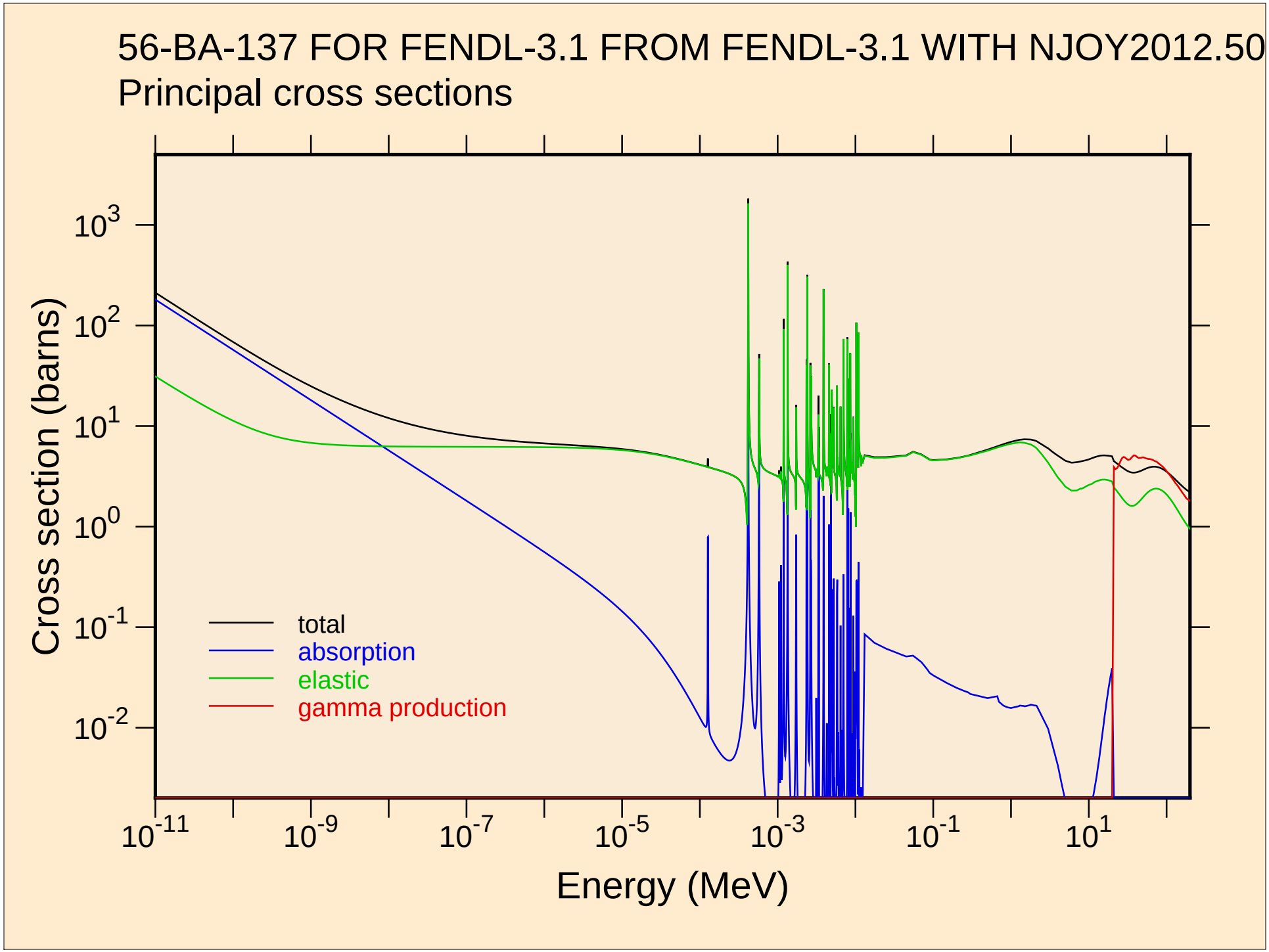
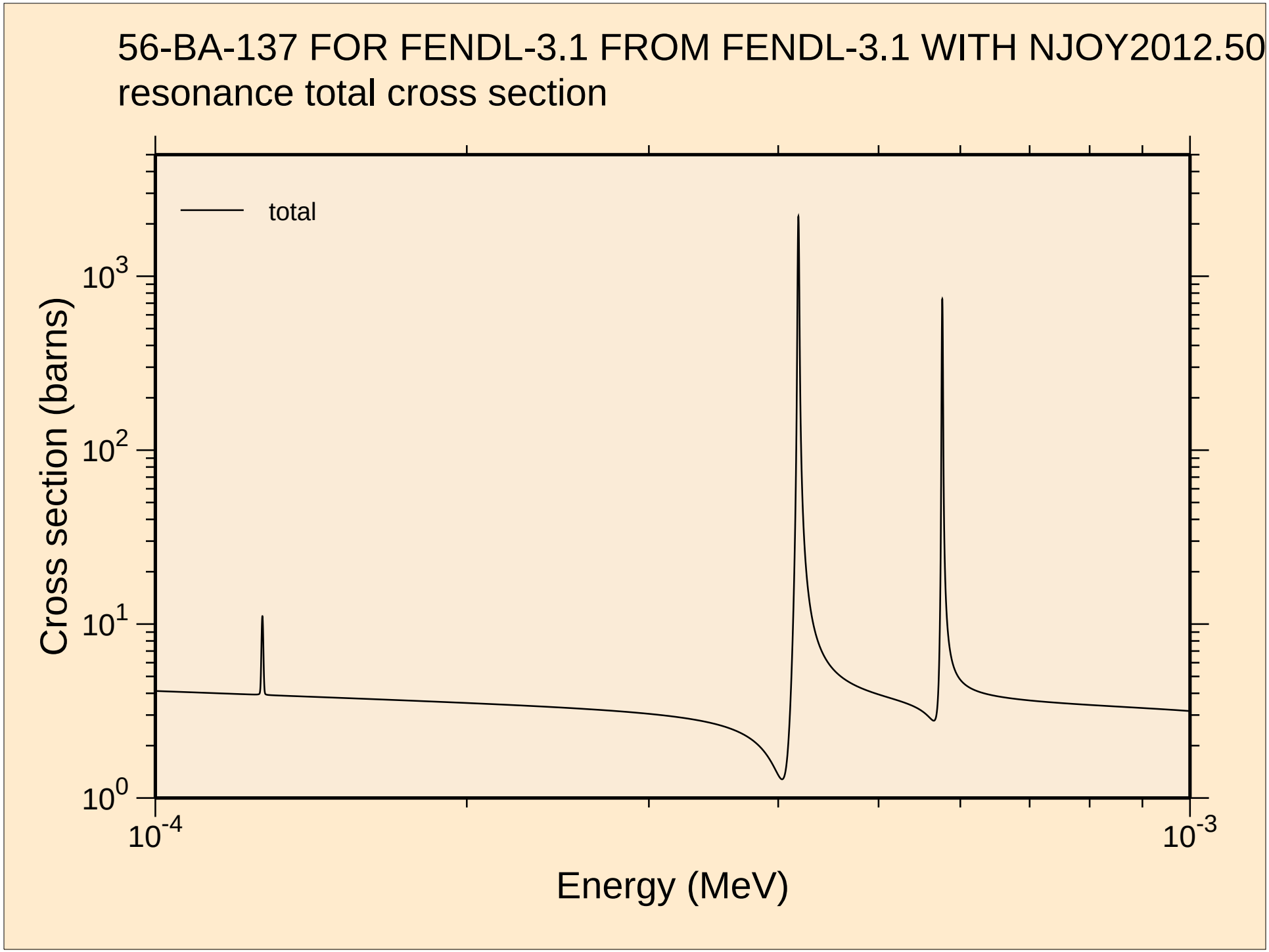
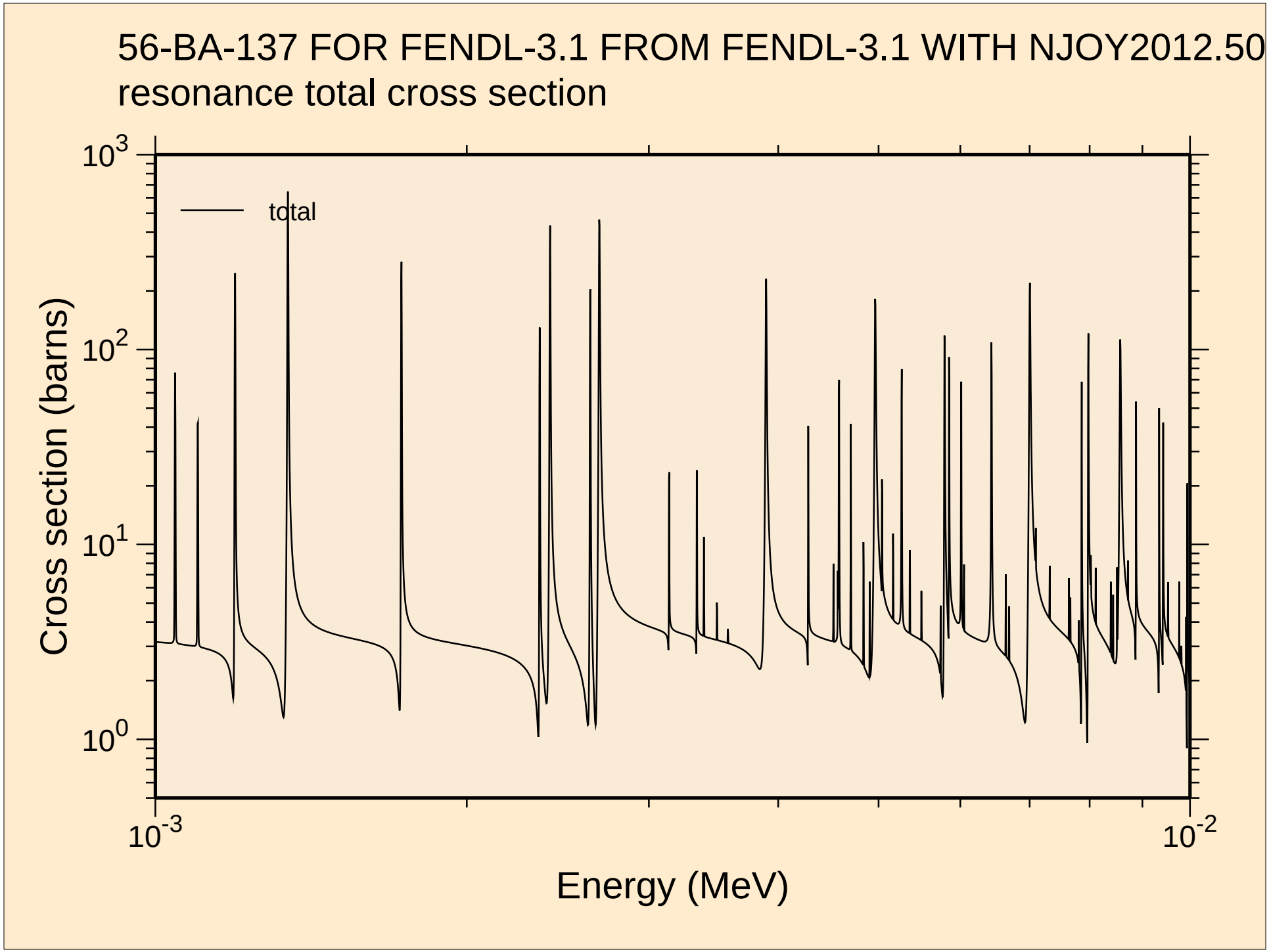
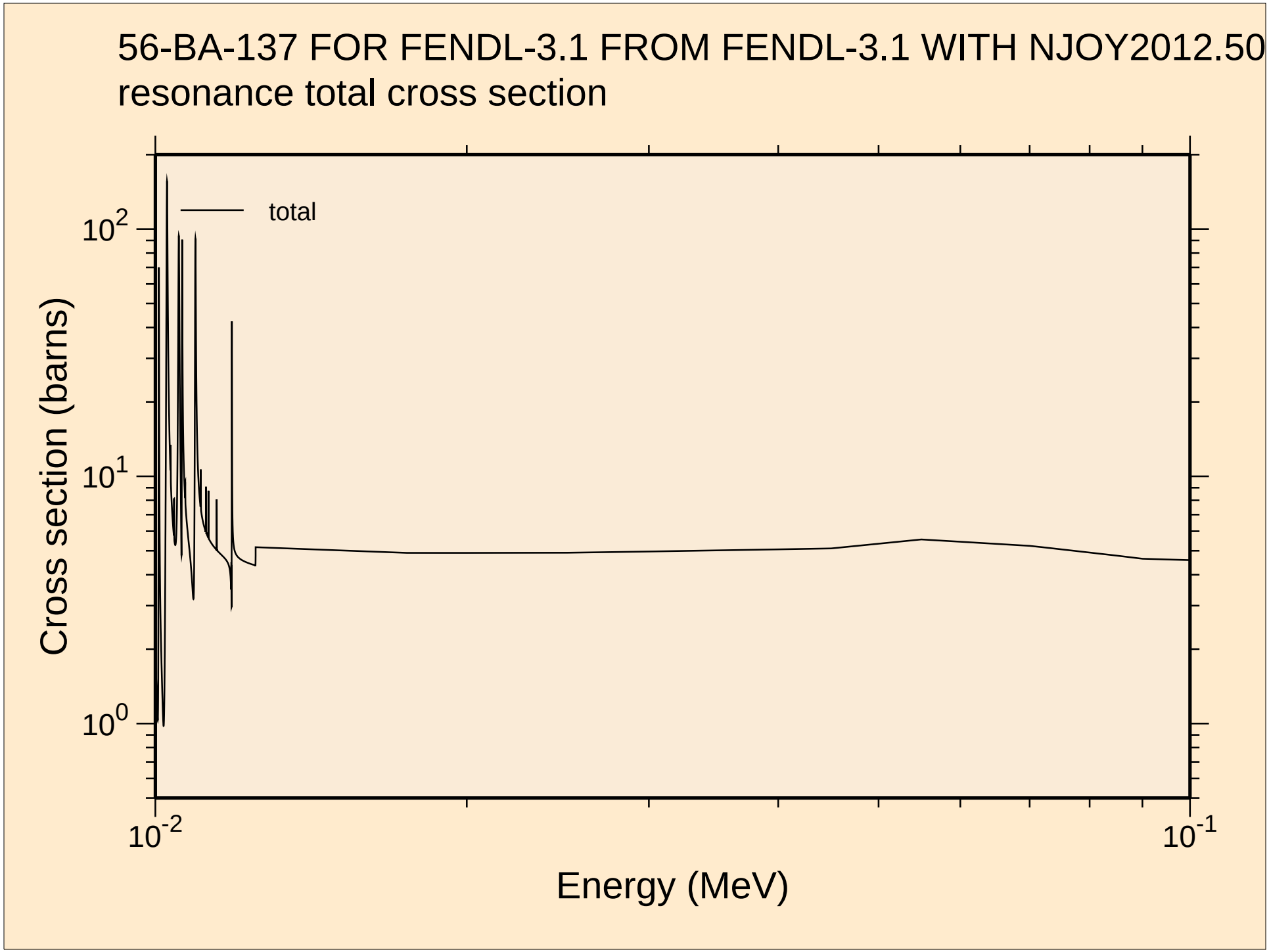
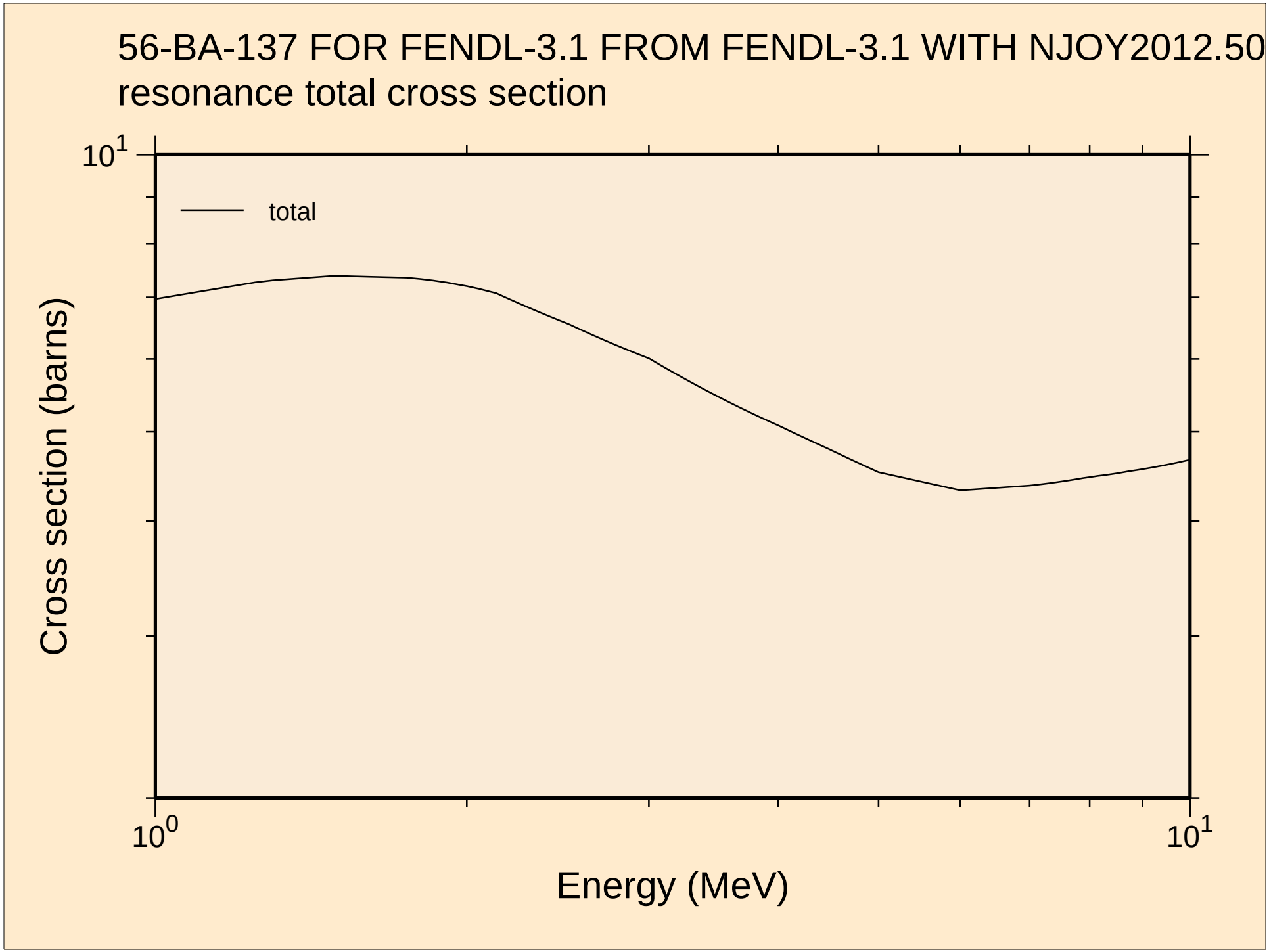

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Principal cross sections
Cross section (barns)
10^3
10^2
10^1
10^0
10^-1
10^-2
total
absorption
elastic
gamma production
10^-11
10^-9
10^-7
10^-5
10^-3
10^-1
10^1
Energy (MeV)

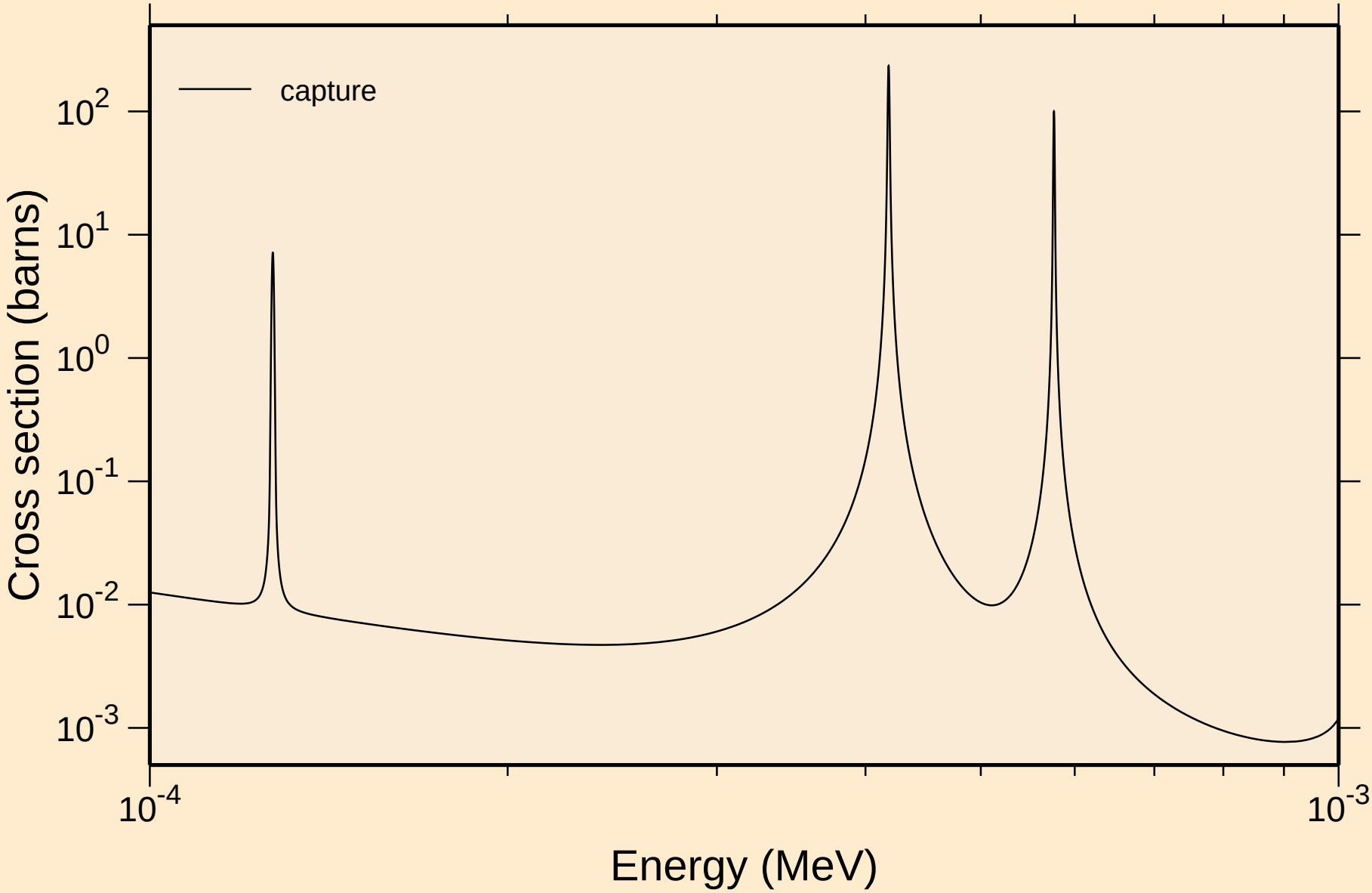

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
resonance total cross section
total
Cross section (barns)
10^3
10^2
10^1
10^0
10^-4
10^-3
Energy (MeV)

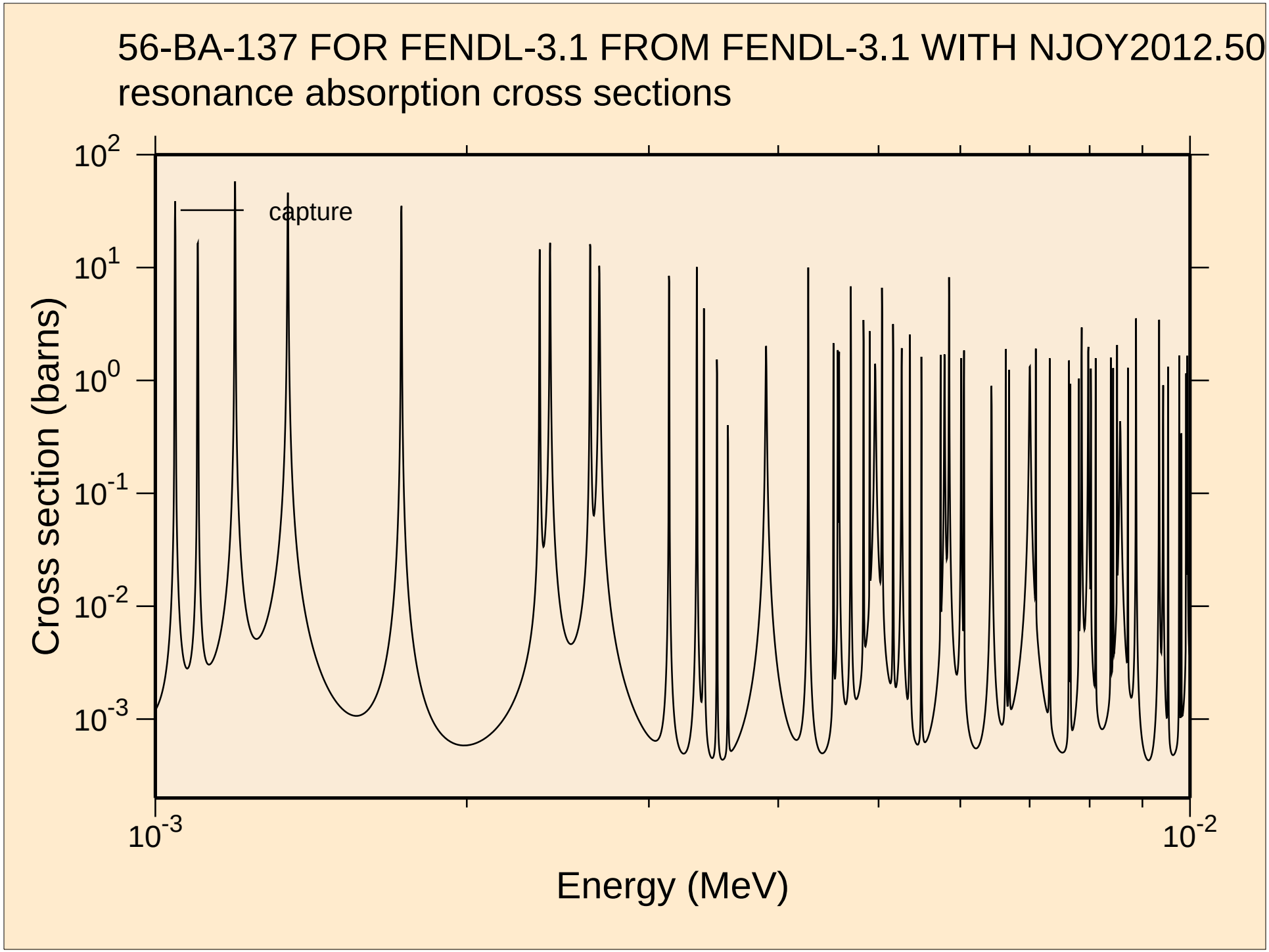

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
resonance total cross section
total
Cross section (barns)
10^3
10^2
10^1
10^0
10^-3
10^-2
Energy (MeV)

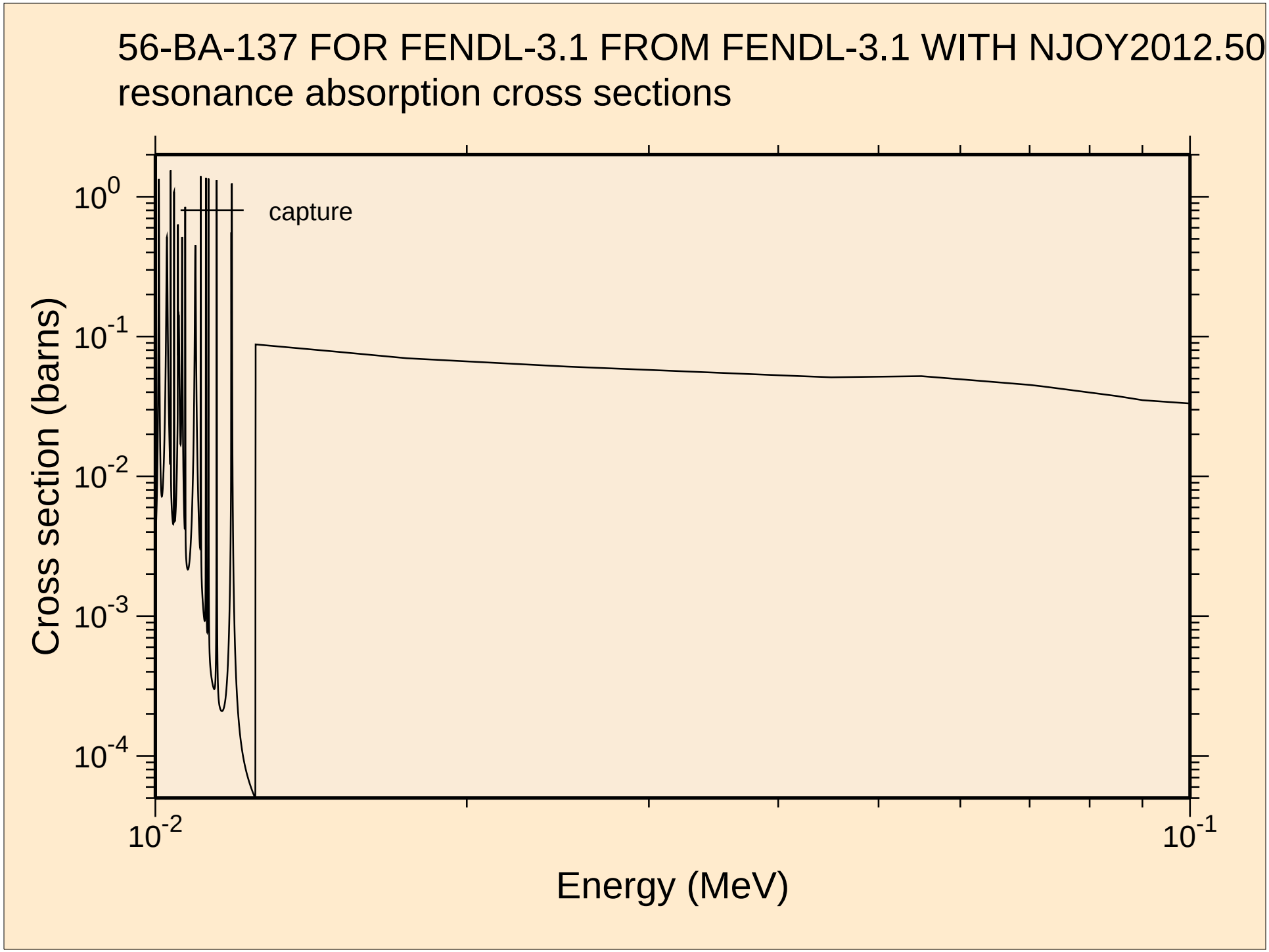

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
resonance total cross section
total
Cross section (barns)
10^2
10^1
10^0
10^-2
10^-1
Energy (MeV)

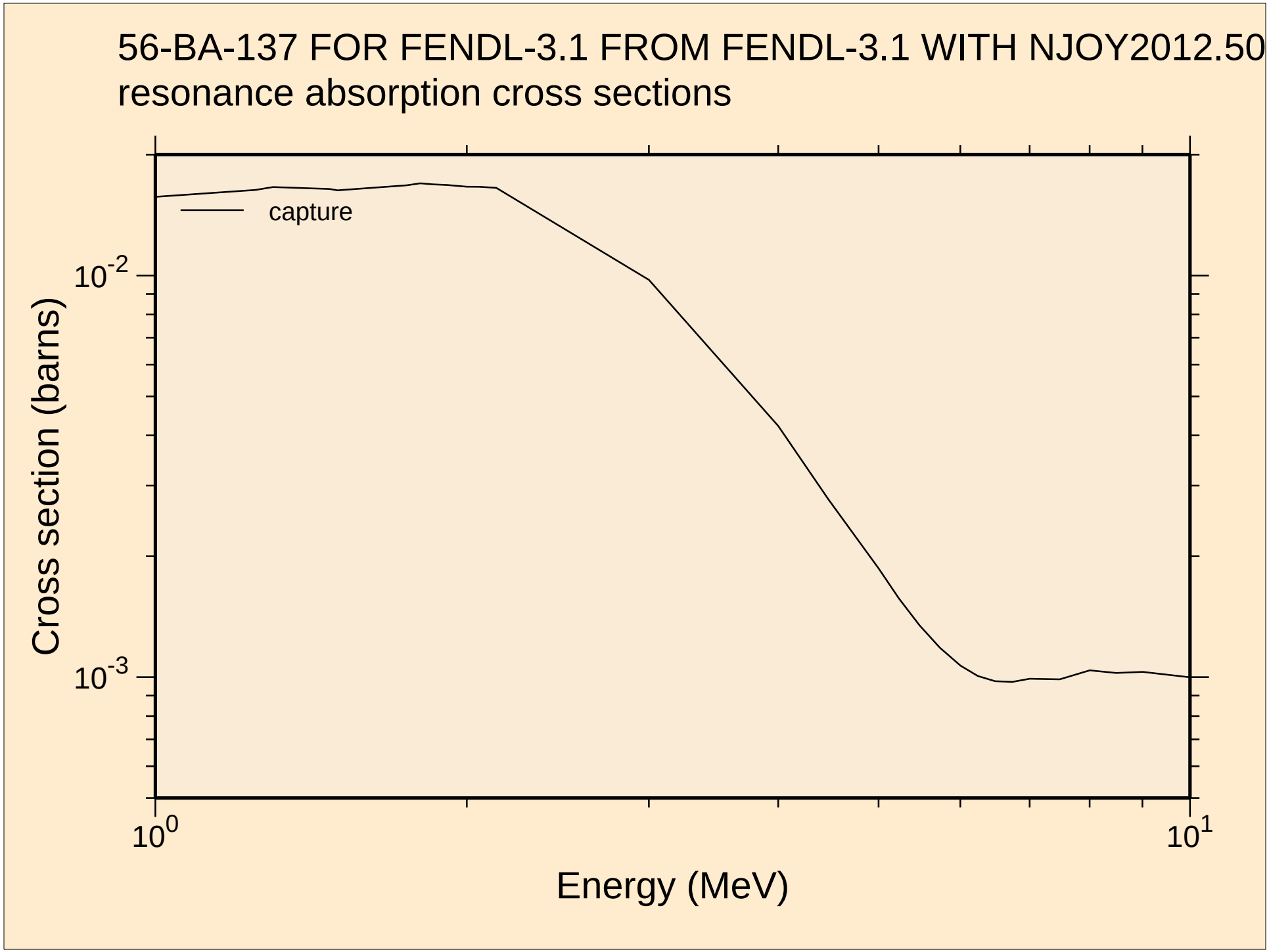

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
resonance total cross section
$10^1$
total
Cross section (barns)
$10^0$
$10^1$
Energy (MeV)

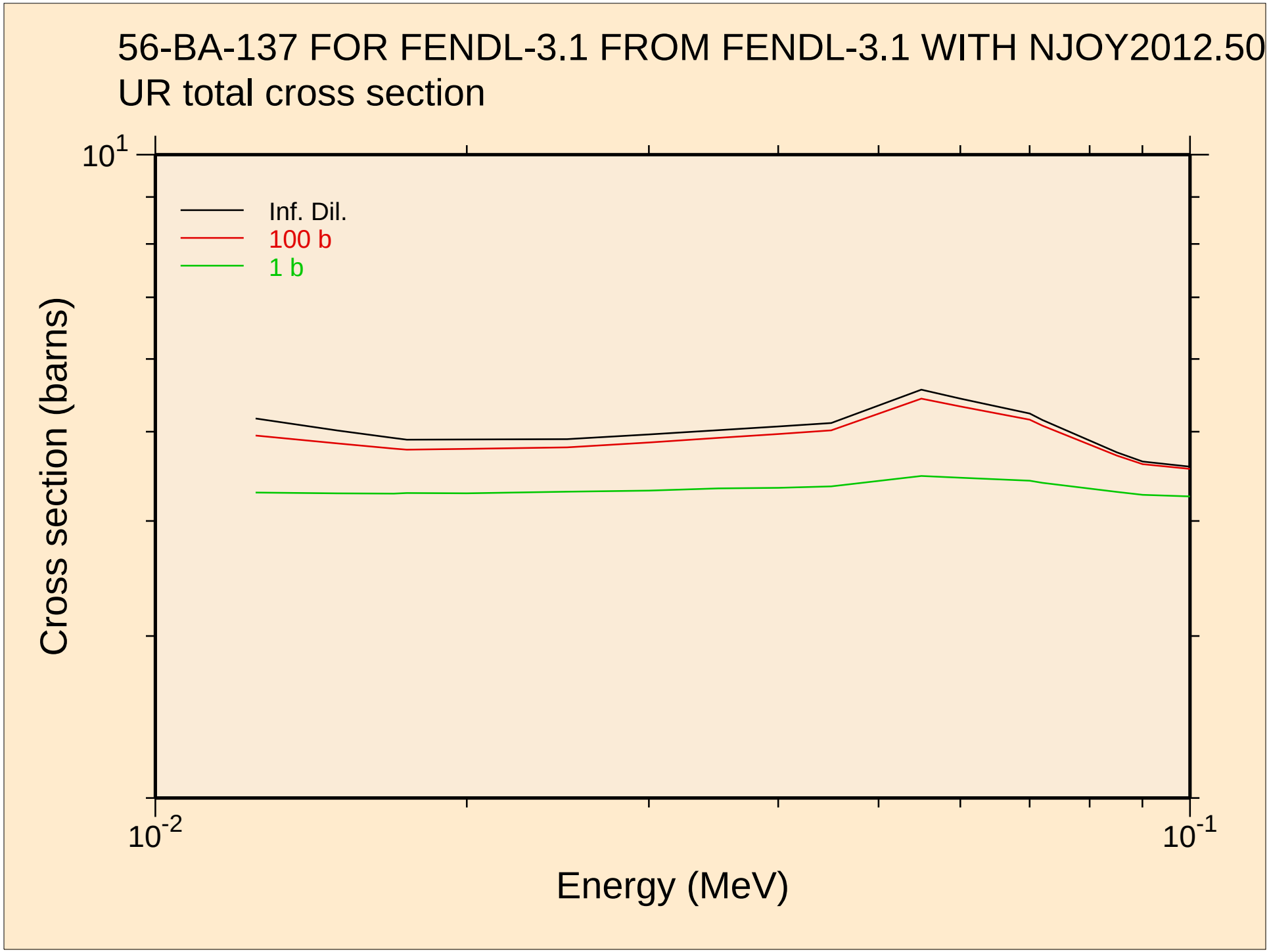
56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
resonance absorption cross sections

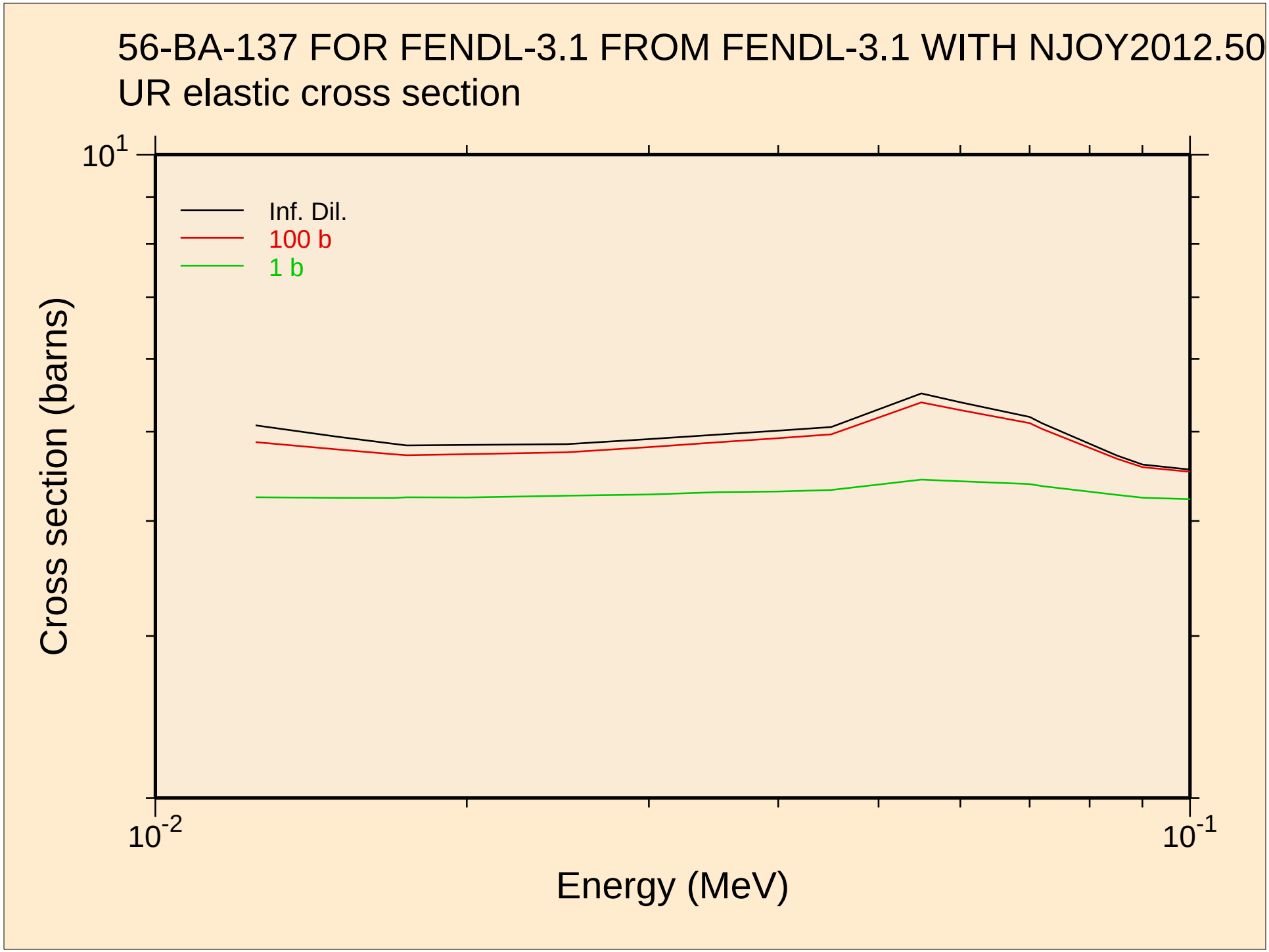


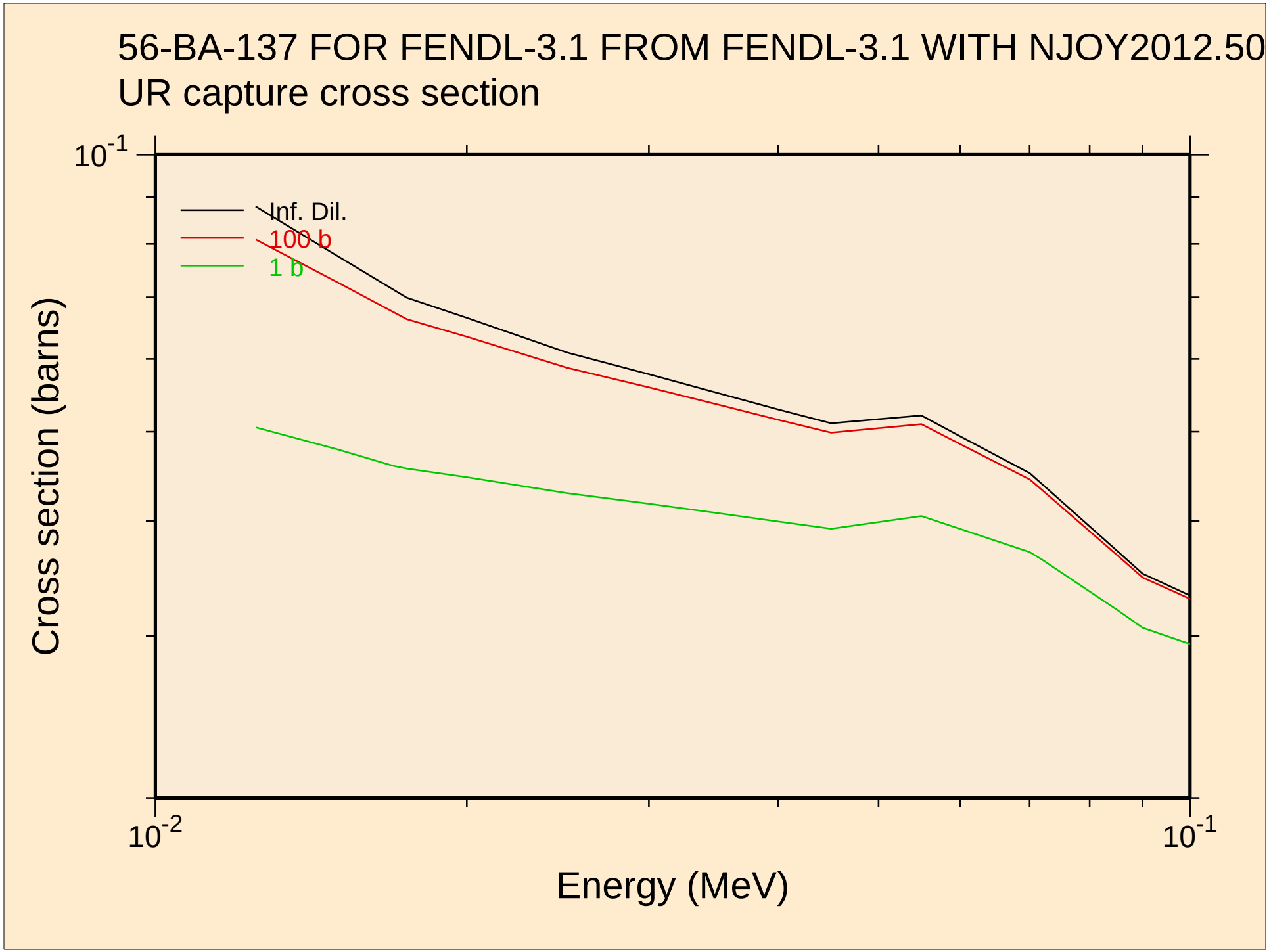

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
resonance absorption cross sections
capture
Cross section (barns)
$10^{2}$
$10^{1}$
$10^{0}$
$10^{-1}$
$10^{-2}$
$10^{-3}$
$10^{-3}$
$10^{-2}$
Energy (MeV)

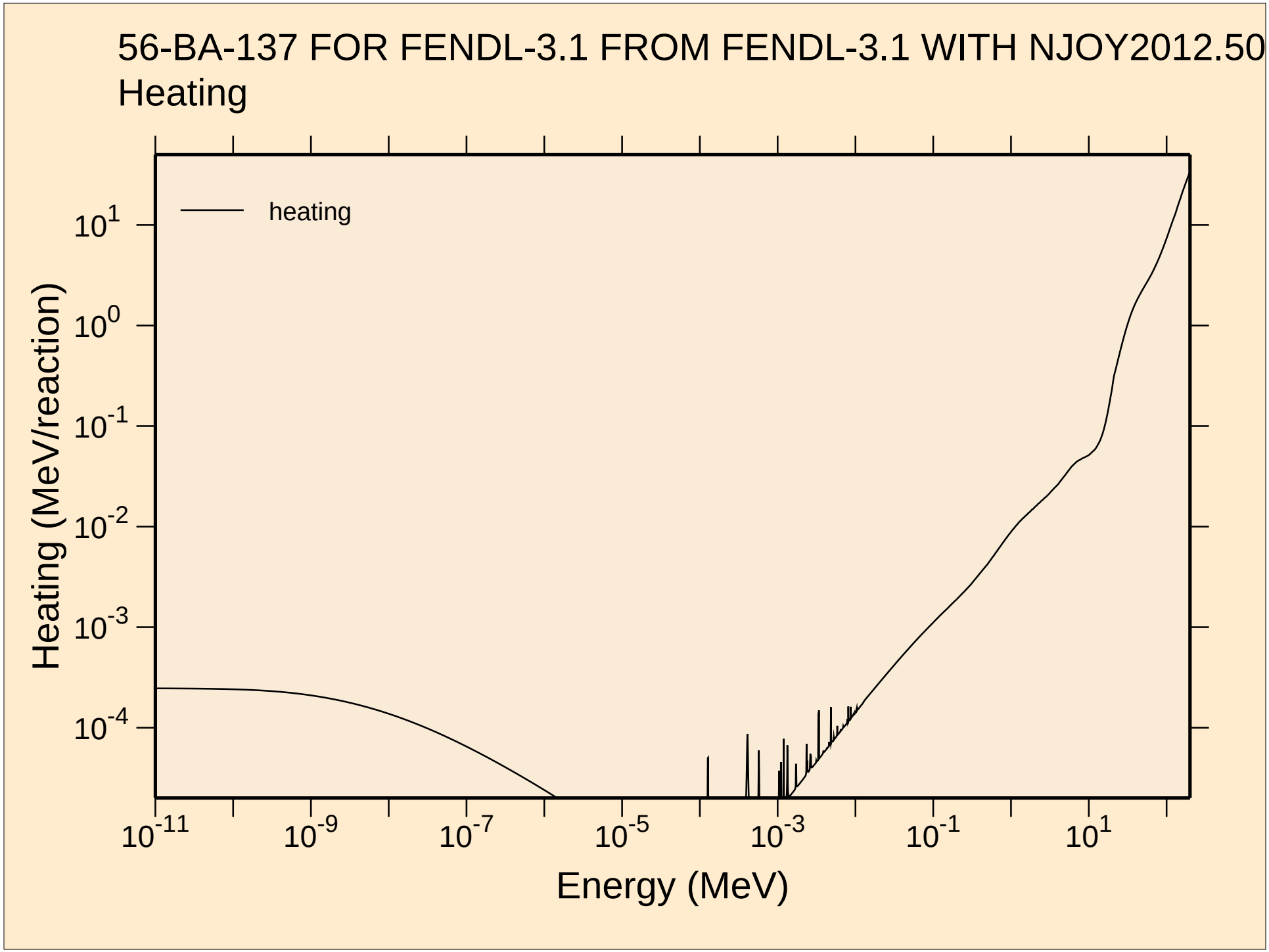

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
resonance absorption cross sections
capture
Cross section (barns)
10^0
10^-1
10^-2
10^-3
10^-4
10^-2
10^-1
Energy (MeV)

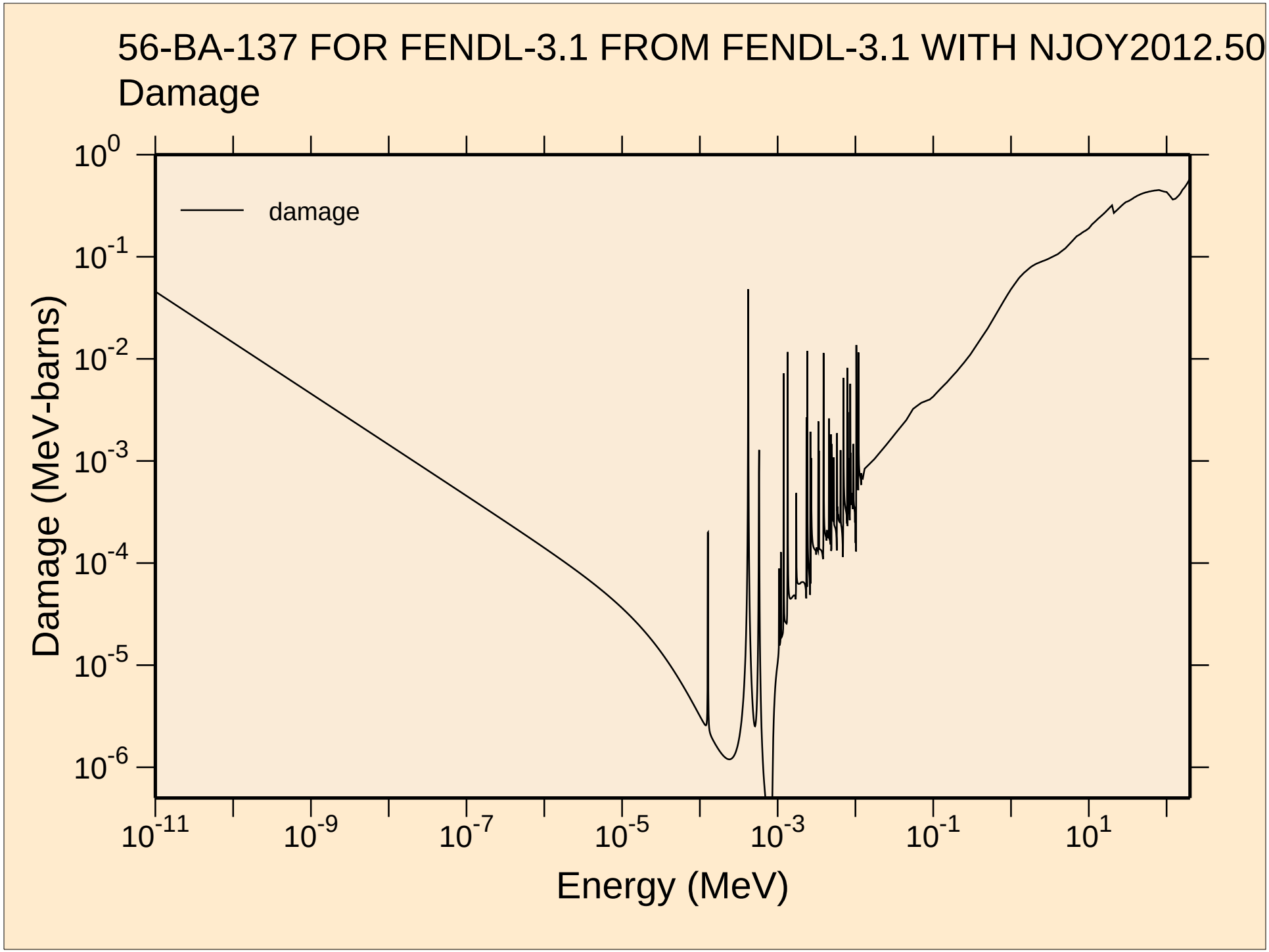

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
resonance absorption cross sections
capture
Cross section (barns)
10-2
10-3
100
101
Energy (MeV)

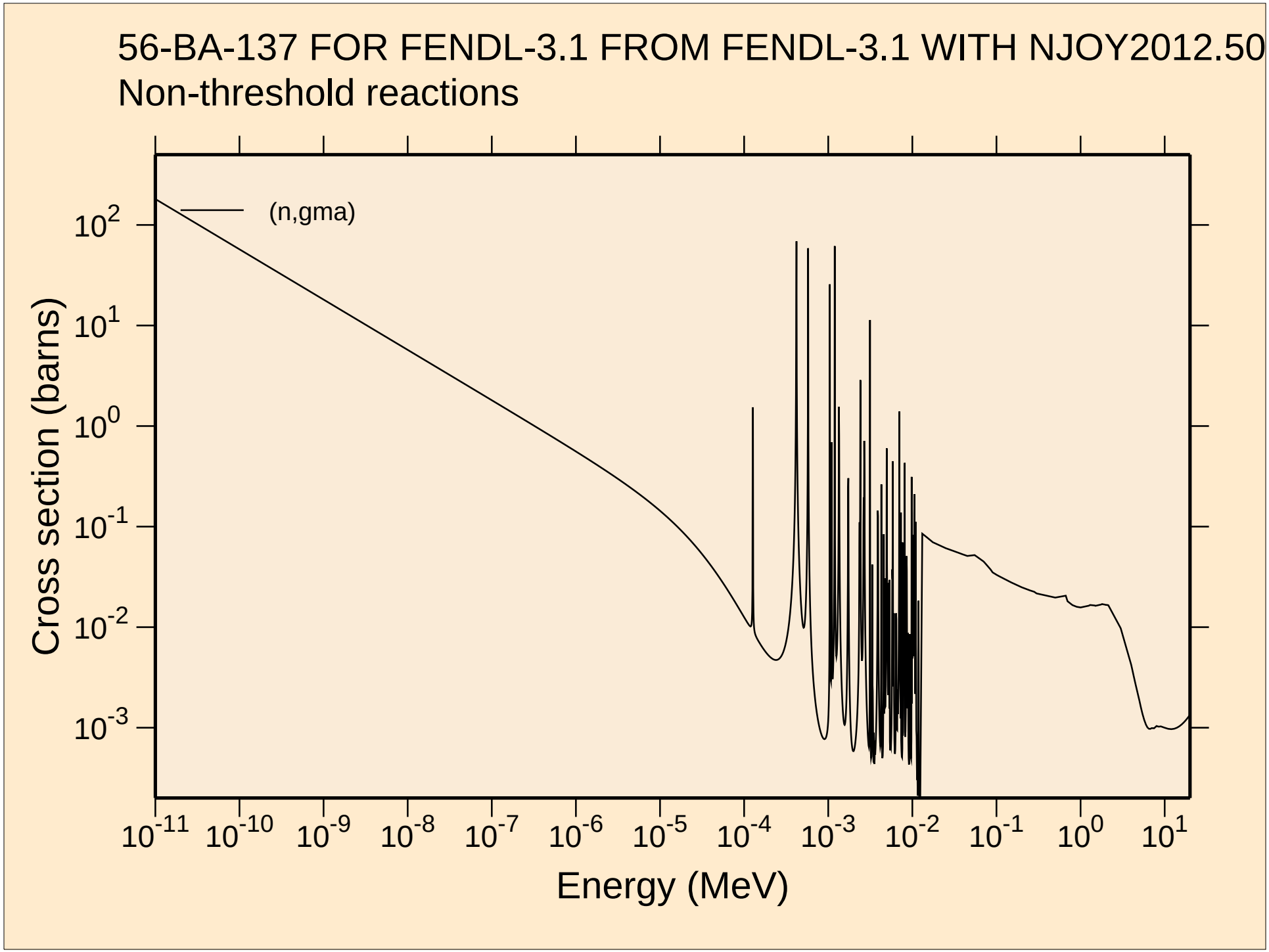

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
UR total cross section
Inf. Dil.
100 b
1 b
Cross section (barns)
Energy (MeV)
10^1
10^-2
10^-1

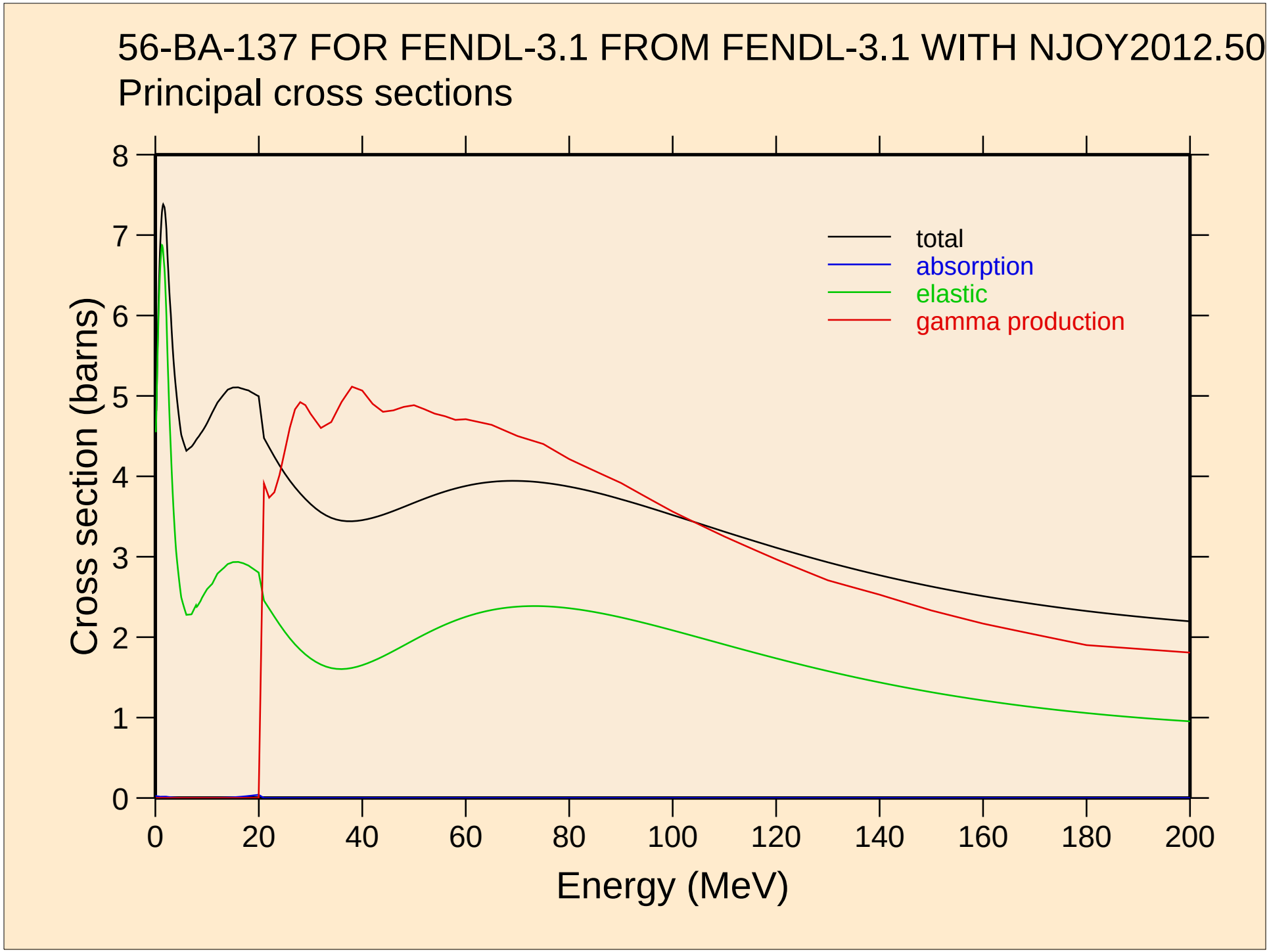

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
UR elastic cross section
Inf. Dil.
100 b
1 b
Cross section (barns)
Energy (MeV)
10^1
10^-2
10^-1

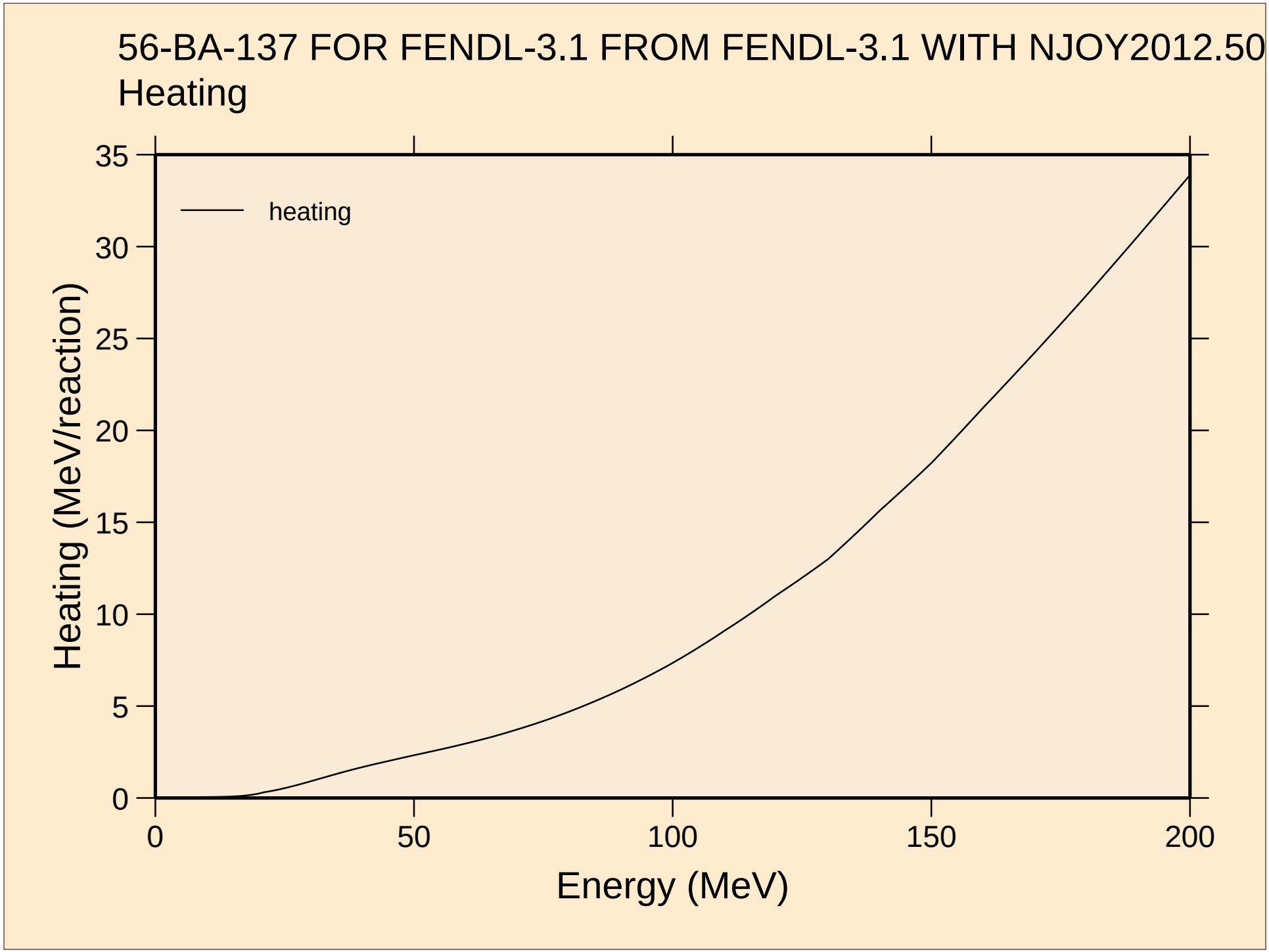

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
UR capture cross section
Inf. Dil.
100 b
1 b
Cross section (barns)
Energy (MeV)
10-1
10-2
10-1

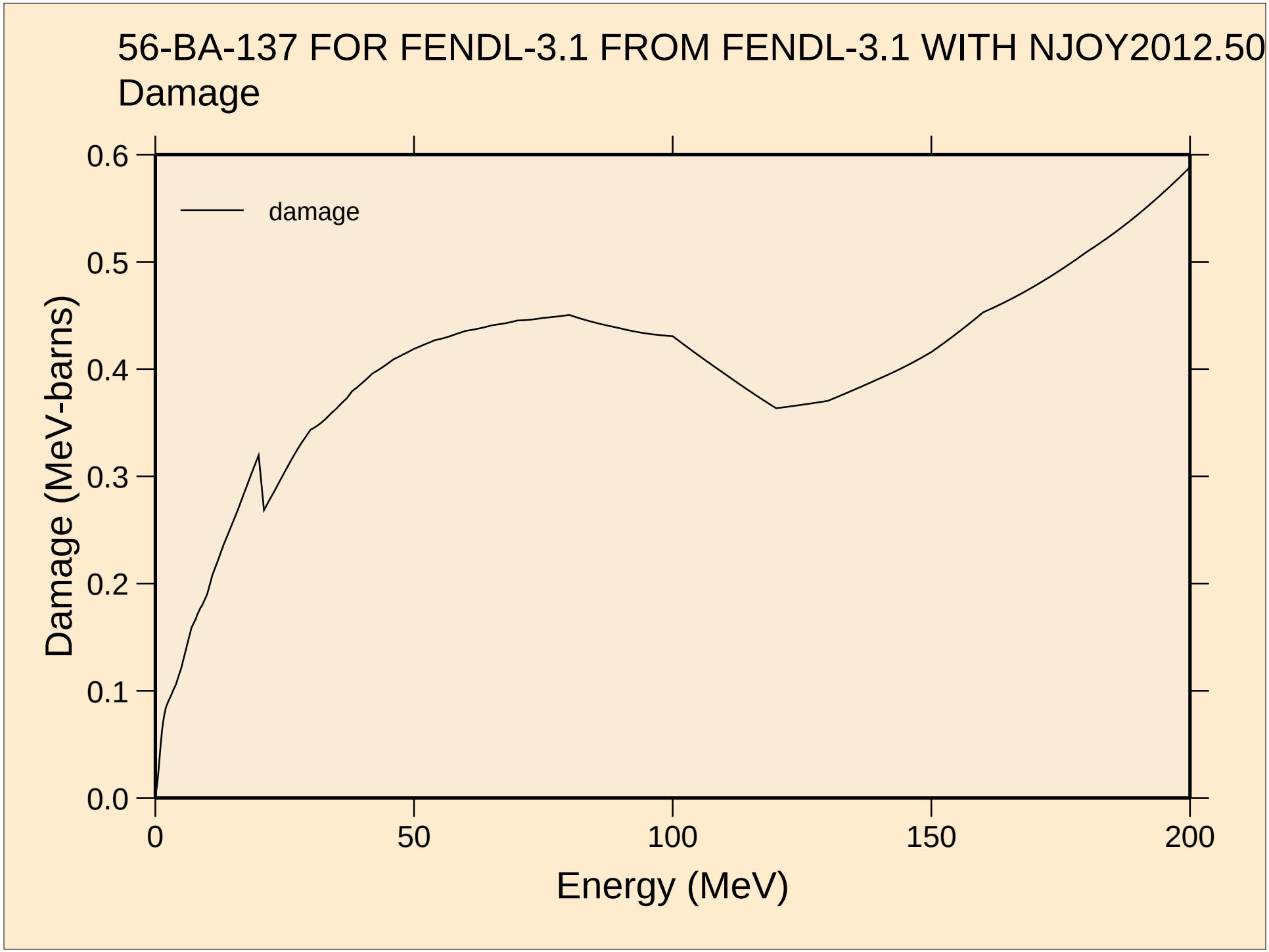

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Heating
heating
Heating (MeV/reaction)
10^1
10^0
10^-1
10^-2
10^-3
10^-4
10^-11
10^-9
10^-7
10^-5
10^-3
10^-1
10^1
Energy (MeV)

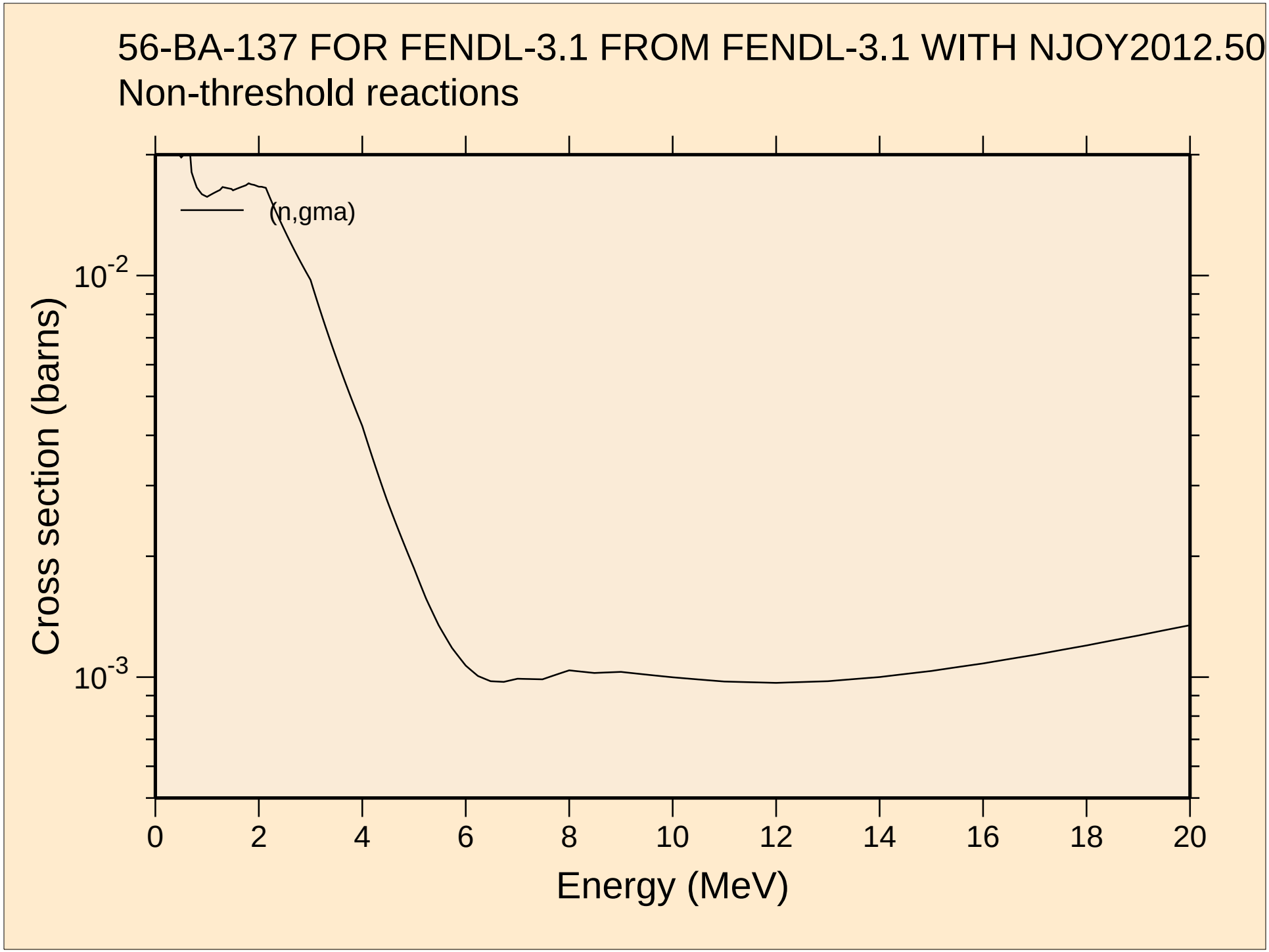

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Damage
damage
Damage (MeV-barns)
Energy (MeV)
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
10^-6
10^-11
10^-9
10^-7
10^-5
10^-3
10^-1
10^1

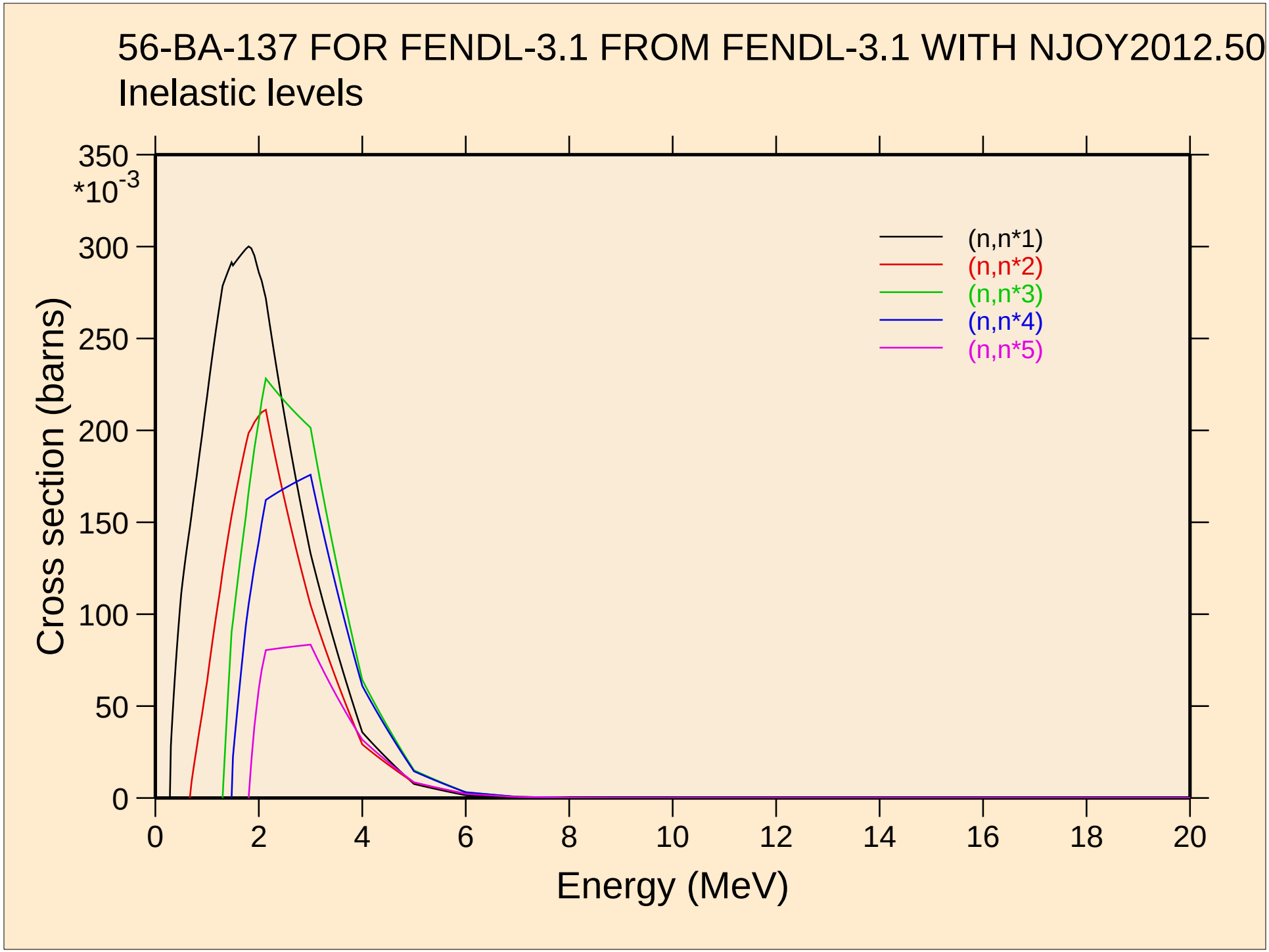

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Non-threshold reactions
(n,gma)
Cross section (barns)
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^-11 10^-10 10^-9 10^-8 10^-7 10^-6 10^-5 10^-4 10^-3 10^-2 10^-1 10^0 10^1
Energy (MeV)

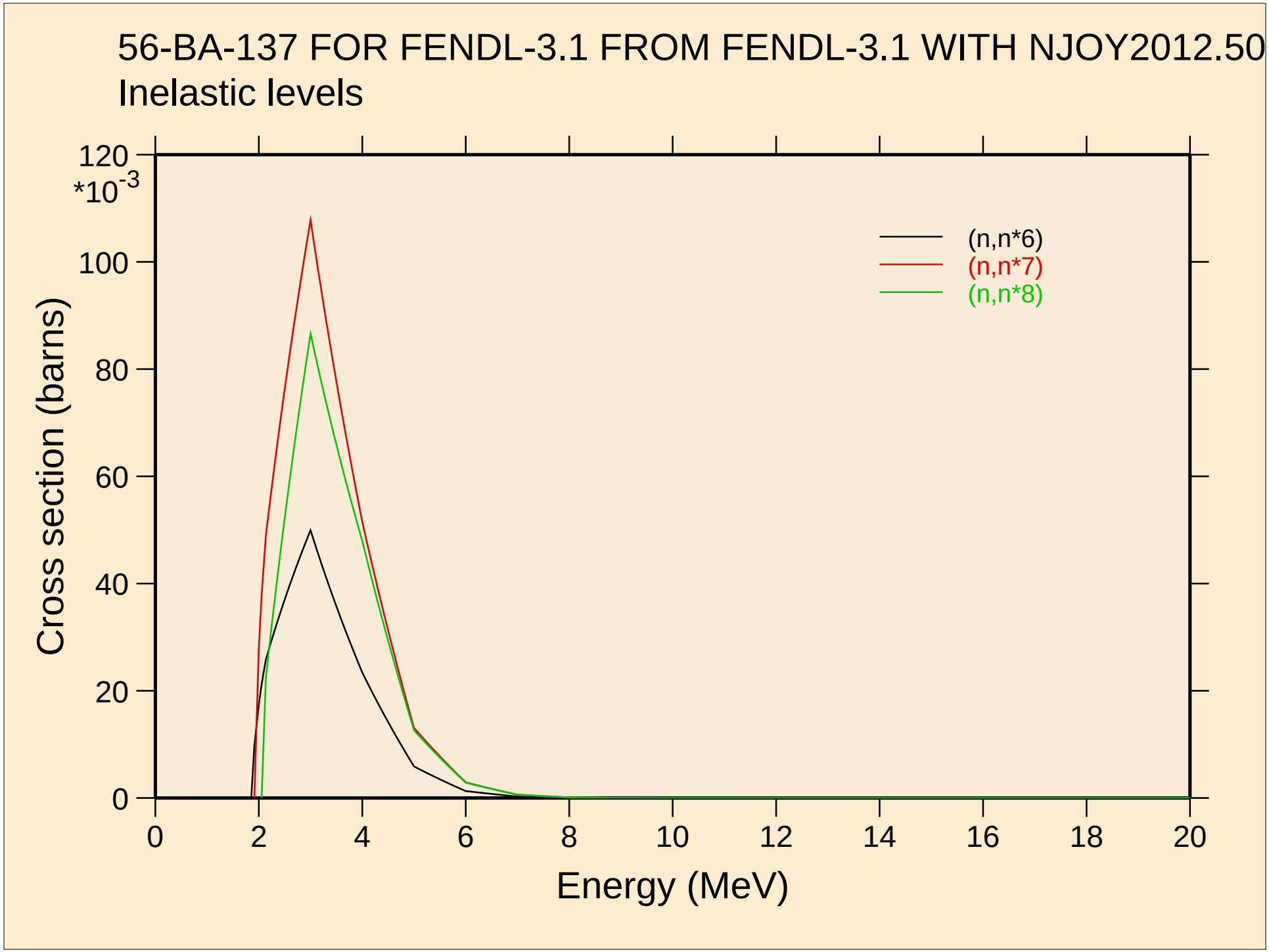

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production
0
1
2
3
4
5
6
7
8
0
20
40
60
80
100
120
140
160
180
200

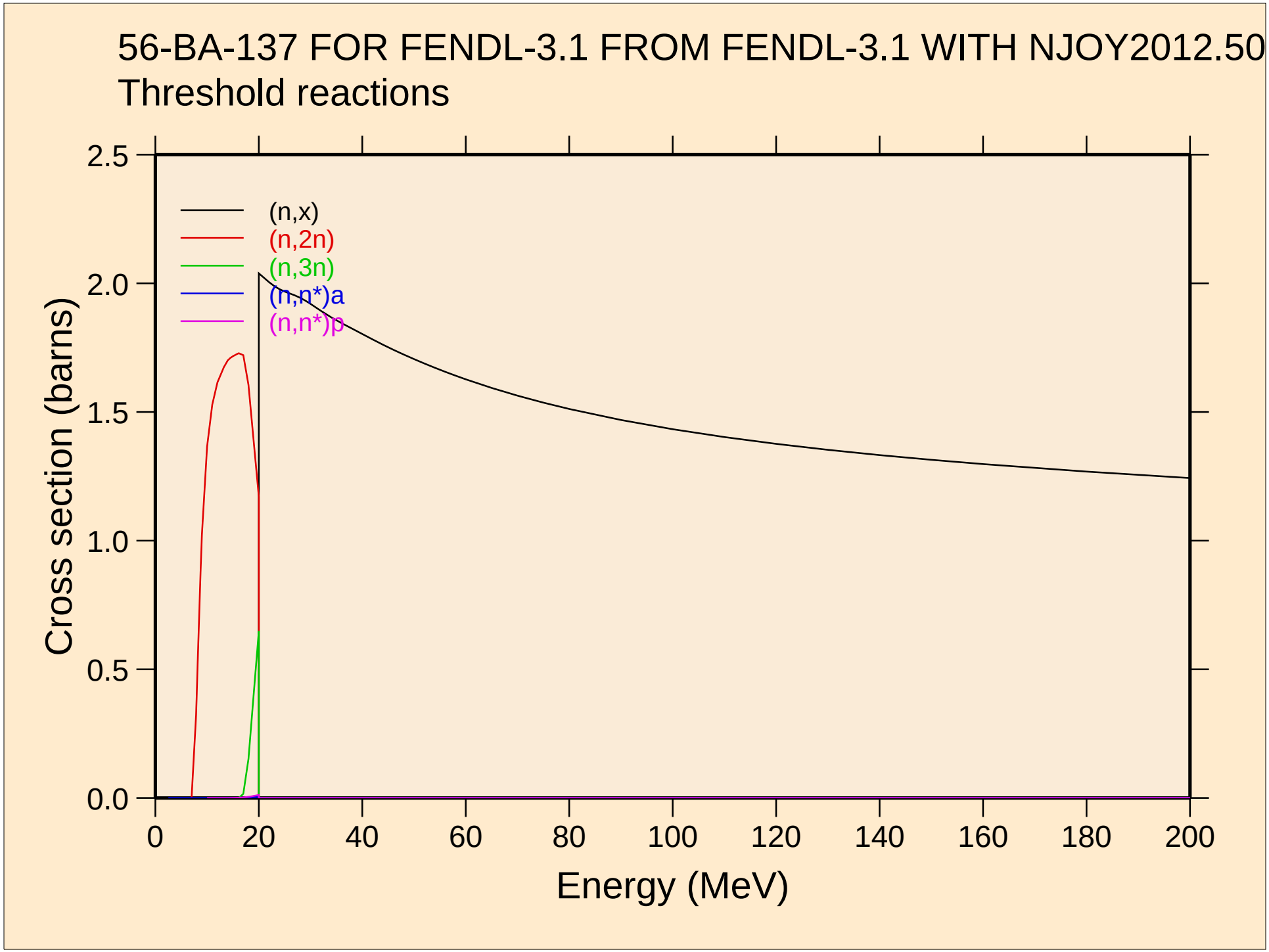

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
0
5
10
15
20
25
30
35
0
50
100
150
200

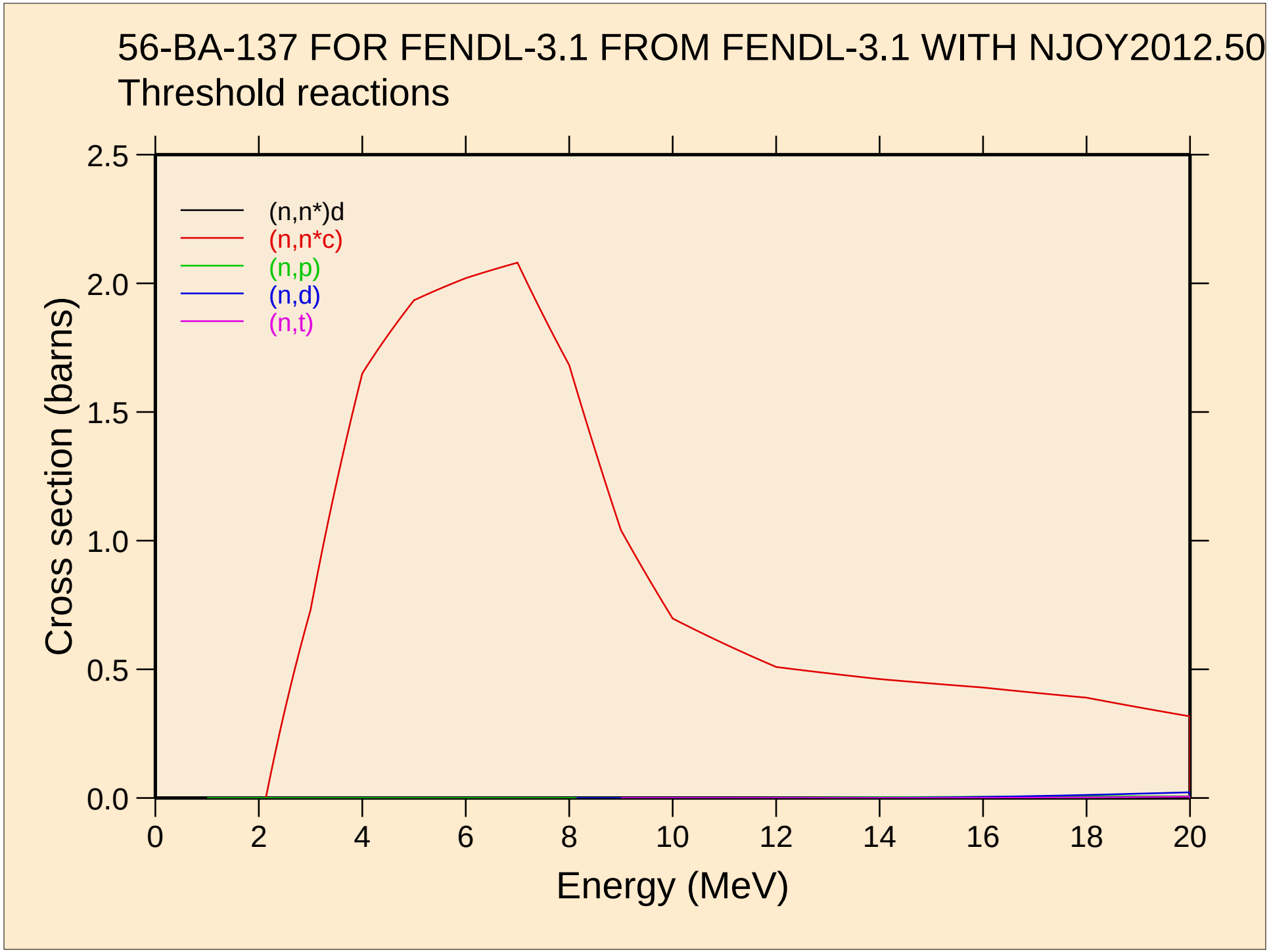

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Damage
damage
Damage (MeV-barns)
Energy (MeV)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0
50
100
150
200

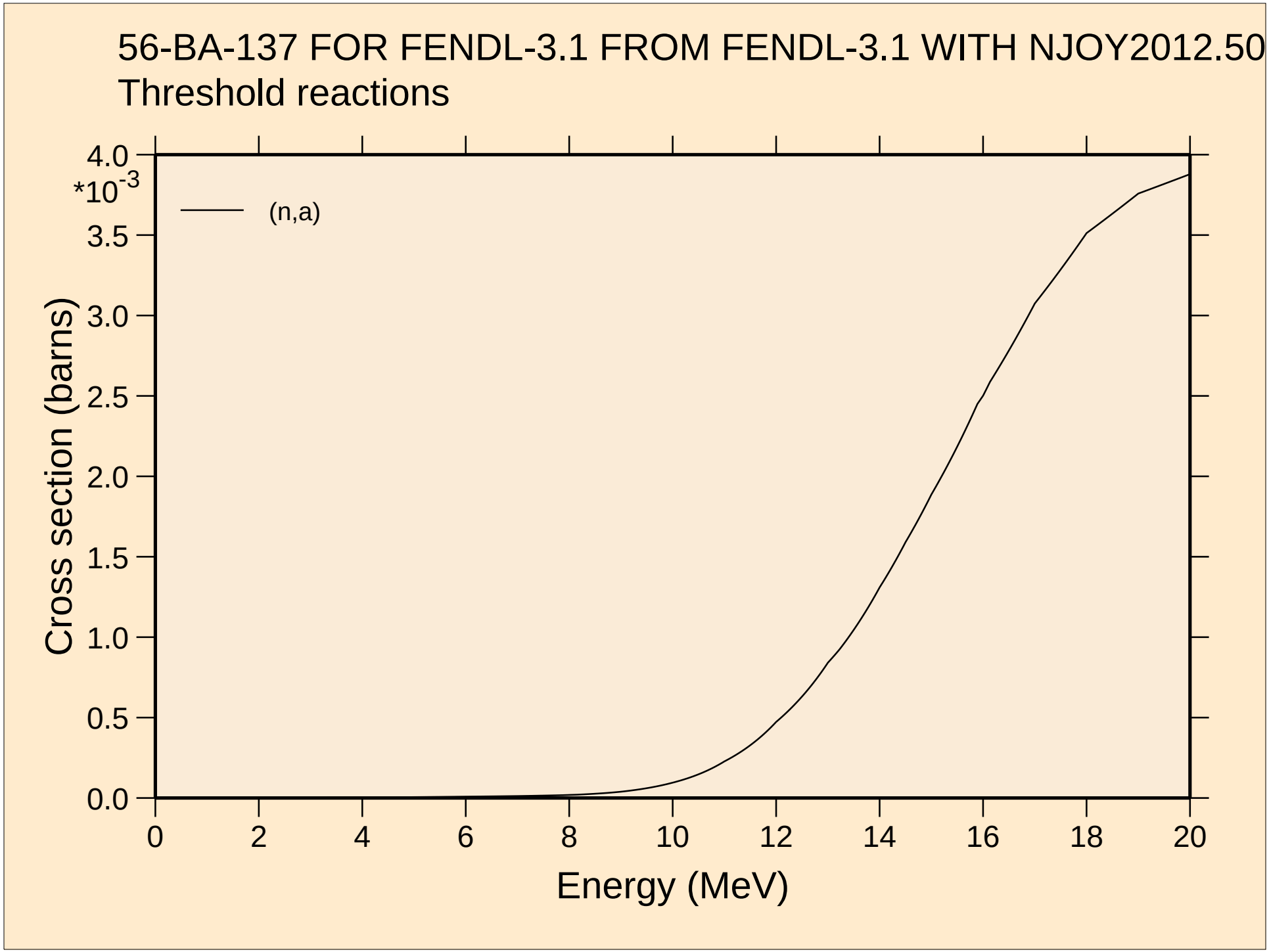

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Non-threshold reactions
(n,gma)
Cross section (barns)
10-2
10-3
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

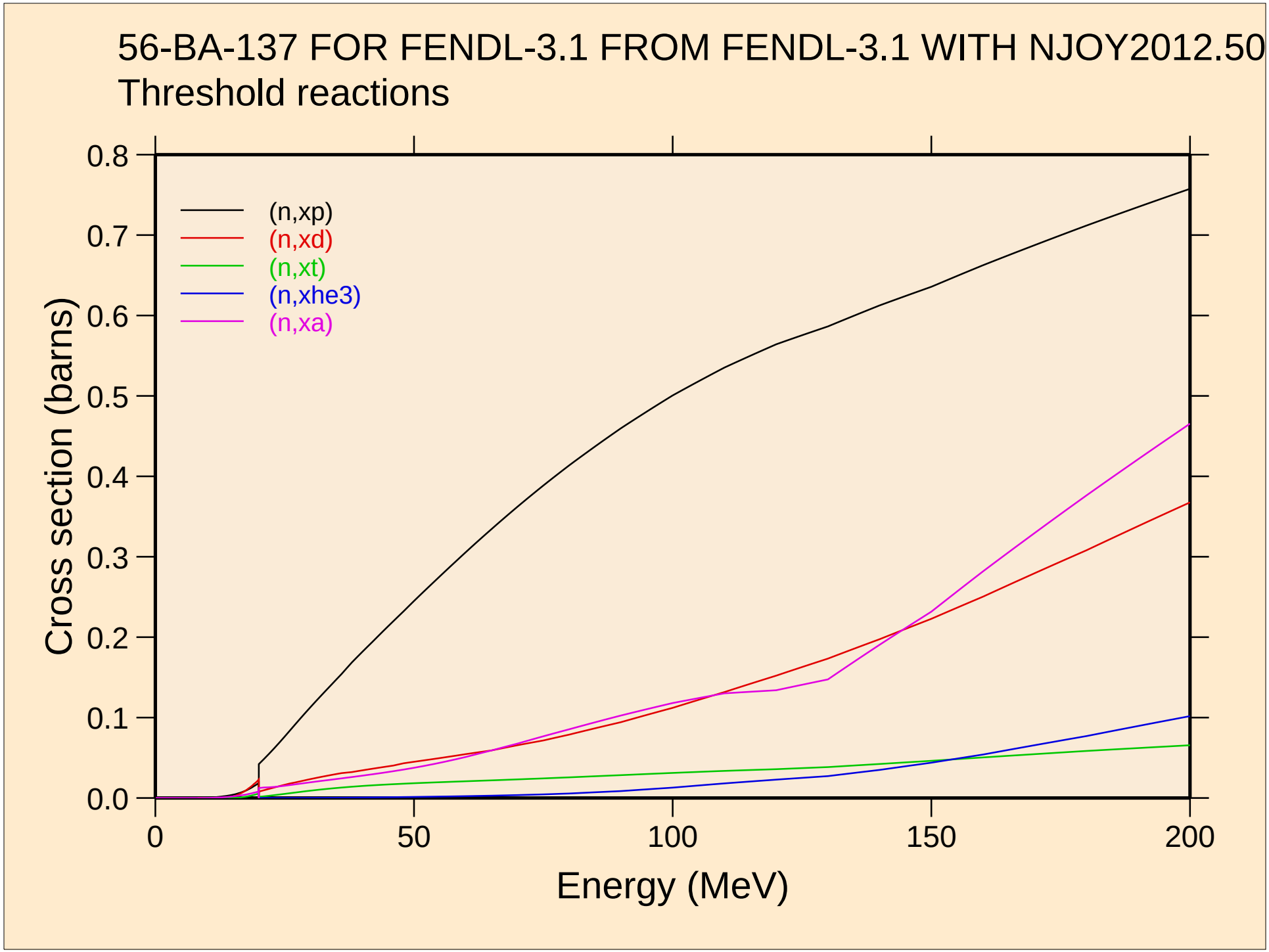

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Inelastic levels
Cross section (barns)
*10-3
350
300
250
200
150
100
50
0
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*1)
(n,n*2)
(n,n*3)
(n,n*4)
(n,n*5)

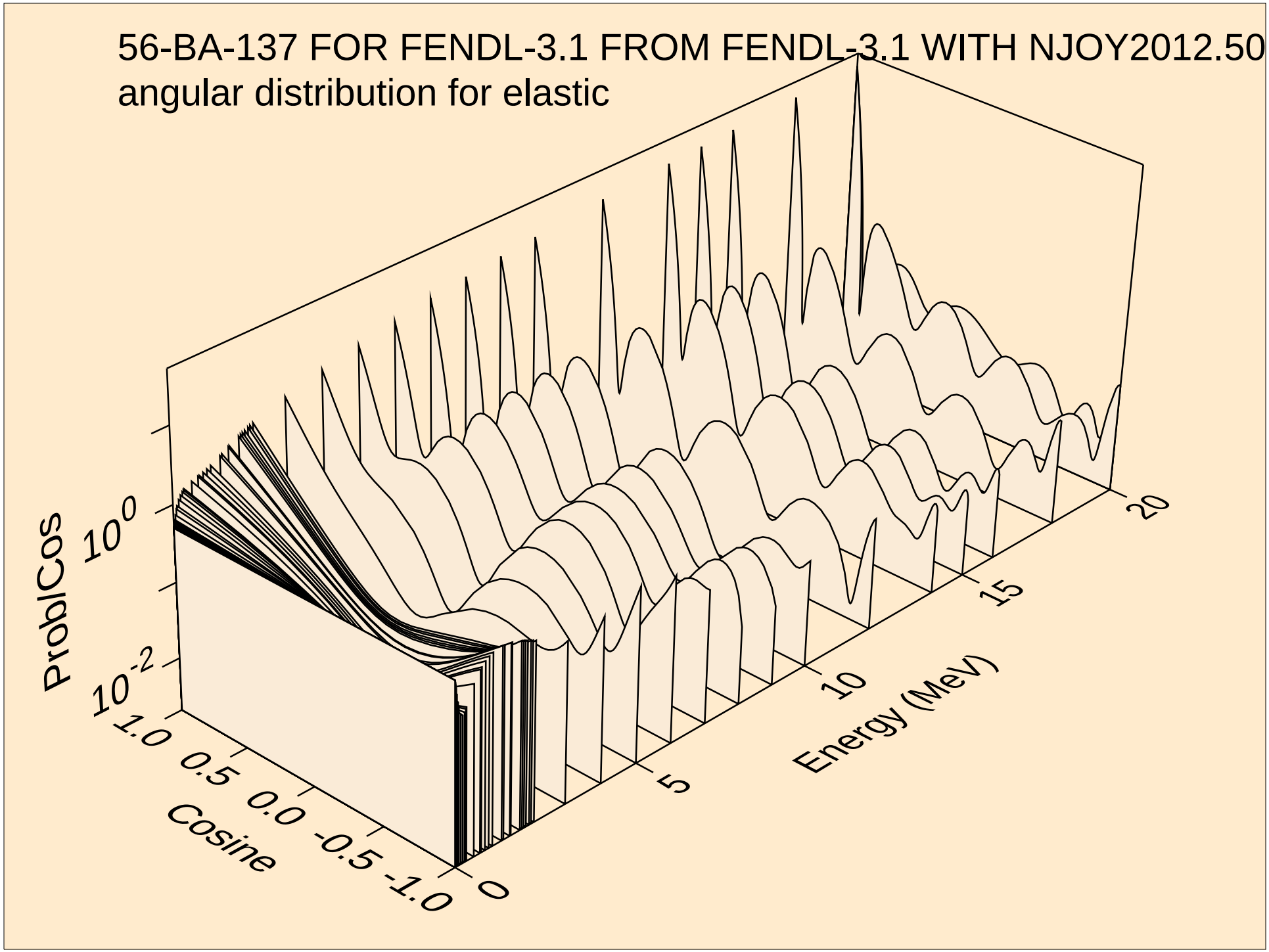

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Inelastic levels
120
*10-3
100
80
60
40
20
0
Cross section (barns)
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*6)
(n,n*7)
(n,n*8)

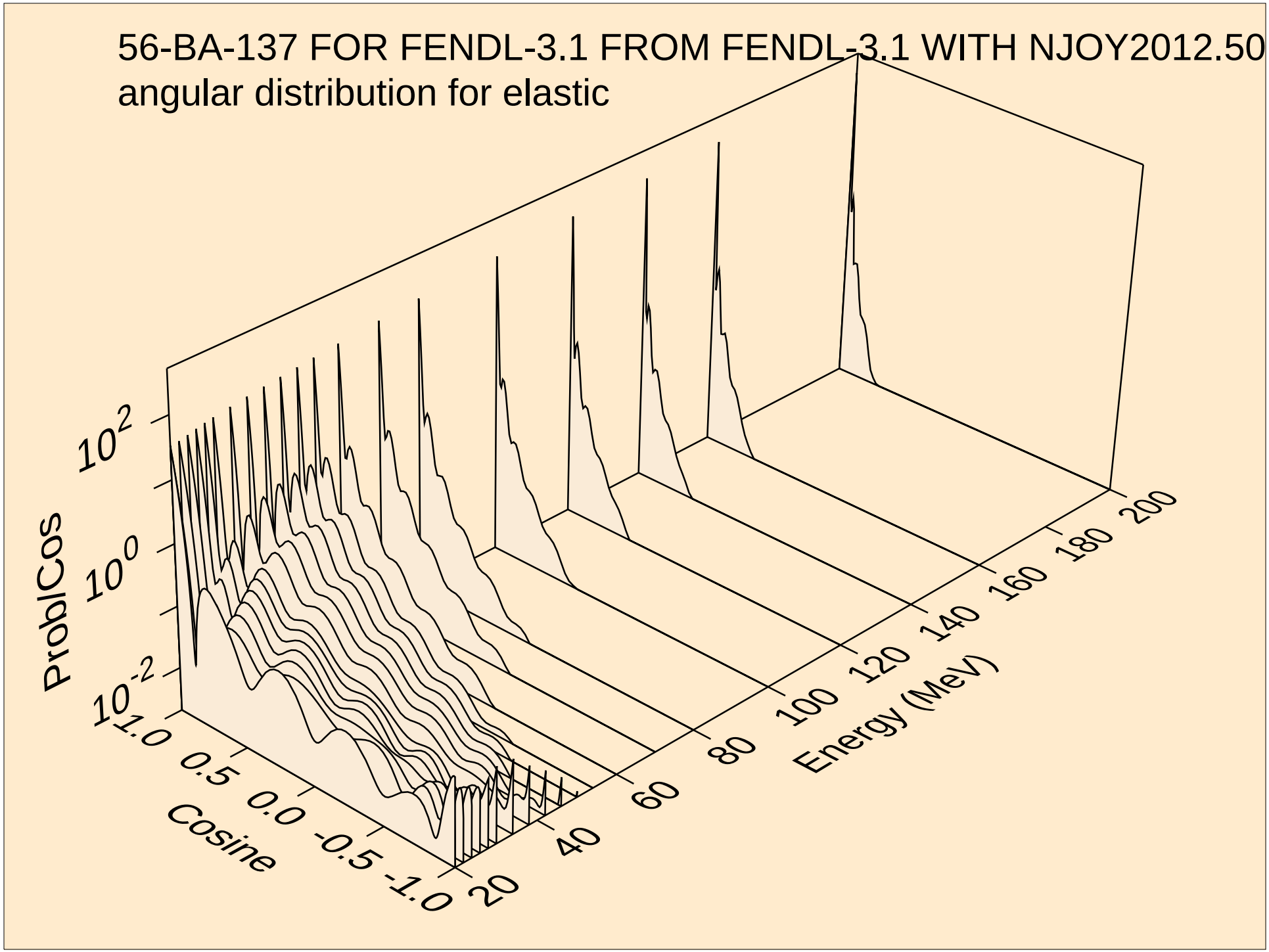

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Threshold reactions
(n,x)
(n,2n)
(n,3n)
(n,n*)a
(n,n*)p
Cross section (barns)
Energy (MeV)
0.0
0.5
1.0
1.5
2.0
2.5
0
20
40
60
80
100
120
140
160
180
200

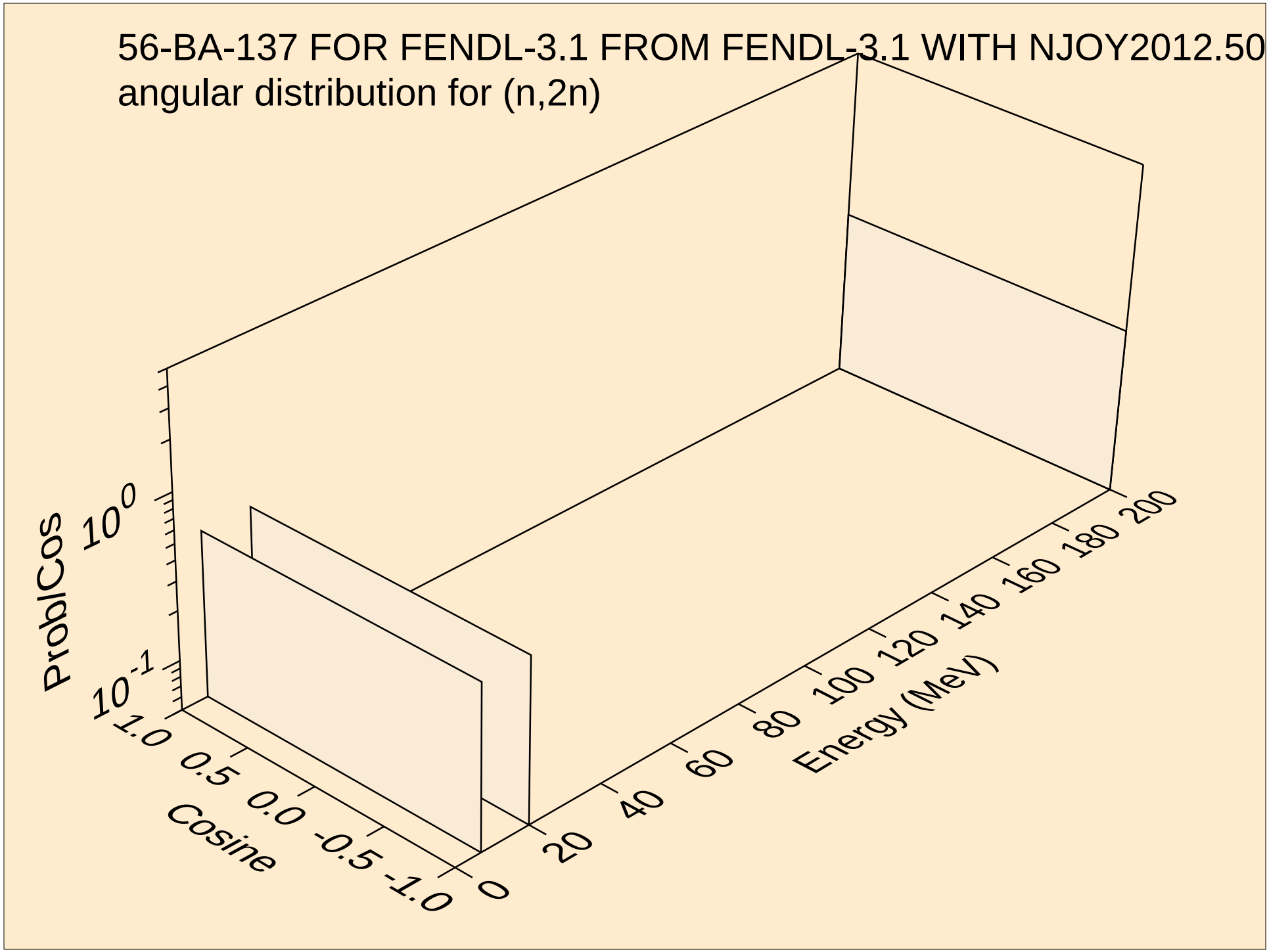

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Threshold reactions
(n,n*)d
(n,n*c)
(n,p)
(n,d)
(n,t)
Cross section (barns)
Energy (MeV)
0.0
0.5
1.0
1.5
2.0
2.5
0
2
4
6
8
10
12
14
16
18
20

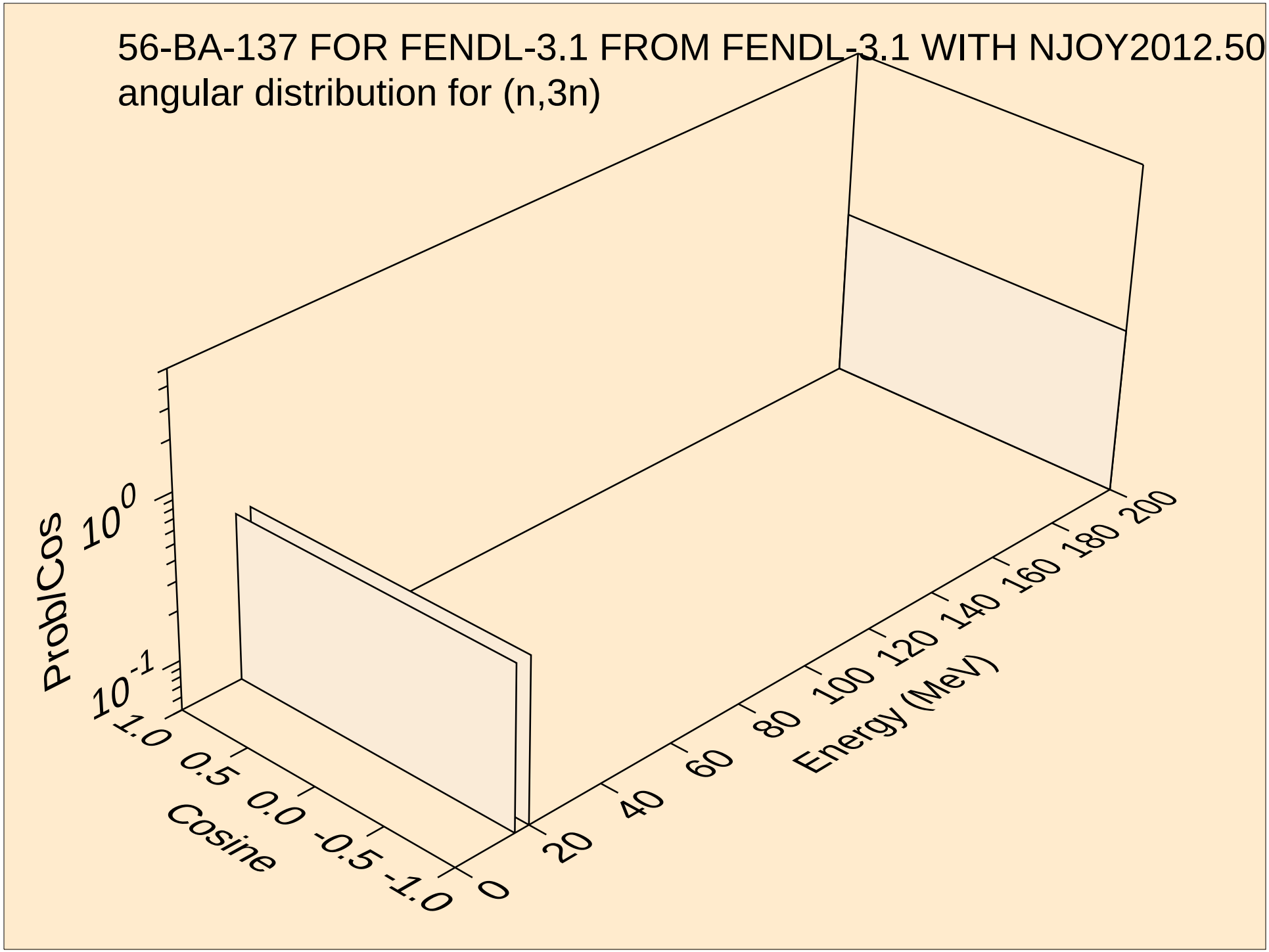

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Threshold reactions
(n,a)
Cross section (barns)
*10-3
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

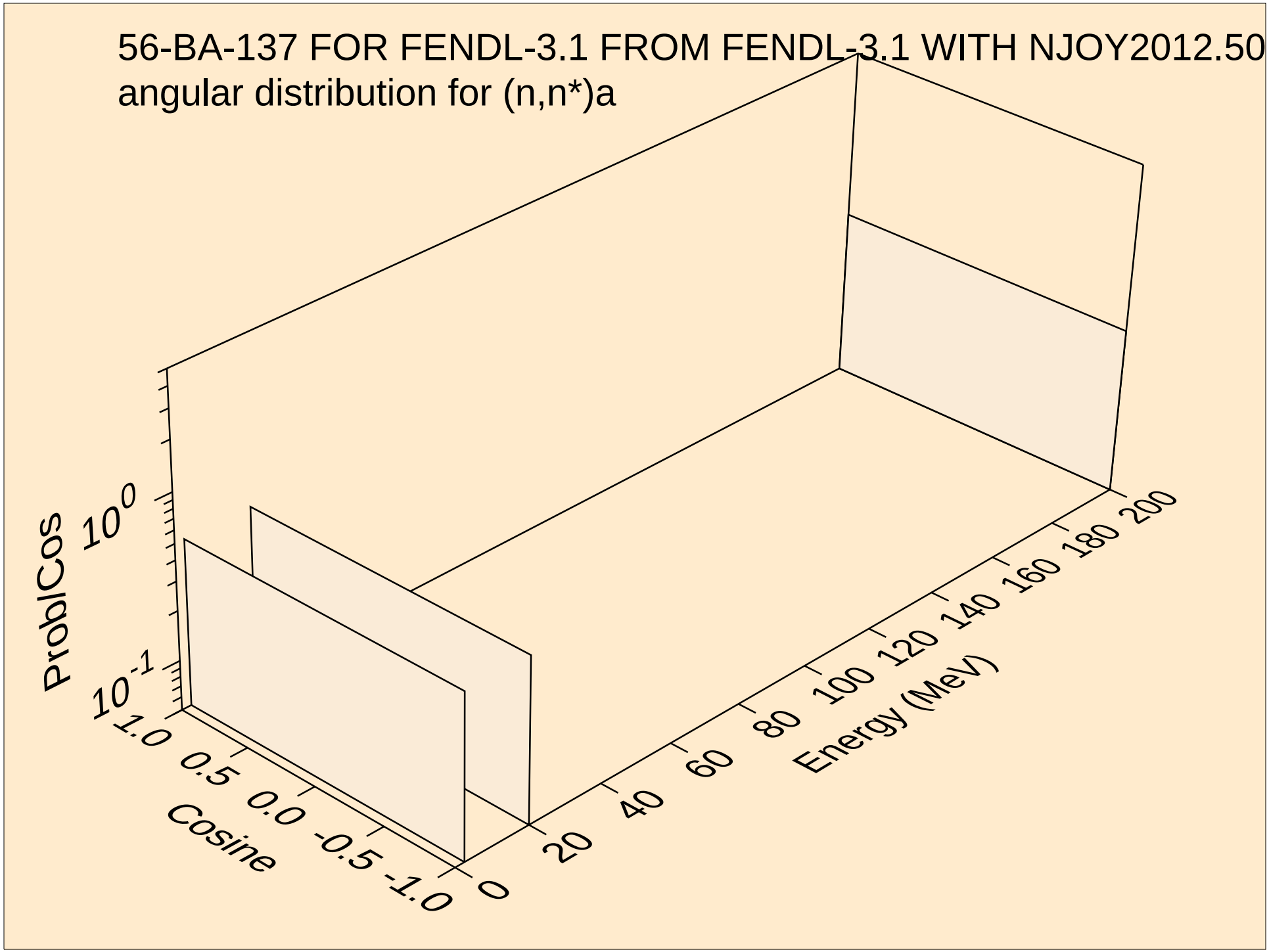

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Threshold reactions
(n,xp)
(n,xd)
(n,xt)
(n,xhe3)
(n,xa)
Cross section (barns)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0
50
100
150
200
Energy (MeV)

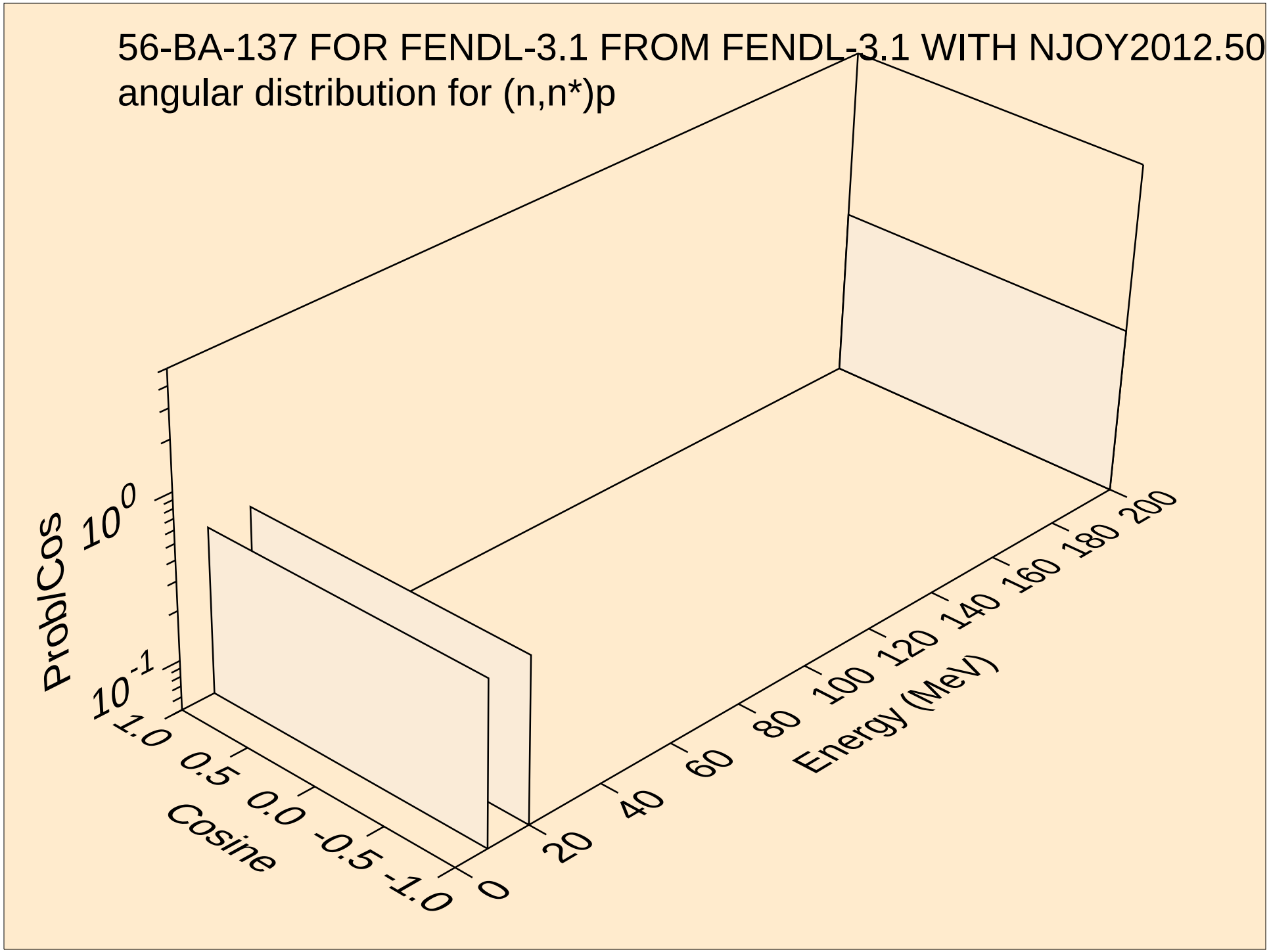

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for elastic
ProbICos
$10^{0}$
$10^{-2}$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)

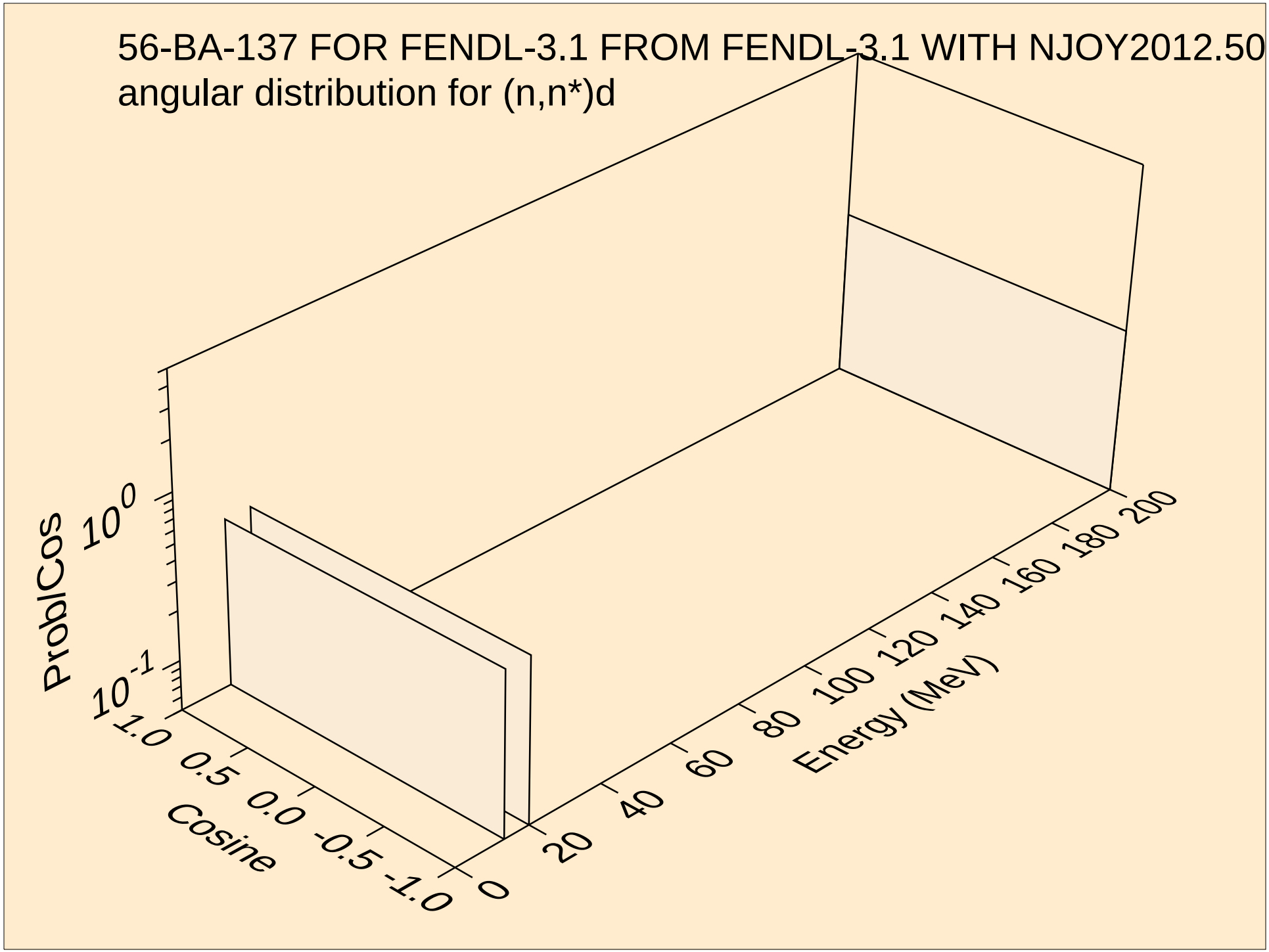

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for elastic
ProblCos
$10^{2}$
$10^{0}$
$10^{-2}$
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
180
200
Energy (MeV)

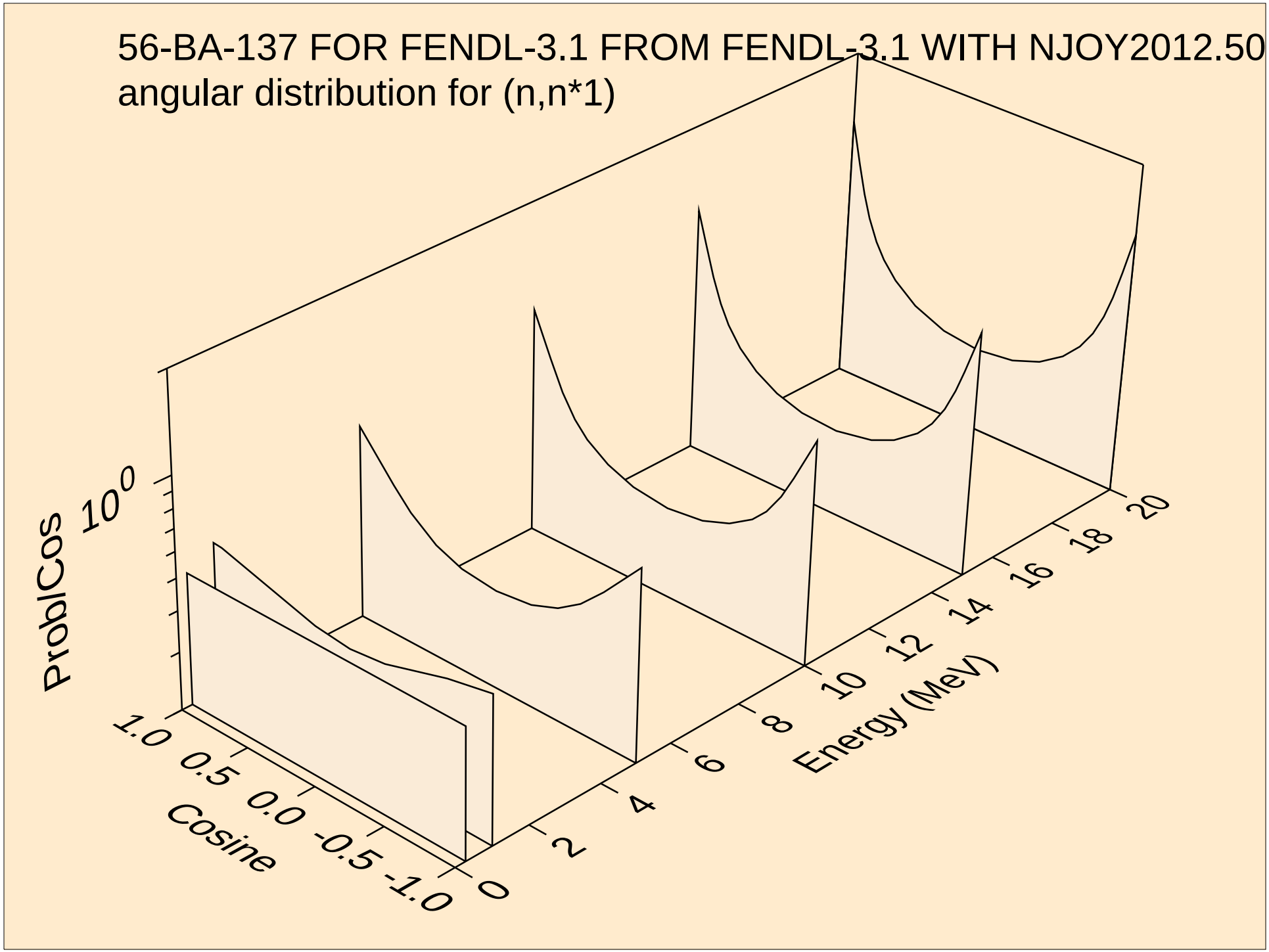

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,2n)
ProblCos
$10^{0}$
$10^{-1}$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
20
40
60
80
100
120
140
160
180
200
Energy (MeV)

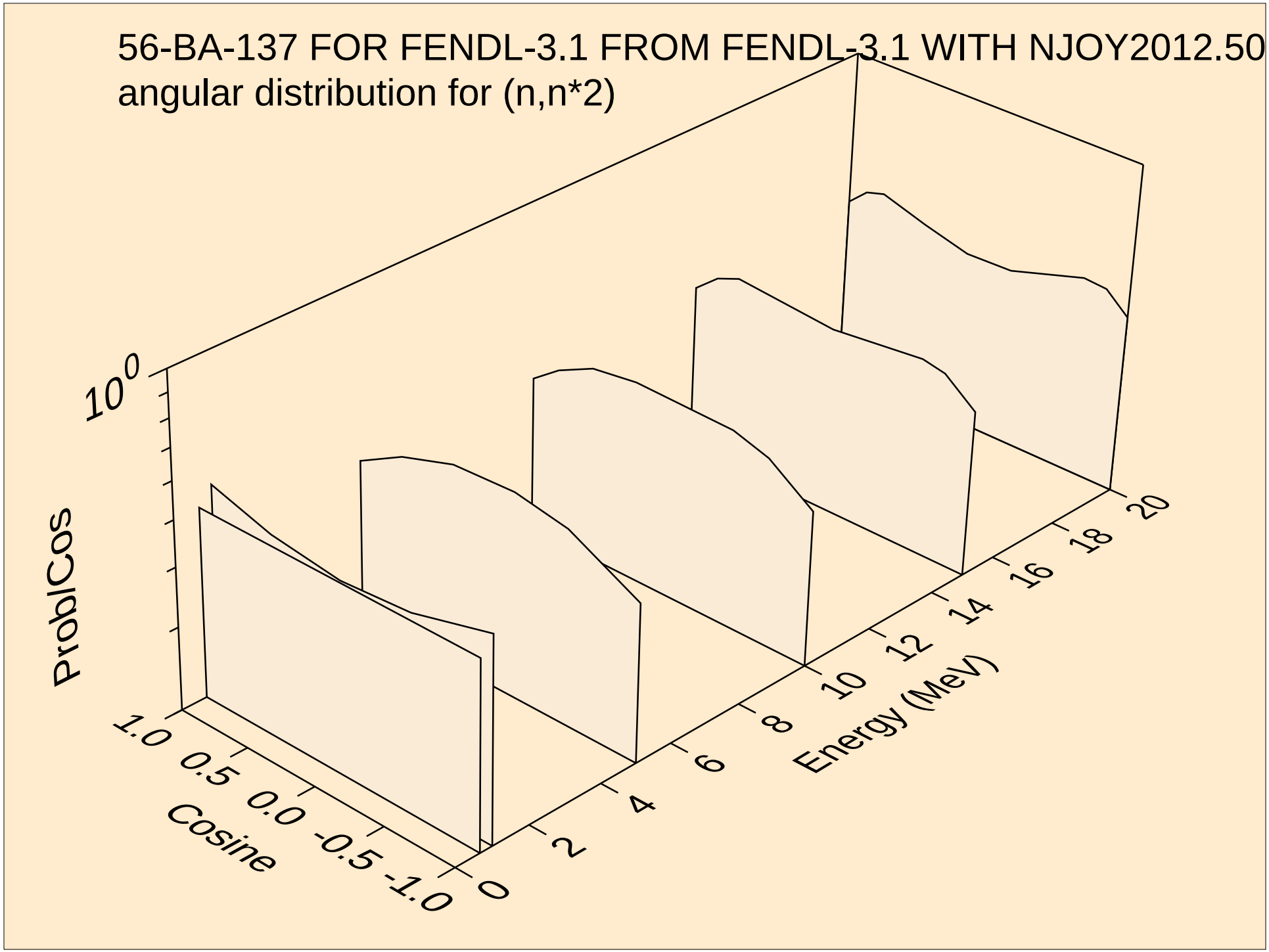

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,3n)
ProblCos
$10^{0}$
$10^{-1}$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
20
40
60
80
100
120
140
160
180
200
Energy (MeV)

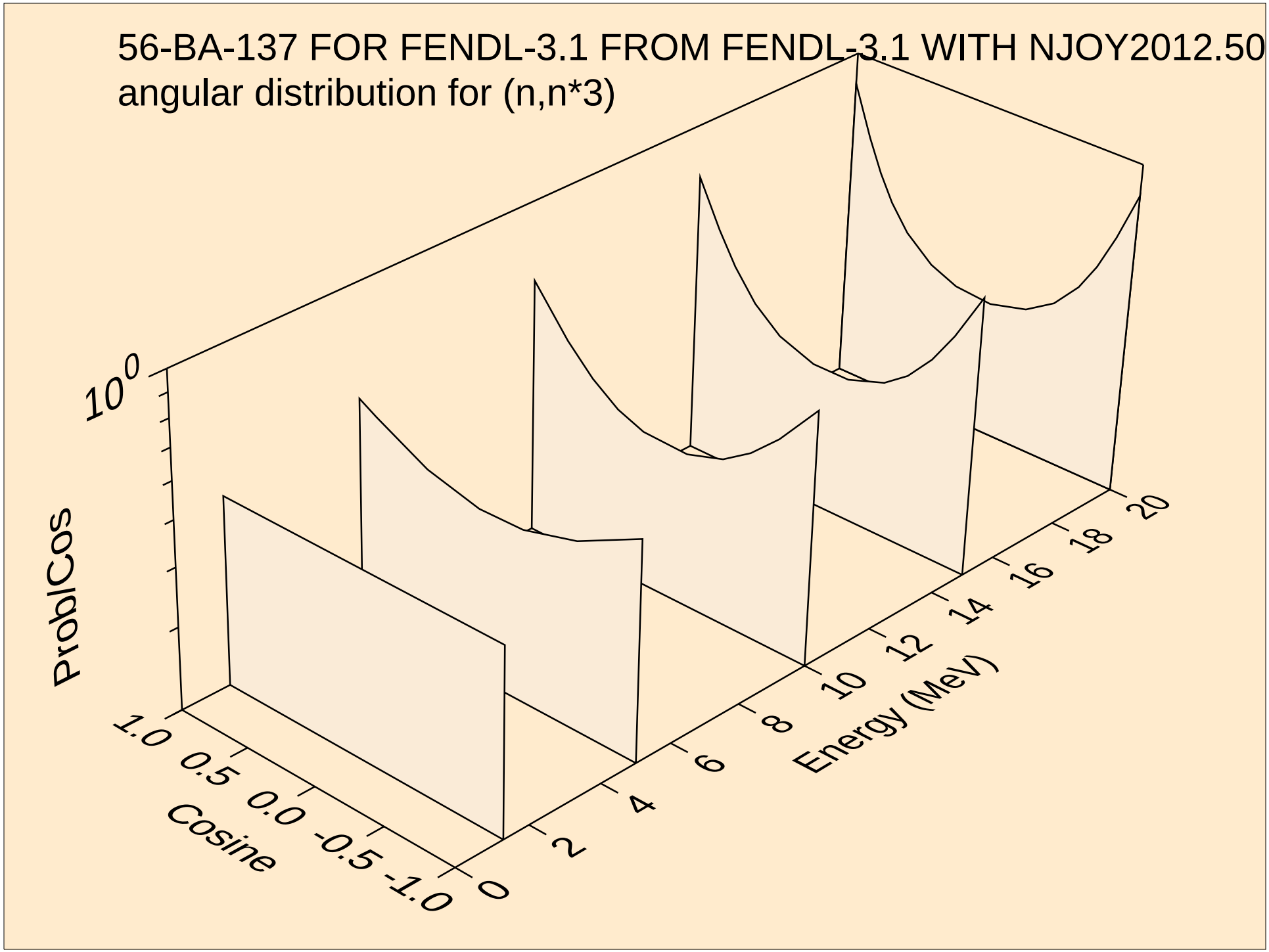

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,n*)a
ProblCos
$10^{0}$
$10^{-1}$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
20
40
60
80
100
120
140
160
180
200
Energy (MeV)

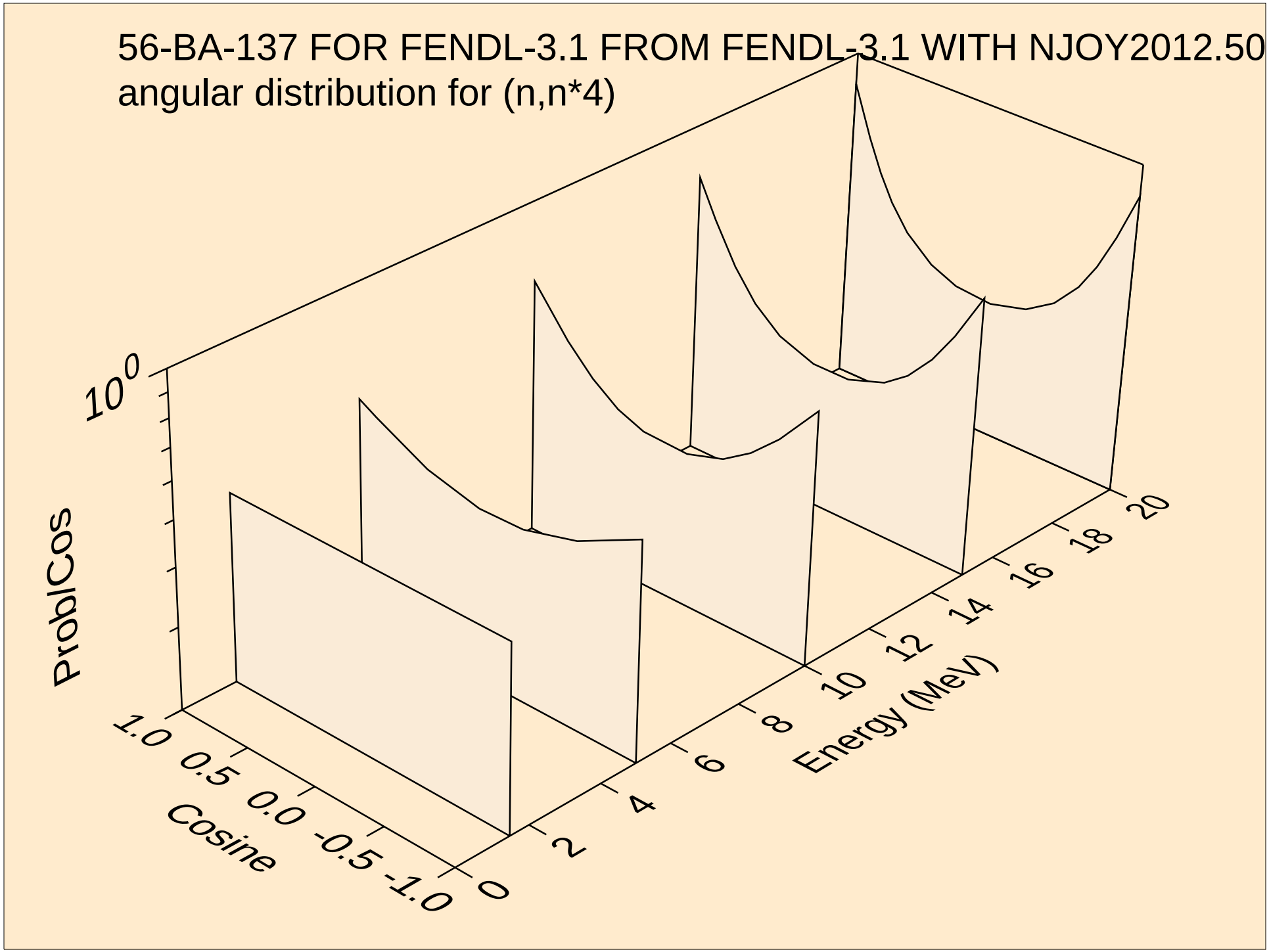

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,n*)p
ProblCos
$10^{0}$
$10^{-1}$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
20
40
60
80
100
120
140
160
180
200
Energy (MeV)

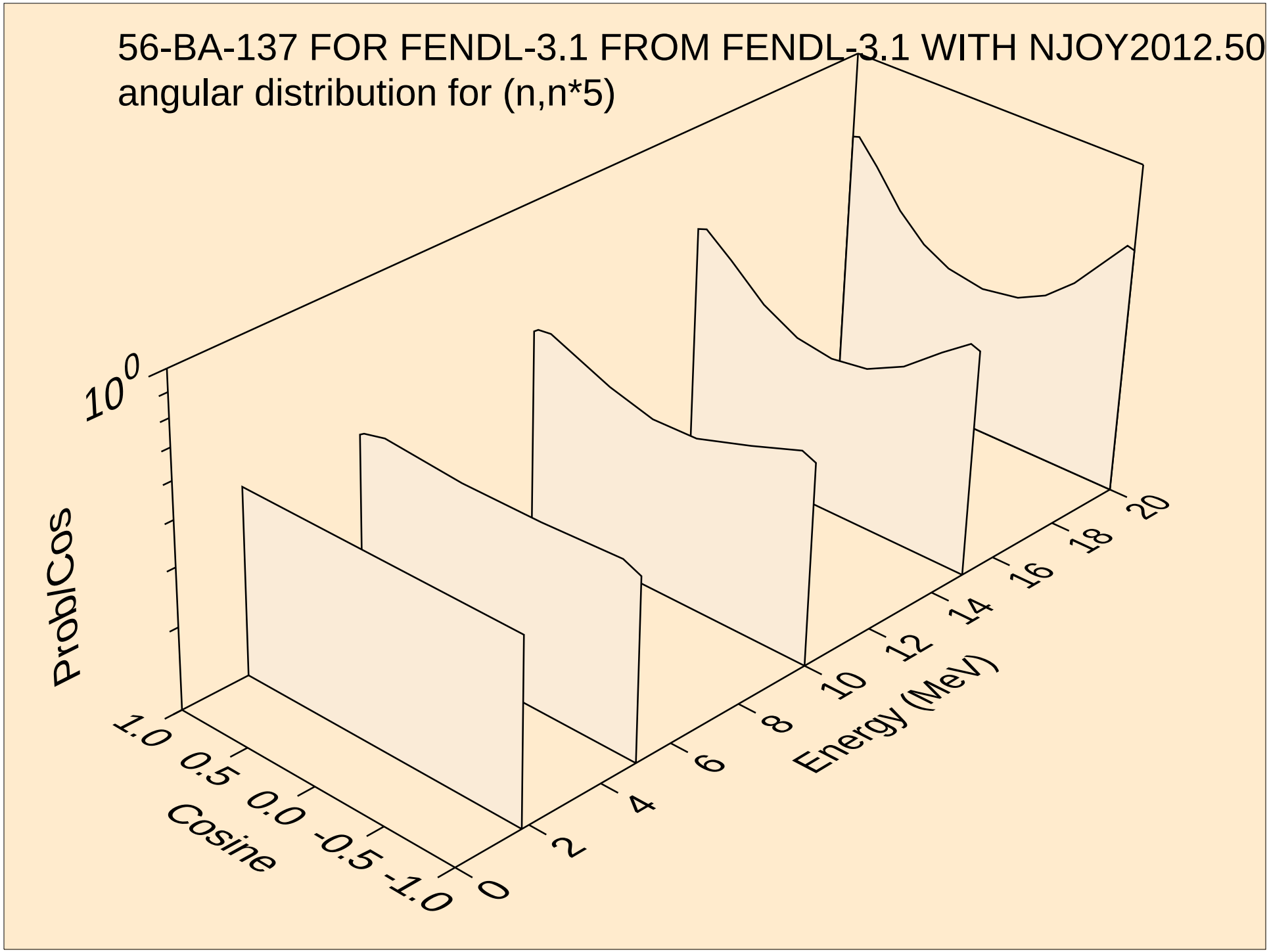

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,n*)d
ProbICos
$10^{0}$
$10^{-1}$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
20
40
60
80
100
120
140
160
180
200
Energy (MeV)

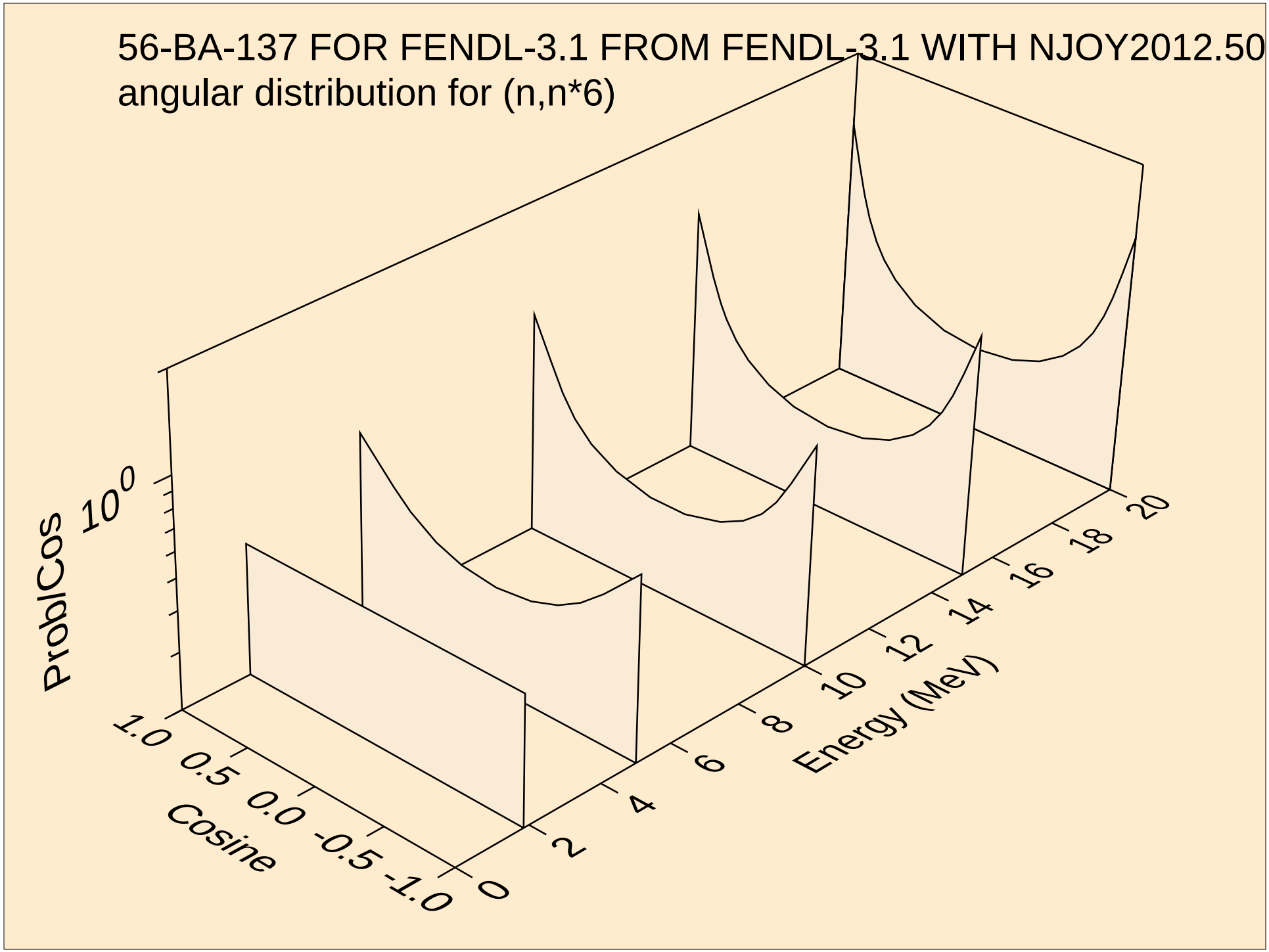

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,n*1)
ProbICos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

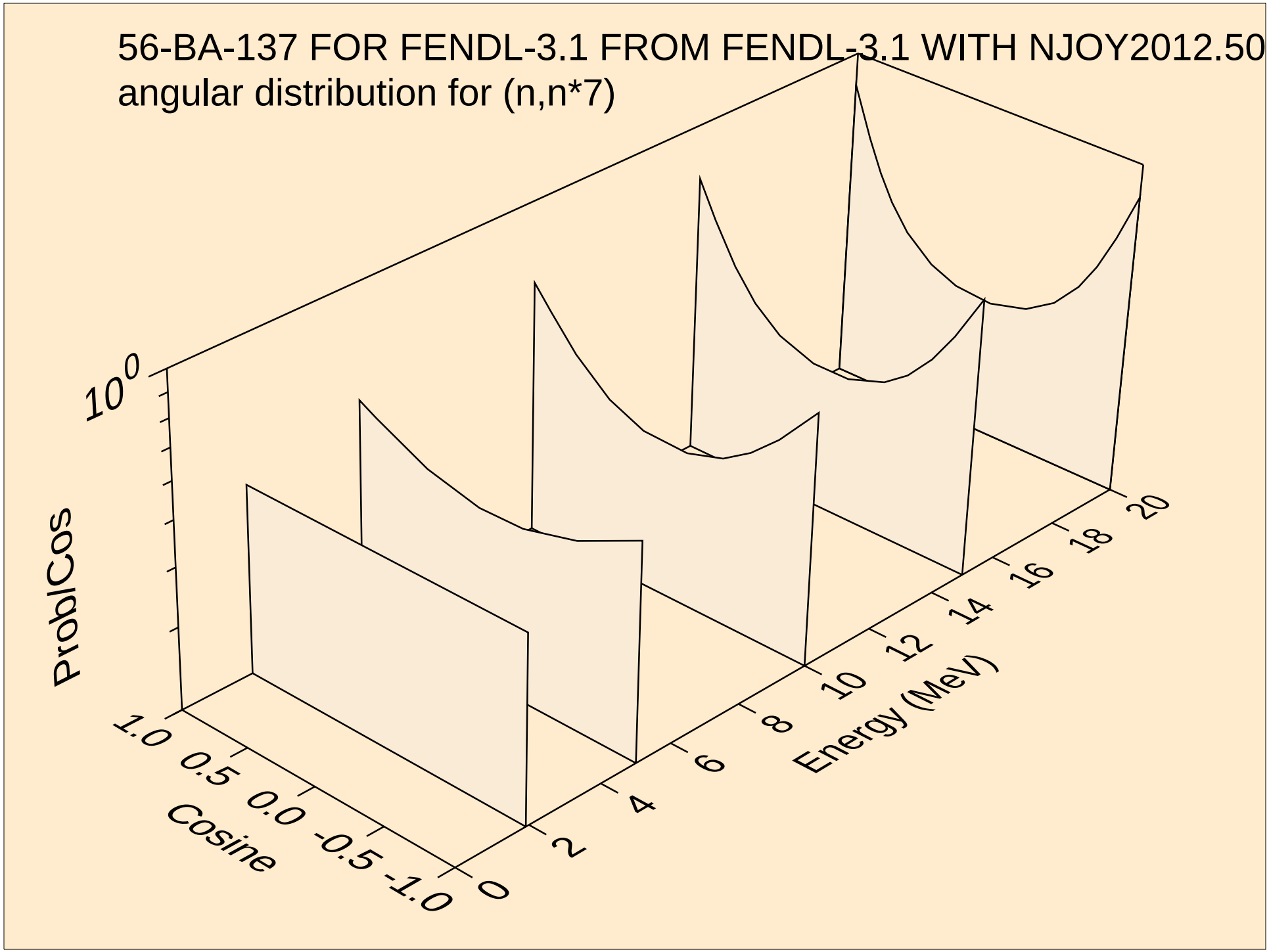

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,n*2)
$10^0$
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

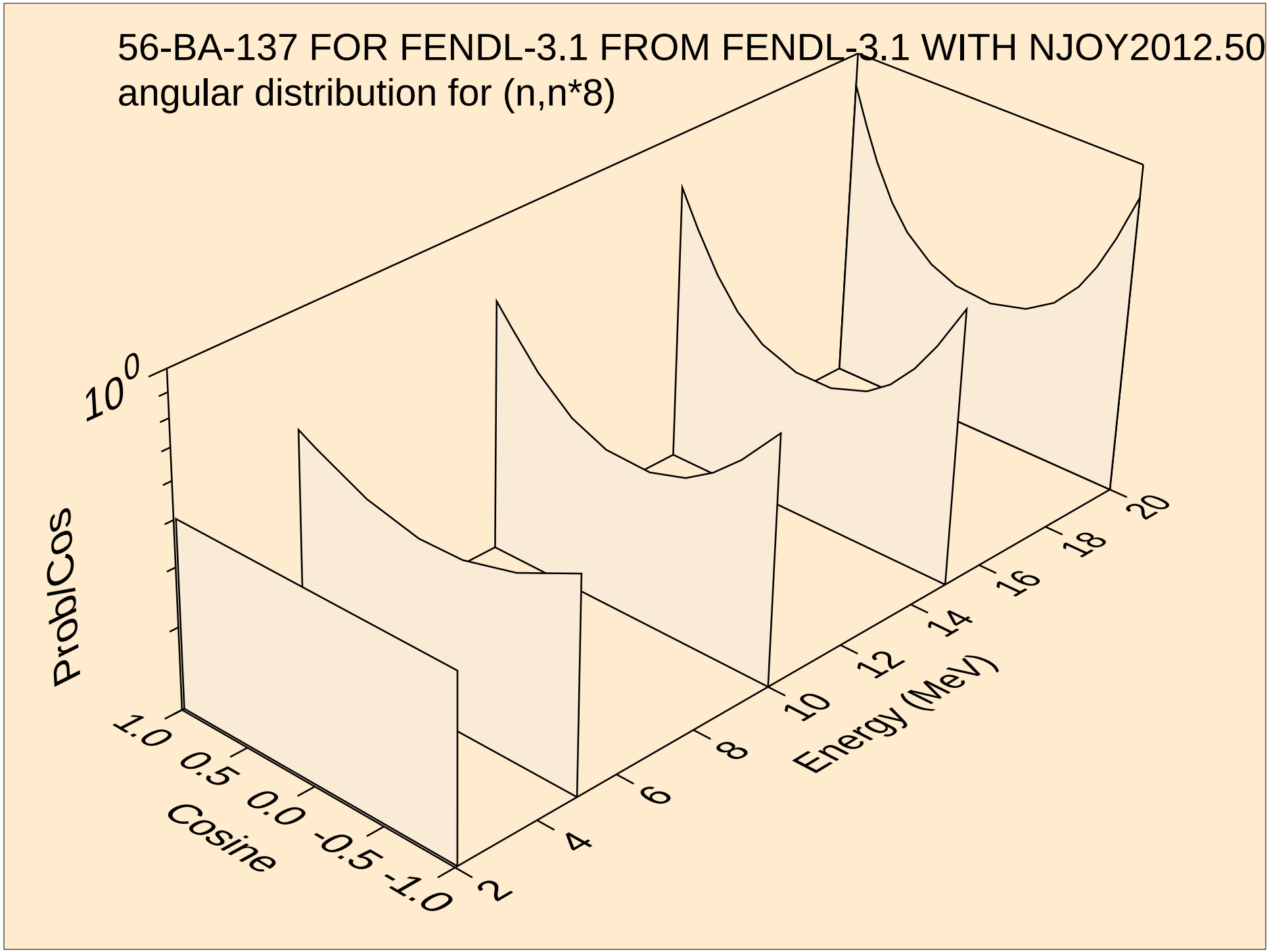

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,n*3)
$10^0$
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

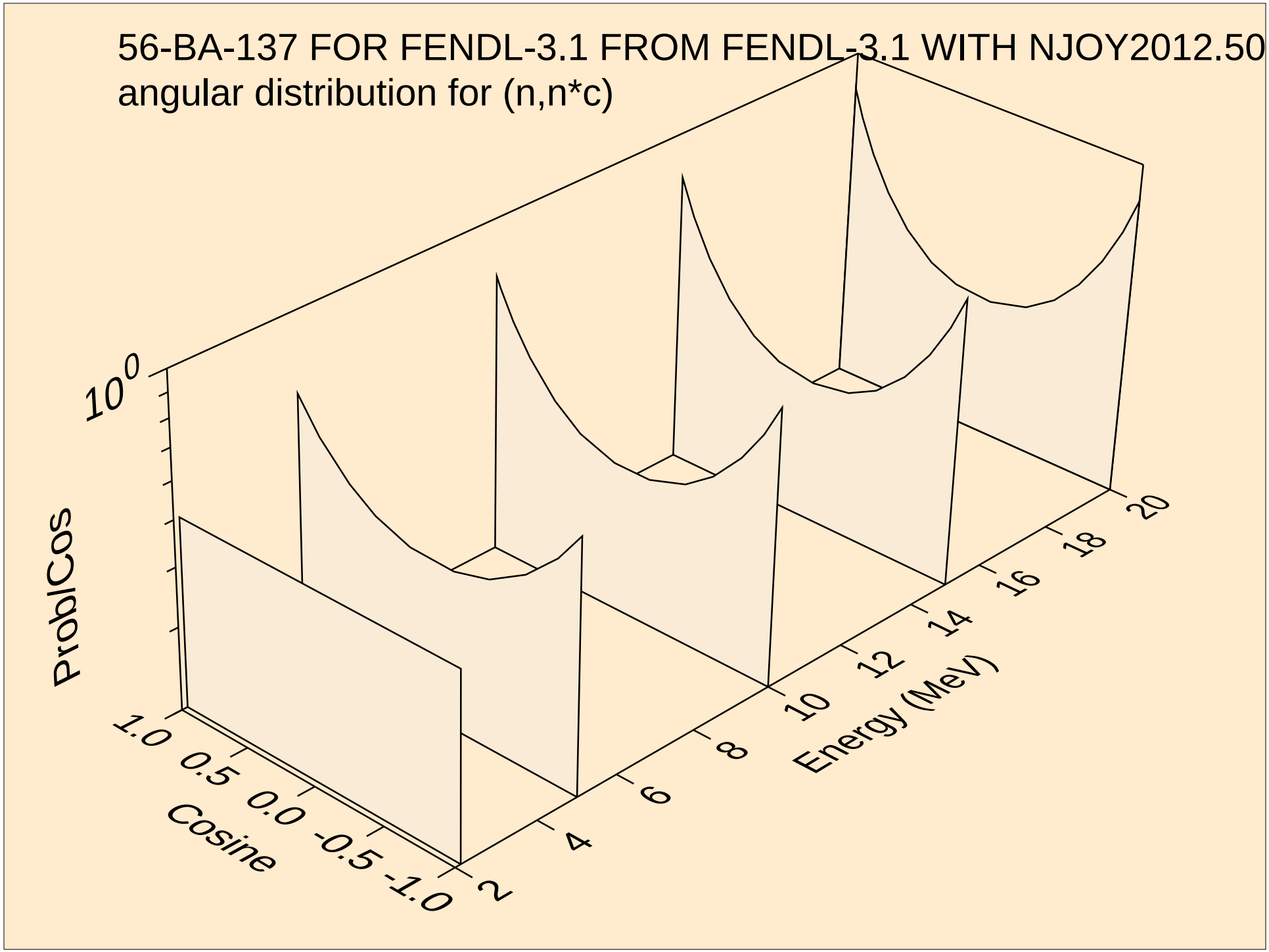

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,n*4)
ProbICos
$10^0$
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

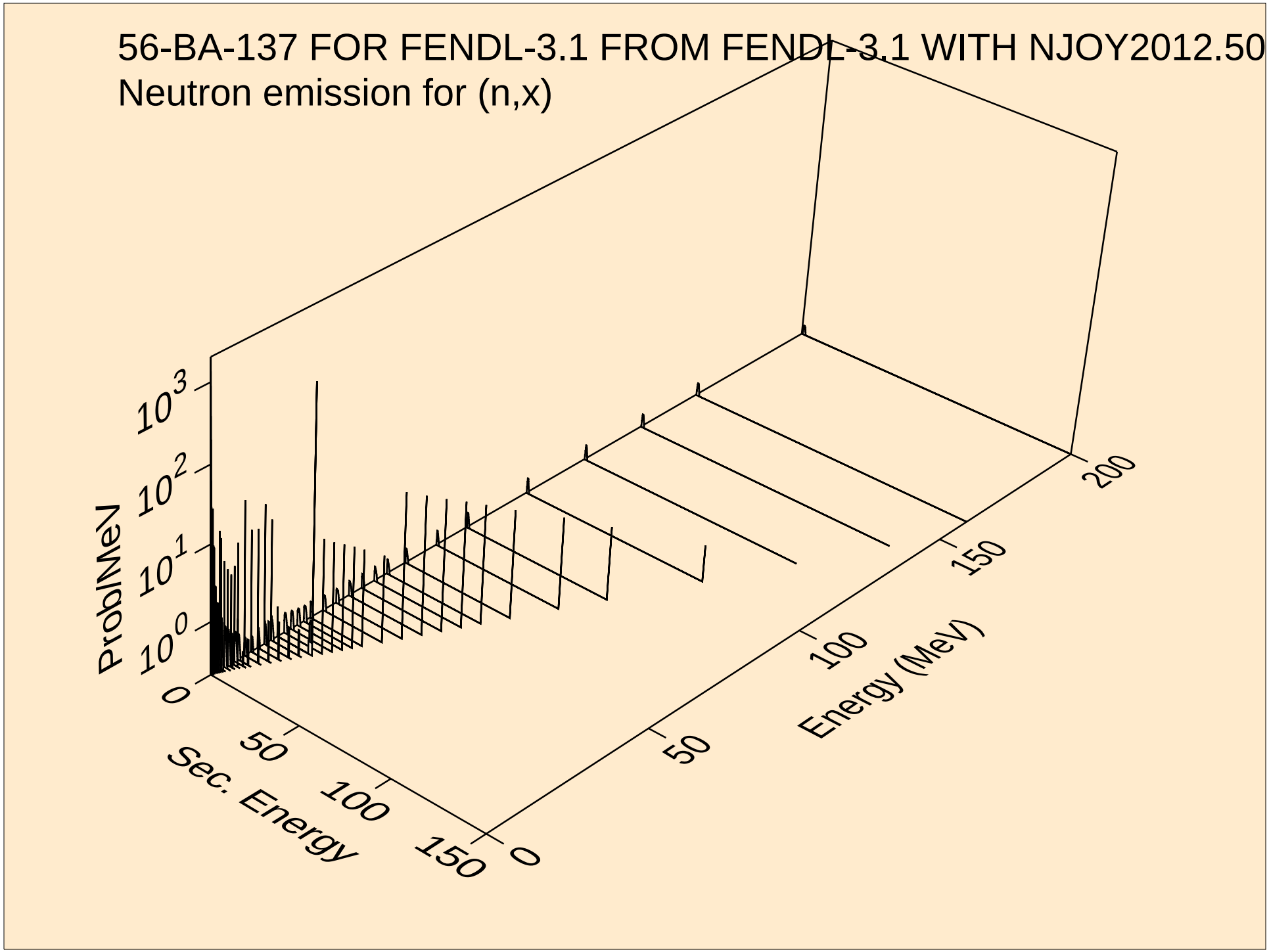

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,n*5)
ProbICos
$10^0$
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

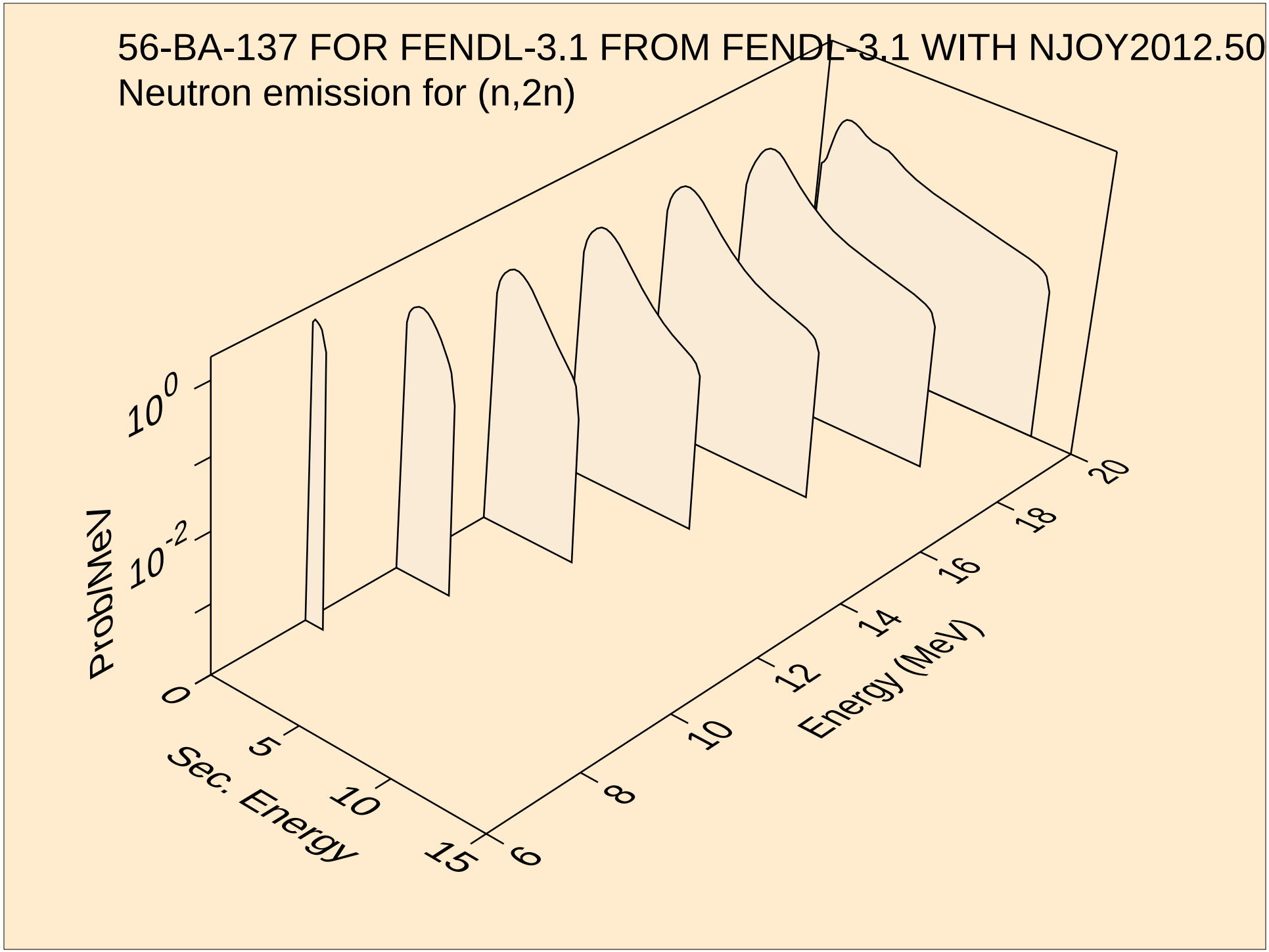

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,n*6)
ProbICos
$10^0$
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

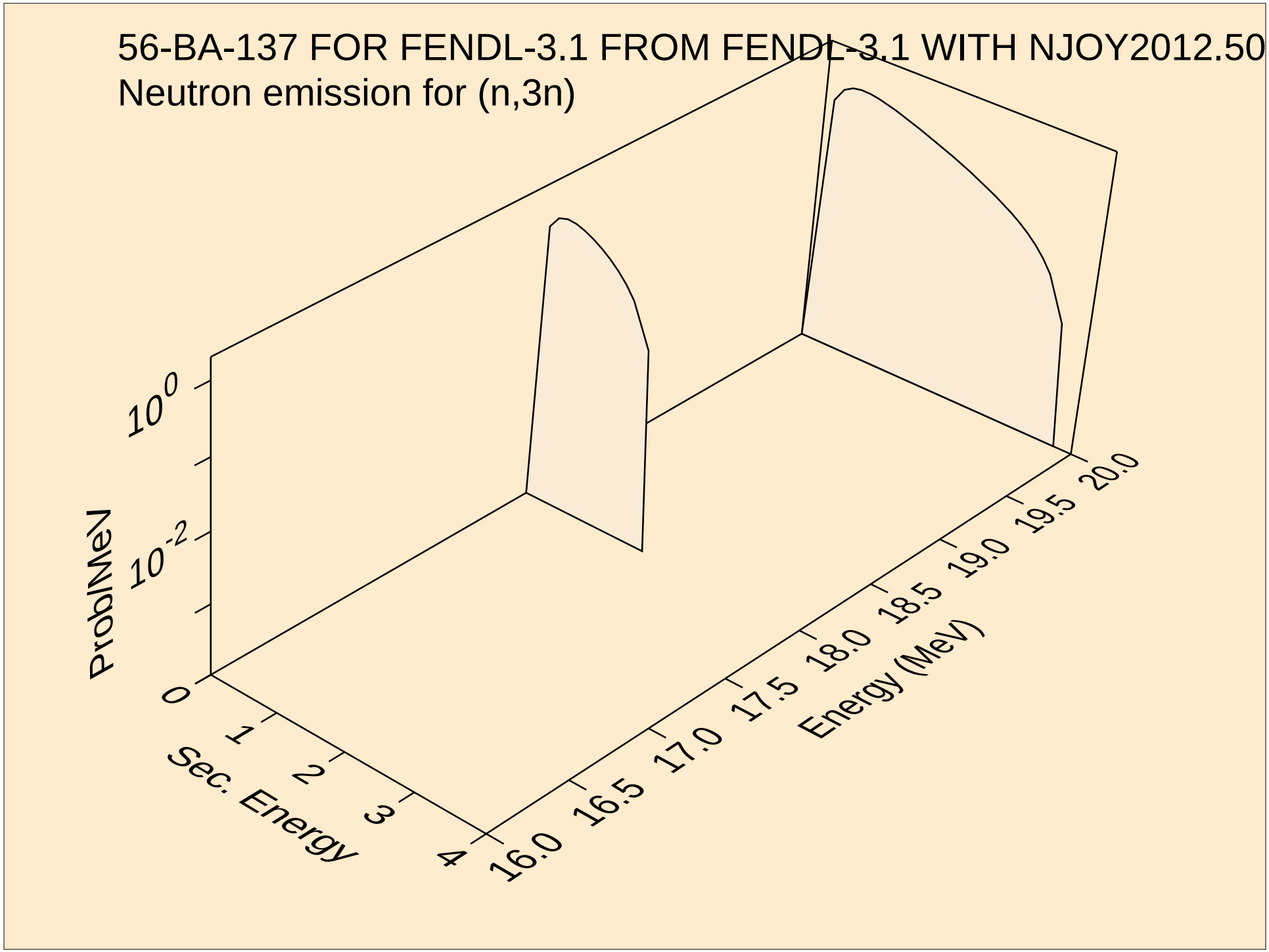

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,n*7)
$10^0$
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

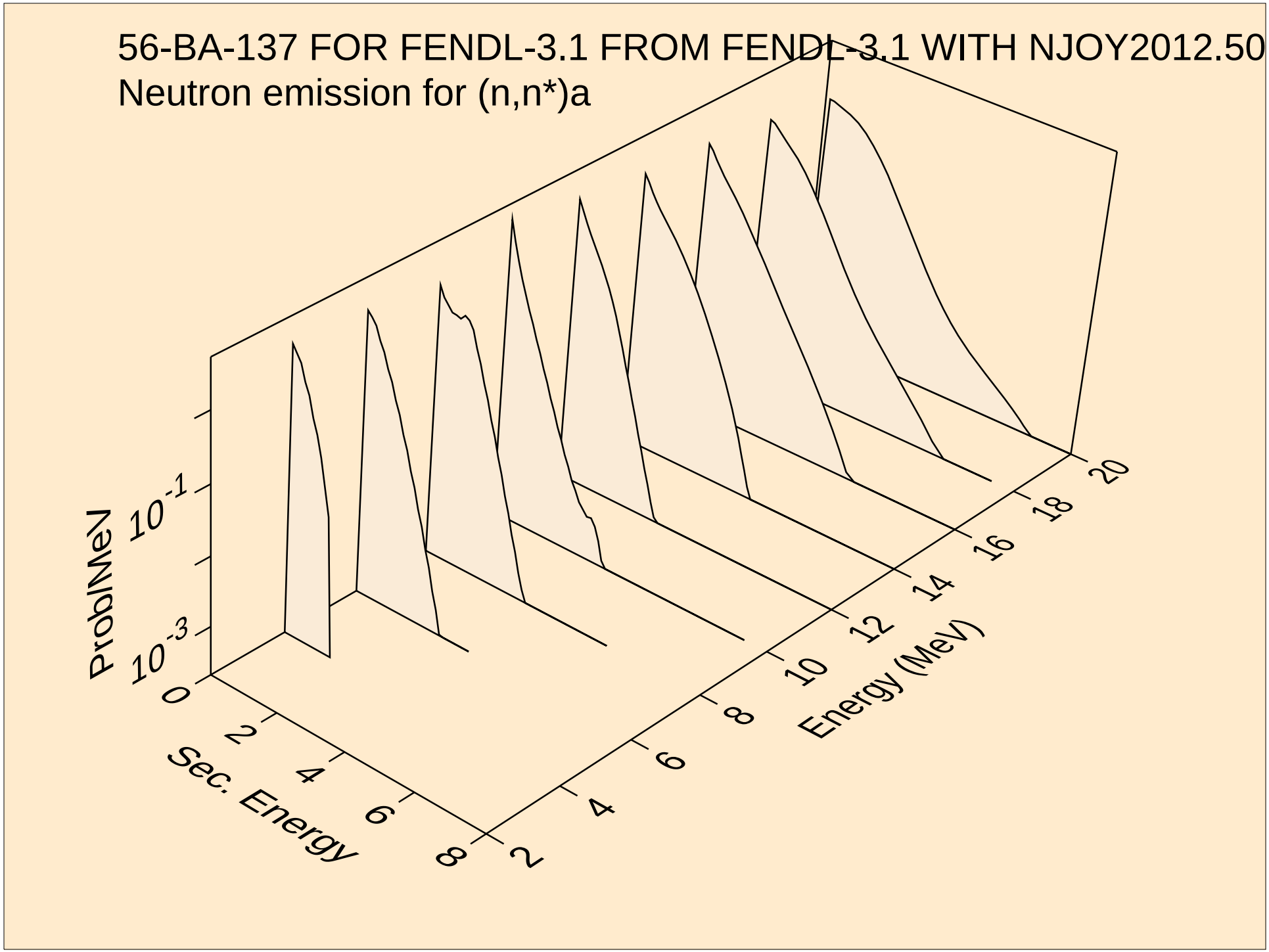

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,n*8)
$10^0$
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

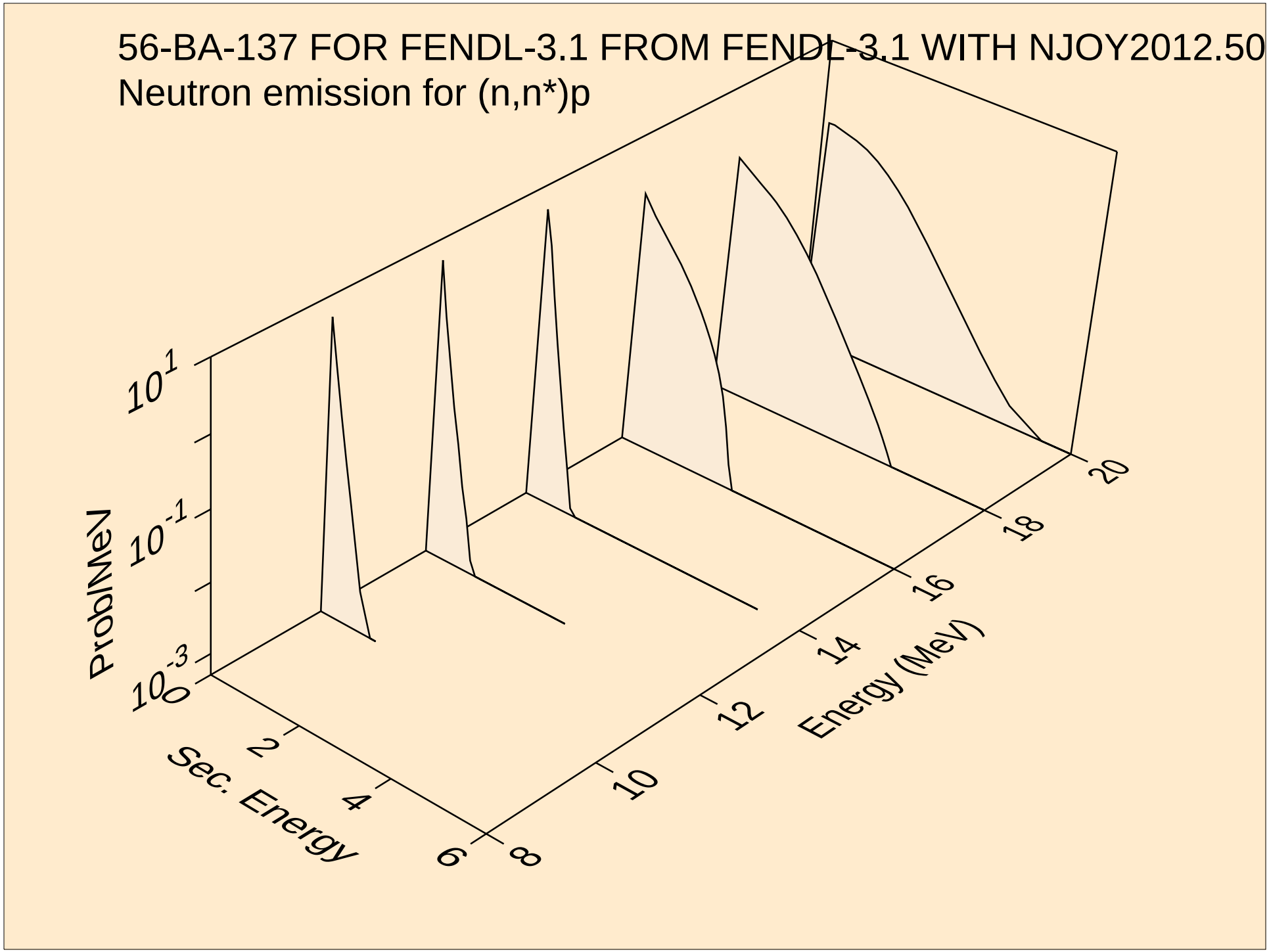

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
angular distribution for (n,n*c)
$10^0$
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

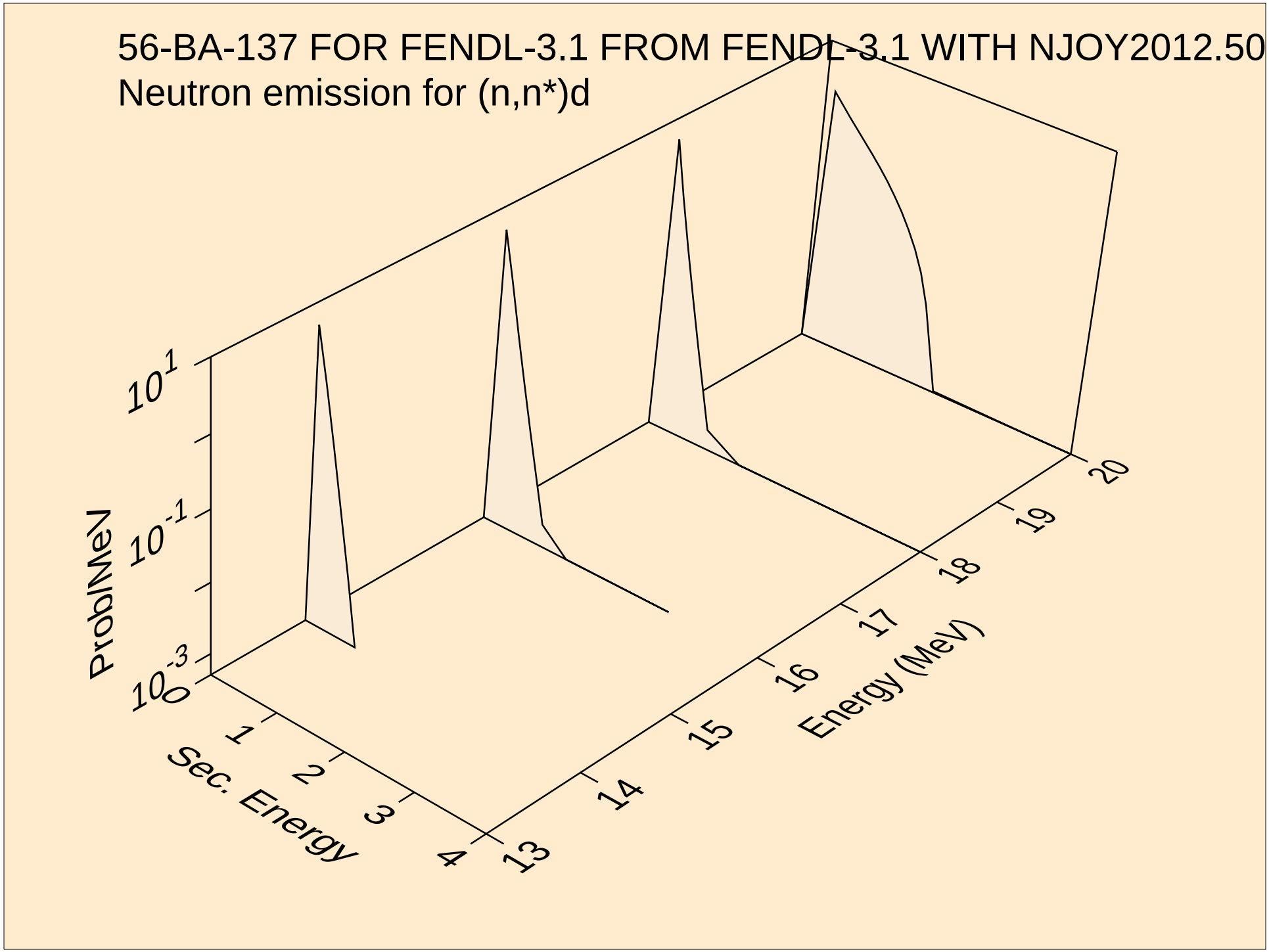

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Neutron emission for (n,x)
Prob/MeV
$10^3$
$10^2$
$10^1$
$10^0$
0
50
100
150
Sec. Energy
0
50
100
150
200
Energy (MeV)

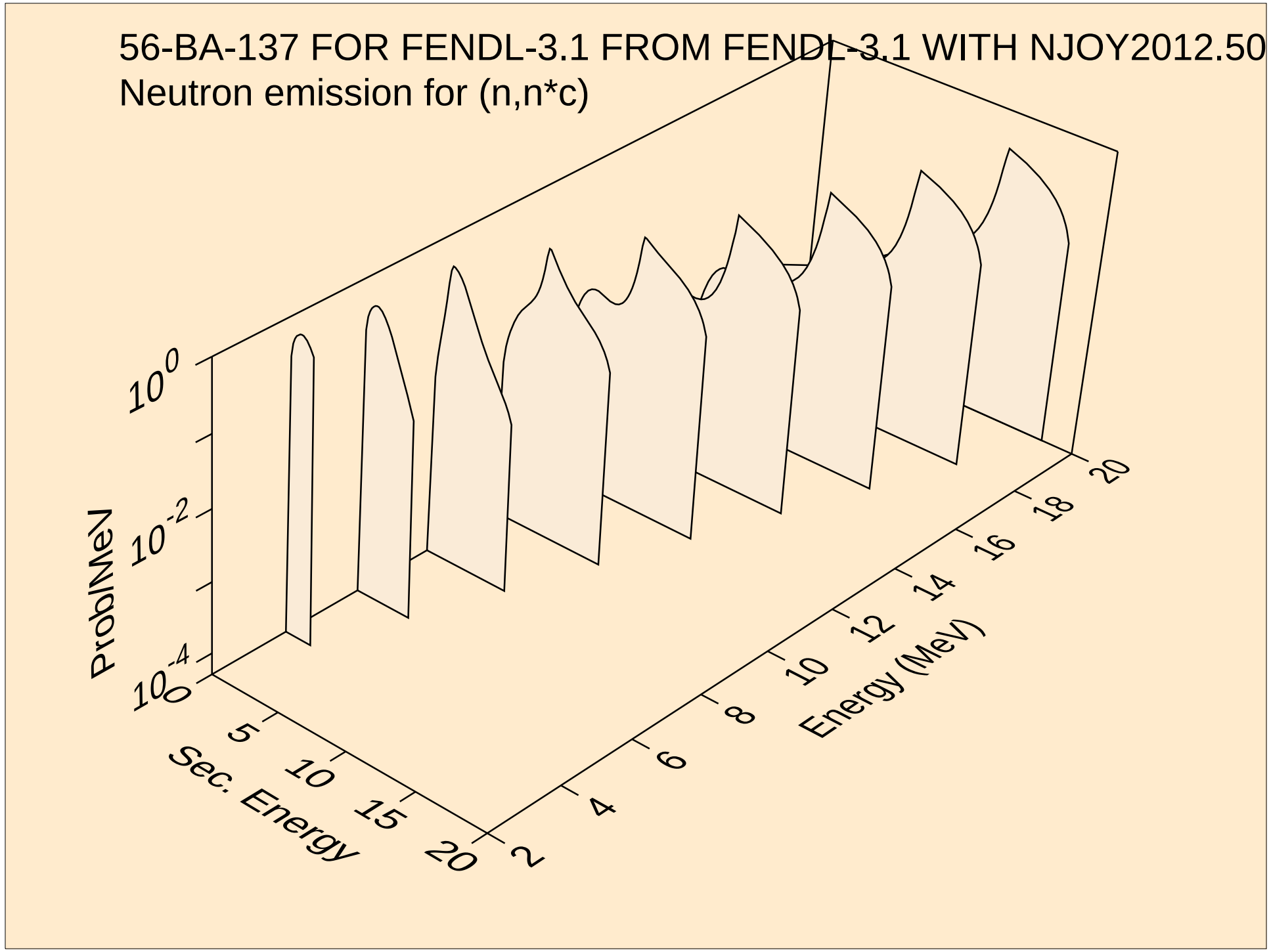

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Neutron emission for (n,2n)
Prob/MeV
10^0
10^-2
0
Sec. Energy
5
10
15
Energy (MeV)
6
8
10
12
14
16
18
20

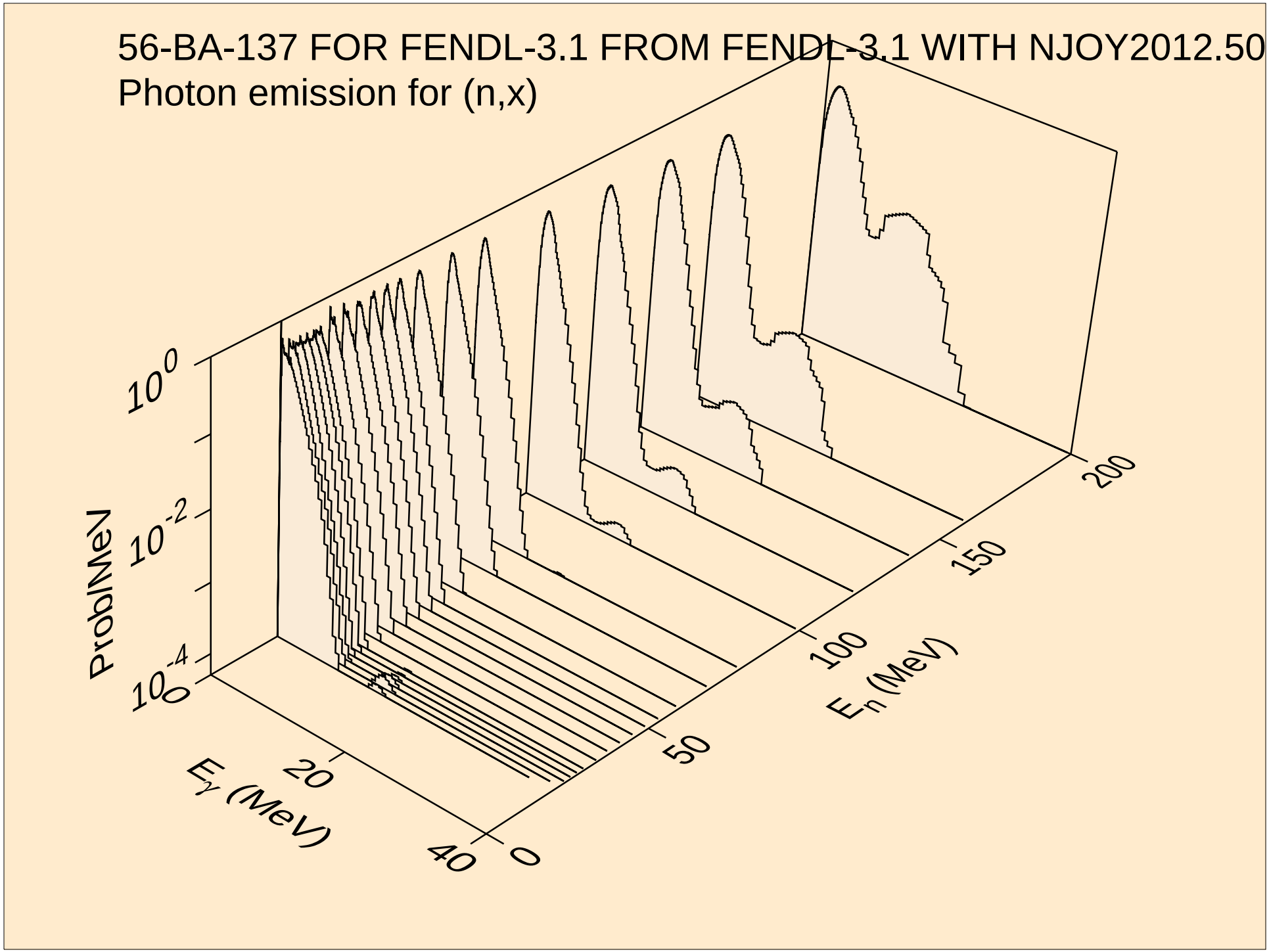

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Neutron emission for (n,3n)
Prob/MeV
$10^{0}$
$10^{-2}$
0
1
2
3
4
Sec. Energy
16.0
16.5
17.0
17.5
18.0
18.5
19.0
19.5
20.0
Energy (MeV)

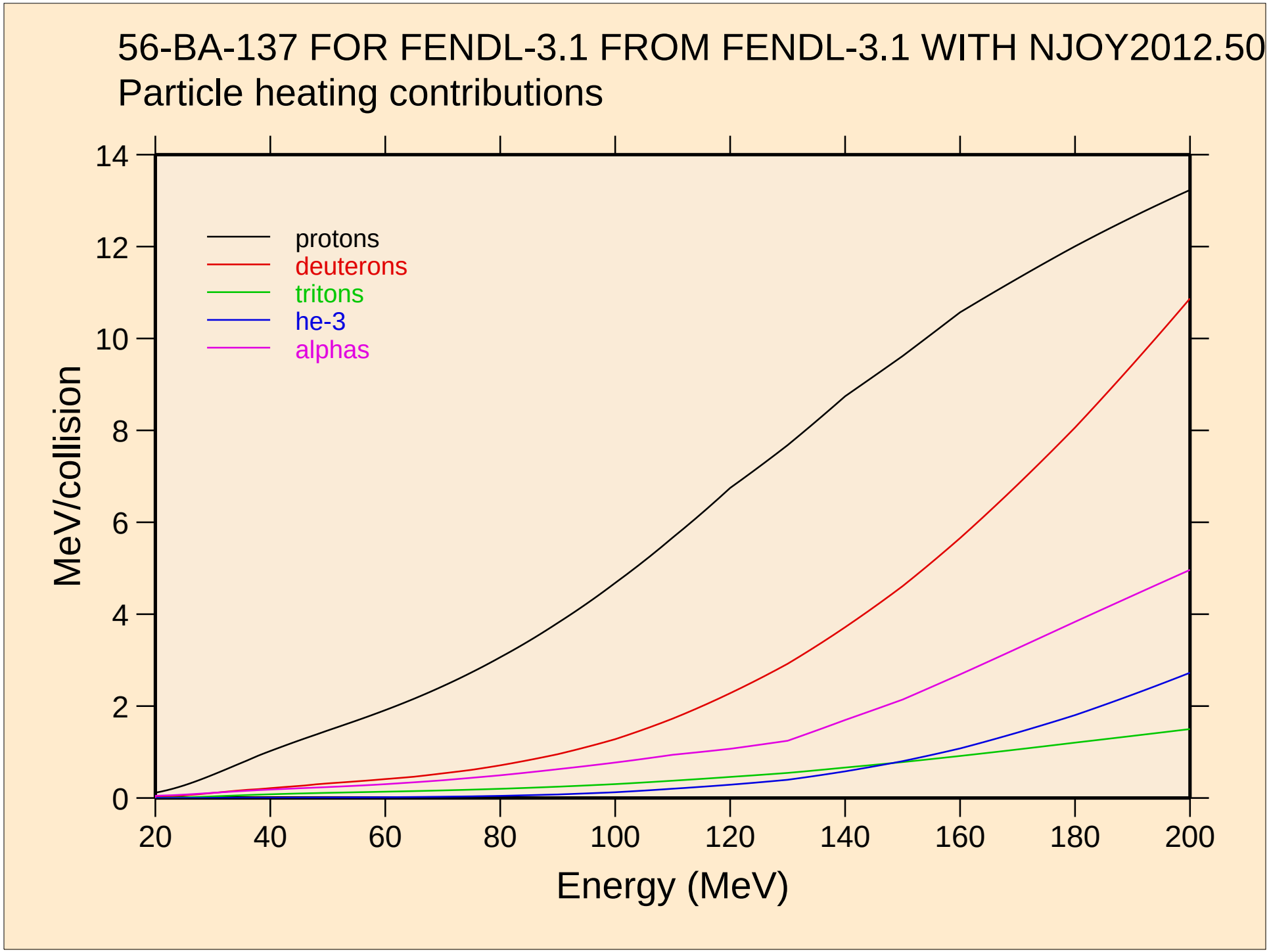

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Neutron emission for (n,n*)a
Prob/MeV
10-1
10-3
0
2
4
6
8
Sec. Energy
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

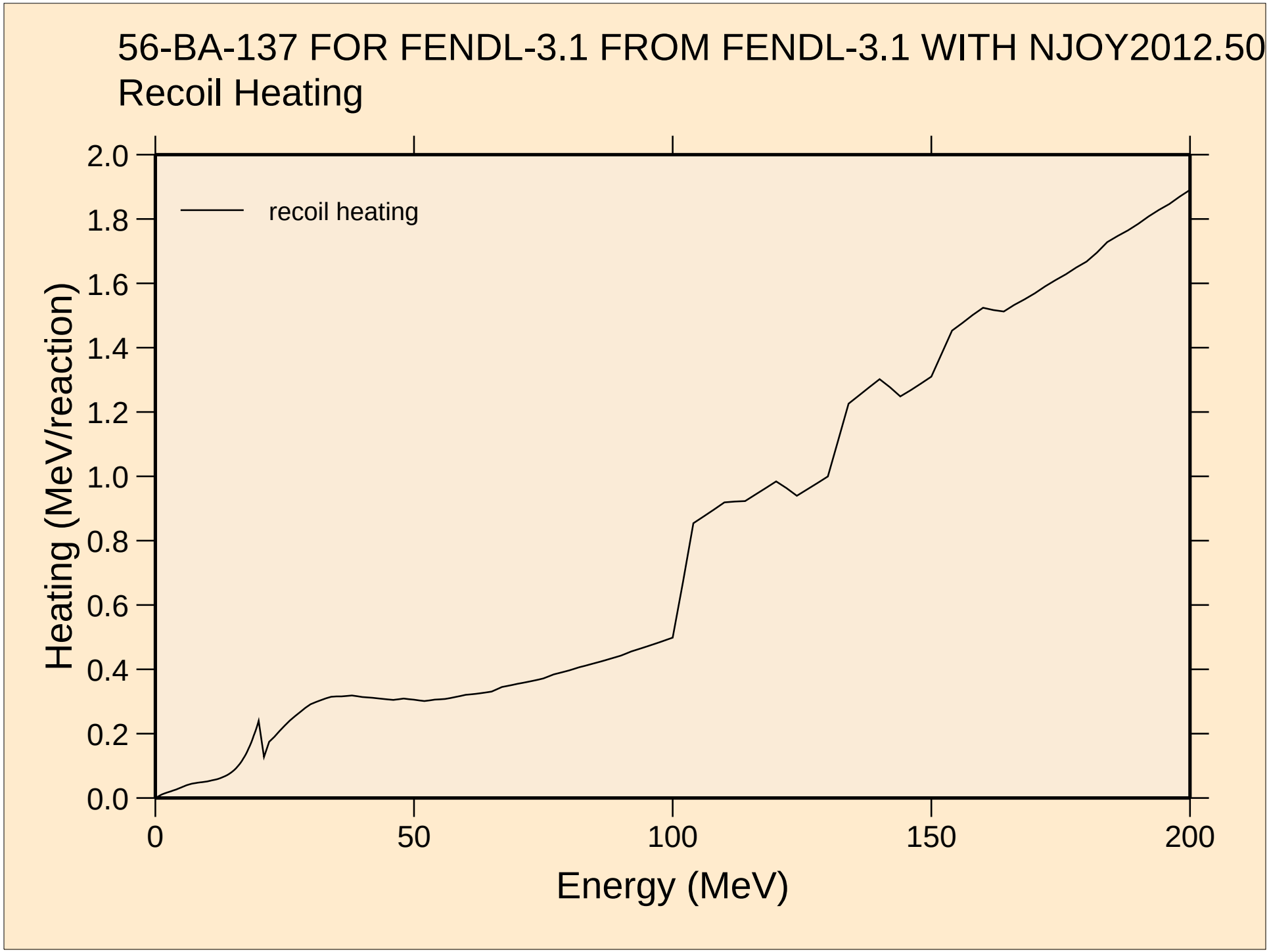

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Neutron emission for (n,n*)p
Prob/MeV
10^1
10^-1
10^-3
0
2
4
6
8
Sec. Energy
10
12
14
16
18
20
Energy (MeV)

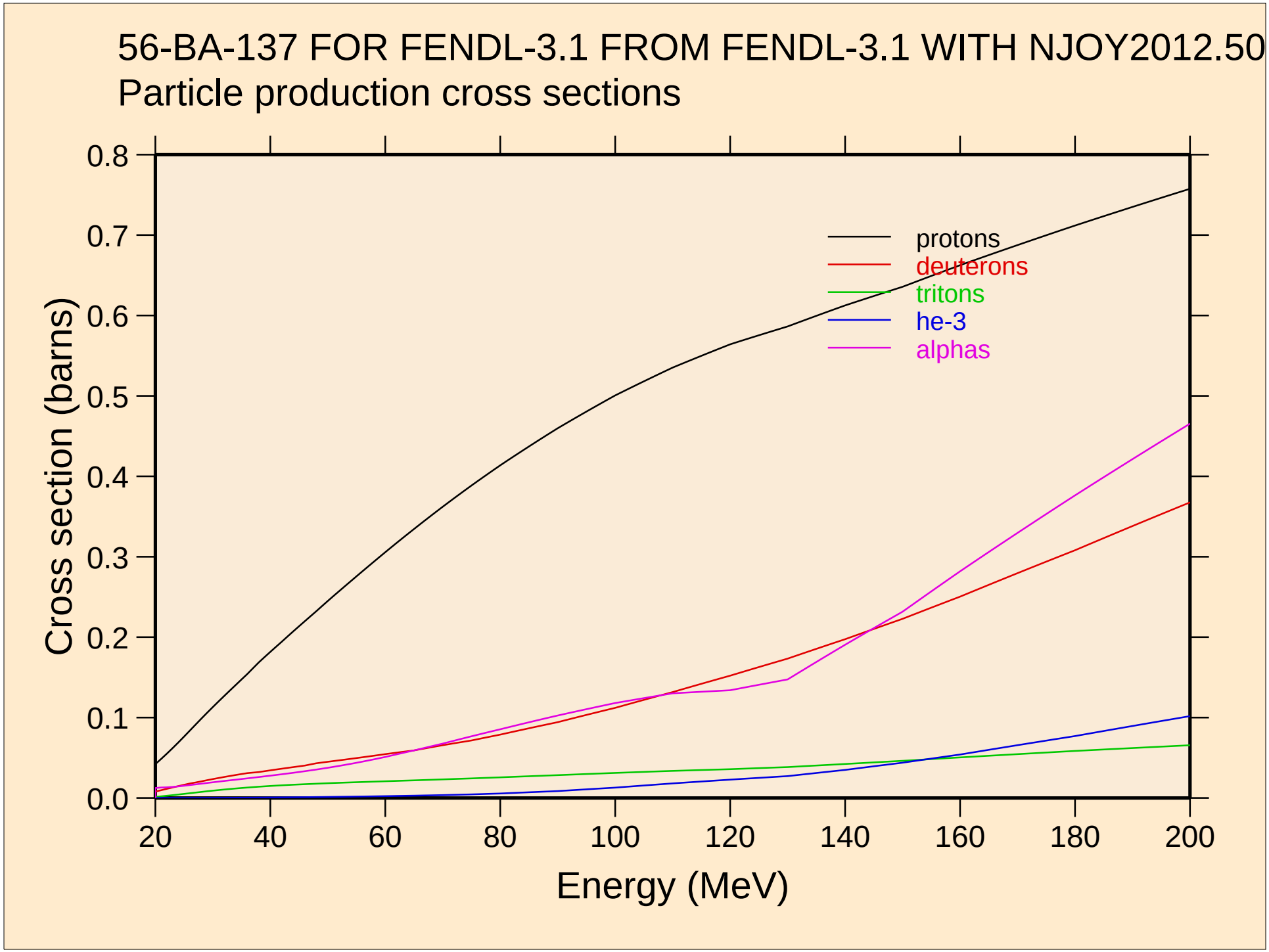

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Neutron emission for (n,n*)d
Prob/MeV
10^1
10^-1
10^-3
0
Sec. Energy
1
2
3
4
13
14
15
16
17
18
19
20
Energy (MeV)

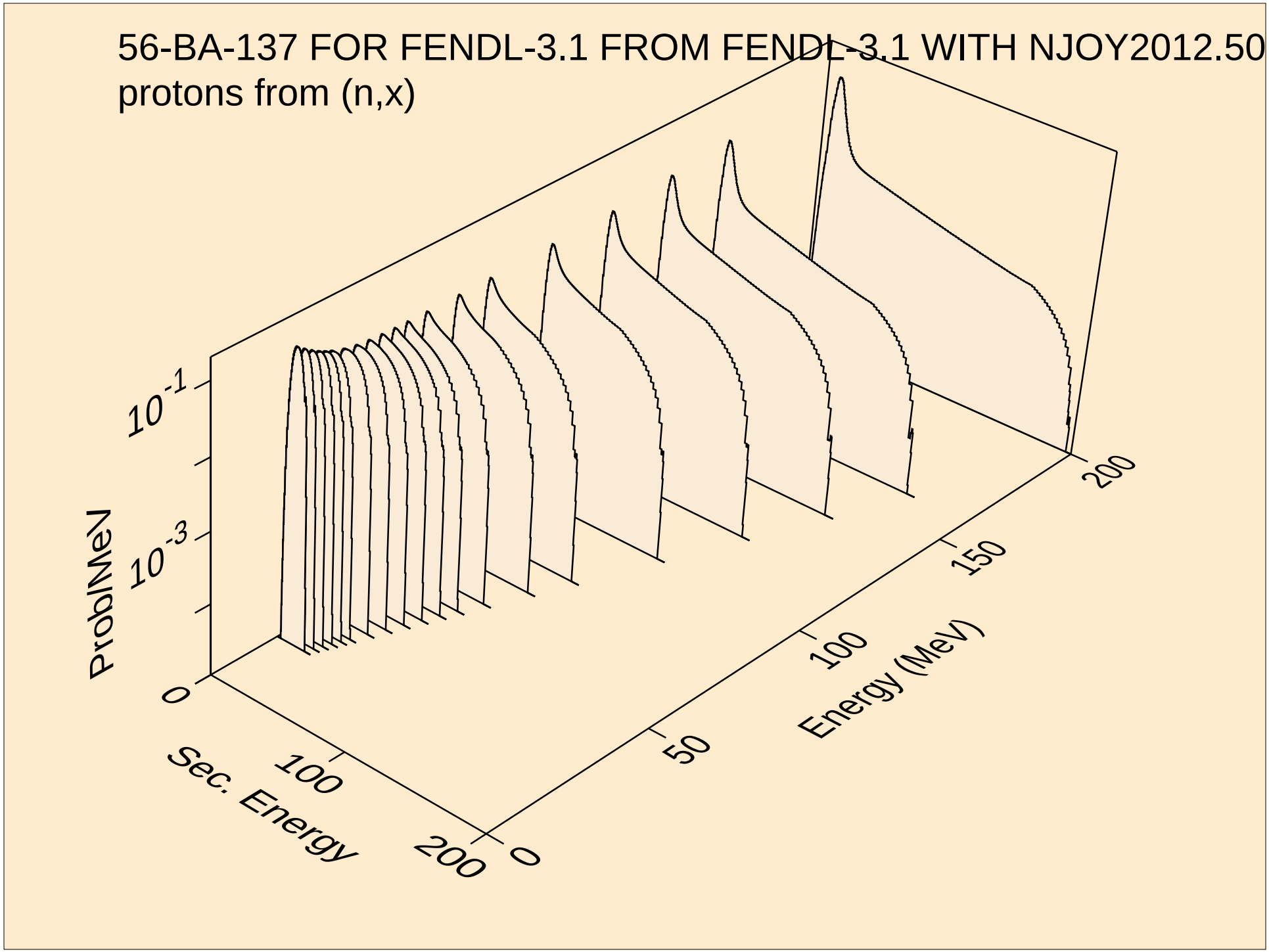

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Neutron emission for (n,n*c)
Prob/MeV
10^0
10^-2
10^-4
Sec. Energy
5
10
15
20
Energy (MeV)
2
4
6
8
10
12
14
16
18
20

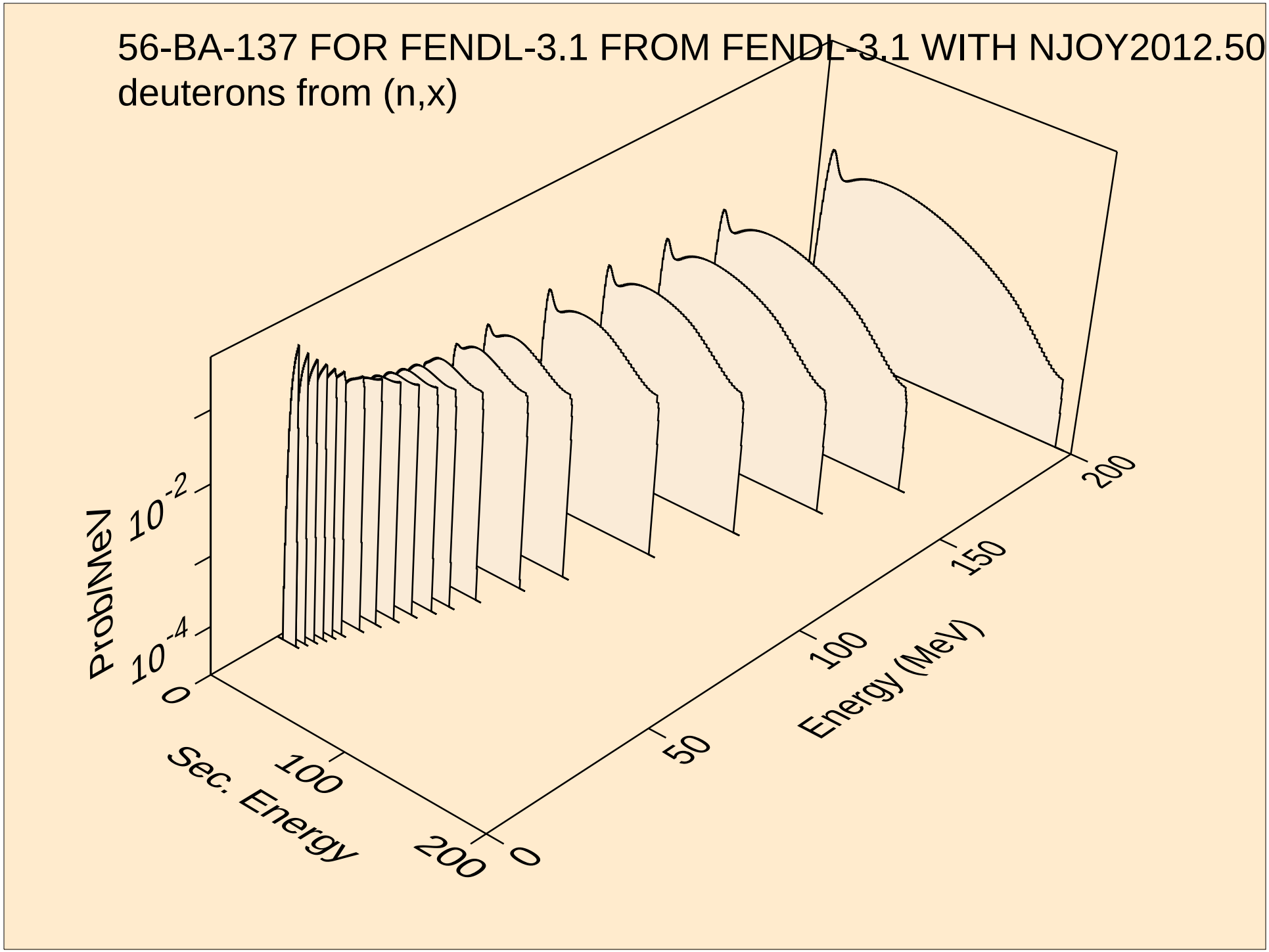

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Photon emission for (n,x)
Prob/MeV
$10^{0}$
$10^{-2}$
$10^{-4}$
0
20
40
$E_\gamma$ (MeV)
0
50
100
150
200
$E_n$ (MeV)

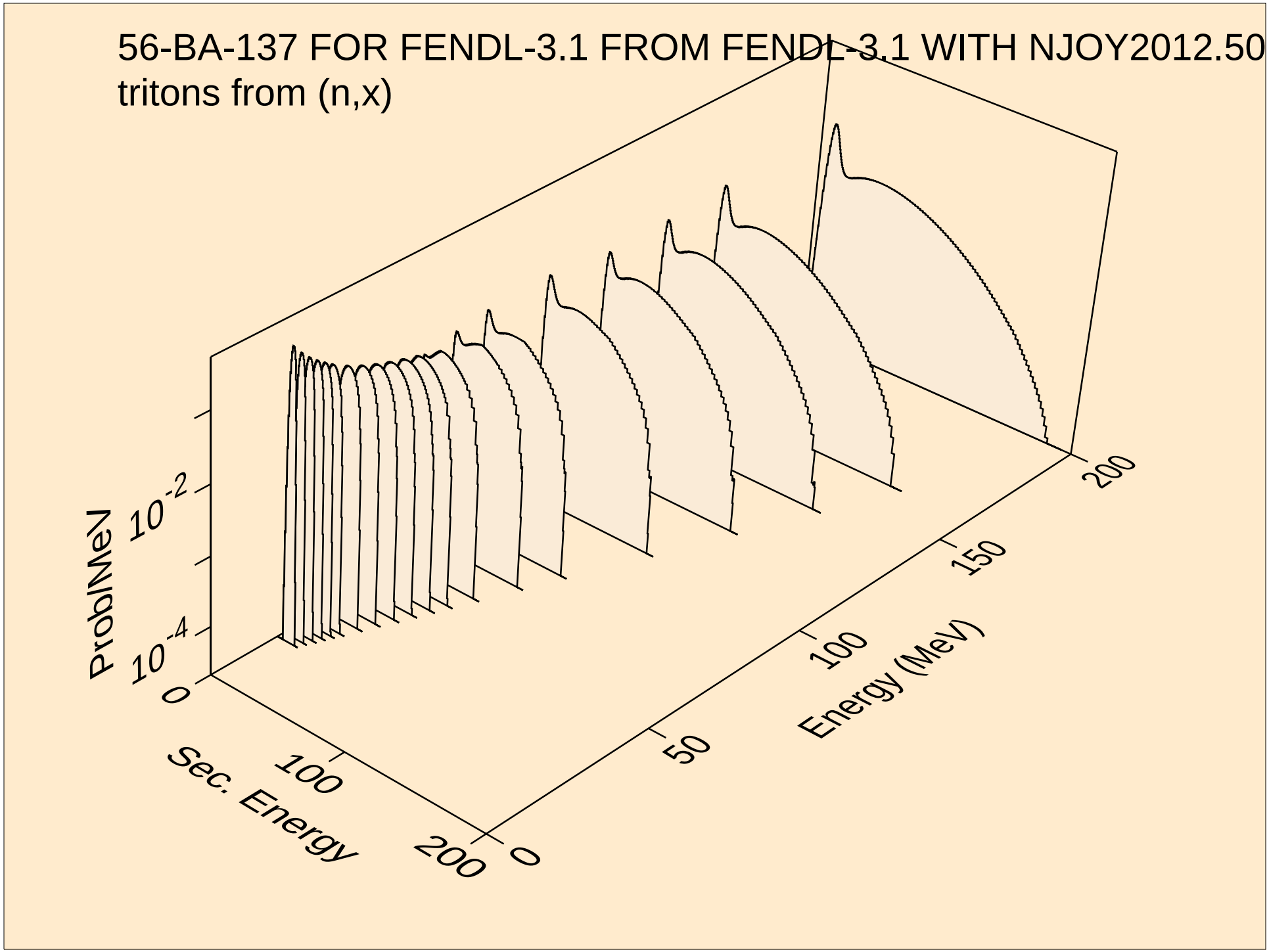

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Particle heating contributions
protons
deuterons
tritons
he-3
alphas
MeV/collision
Energy (MeV)
0
2
4
6
8
10
12
14
20
40
60
80
100
120
140
160
180
200

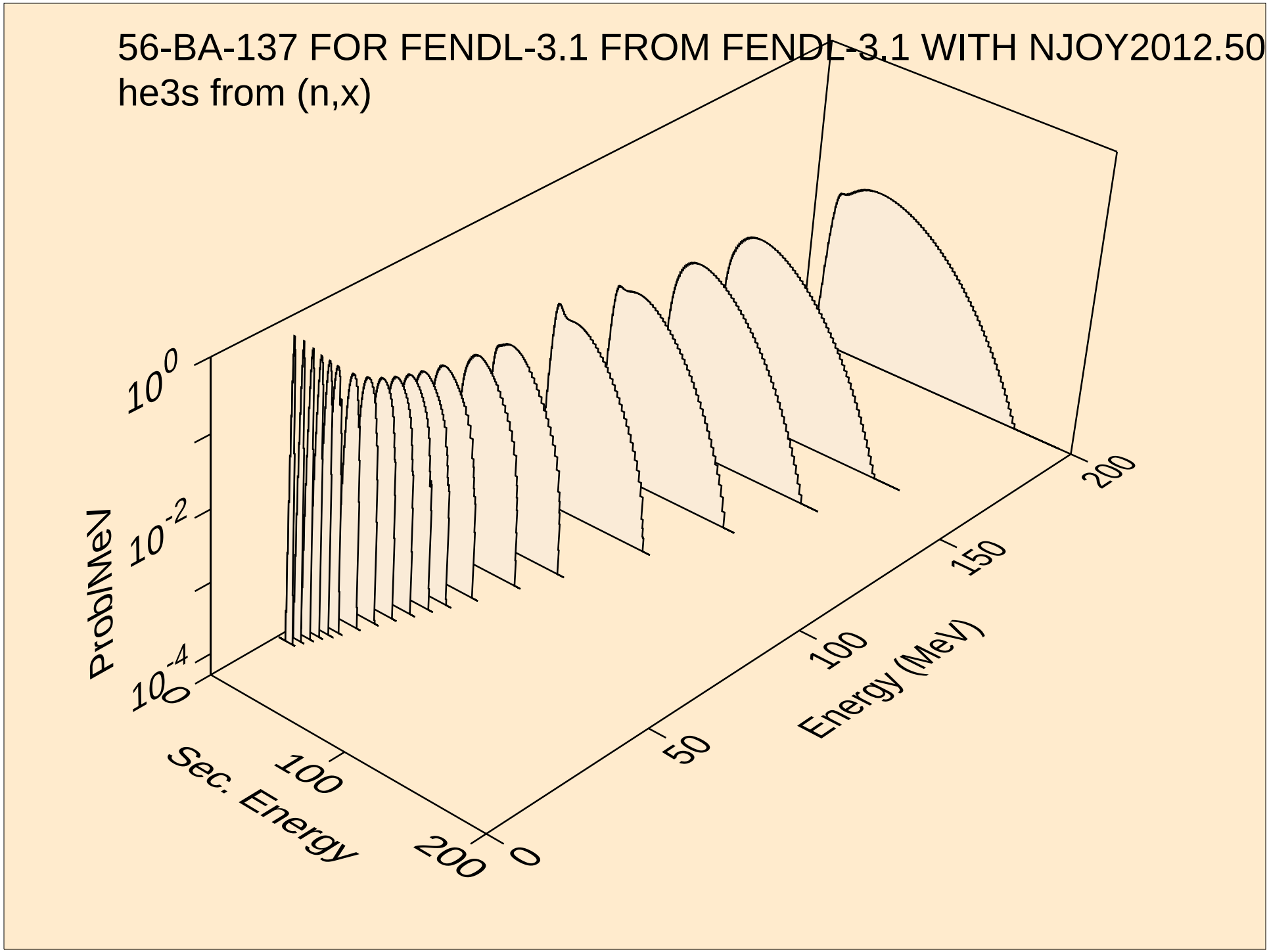

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Recoil Heating
recoil heating
Heating (MeV/reaction)
Energy (MeV)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0
50
100
150
200

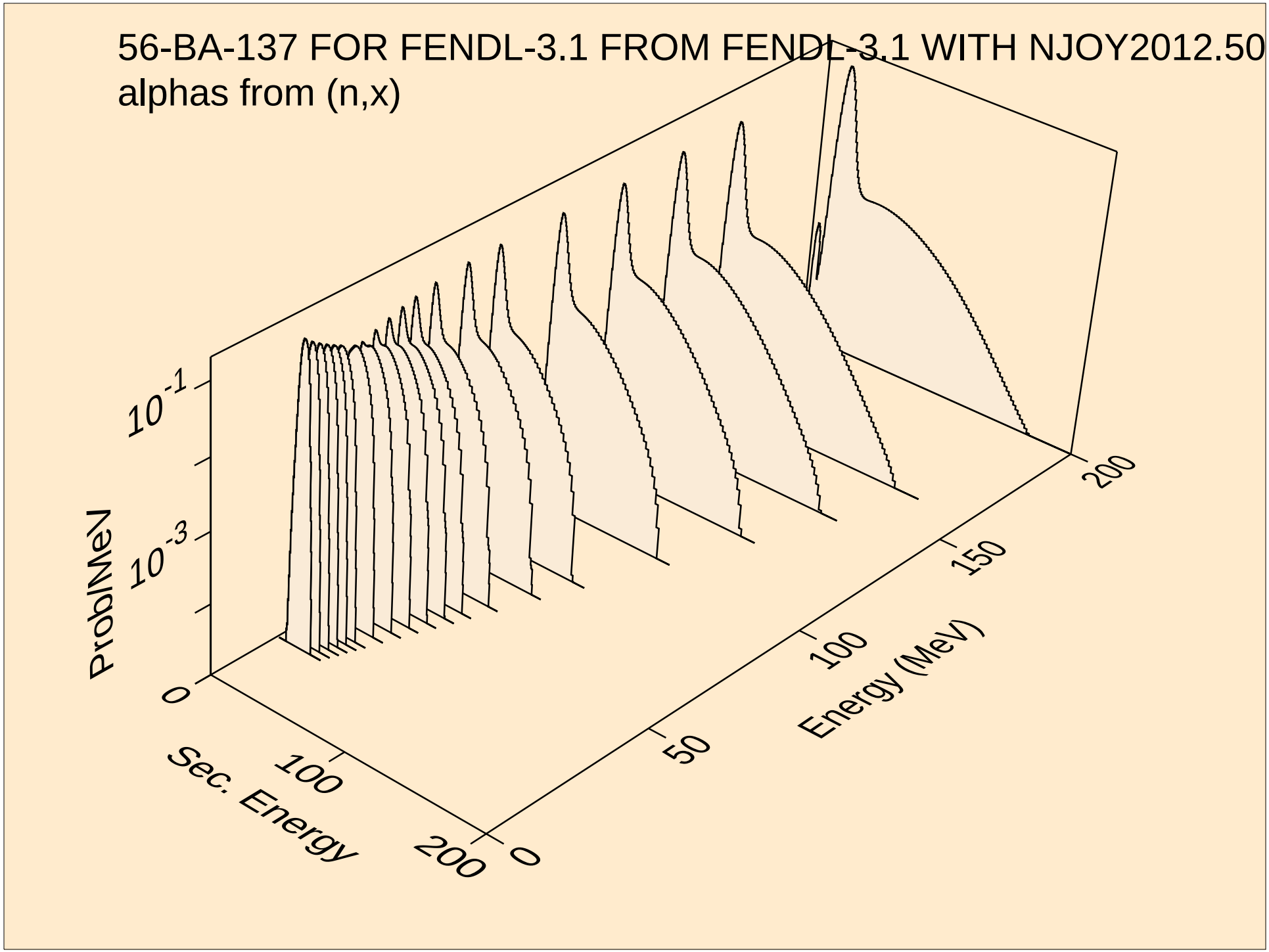

56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
Particle production cross sections
Cross section (barns)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
20
40
60
80
100
120
140
160
180
200
Energy (MeV)
protons
deuterons
tritons
he-3
alphas


56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
protons from (n,x)
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
50
100
Energy (MeV)
150
200


56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
deuterons from (n,x)
Prob/MeV
10-2
10-4
0
Sec. Energy
100
200
0
50
100
Energy (MeV)
150
200


56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
tritons from (n,x)
Prob/MeV
10-2
10-4
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)


56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
he3s from (n,x)
Prob/MeV
10^0
10^-2
10^-4
Sec. Energy
0
100
200
Energy (MeV)
0
50
100
150
200


56-BA-137 FOR FENDL-3.1 FROM FENDL-3.1 WITH NJOY2012.50
alphas from (n,x)
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
50
100
150
200
Energy (MeV)