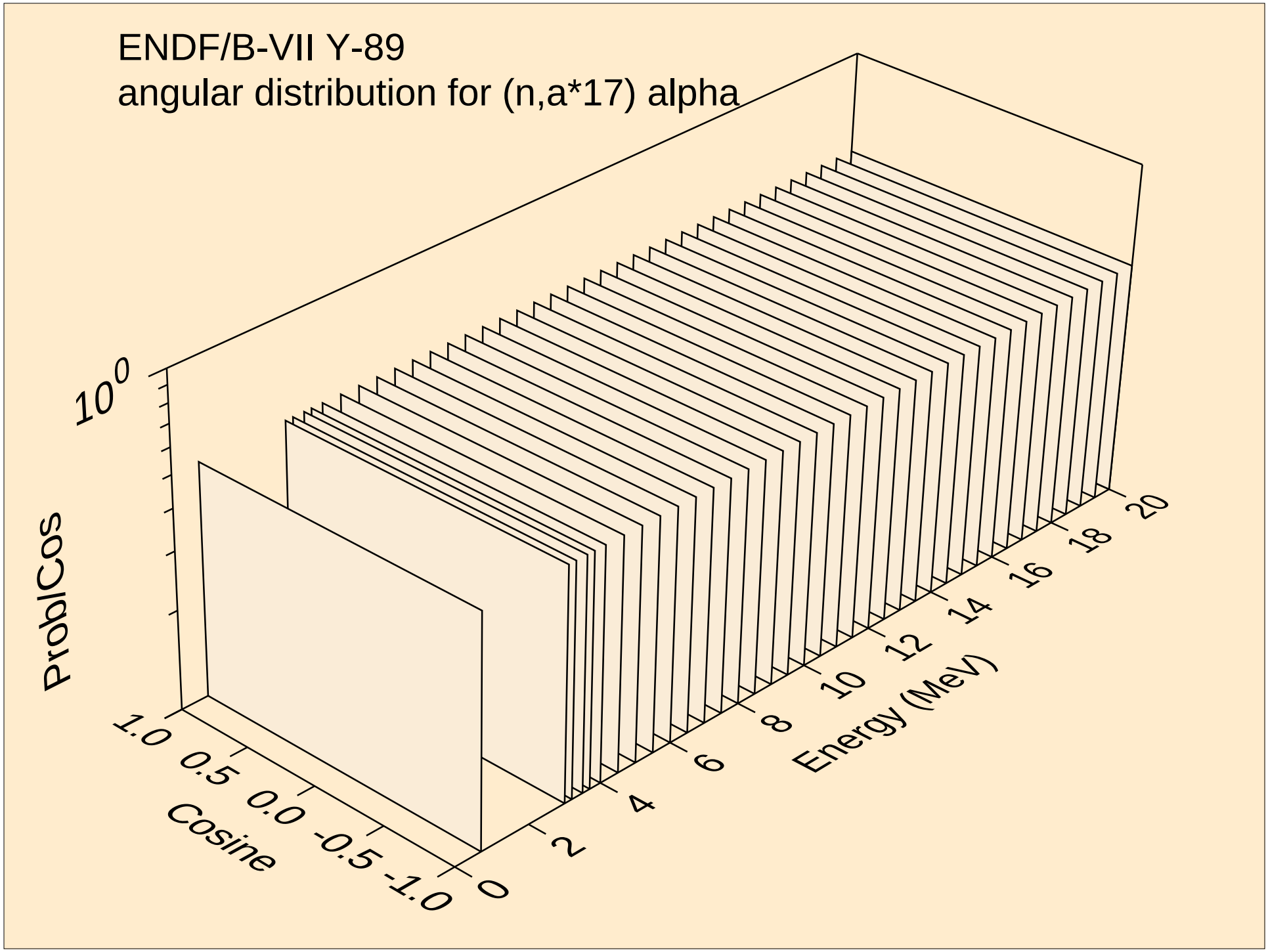

ENDF/B-VII Y-89
angular distribution for (n,a*12) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

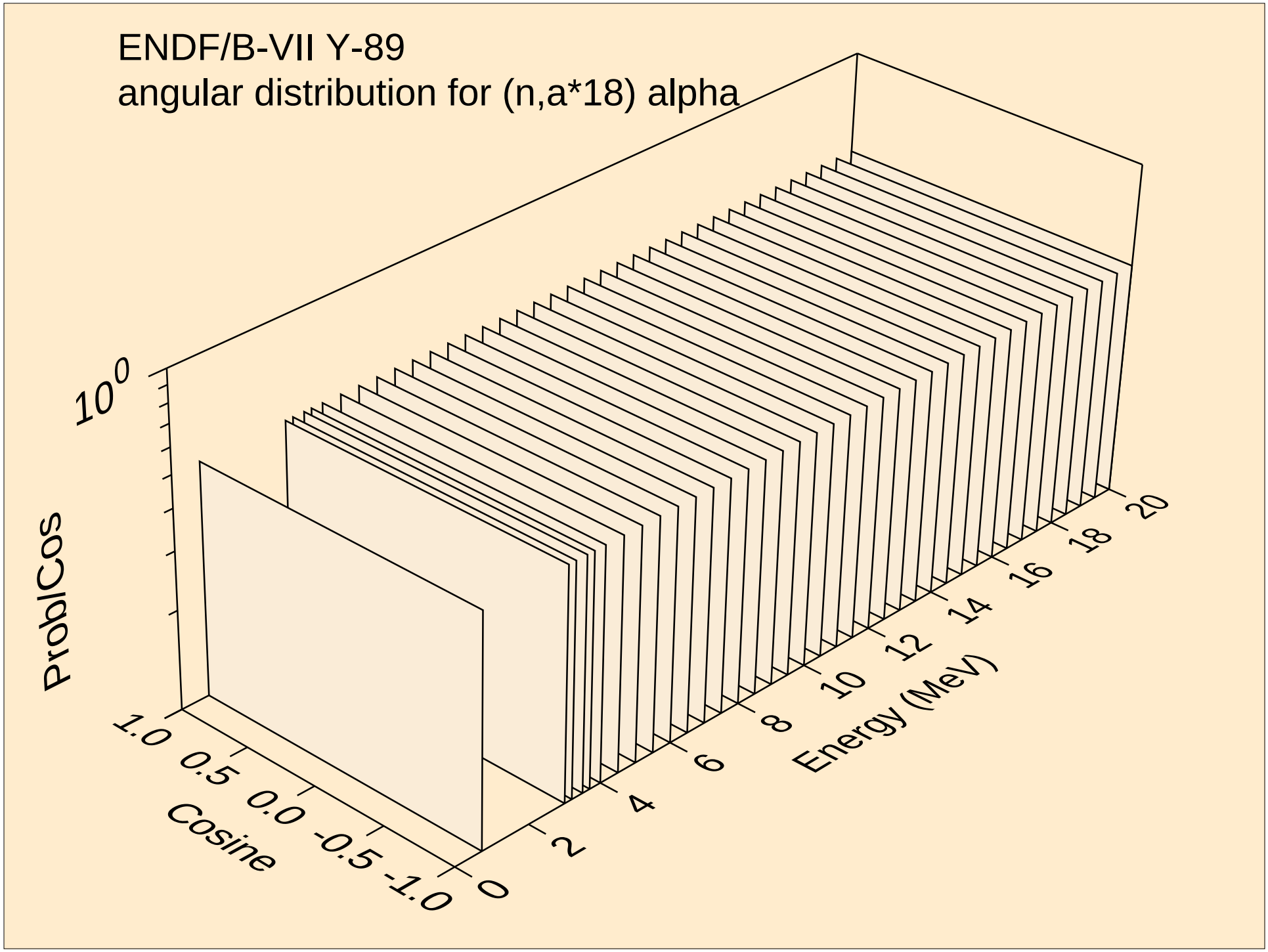

ENDF/B-VII Y-89
angular distribution for (n,a*13) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

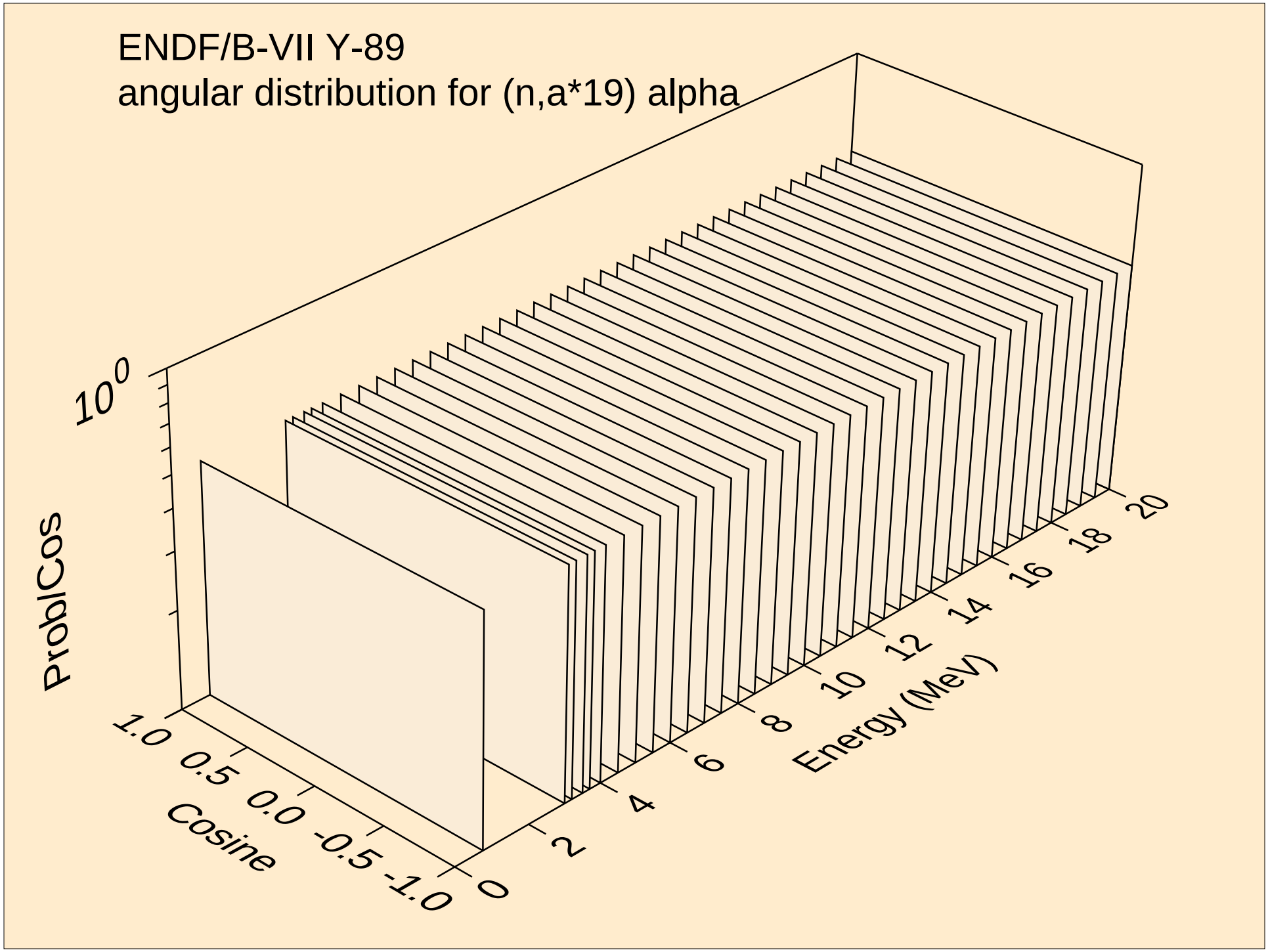

ENDF/B-VII Y-89
angular distribution for (n,a*14) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

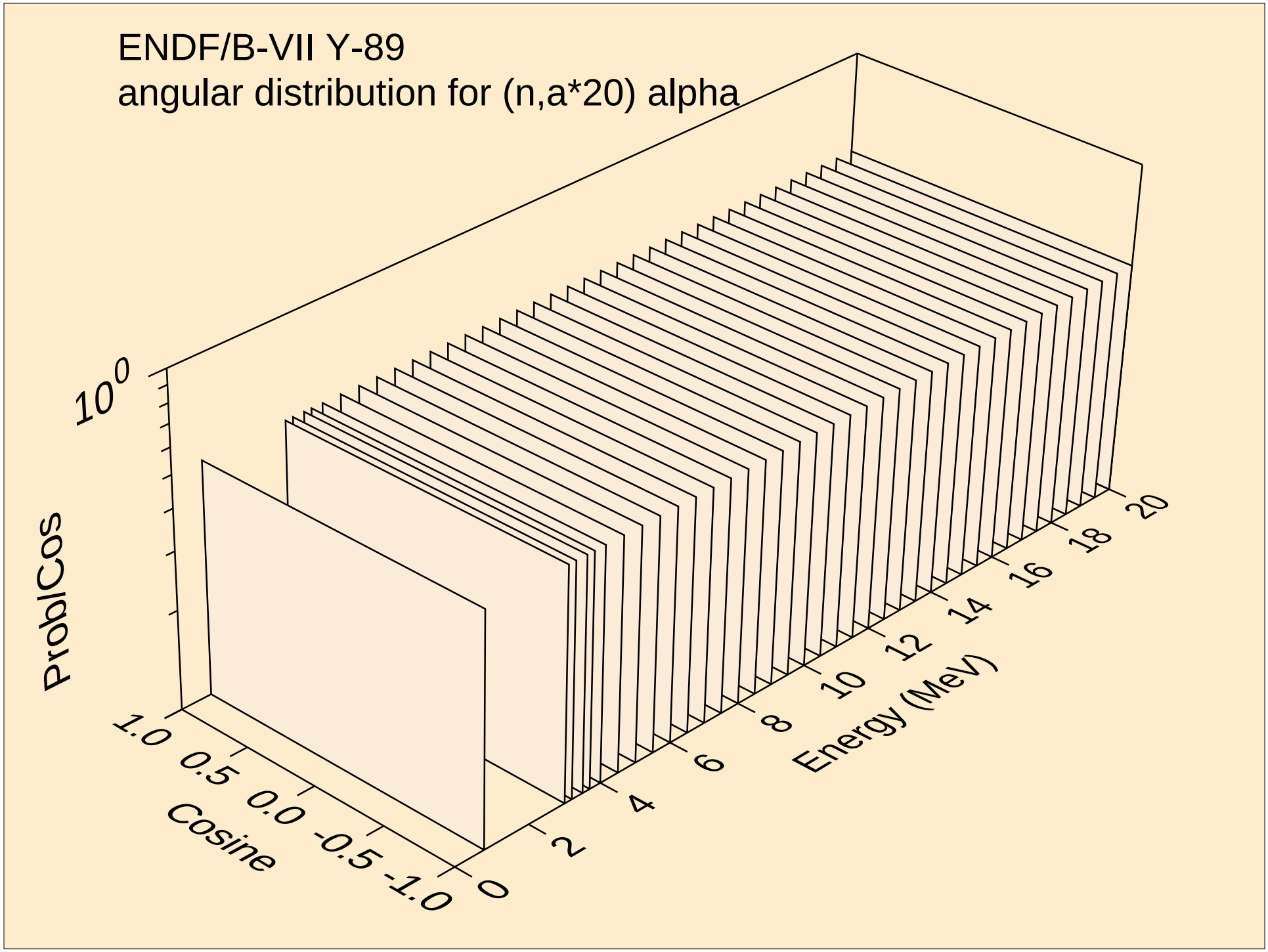

ENDF/B-VII Y-89
angular distribution for (n,a*15) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

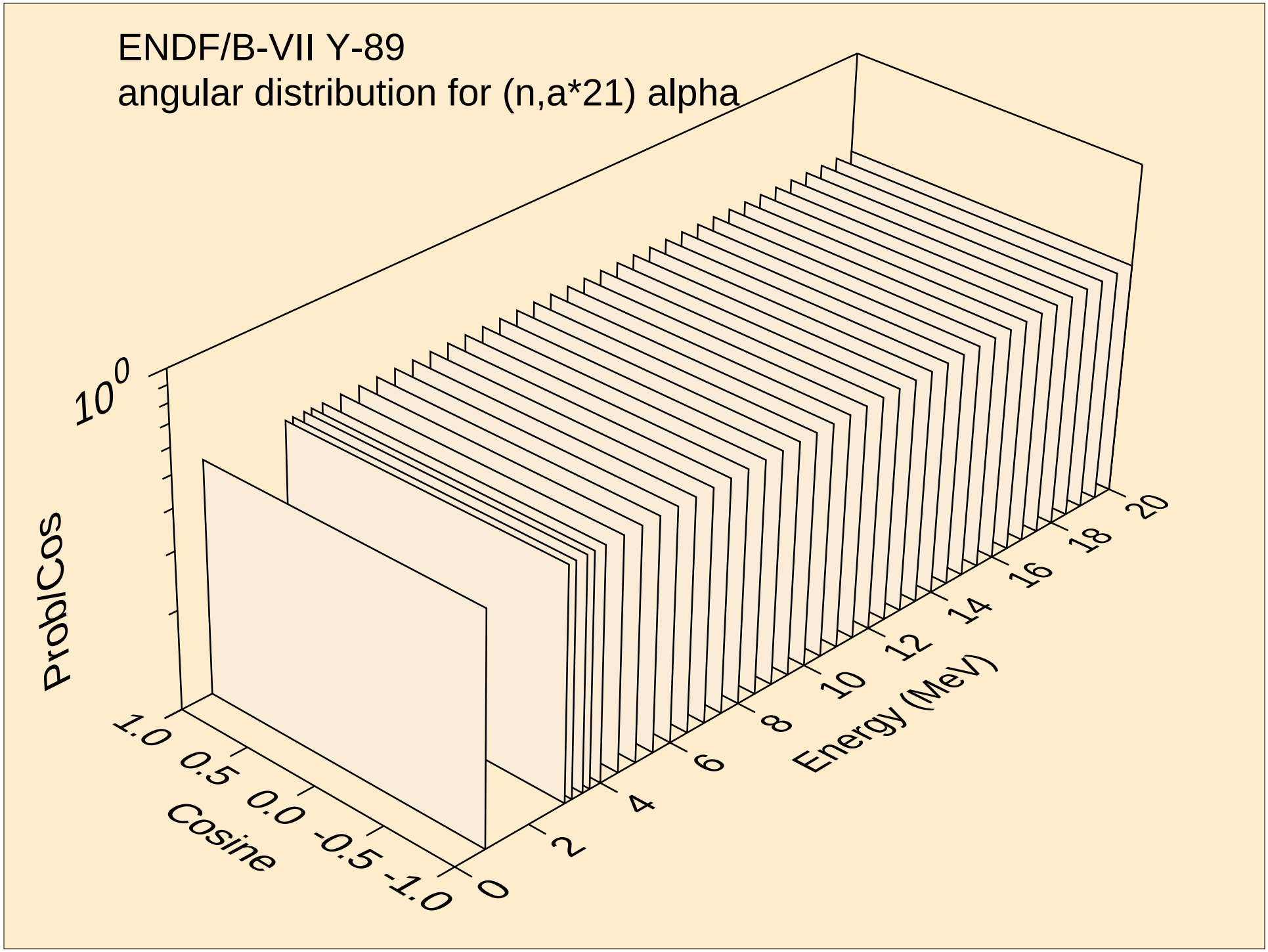

ENDF/B-VII Y-89
angular distribution for (n,a*16) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

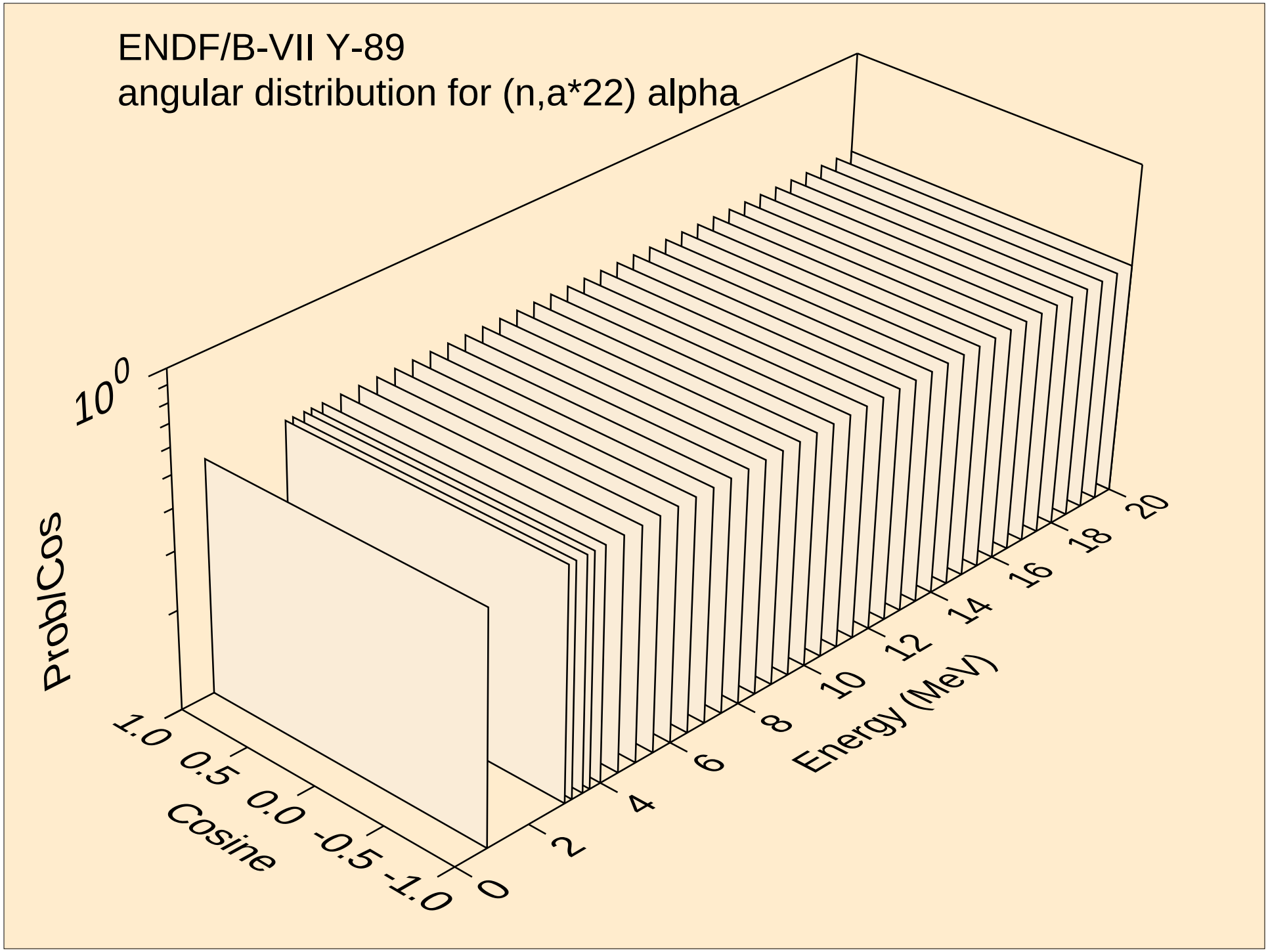

ENDF/B-VII Y-89
angular distribution for (n,a*17) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

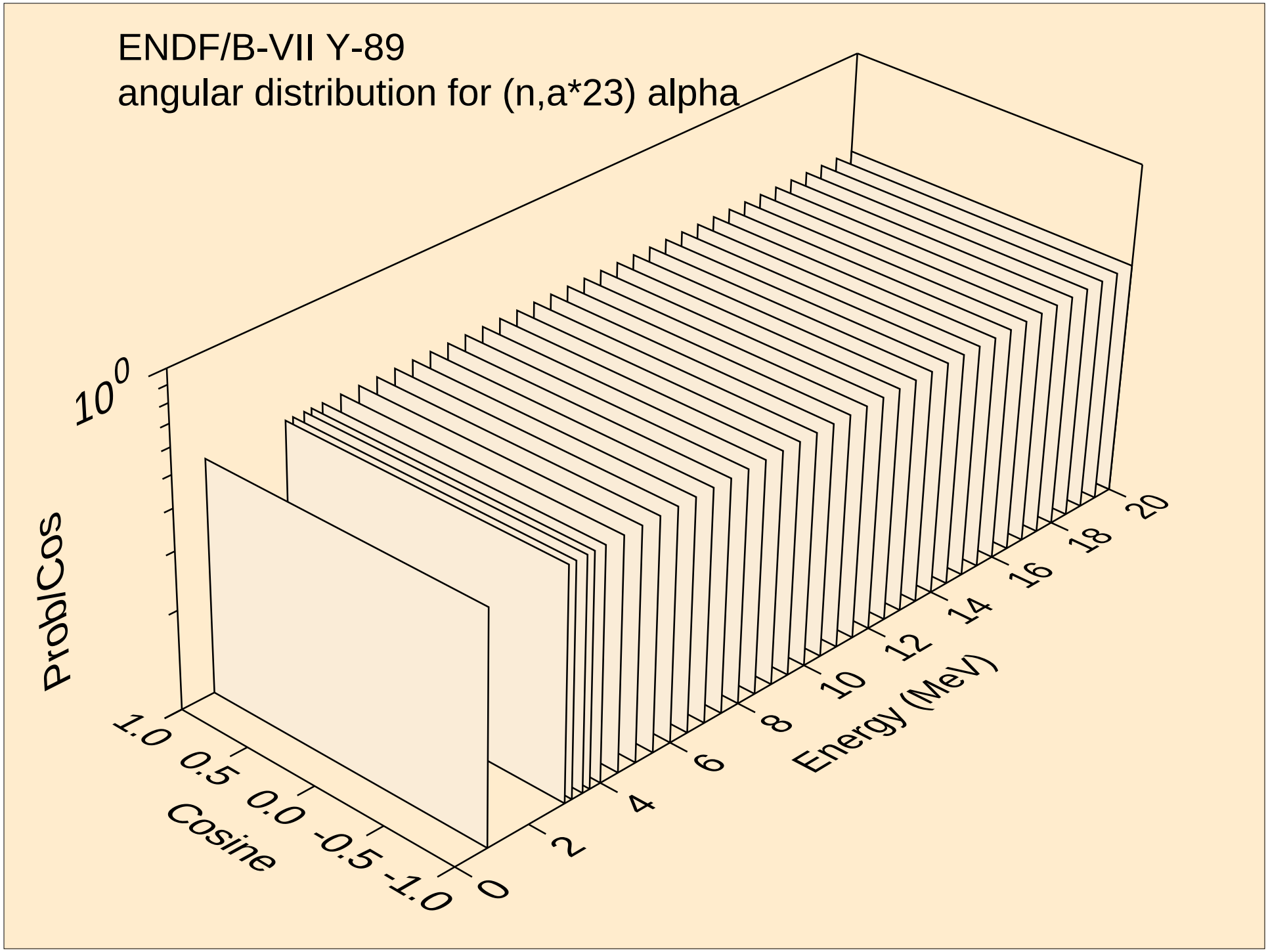

ENDF/B-VII Y-89
angular distribution for (n,a*18) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

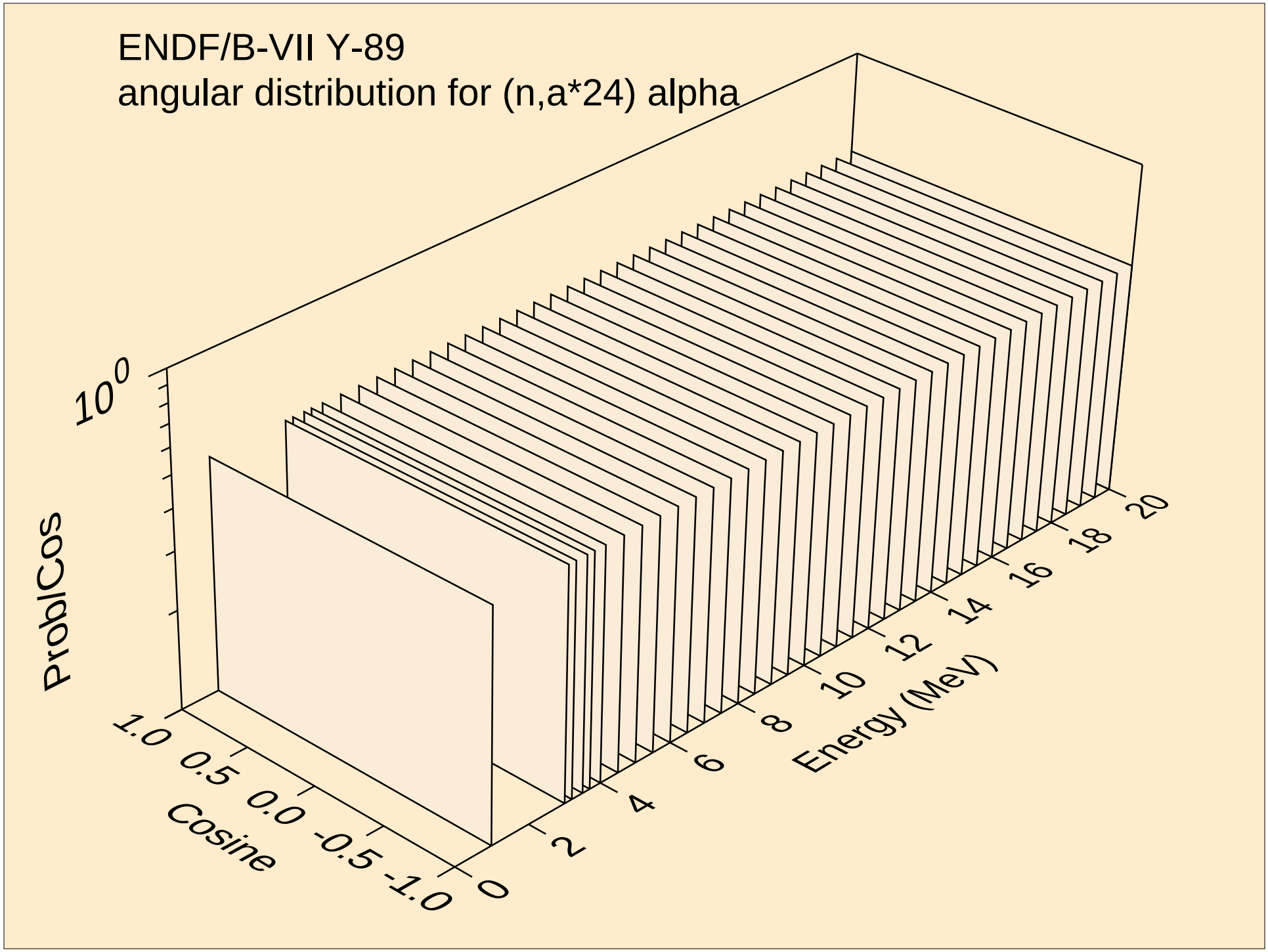

ENDF/B-VII Y-89
angular distribution for (n,a*19) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

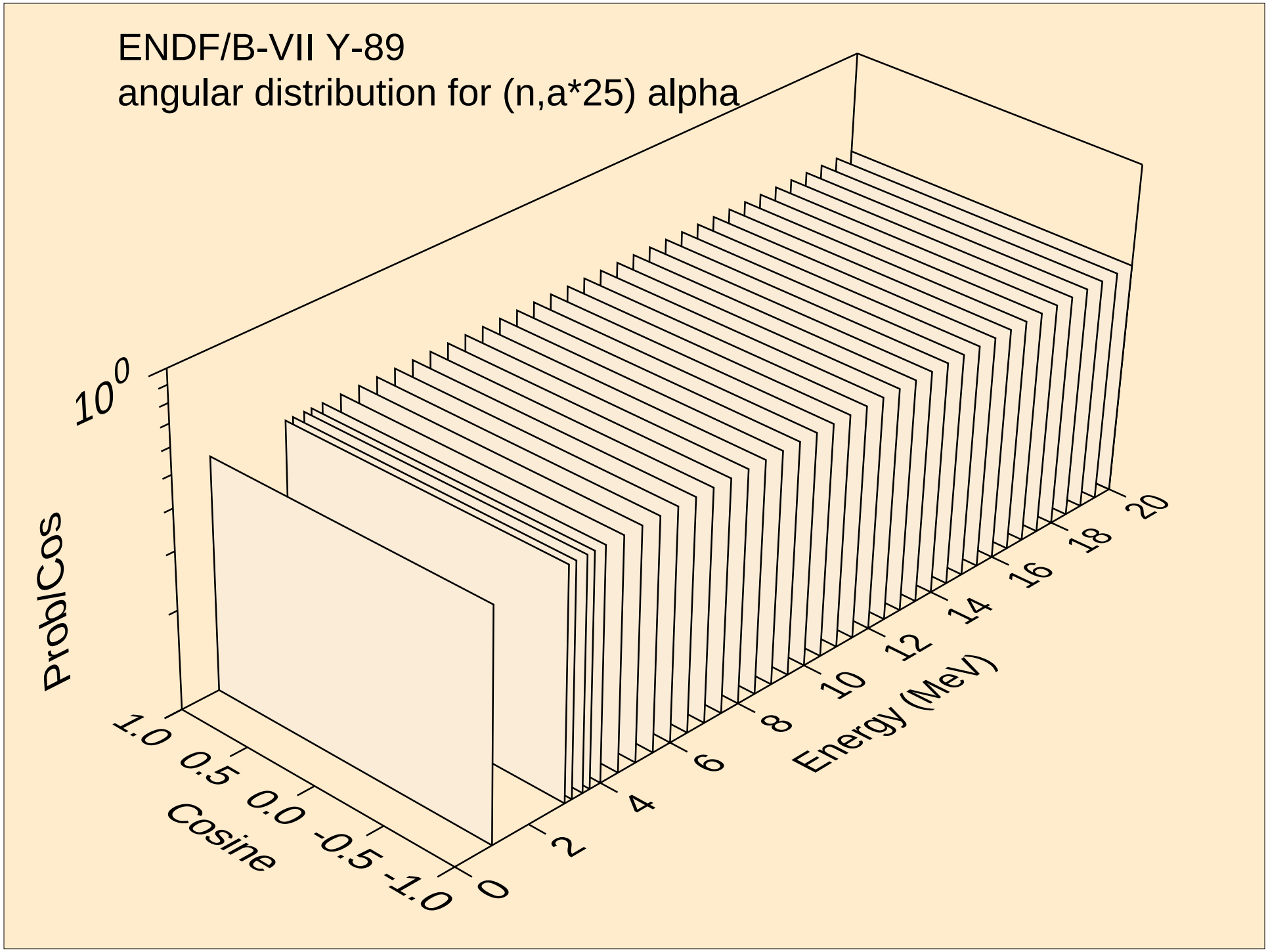

ENDF/B-VII Y-89
angular distribution for (n,a*20) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

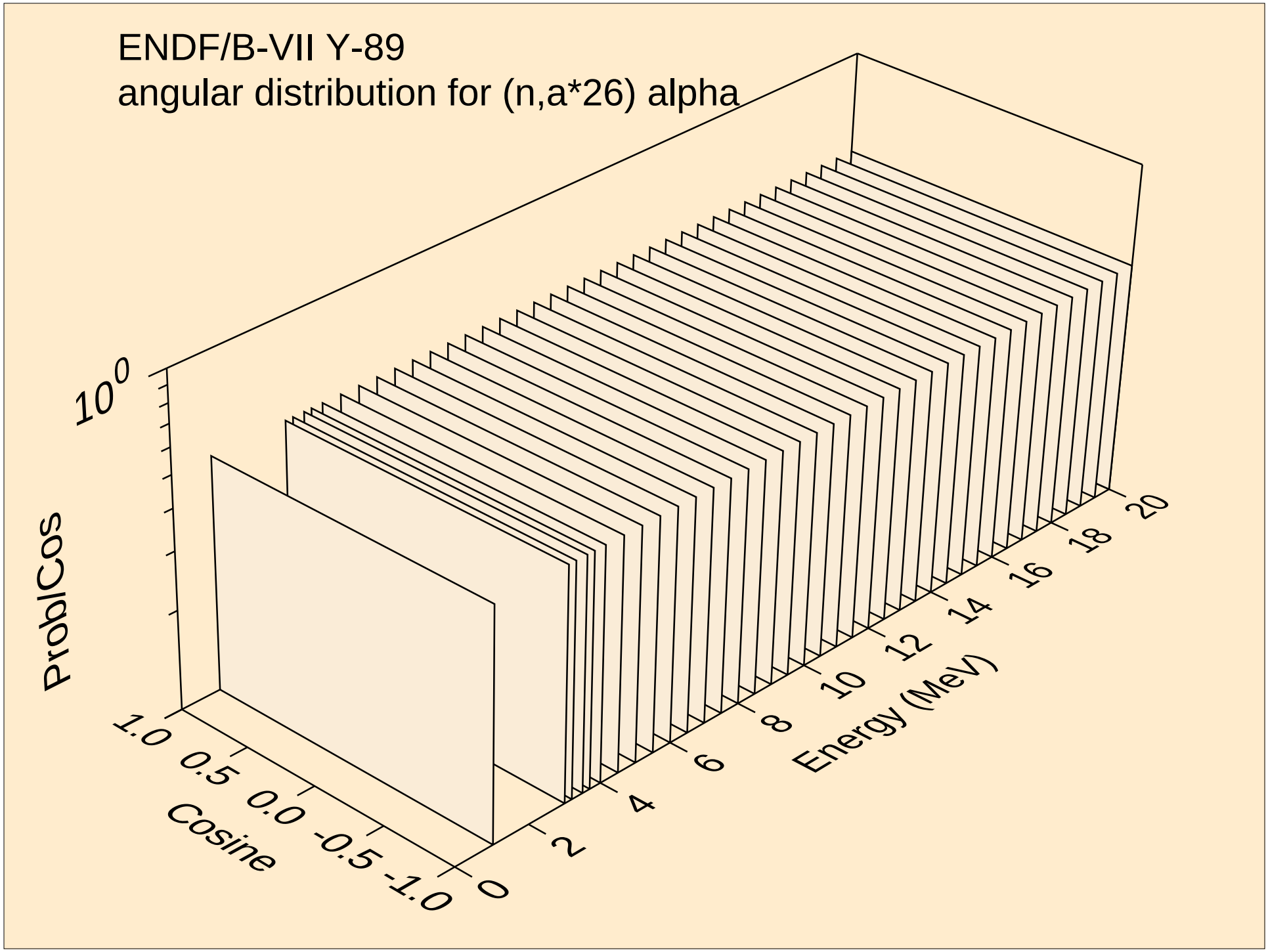

ENDF/B-VII Y-89
angular distribution for (n,a*21) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

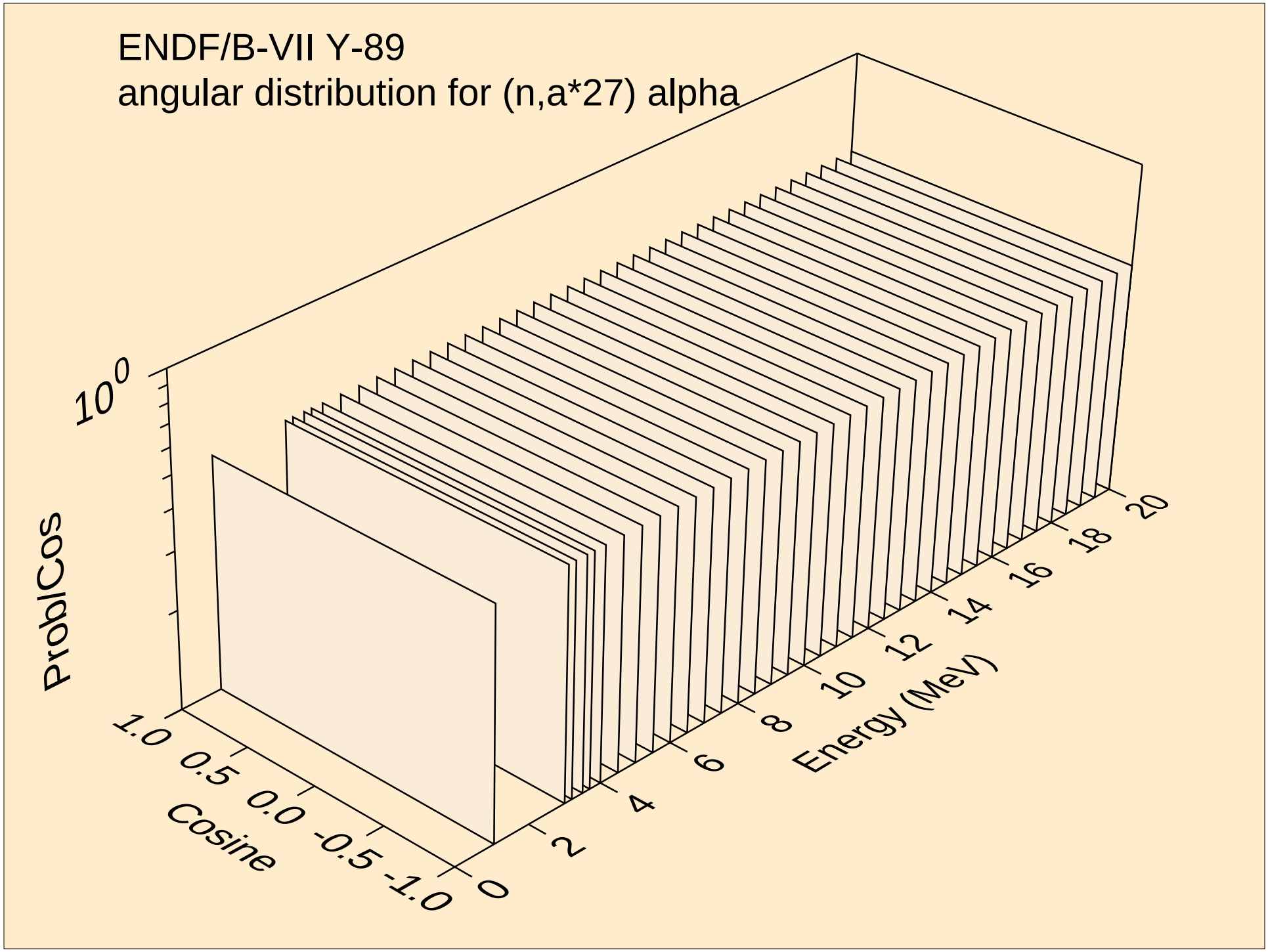

ENDF/B-VII Y-89
angular distribution for (n,a*22) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

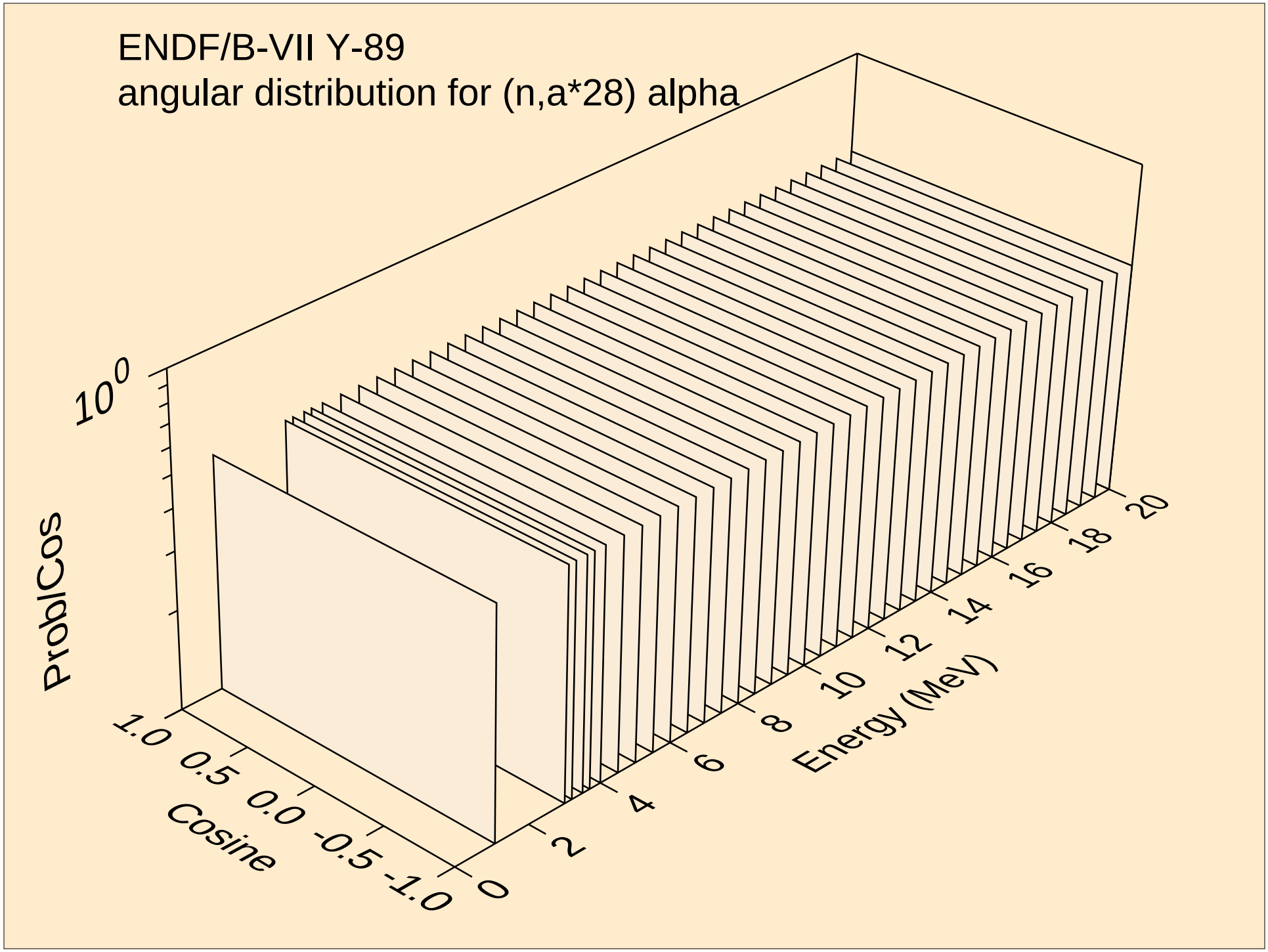

ENDF/B-VII Y-89
angular distribution for (n,a*23) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

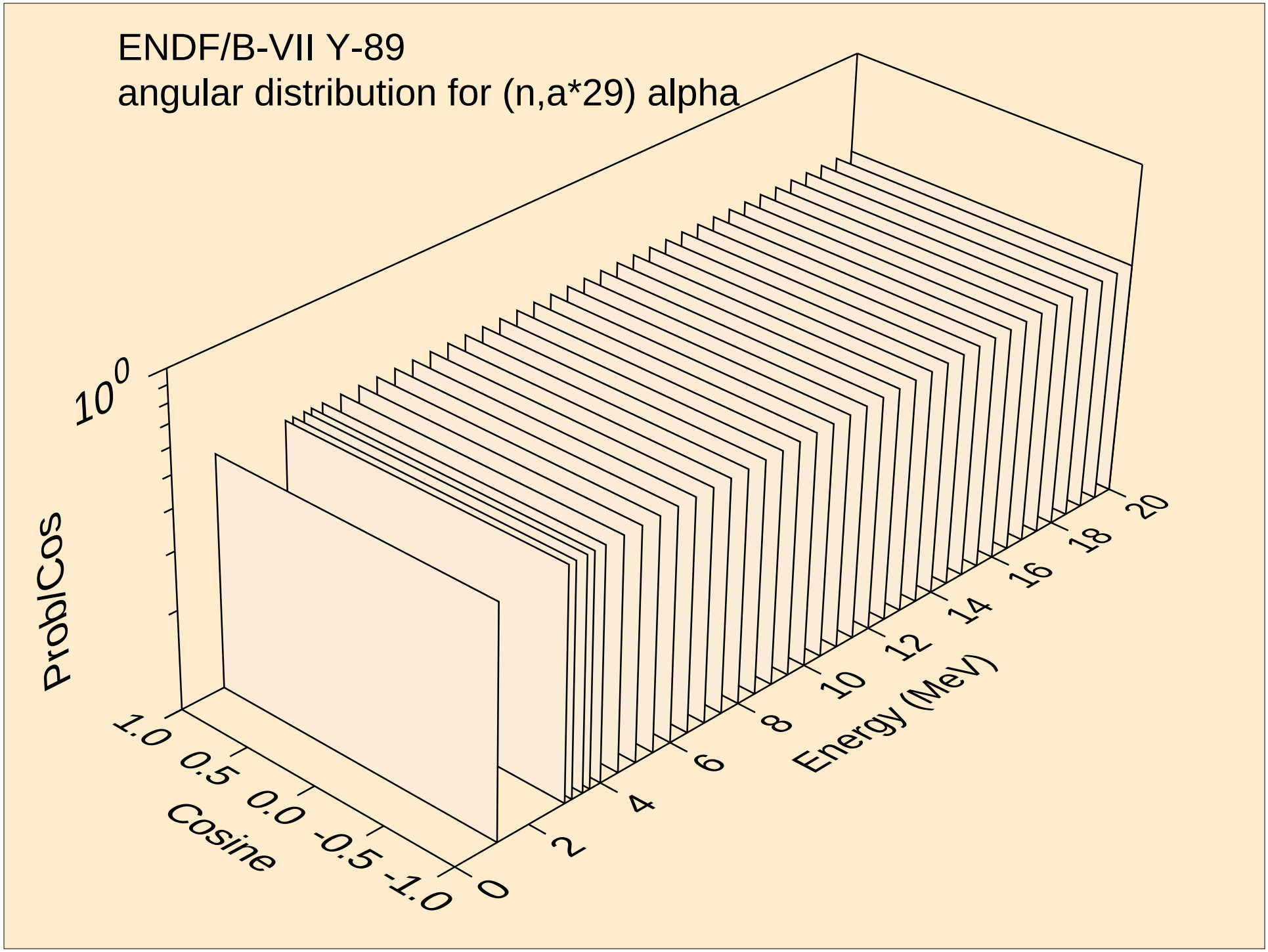

ENDF/B-VII Y-89
angular distribution for (n,a*24) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

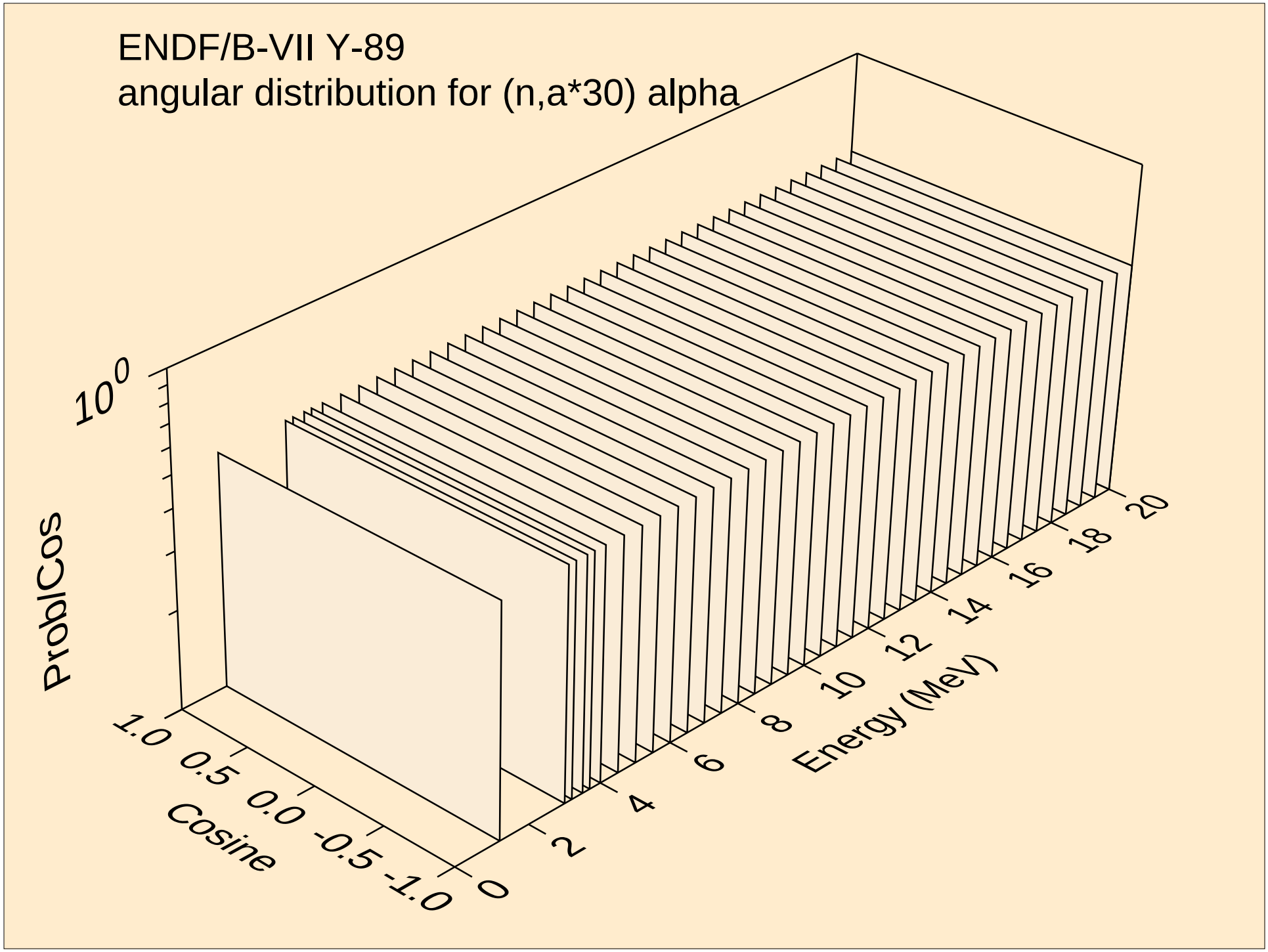

ENDF/B-VII Y-89
angular distribution for (n,a*25) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

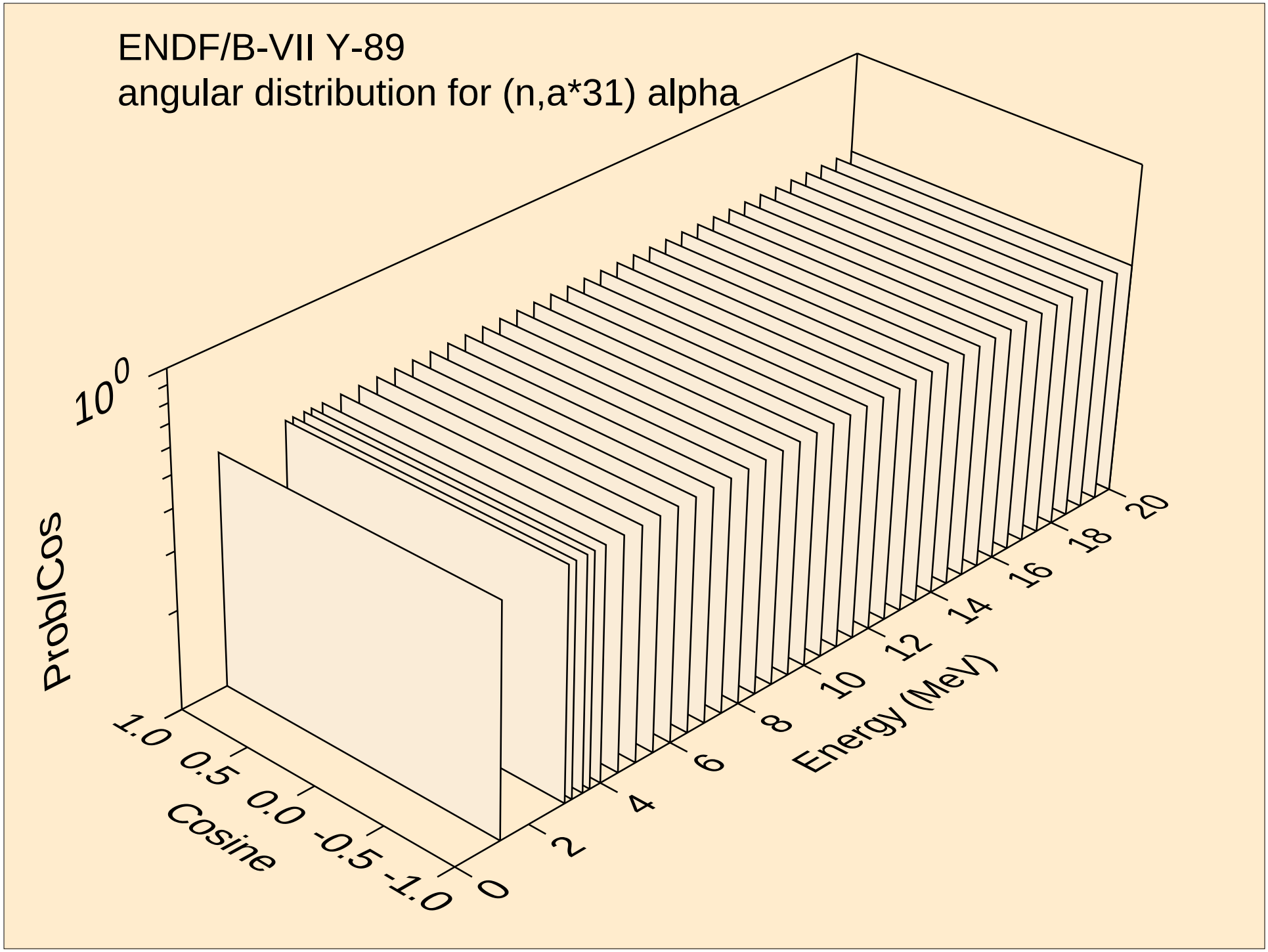

ENDF/B-VII Y-89
angular distribution for (n,a*26) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

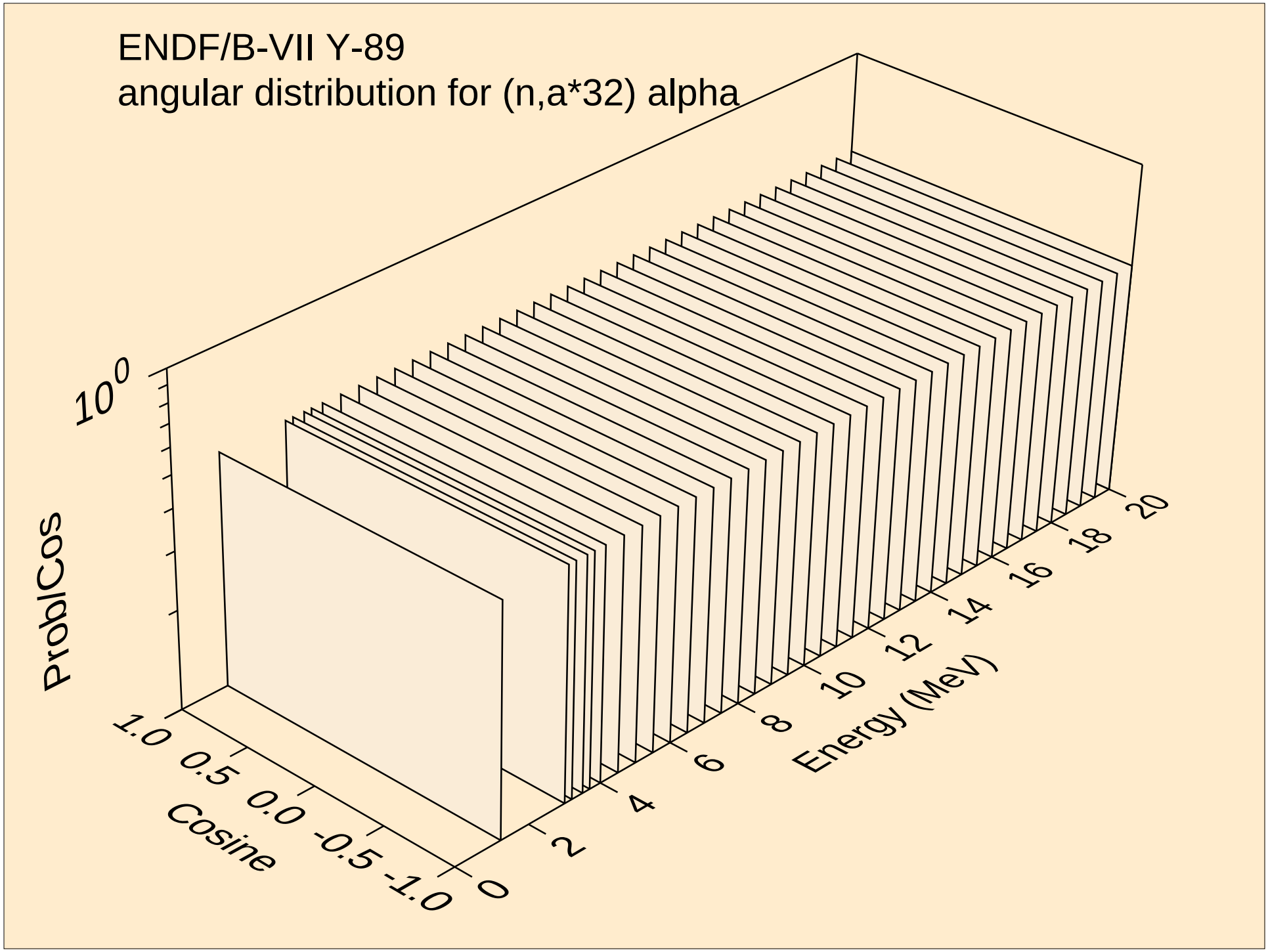

ENDF/B-VII Y-89
angular distribution for (n,a*27) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

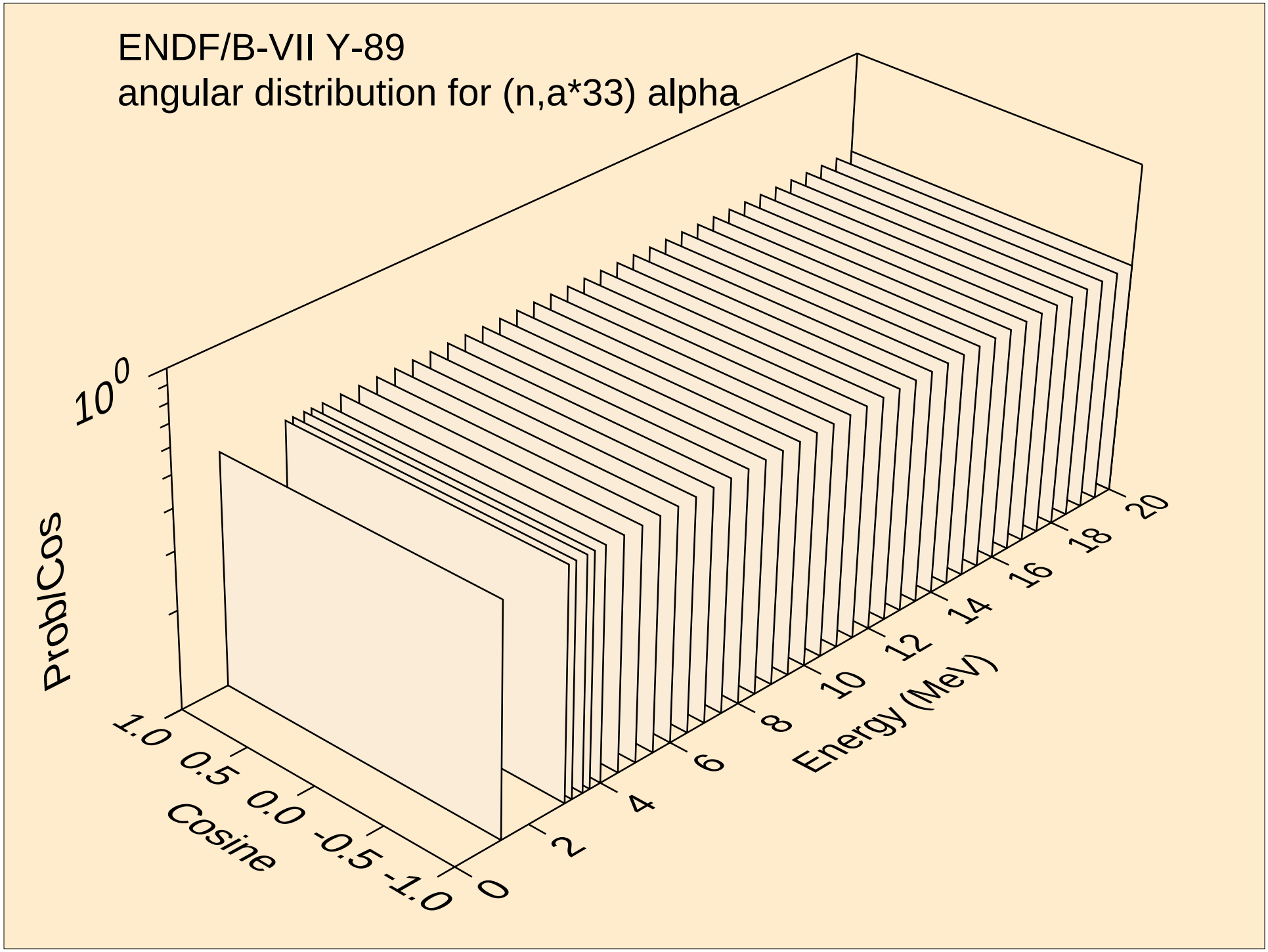

ENDF/B-VII Y-89
angular distribution for (n,a*28) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

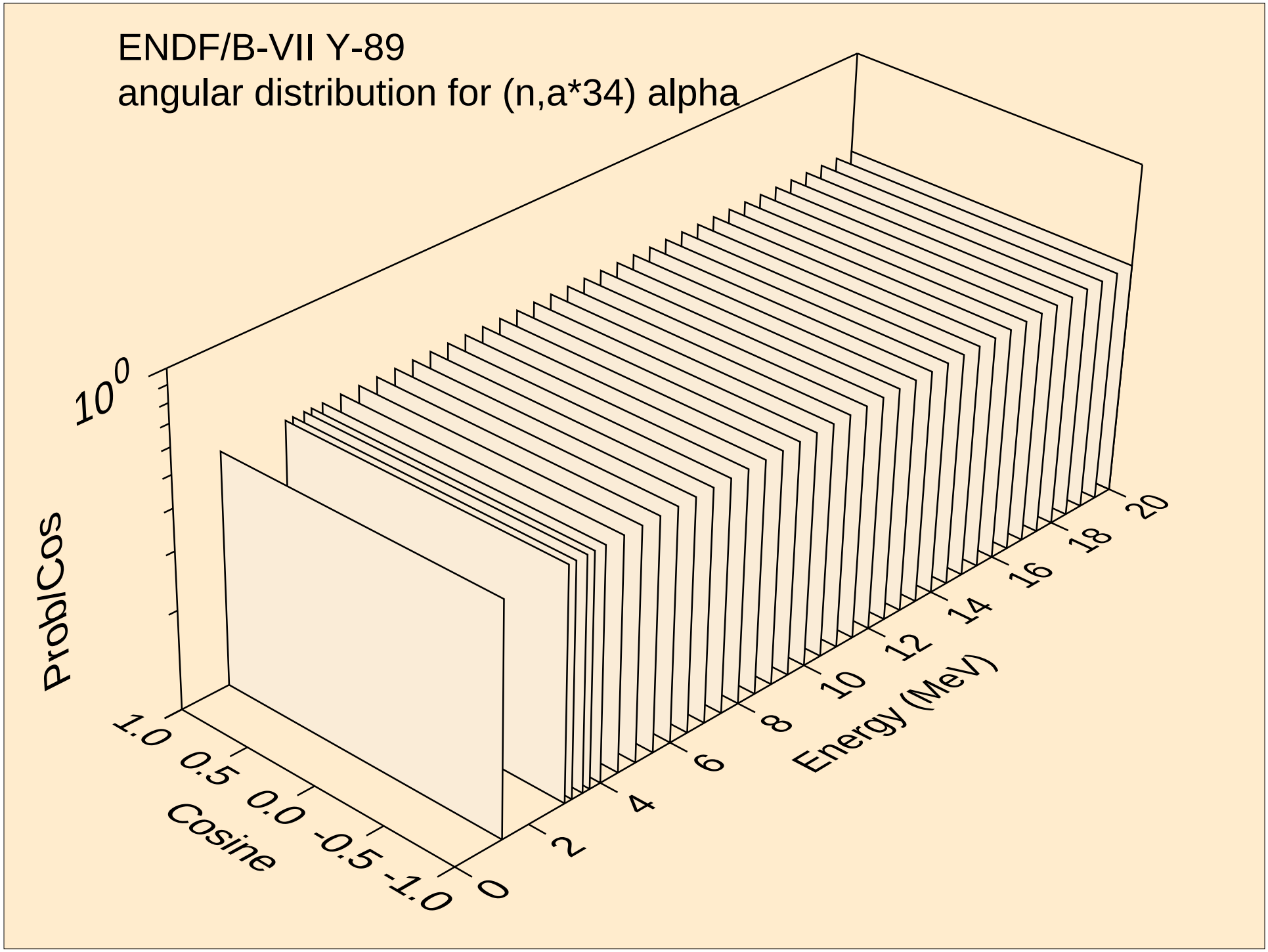

ENDF/B-VII Y-89
angular distribution for (n,a*29) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

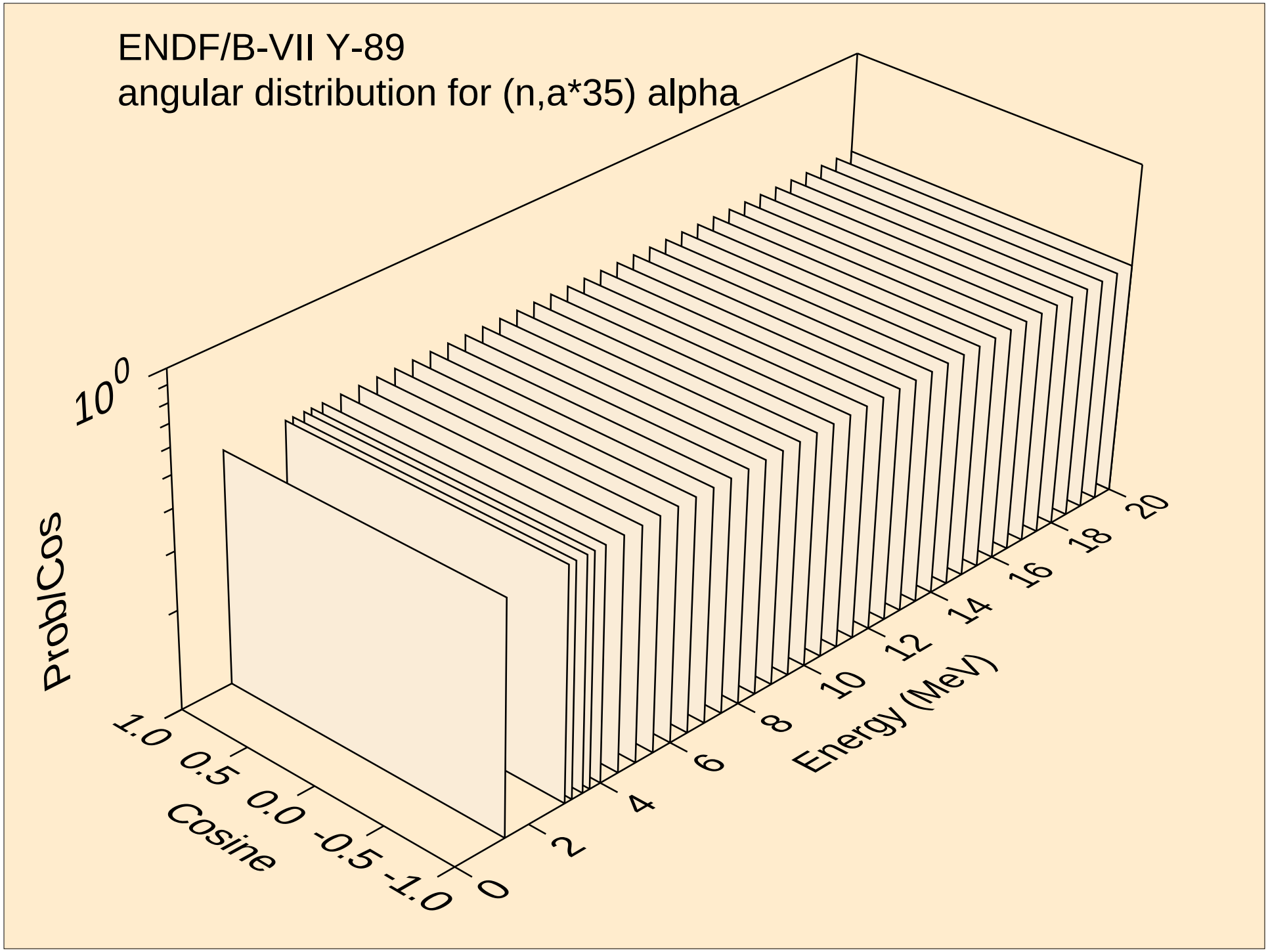

ENDF/B-VII Y-89
angular distribution for (n,a*30) alpha
10^0
ProblCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

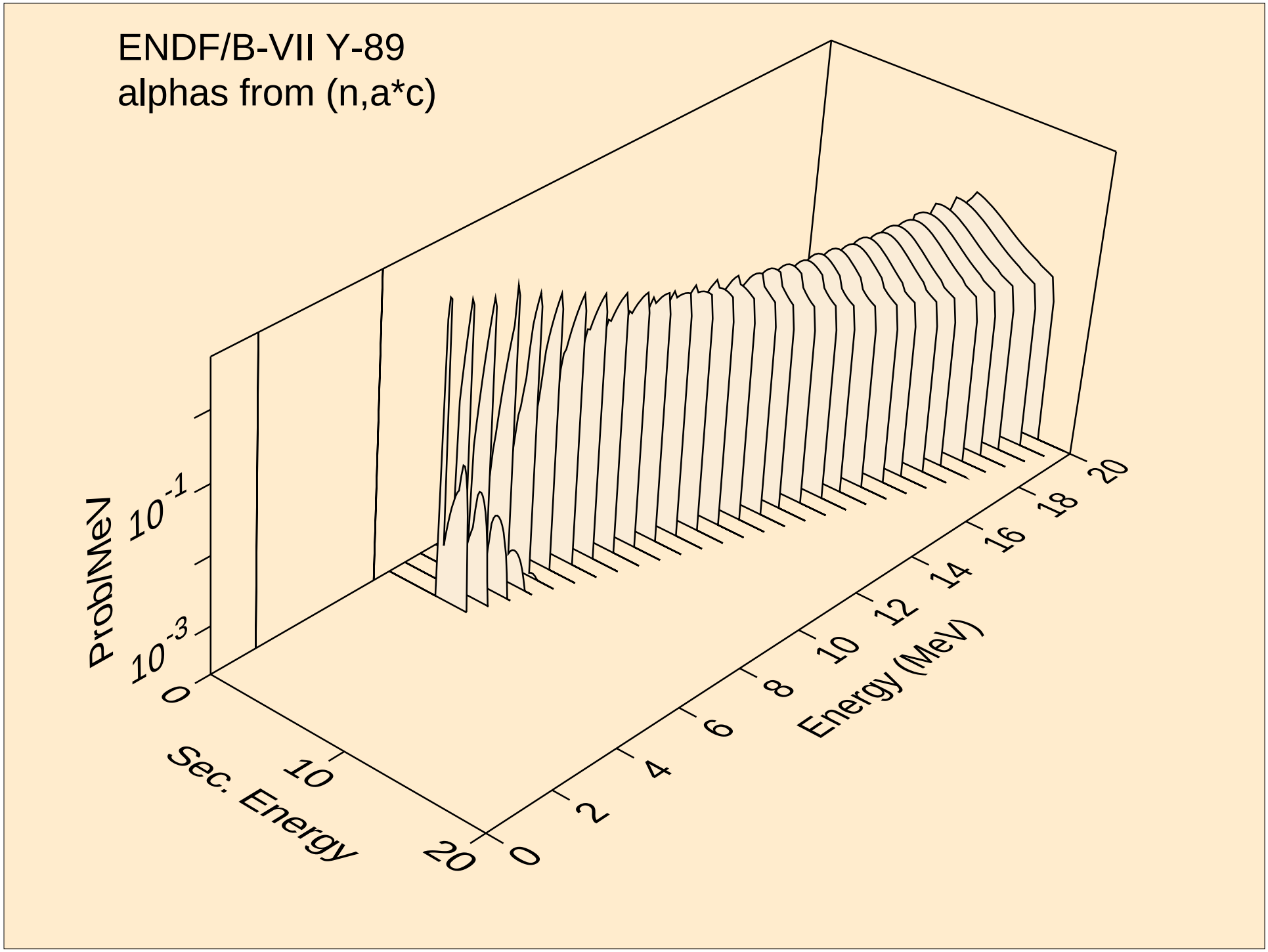

ENDF/B-VII Y-89
angular distribution for (n,a*31) alpha
10^0
ProbCos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)


ENDF/B-VII Y-89
angular distribution for (n,a*32) alpha
10^0
ProbCos
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 Y-89
angular distribution for (n,a*33) alpha
10^0
ProbCos
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 Y-89
angular distribution for (n,a*34) alpha
10^0
ProbCos
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 Y-89
angular distribution for (n,a*35) alpha
10^0
ProbCos
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 Y-89
alphas from (n,a*c)
Prob/MeV
10^-1
10^-3
0
Sec. Energy
10
20
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)