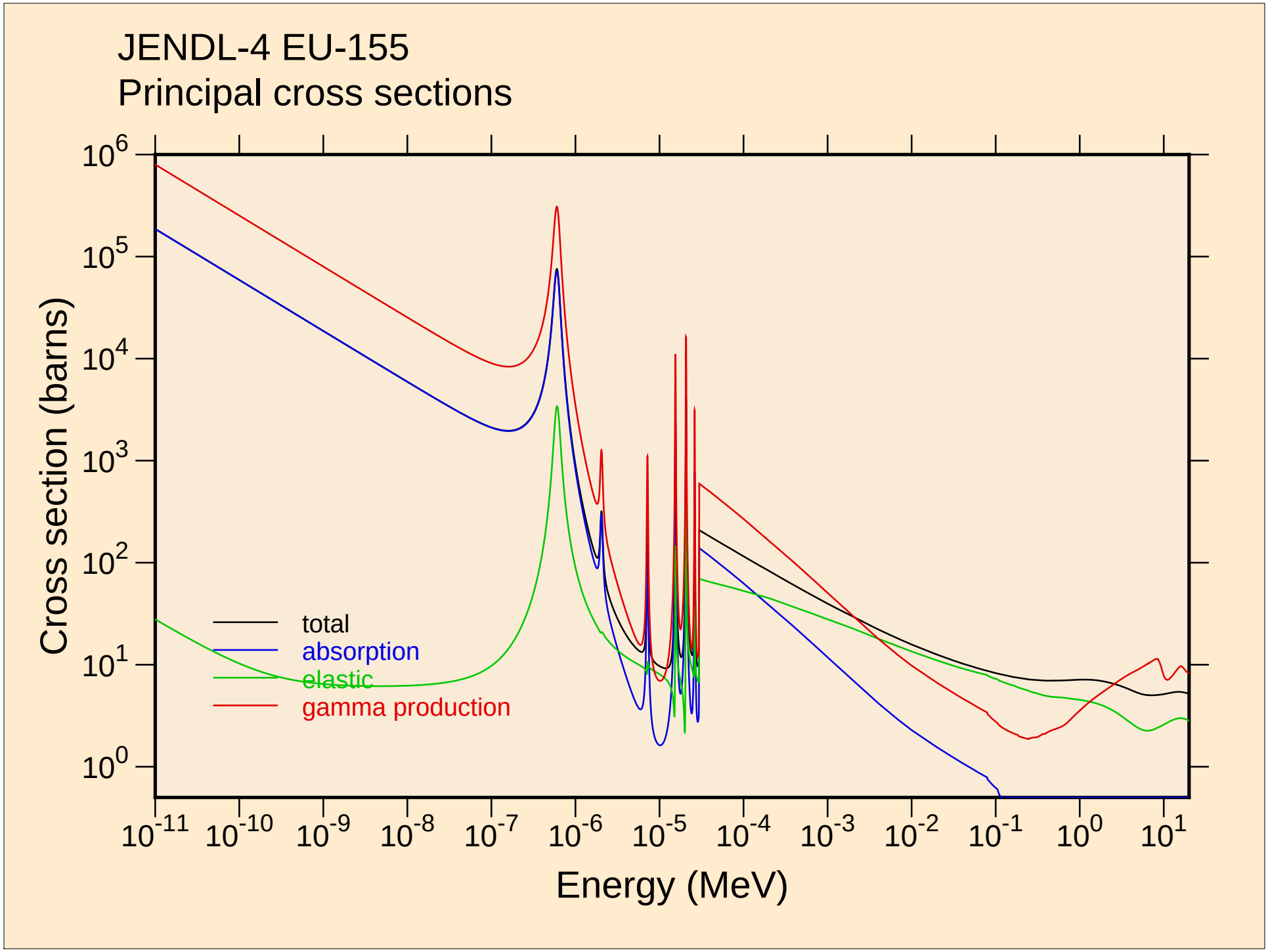
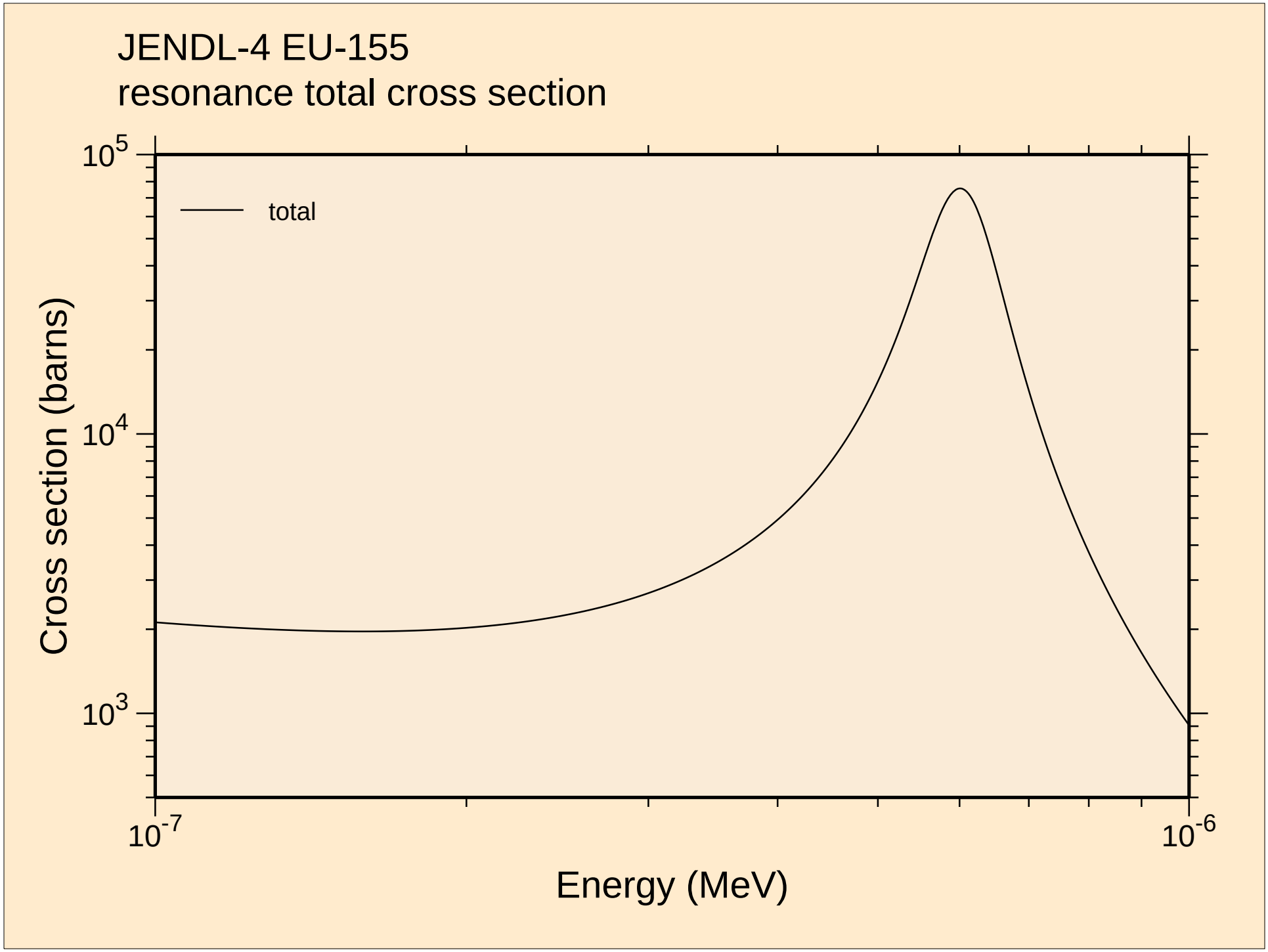
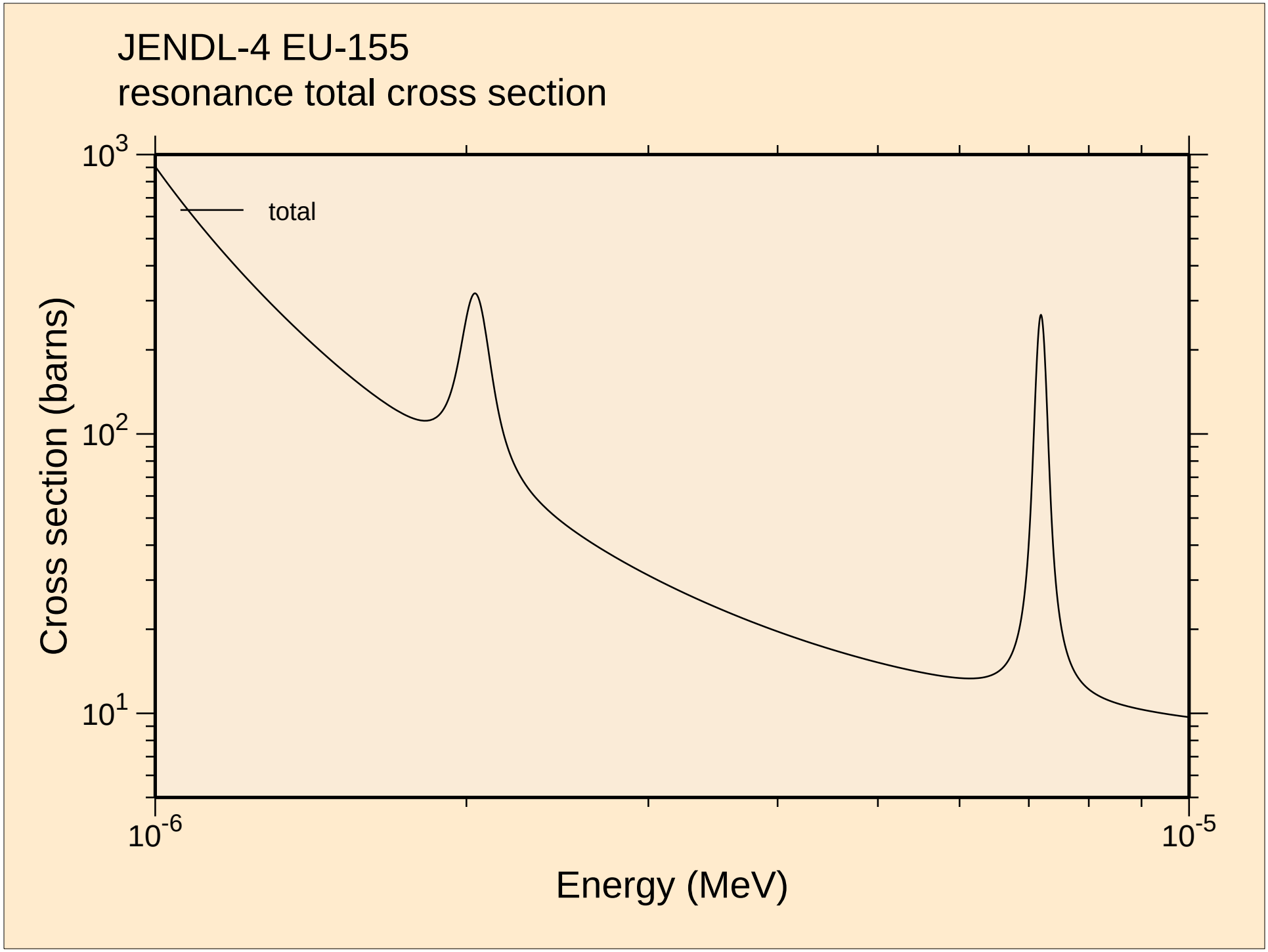
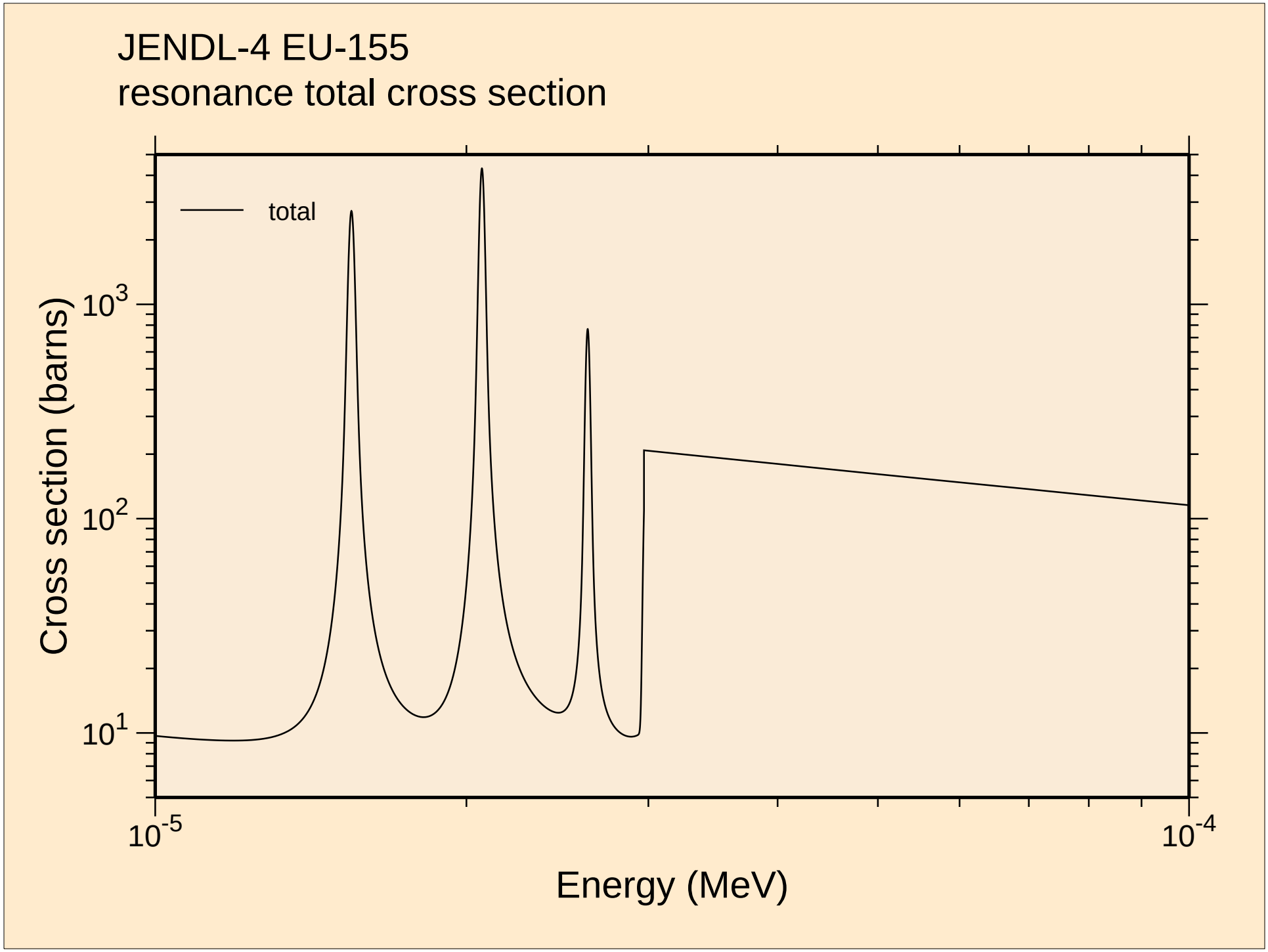
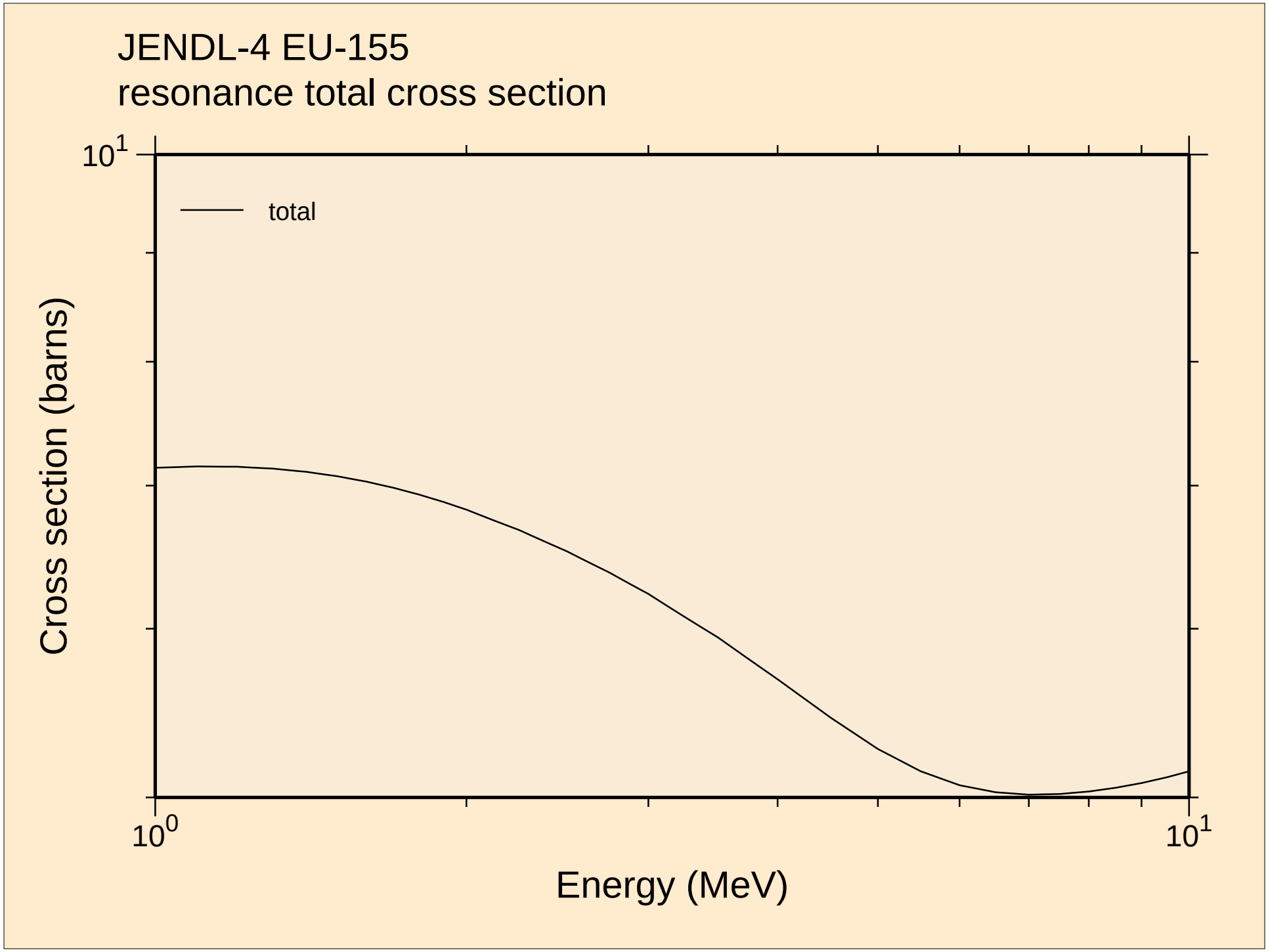
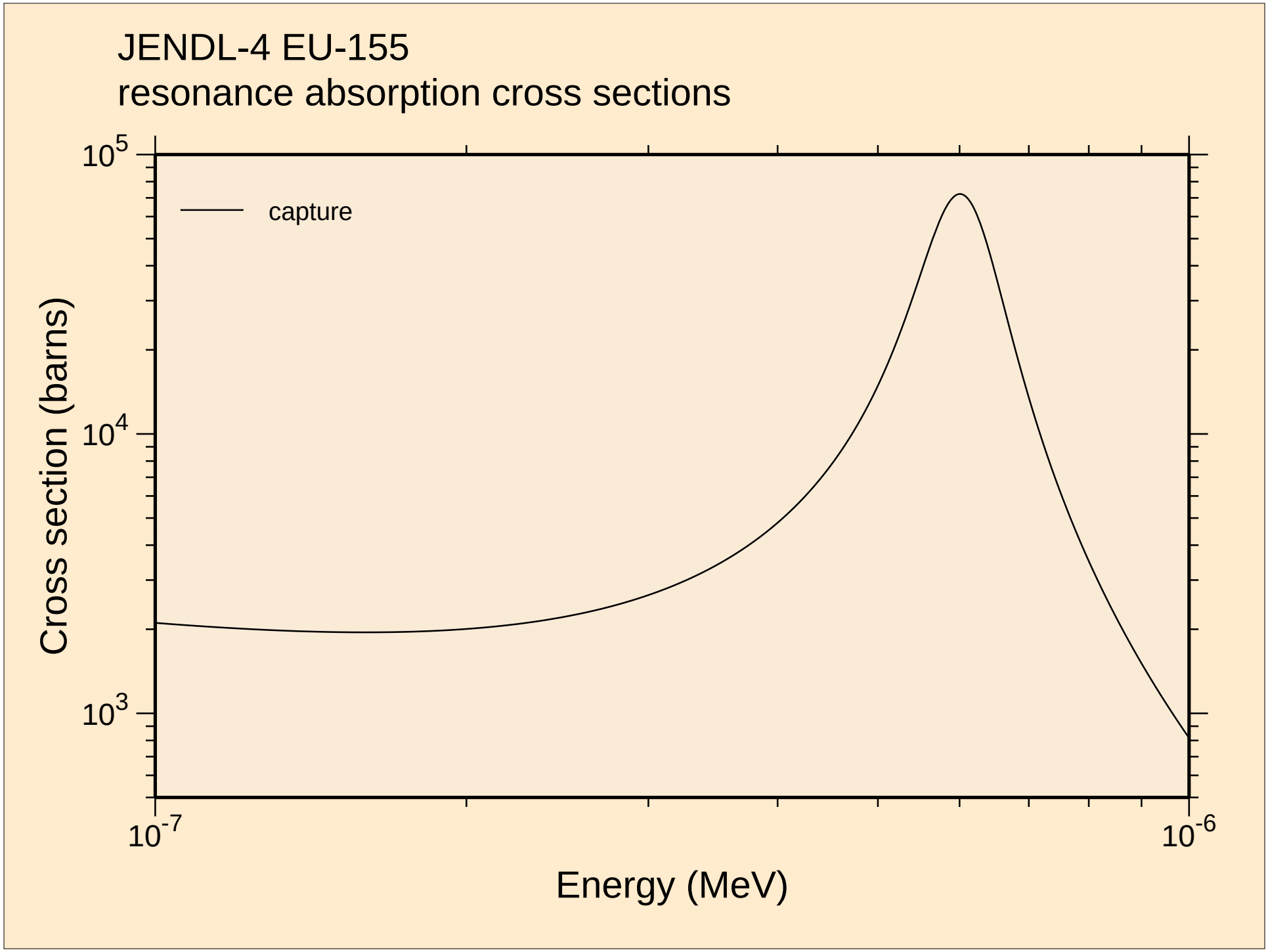

JENDL-4 EU-155
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production

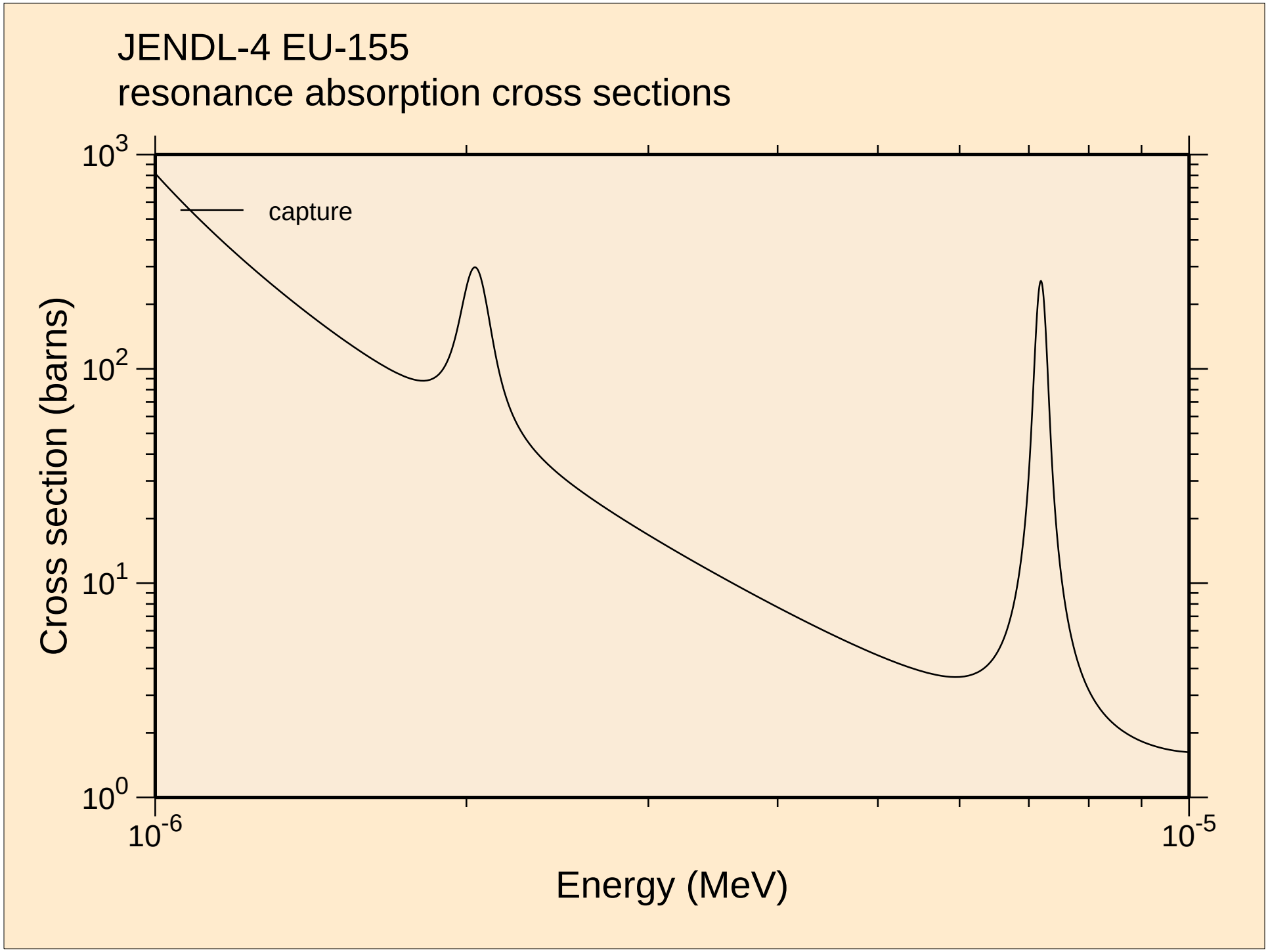

JENDL-4 EU-155
resonance total cross section
total
Cross section (barns)
10^5
10^4
10^3
10^{-7}
10^{-6}
Energy (MeV)


JENDL-4 EU-155
resonance total cross section
total
Cross section (barns)
10^3
10^2
10^1
10^{-6}
10^{-5}
Energy (MeV)

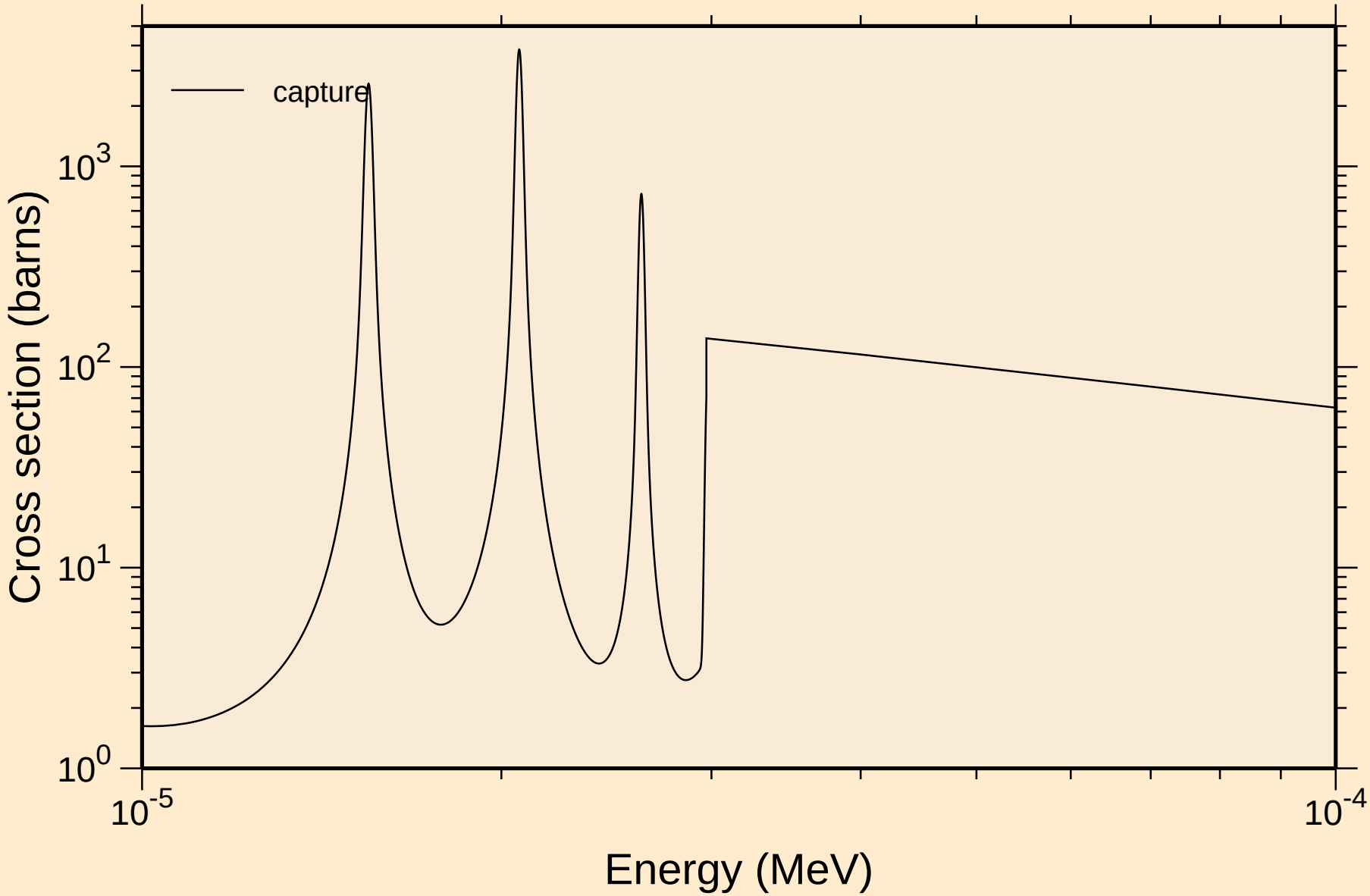

JENDL-4 EU-155
resonance total cross section
total
Cross section (barns)
10^3
10^2
10^1
10^{-5}
10^{-4}
Energy (MeV)

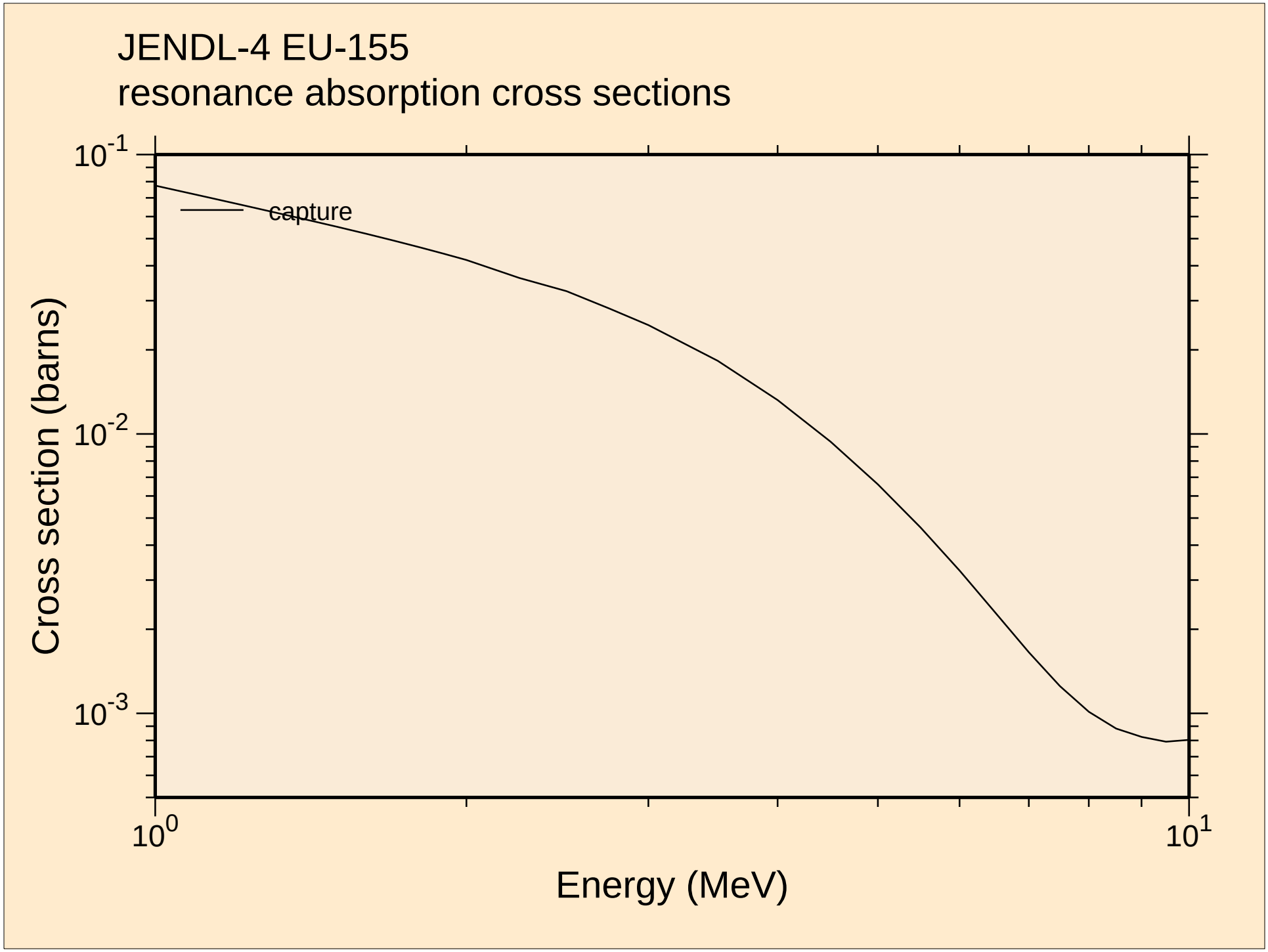

JENDL-4 EU-155
resonance total cross section
total
Cross section (barns)
Energy (MeV)
10^1
10^0
10^1

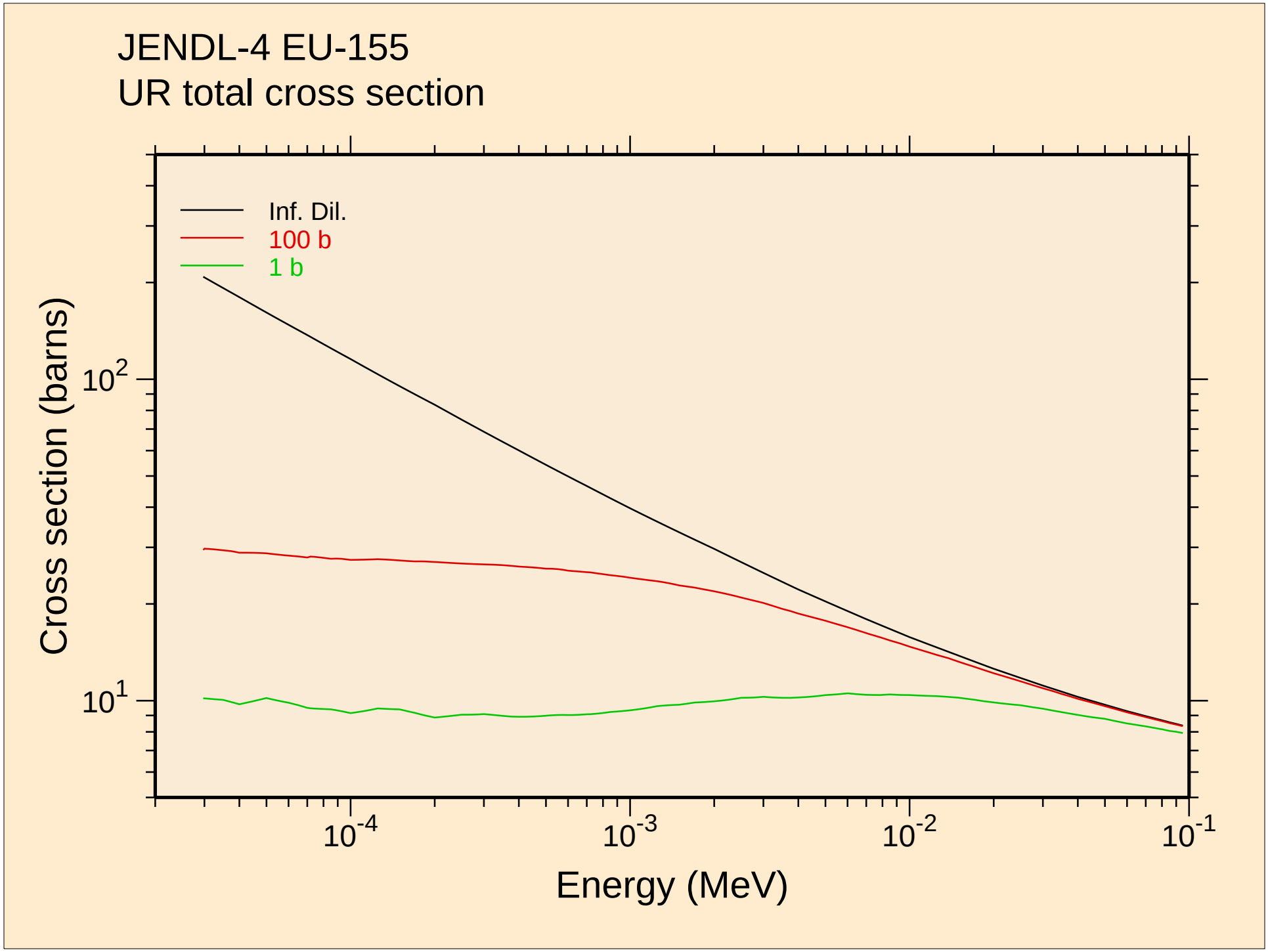

JENDL-4 EU-155
resonance absorption cross sections
capture
Cross section (barns)
10^5
10^4
10^3
10^{-7}
10^{-6}
Energy (MeV)

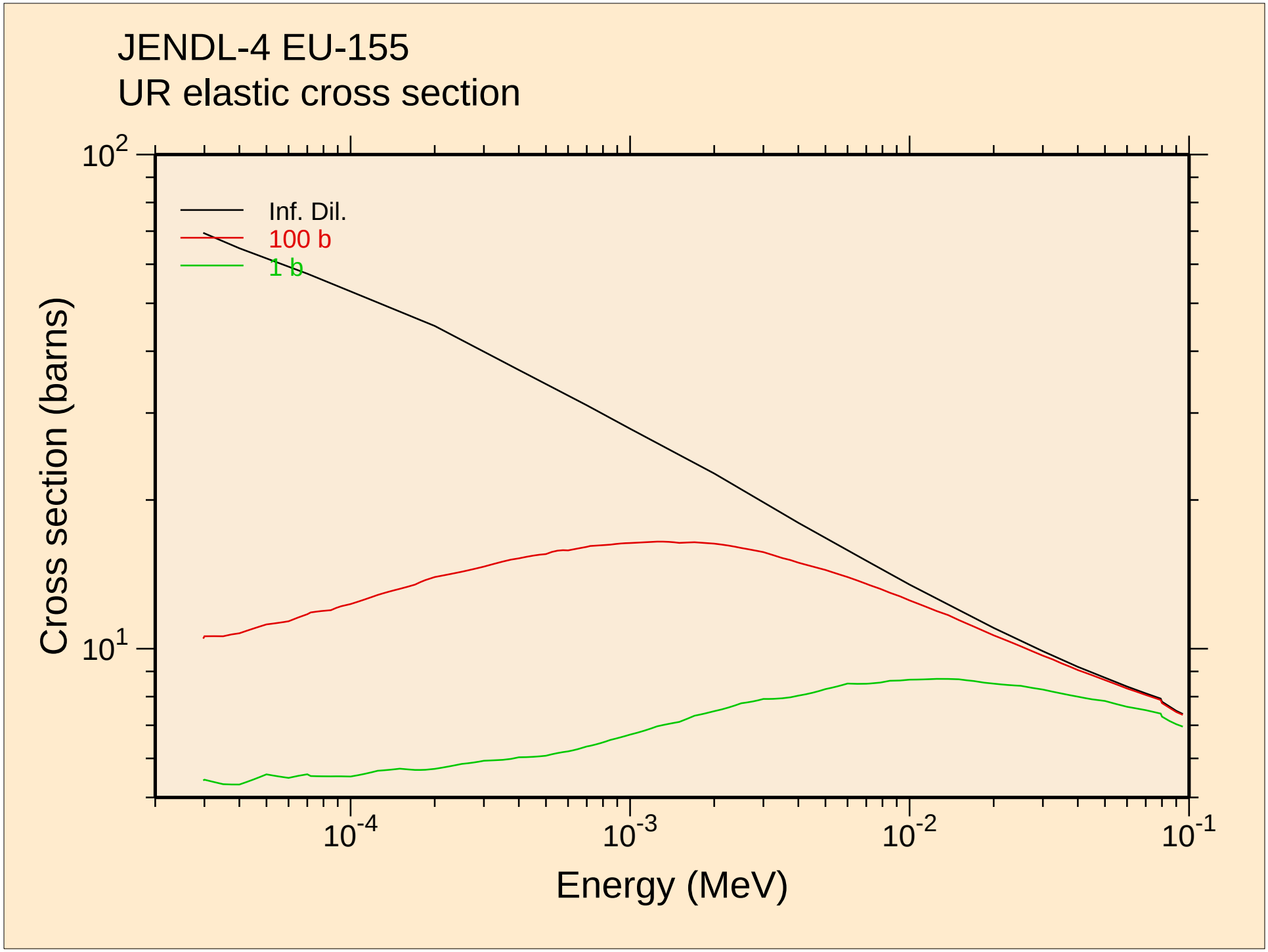

JENDL-4 EU-155
resonance absorption cross sections
capture
Cross section (barns)
10^3
10^2
10^1
10^0
10^{-6}
10^{-5}
Energy (MeV)

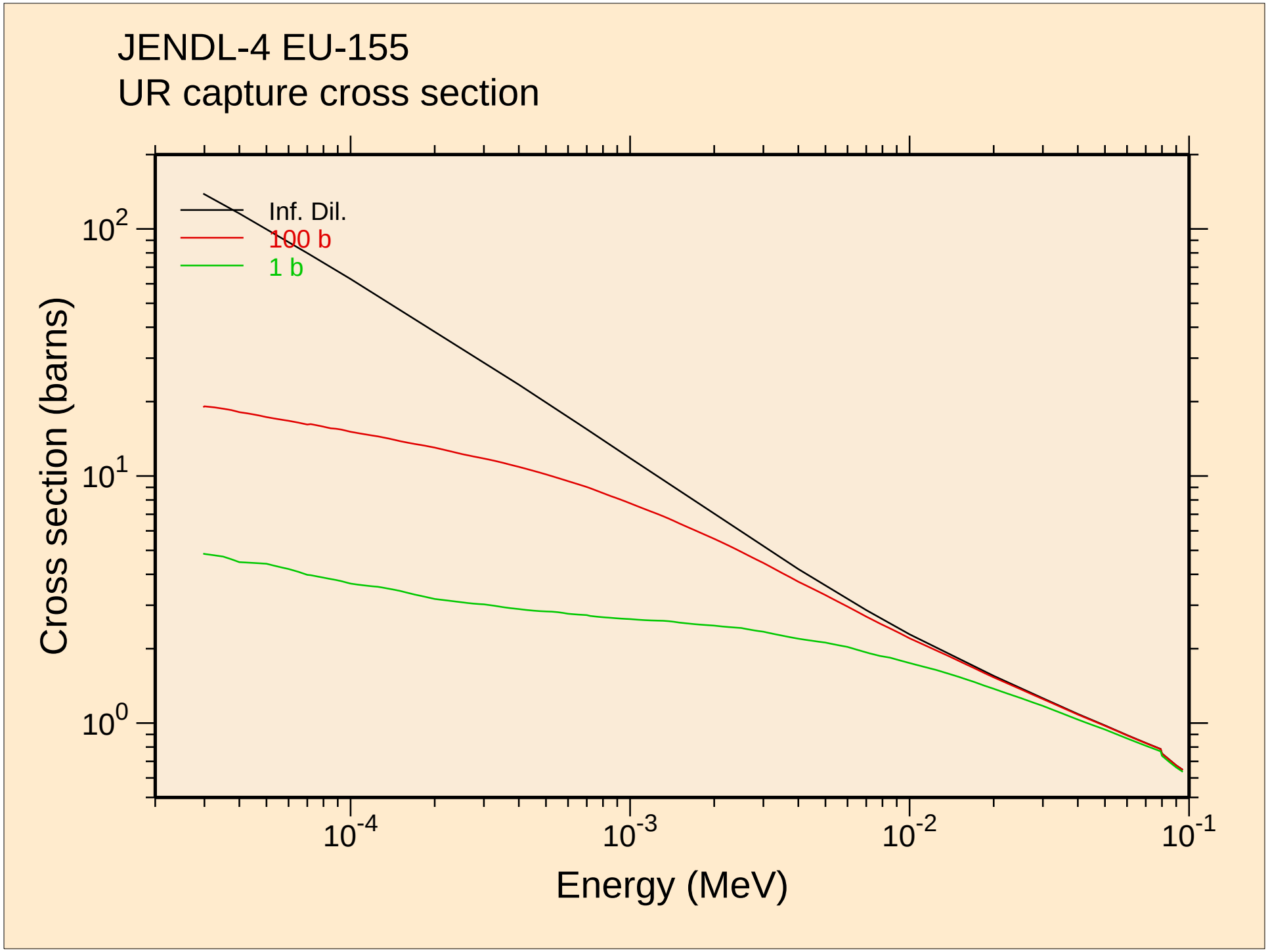
JENDL-4 EU-155
resonance absorption cross sections

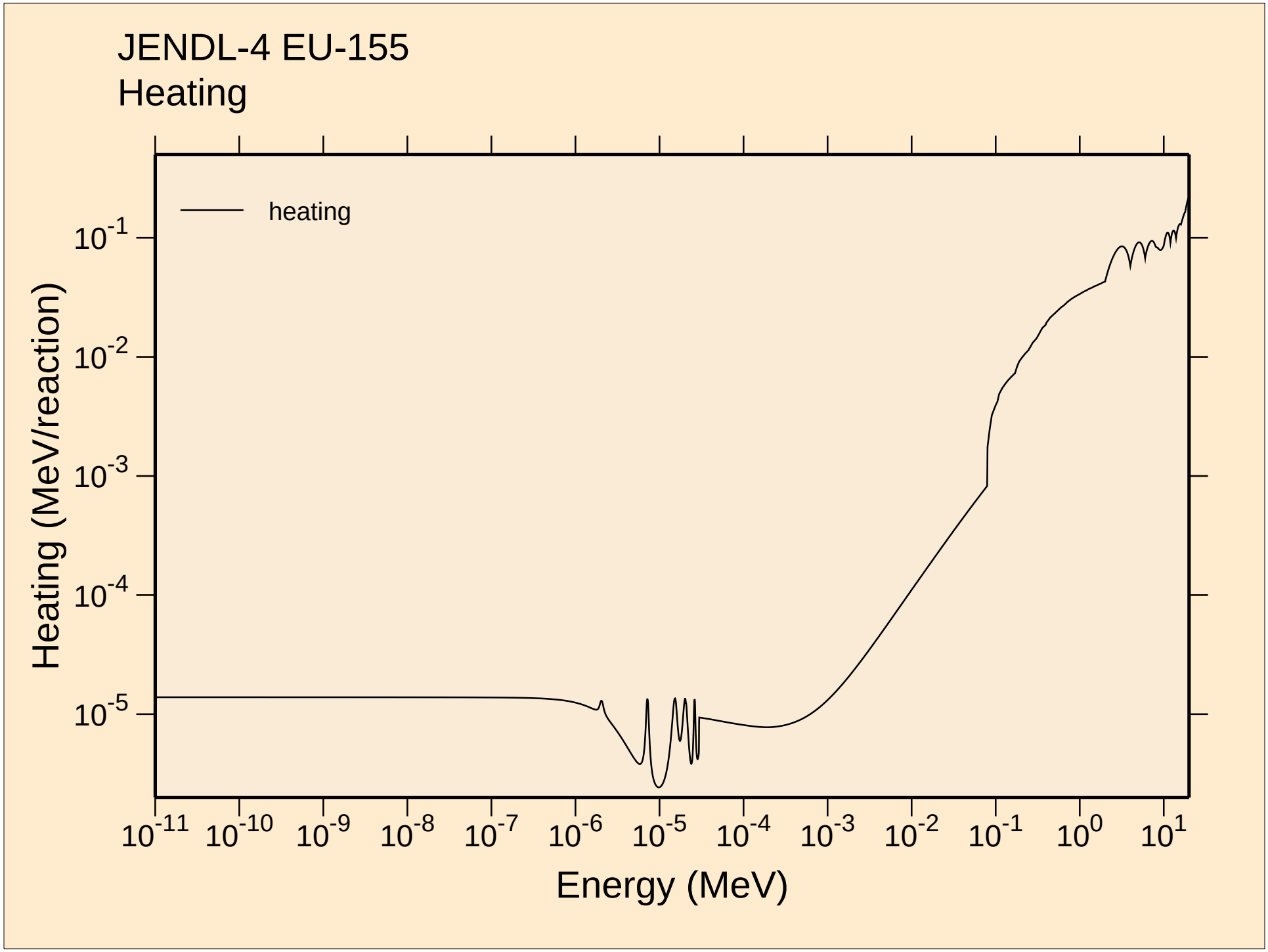


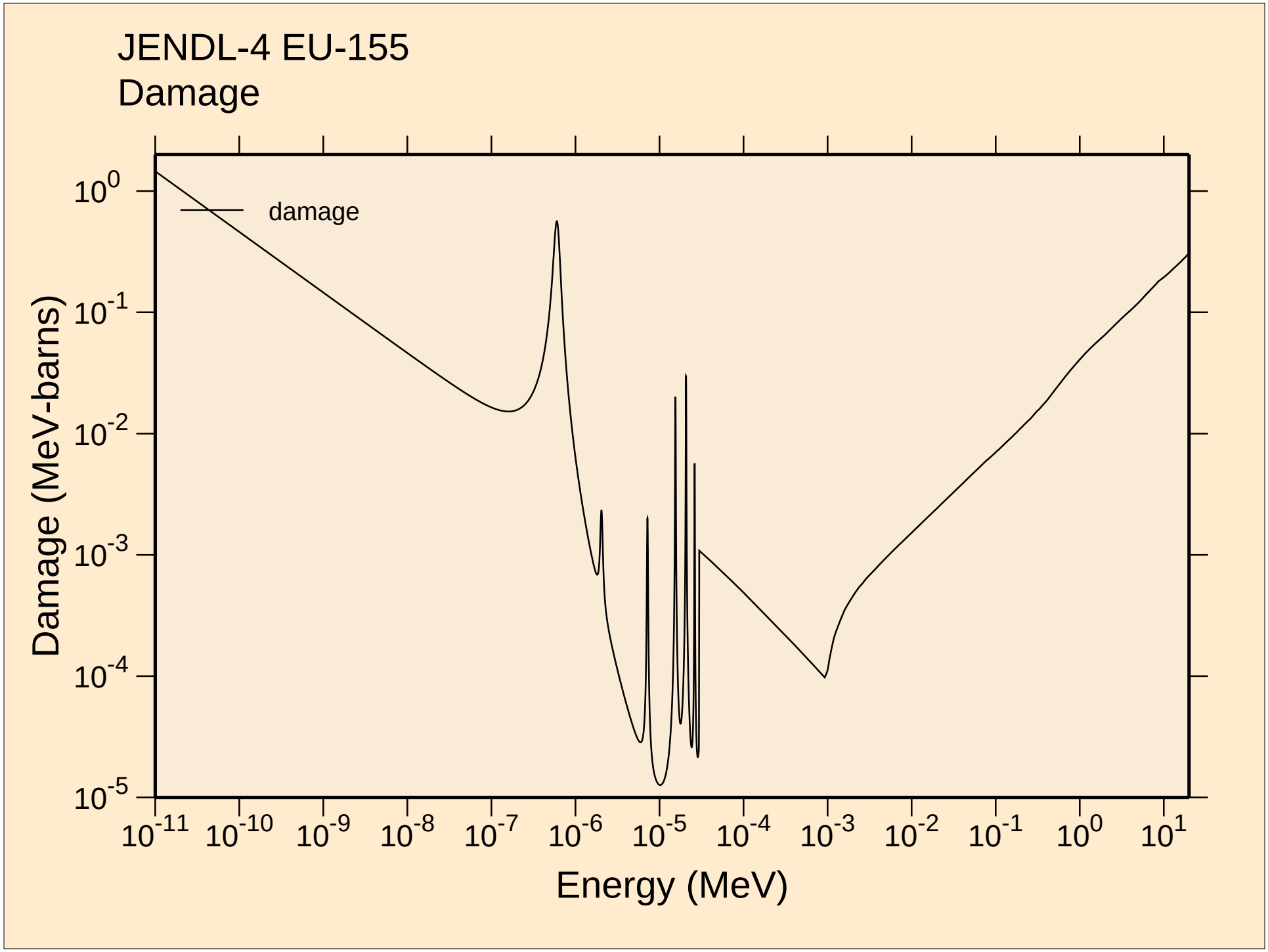

JENDL-4 EU-155
resonance absorption cross sections
capture
Cross section (barns)
10-1
10-2
10-3
100
101
Energy (MeV)

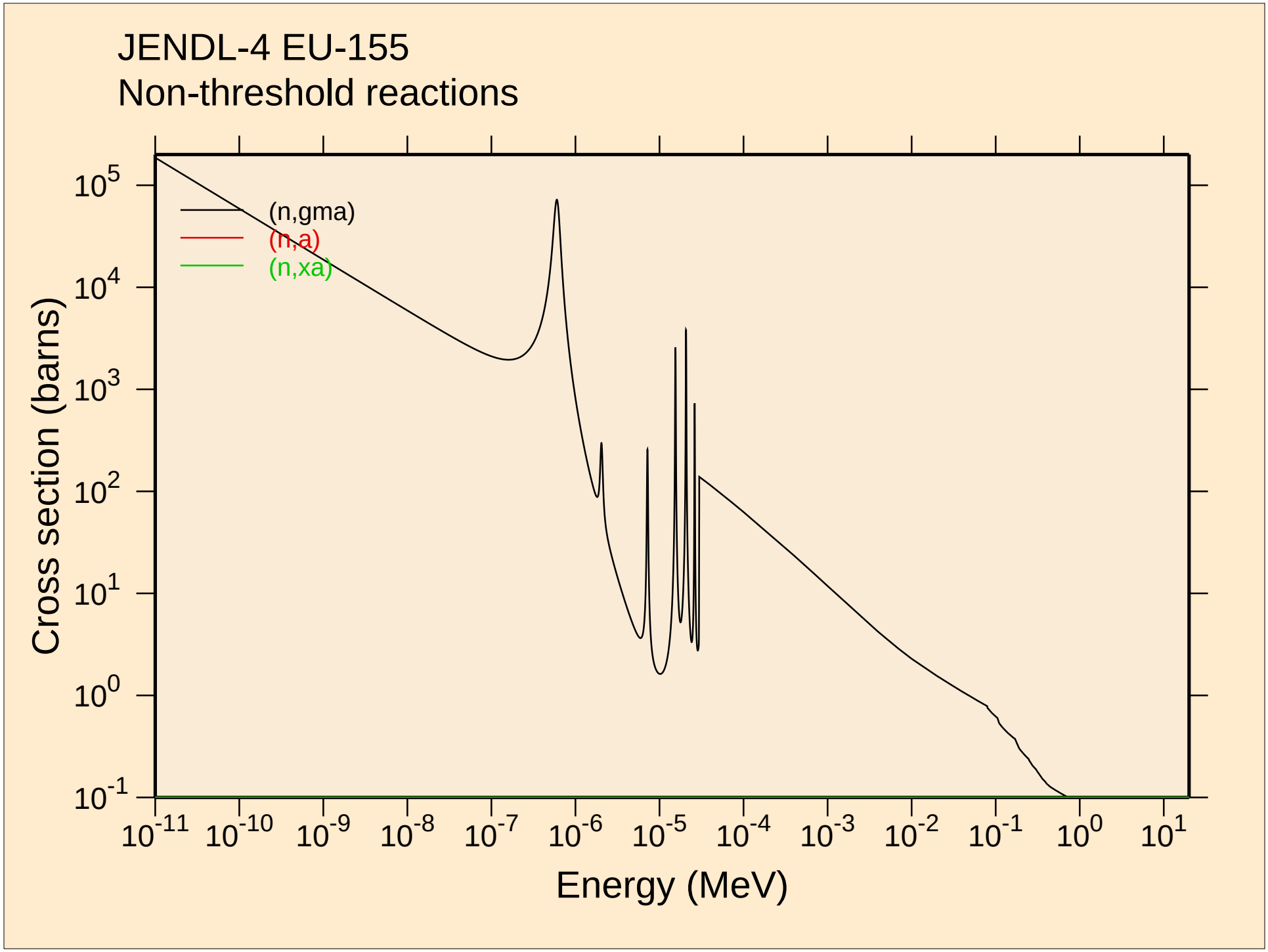

JENDL-4 EU-155
UR total cross section
Inf. Dil.
100 b
1 b
Cross section (barns)
10^2
10^1
10^-4
10^-3
10^-2
10^-1
Energy (MeV)

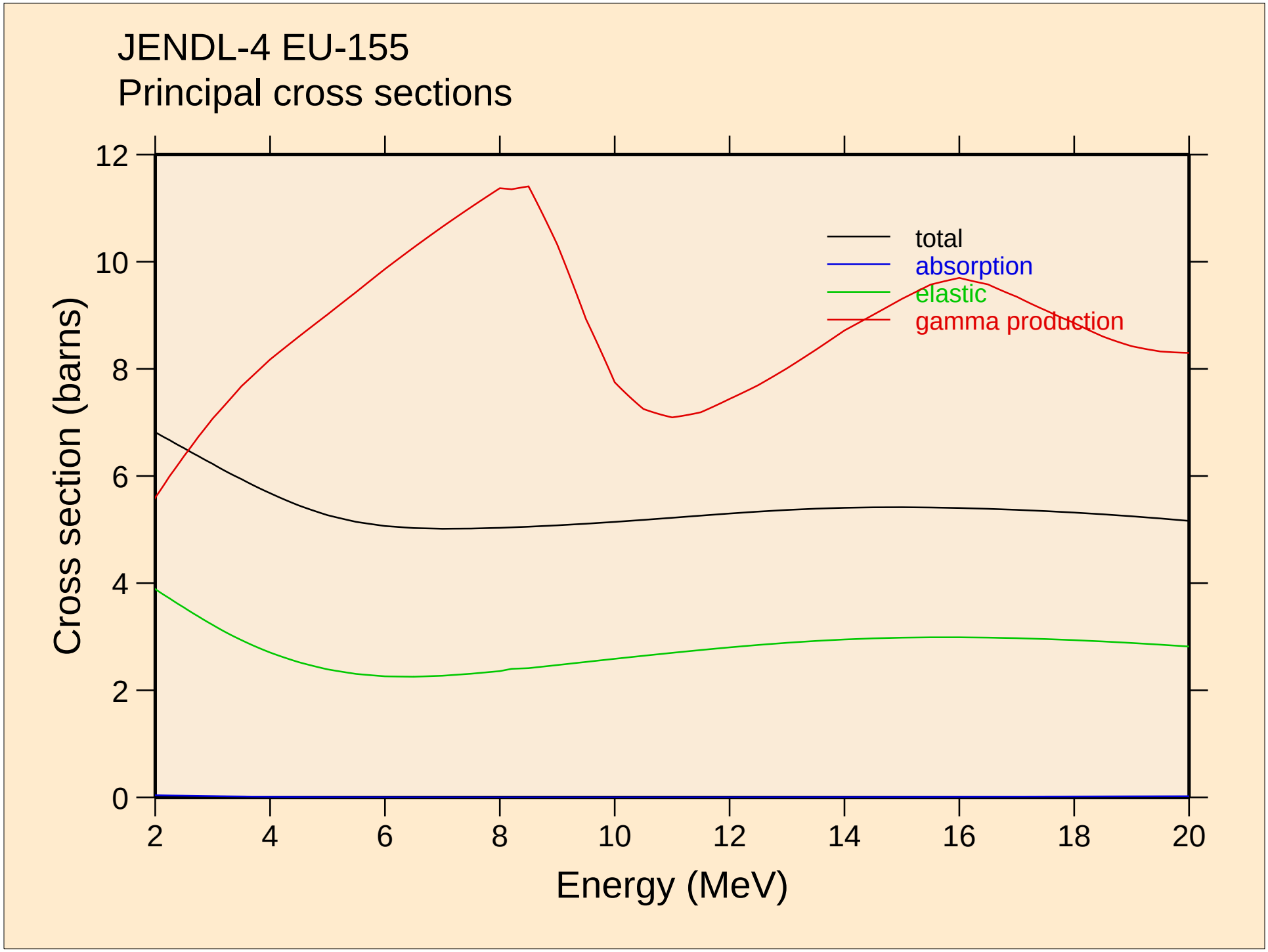

JENDL-4 EU-155
UR elastic cross section
Inf. Dil.
100 b
1 b
Cross section (barns)
Energy (MeV)
10^2
10^1
10^-4
10^-3
10^-2
10^-1

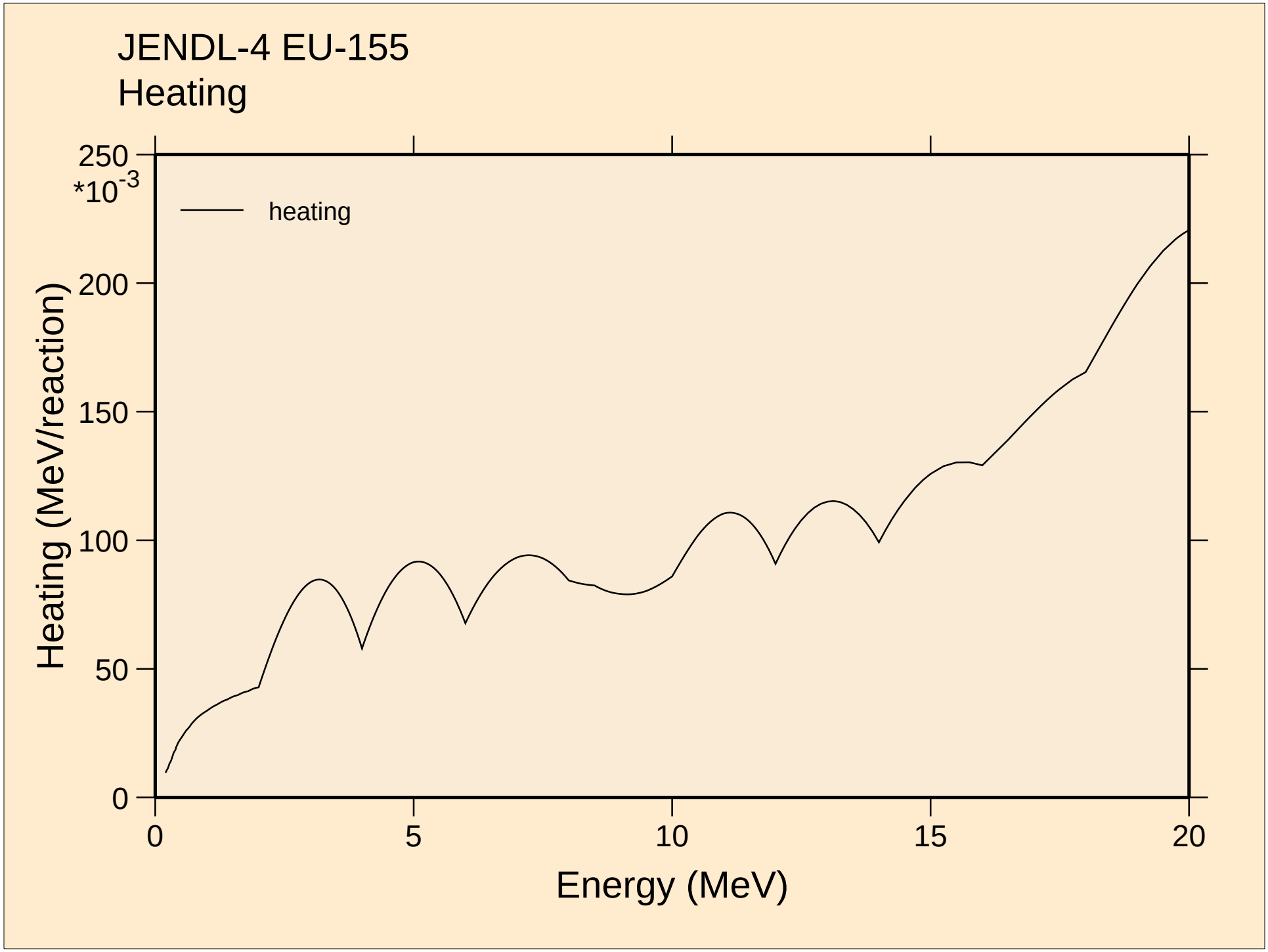

JENDL-4 EU-155
UR capture cross section
Inf. Dil.
100 b
1 b
Cross section (barns)
Energy (MeV)
10^2
10^1
10^0
10^-4
10^-3
10^-2
10^-1

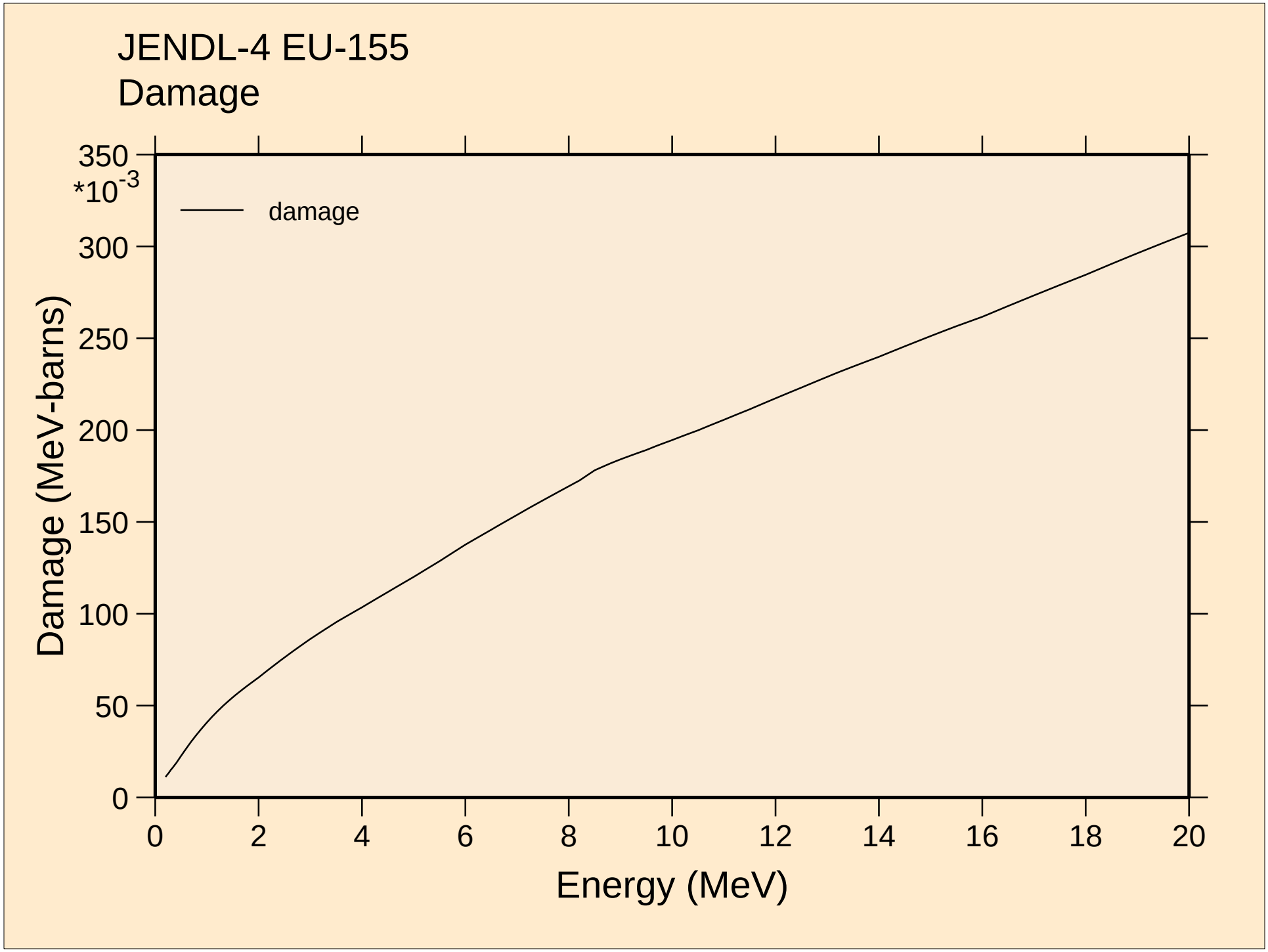

JENDL-4 EU-155
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
10-1
10-2
10-3
10-4
10-5
10-11
10-10
10-9
10-8
10-7
10-6
10-5
10-4
10-3
10-2
10-1
100
101

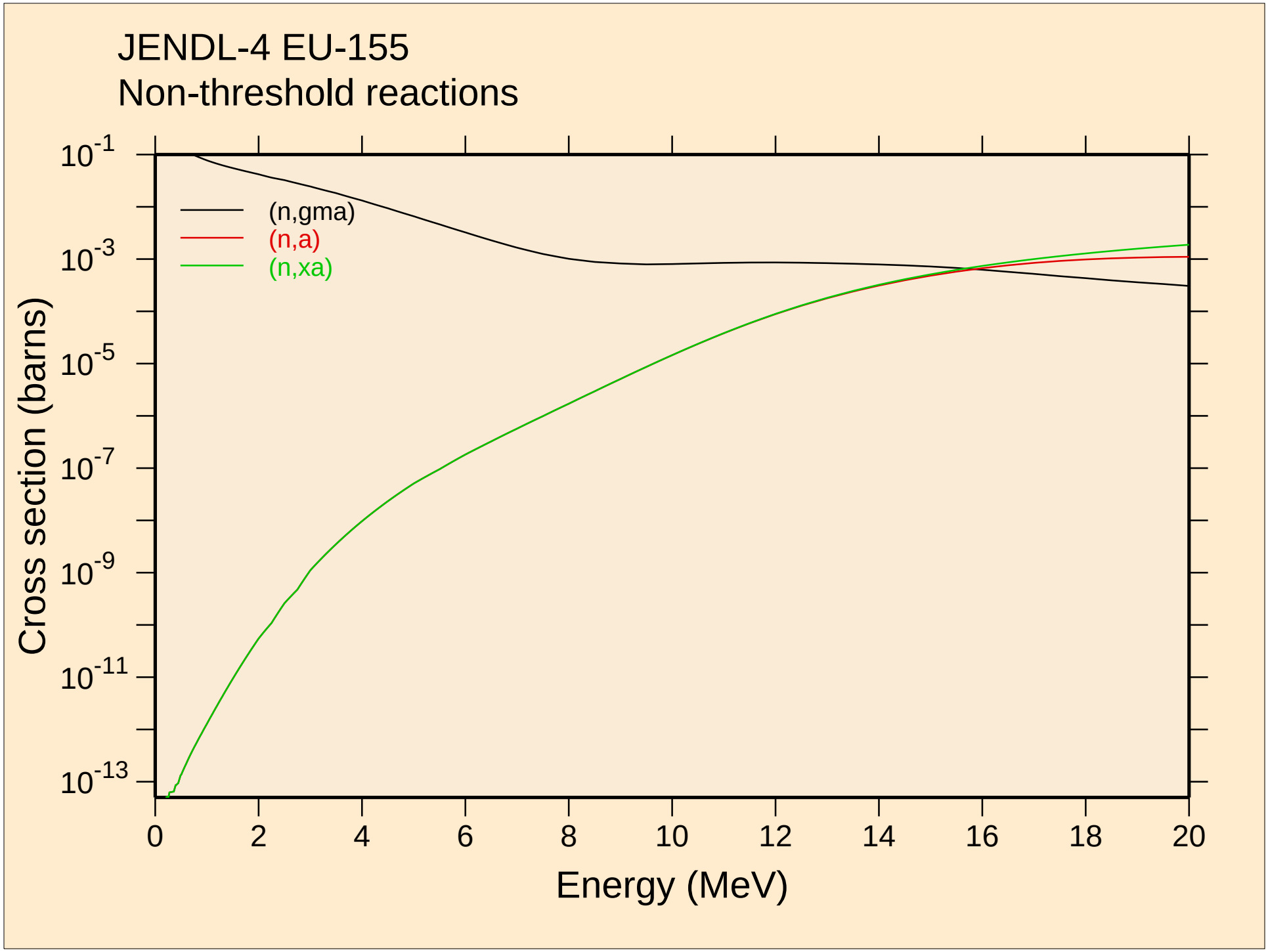

JENDL-4 EU-155
Damage
damage
Damage (MeV-barns)
Energy (MeV)
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-11} 10^{-10} 10^{-9} 10^{-8} 10^{-7} 10^{-6} 10^{-5} 10^{-4} 10^{-3} 10^{-2} 10^{-1} 10^{0} 10^{1}

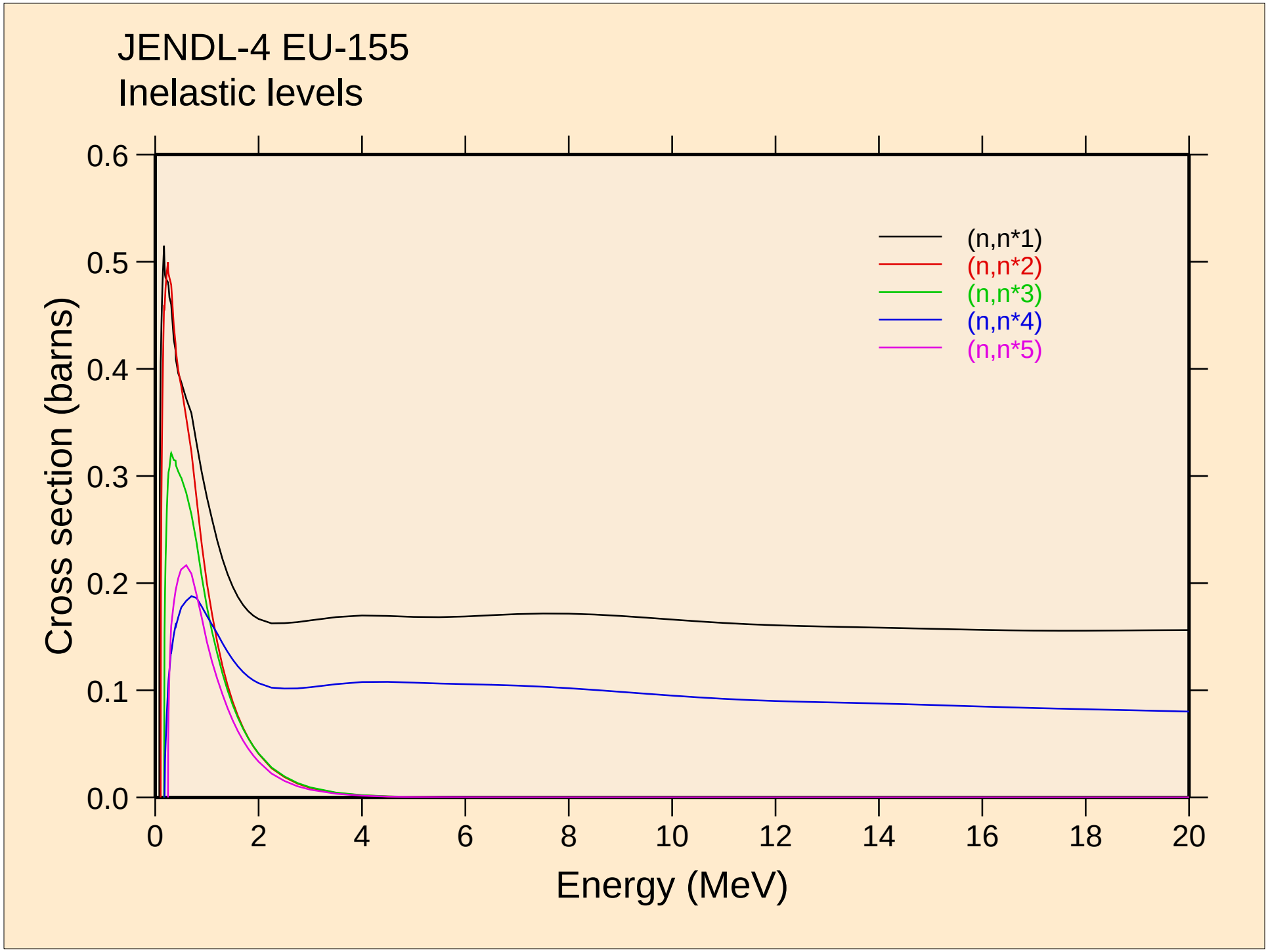

JENDL-4 EU-155
Non-threshold reactions
(n,gma)
(n,a)
(n,xa)
Cross section (barns)
Energy (MeV)
10^{5}
10^{4}
10^{3}
10^{2}
10^{1}
10^{0}
10^{-1}
10^{-11} 10^{-10} 10^{-9} 10^{-8} 10^{-7} 10^{-6} 10^{-5} 10^{-4} 10^{-3} 10^{-2} 10^{-1} 10^{0} 10^{1}

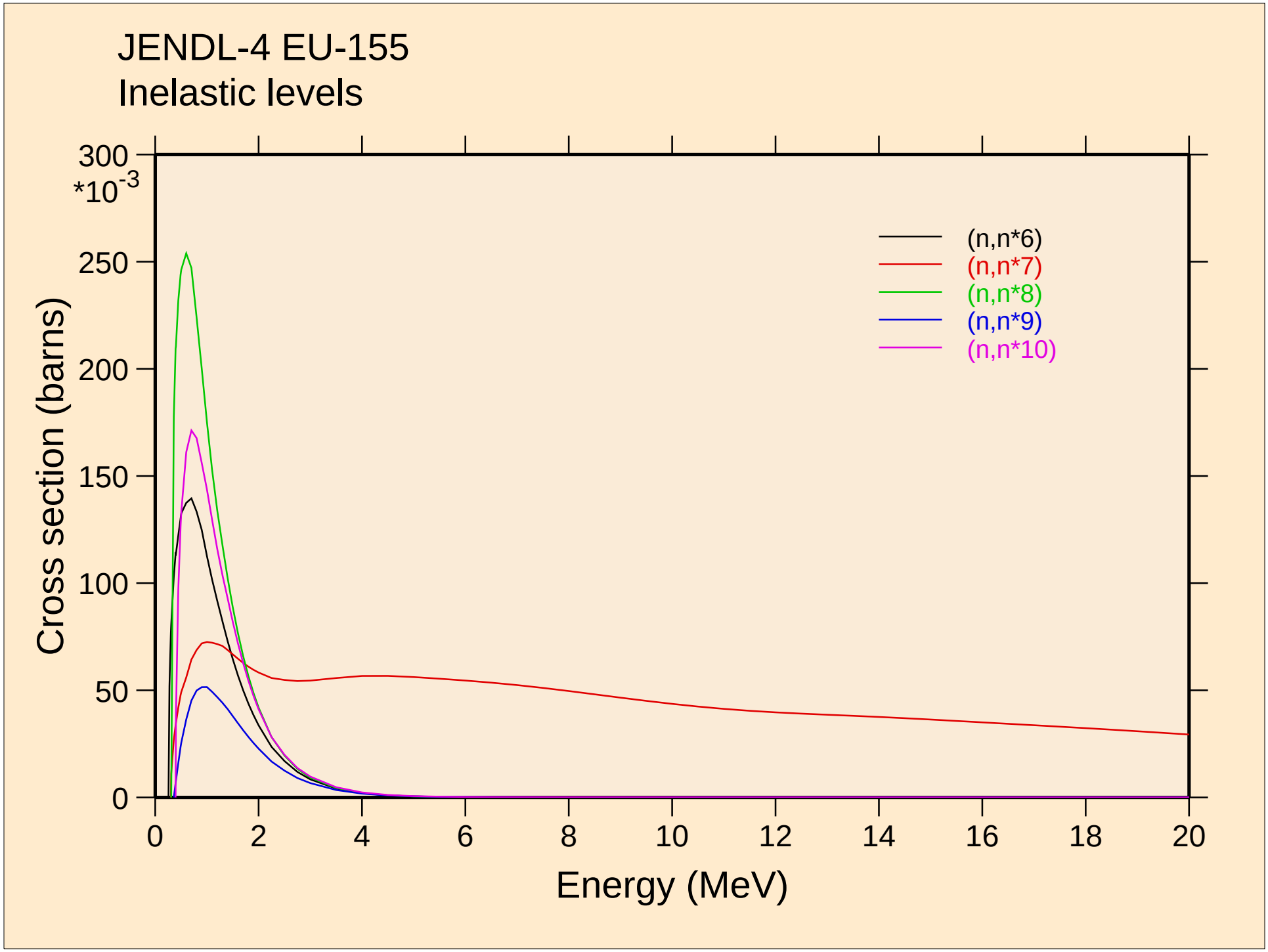

JENDL-4 EU-155
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production
0
2
4
6
8
10
12
2
4
6
8
10
12
14
16
18
20

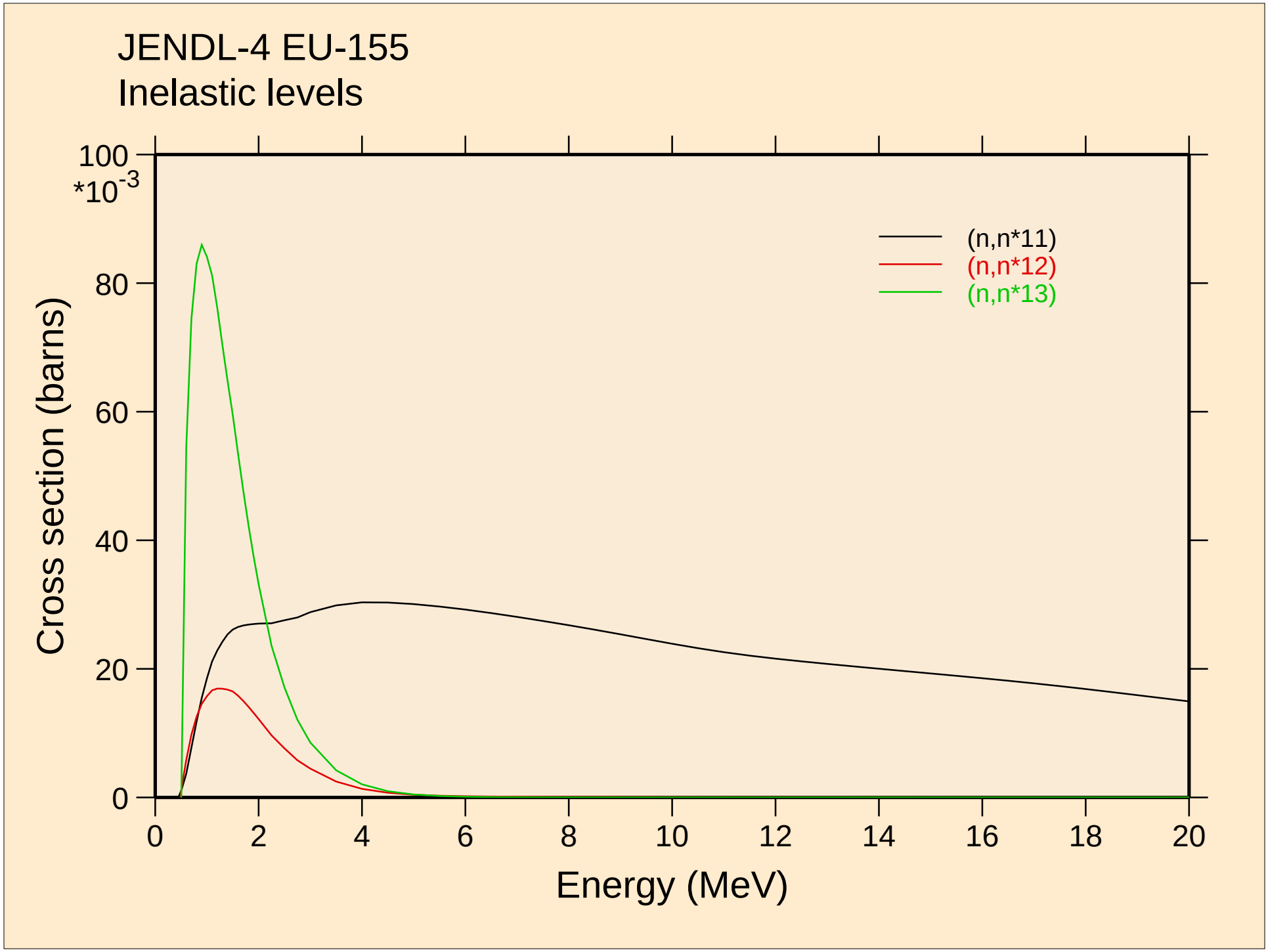

JENDL-4 EU-155
Heating
heating
Heating (MeV/reaction)
*10-3
250
200
150
100
50
0
0
5
10
15
20
Energy (MeV)

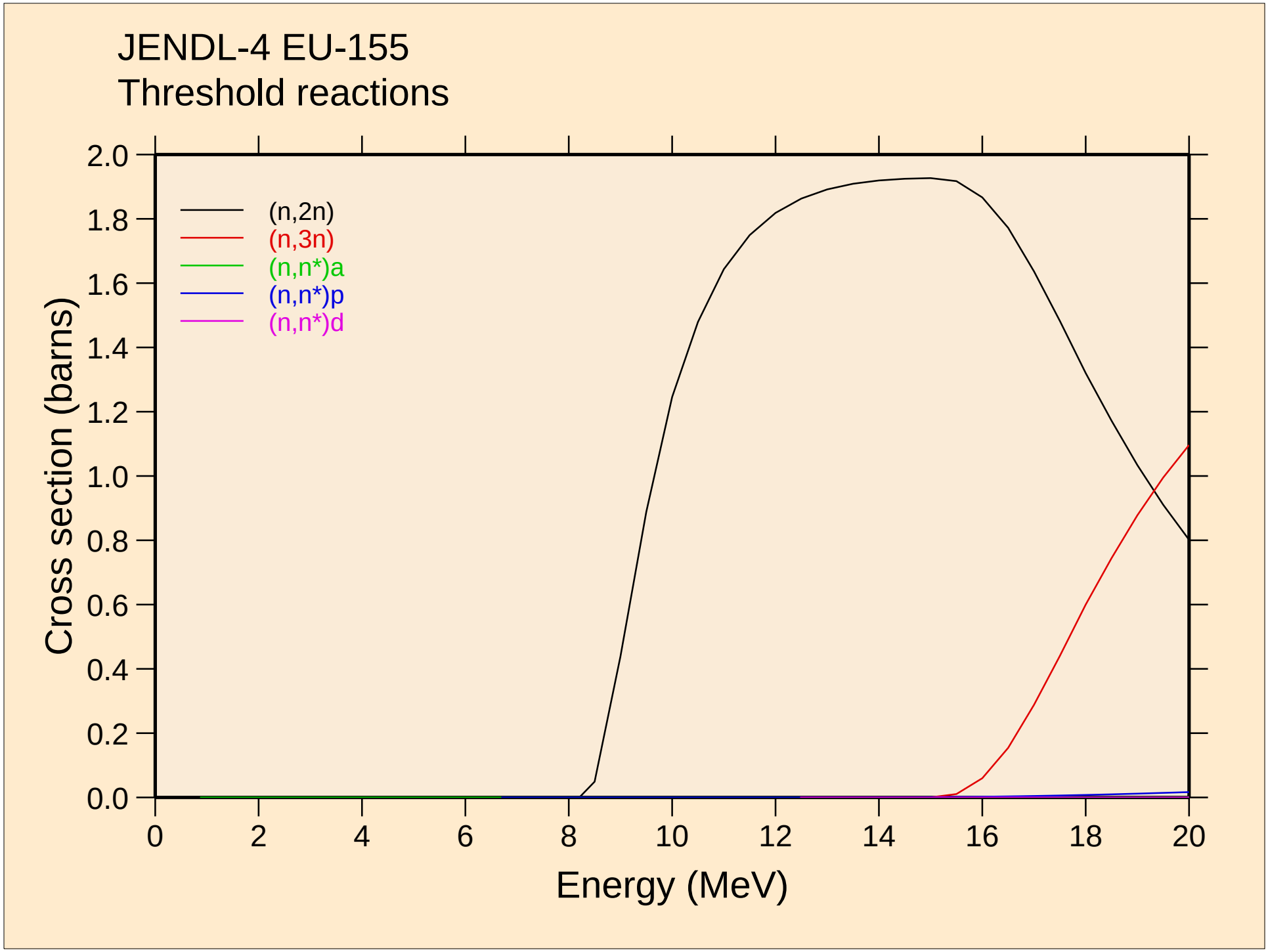

JENDL-4 EU-155
Damage
damage
*10-3
350
300
250
200
150
100
50
0
Damage (MeV-barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

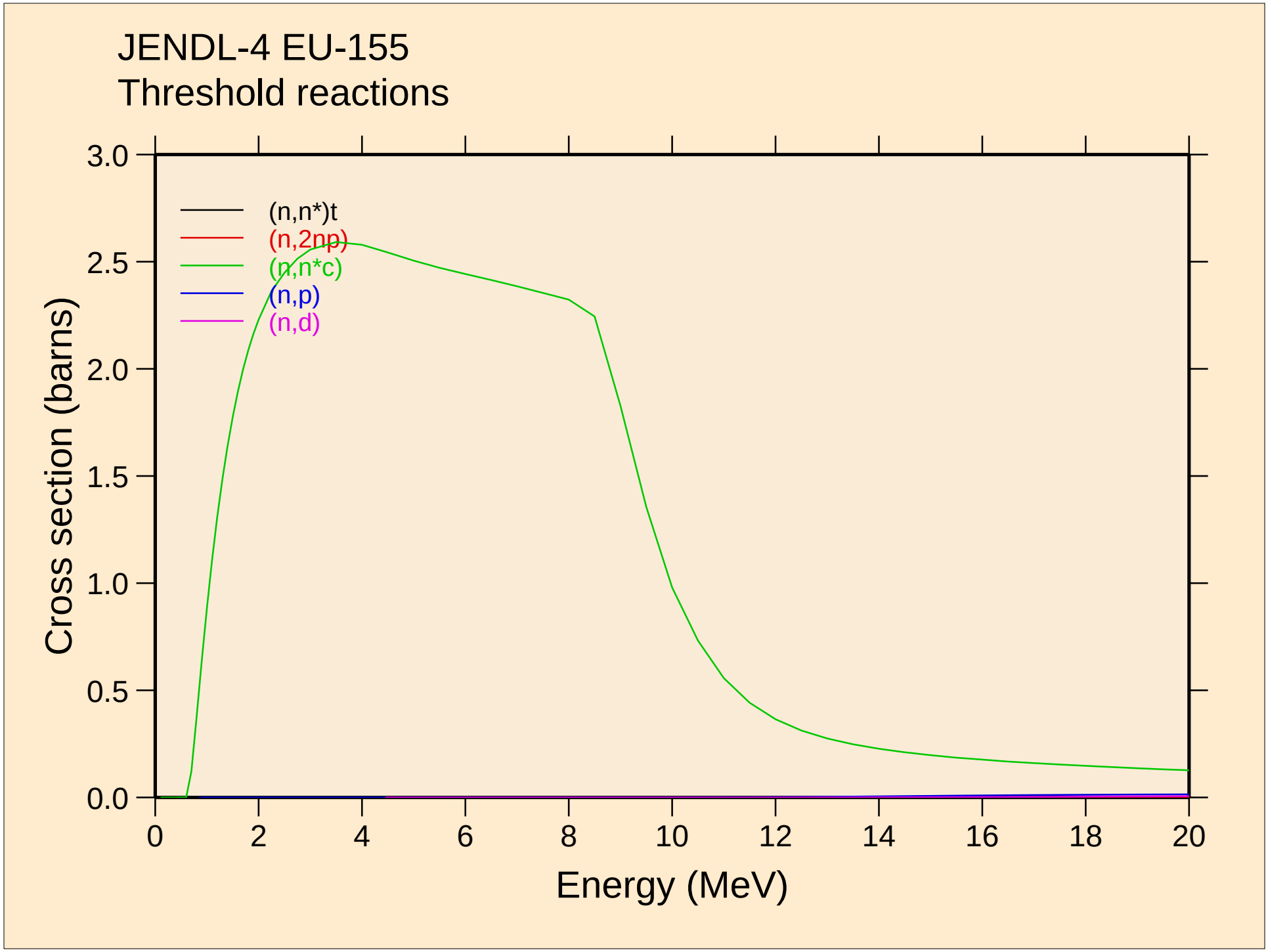

JENDL-4 EU-155
Non-threshold reactions
(n,gma)
(n,a)
(n,xa)
Cross section (barns)
Energy (MeV)
10-1
10-3
10-5
10-7
10-9
10-11
10-13
0
2
4
6
8
10
12
14
16
18
20

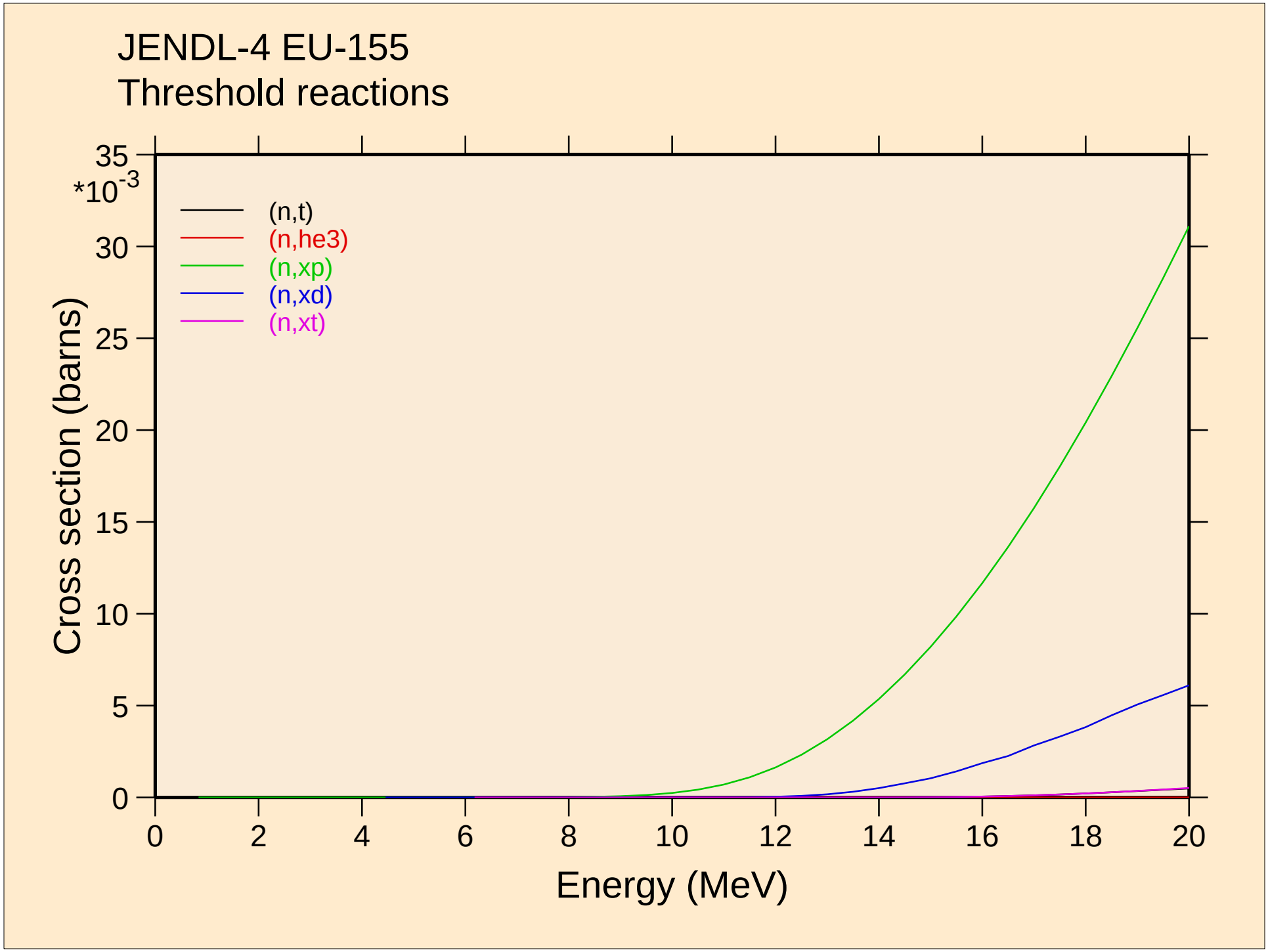

JENDL-4 EU-155
Inelastic levels
Cross section (barns)
Energy (MeV)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0
2
4
6
8
10
12
14
16
18
20
(n,n*1)
(n,n*2)
(n,n*3)
(n,n*4)
(n,n*5)

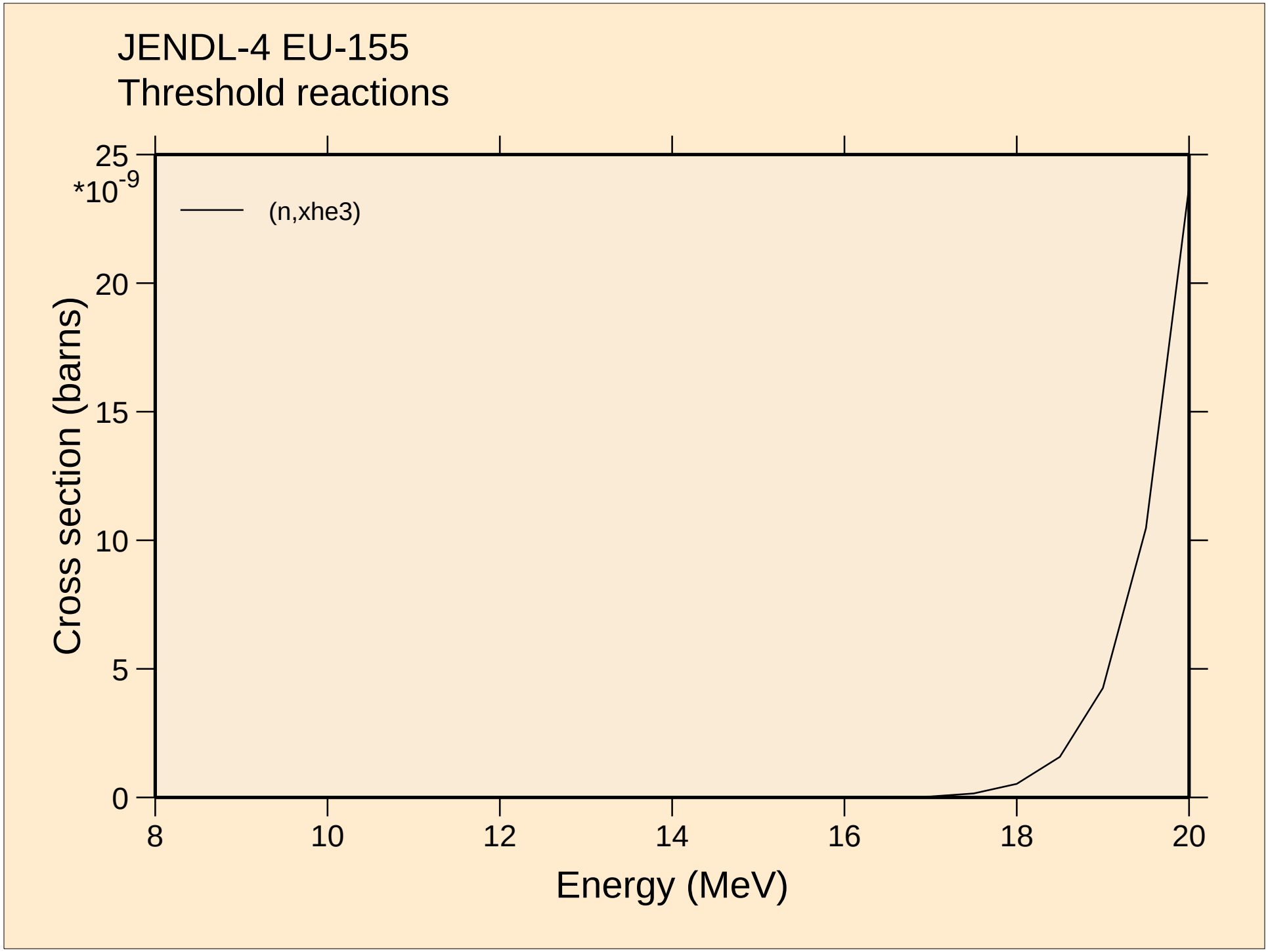

JENDL-4 EU-155
Inelastic levels
300
*10-3
250
200
150
100
50
0
Cross section (barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*6)
(n,n*7)
(n,n*8)
(n,n*9)
(n,n*10)

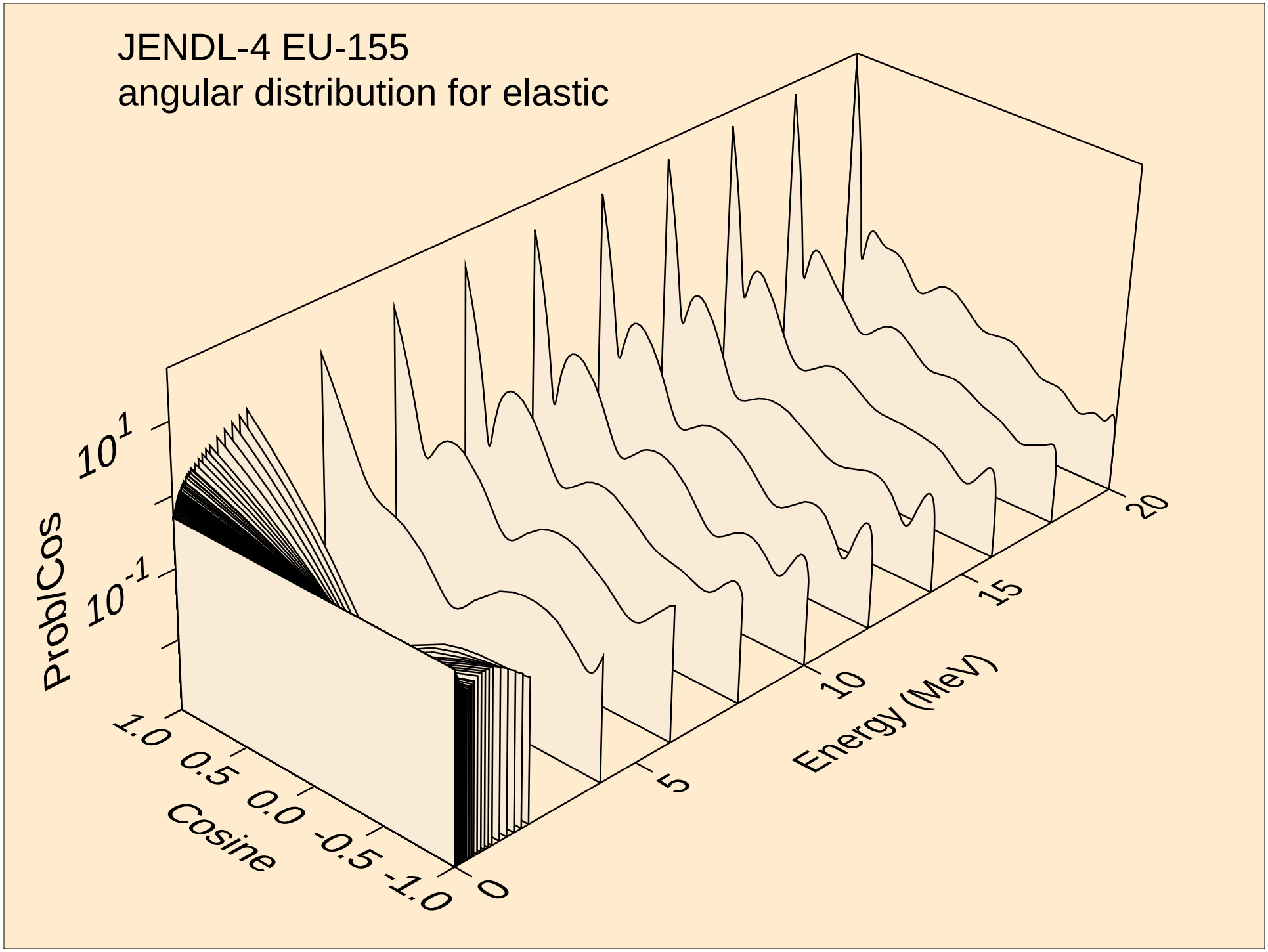

JENDL-4 EU-155
Inelastic levels
100
*10-3
80
60
40
20
0
Cross section (barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*11)
(n,n*12)
(n,n*13)

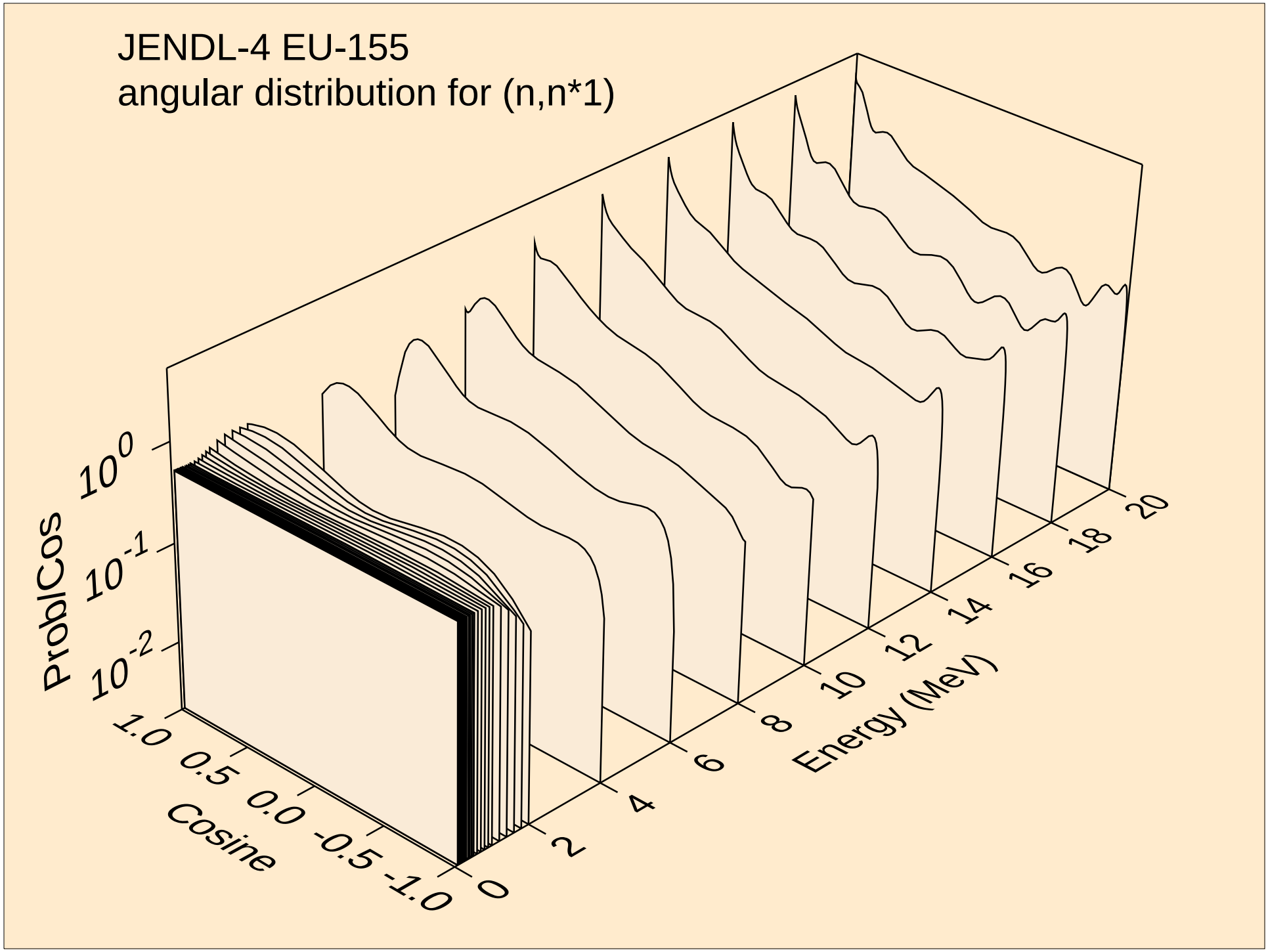

JENDL-4 EU-155
Threshold reactions
(n,2n)
(n,3n)
(n,n*)a
(n,n*)p
(n,n*)d
Cross section (barns)
Energy (MeV)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0
2
4
6
8
10
12
14
16
18
20

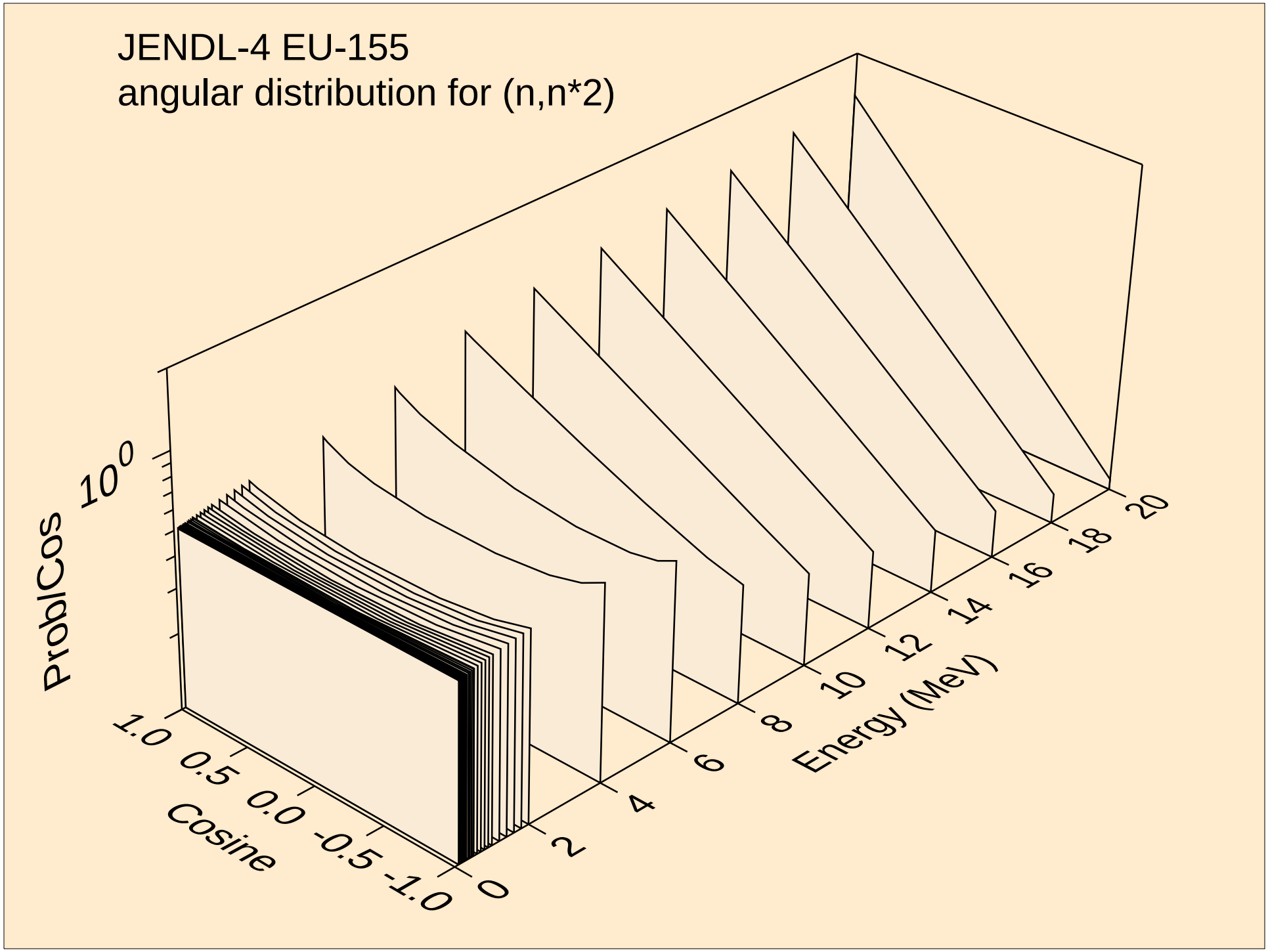

JENDL-4 EU-155
Threshold reactions
(n,n*)t
(n,2np)
(n,n*c)
(n,p)
(n,d)
Cross section (barns)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

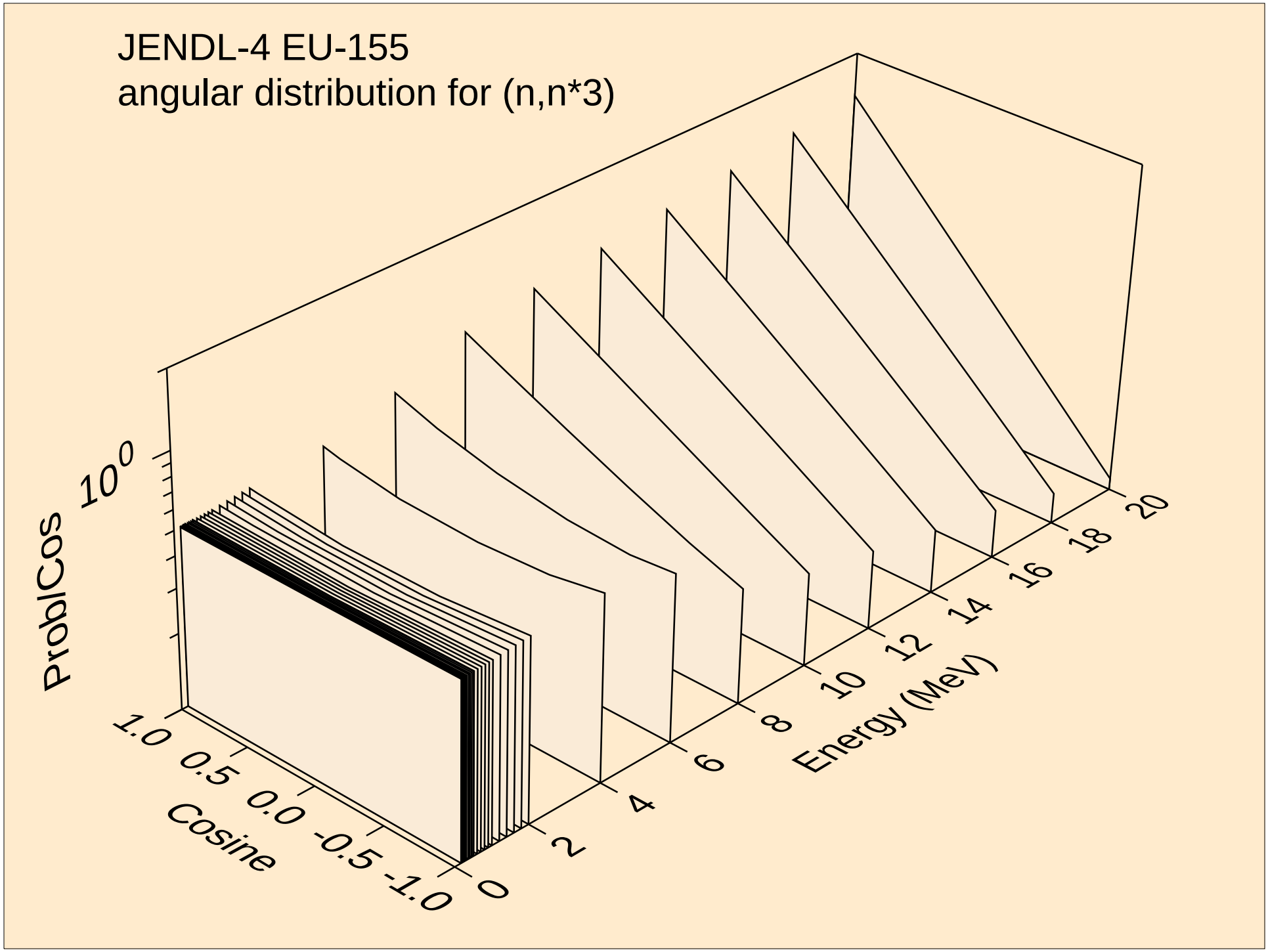

JENDL-4 EU-155
Threshold reactions
*10-3
35
30
25
20
15
10
5
0
Cross section (barns)
(n,t)
(n,he3)
(n,xp)
(n,xd)
(n,xt)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

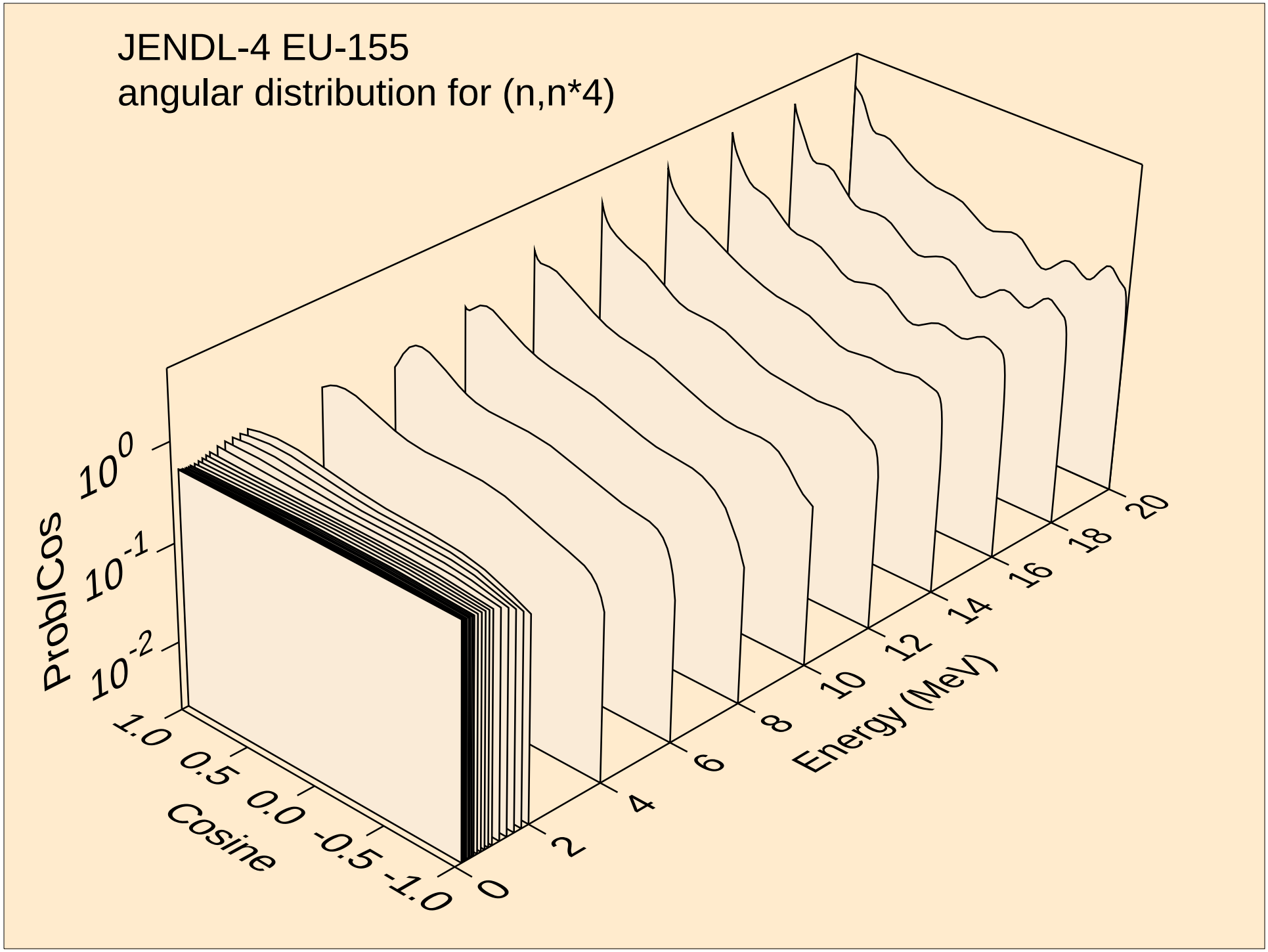

JENDL-4 EU-155
Threshold reactions
(n,xhe3)
Cross section (barns)
*10^-9
25
20
15
10
5
0
8
10
12
14
16
18
20
Energy (MeV)

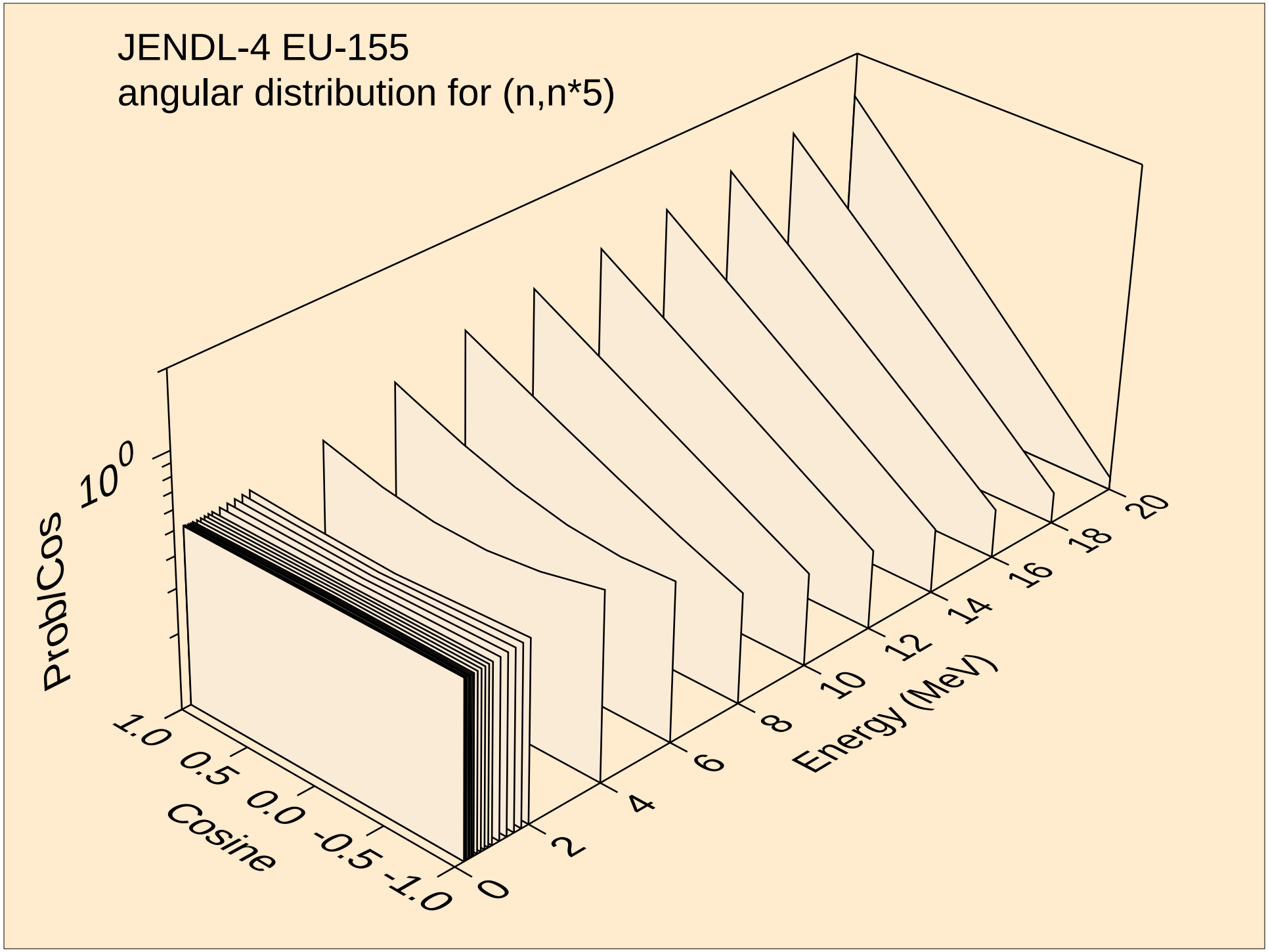

JENDL-4 EU-155
angular distribution for elastic
ProblCos
10^{1}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)

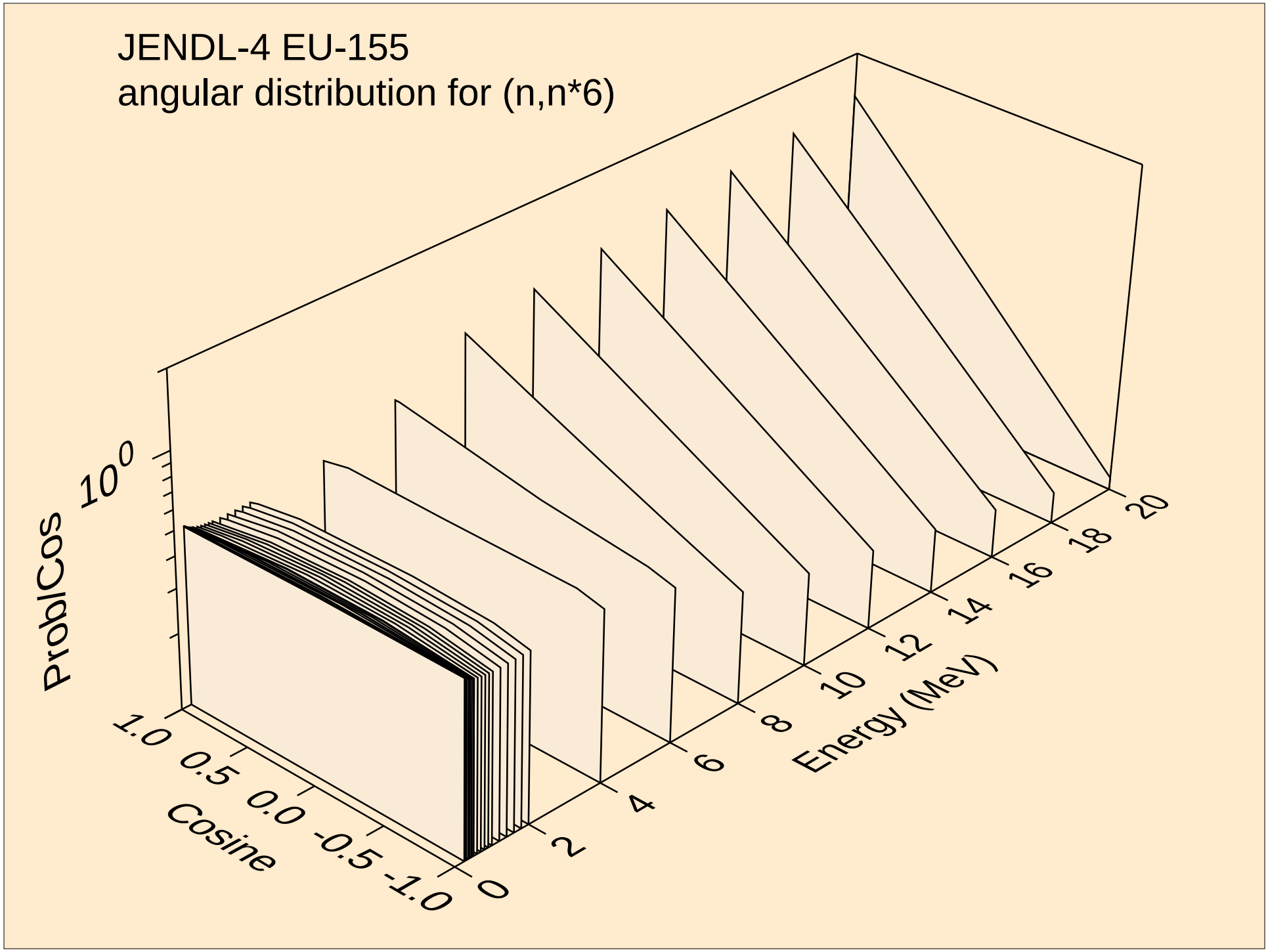

JENDL-4 EU-155
angular distribution for (n,n*1)
ProbCos
10^{0}
10^{-1}
10^{-2}
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

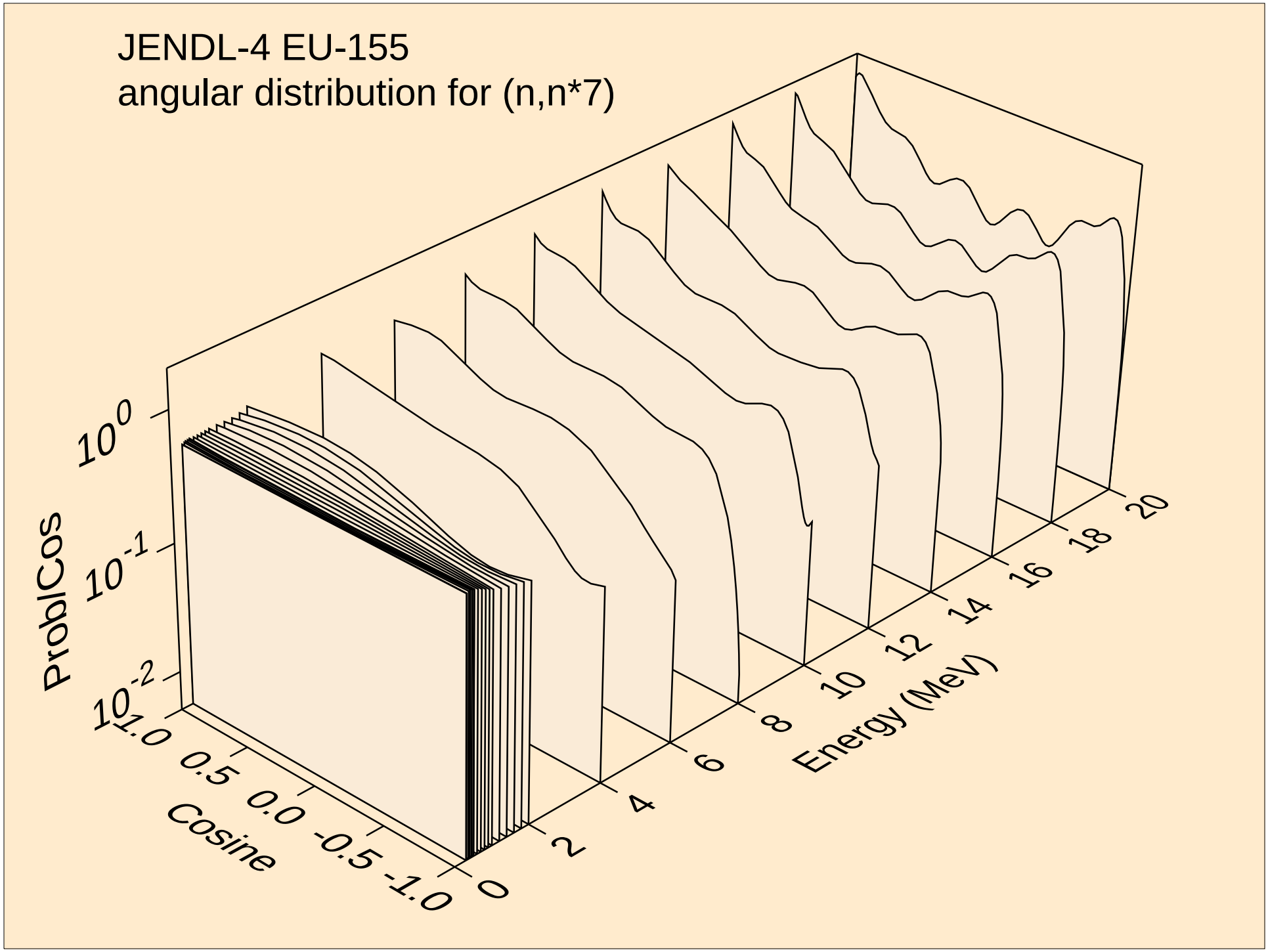

JENDL-4 EU-155
angular distribution for (n,n*2)
ProbCos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

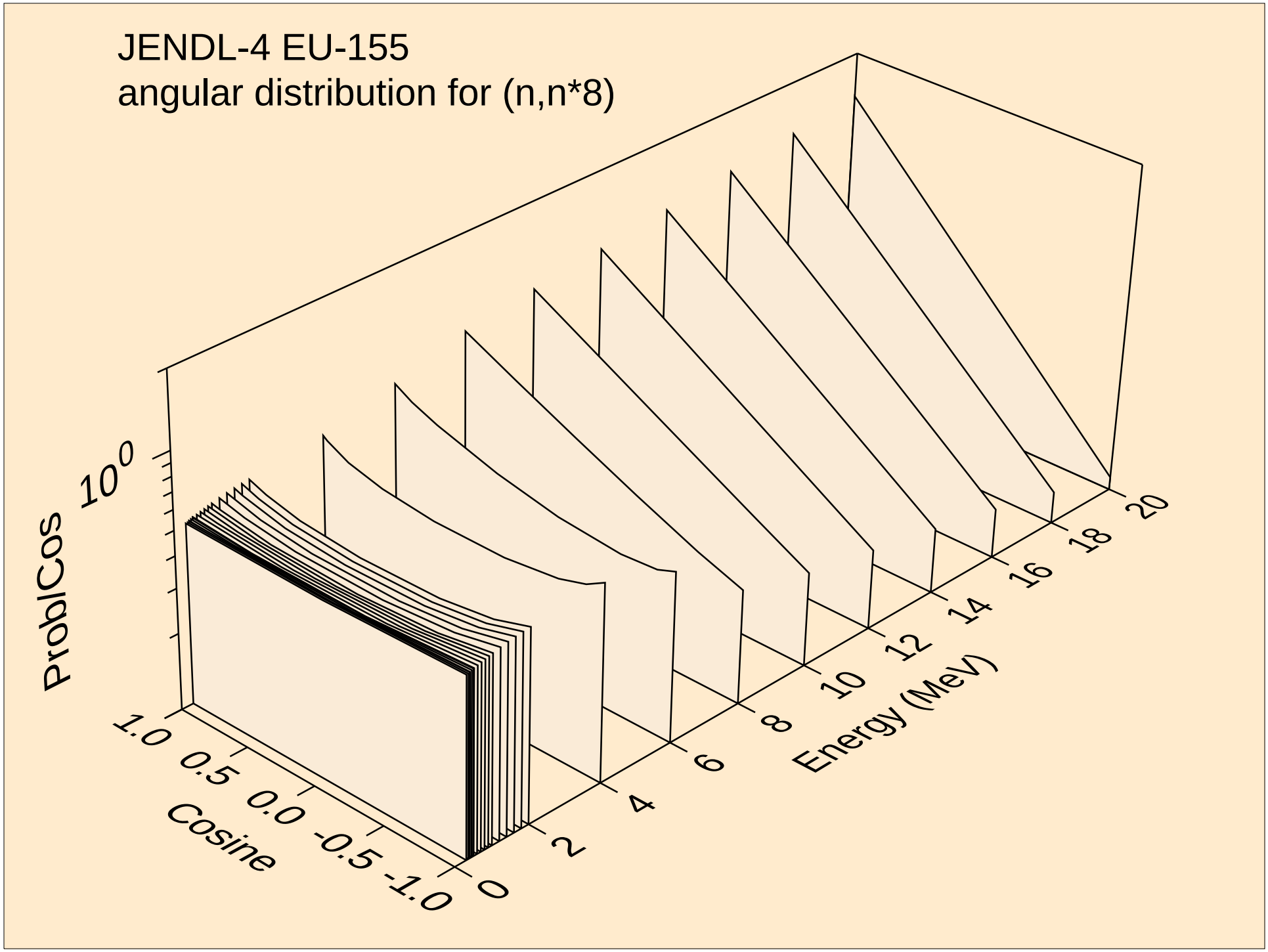

JENDL-4 EU-155
angular distribution for (n,n*3)
ProbCos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

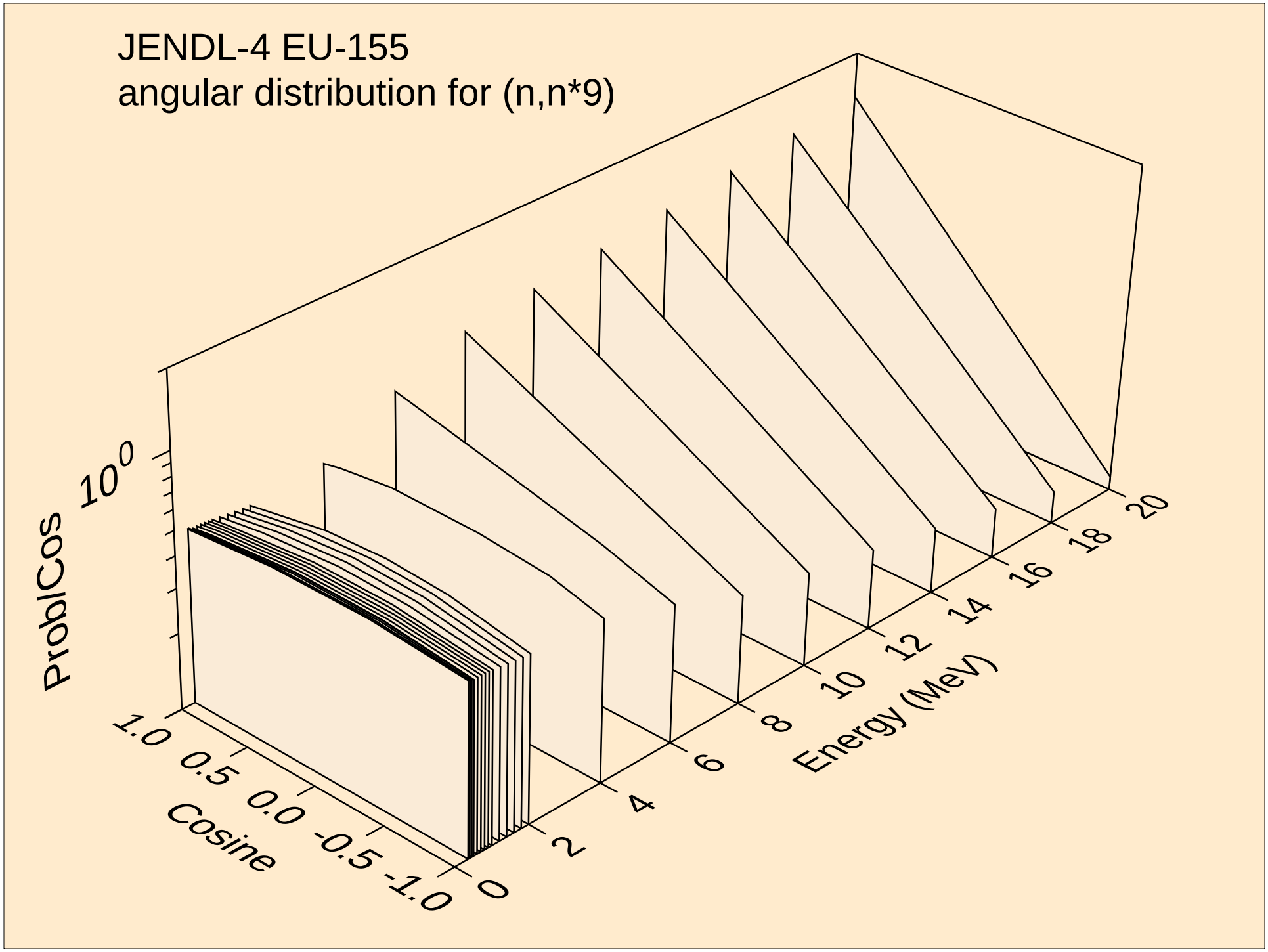

JENDL-4 EU-155
angular distribution for (n,n*4)
ProbCos
10^{0}
10^{-1}
10^{-2}
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

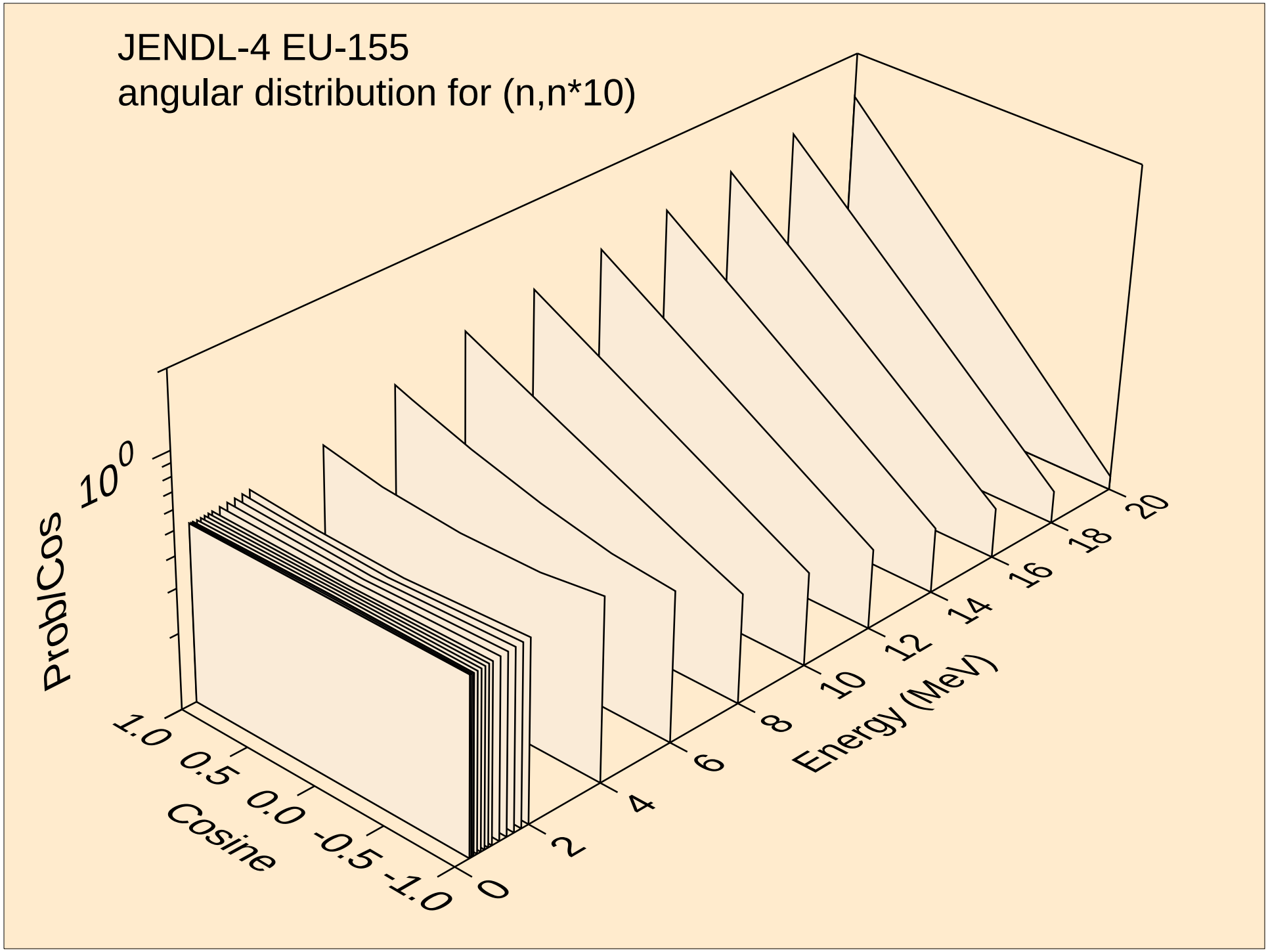

JENDL-4 EU-155
angular distribution for (n,n*5)
ProbCos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

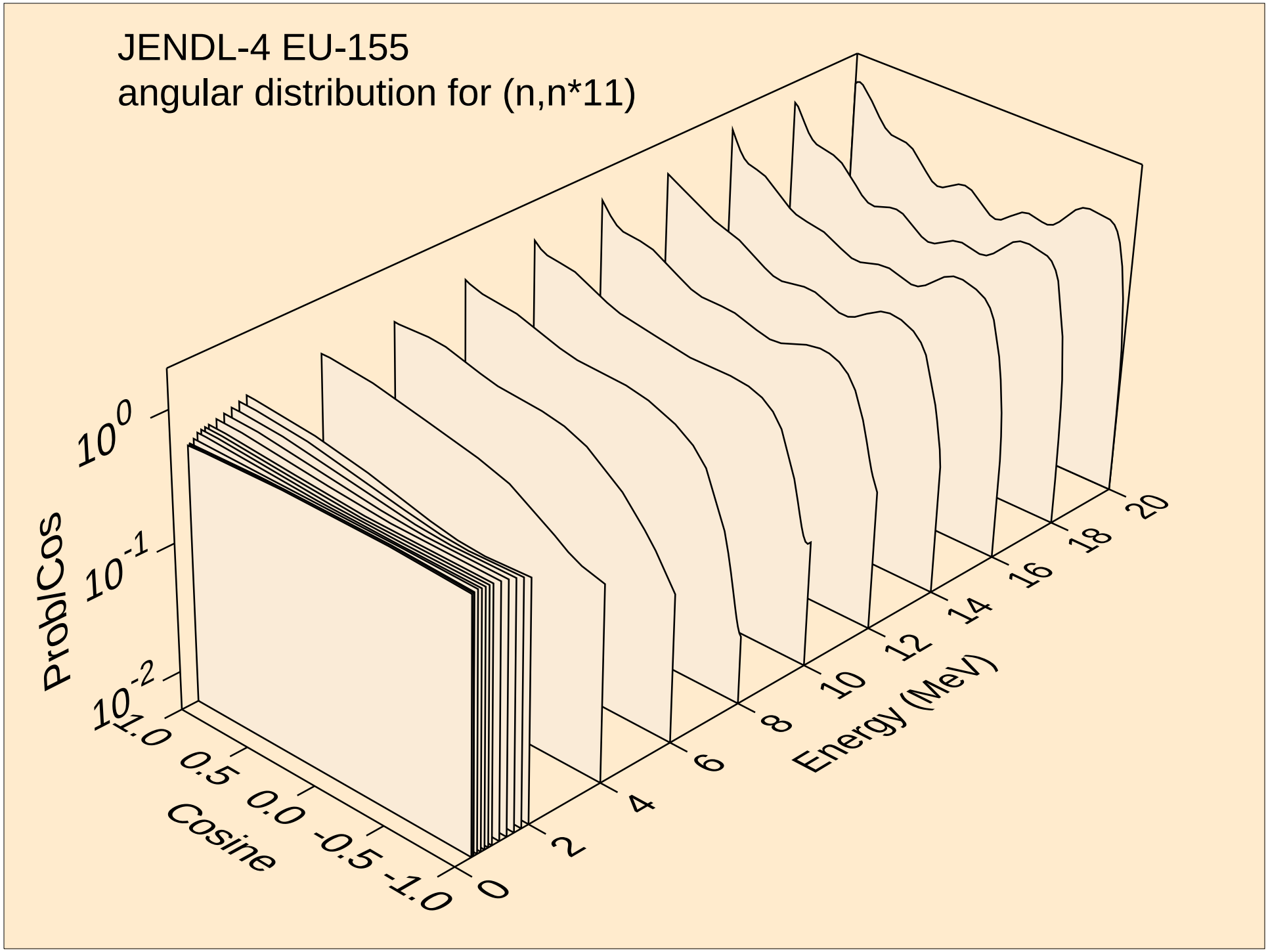

JENDL-4 EU-155
angular distribution for (n,n*6)
ProbCos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

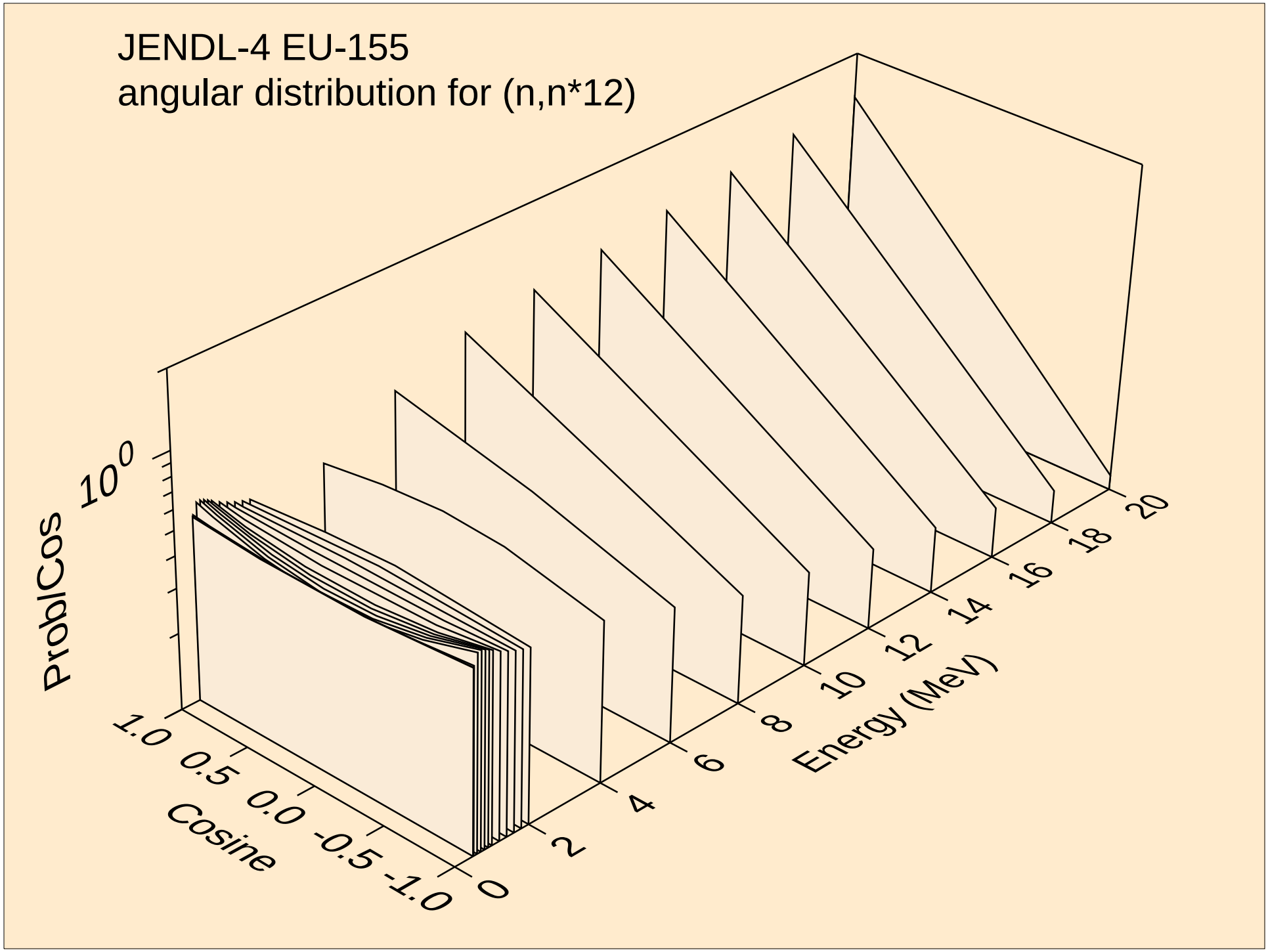

JENDL-4 EU-155
angular distribution for (n,n*7)
ProbCos
10^{0}
10^{-1}
10^{-2}
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

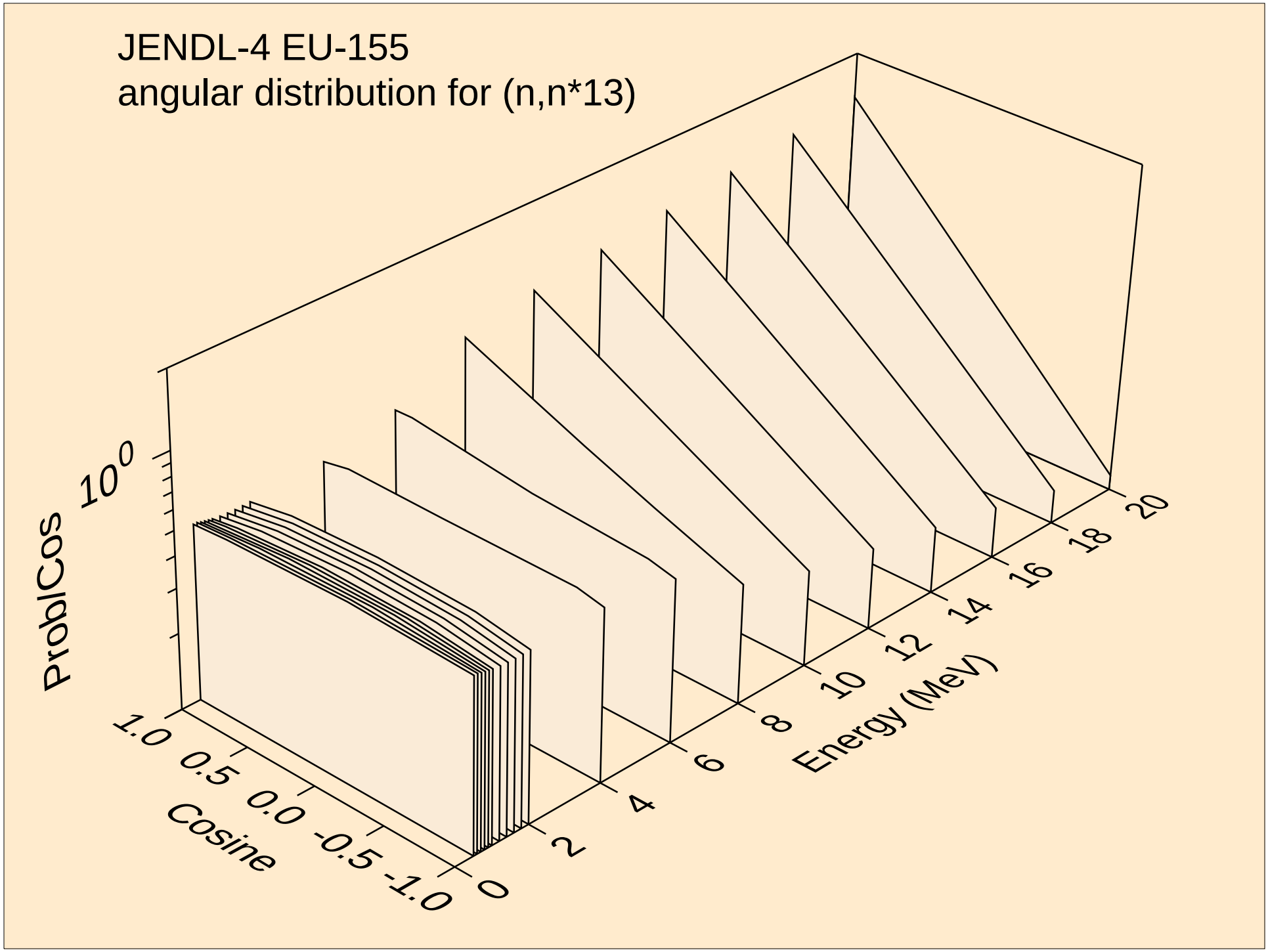

JENDL-4 EU-155
angular distribution for (n,n*8)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

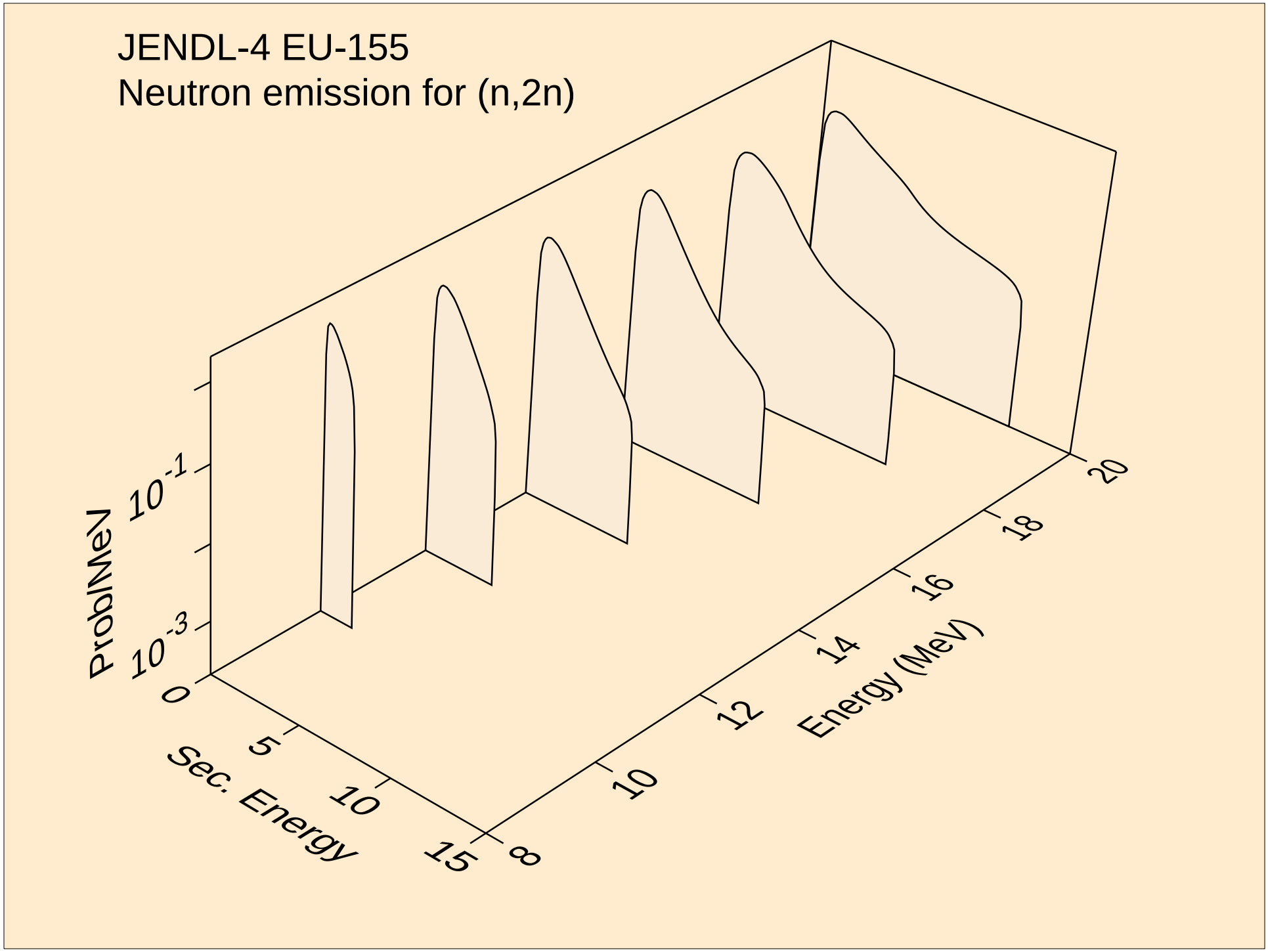

JENDL-4 EU-155
angular distribution for (n,n*9)
ProblCos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

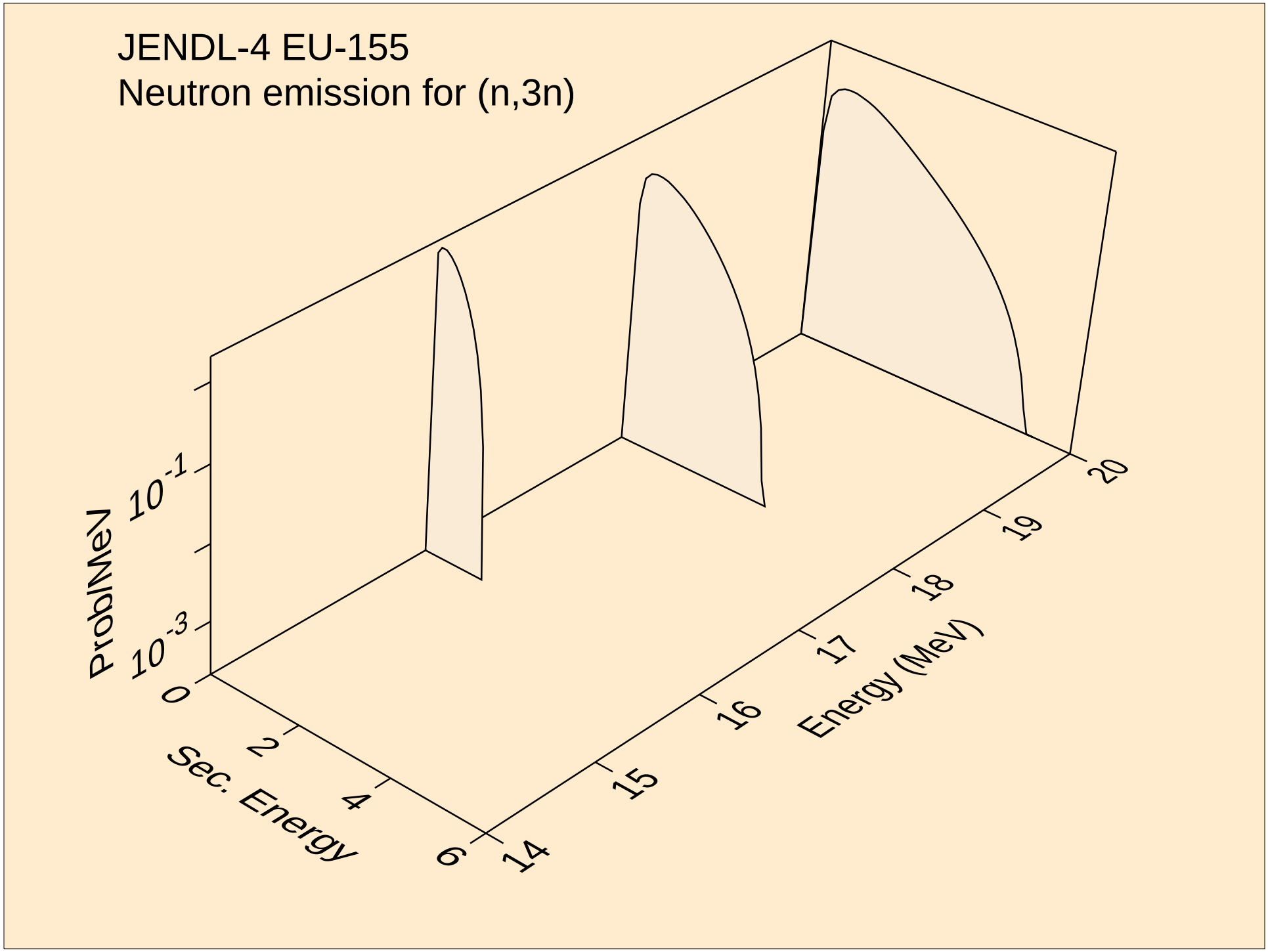

JENDL-4 EU-155
angular distribution for (n,n*10)
ProbCos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

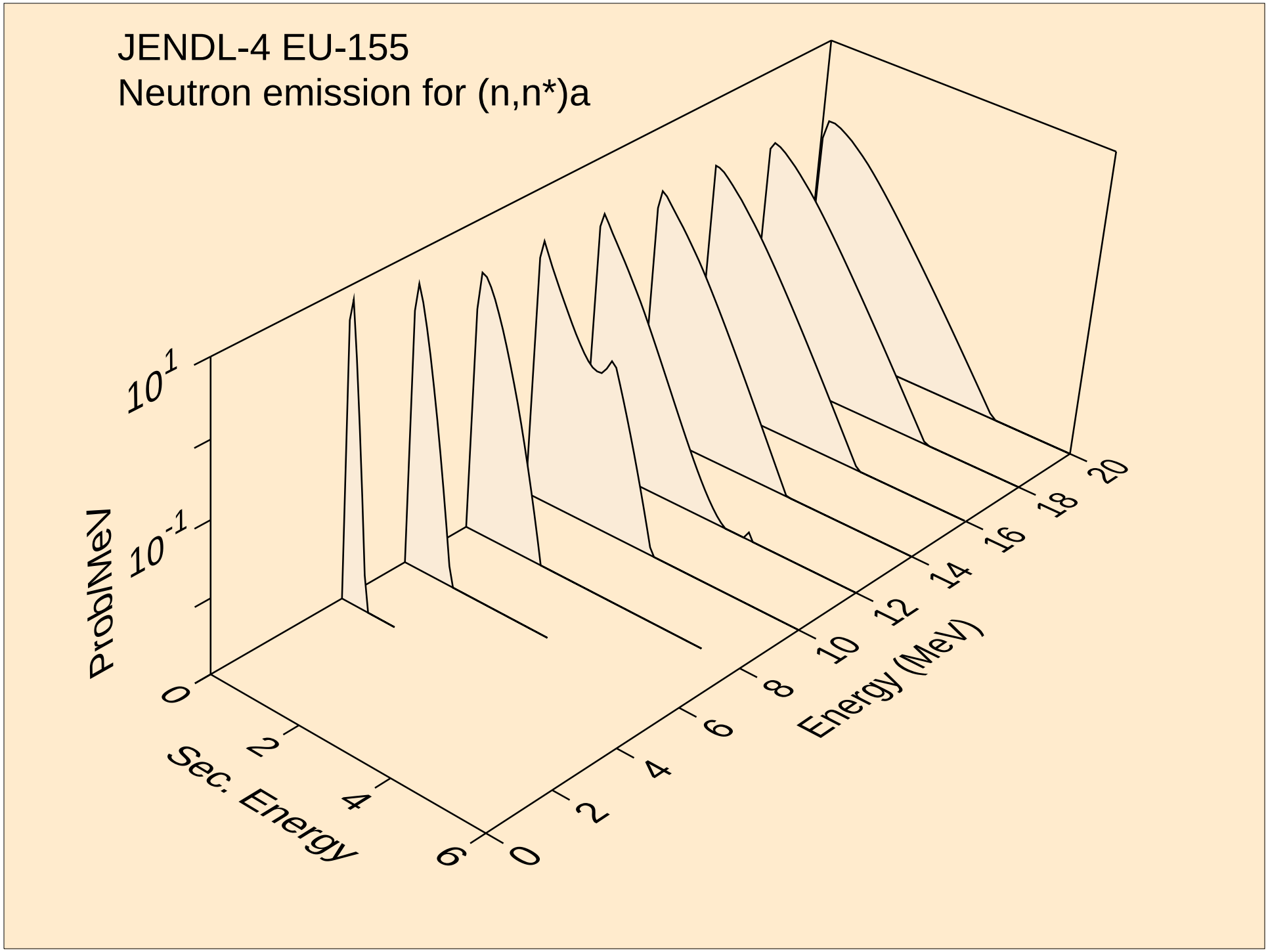

JENDL-4 EU-155
angular distribution for (n,n*11)
ProbCos
10^{0}
10^{-1}
10^{-2}
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

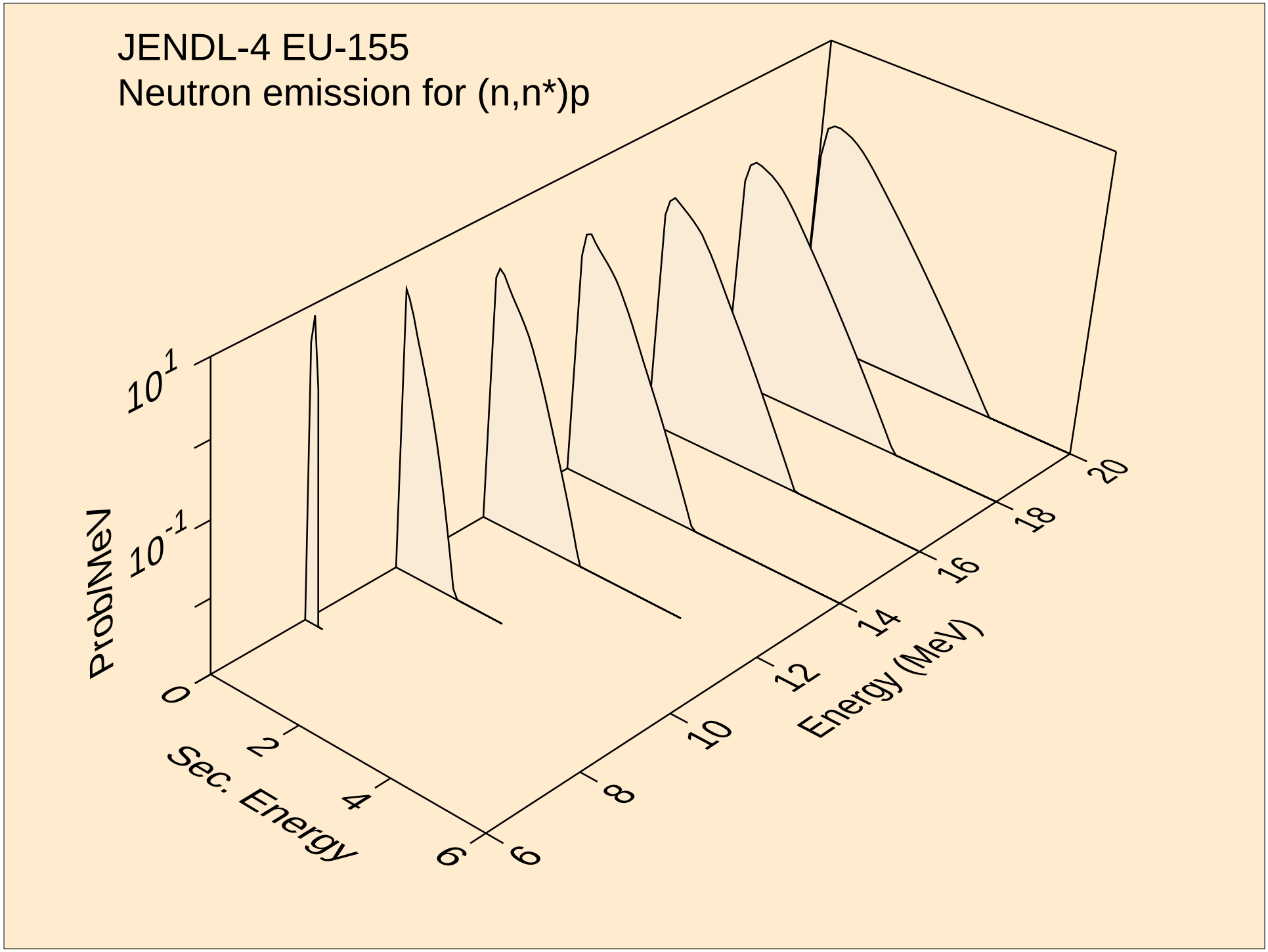

JENDL-4 EU-155
angular distribution for (n,n*12)
ProblCos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

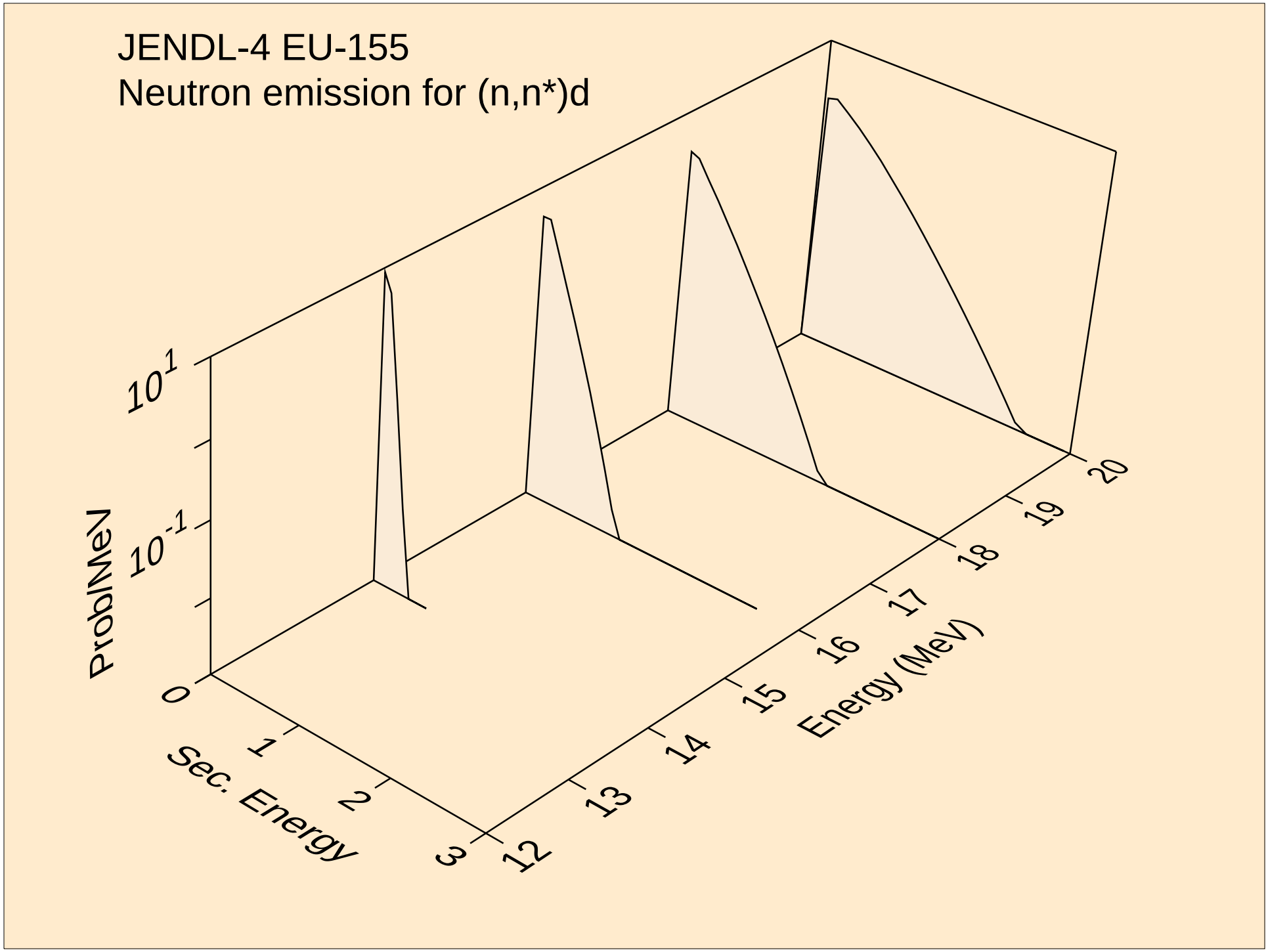

JENDL-4 EU-155
angular distribution for (n,n*13)
ProblCos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20


JENDL-4 EU-155
Neutron emission for (n,2n)
Prob/MeV
10-1
10-3
0
5
10
15
Sec. Energy
8
10
12
14
16
18
20
Energy (MeV)

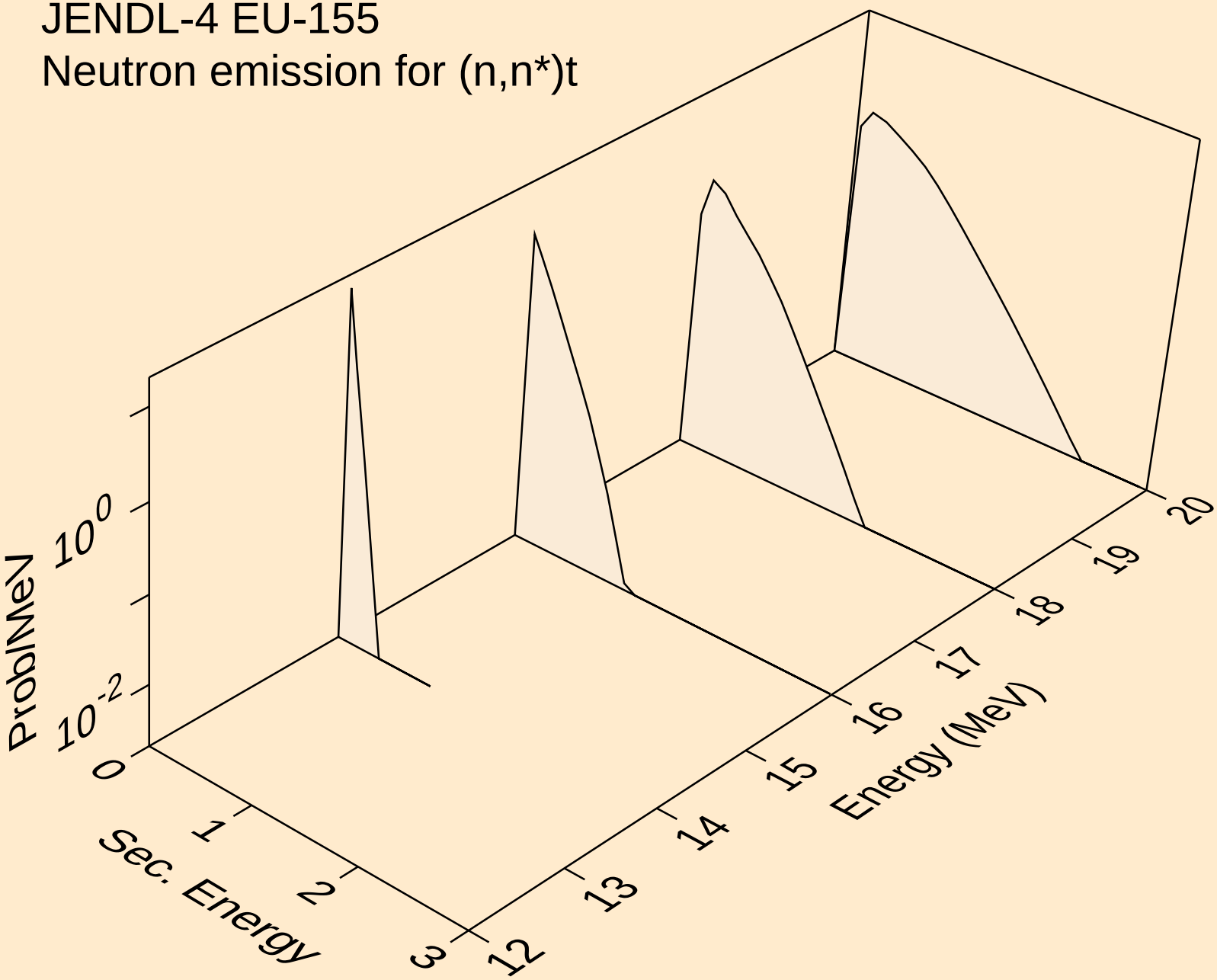

JENDL-4 EU-155
Neutron emission for (n,3n)
Prob/MeV
10-1
10-3
0
2
4
6
Sec. Energy
14
15
16
17
18
19
20
Energy (MeV)

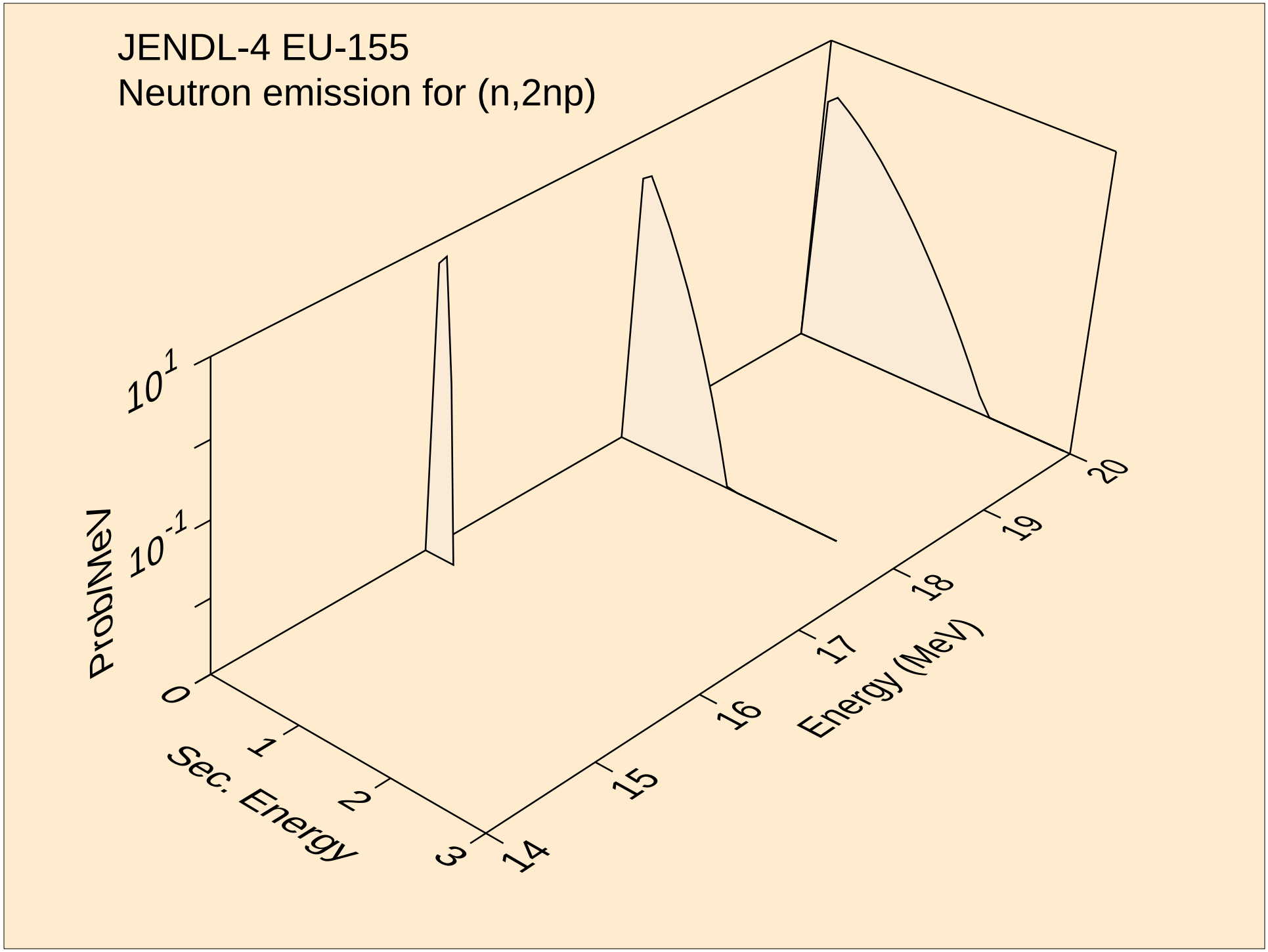

JENDL-4 EU-155
Neutron emission for (n,n*)a
Prob/MeV
10^{1}
10^{-1}
0
2
4
6
Sec. Energy
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

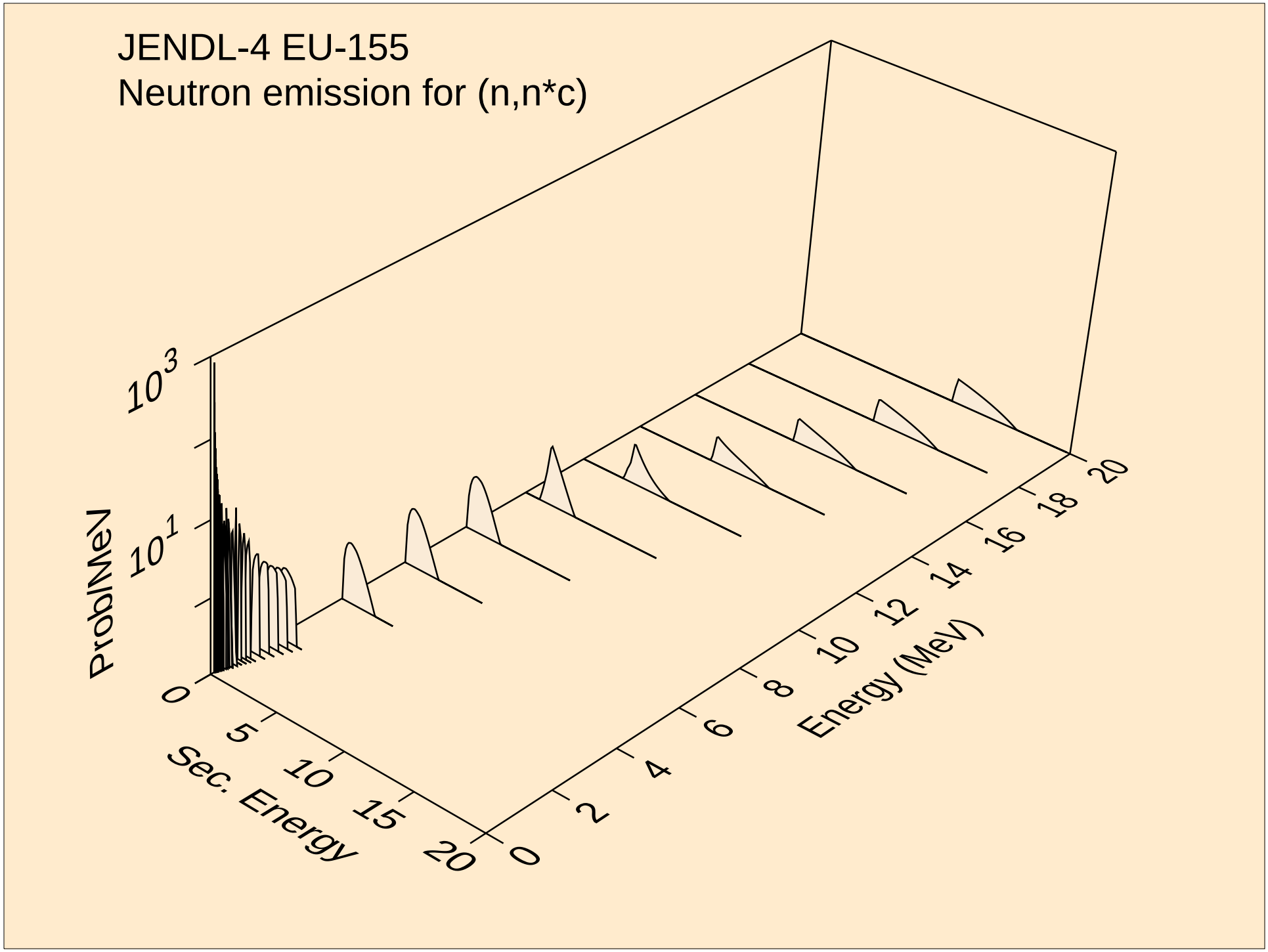

JENDL-4 EU-155
Neutron emission for (n,n*)p
Prob/MeV
10^{1}
10^{-1}
0
Sec. Energy
2
4
6
Energy (MeV)
6
8
10
12
14
16
18
20

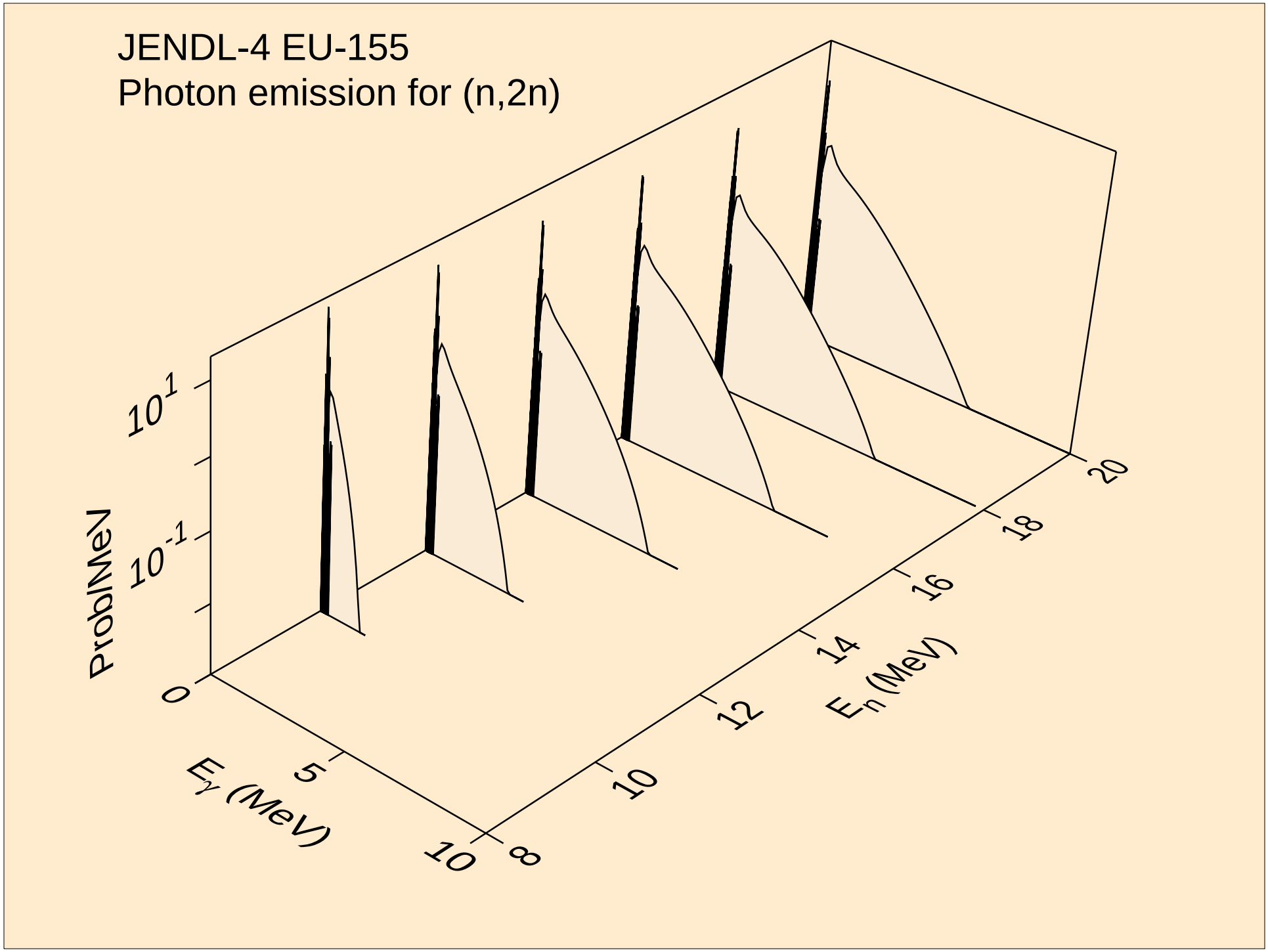

JENDL-4 EU-155
Neutron emission for (n,n*)d
Prob/MeV
10^1
10^-1
0
Sec. Energy
1
2
3
Energy (MeV)
12
13
14
15
16
17
18
19
20

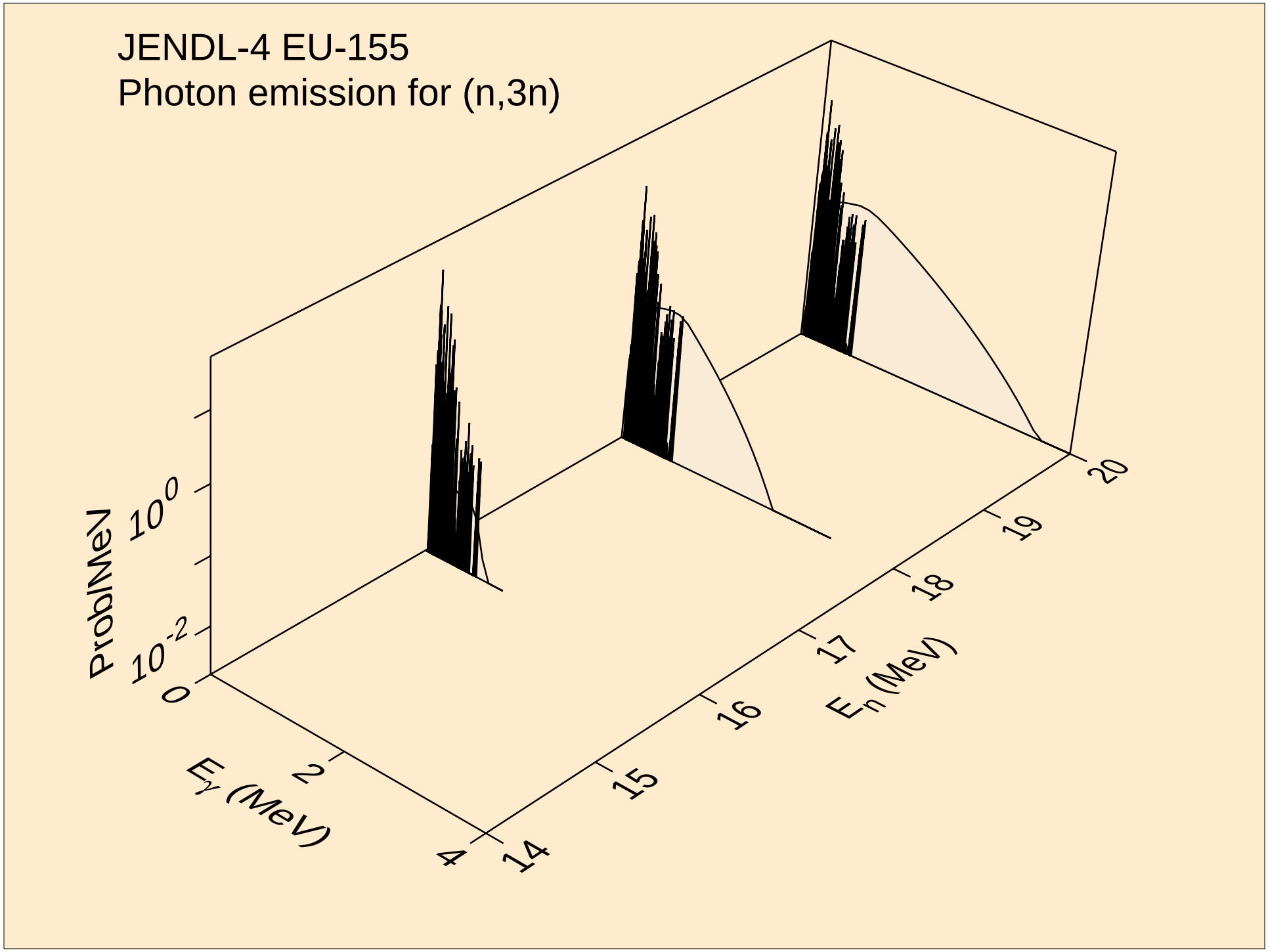
JENDL-4 EU-155
Neutron emission for (n,n*)t

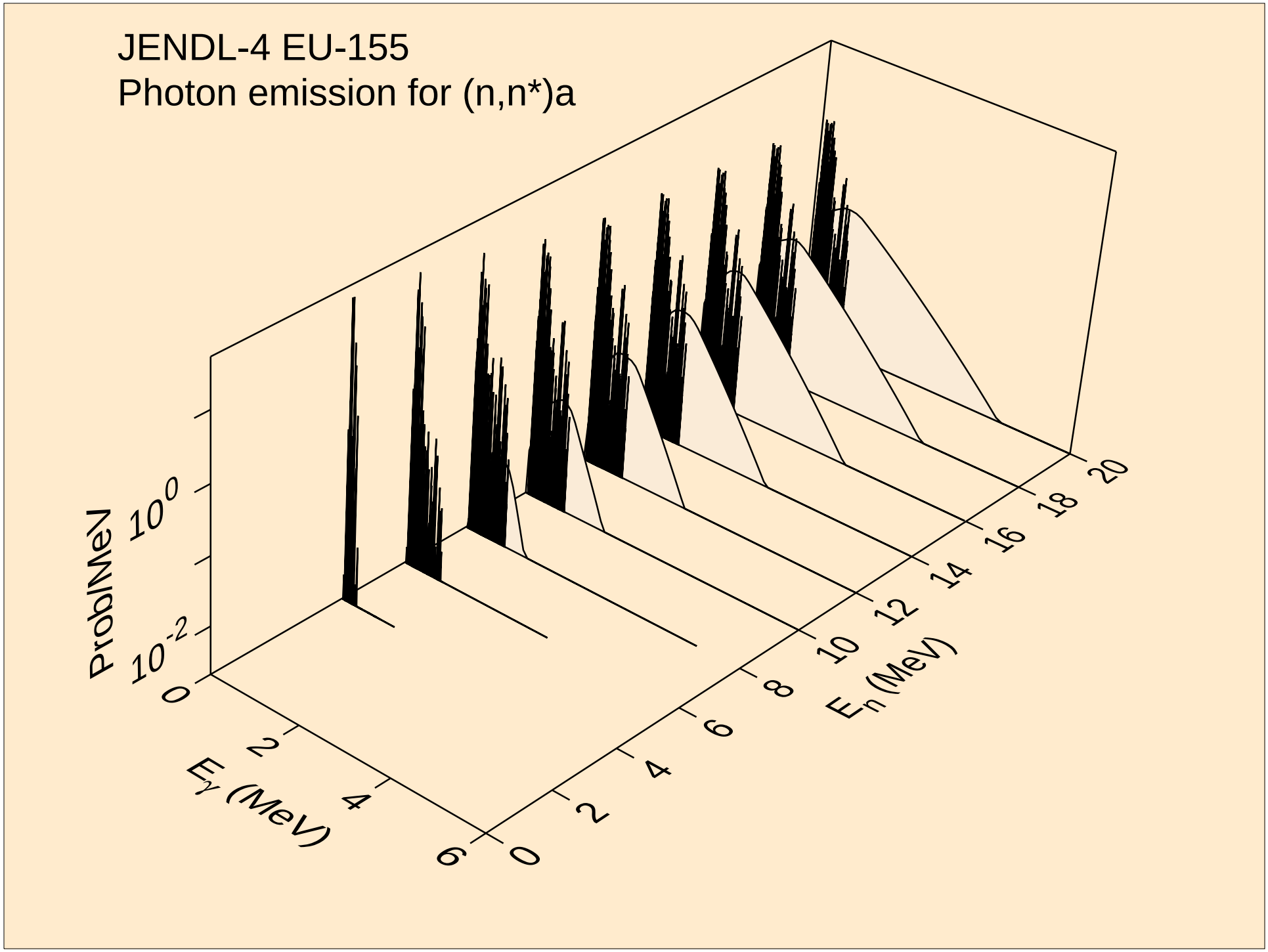


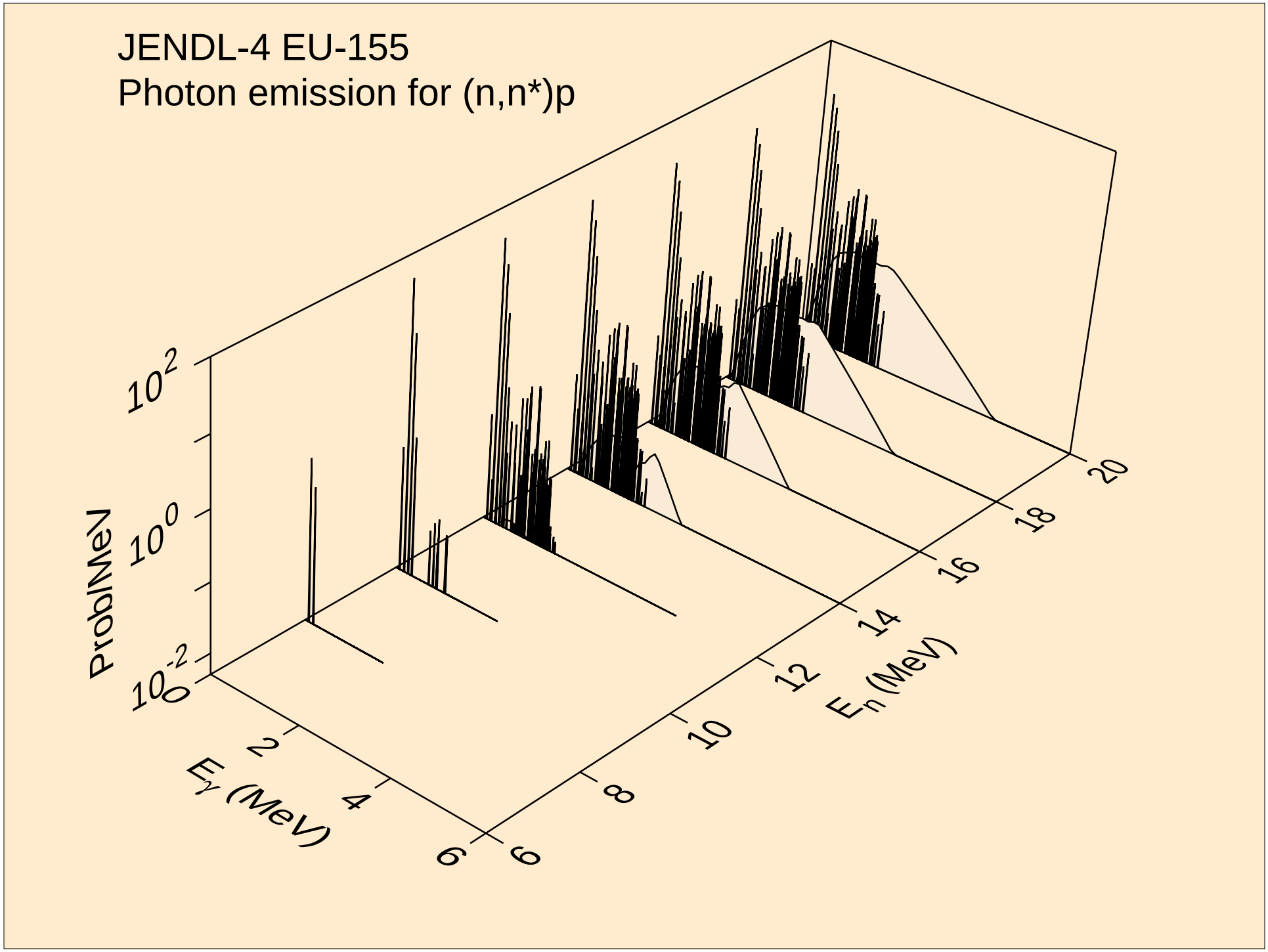

JENDL-4 EU-155
Neutron emission for (n,2np)
Prob/MeV
10^{1}
10^{-1}
0
Sec. Energy
1
2
3
Energy (MeV)
14
15
16
17
18
19
20

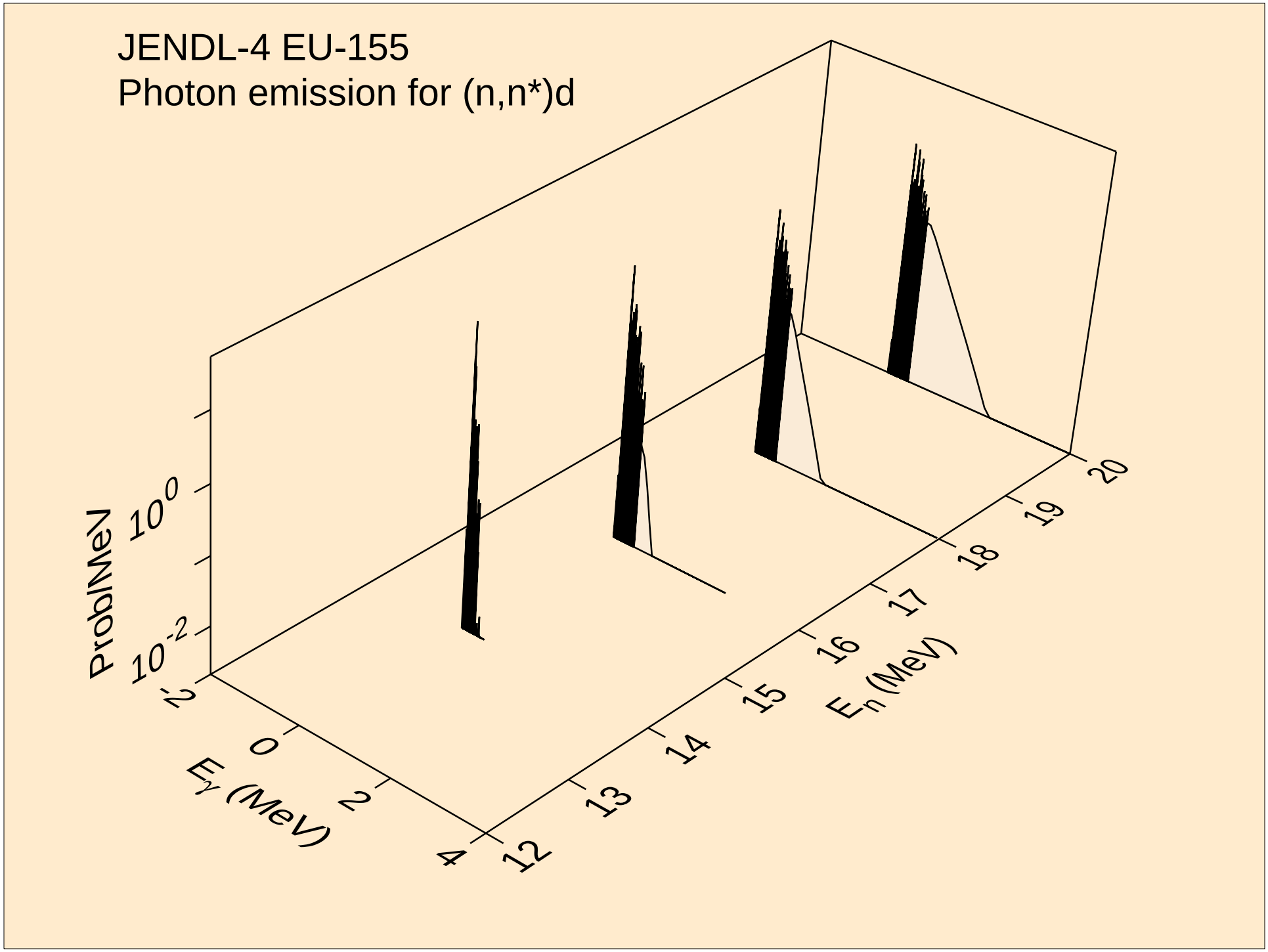

JENDL-4 EU-155
Neutron emission for (n,n*c)
Prob/MeV
10^3
10^1
0
Sec. Energy
5
10
15
20
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

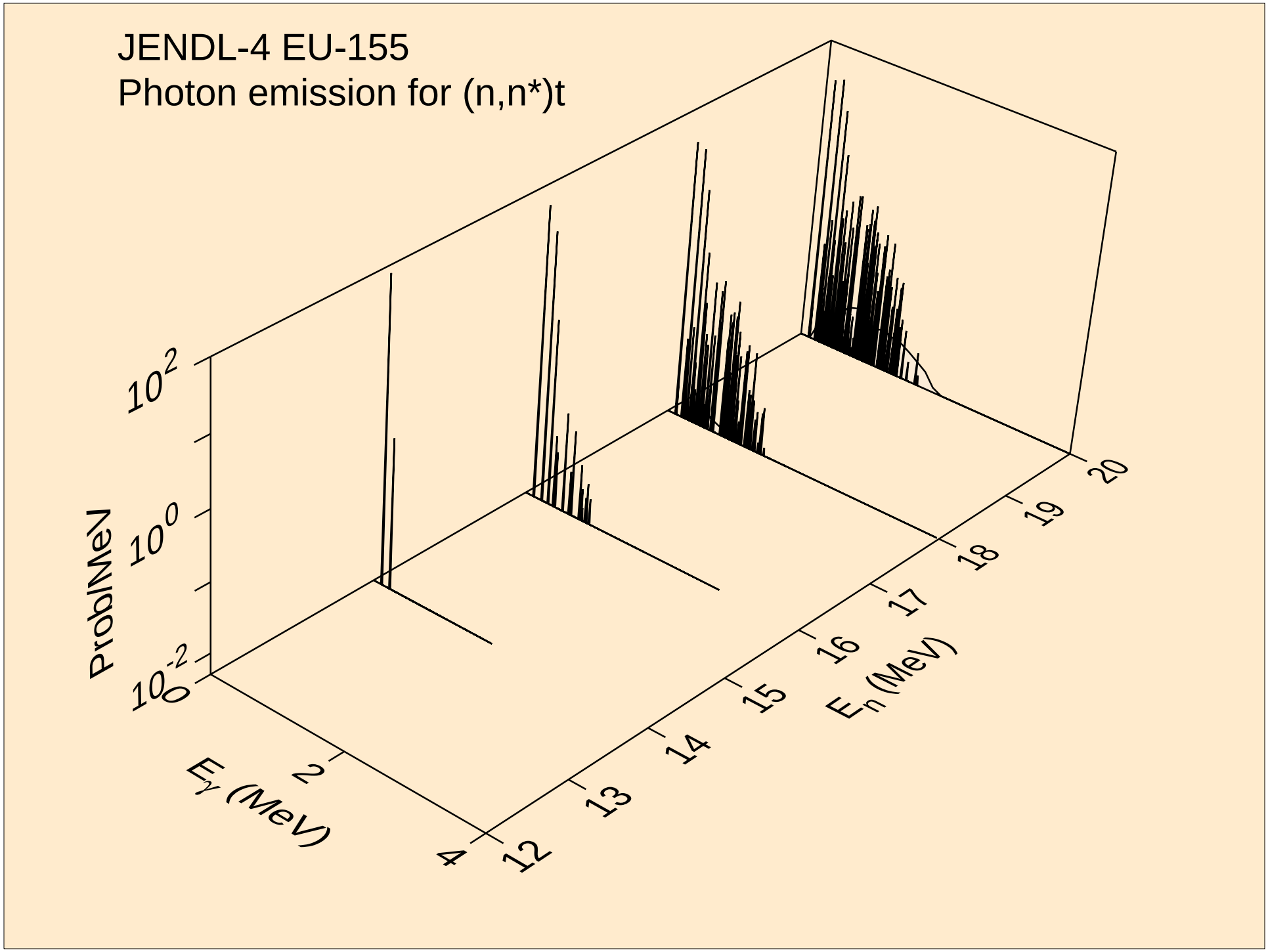

JENDL-4 EU-155
Photon emission for (n,2n)
Prob/MeV
10^{1}
10^{-1}
0
5
10
E_γ (MeV)
8
10
12
14
16
18
20
E_n (MeV)

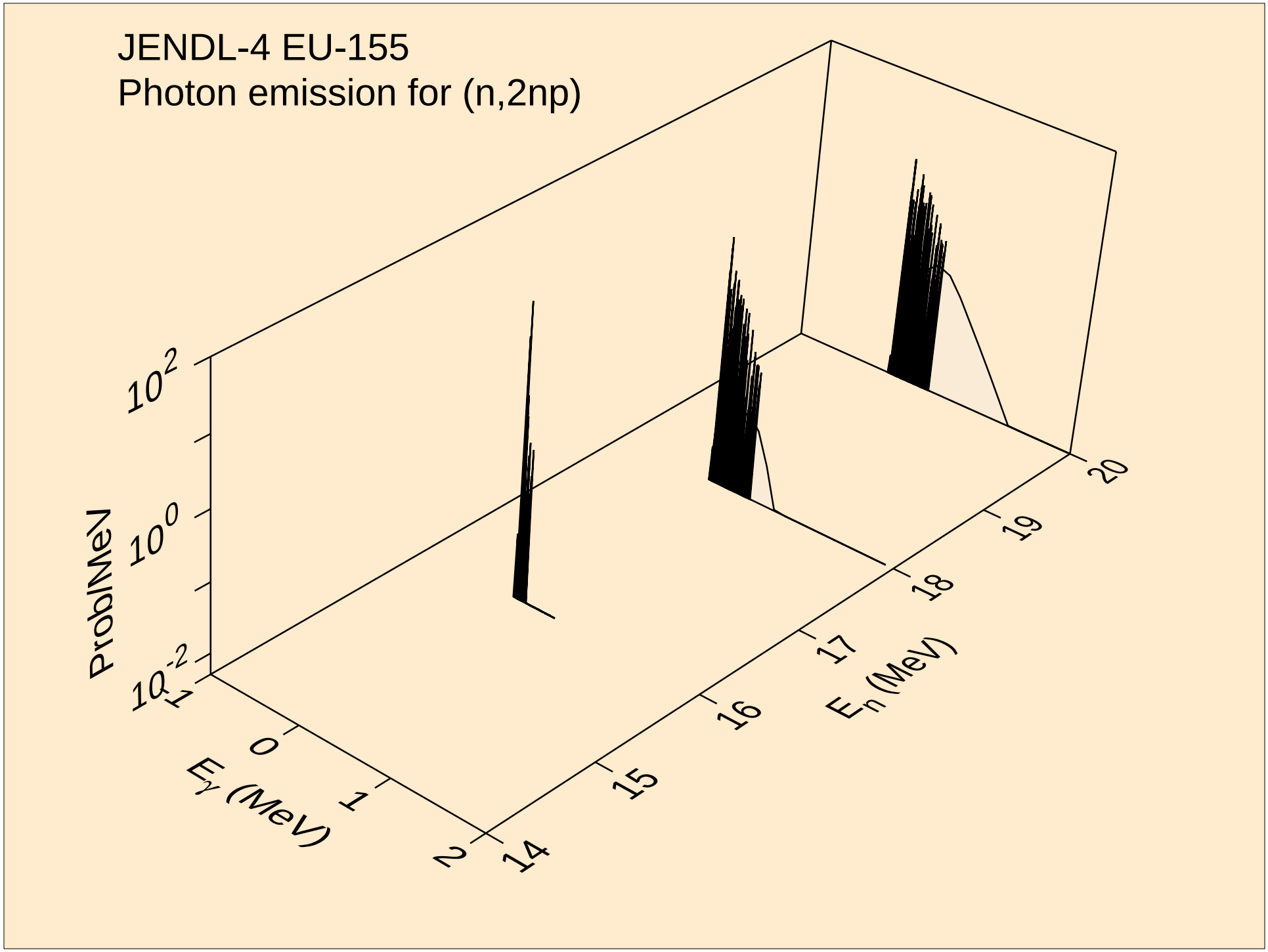

JENDL-4 EU-155
Photon emission for (n,3n)
Prob/MeV
10^0
10^{-2}
0
2
4
E_γ (MeV)
14
15
16
17
18
19
20
E_n (MeV)

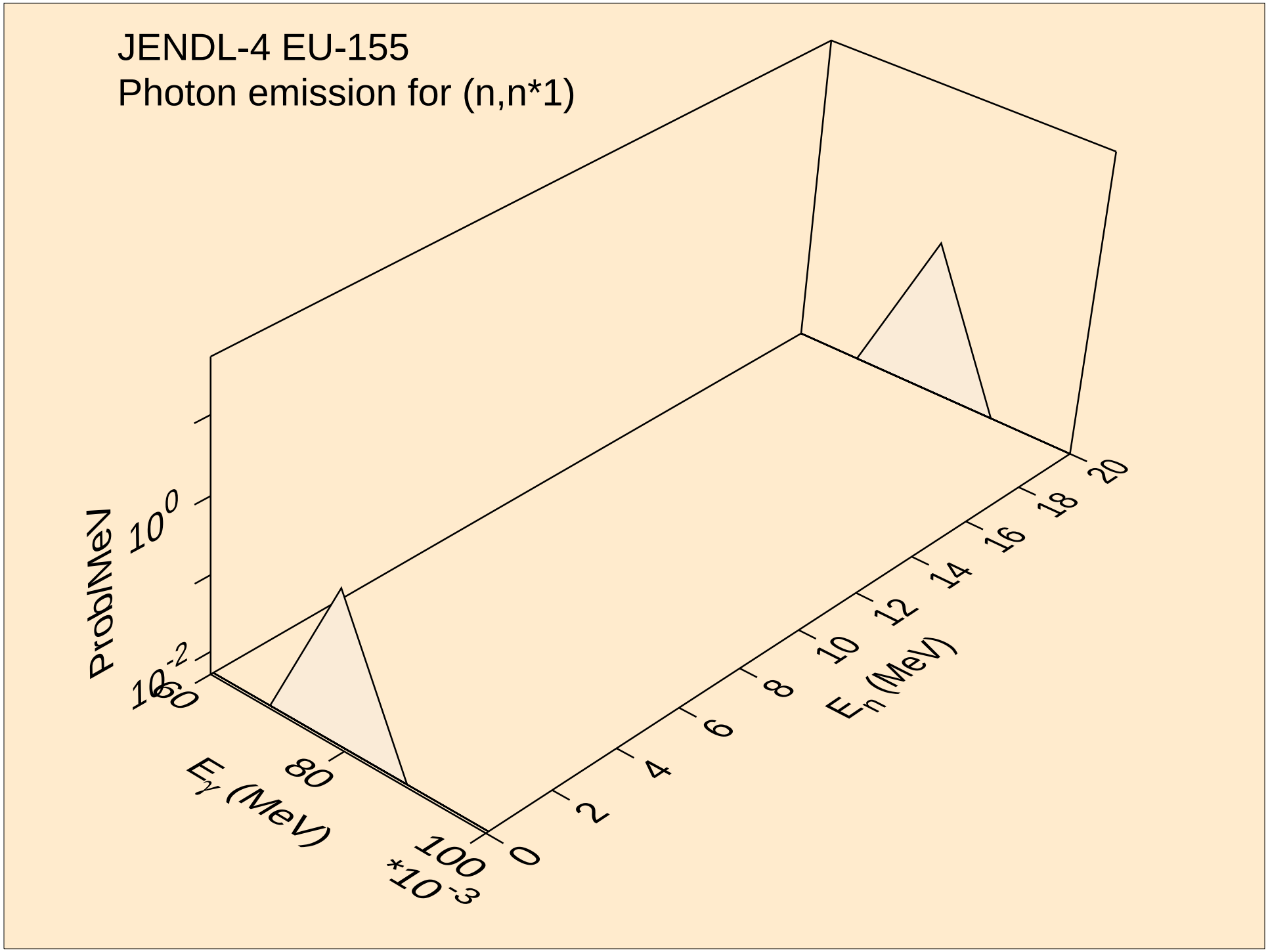

JENDL-4 EU-155
Photon emission for (n,n*)a
Prob/MeV
10^0
10^{-2}
0
2
4
6
E_γ (MeV)
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

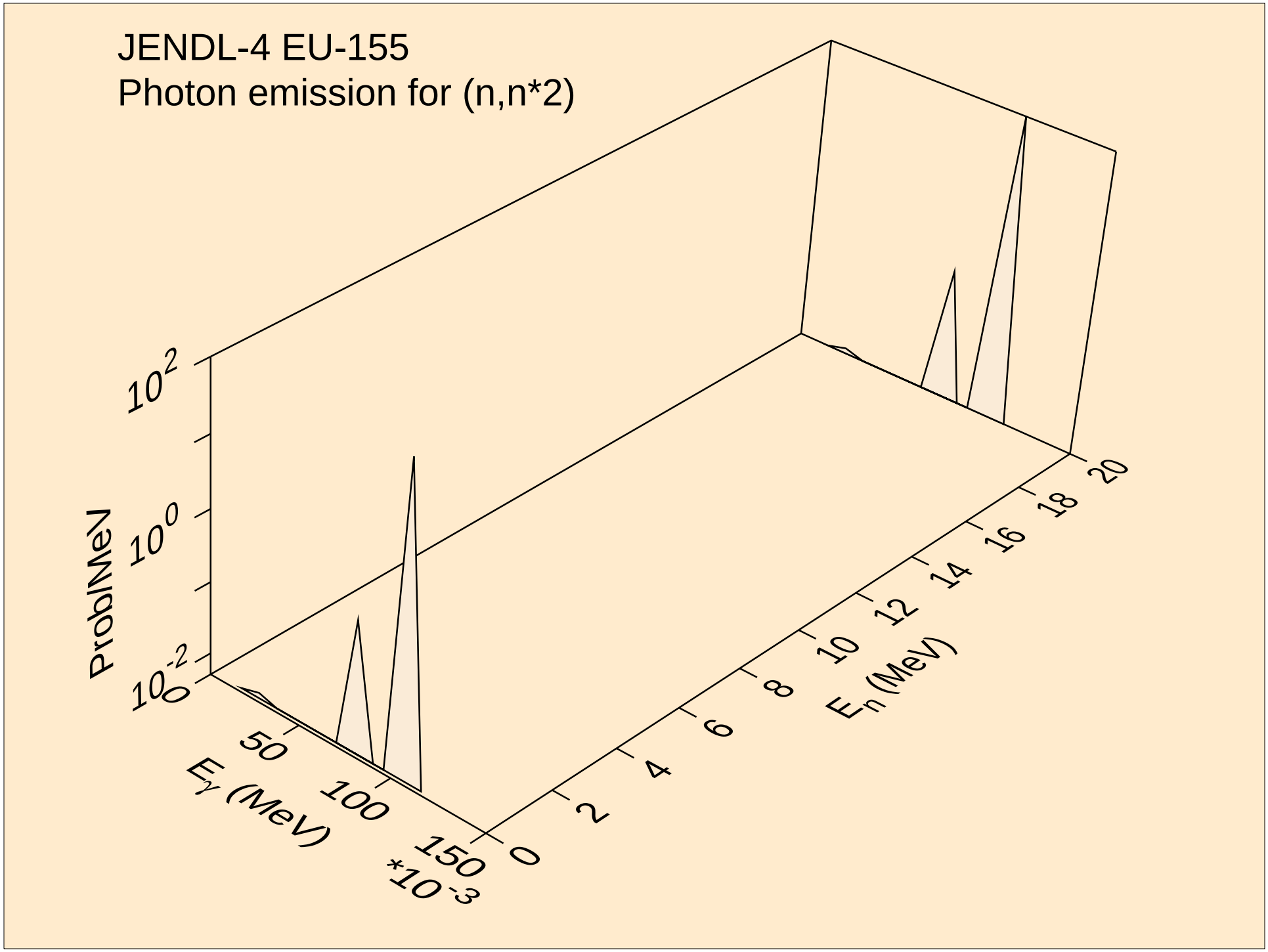

JENDL-4 EU-155
Photon emission for (n,n*)p
Prob/MeV
10^{2}
10^{0}
10^{-2}
E_γ (MeV)
0
2
4
6
E_n (MeV)
6
8
10
12
14
16
18
20


JENDL-4 EU-155
Photon emission for (n,n*)d
Prob/MeV
10^{0}
10^{-2}
-2
0
2
4
E_γ (MeV)
12
13
14
15
16
17
18
19
20
E_n (MeV)

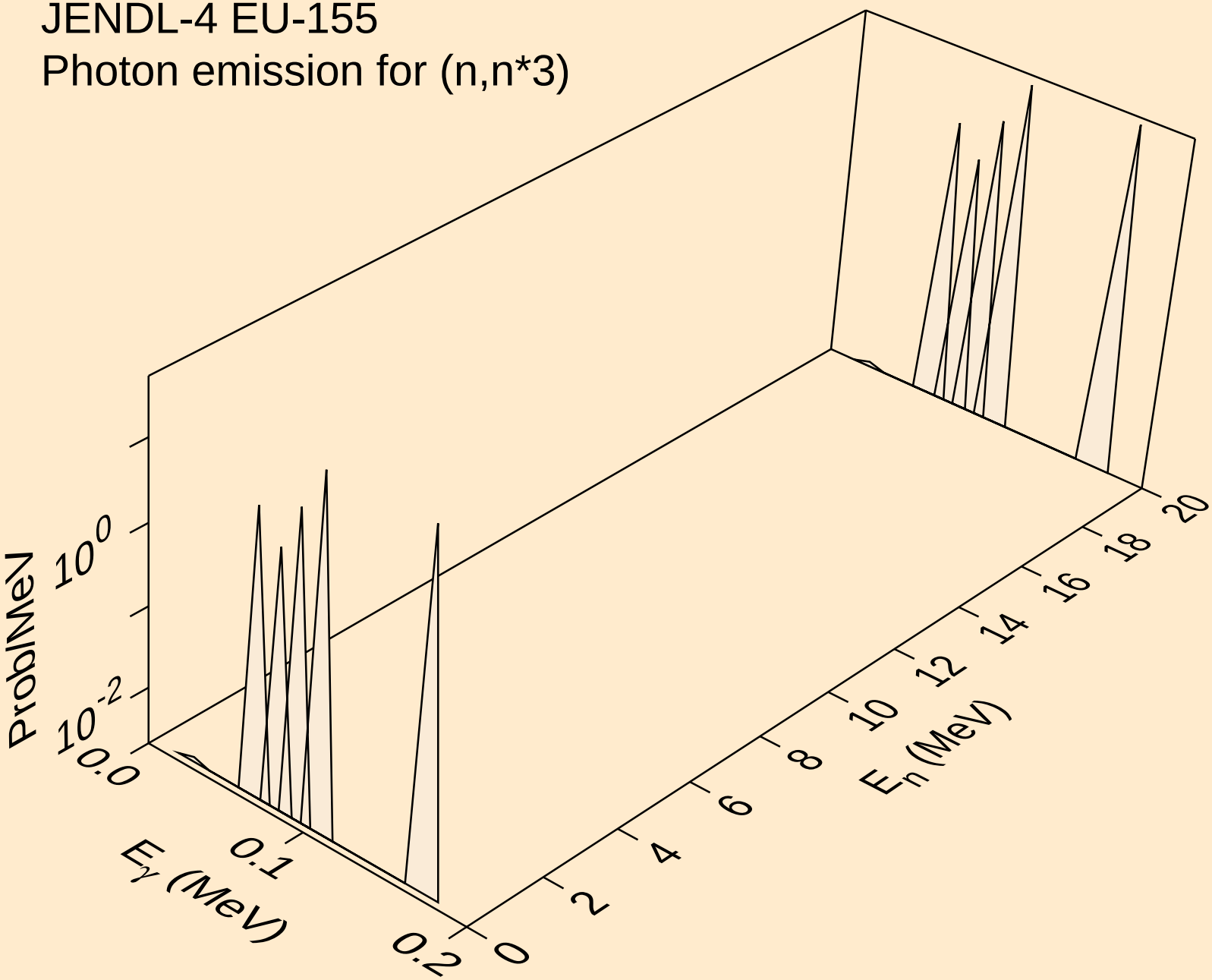

JENDL-4 EU-155
Photon emission for (n,n*)t
Prob/MeV
10^{2}
10^{0}
10^{-2}
E_γ (MeV)
0
2
4
E_n (MeV)
12
13
14
15
16
17
18
19
20


JENDL-4 EU-155
Photon emission for (n,2np)
Prob/MeV
10^{2}
10^{0}
10^{-2}
E_γ (MeV)
-1
0
1
2
E_n (MeV)
14
15
16
17
18
19
20

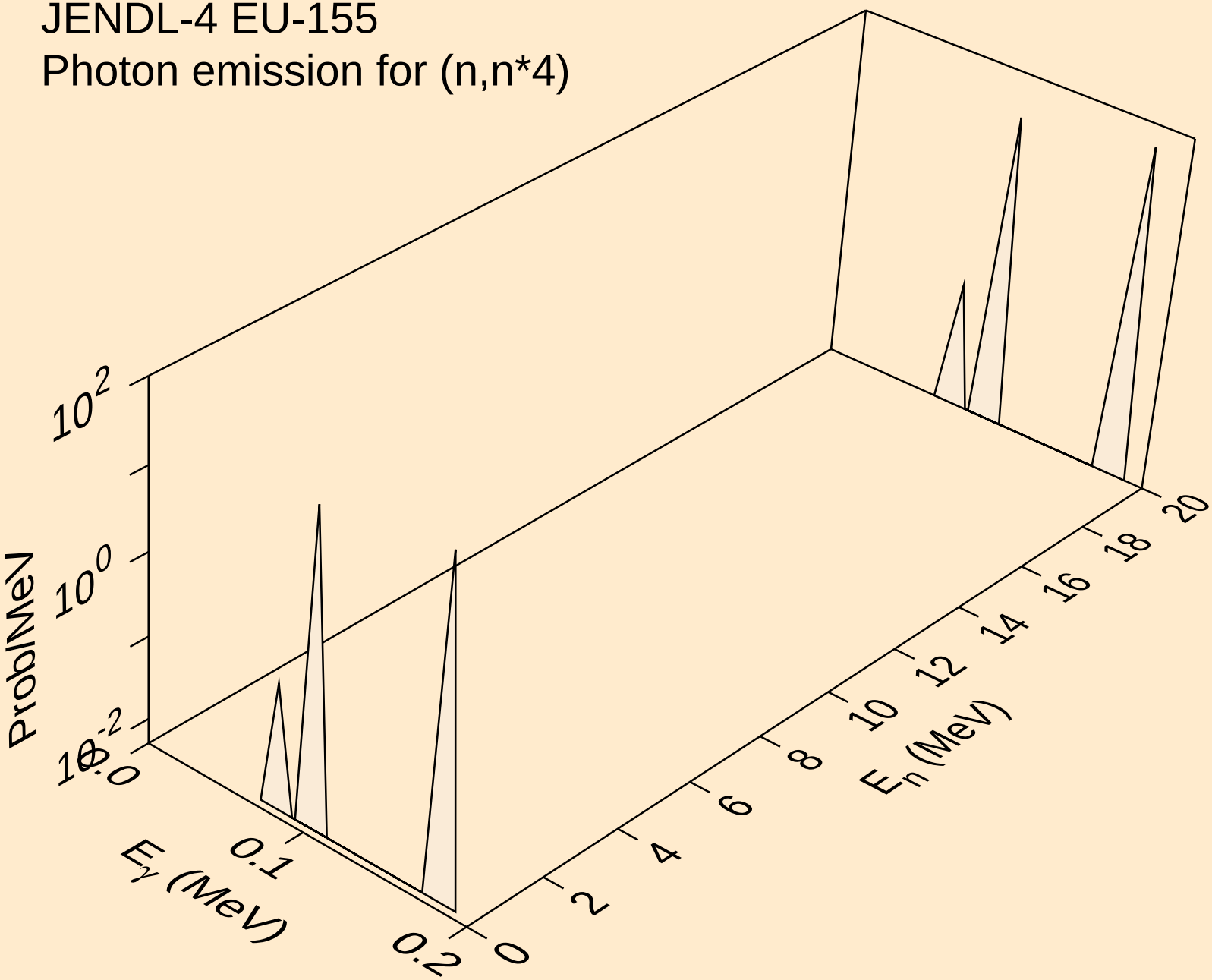

JENDL-4 EU-155
Photon emission for (n,n*1)
Prob/MeV
10^{0}
10^{-2}
60
80
100
E_γ (MeV)
*10^{-3}
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)


JENDL-4 EU-155
Photon emission for (n,n*2)
Prob/MeV
10^{2}
10^{0}
10^{-2}
0
50
100
150
E_γ (MeV)
*10 -3
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

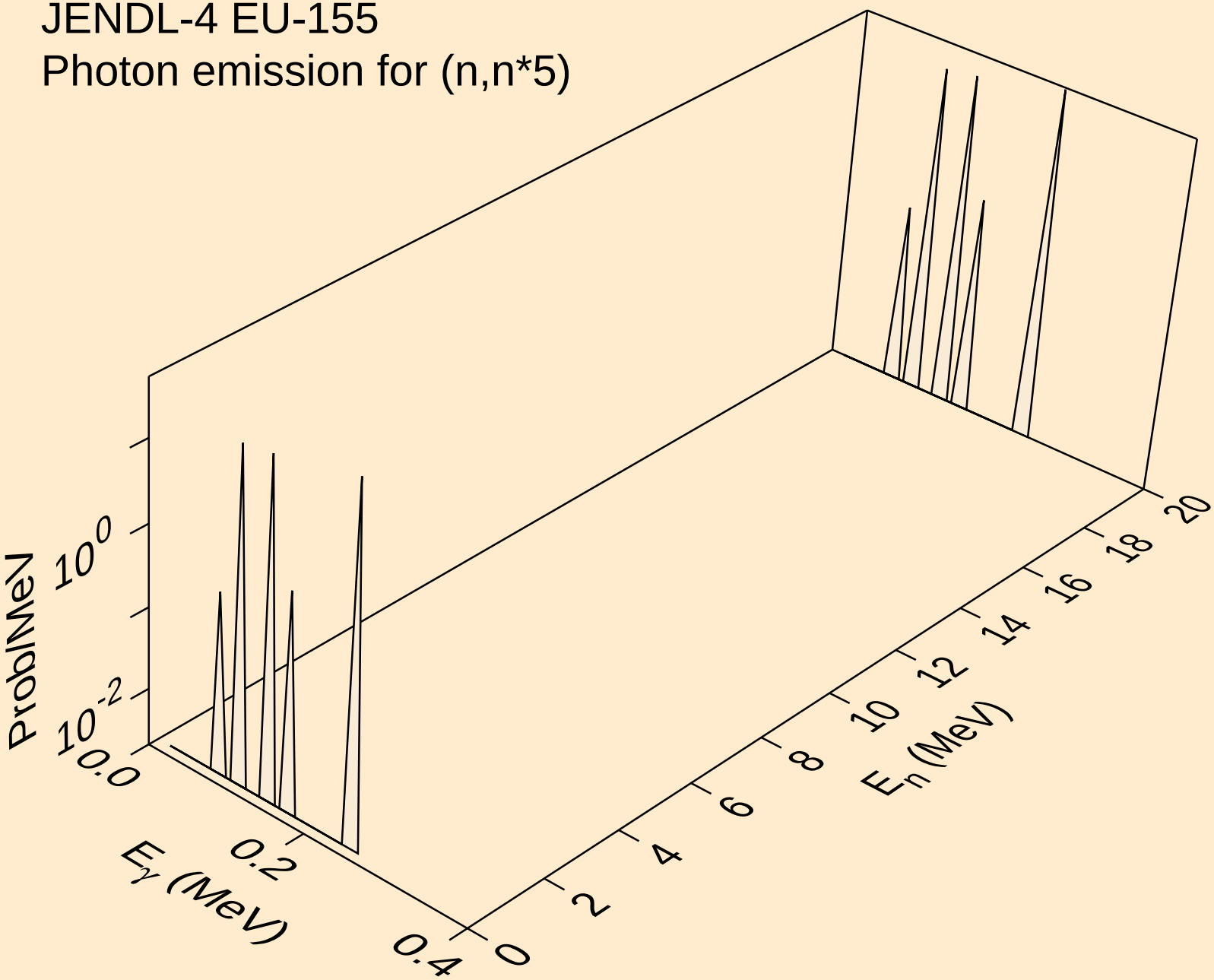
JENDL-4 EU-155
Photon emission for (n,n*3)

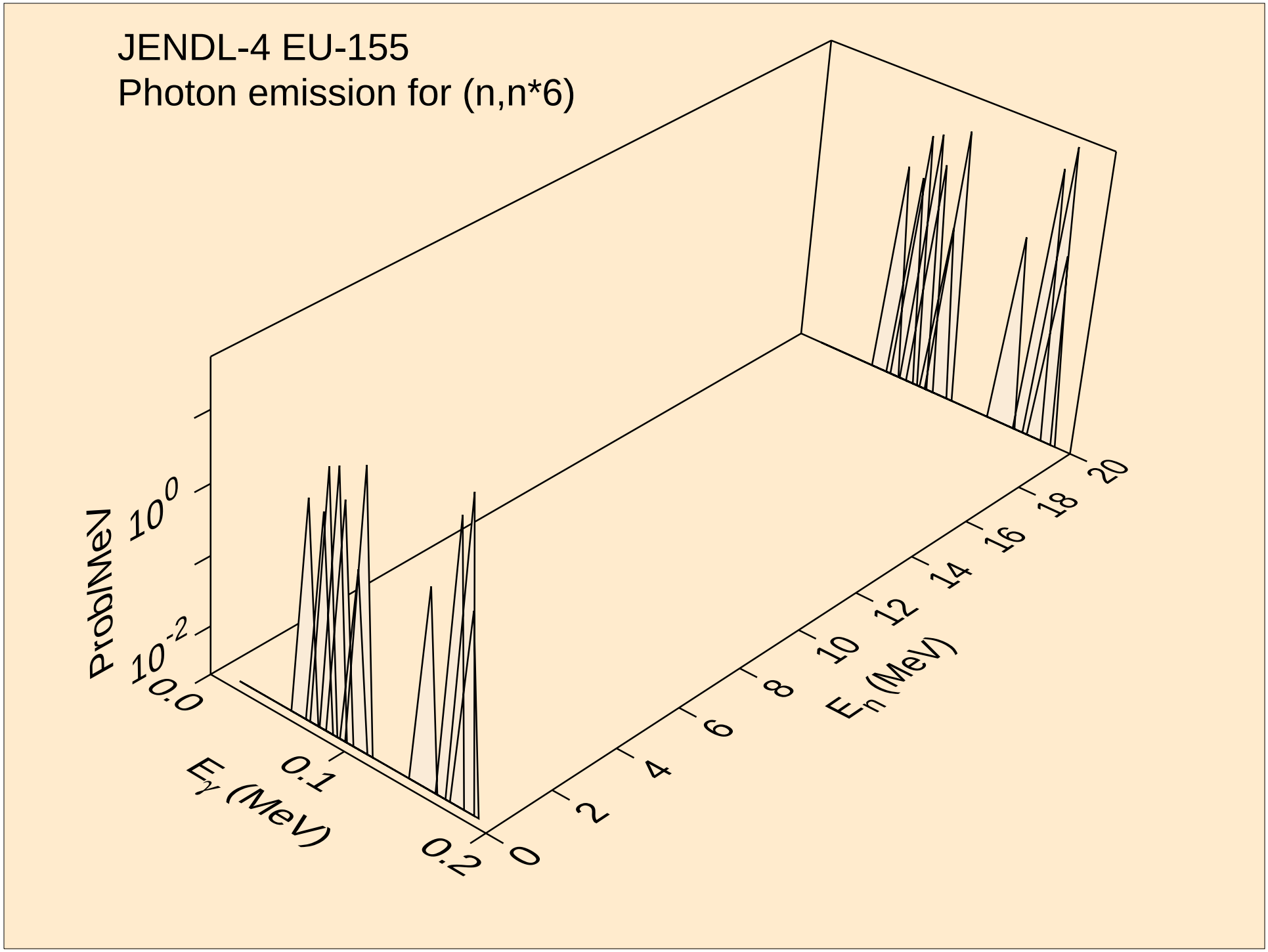


JENDL-4 EU-155
Photon emission for (n,n*4)

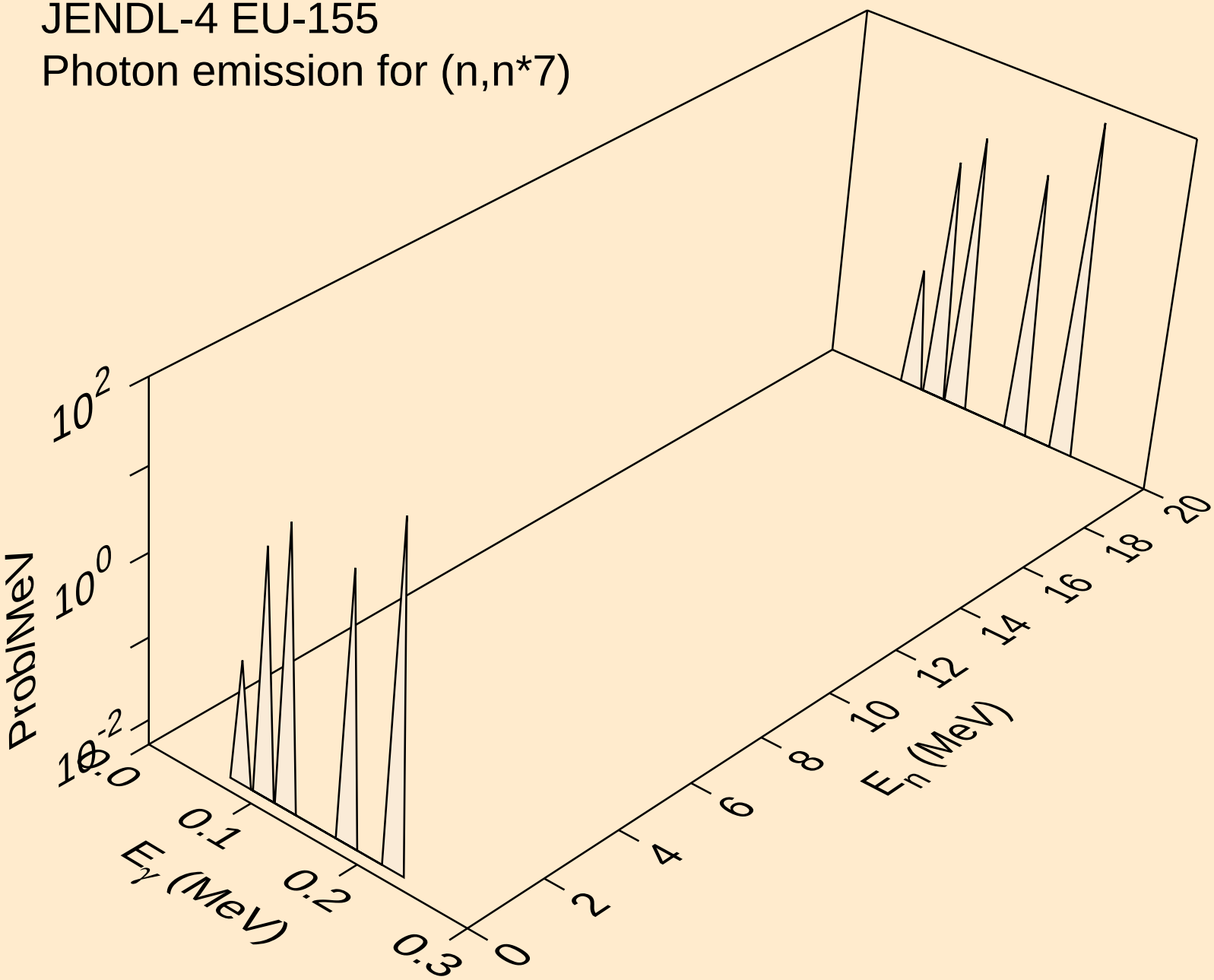


JENDL-4 EU-155
Photon emission for (n,n*5)

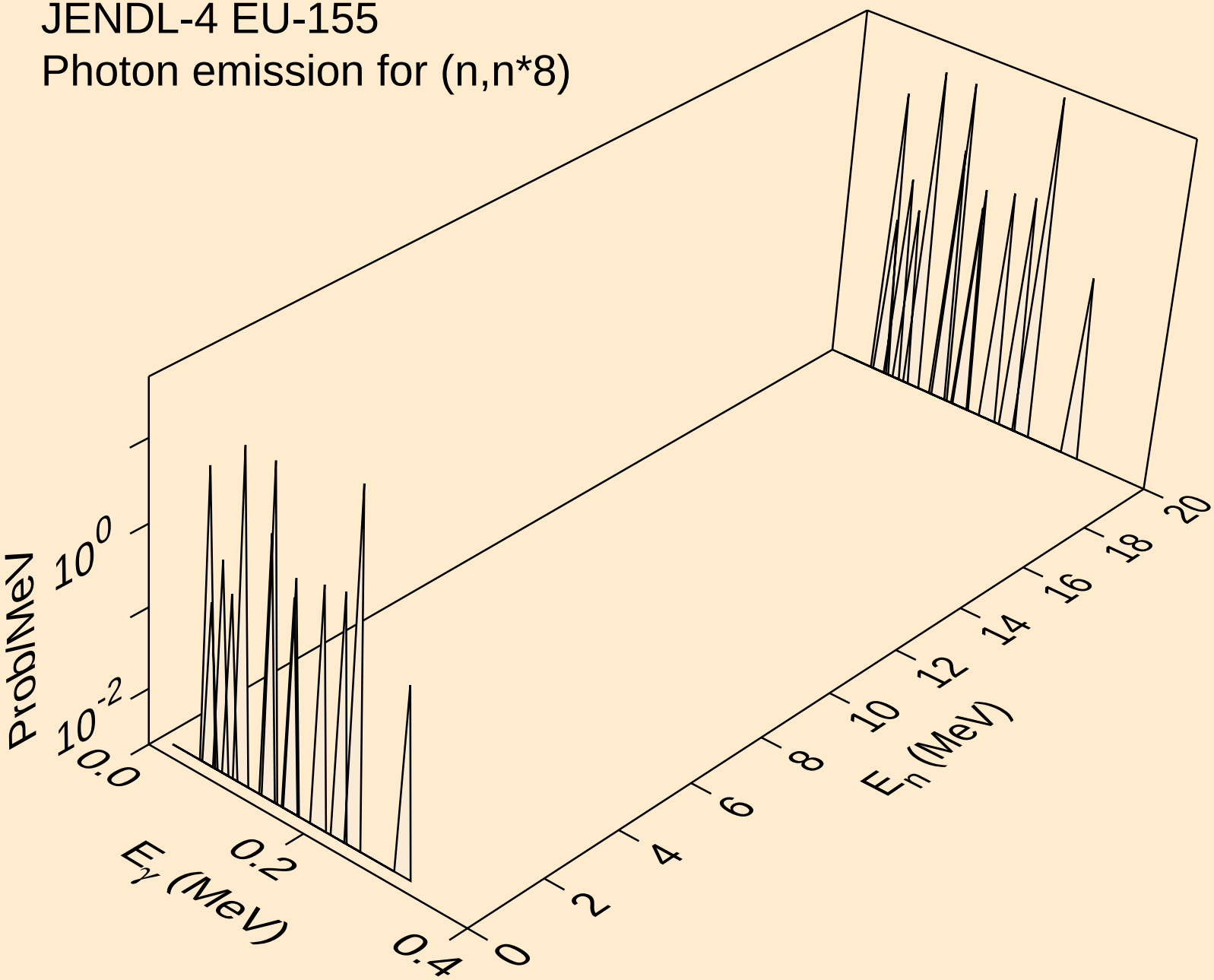


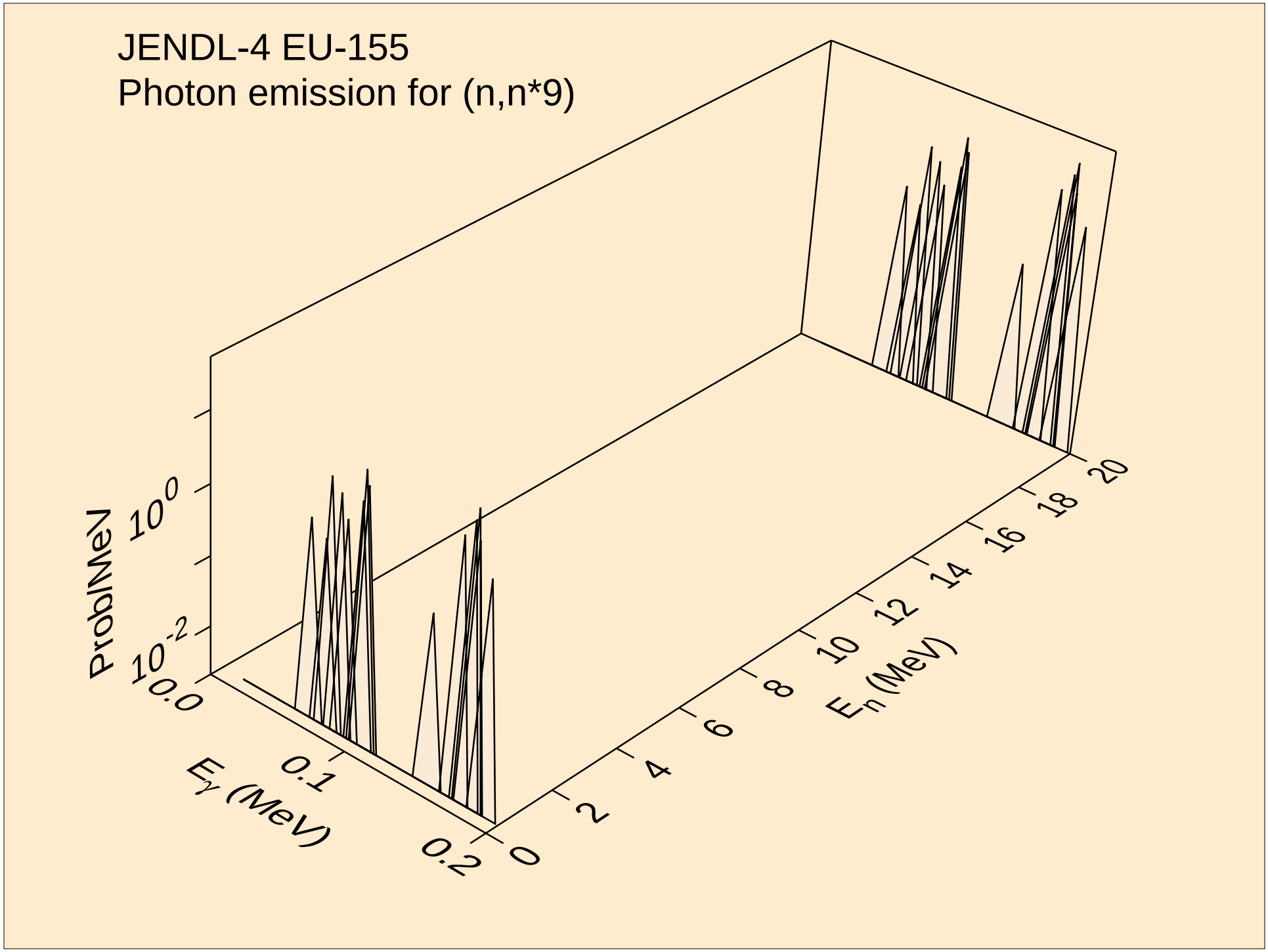

JENDL-4 EU-155
Photon emission for (n,n*6)
Prob/MeV
10^0
10^{-2}
0.0
0.1
0.2
E_γ (MeV)
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

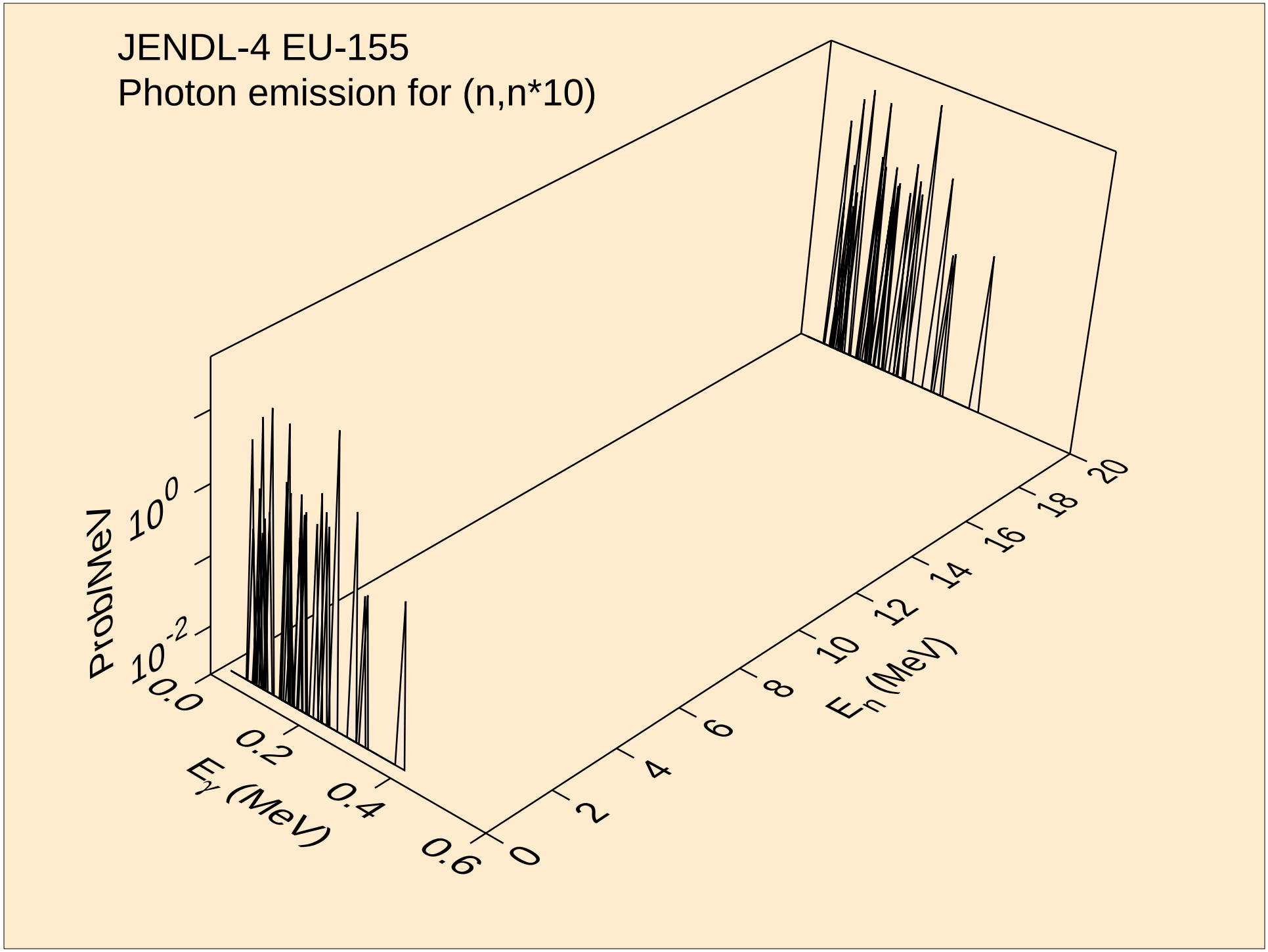
JENDL-4 EU-155
Photon emission for (n,n*7)

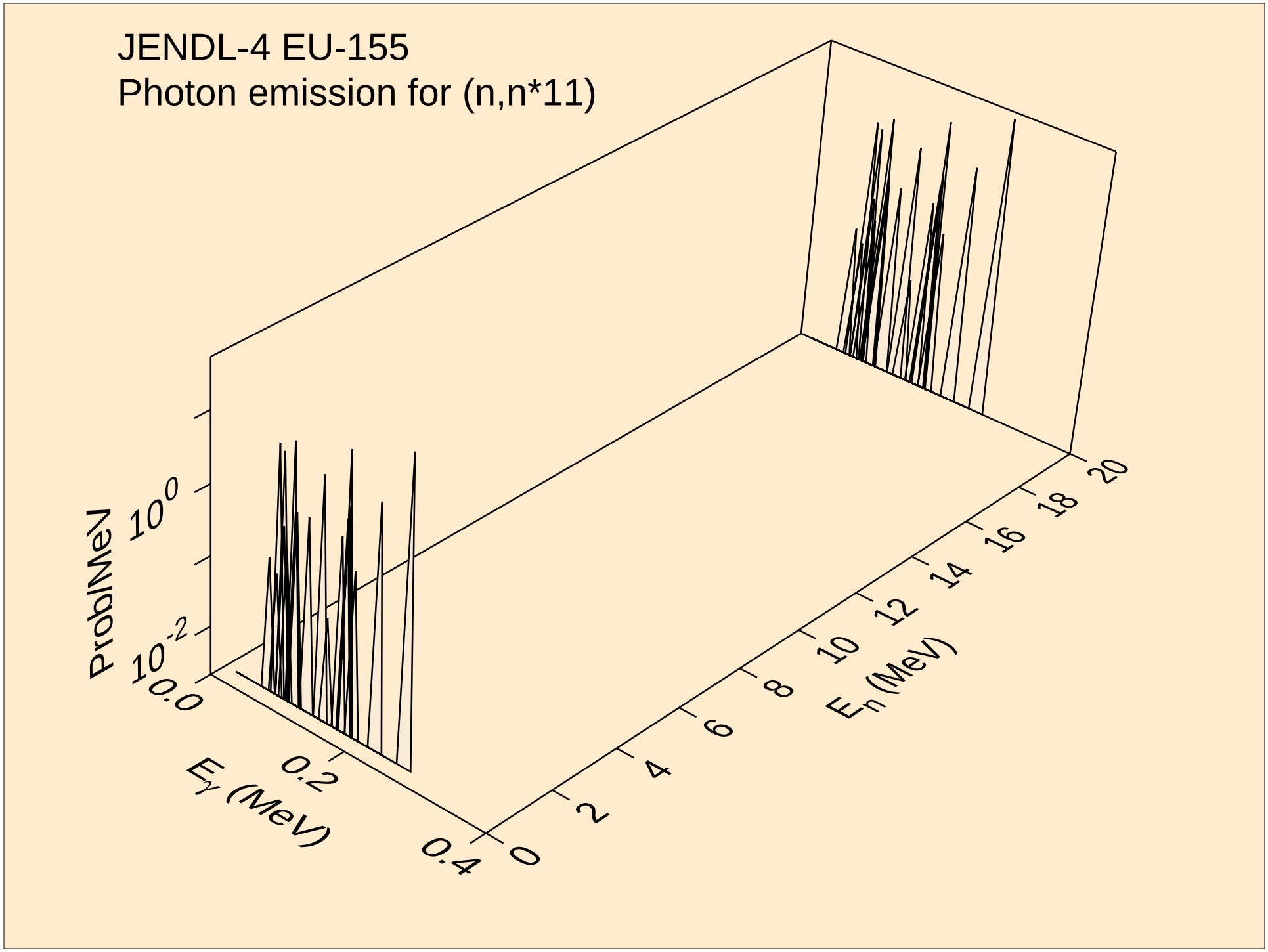


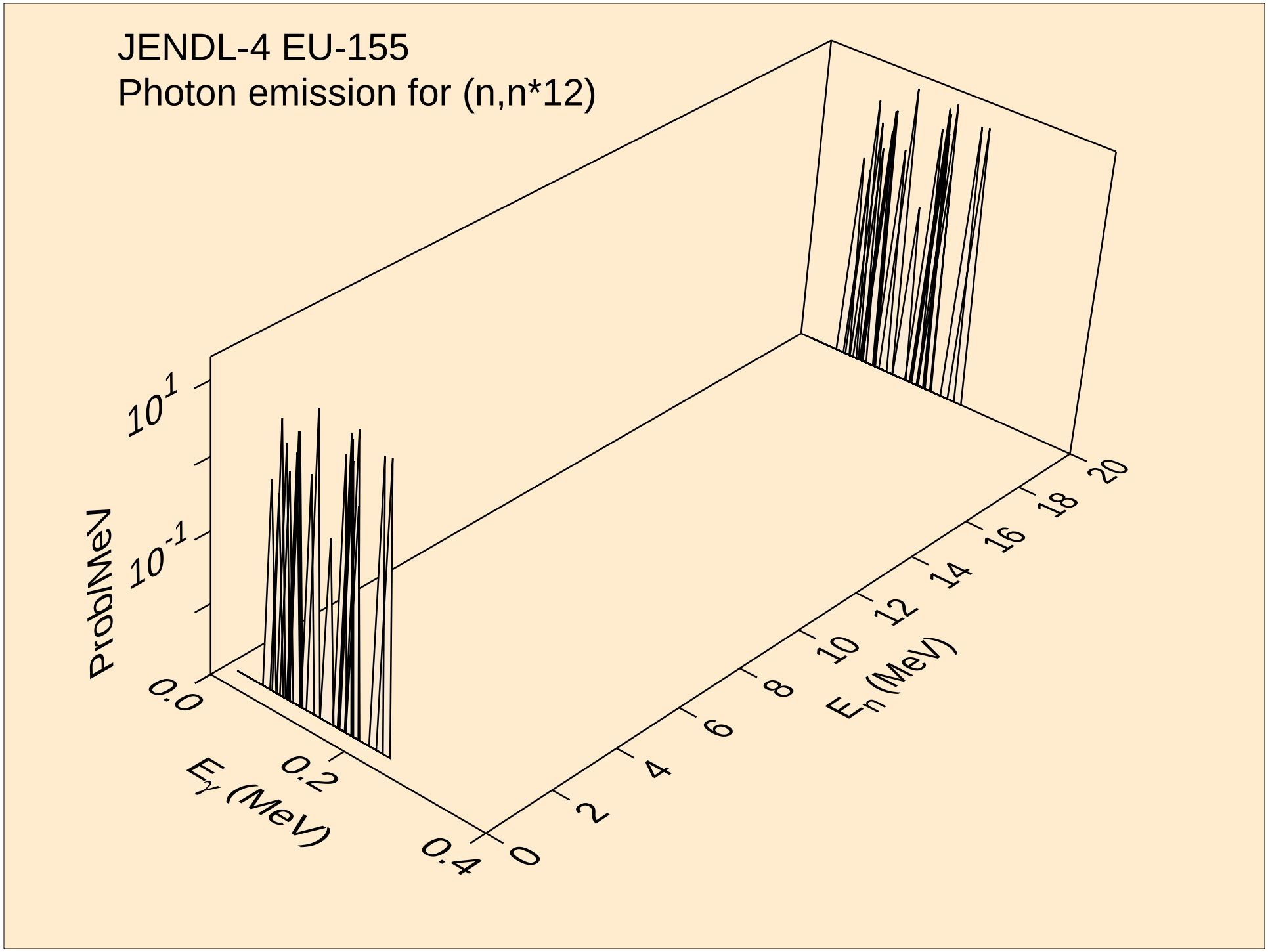
JENDL-4 EU-155
Photon emission for (n,n*8)

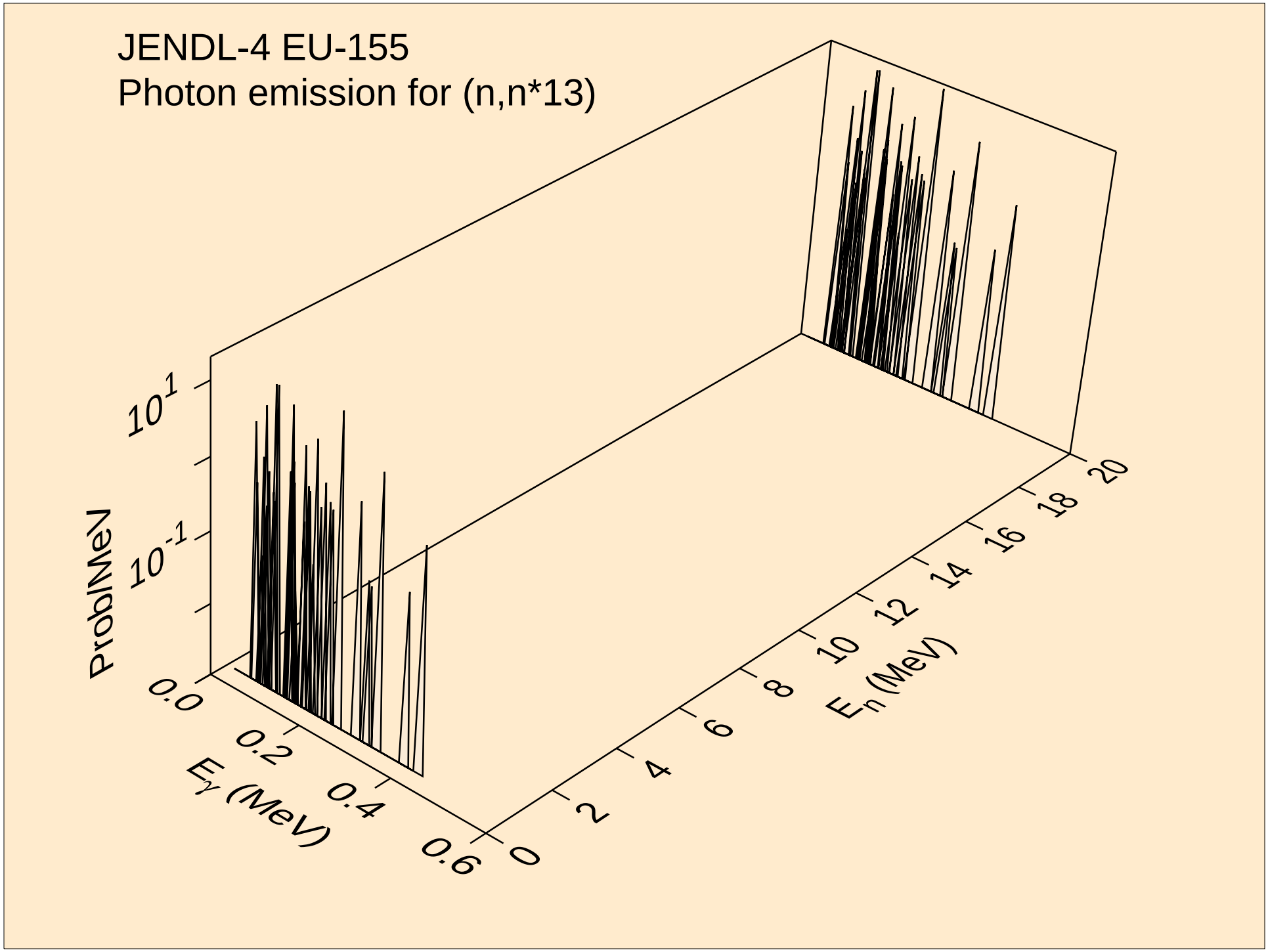


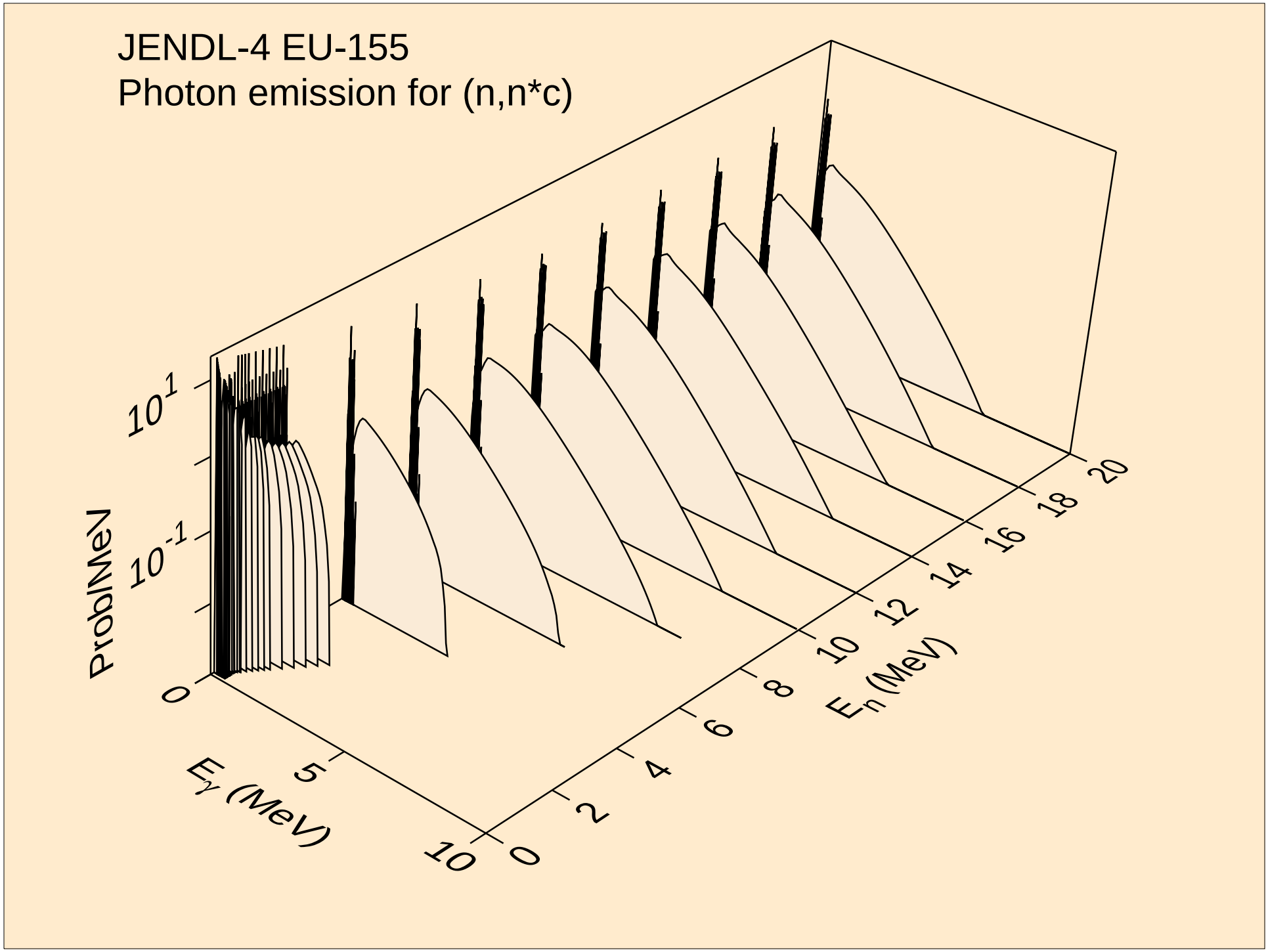

JENDL-4 EU-155
Photon emission for (n,n*9)
Prob/MeV
10^{0}
10^{-2}
0.0
0.1
0.2
E_γ (MeV)
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

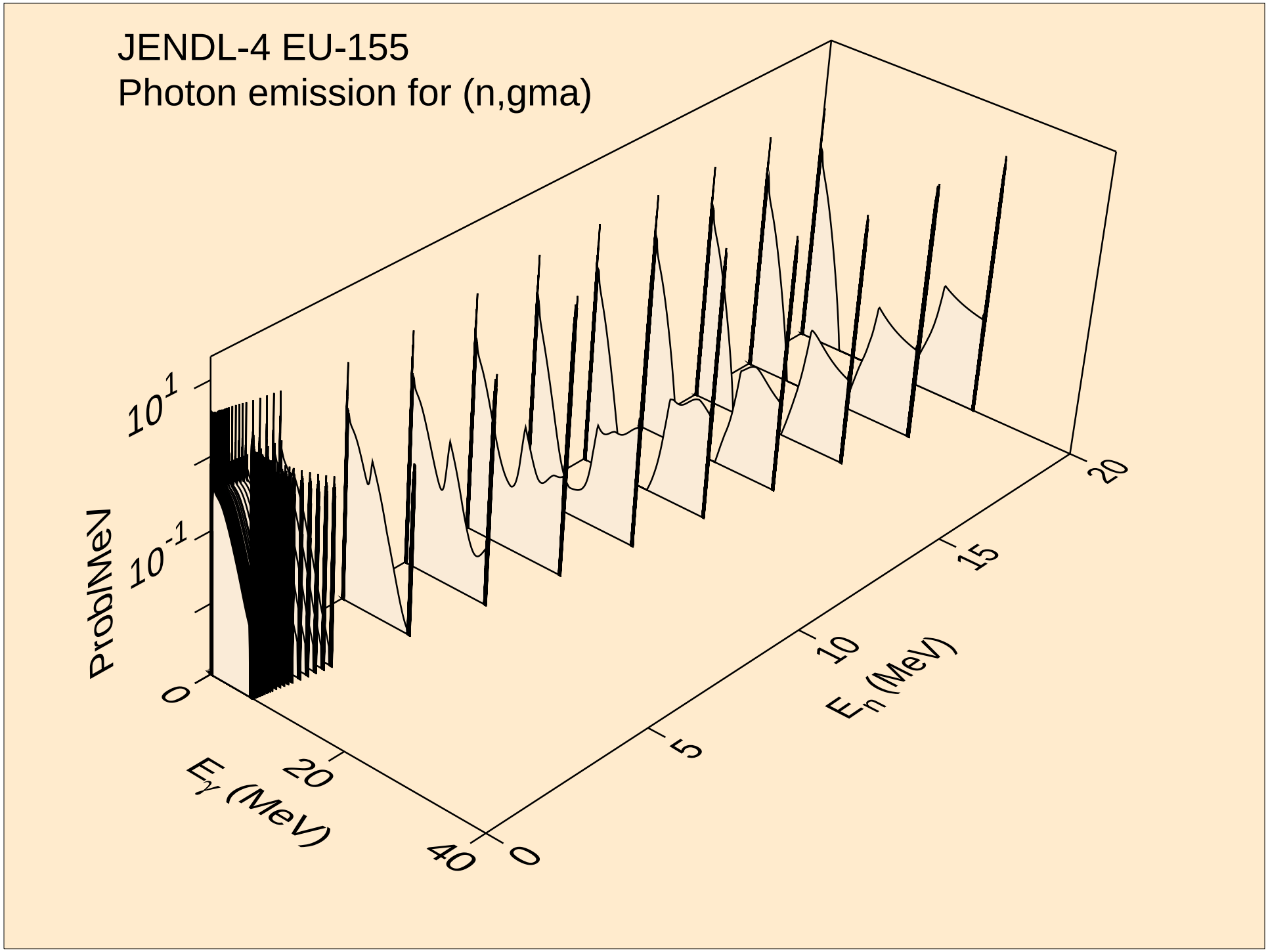

JENDL-4 EU-155
Photon emission for (n,n*10)
Prob/MeV
10^{0}
10^{-2}
0.0
0.2
0.4
0.6
E_γ (MeV)
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

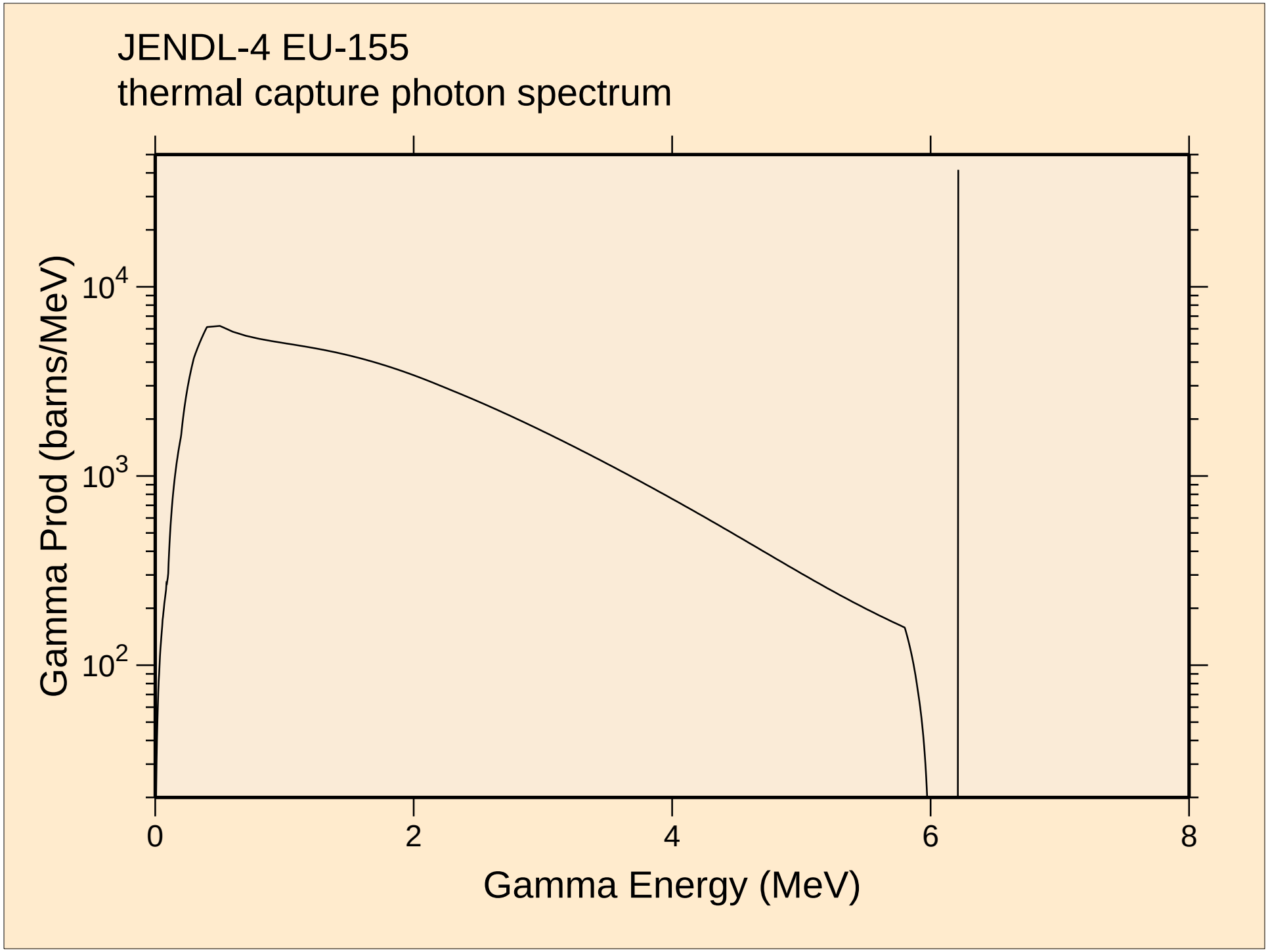

JENDL-4 EU-155
Photon emission for (n,n*11)
Prob/MeV
10^0
10^{-2}
0.0
0.2
0.4
E_γ (MeV)
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

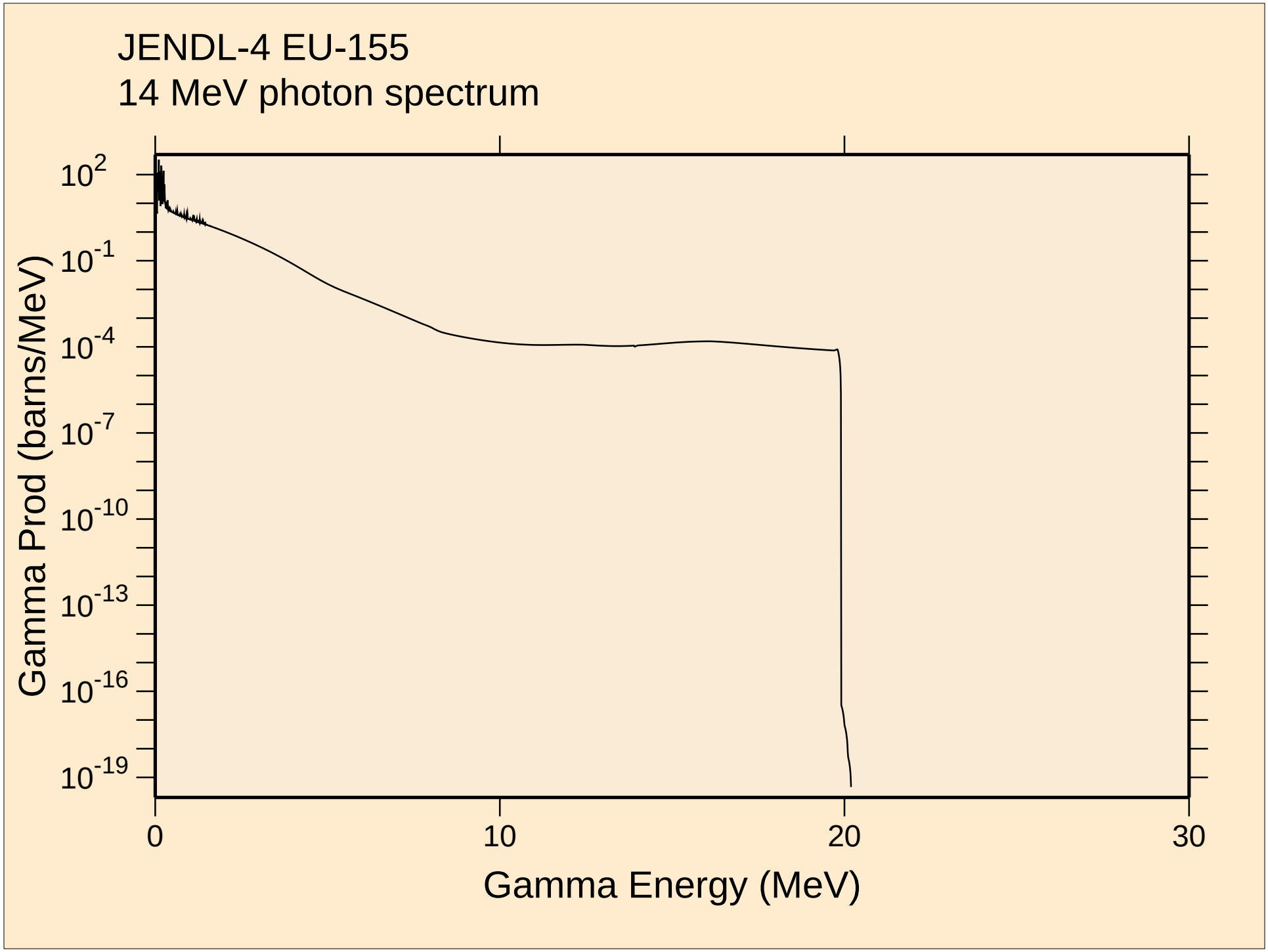

JENDL-4 EU-155
Photon emission for (n,n*12)
Prob/MeV
10^{1}
10^{-1}
0.0
0.2
0.4
E_γ (MeV)
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

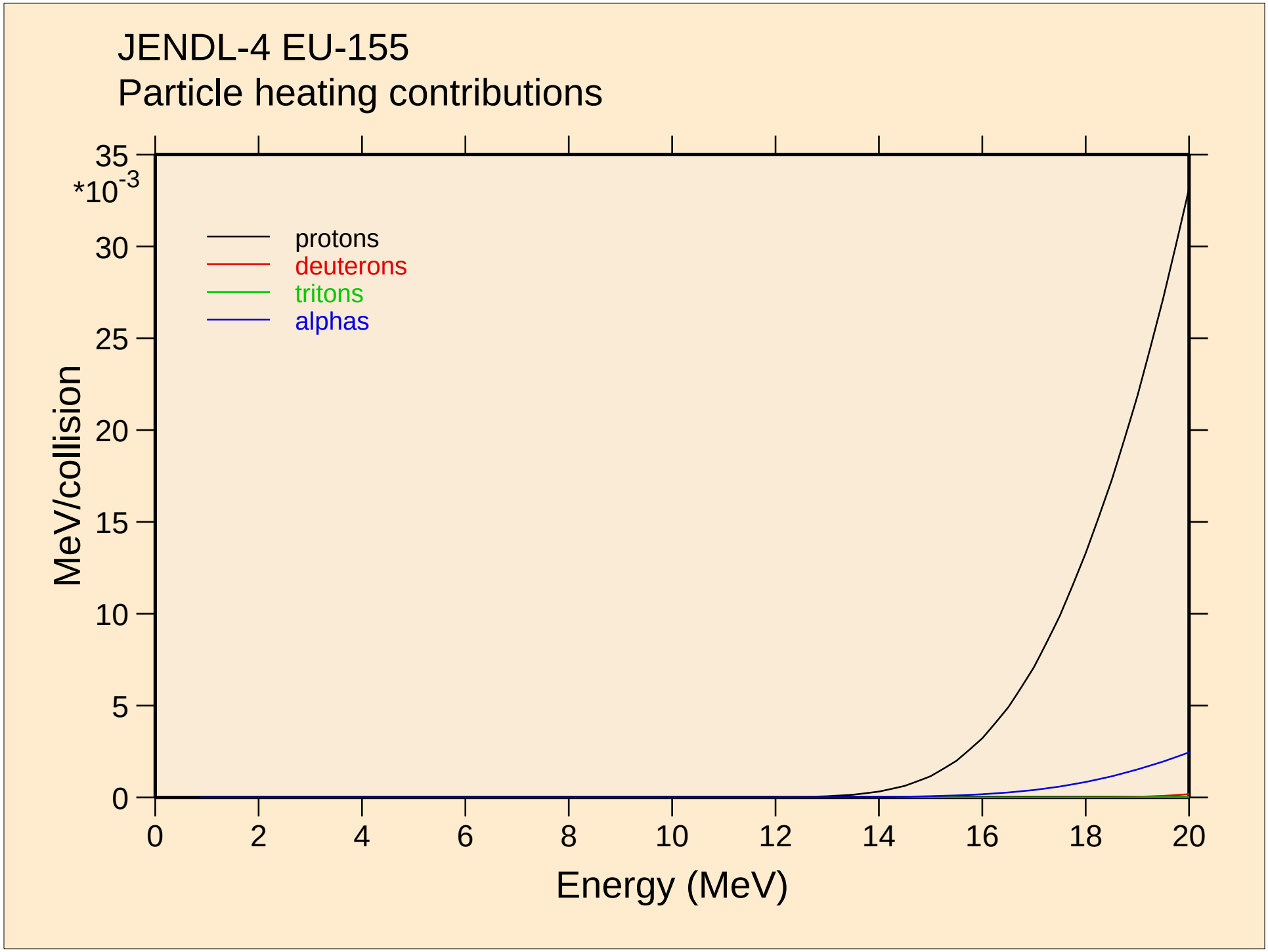

JENDL-4 EU-155
Photon emission for (n,n*13)
Prob/MeV
10^{1}
10^{-1}
0.0
0.2
0.4
0.6
E_γ (MeV)
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

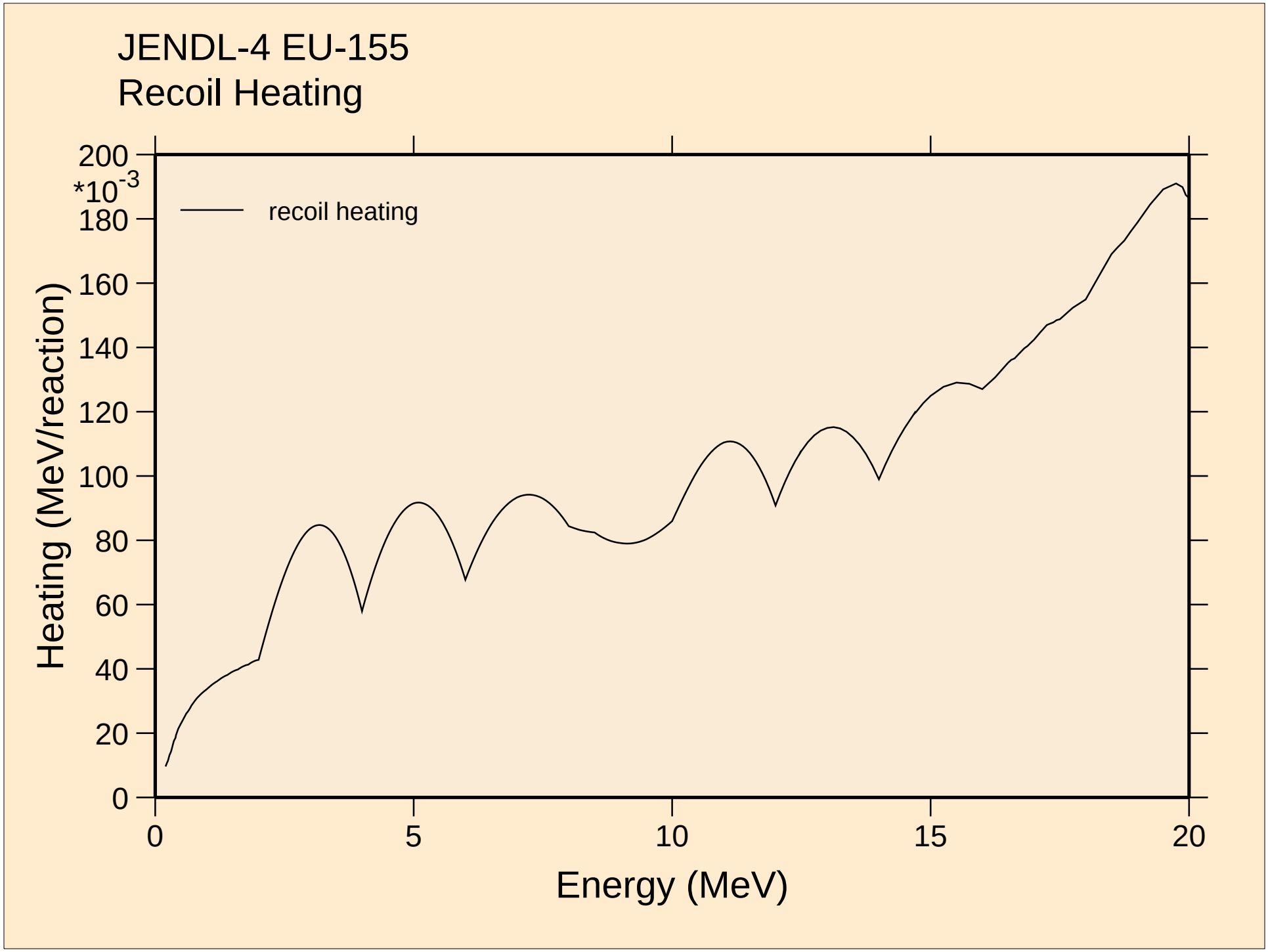

JENDL-4 EU-155
Photon emission for (n,n*c)
Prob/MeV
10^{1}
10^{-1}
0
5
10
E_γ (MeV)
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

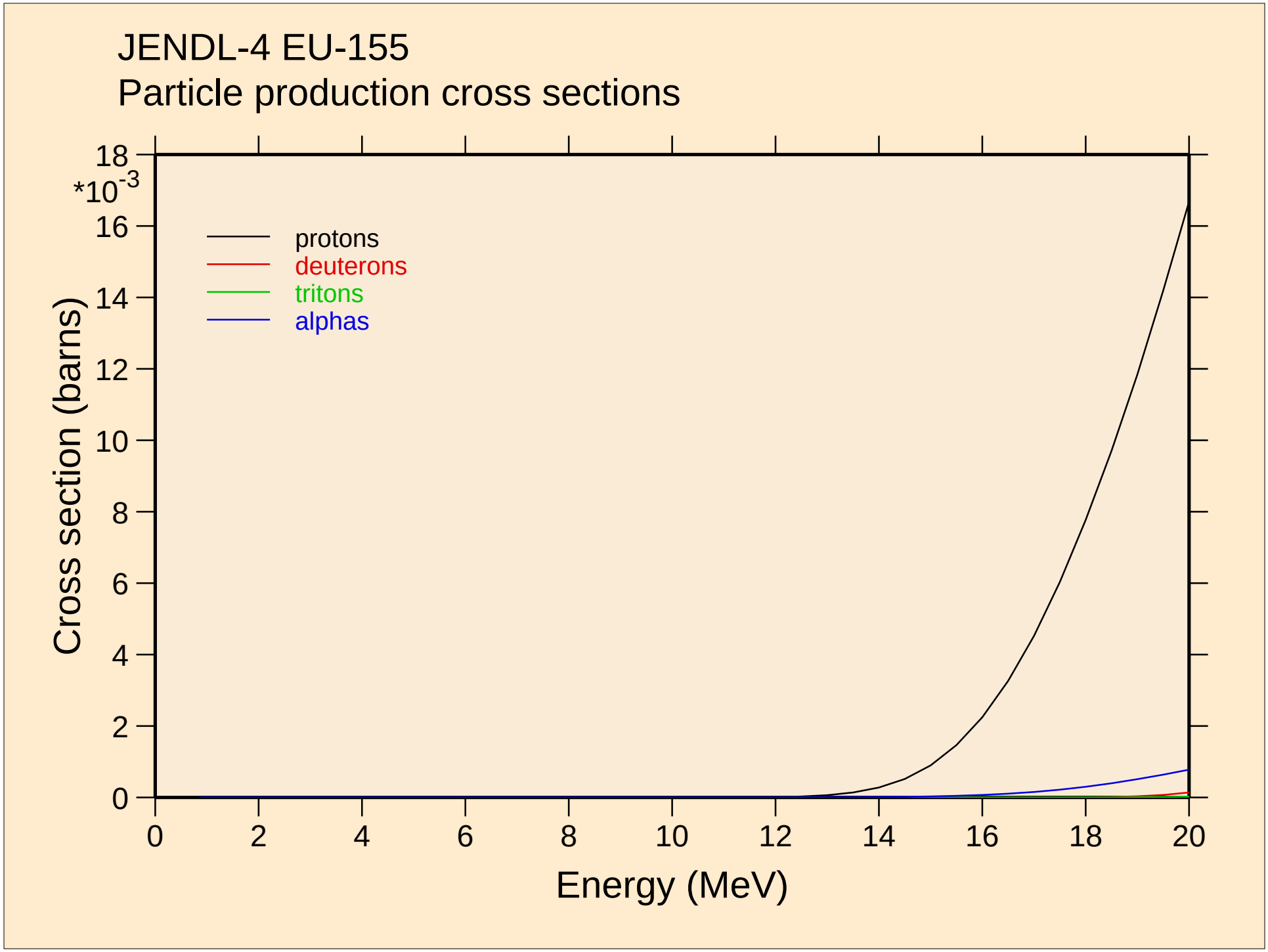

JENDL-4 EU-155
Photon emission for (n,gma)
Prob/MeV
10^{1}
10^{-1}
0
E_γ (MeV)
20
40
E_n (MeV)
0
5
10
15
20

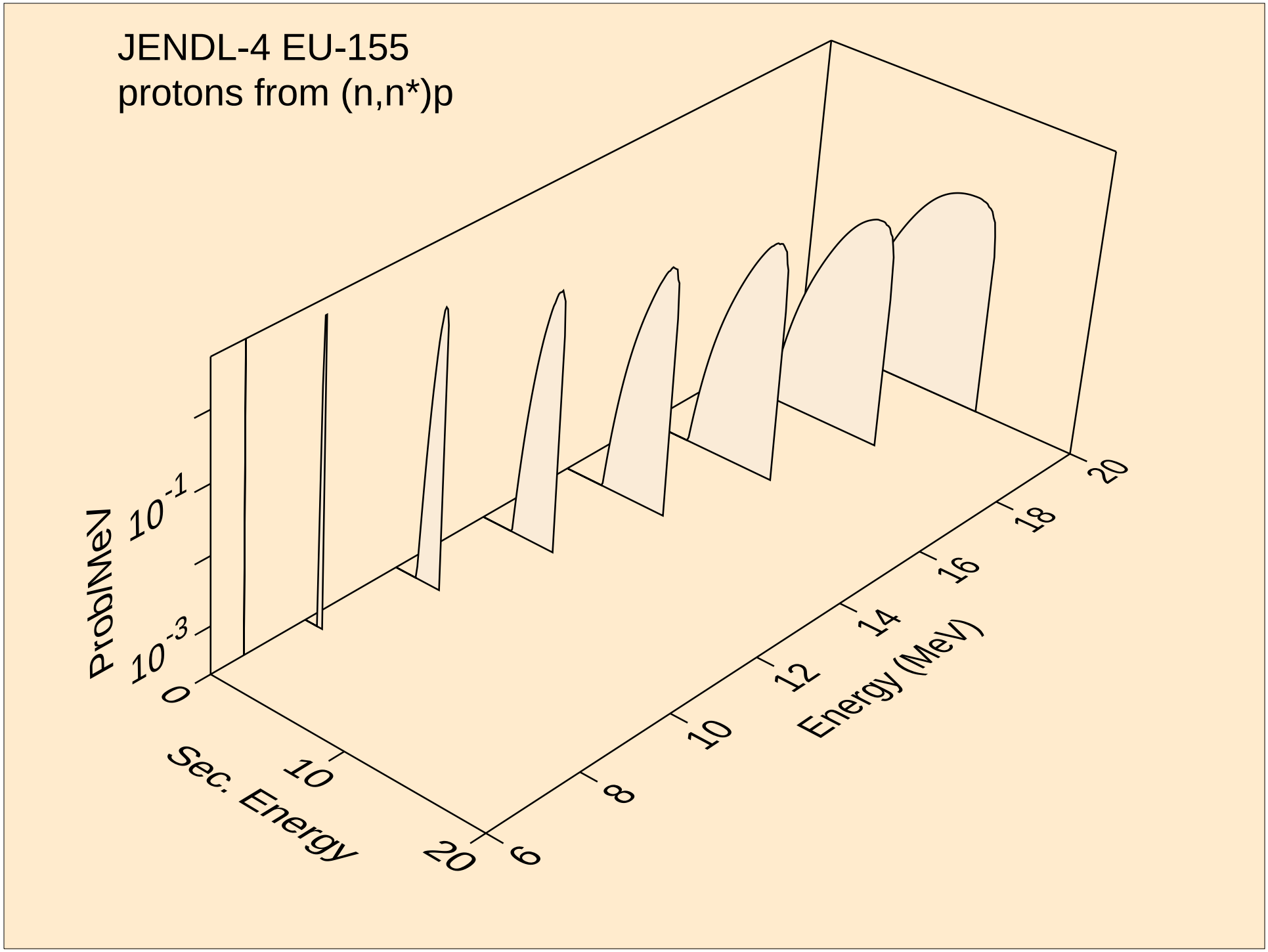

JENDL-4 EU-155
thermal capture photon spectrum
Gamma Prod (barns/MeV)
10^4
10^3
10^2
0
2
4
6
8
Gamma Energy (MeV)

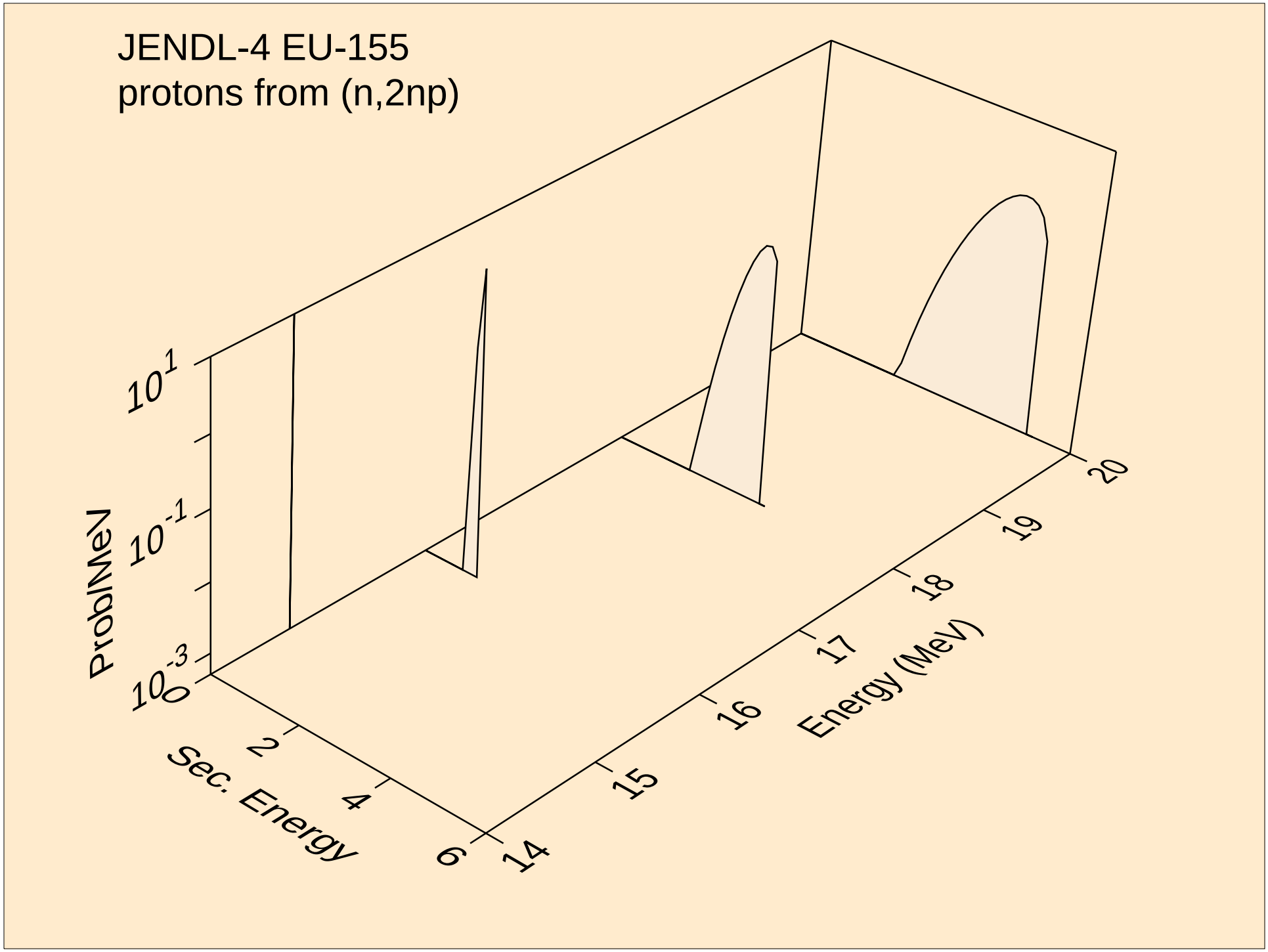

JENDL-4 EU-155
14 MeV photon spectrum
Gamma Prod (barns/MeV)
10^2
10^-1
10^-4
10^-7
10^-10
10^-13
10^-16
10^-19
0
10
20
30
Gamma Energy (MeV)

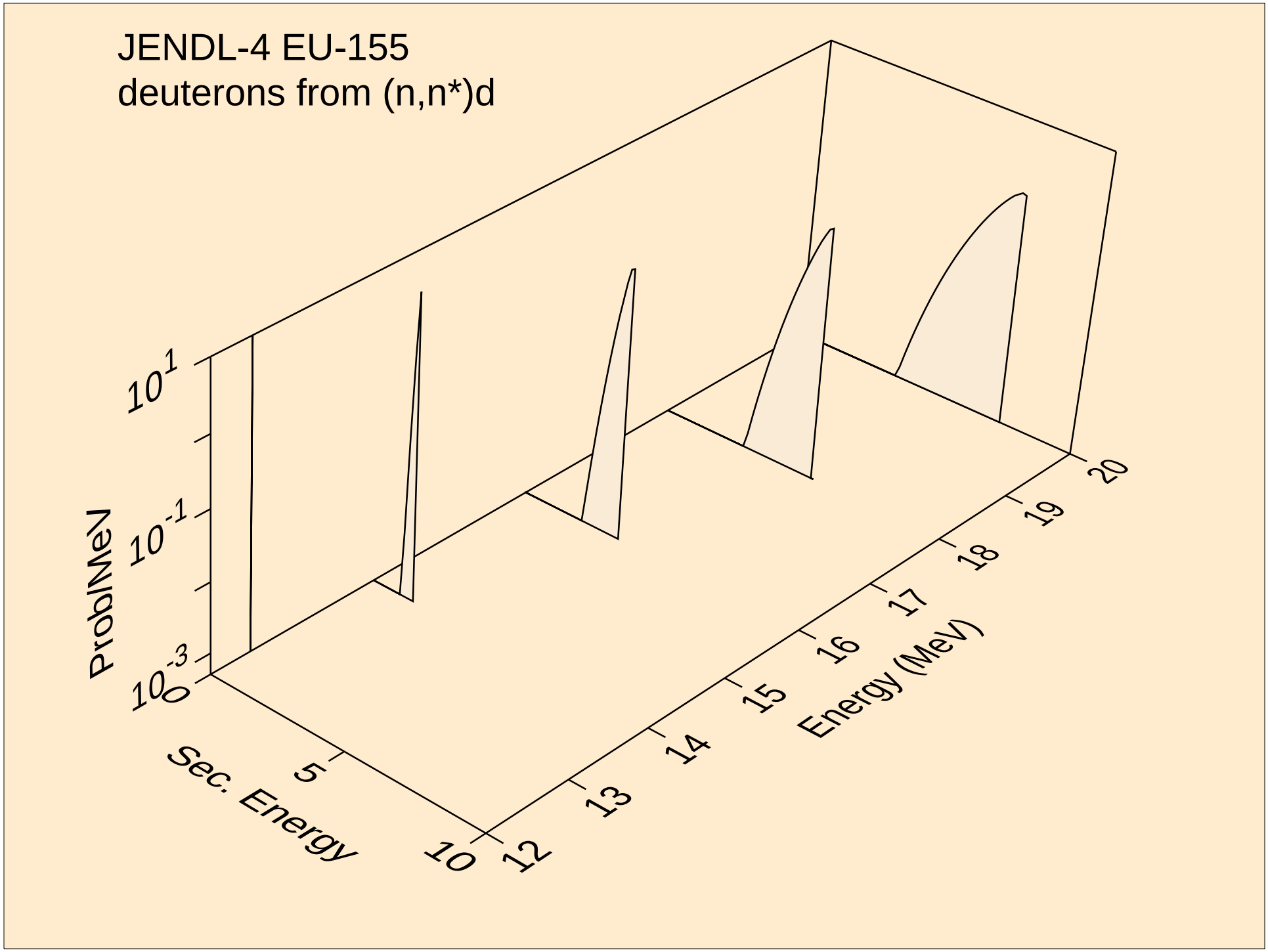

JENDL-4 EU-155
Particle heating contributions
*10-3
35
30
25
20
15
10
5
0
MeV/collision
protons
deuterons
tritons
alphas
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

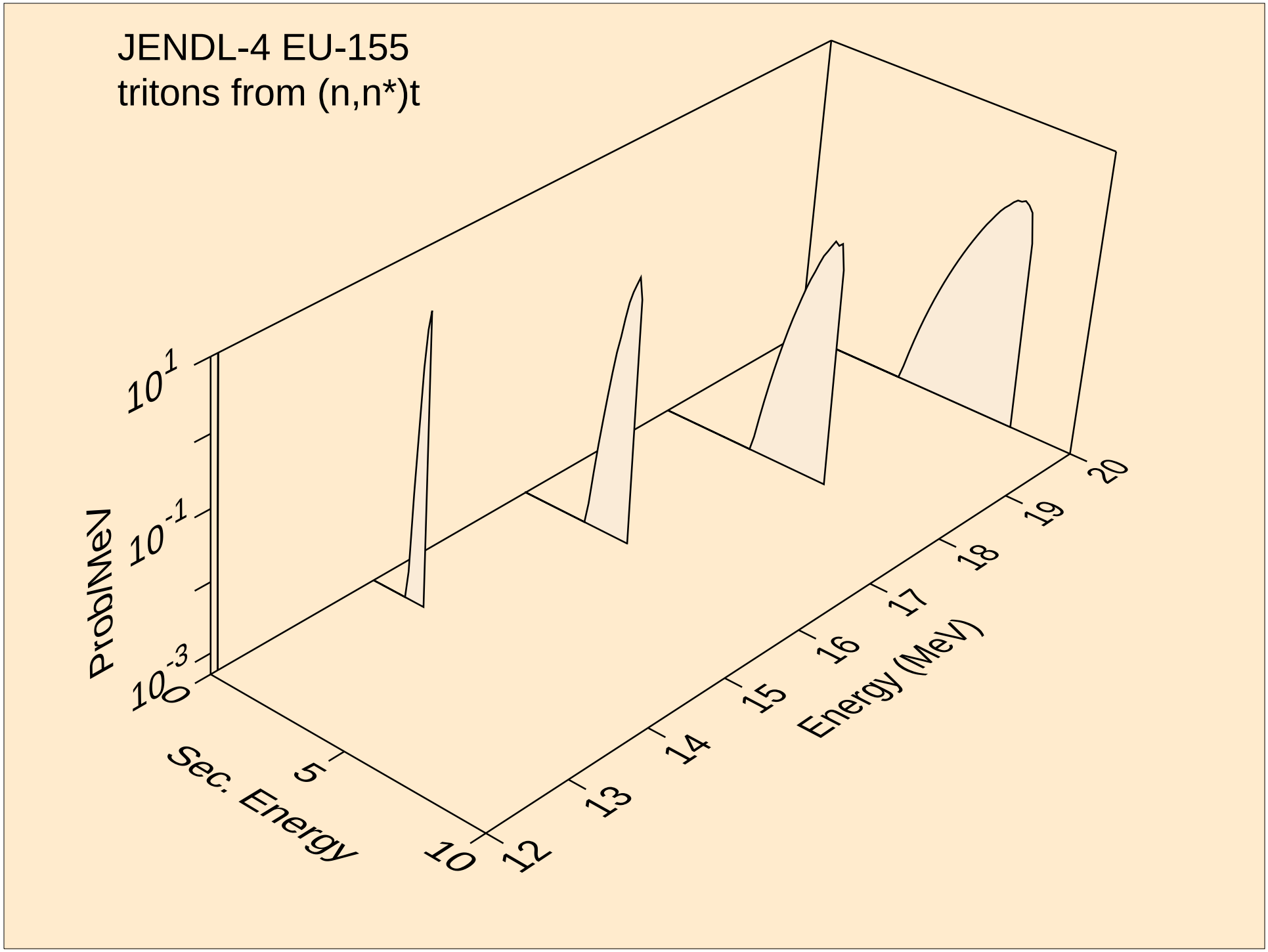

JENDL-4 EU-155
Recoil Heating
recoil heating
Heating (MeV/reaction)
*10-3
200
180
160
140
120
100
80
60
40
20
0
0
5
10
15
20
Energy (MeV)

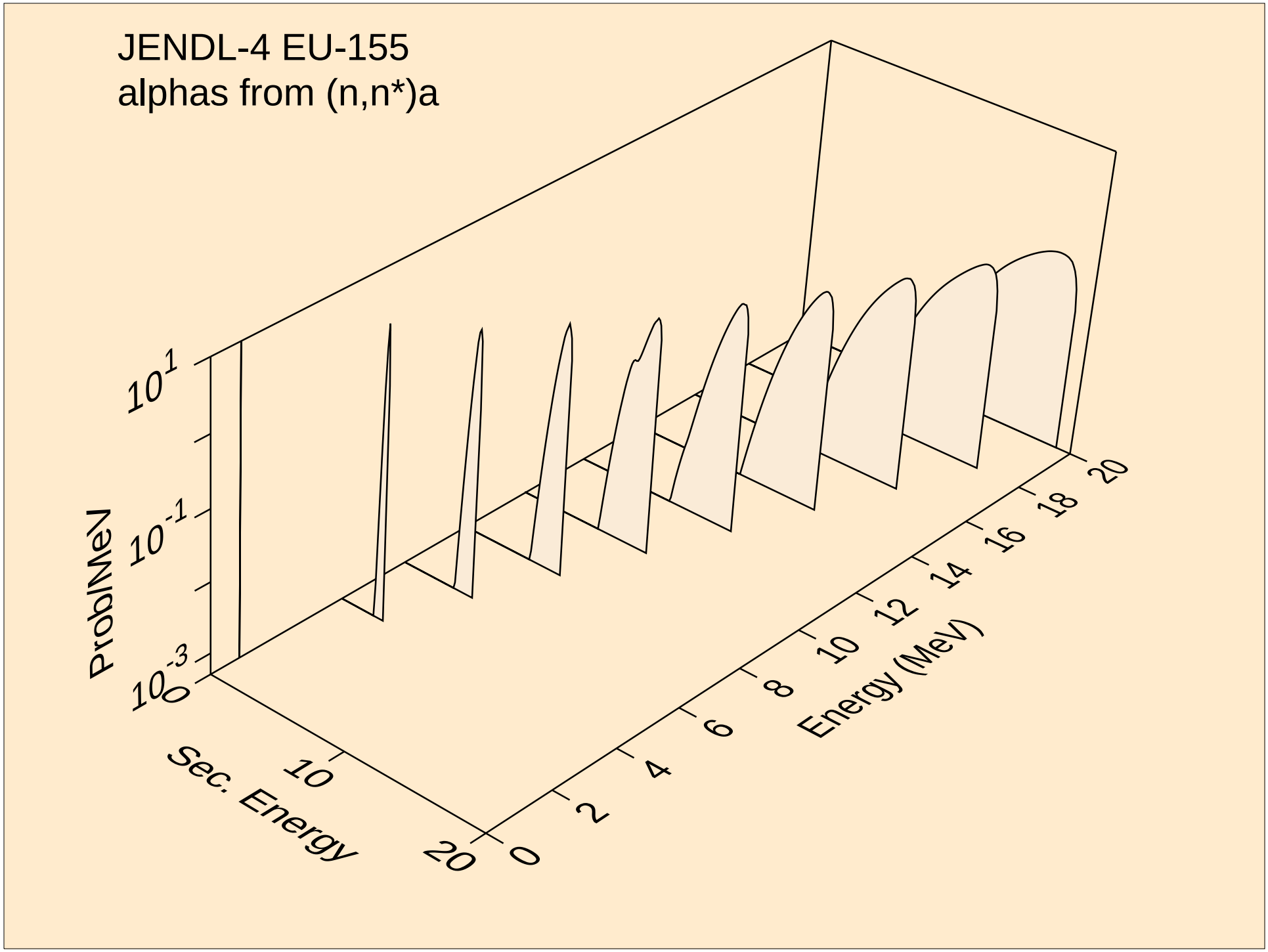

JENDL-4 EU-155
Particle production cross sections
*10-3
18
16
14
12
10
8
6
4
2
0
Cross section (barns)
protons
deuterons
tritons
alphas
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)


JENDL-4 EU-155
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)


JENDL-4 EU-155
protons from (n,2np)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
2
4
6
Sec. Energy
14
15
16
17
18
19
20
Energy (MeV)


JENDL-4 EU-155
deuterons from (n,n*)d
Prob/MeV
10^1
10^-1
10^-3
Sec. Energy
0
5
10
Energy (MeV)
12
13
14
15
16
17
18
19
20


JENDL-4 EU-155
tritons from (n,n*)t
Prob/MeV
10^{1}
10^{-1}
10^{-3}
Sec. Energy
0
5
10
Energy (MeV)
12
13
14
15
16
17
18
19
20


JENDL-4 EU-155
alphas from (n,n*)a
Prob/MeV
10^1
10^-1
10^-3
Sec. Energy
0
10
20
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20