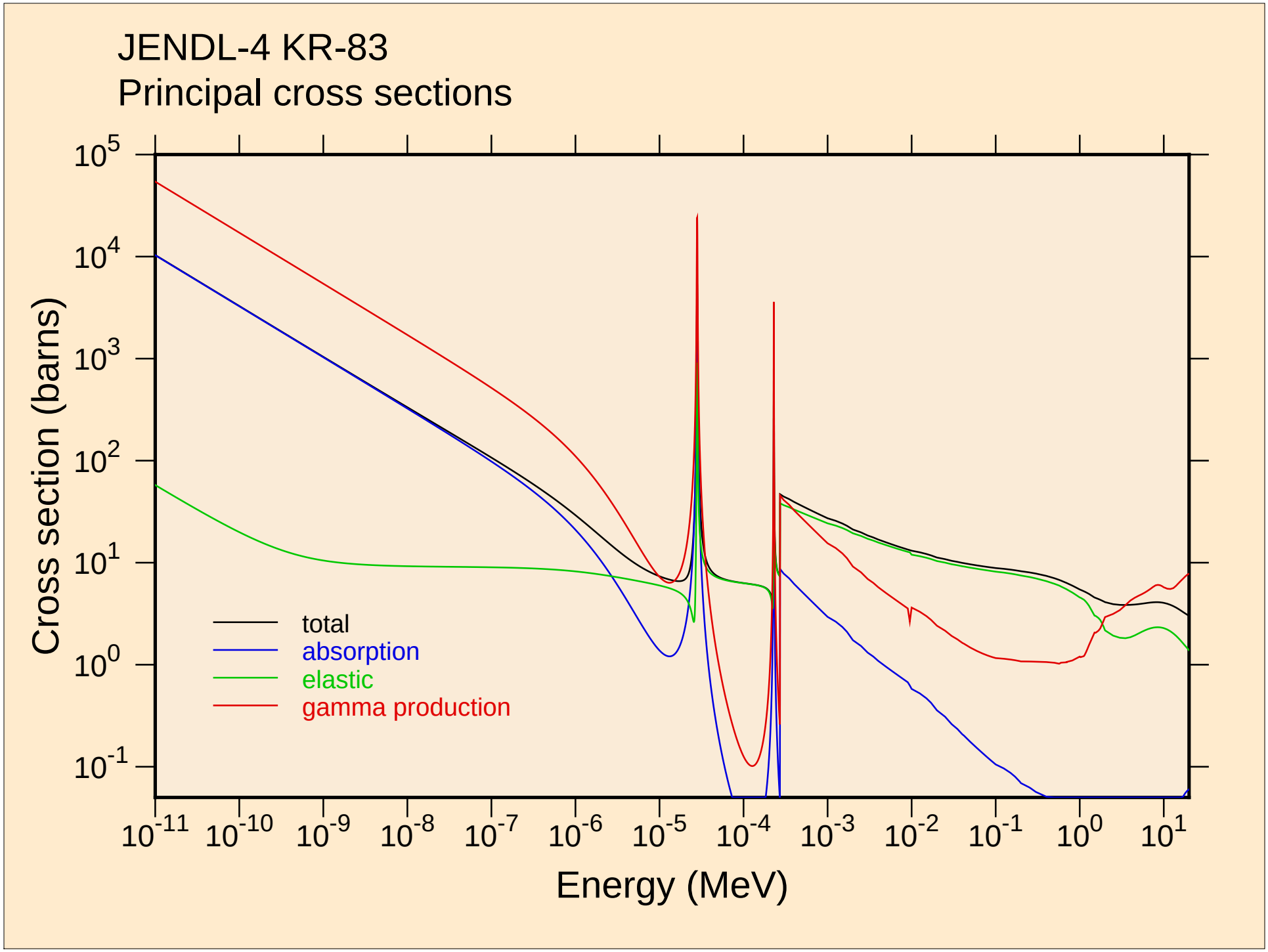
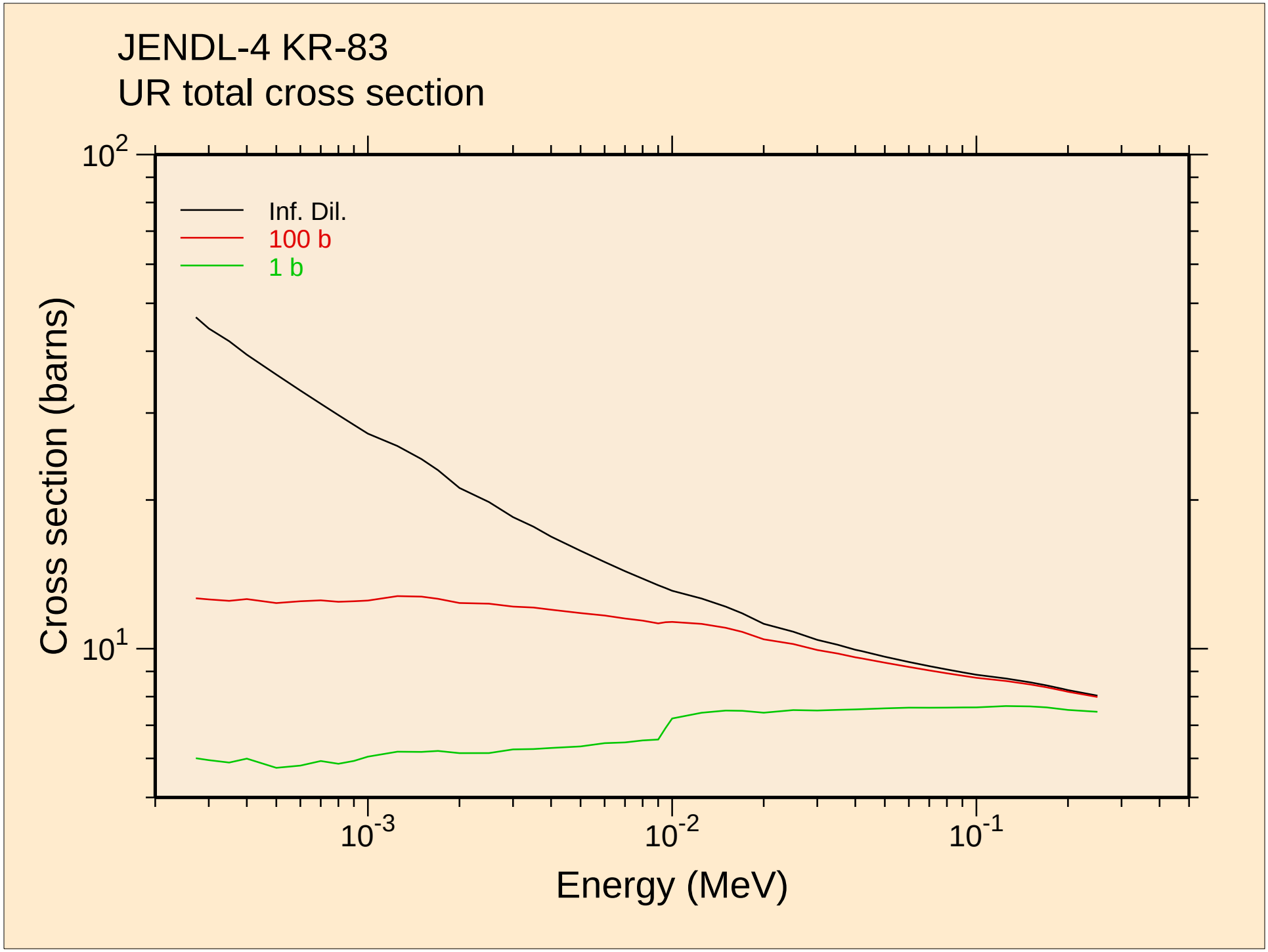
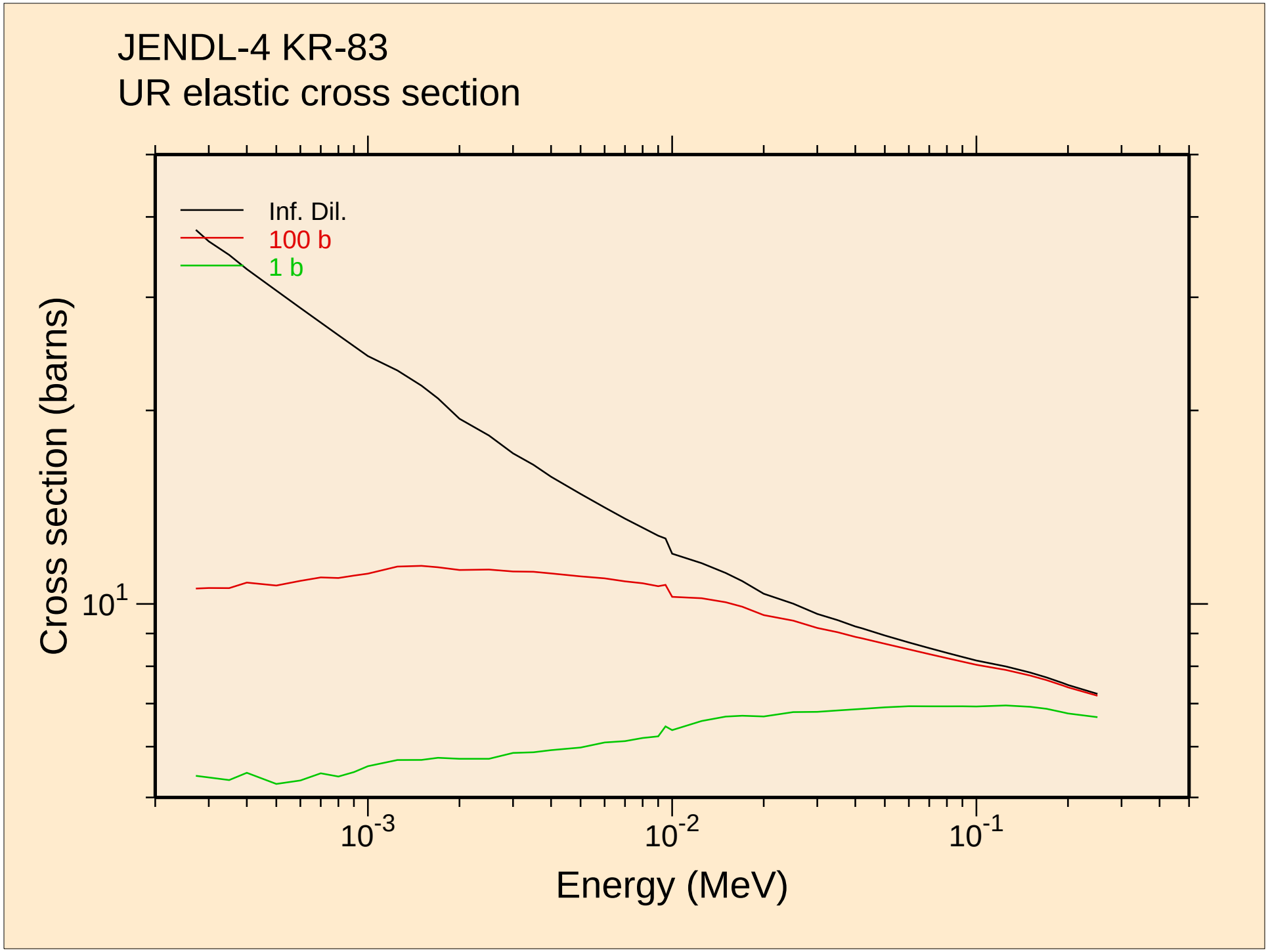
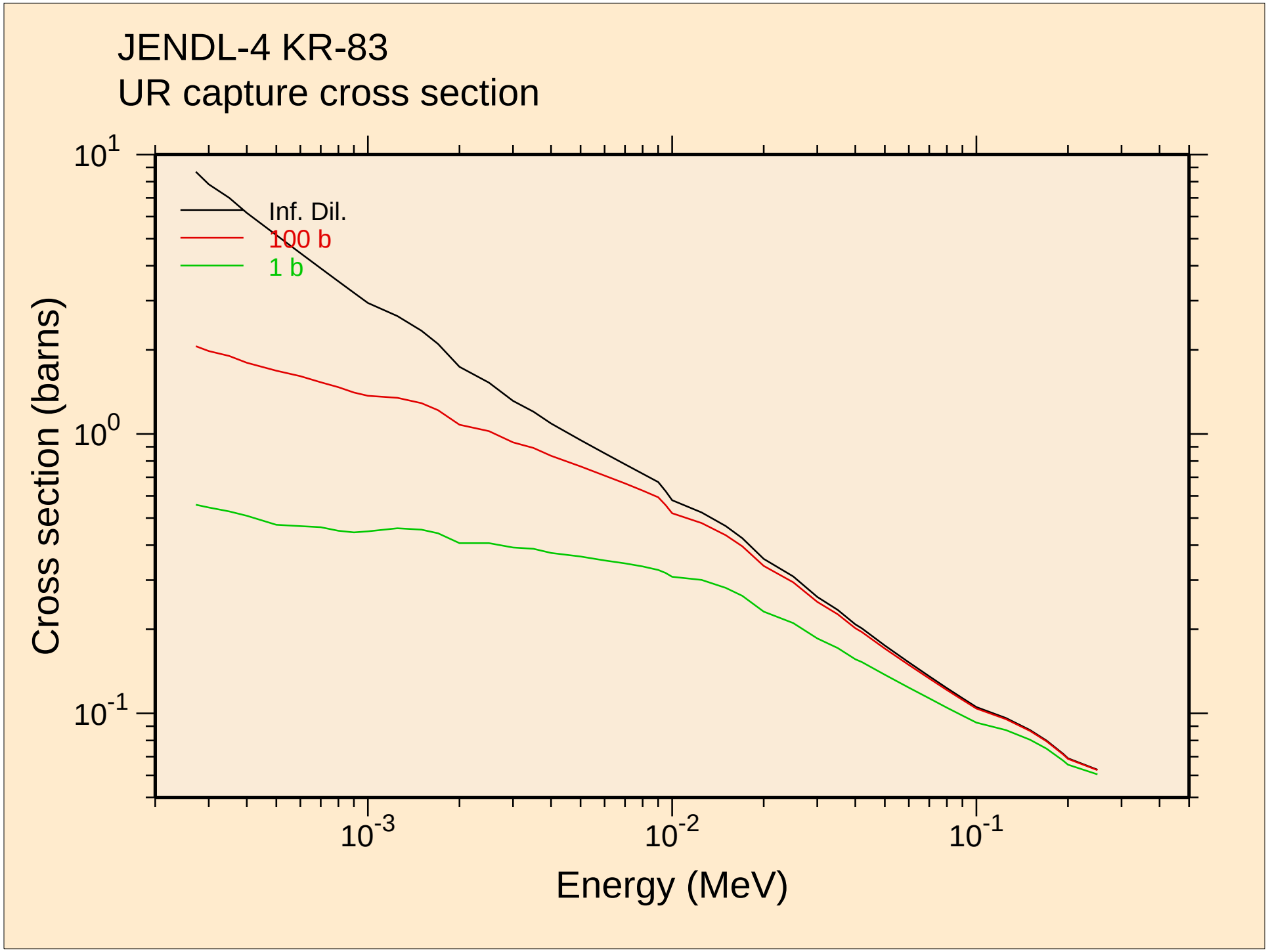
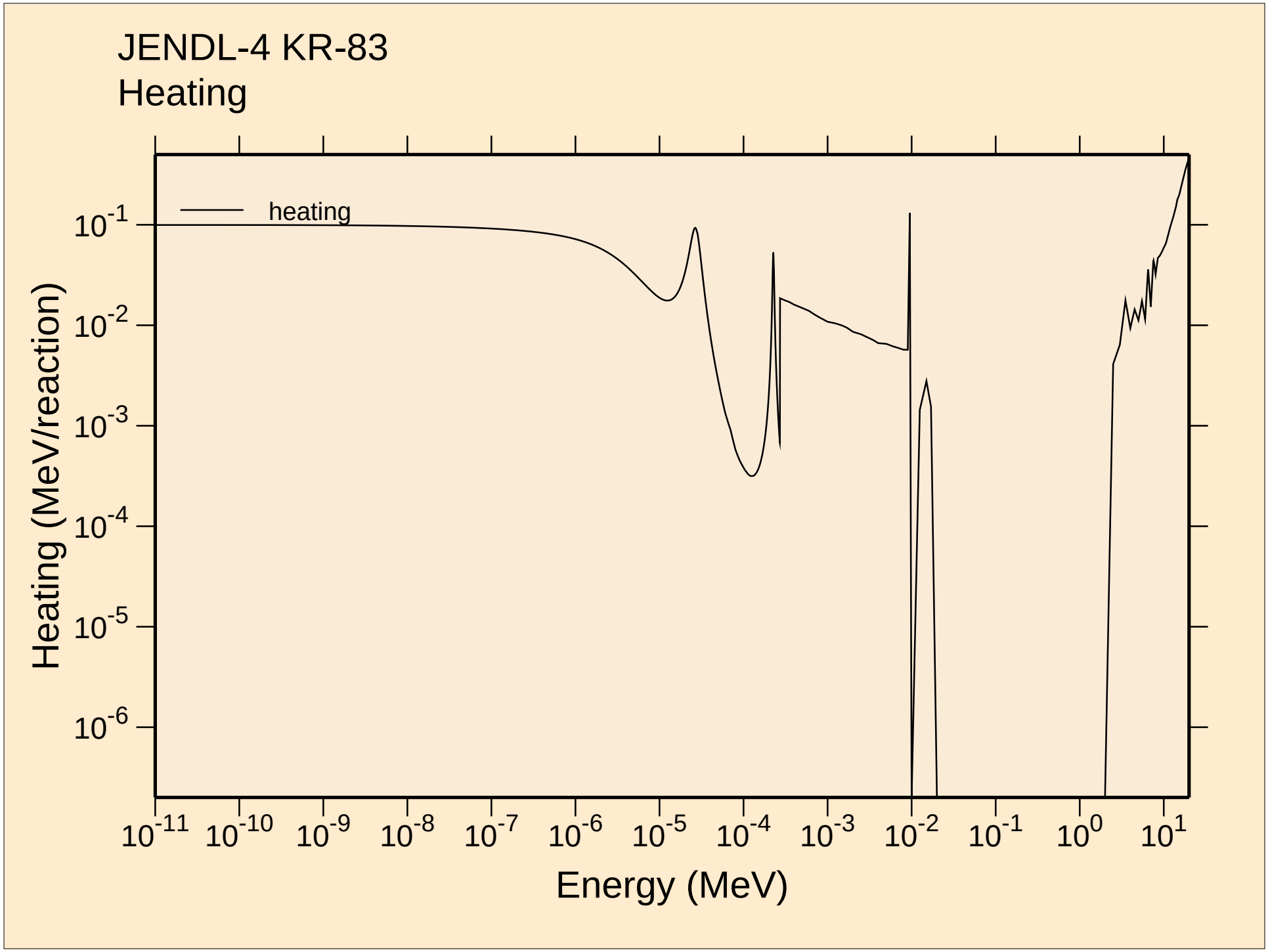
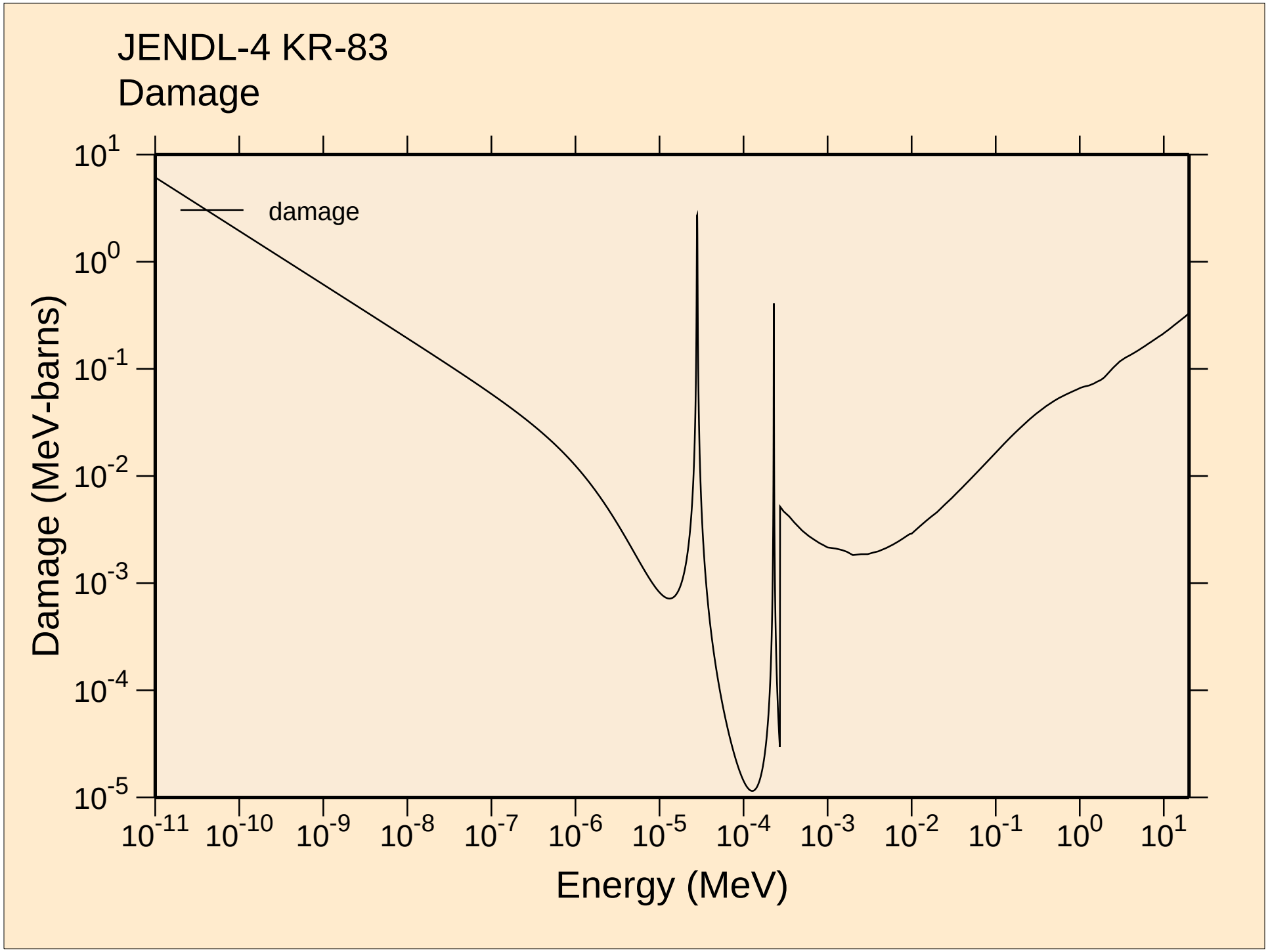

JENDL-4 KR-83
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production
$10^{5}$
$10^{4}$
$10^{3}$
$10^{2}$
$10^{1}$
$10^{0}$
$10^{-1}$
$10^{-11}$
$10^{-10}$
$10^{-9}$
$10^{-8}$
$10^{-7}$
$10^{-6}$
$10^{-5}$
$10^{-4}$
$10^{-3}$
$10^{-2}$
$10^{-1}$
$10^{0}$
$10^{1}$

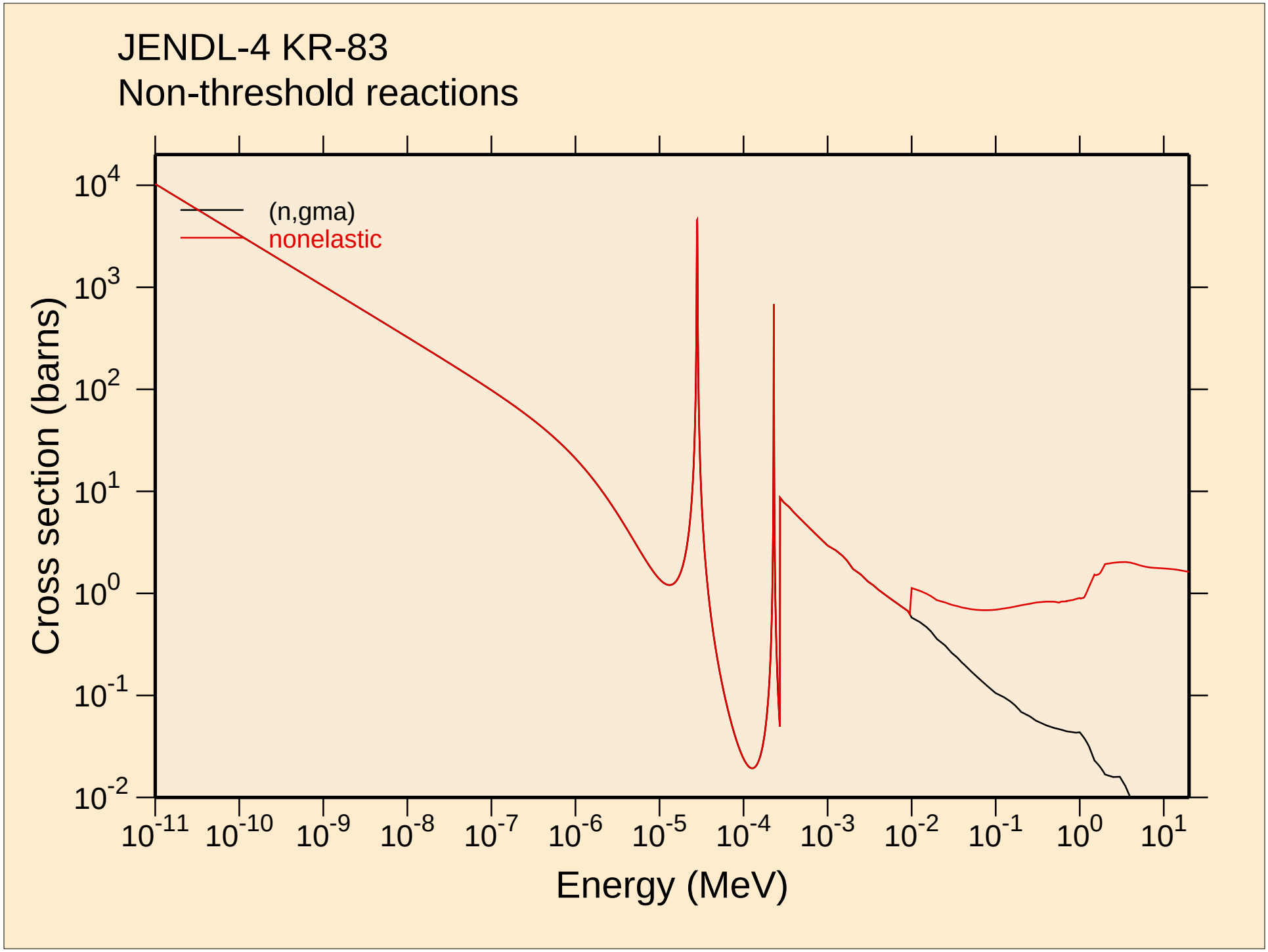

JENDL-4 KR-83
UR total cross section
Inf. Dil.
100 b
1 b
Cross section (barns)
10^2
10^1
10^-3
10^-2
10^-1
Energy (MeV)

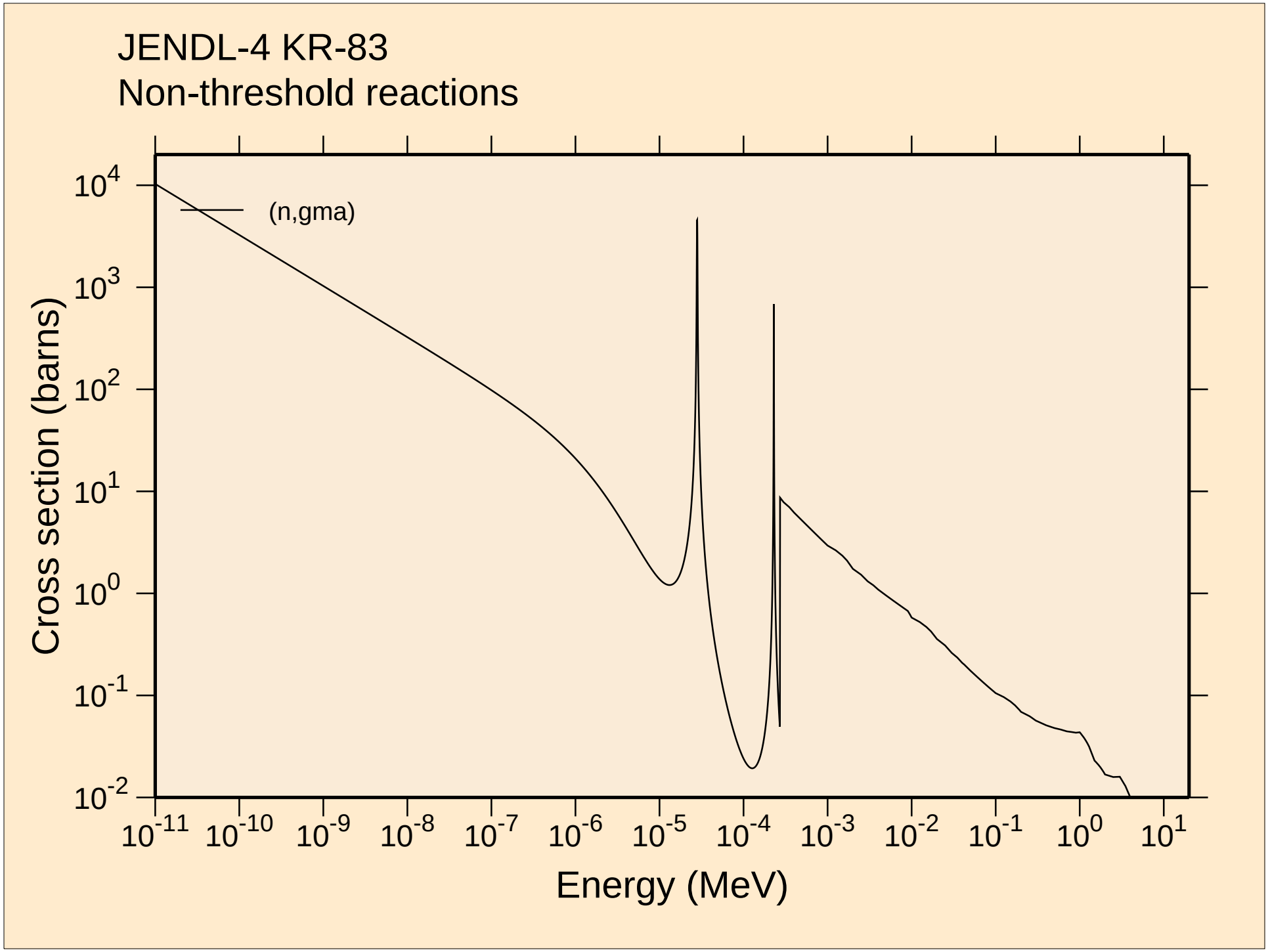

JENDL-4 KR-83
UR elastic cross section
Inf. Dil.
100 b
1 b
Cross section (barns)
10^1
10^-3
10^-2
10^-1
Energy (MeV)

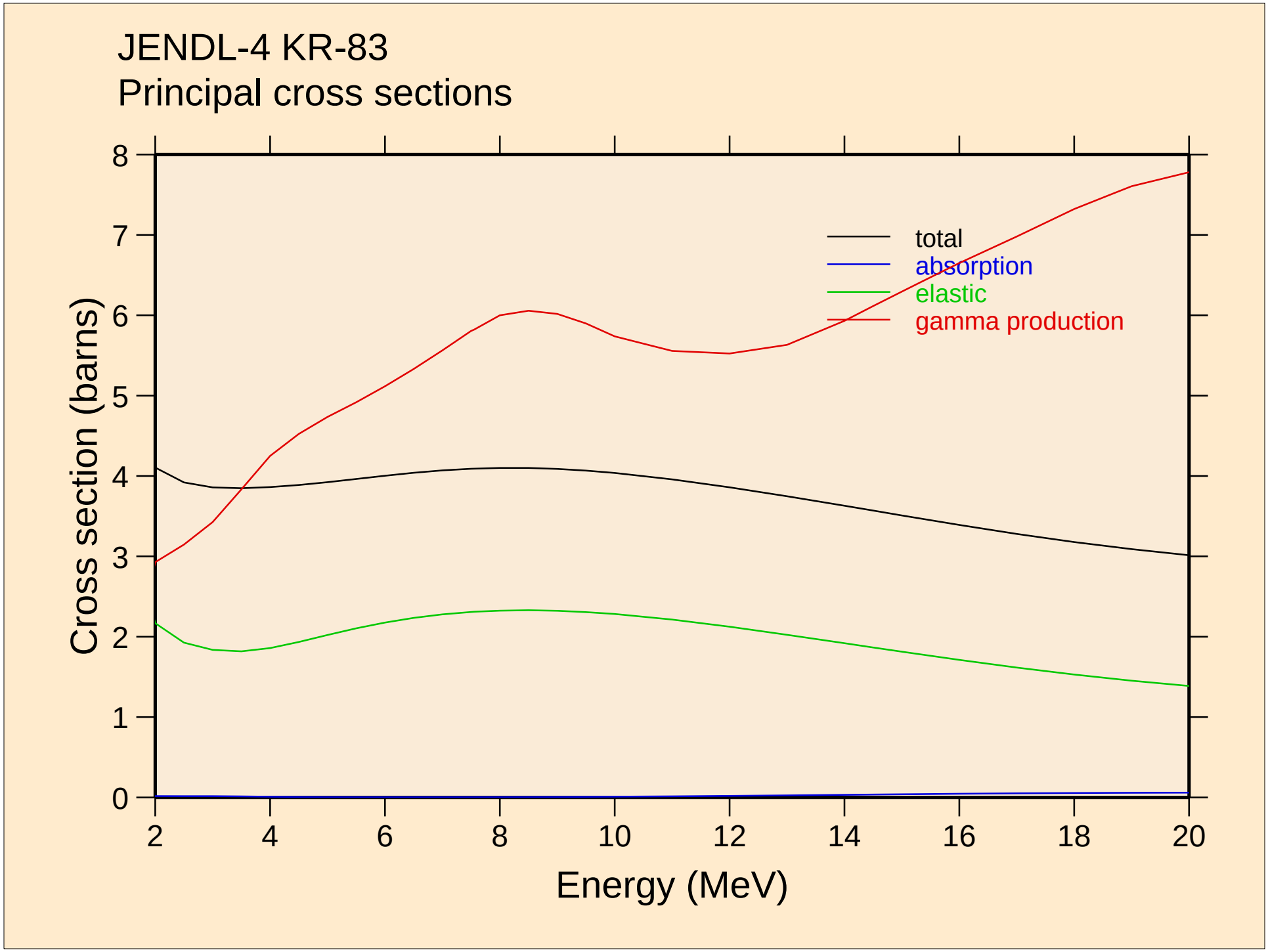

JENDL-4 KR-83
UR capture cross section
Inf. Dil.
100 b
1 b
Cross section (barns)
Energy (MeV)
10^1
10^0
10^-1
10^-3
10^-2
10^-1

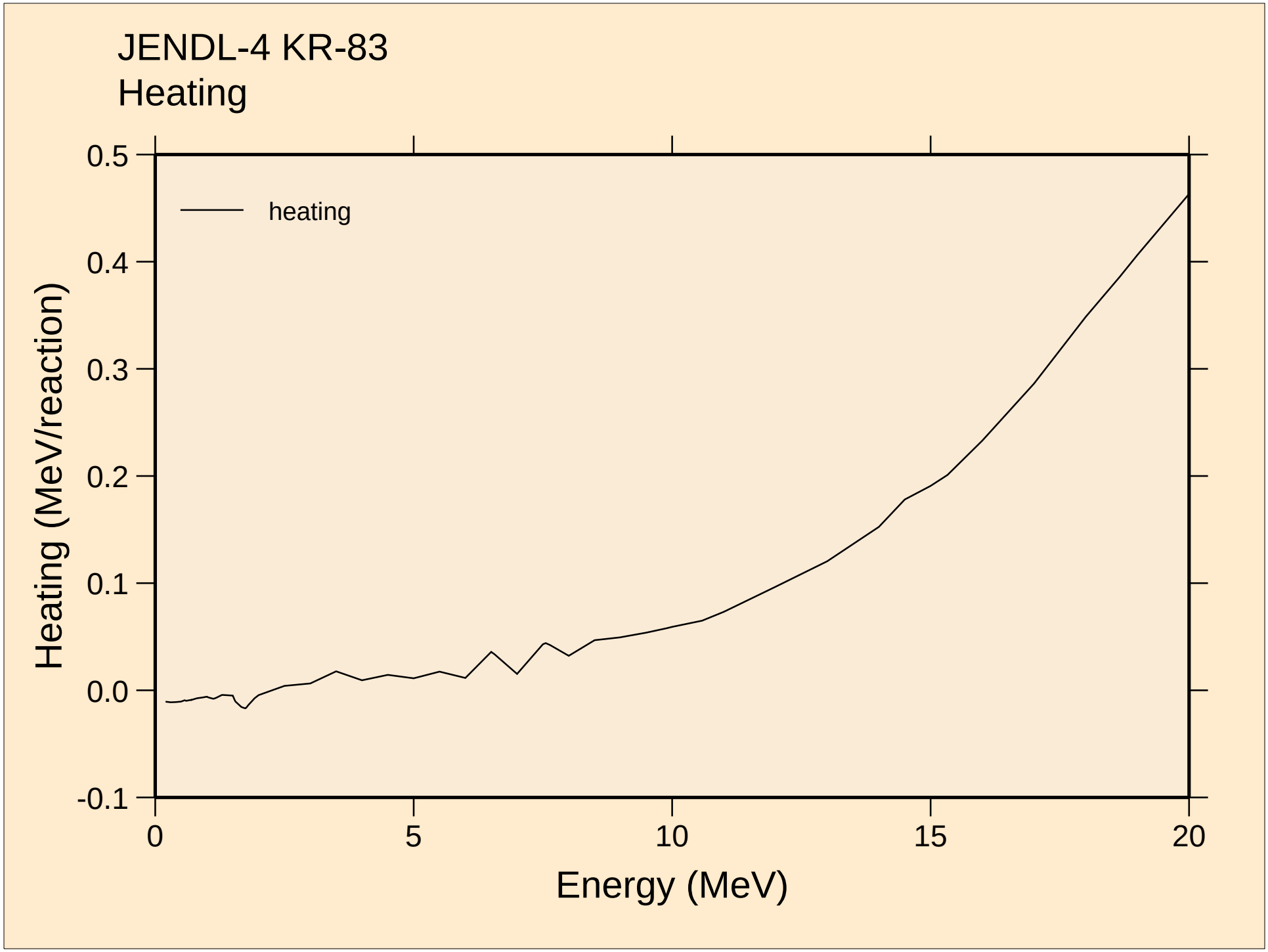

JENDL-4 KR-83
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
10-1
10-2
10-3
10-4
10-5
10-6
10-11
10-10
10-9
10-8
10-7
10-6
10-5
10-4
10-3
10-2
10-1
100
101

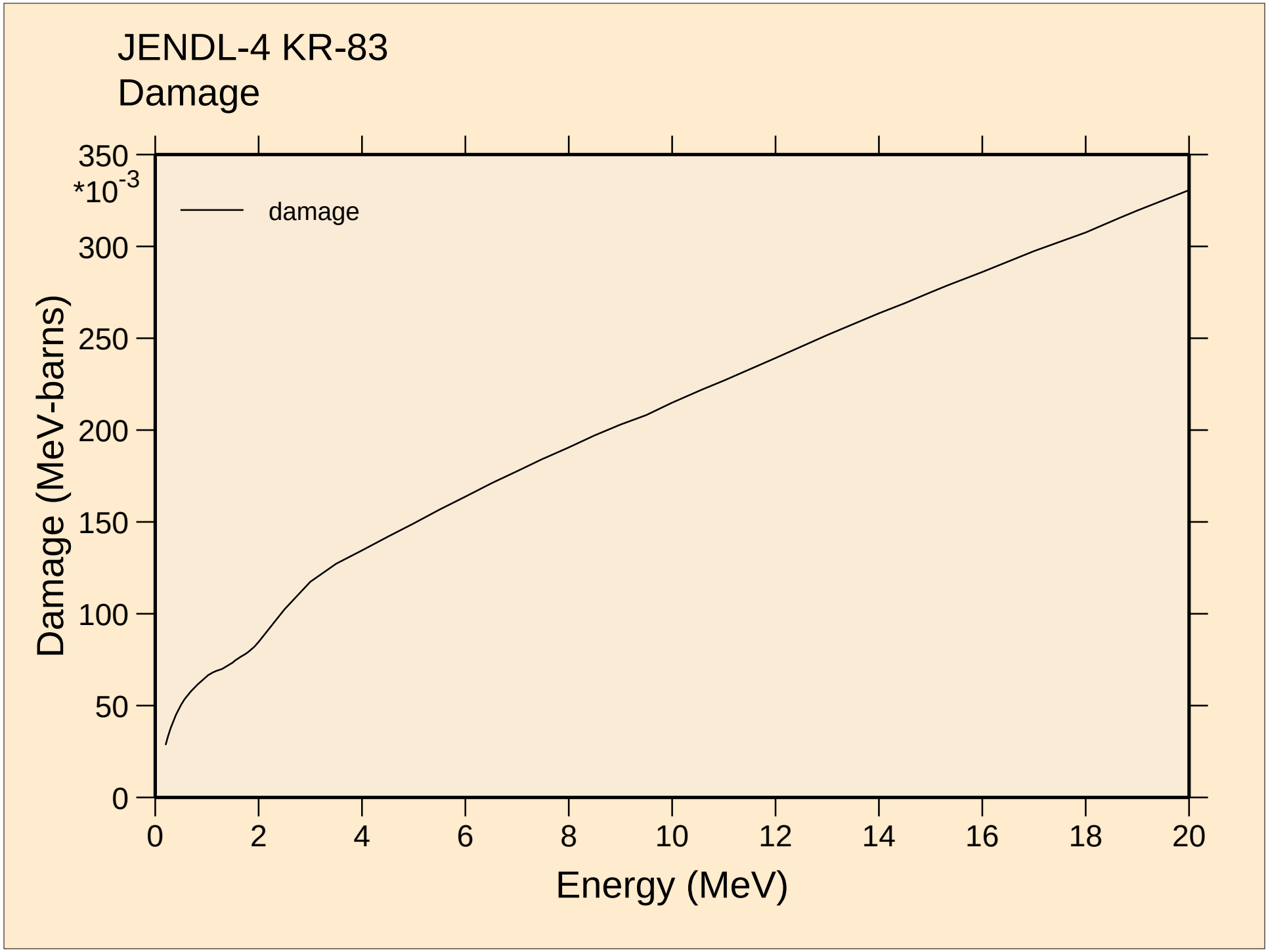

JENDL-4 KR-83
Damage
damage
Damage (MeV-barns)
Energy (MeV)
$10^{1}$
$10^{0}$
$10^{-1}$
$10^{-2}$
$10^{-3}$
$10^{-4}$
$10^{-5}$
$10^{-11}$ $10^{-10}$ $10^{-9}$ $10^{-8}$ $10^{-7}$ $10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$ $10^{-2}$ $10^{-1}$ $10^{0}$ $10^{1}$

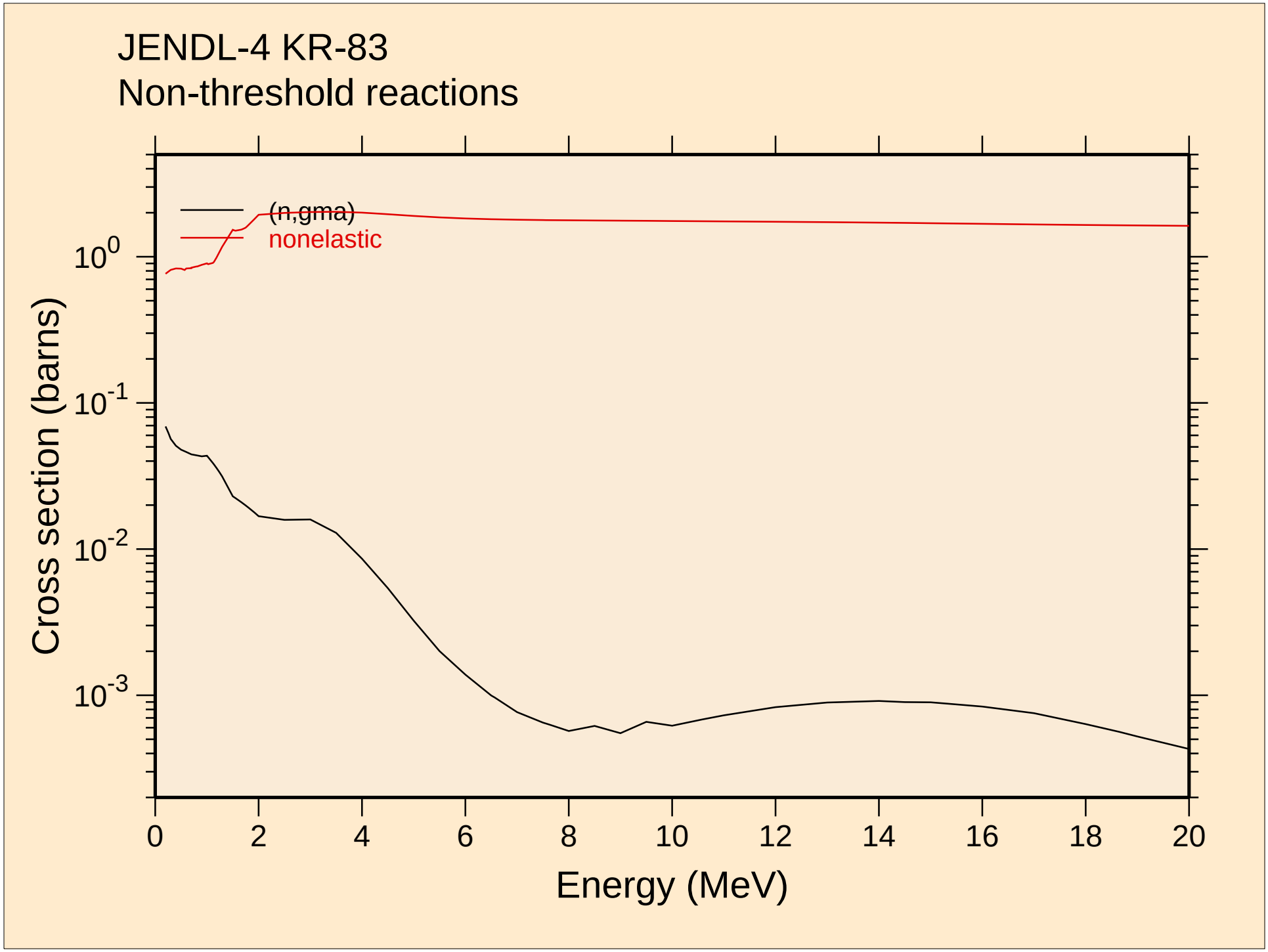

JENDL-4 KR-83
Non-threshold reactions
(n,gma)
nonelastic
Cross section (barns)
Energy (MeV)
10^4
10^3
10^2
10^1
10^0
10^-1
10^-2
10^-11
10^-10
10^-9
10^-8
10^-7
10^-6
10^-5
10^-4
10^-3
10^-2
10^-1
10^0
10^1

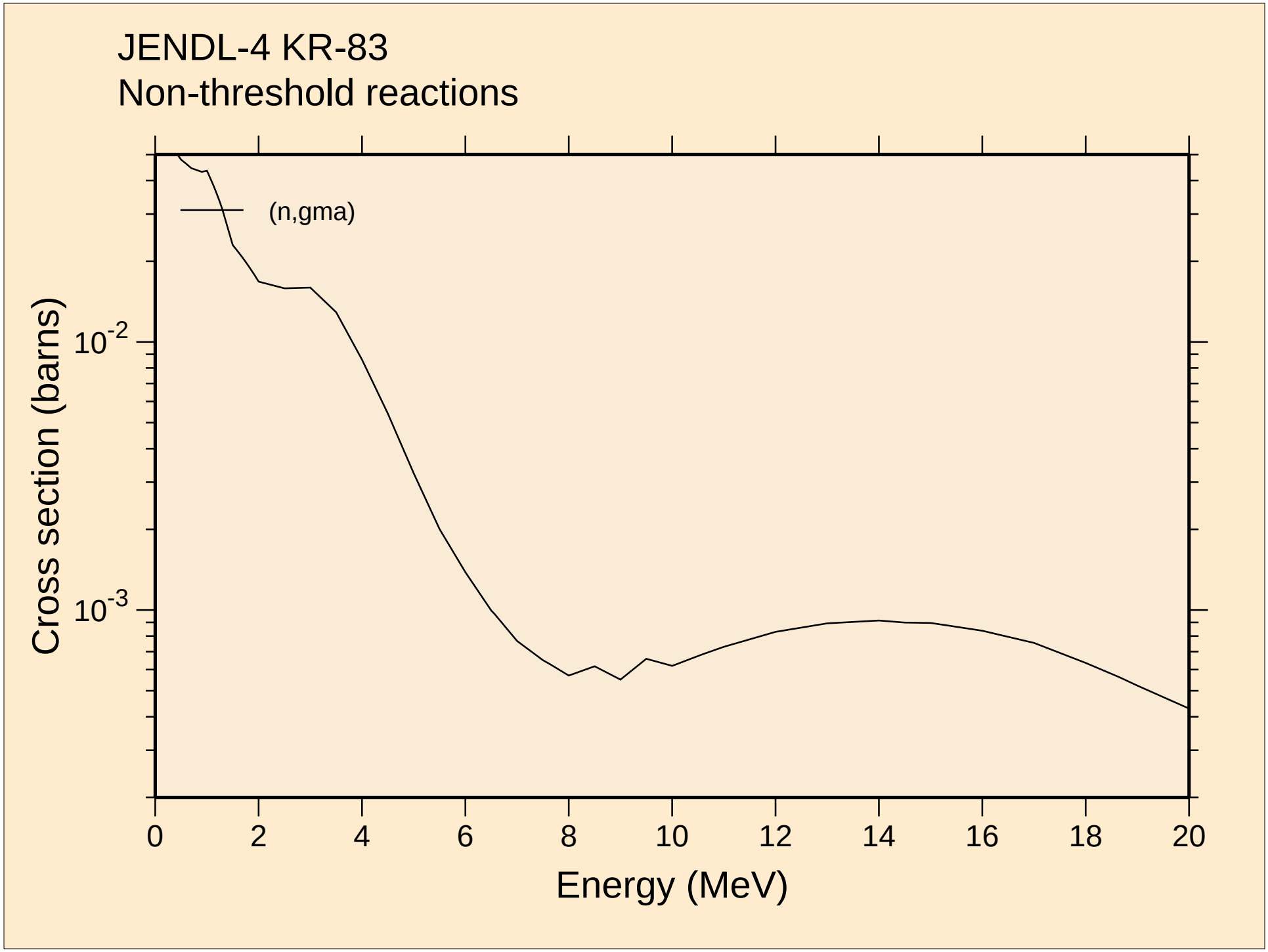

JENDL-4 KR-83
Non-threshold reactions
(n,gma)
Cross section (barns)
Energy (MeV)
10^4
10^3
10^2
10^1
10^0
10^-1
10^-2
10^-11
10^-10
10^-9
10^-8
10^-7
10^-6
10^-5
10^-4
10^-3
10^-2
10^-1
10^0
10^1

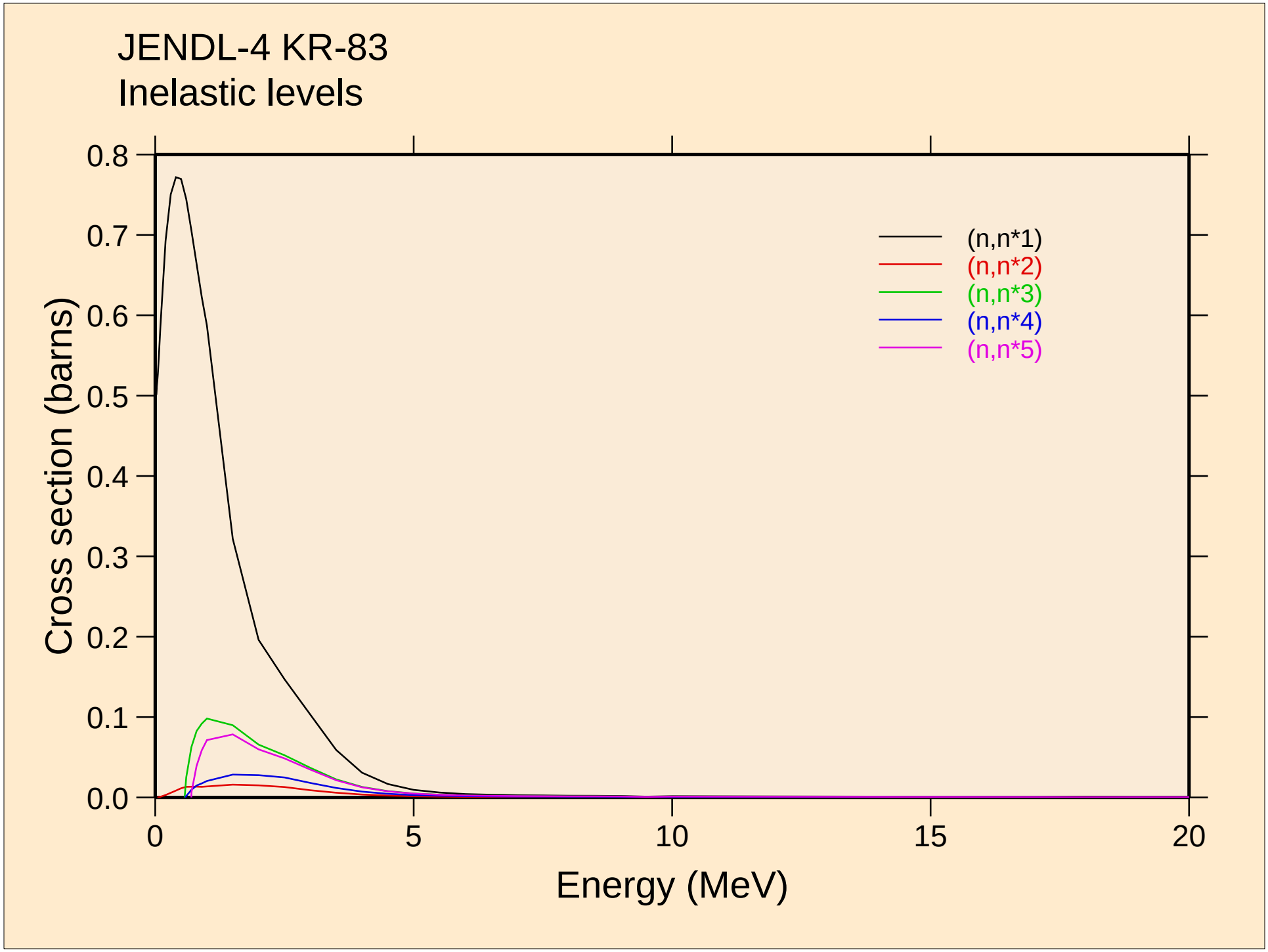

JENDL-4 KR-83
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production
0
1
2
3
4
5
6
7
8
2
4
6
8
10
12
14
16
18
20

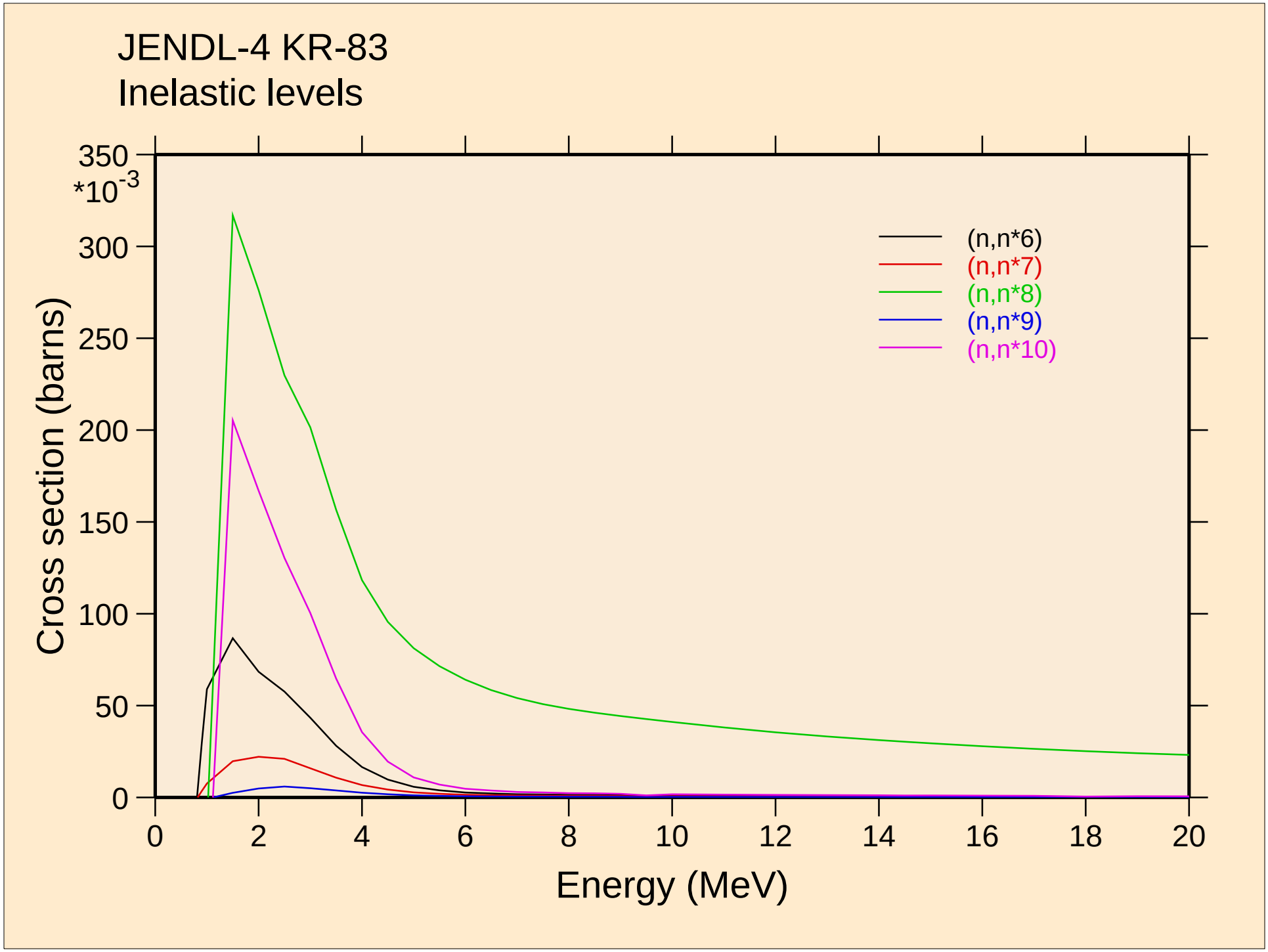

JENDL-4 KR-83
Heating
heating
Heating (MeV/reaction)
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
0
5
10
15
20
Energy (MeV)

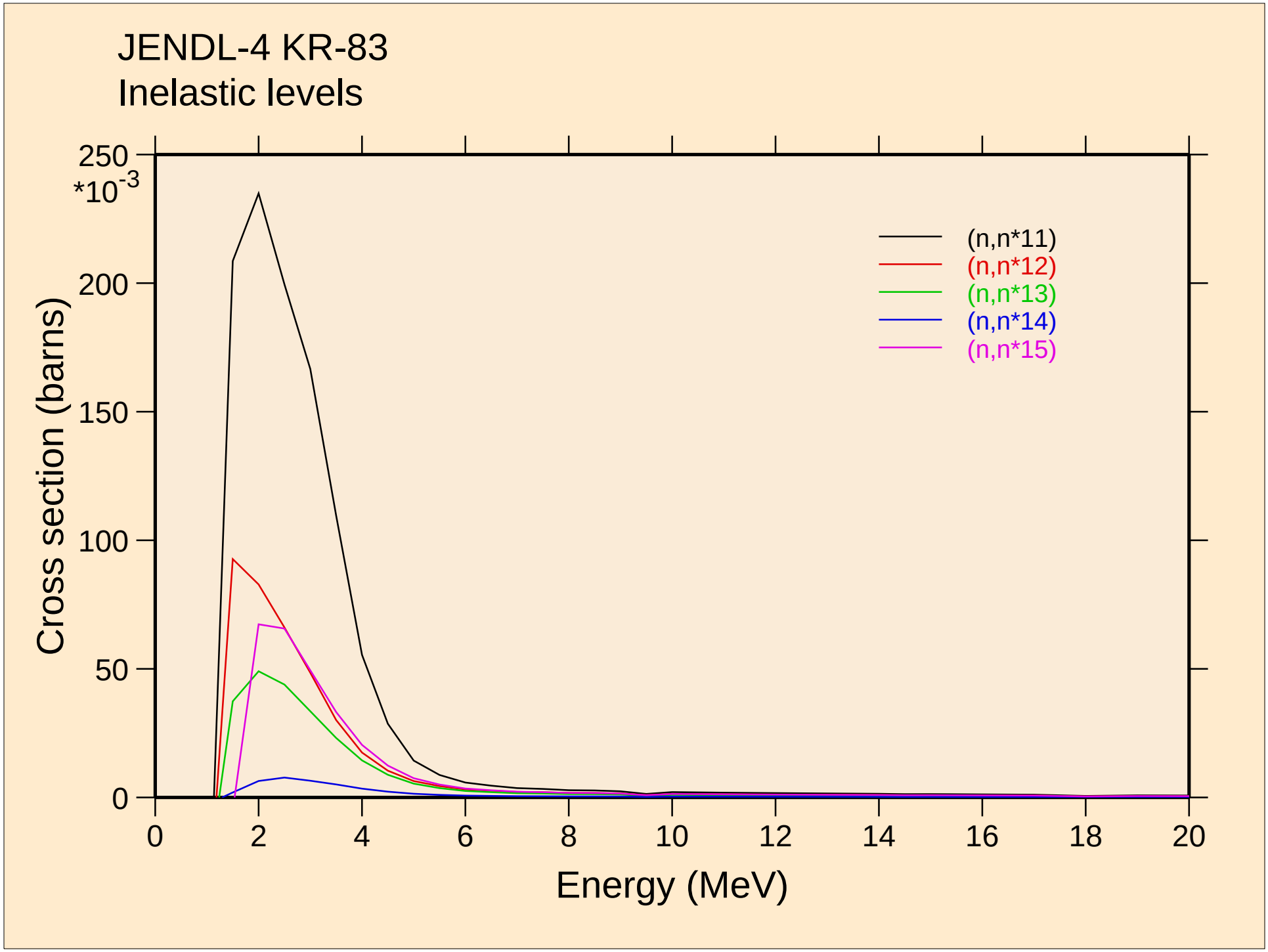

JENDL-4 KR-83
Damage
damage
*10-3
350
300
250
200
150
100
50
0
Damage (MeV-barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

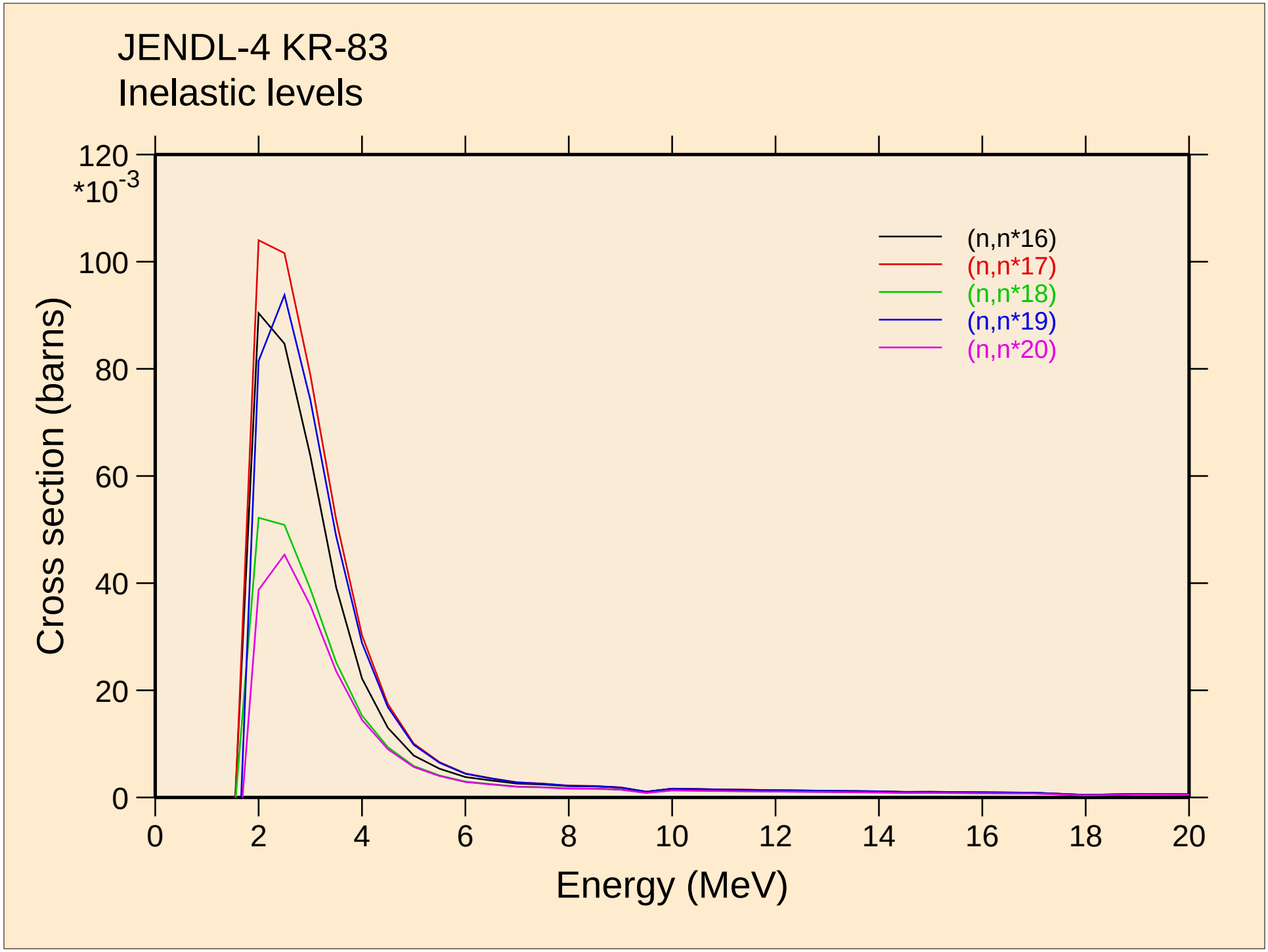

JENDL-4 KR-83
Non-threshold reactions
(n,gma)
nonelastic
Cross section (barns)
$10^{0}$
$10^{-1}$
$10^{-2}$
$10^{-3}$
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

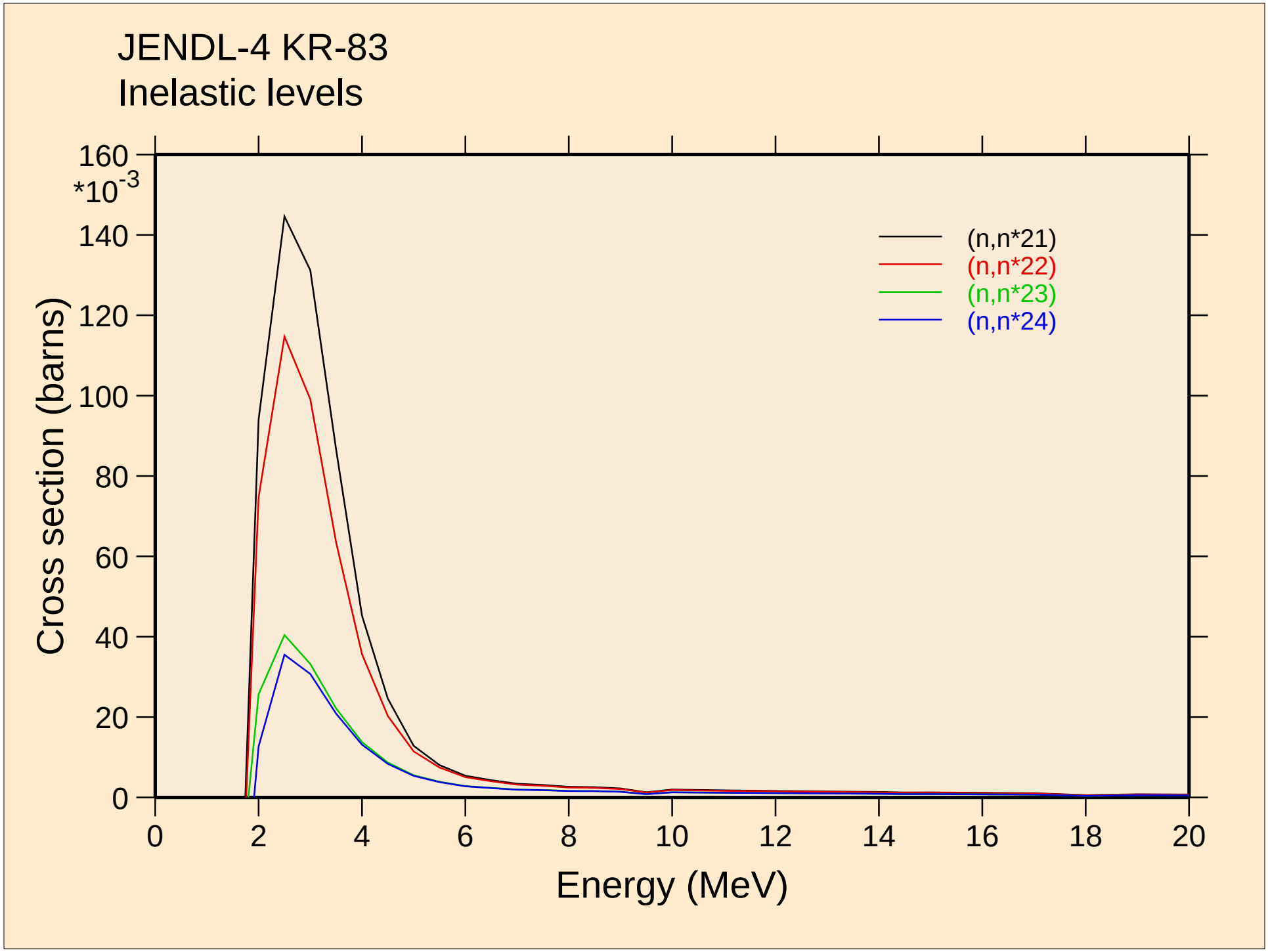

JENDL-4 KR-83
Non-threshold reactions
(n,gma)
Cross section (barns)
10-2
10-3
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

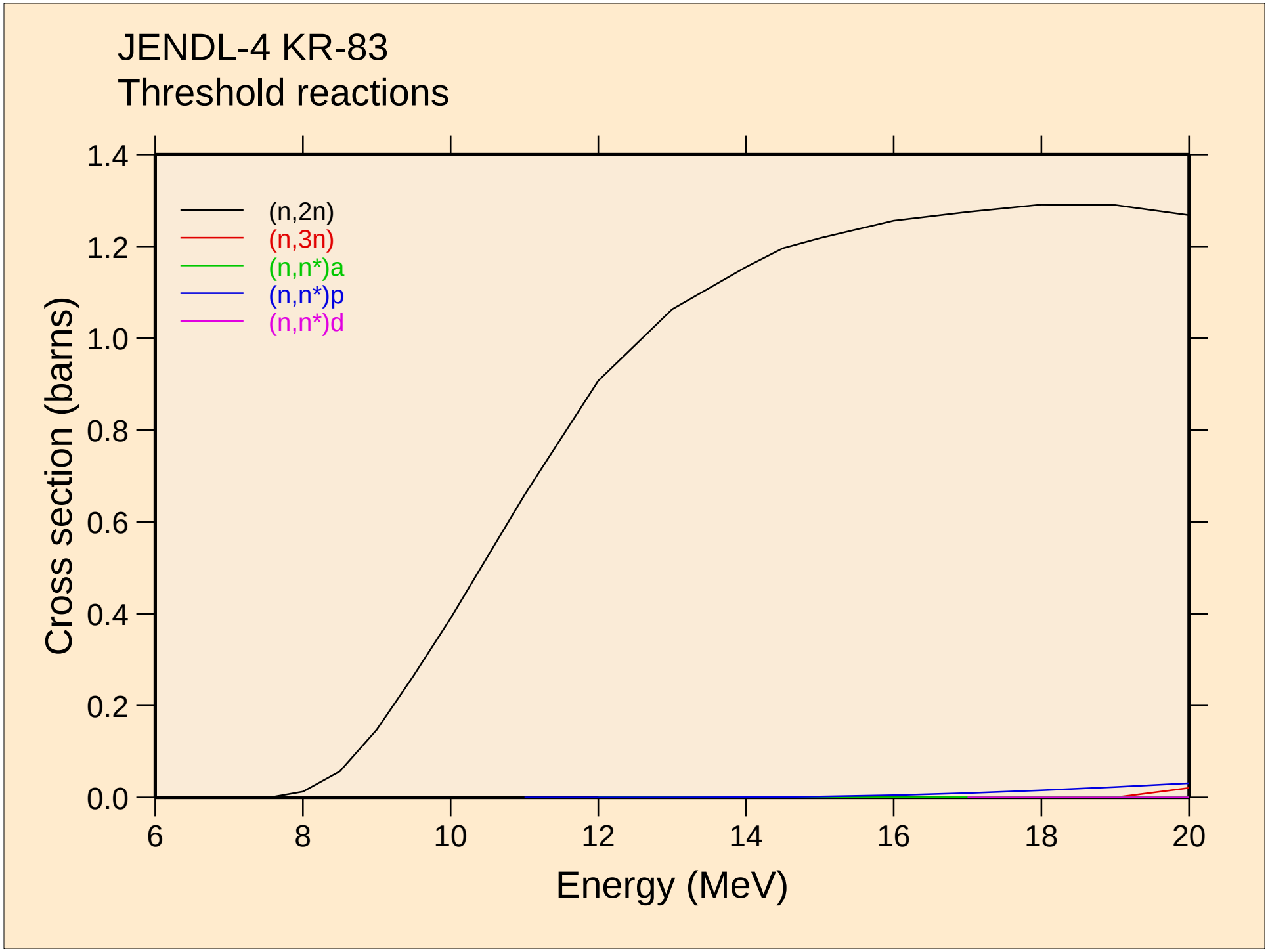

JENDL-4 KR-83
Inelastic levels
Cross section (barns)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0
5
10
15
20
Energy (MeV)
(n,n*1)
(n,n*2)
(n,n*3)
(n,n*4)
(n,n*5)

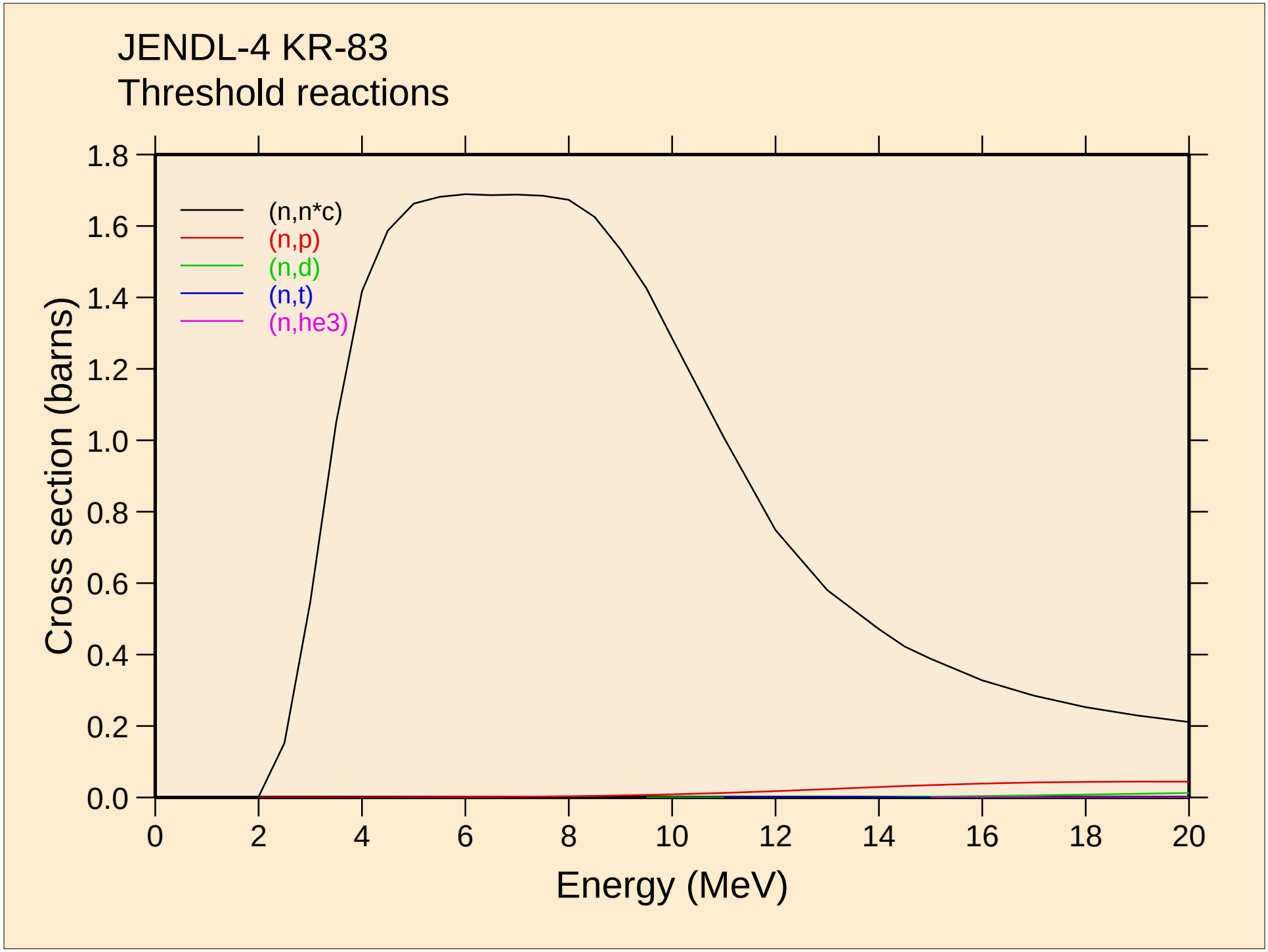

JENDL-4 KR-83
Inelastic levels
Cross section (barns)
*10^-3
350
300
250
200
150
100
50
0
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*6)
(n,n*7)
(n,n*8)
(n,n*9)
(n,n*10)

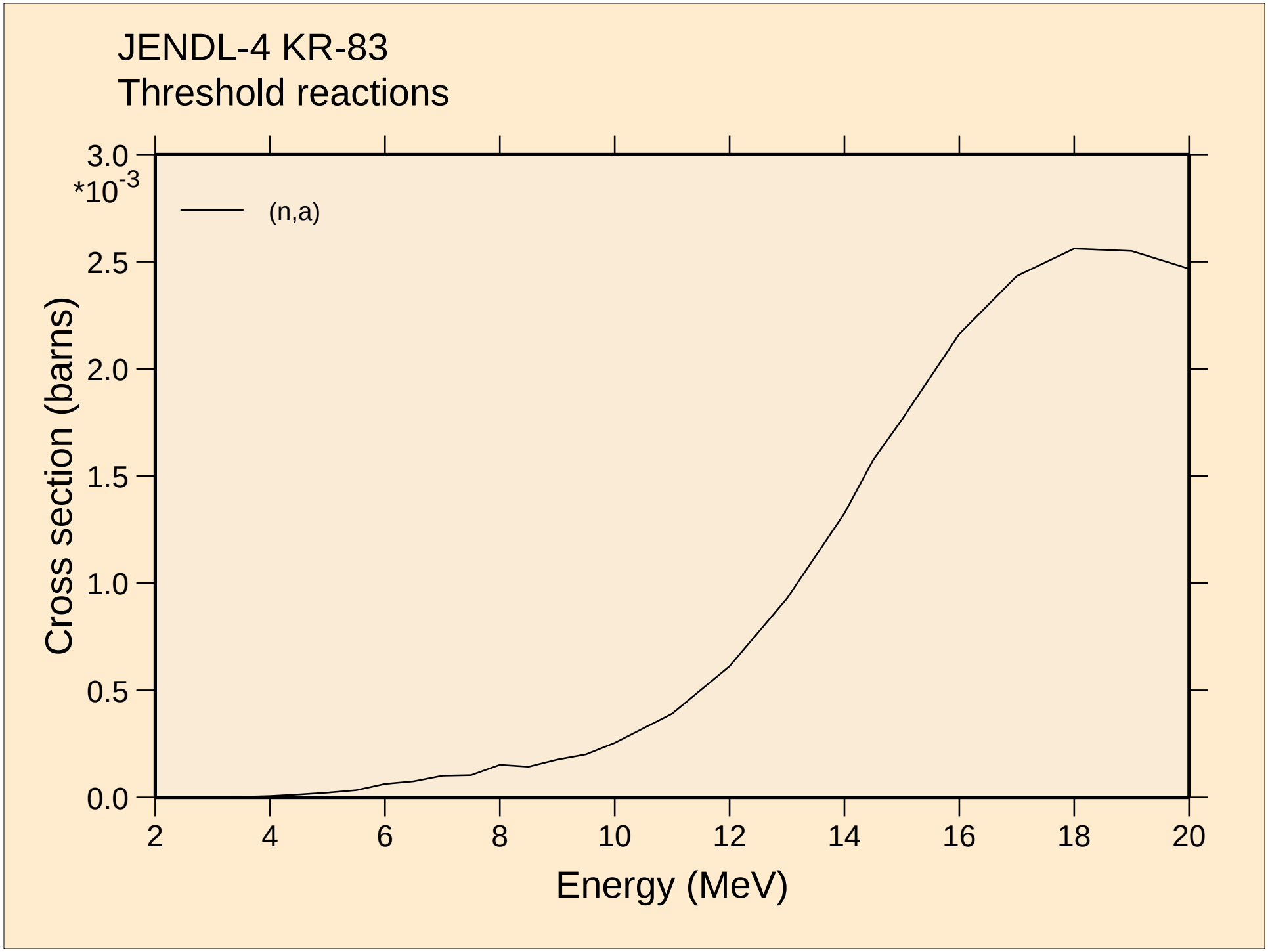

JENDL-4 KR-83
Inelastic levels
Cross section (barns)
*10^-3
250
200
150
100
50
0
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*11)
(n,n*12)
(n,n*13)
(n,n*14)
(n,n*15)

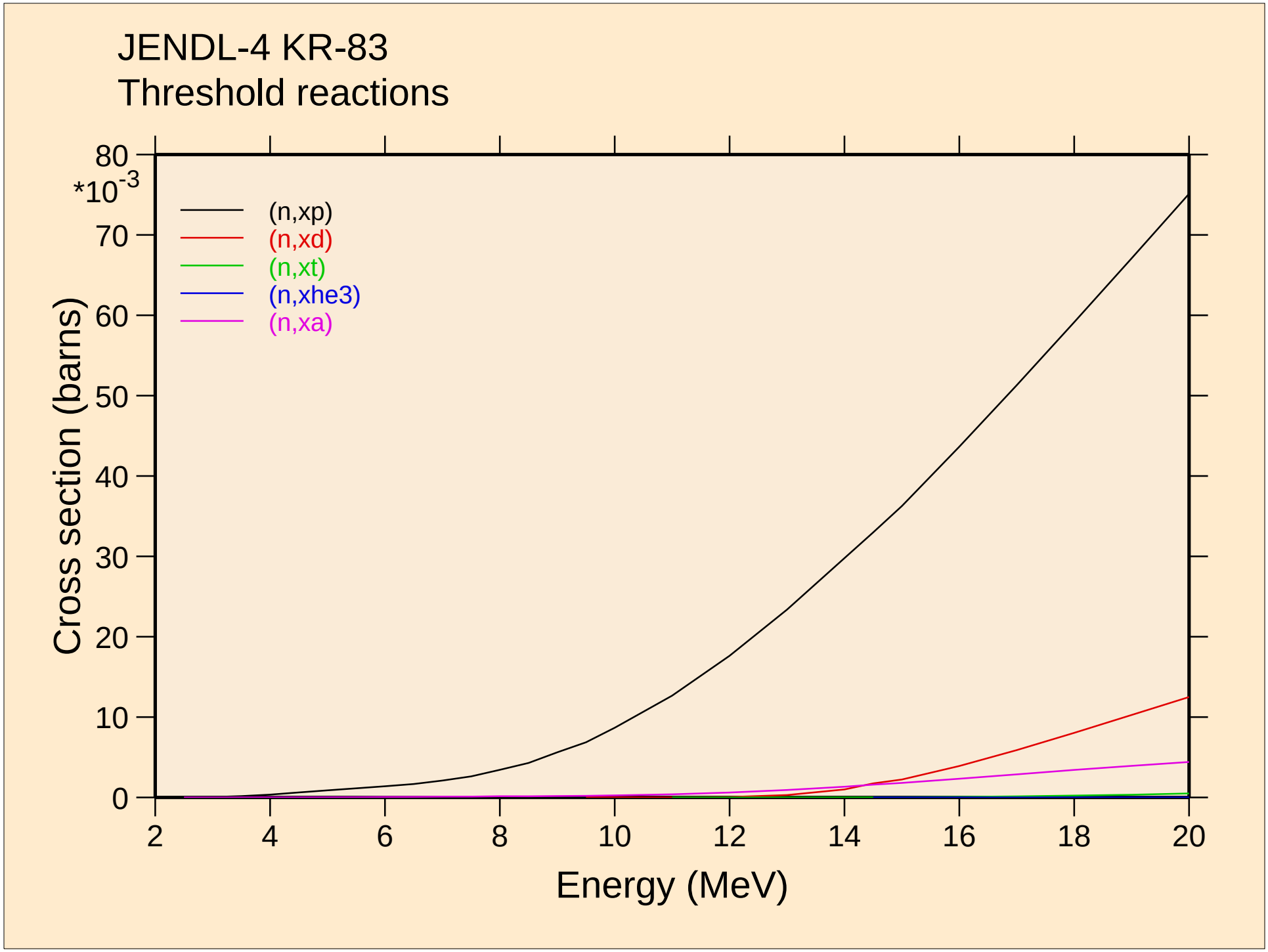

JENDL-4 KR-83
Inelastic levels
120
*10-3
100
80
60
40
20
0
Cross section (barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*16)
(n,n*17)
(n,n*18)
(n,n*19)
(n,n*20)

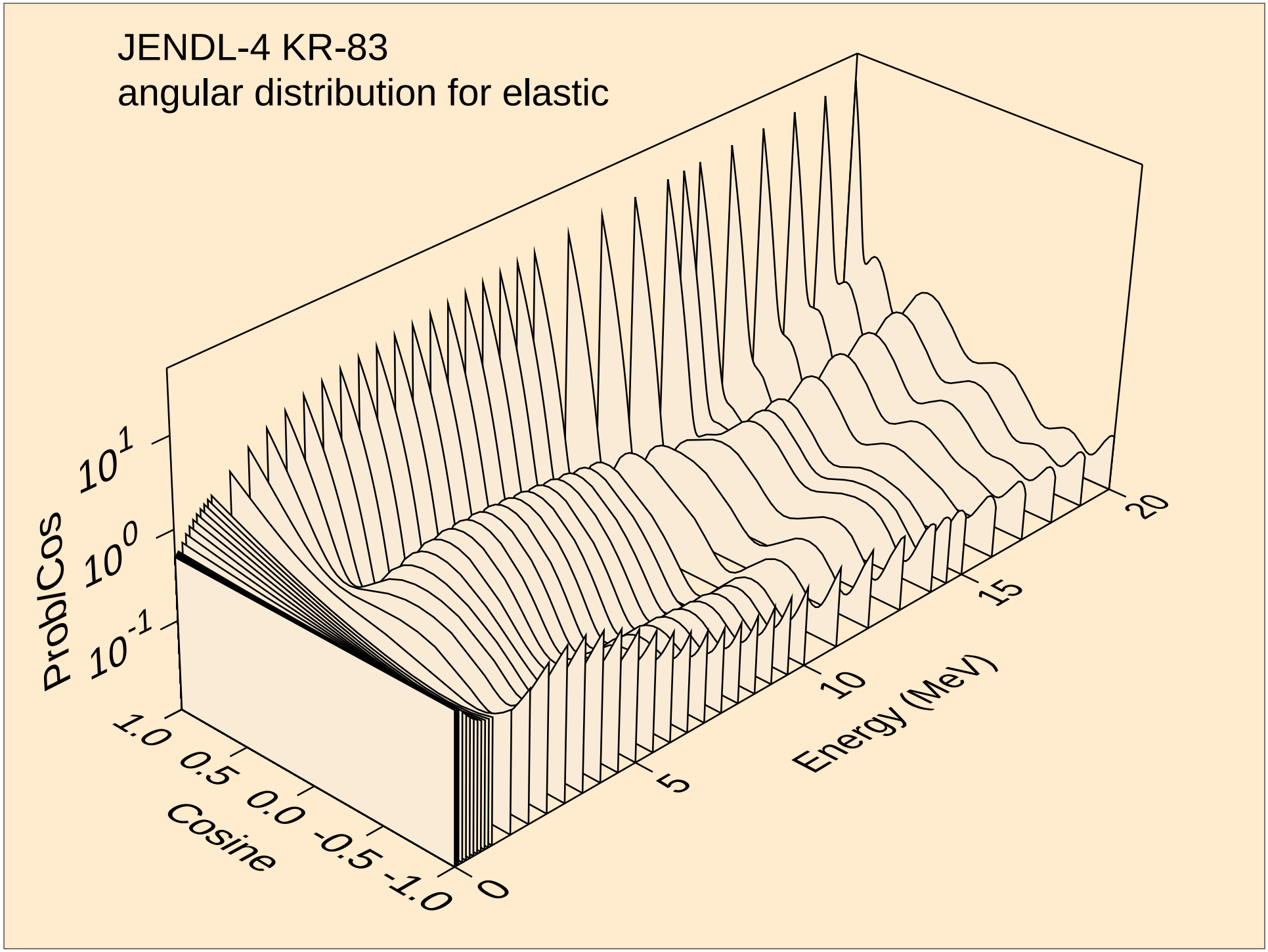

JENDL-4 KR-83
Inelastic levels
Cross section (barns)
*10-3
160
140
120
100
80
60
40
20
0
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*21)
(n,n*22)
(n,n*23)
(n,n*24)

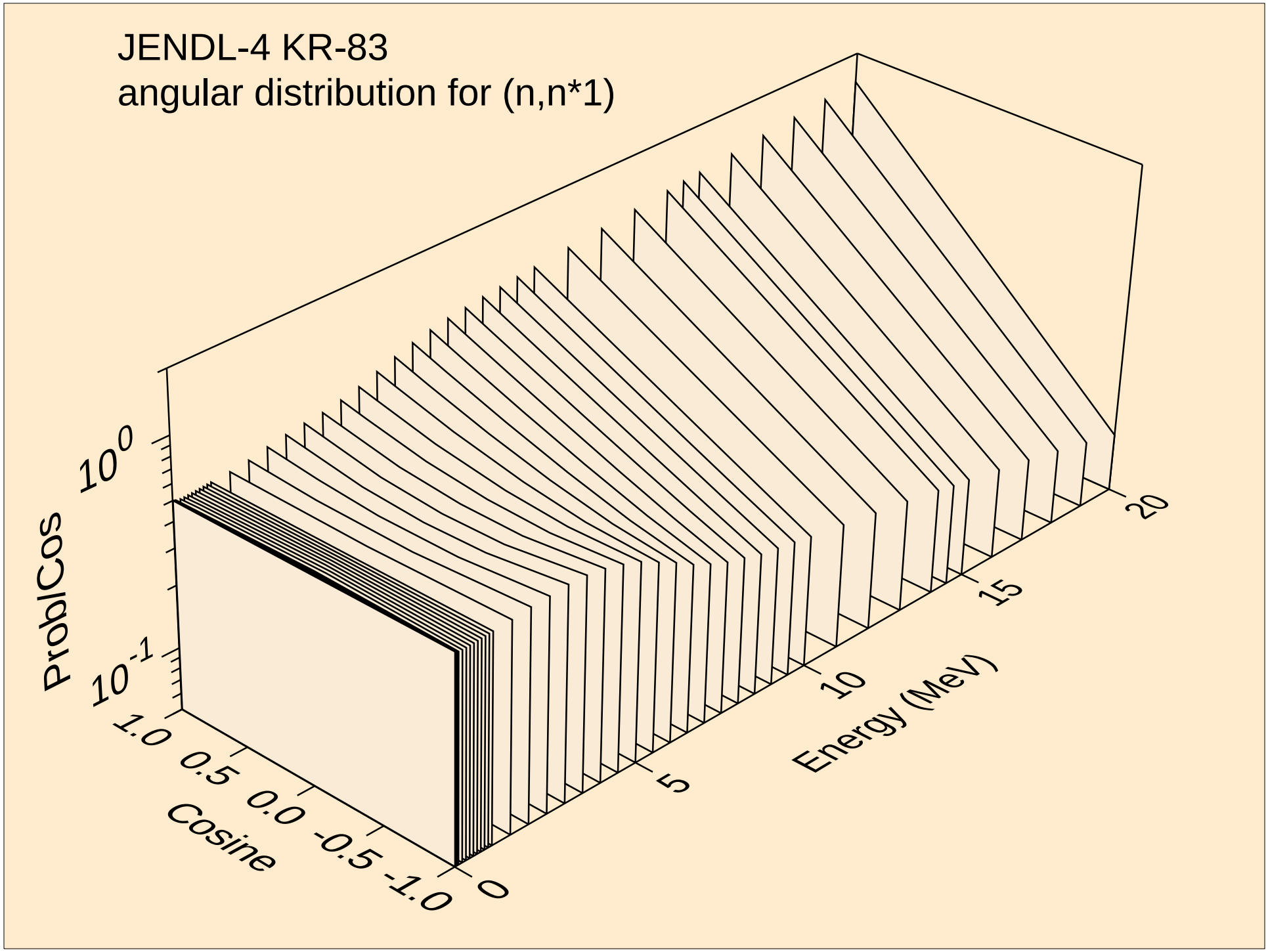

JENDL-4 KR-83
Threshold reactions
(n,2n)
(n,3n)
(n,n*)a
(n,n*)p
(n,n*)d
Cross section (barns)
Energy (MeV)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
6
8
10
12
14
16
18
20

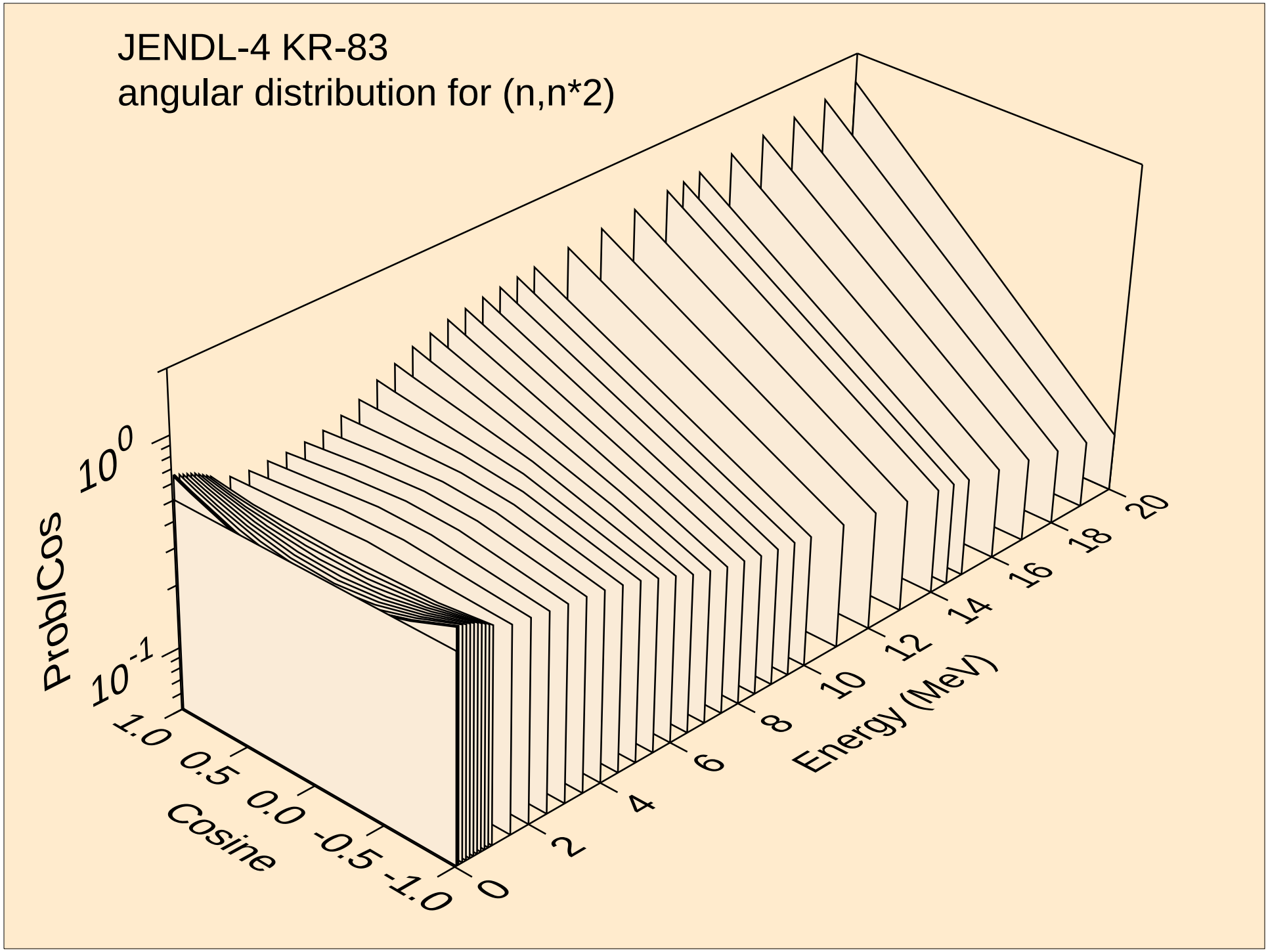

JENDL-4 KR-83
Threshold reactions
(n,n*c)
(n,p)
(n,d)
(n,t)
(n,he3)
Cross section (barns)
Energy (MeV)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
0
2
4
6
8
10
12
14
16
18
20

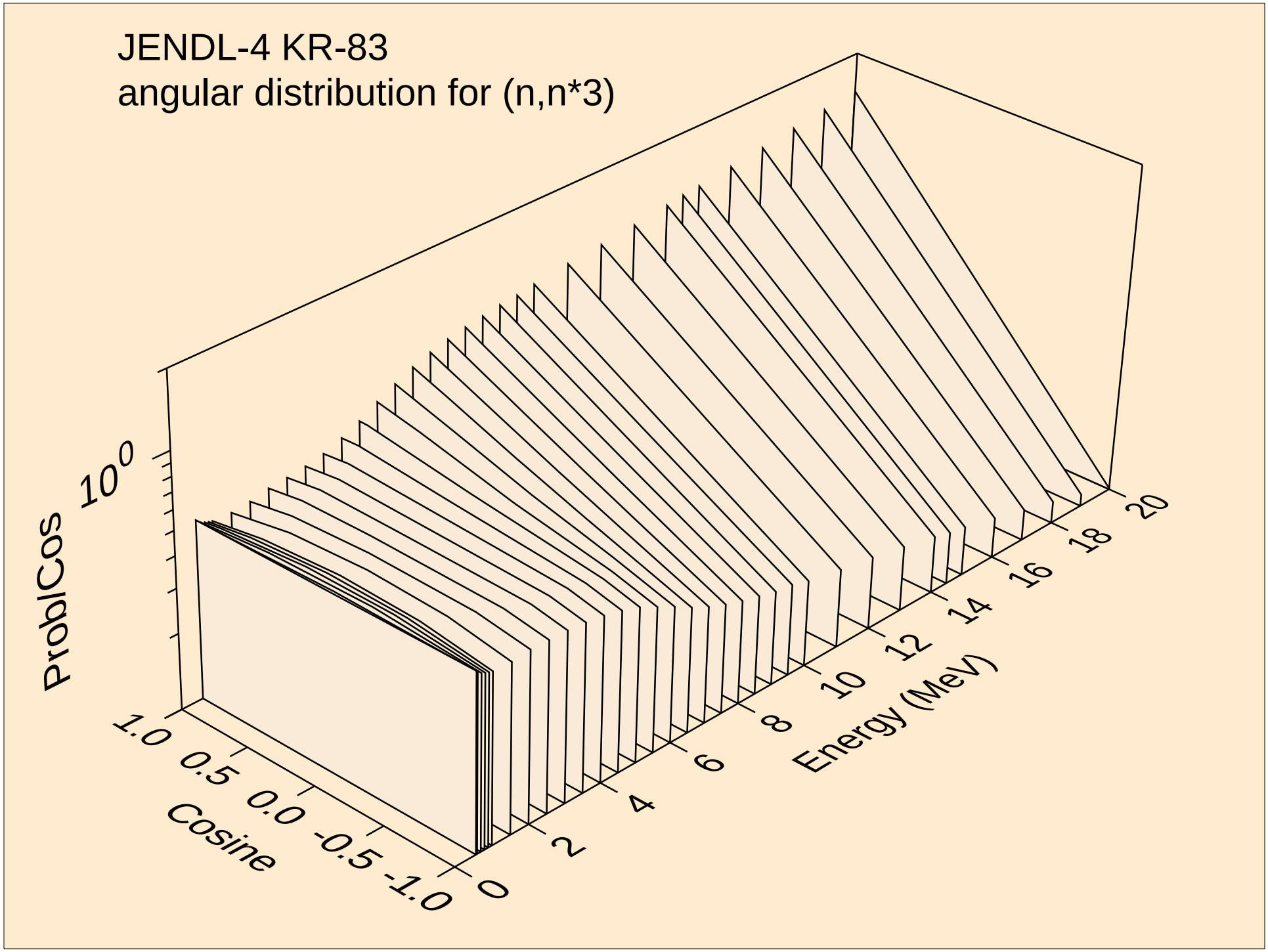

JENDL-4 KR-83
Threshold reactions
(n,a)
Cross section (barns)
*10-3
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

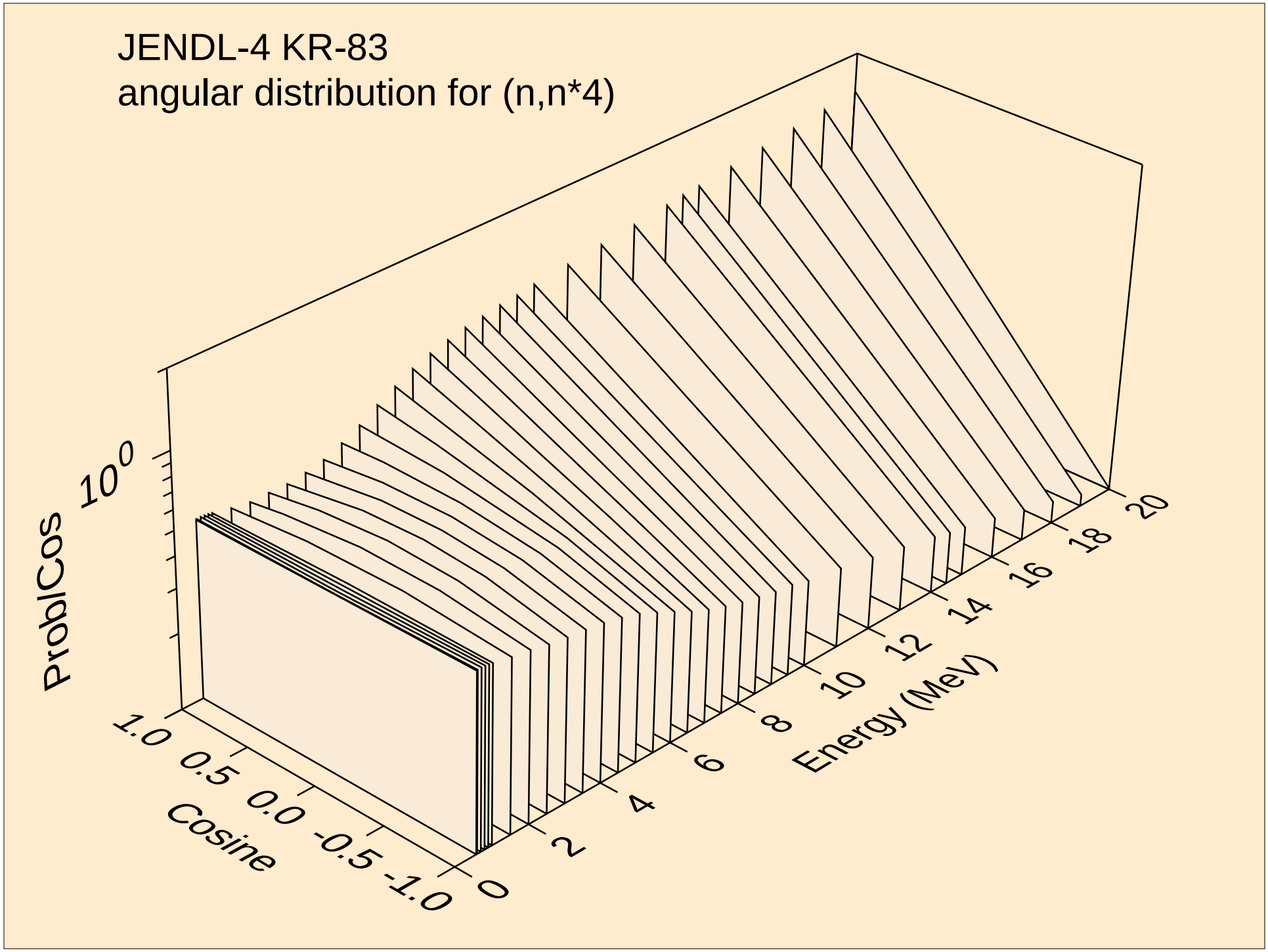

JENDL-4 KR-83
Threshold reactions
*10-3
80
70
60
50
40
30
20
10
0
Cross section (barns)
(n,xp)
(n,xd)
(n,xt)
(n,xhe3)
(n,xa)
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

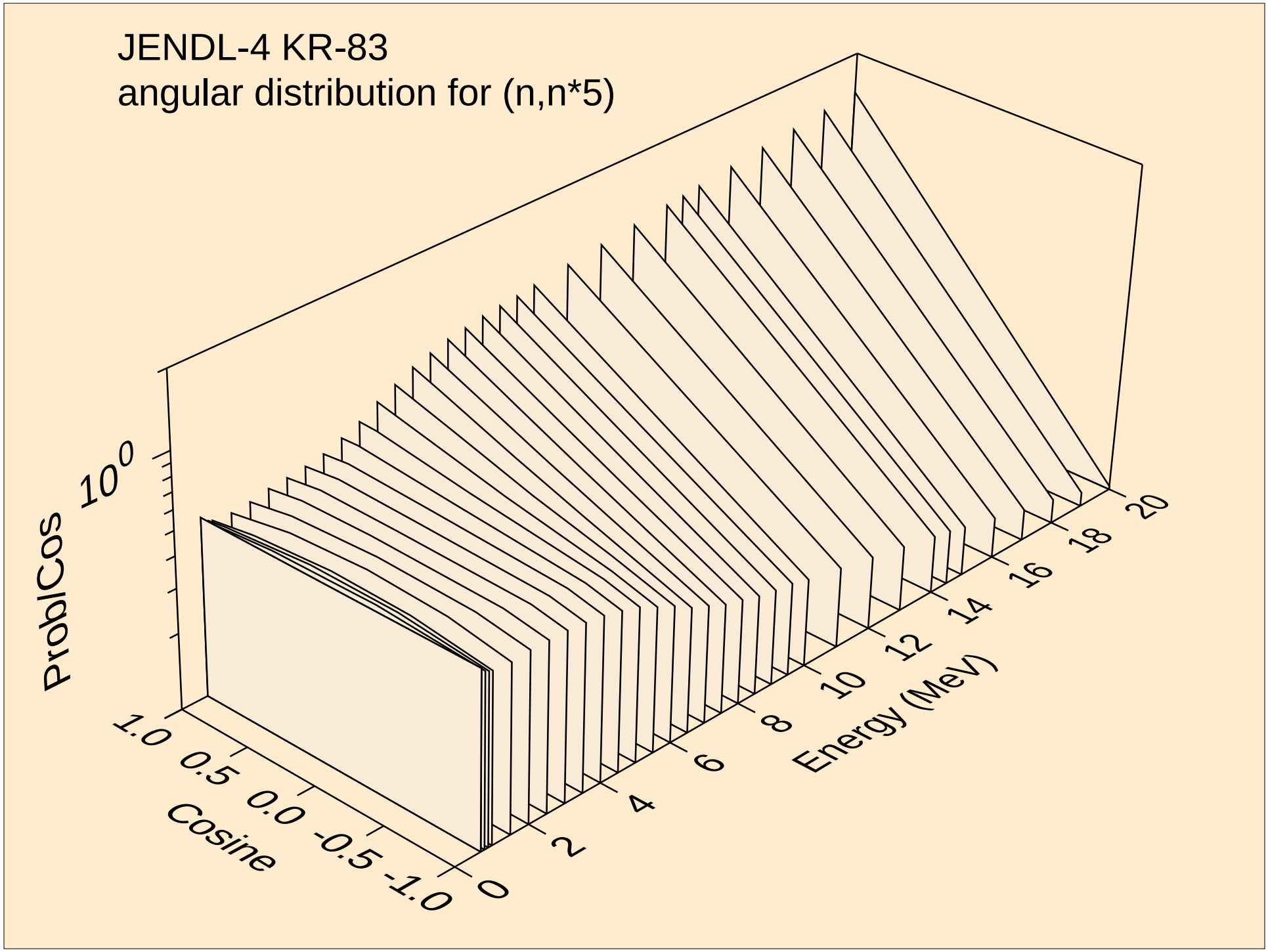

JENDL-4 KR-83
angular distribution for elastic
ProblCos
$10^{1}$
$10^{0}$
$10^{-1}$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)

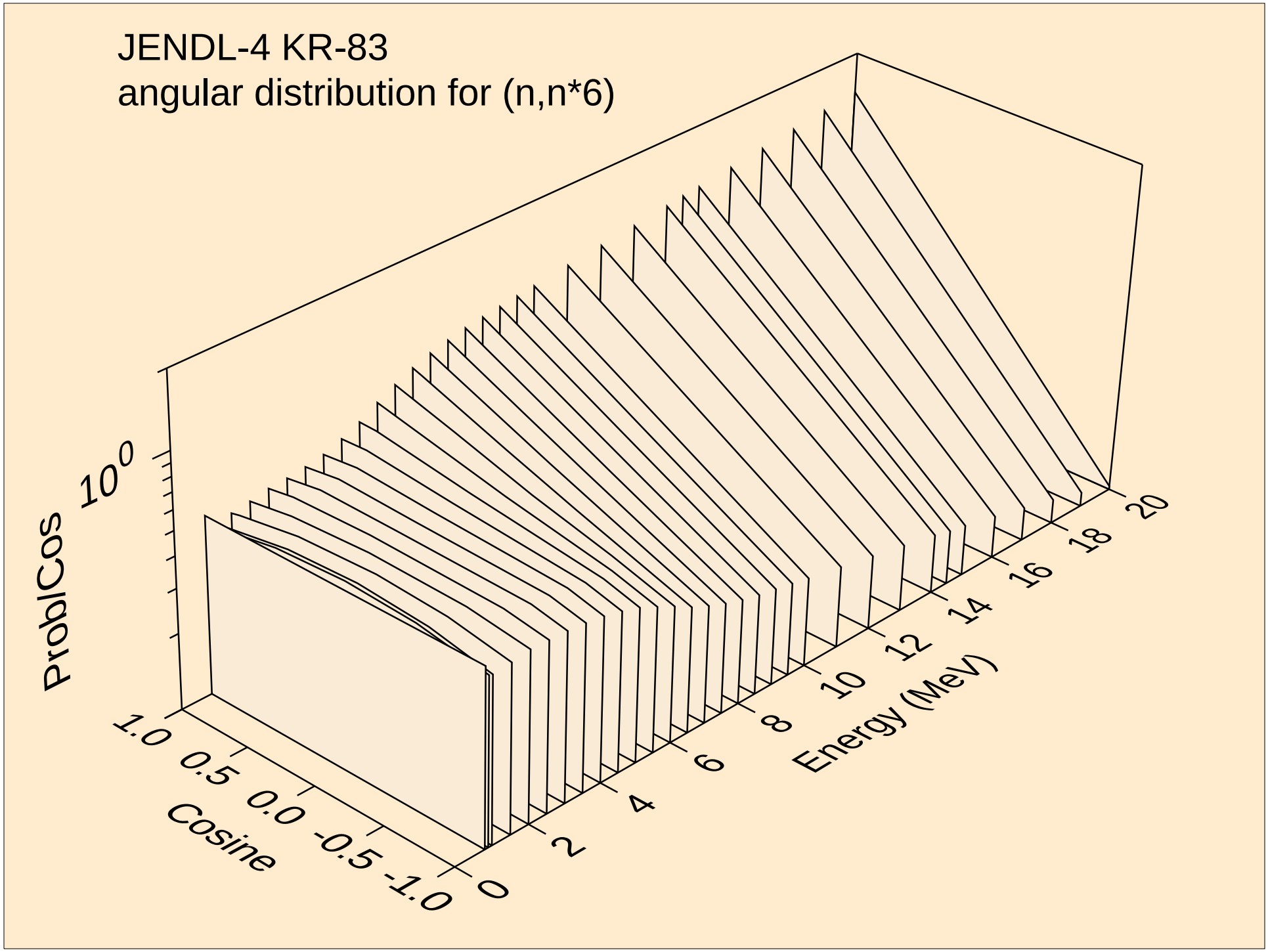

JENDL-4 KR-83
angular distribution for (n,n*1)
ProbCos
$10^0$
$10^{-1}$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)

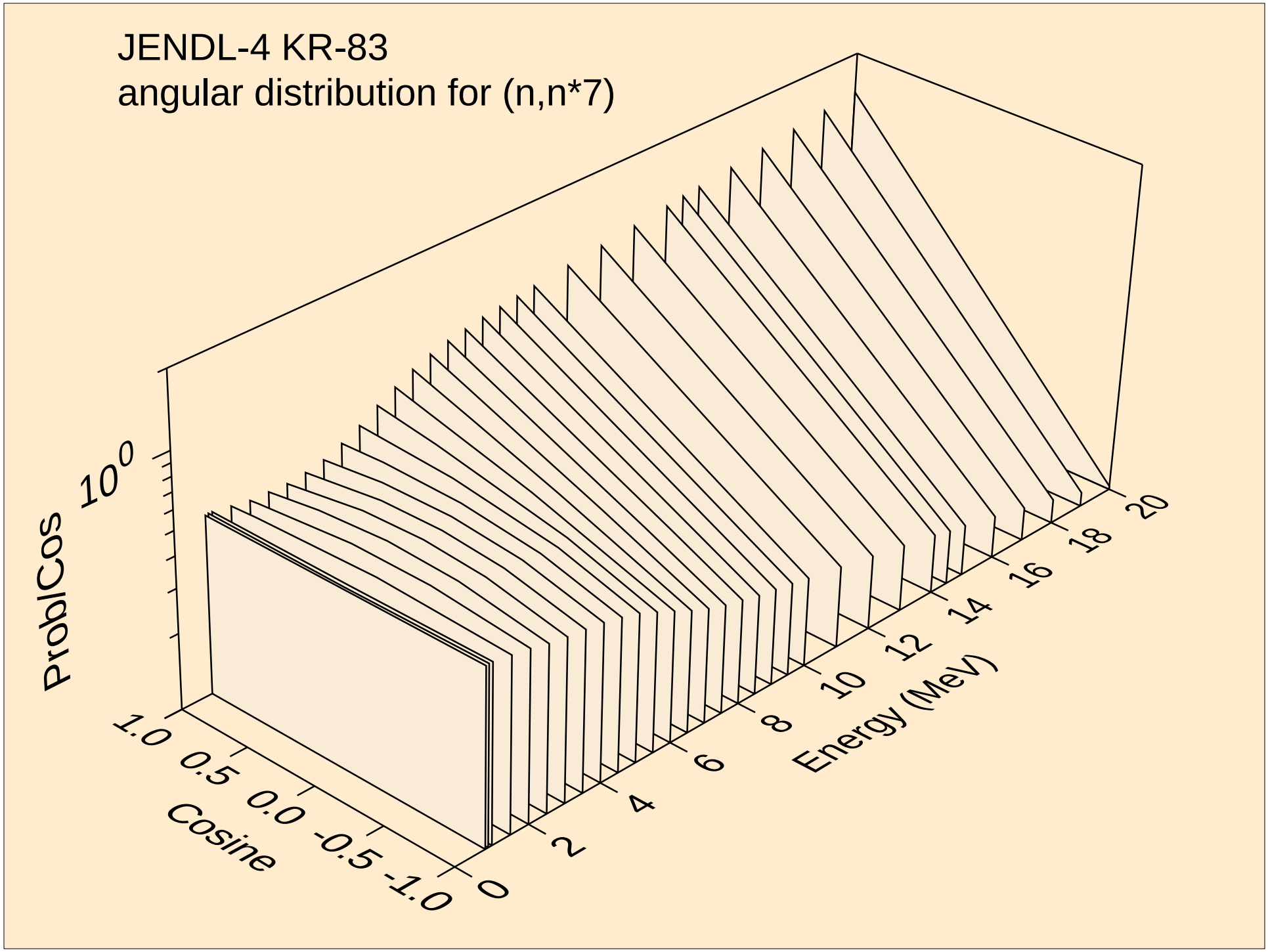

JENDL-4 KR-83
angular distribution for (n,n*2)
ProbCos
$10^0$
$10^{-1}$
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

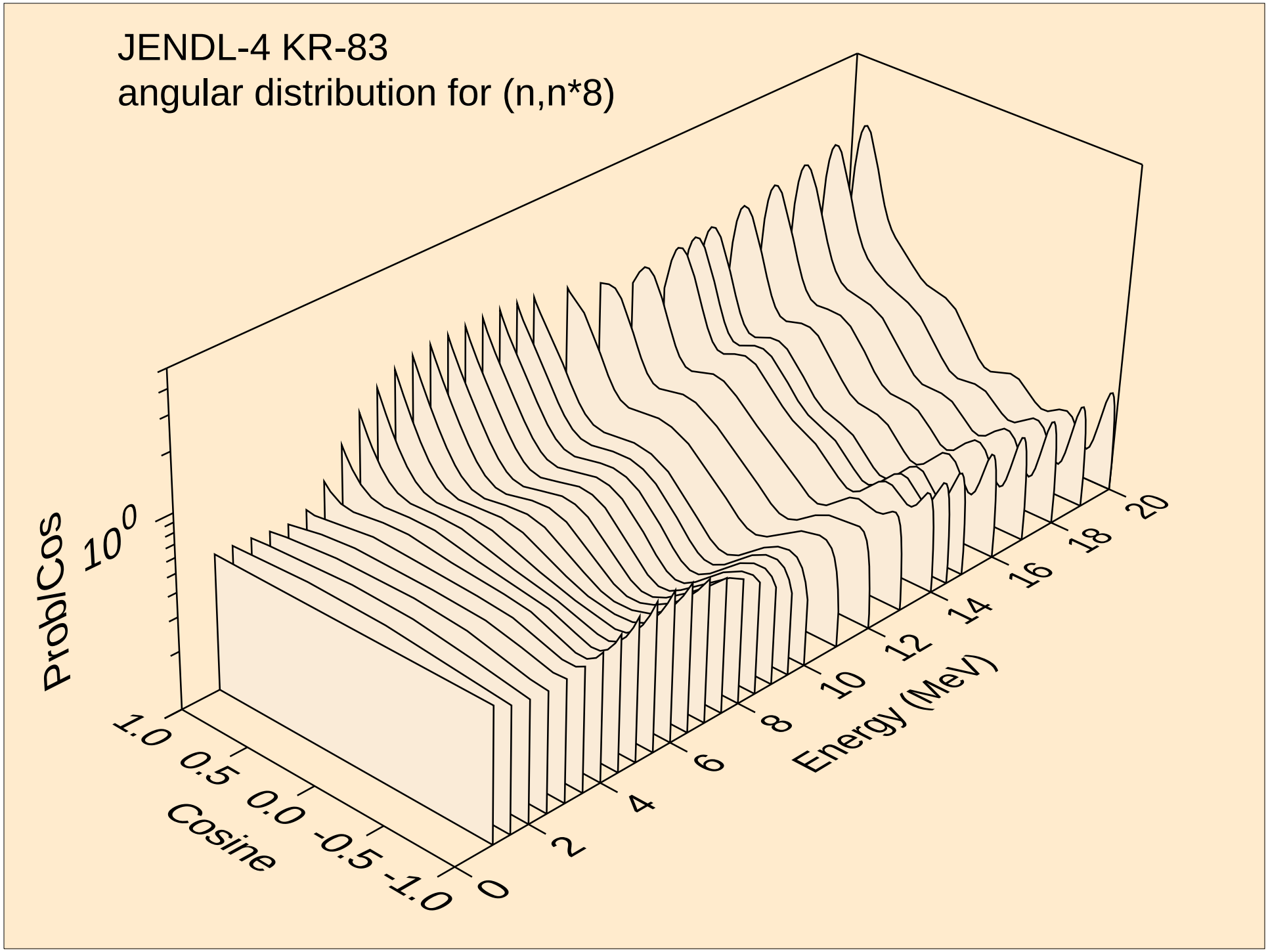

JENDL-4 KR-83
angular distribution for (n,n*3)
ProblCos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

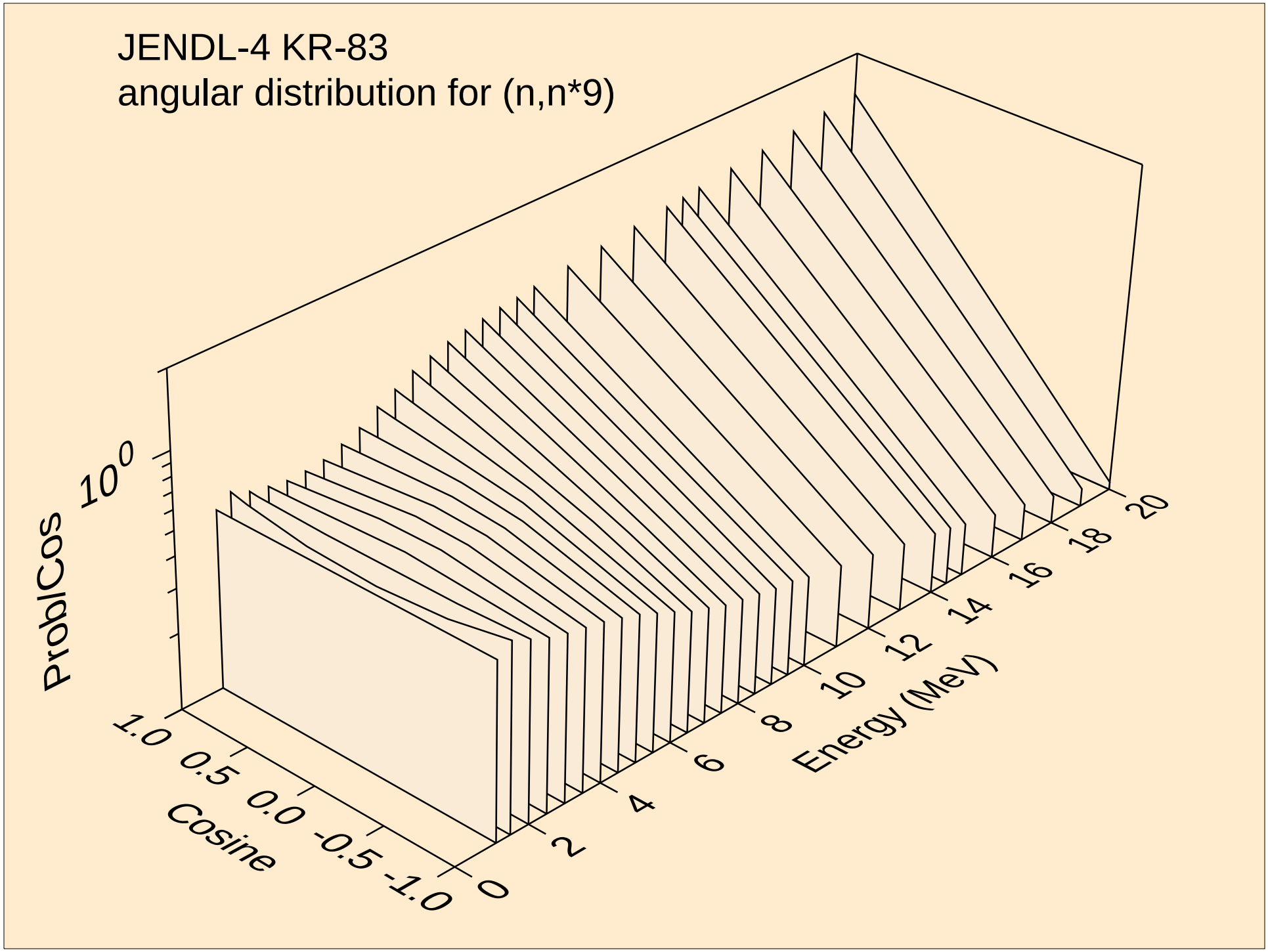

JENDL-4 KR-83
angular distribution for (n,n*4)
ProbCos
$10^0$
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

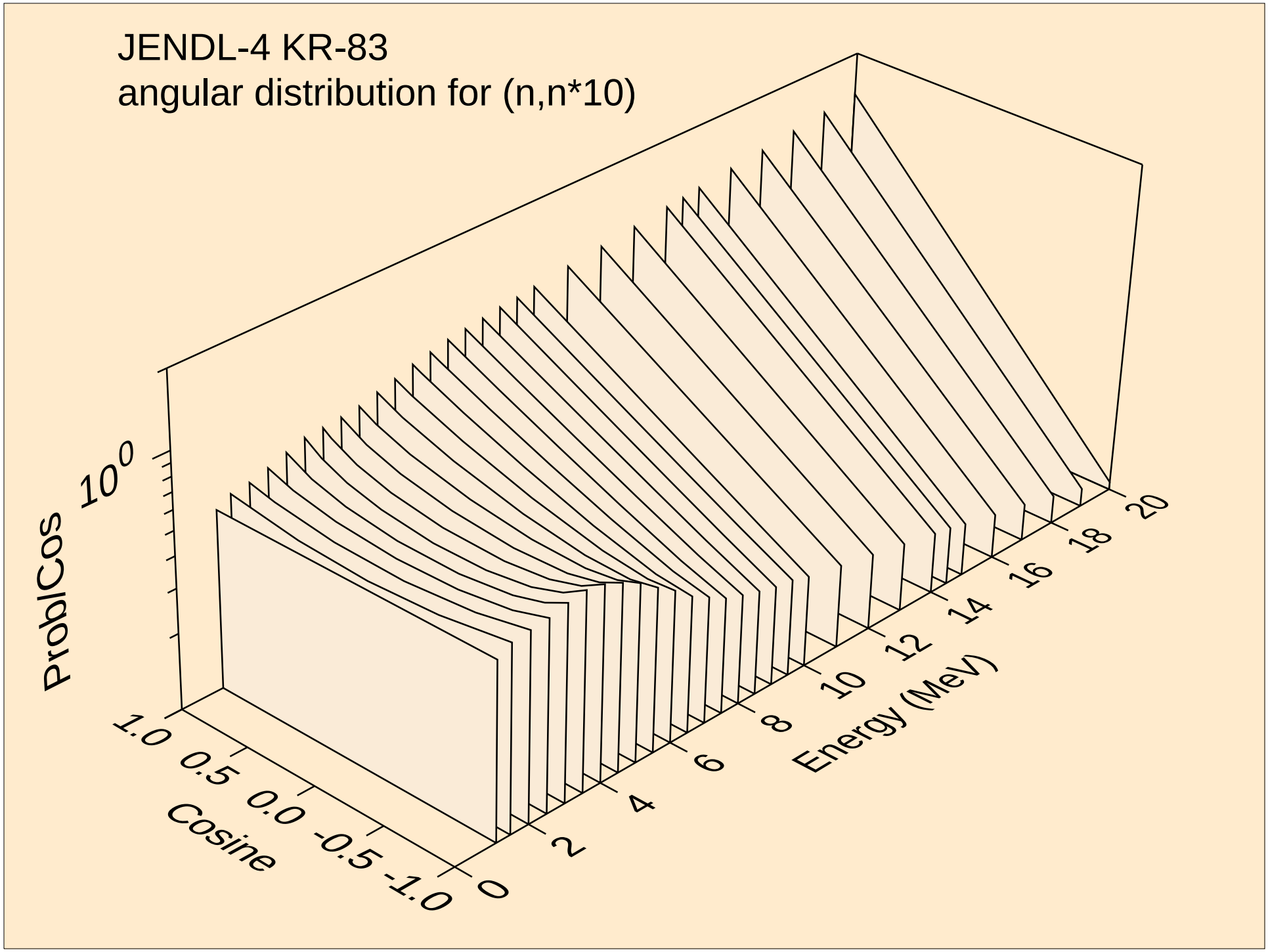

JENDL-4 KR-83
angular distribution for (n,n*5)
ProblCos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

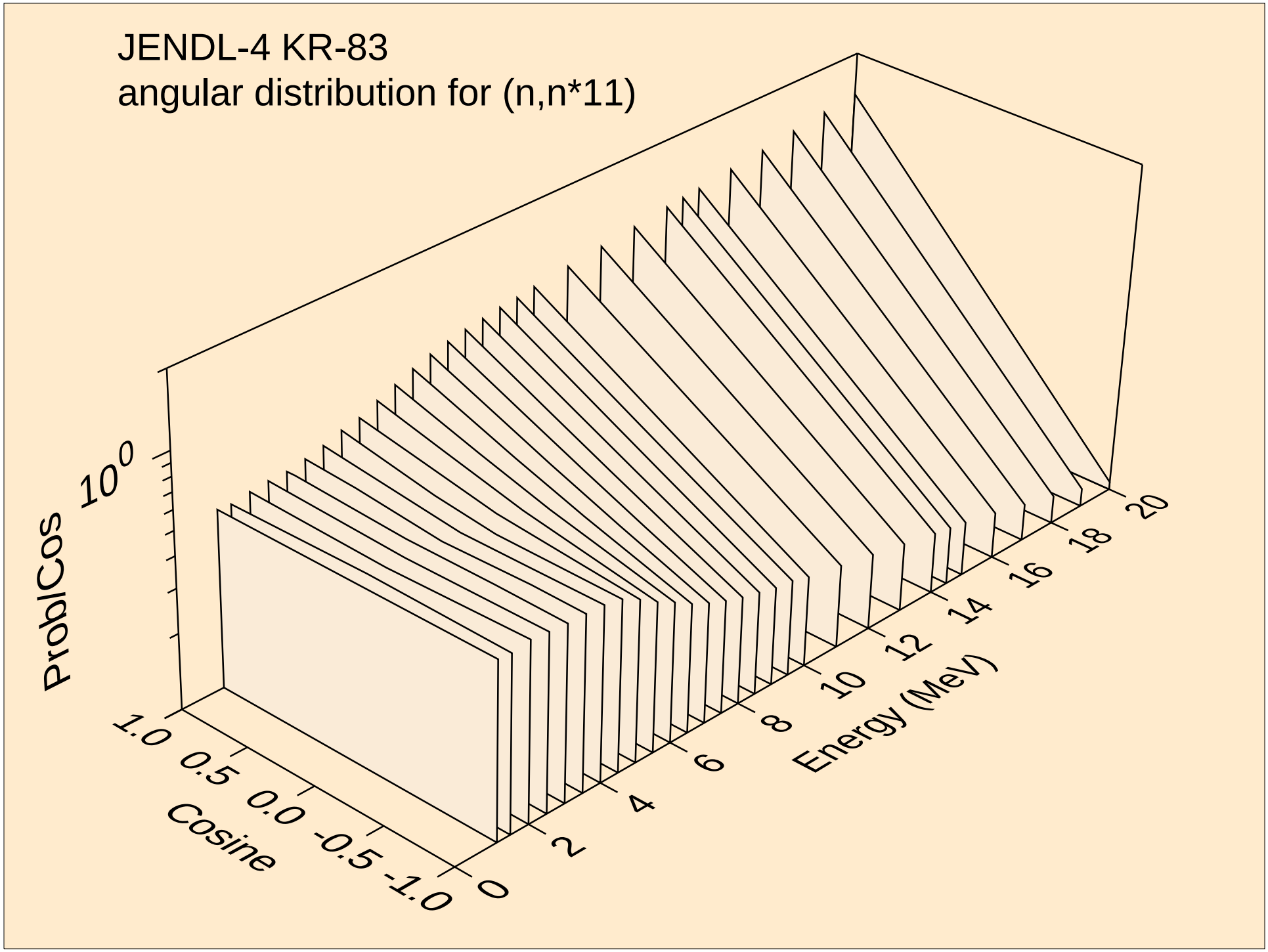

JENDL-4 KR-83
angular distribution for (n,n*6)
ProblCos
$10^0$
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

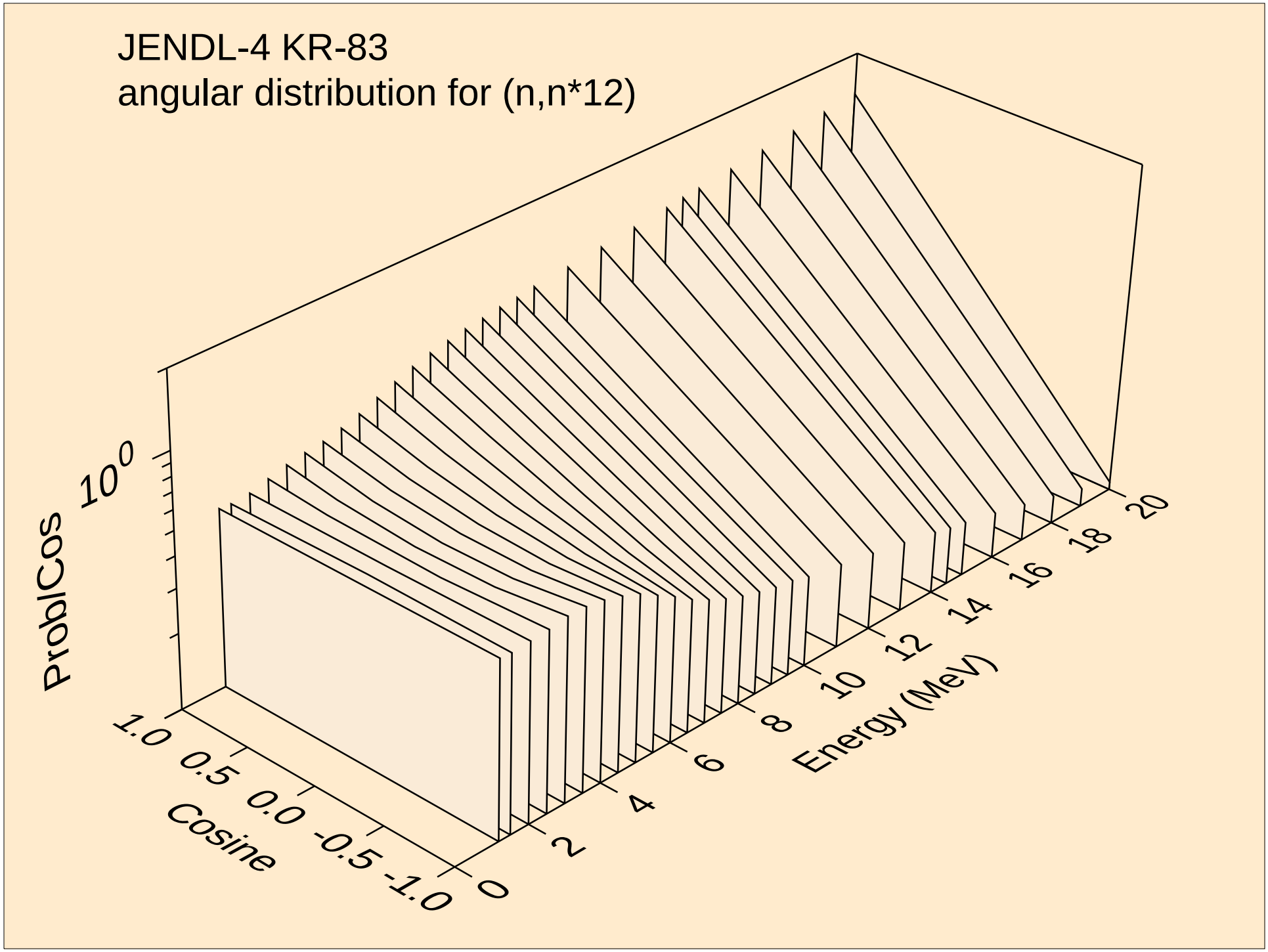

JENDL-4 KR-83
angular distribution for (n,n*7)
ProblCos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

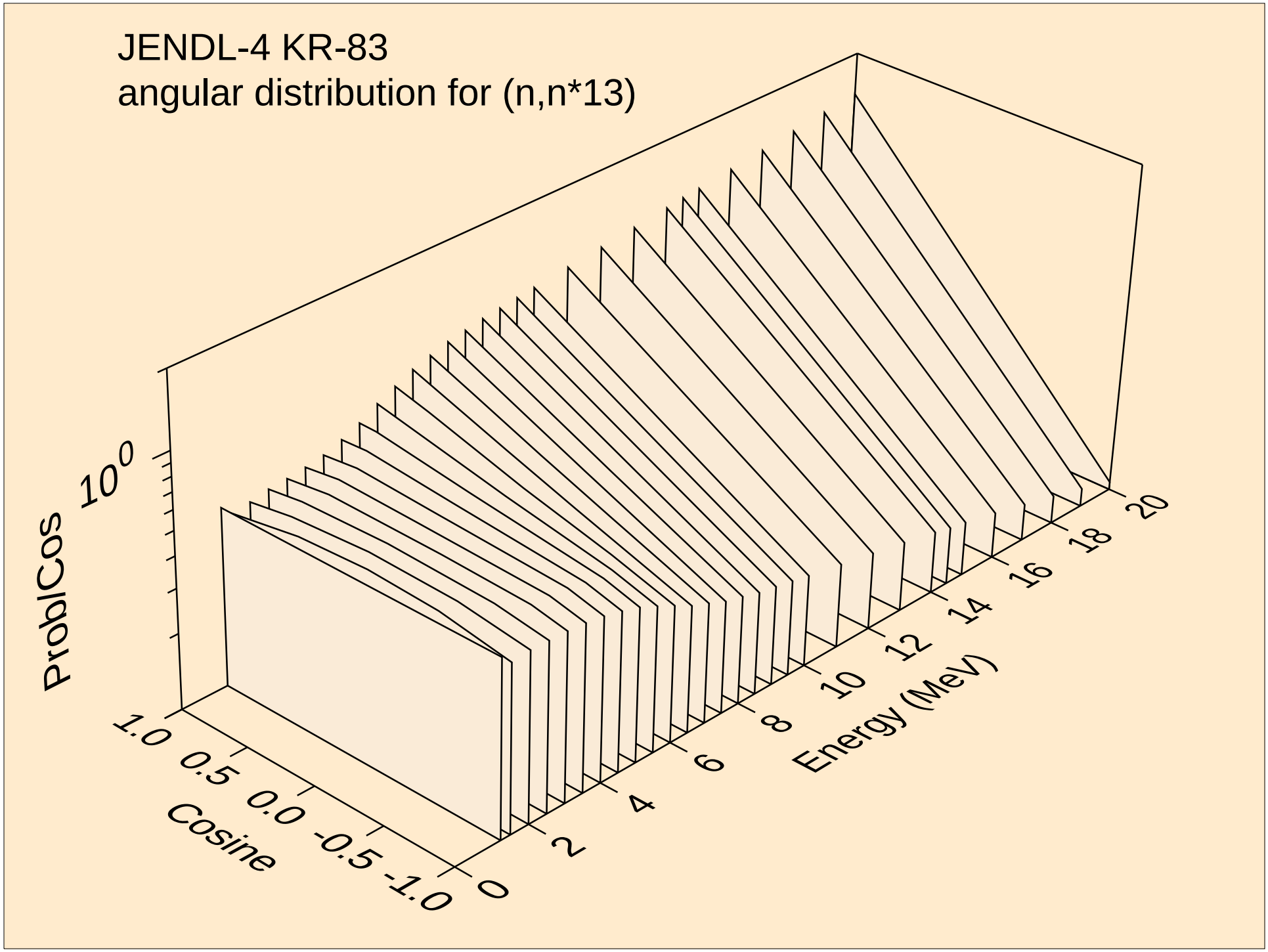

JENDL-4 KR-83
angular distribution for (n,n*8)
ProblCos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

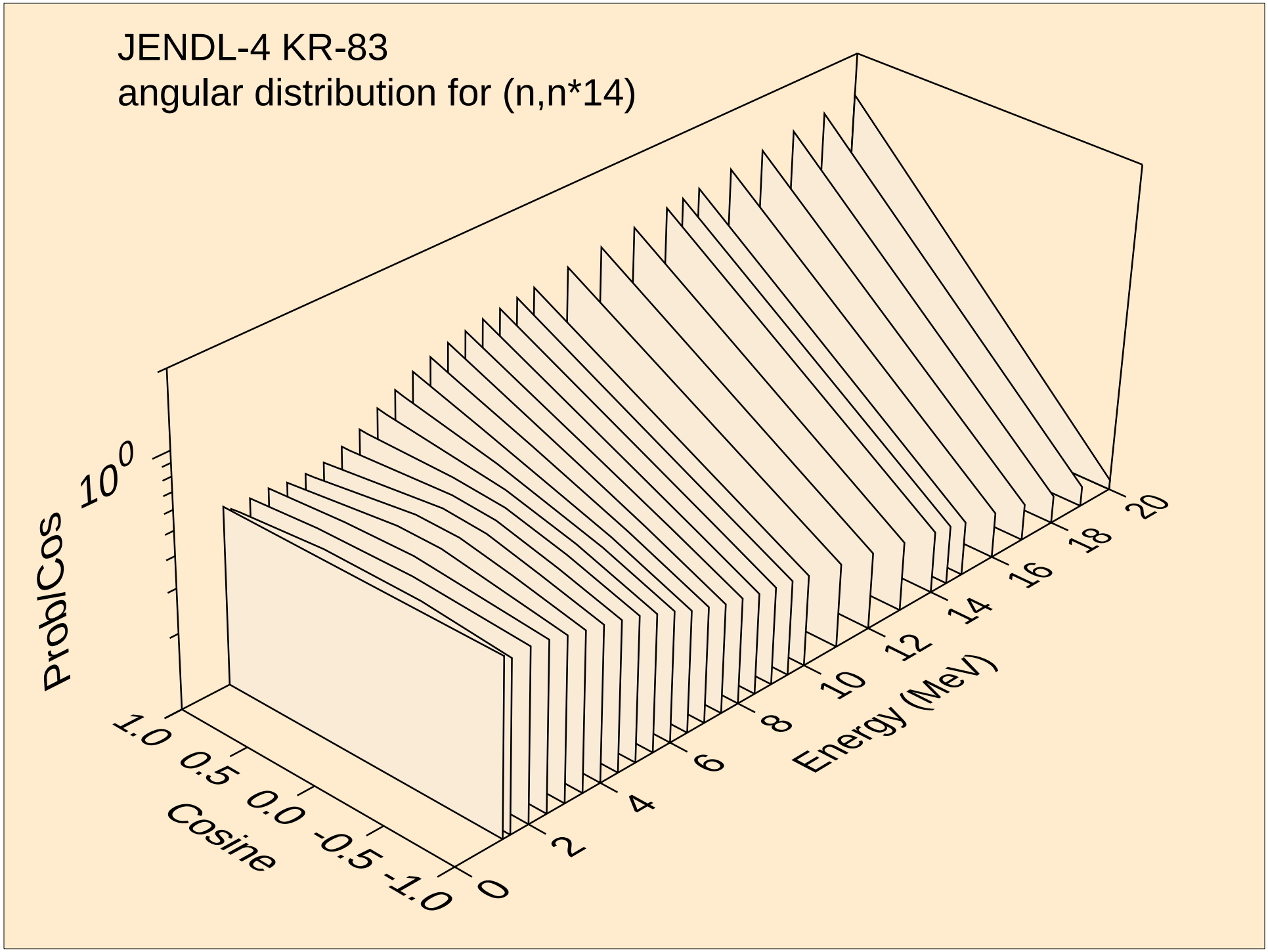

JENDL-4 KR-83
angular distribution for (n,n*9)
ProbCos
$10^0$
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

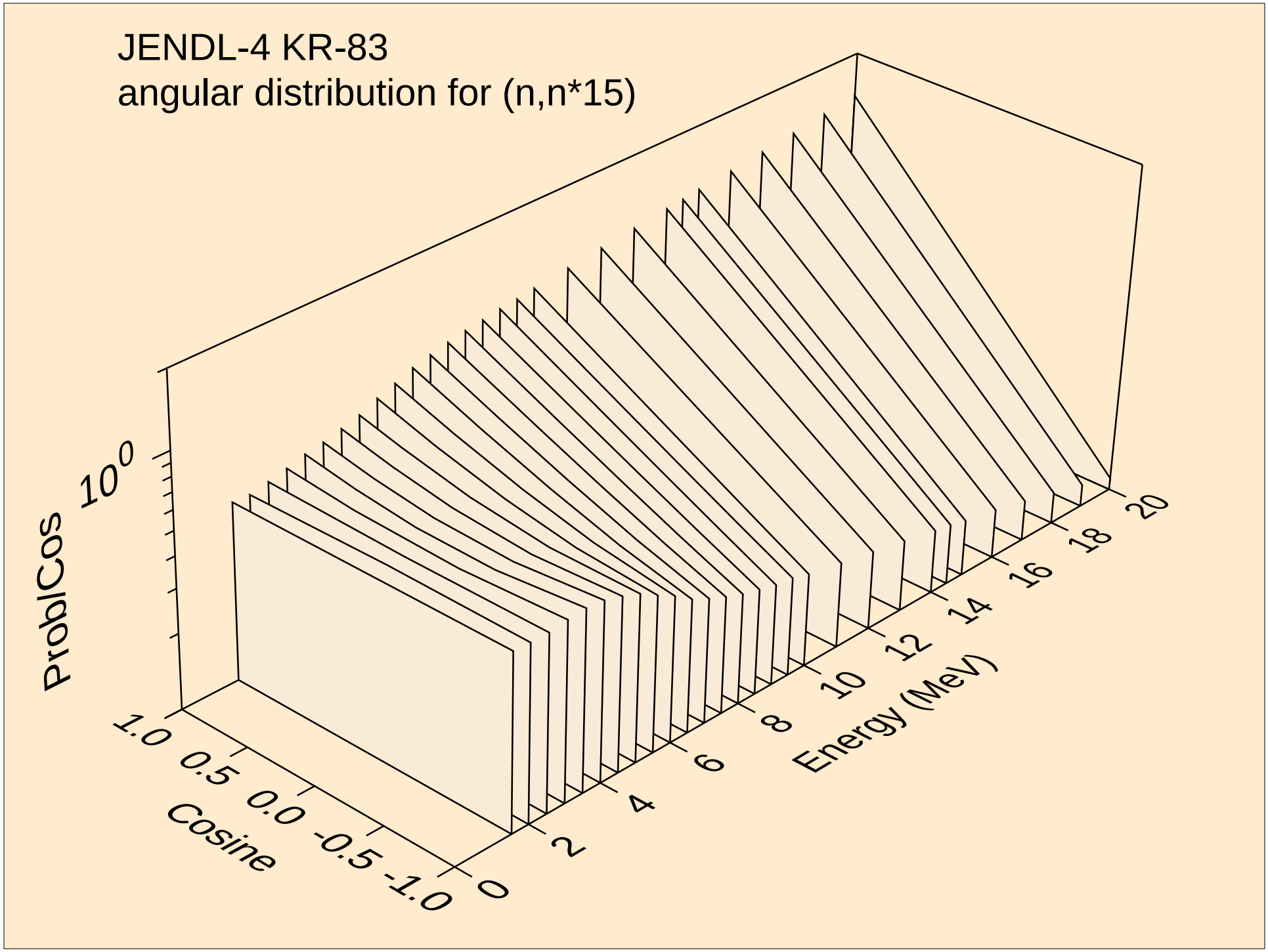

JENDL-4 KR-83
angular distribution for (n,n*10)
ProblCos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

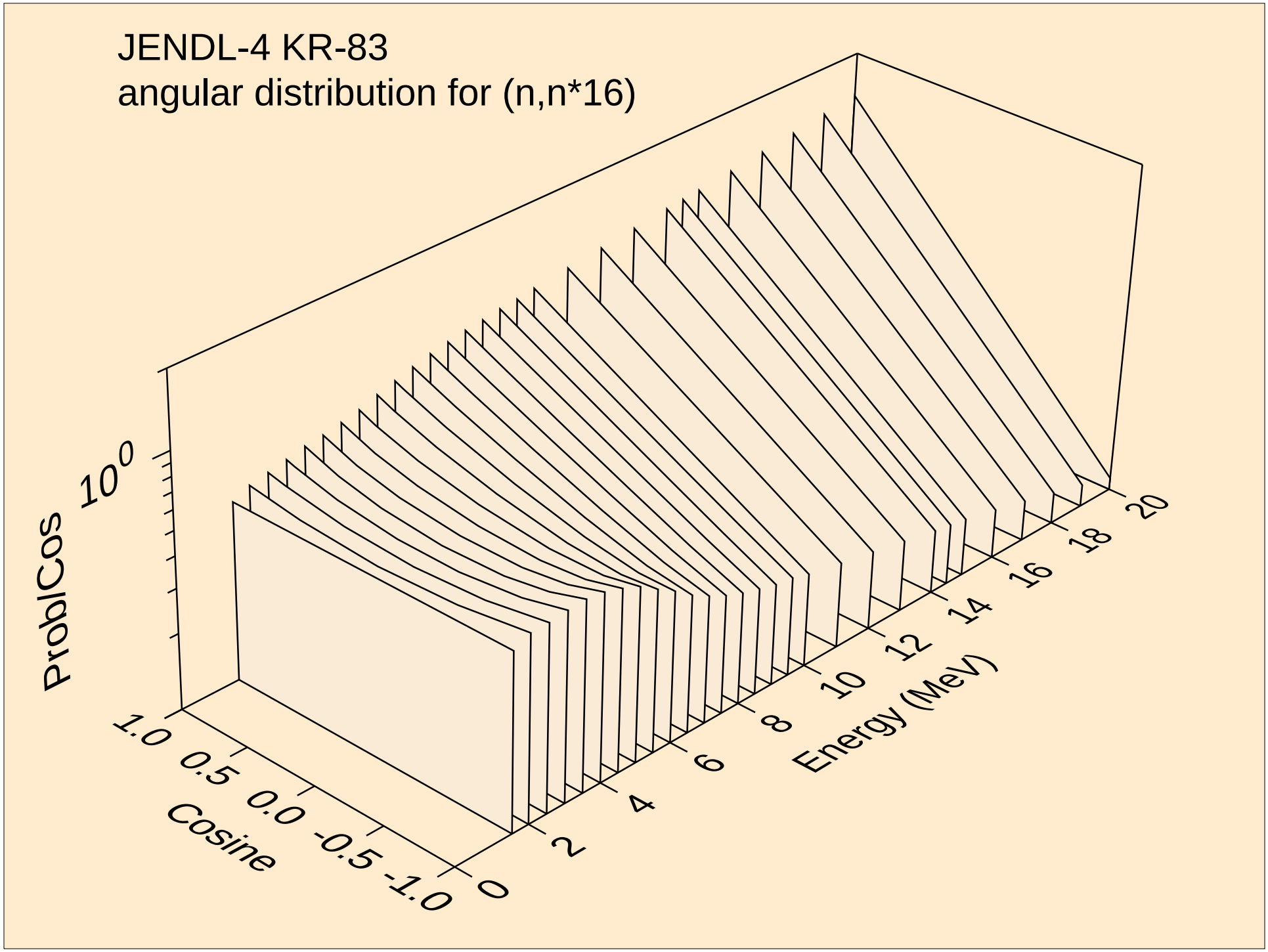

JENDL-4 KR-83
angular distribution for (n,n*11)
ProbCos
$10^0$
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

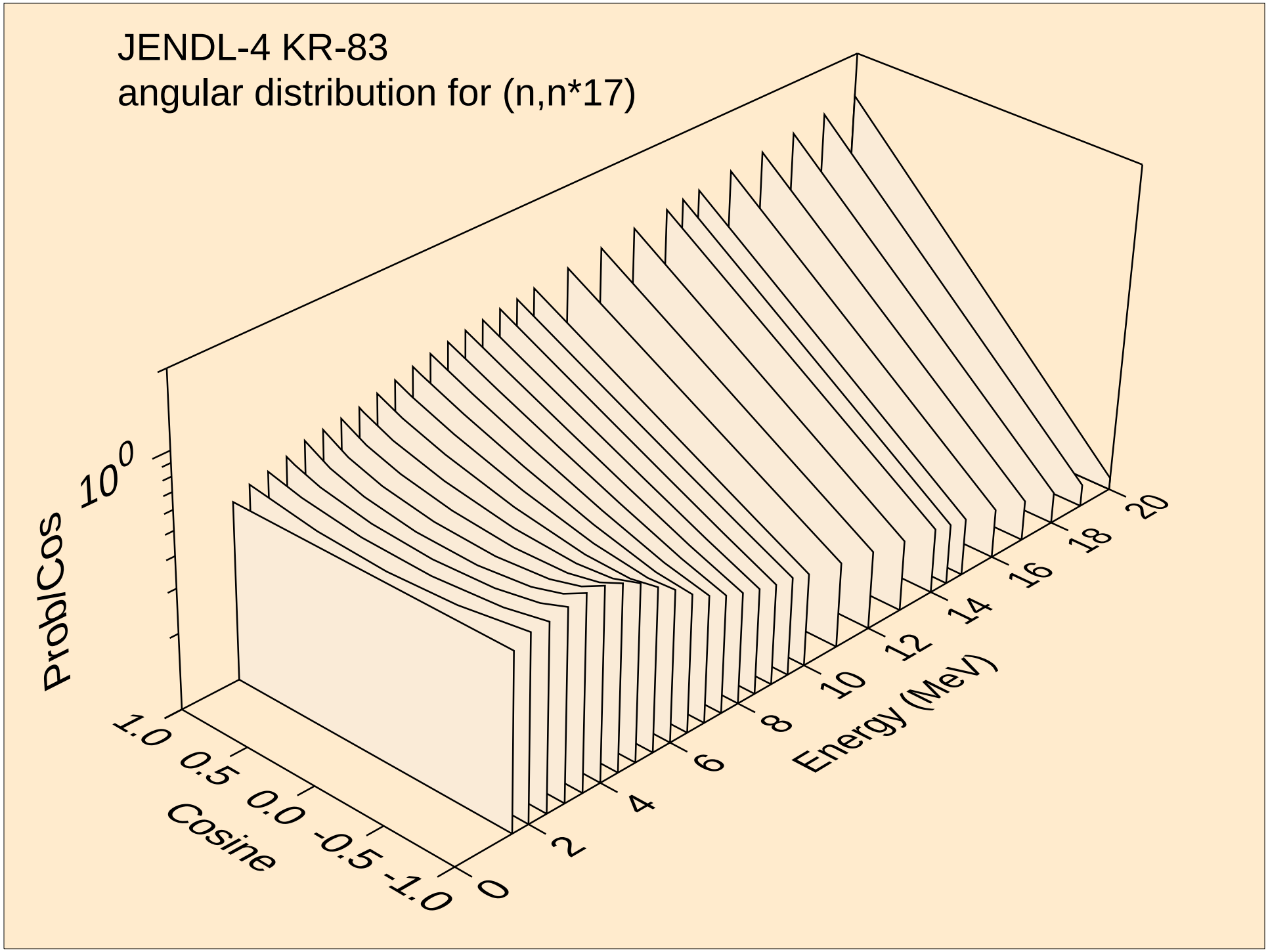

JENDL-4 KR-83
angular distribution for (n,n*12)
ProblCos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

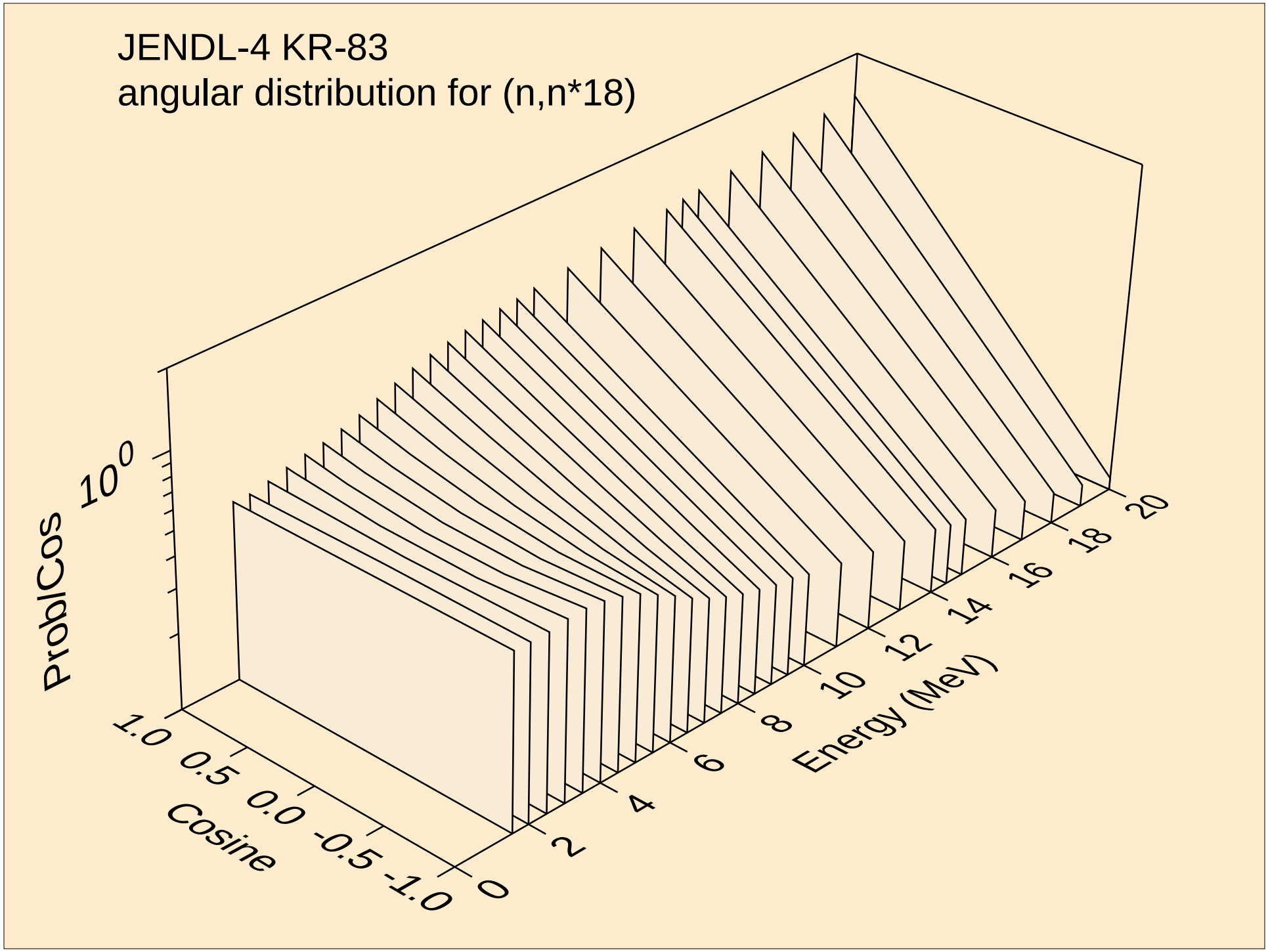

JENDL-4 KR-83
angular distribution for (n,n*13)
ProblCos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

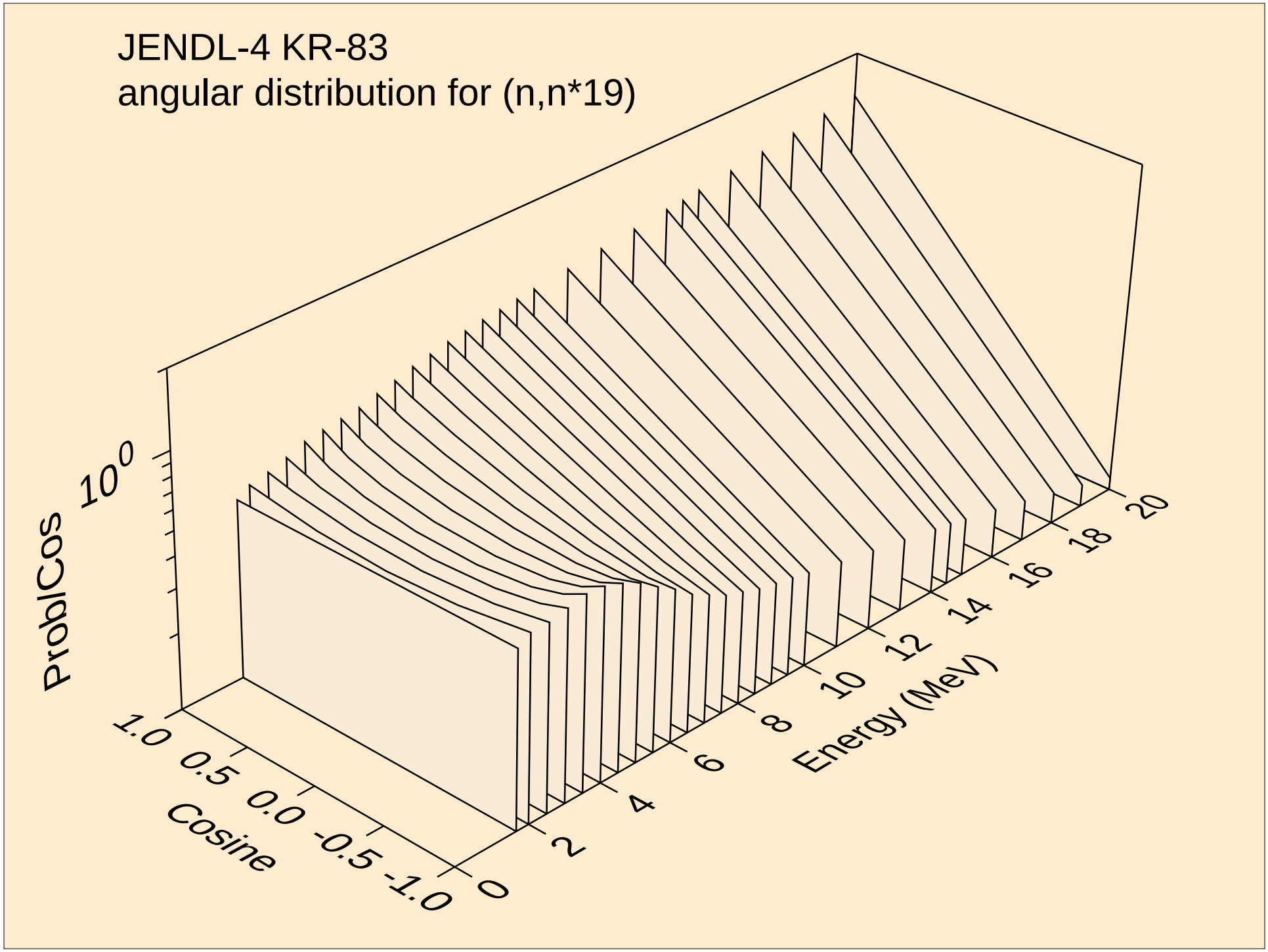

JENDL-4 KR-83
angular distribution for (n,n*14)
ProbCos
$10^0$
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

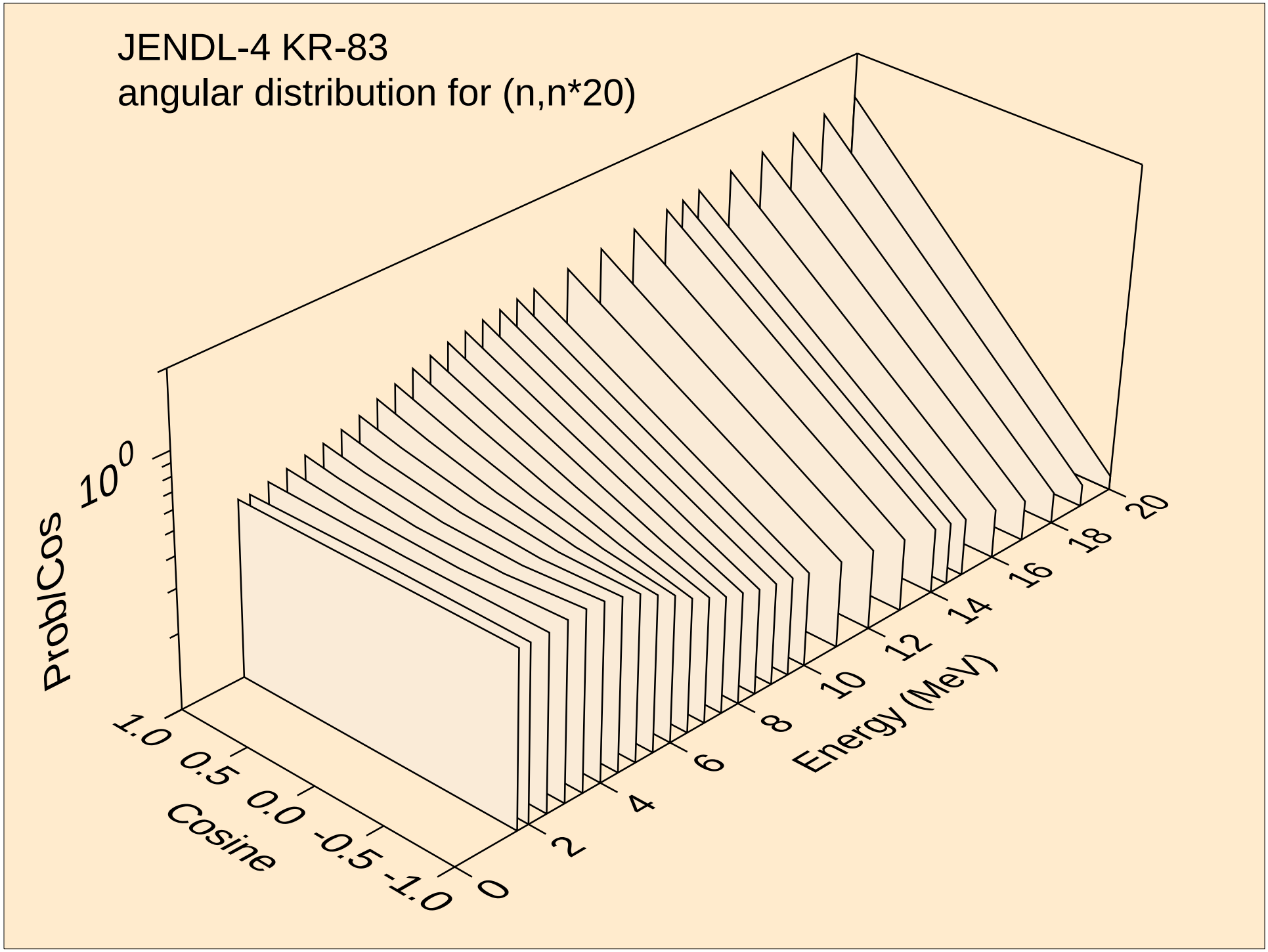

JENDL-4 KR-83
angular distribution for (n,n*15)
ProbCos
$10^0$
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

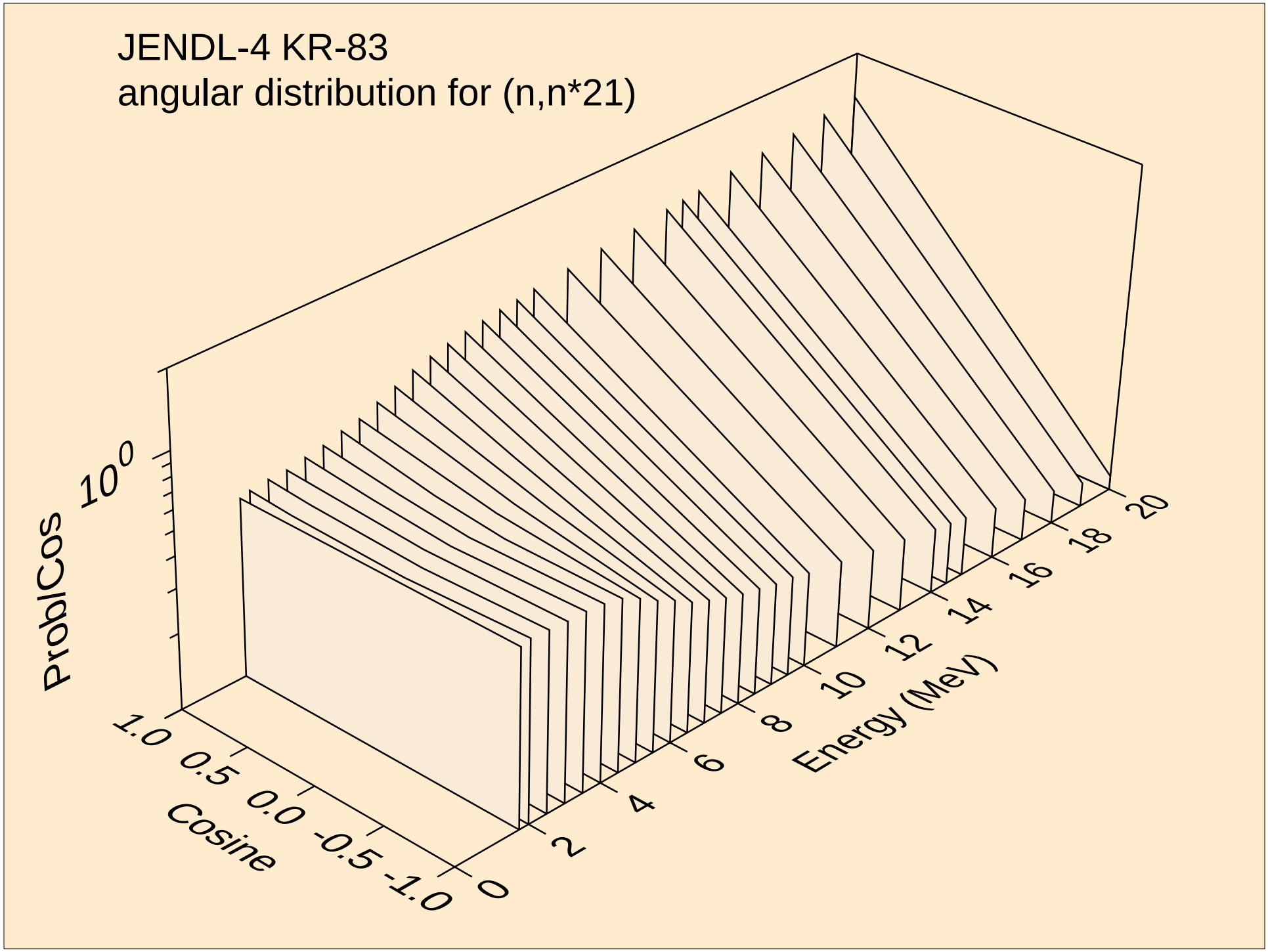

JENDL-4 KR-83
angular distribution for (n,n*16)
ProblCos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

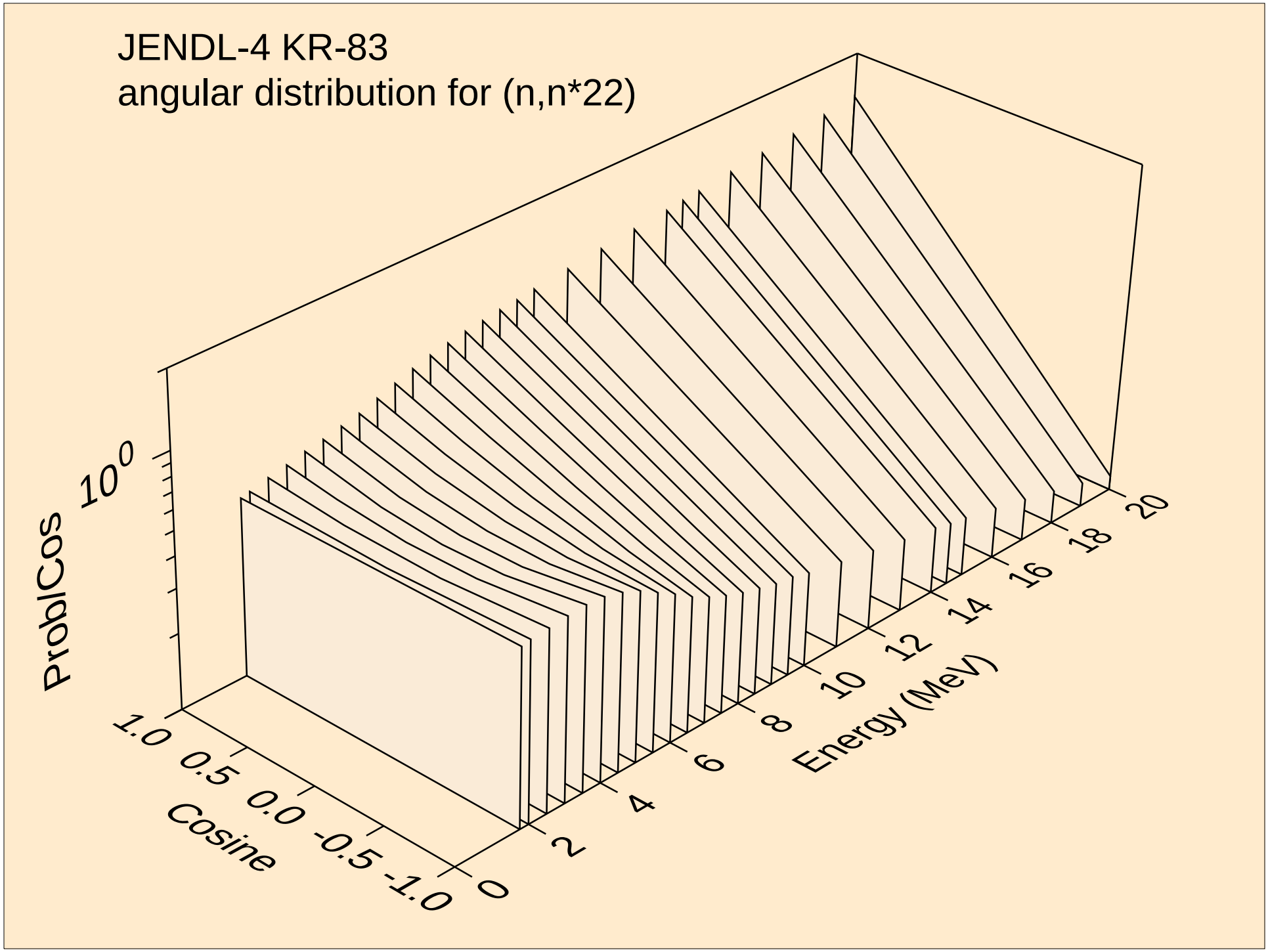

JENDL-4 KR-83
angular distribution for (n,n*17)
ProblCos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

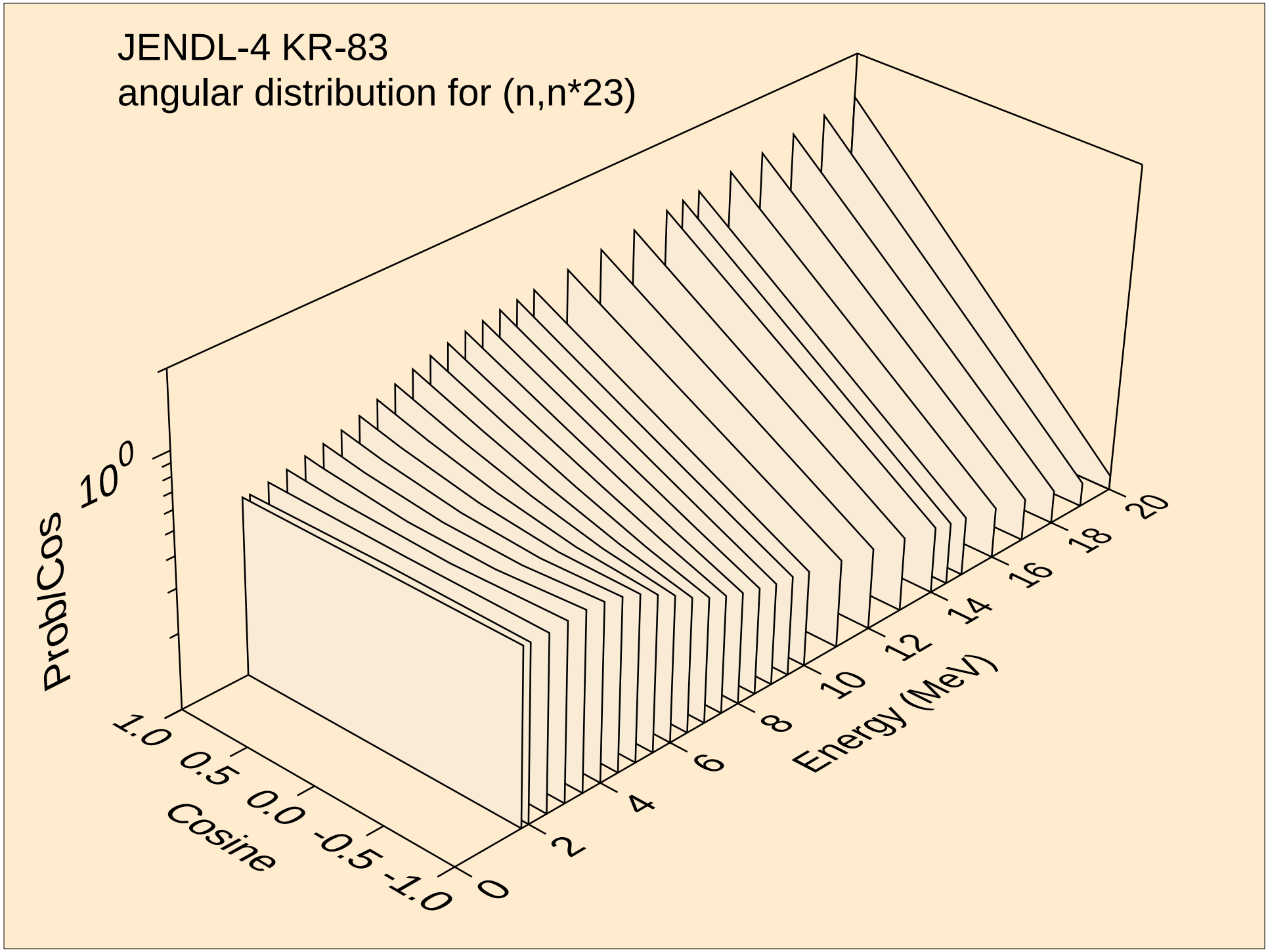

JENDL-4 KR-83
angular distribution for (n,n*18)
ProbCos
$10^0$
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

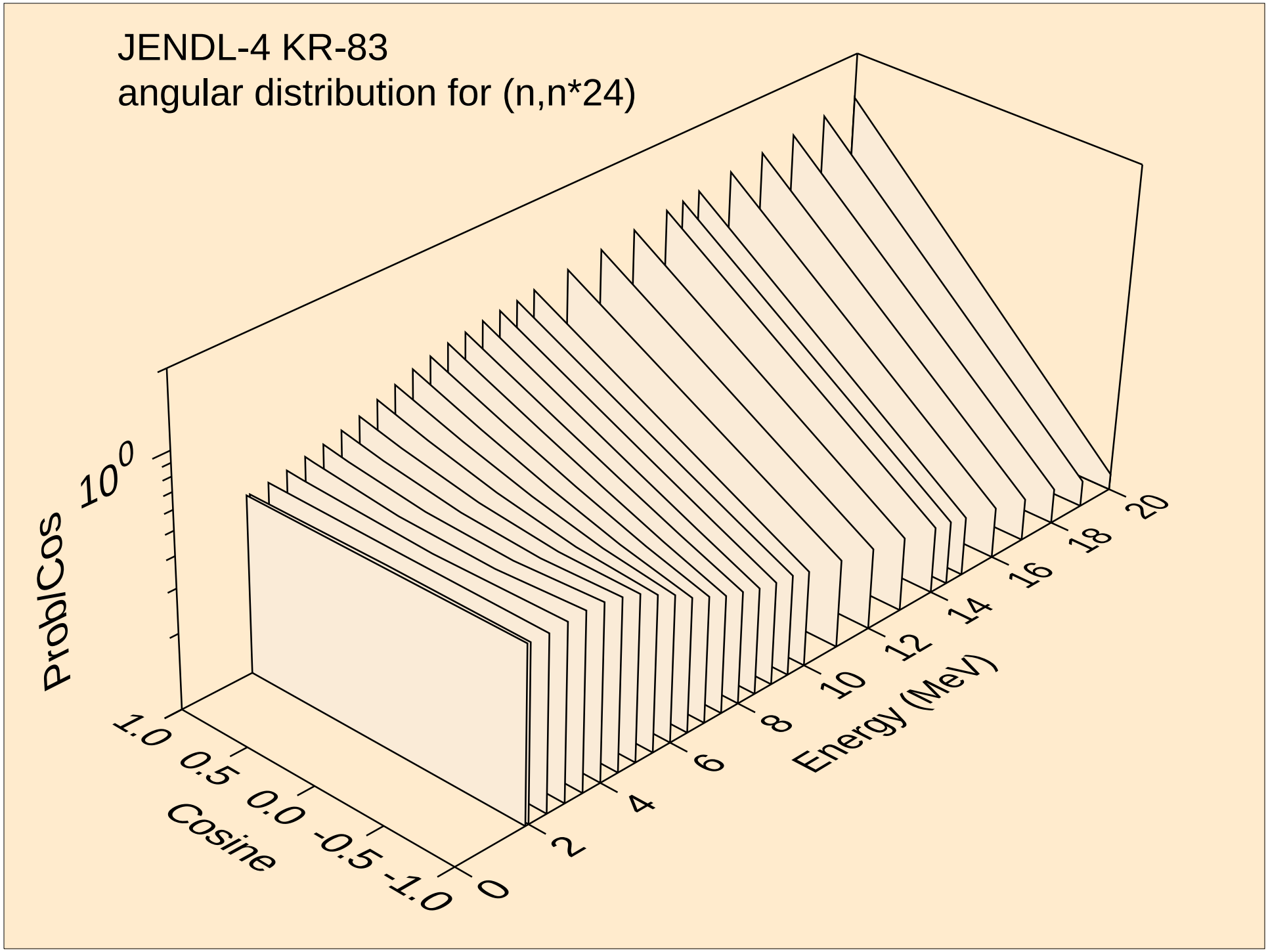

JENDL-4 KR-83
angular distribution for (n,n*19)
ProblCos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

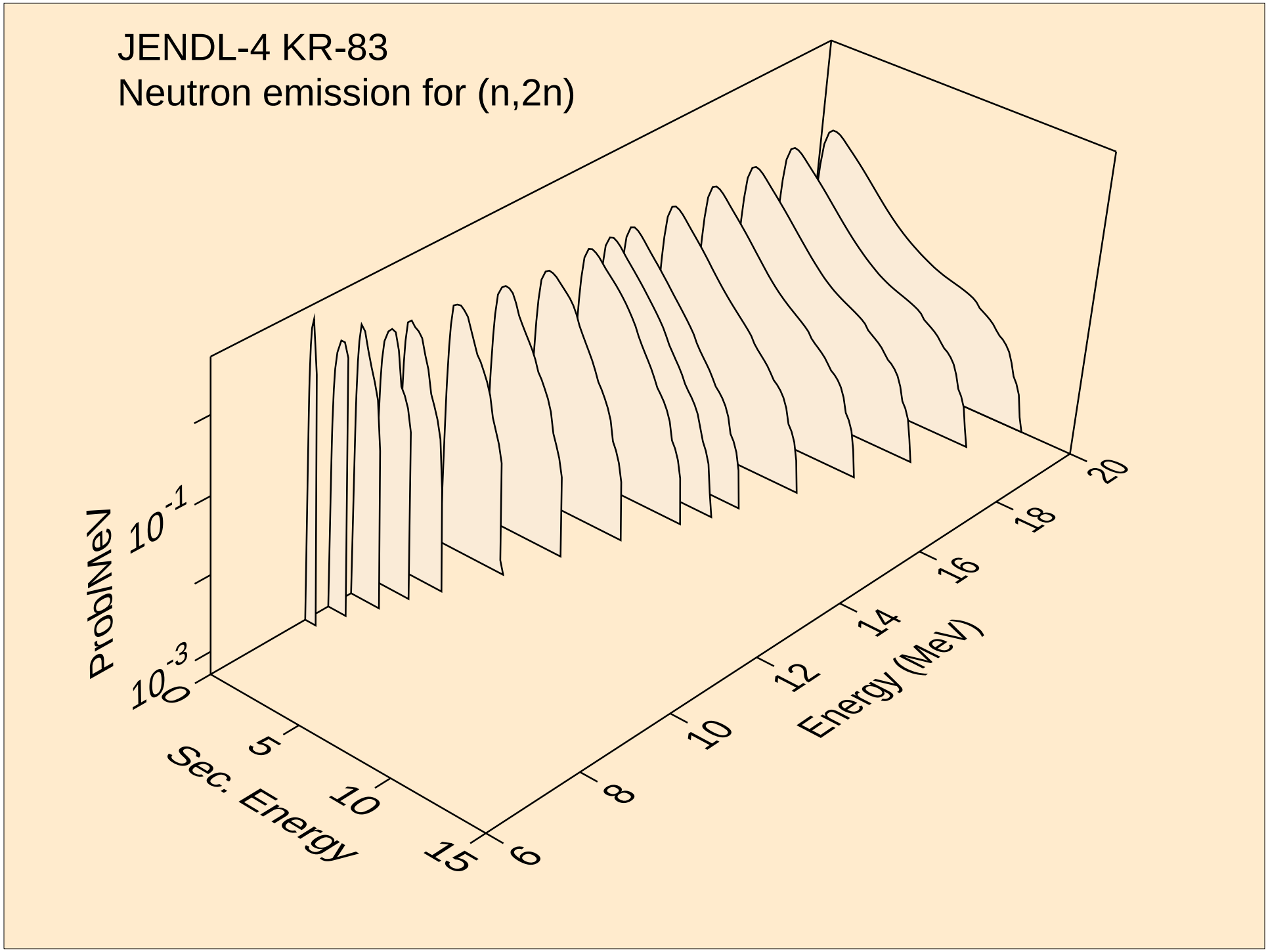

JENDL-4 KR-83
angular distribution for (n,n*20)
ProblCos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

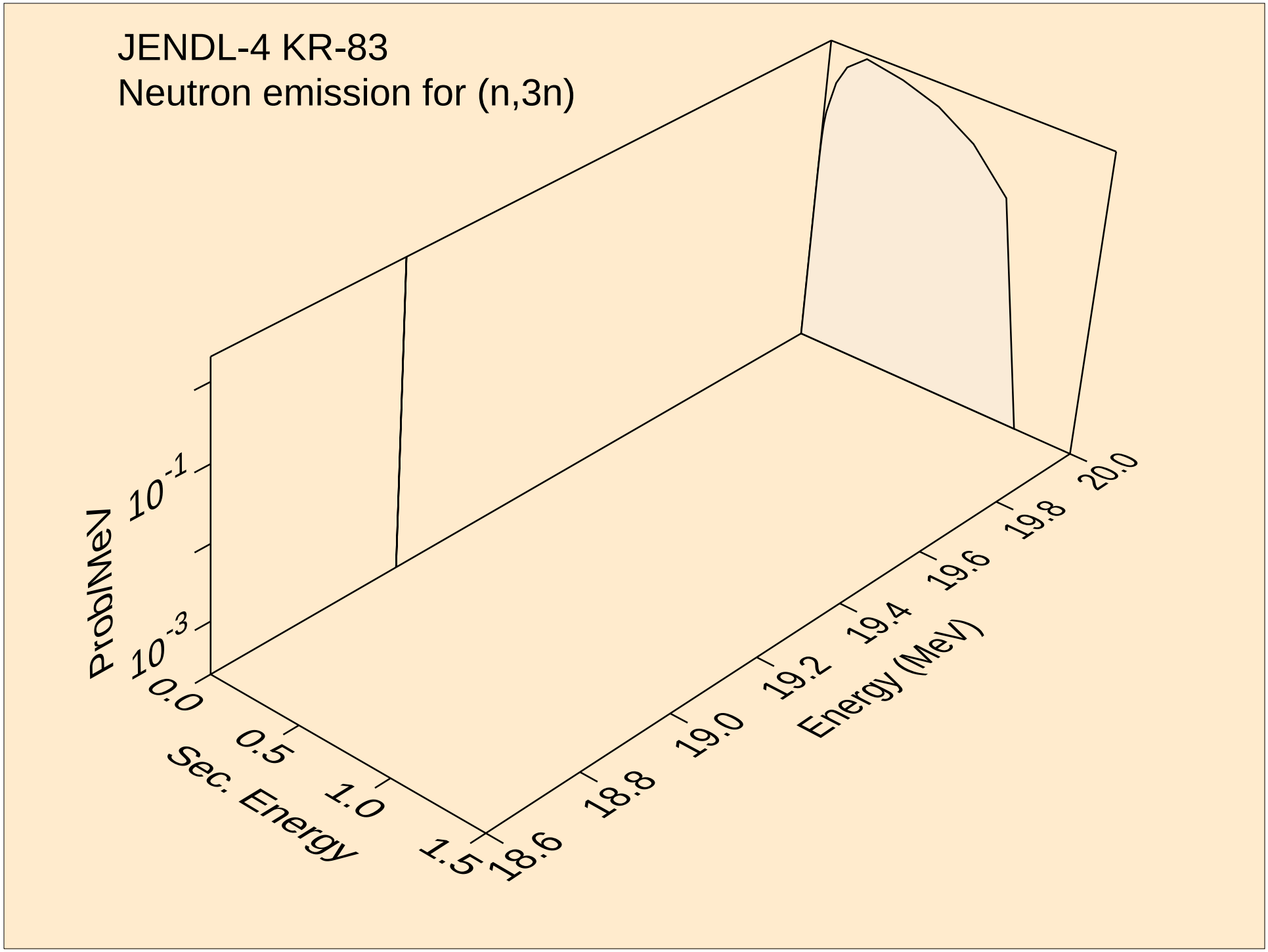

JENDL-4 KR-83
angular distribution for (n,n*21)
ProbCos
$10^0$
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20


JENDL-4 KR-83
angular distribution for (n,n*22)
ProblCos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

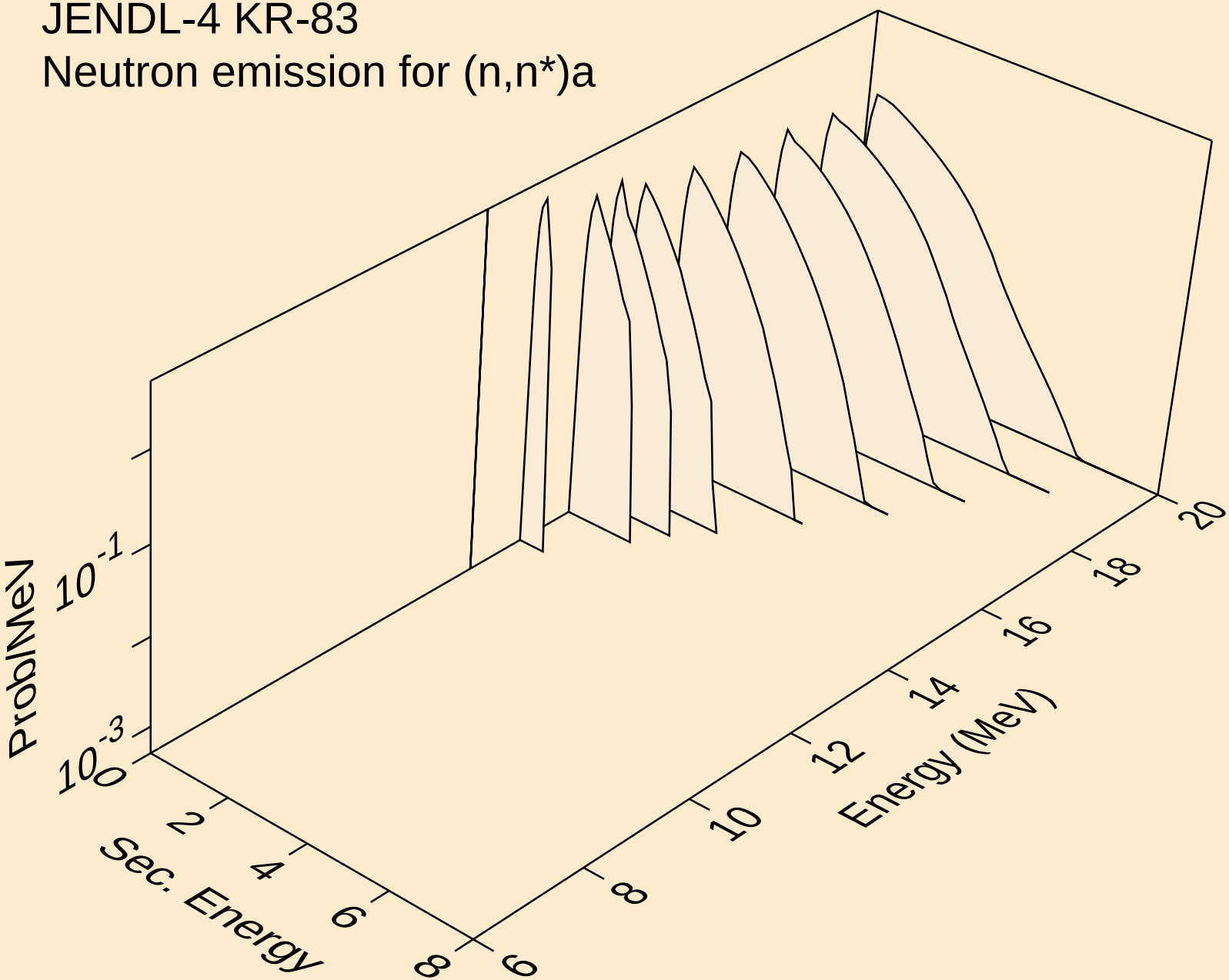

JENDL-4 KR-83
angular distribution for (n,n*23)
ProbCos
$10^0$
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

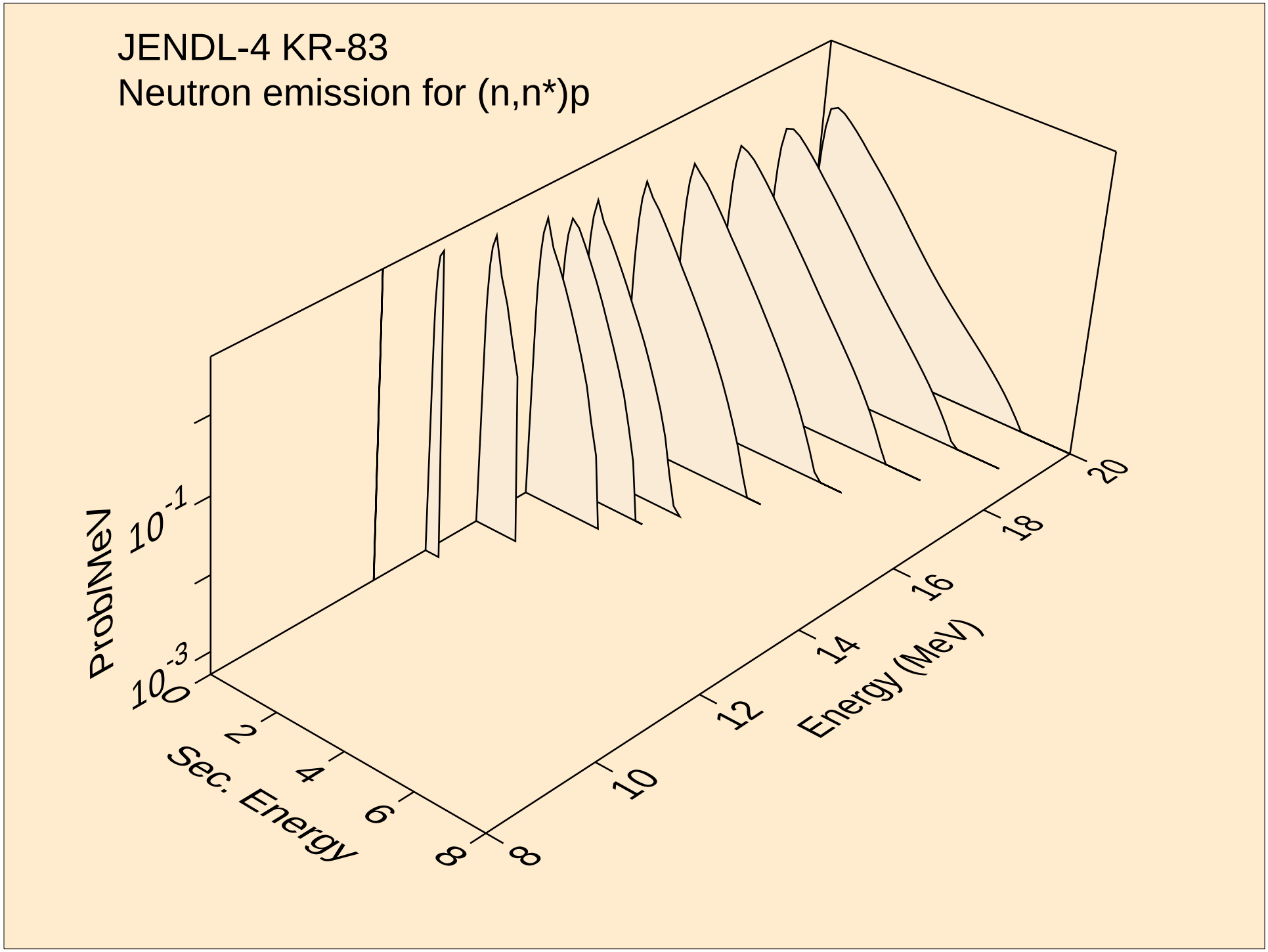

JENDL-4 KR-83
angular distribution for (n,n*24)
ProblCos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

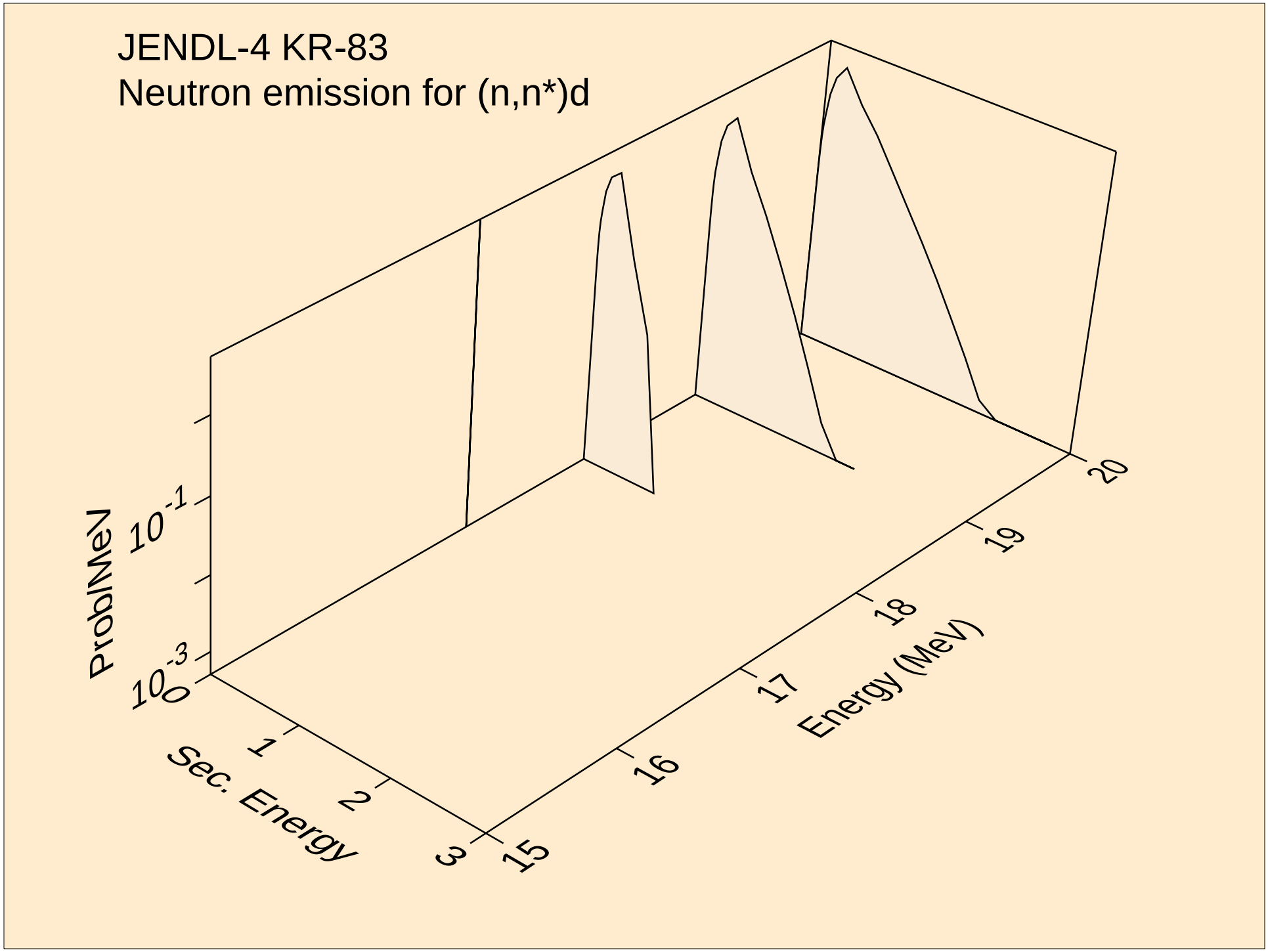

JENDL-4 KR-83
Neutron emission for (n,2n)
Prob/MeV
$10^{-1}$
$10^{-3}$
0
5
10
15
Sec. Energy
6
8
10
12
14
16
18
20
Energy (MeV)

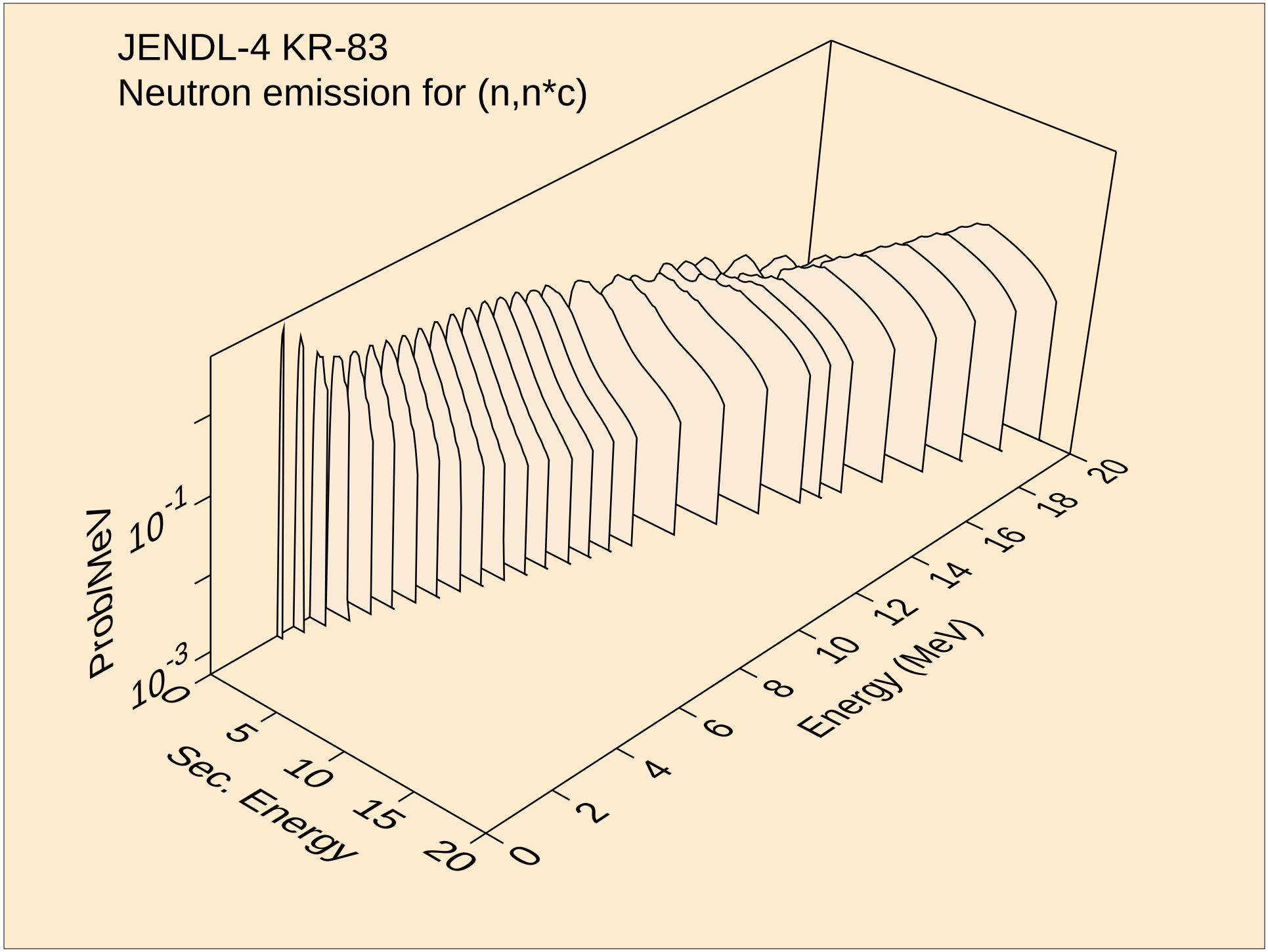

JENDL-4 KR-83
Neutron emission for (n,3n)
Prob/MeV
10^-1
10^-3
0.0
0.5
1.0
1.5
Sec. Energy
18.6
18.8
19.0
19.2
19.4
19.6
19.8
20.0
Energy (MeV)

JENDL-4 KR-83
Neutron emission for (n,n*)a

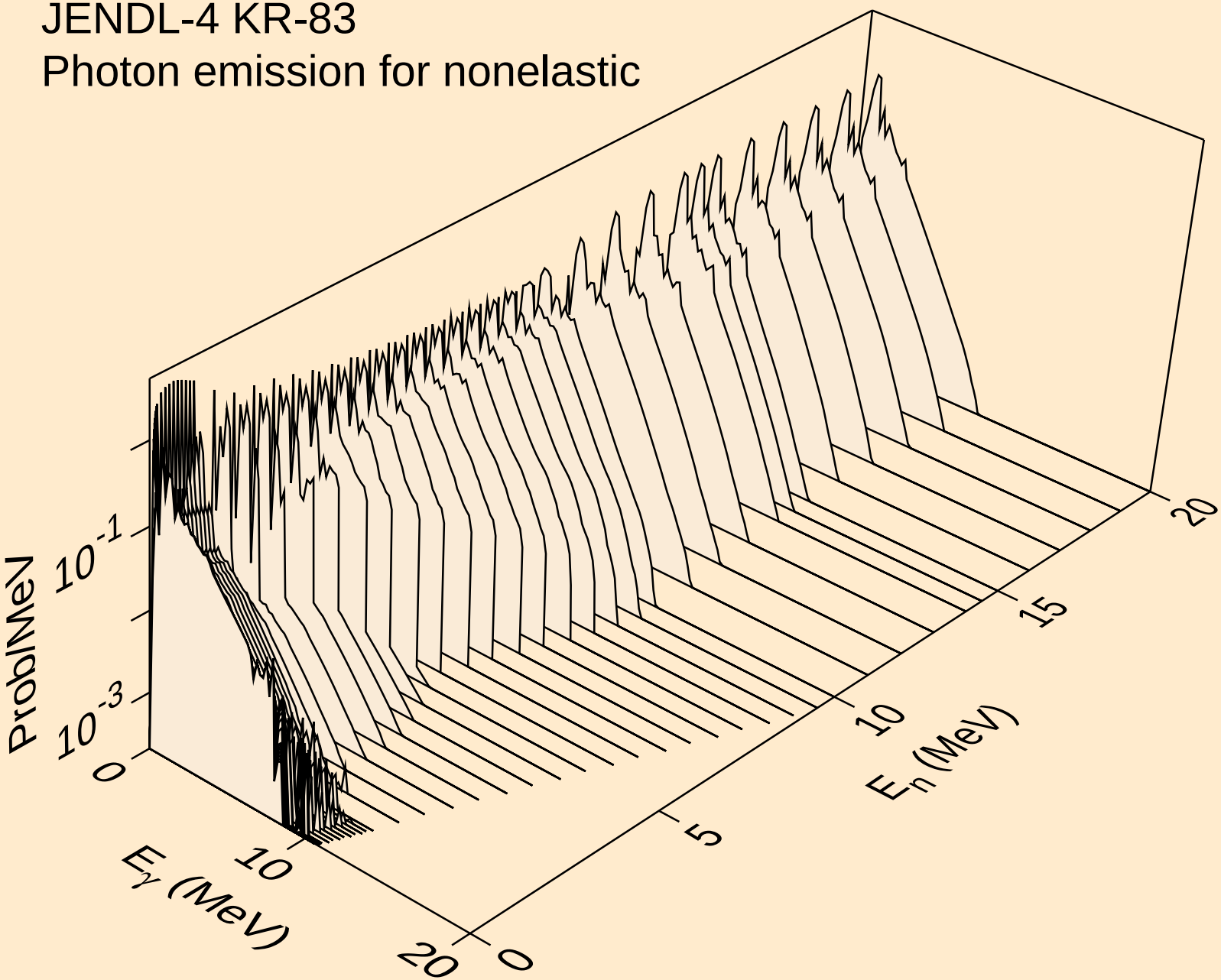


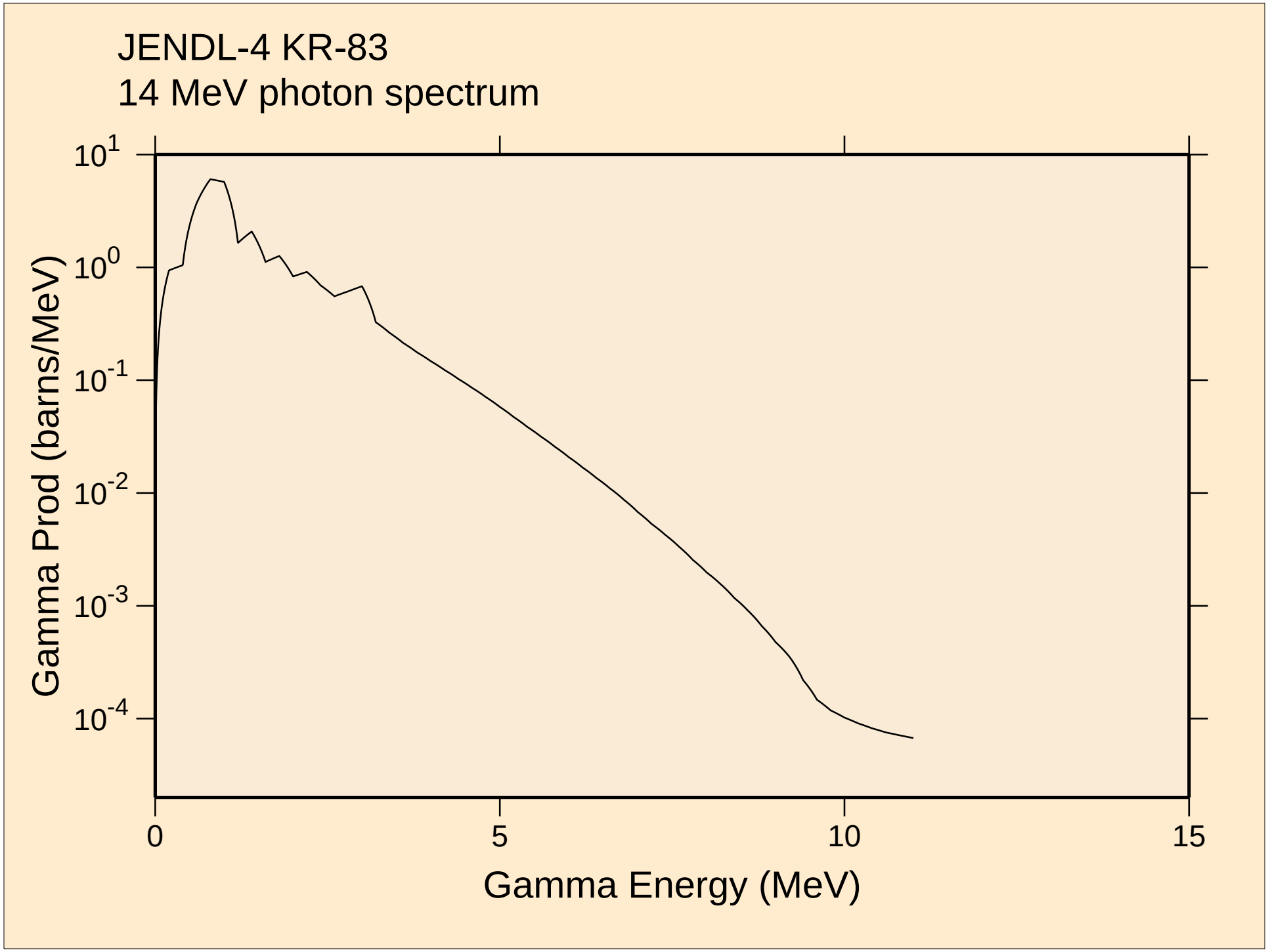

JENDL-4 KR-83
Neutron emission for (n,n*)p
Prob/MeV
10^-1
10^-3
0
2
4
6
8
Sec. Energy
8
10
12
14
16
18
20
Energy (MeV)

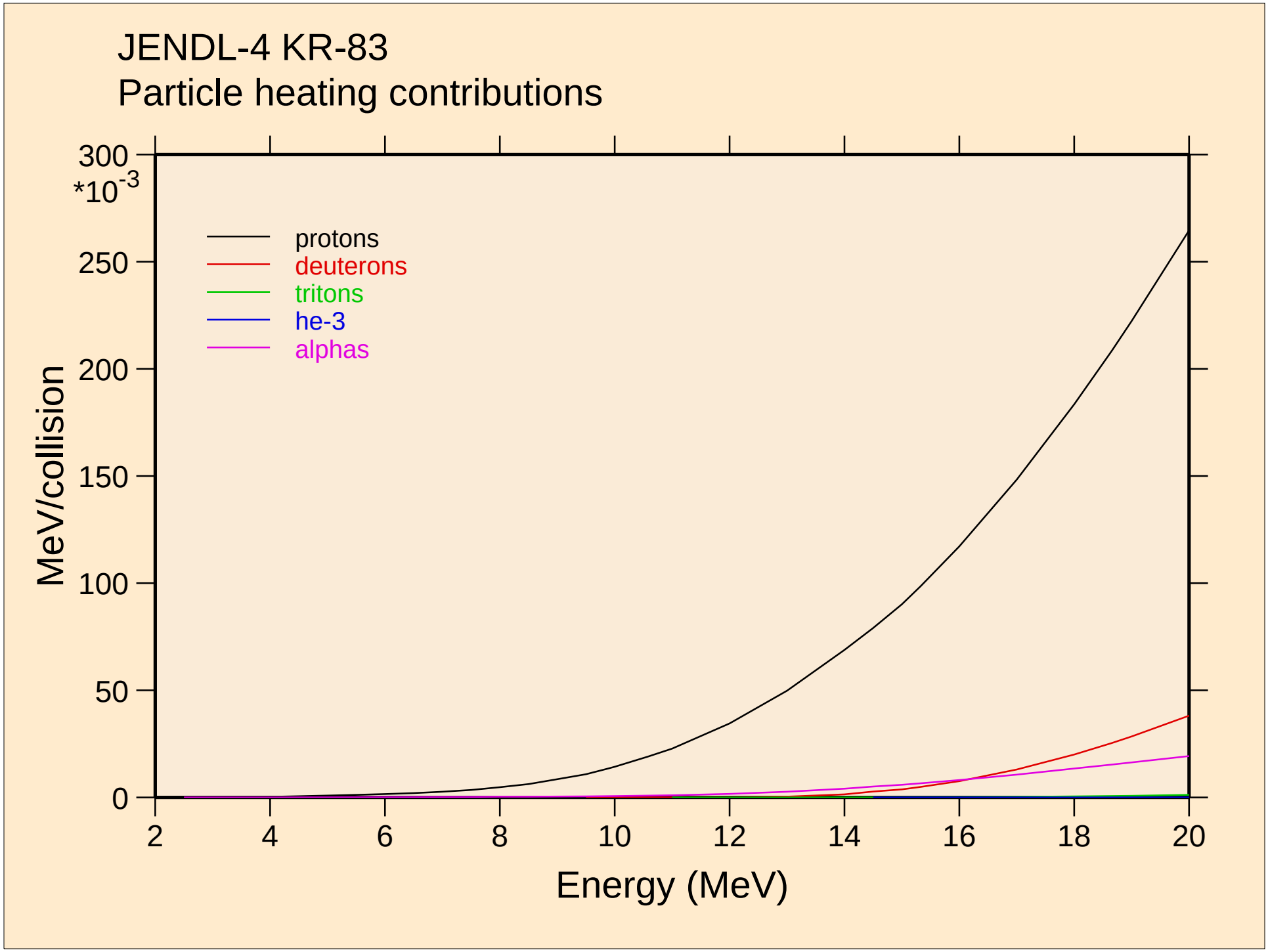

JENDL-4 KR-83
Neutron emission for (n,n*)d
Prob/MeV
$10^{-1}$
$10^{-3}$
0
1
2
3
Sec. Energy
15
16
17
18
19
20
Energy (MeV)

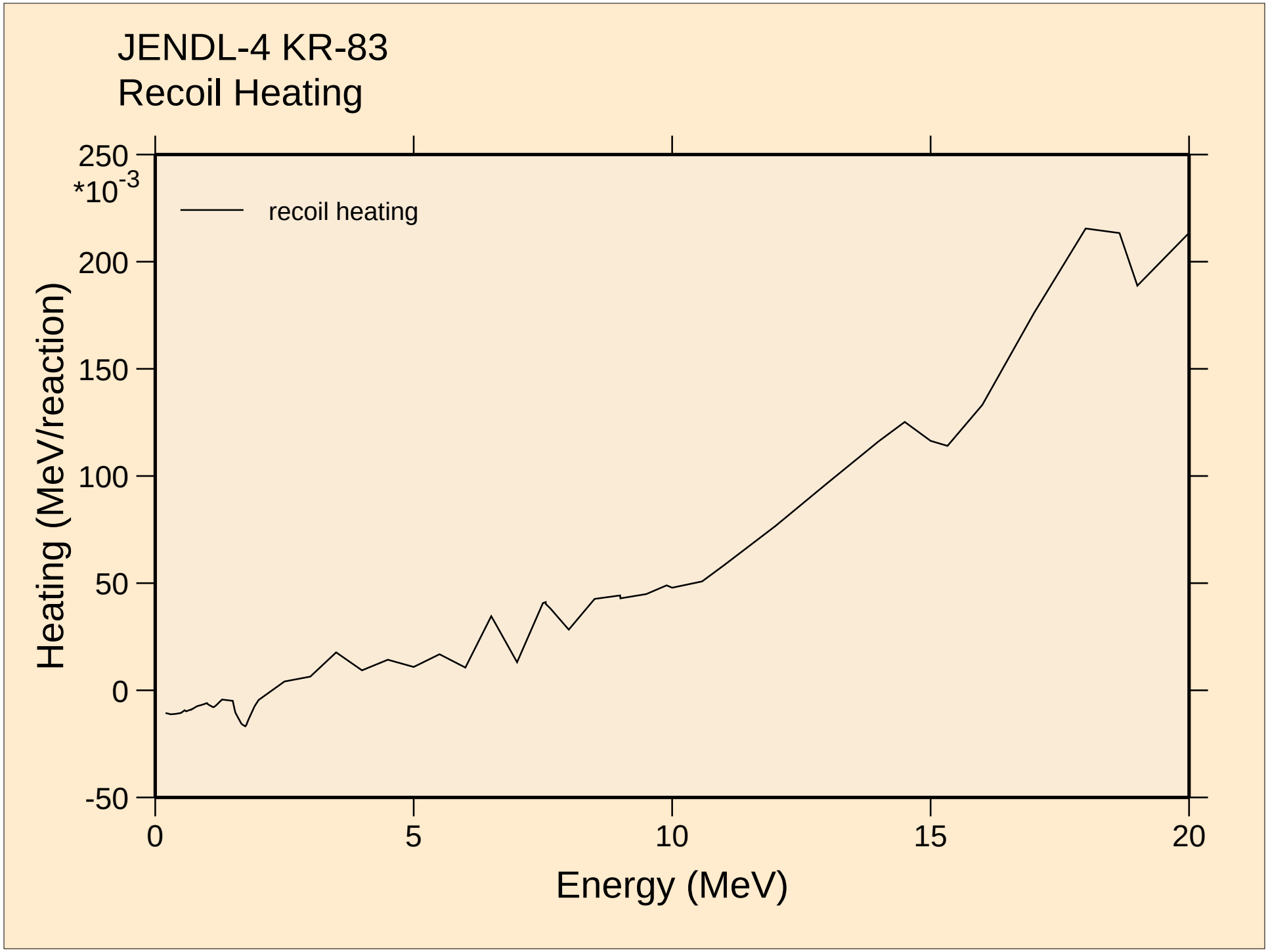

JENDL-4 KR-83
Neutron emission for (n,n*c)
Prob/MeV
10^-1
10^-3
0
5
10
15
20
Sec. Energy
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

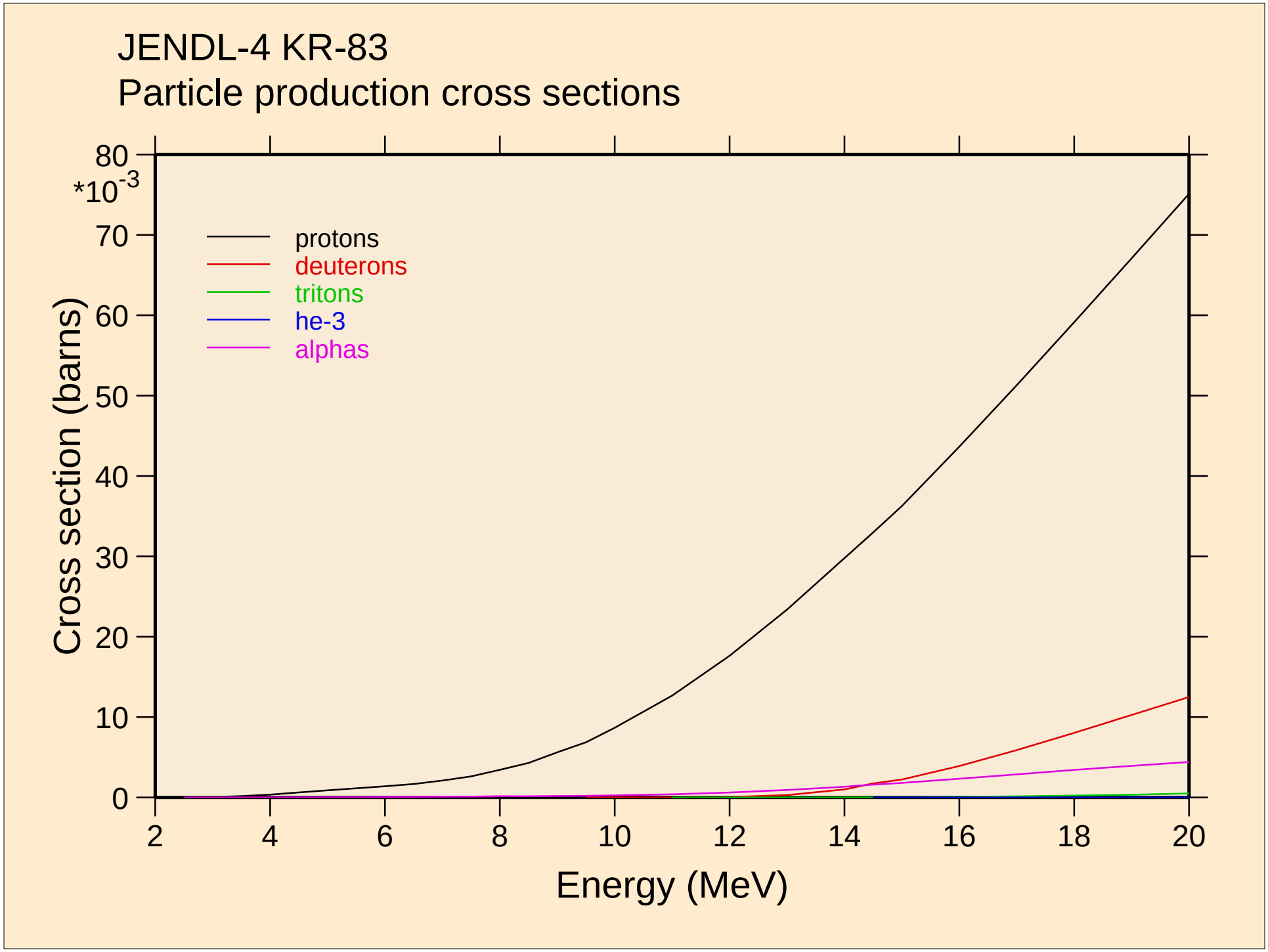
JENDL-4 KR-83
Photon emission for nonelastic

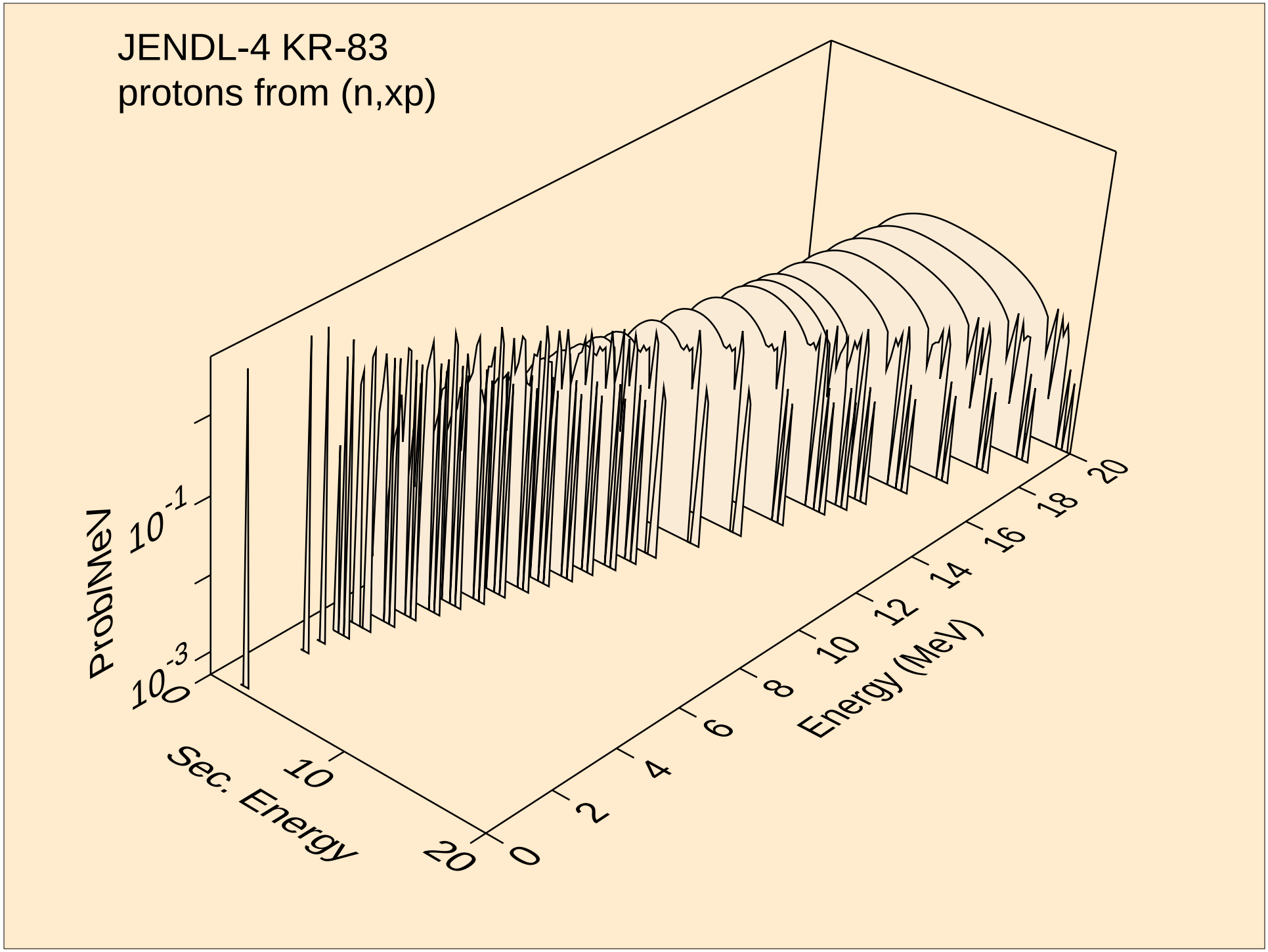


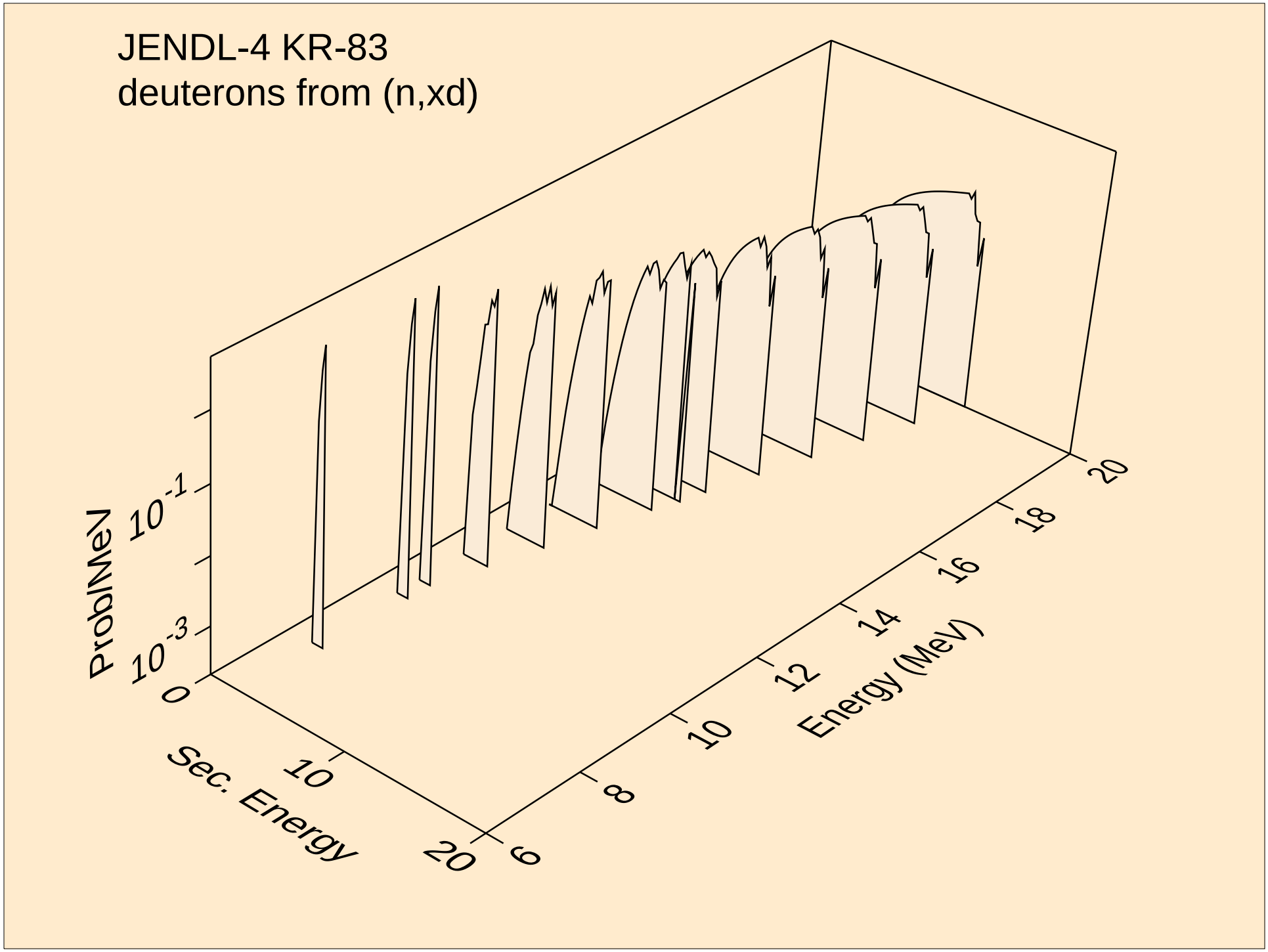

JENDL-4 KR-83
14 MeV photon spectrum
Gamma Prod (barns/MeV)
10^1
10^0
10^-1
10^-2
10^-3
10^-4
0
5
10
15
Gamma Energy (MeV)

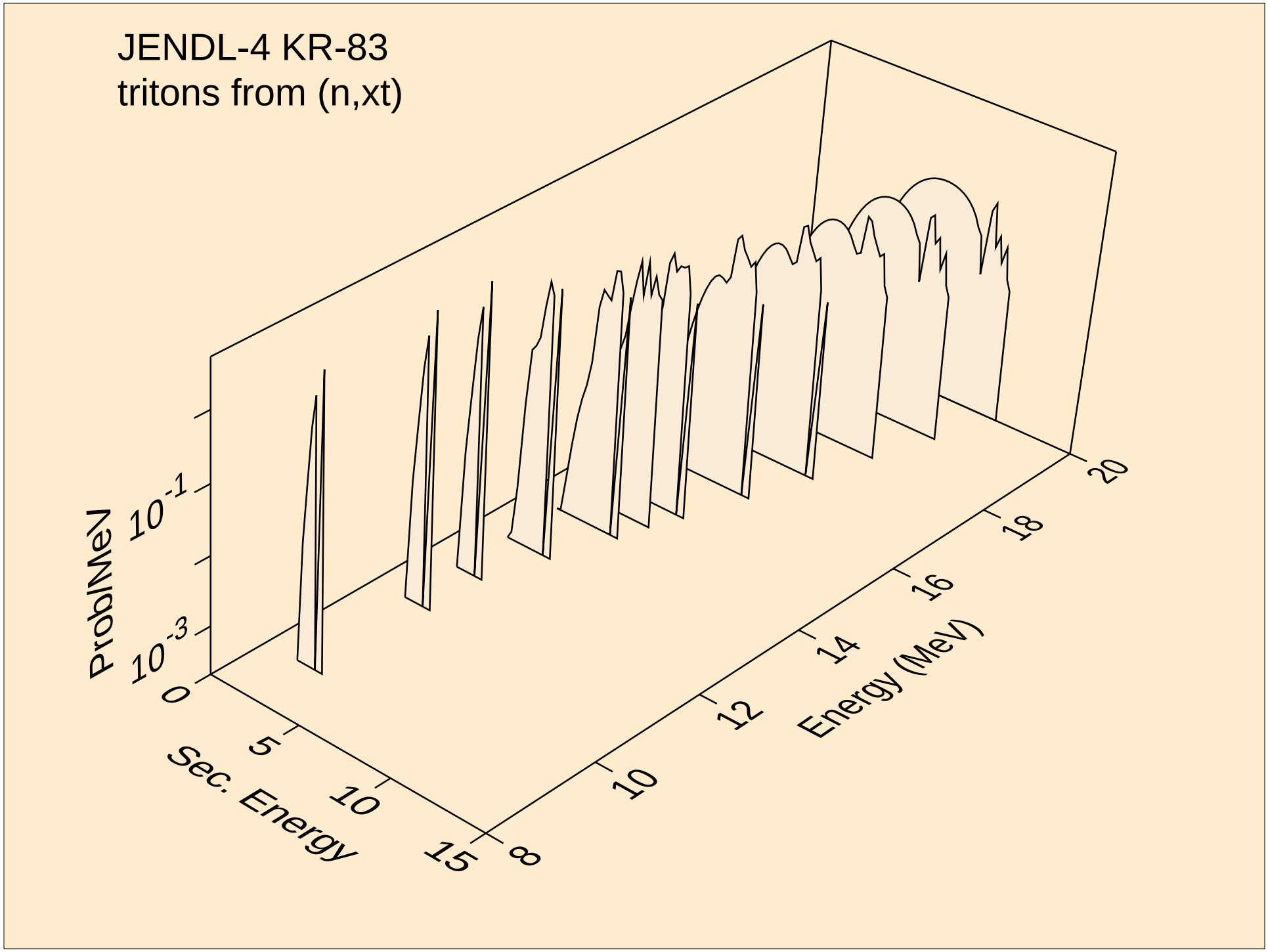

JENDL-4 KR-83
Particle heating contributions
300
*10-3
250
200
150
100
50
0
MeV/collision
protons
deuterons
tritons
he-3
alphas
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

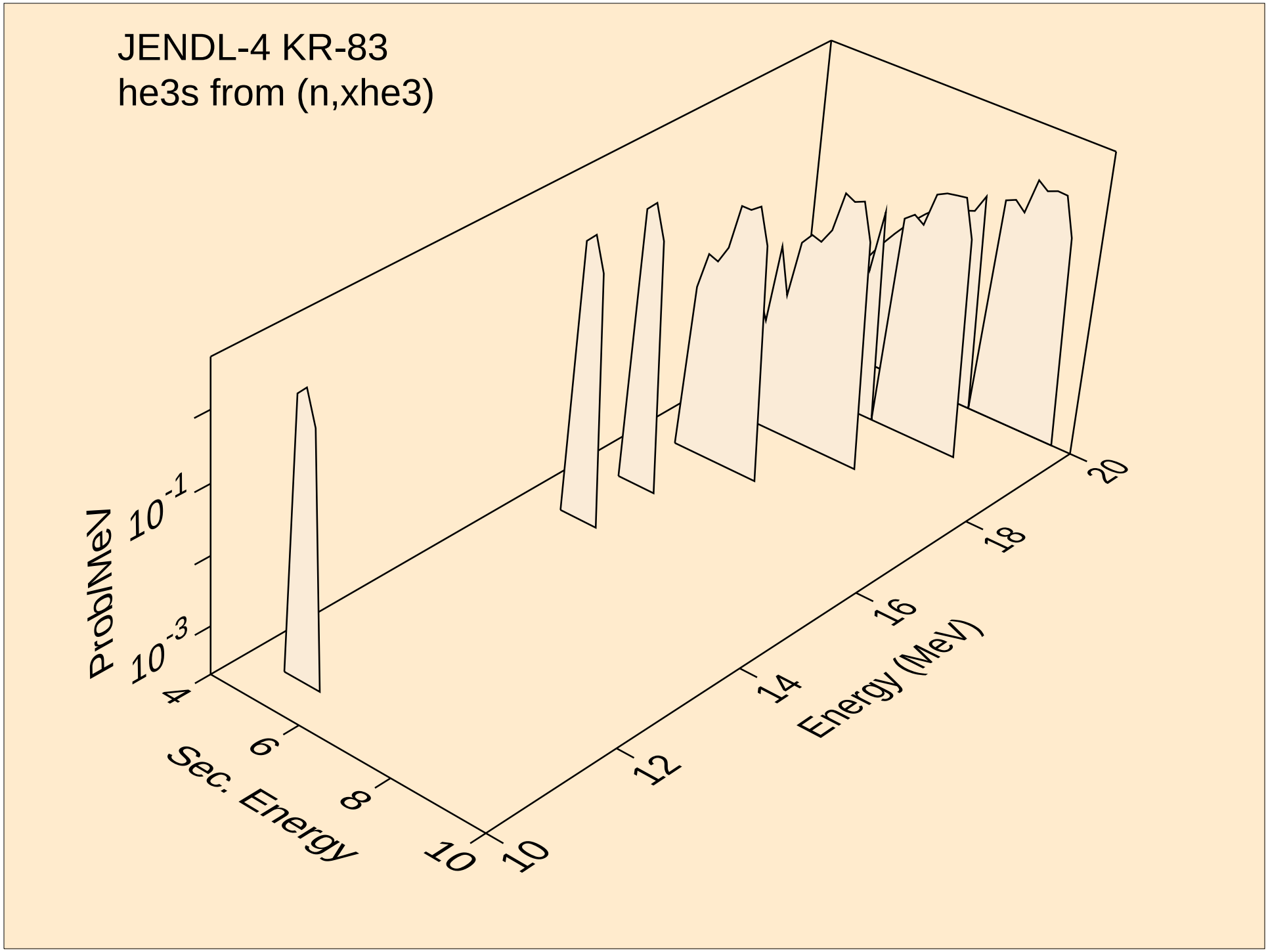

JENDL-4 KR-83
Recoil Heating
recoil heating
Heating (MeV/reaction)
*10-3
250
200
150
100
50
0
-50
0
5
10
15
20
Energy (MeV)

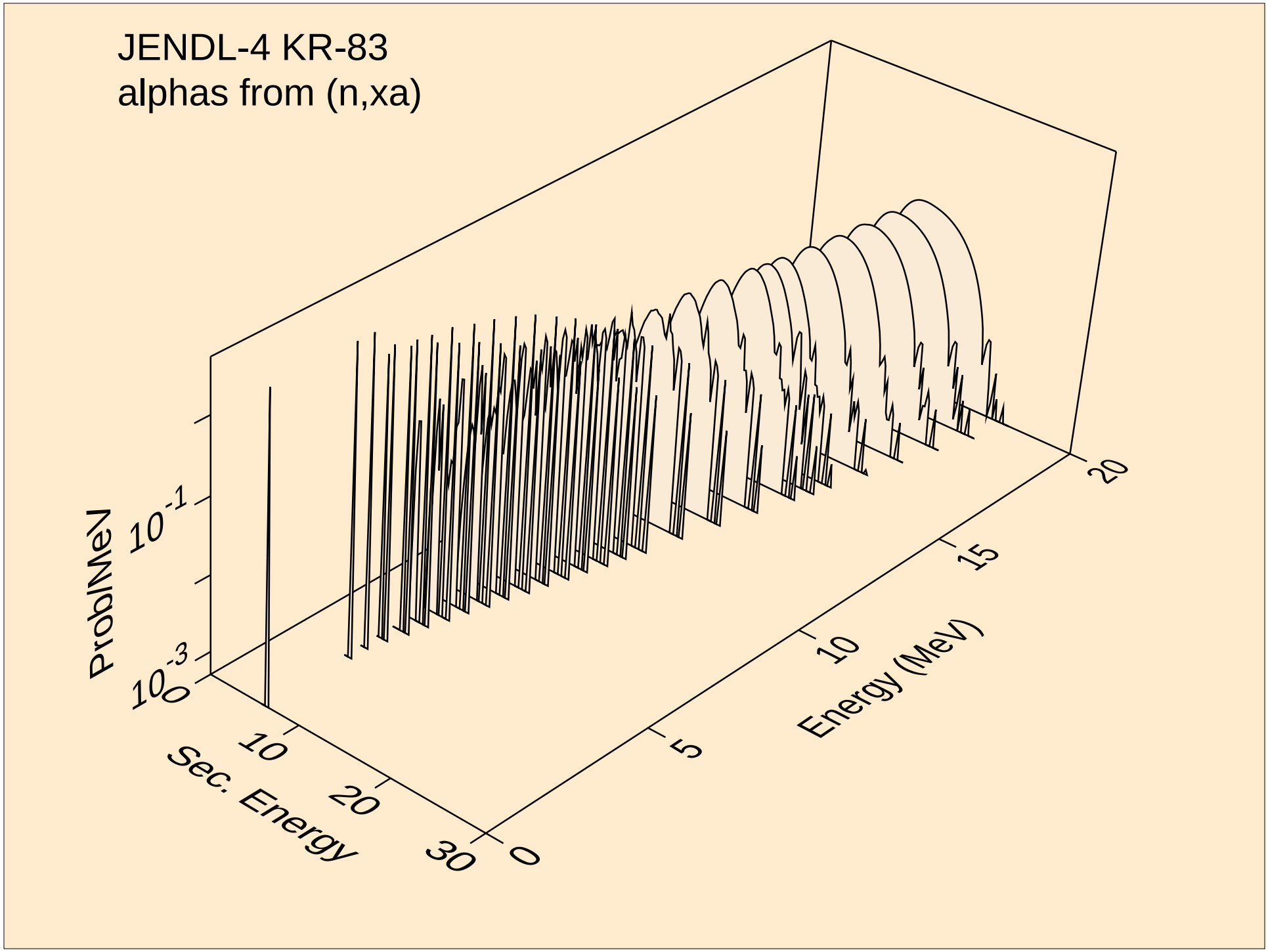

JENDL-4 KR-83
Particle production cross sections
*10-3
80
70
60
50
40
30
20
10
0
Cross section (barns)
protons
deuterons
tritons
he-3
alphas
2
4
6
8
10
12
14
16
18
20
Energy (MeV)


JENDL-4 KR-83
protons from (n,xp)
Prob/MeV
10^-1
10^-3
0
10
20
Sec. Energy
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)


JENDL-4 KR-83
deuterons from (n,xd)
Prob/MeV
10^-1
10^-3
0
10
20
Sec. Energy
6
8
10
12
14
16
18
20
Energy (MeV)


JENDL-4 KR-83
tritons from (n,xt)
Prob/MeV
10-1
10-3
0
5
10
15
Sec. Energy
8
10
12
14
16
18
20
Energy (MeV)


JENDL-4 KR-83
he3s from (n,xhe3)
Prob/MeV
10^-1
10^-3
4
6
8
10
Sec. Energy
10
12
14
16
18
20
Energy (MeV)


JENDL-4 KR-83
alphas from (n,xa)
Prob/MeV
10^-1
10^-3
0
10
20
30
Sec. Energy
0
5
10
15
20
Energy (MeV)