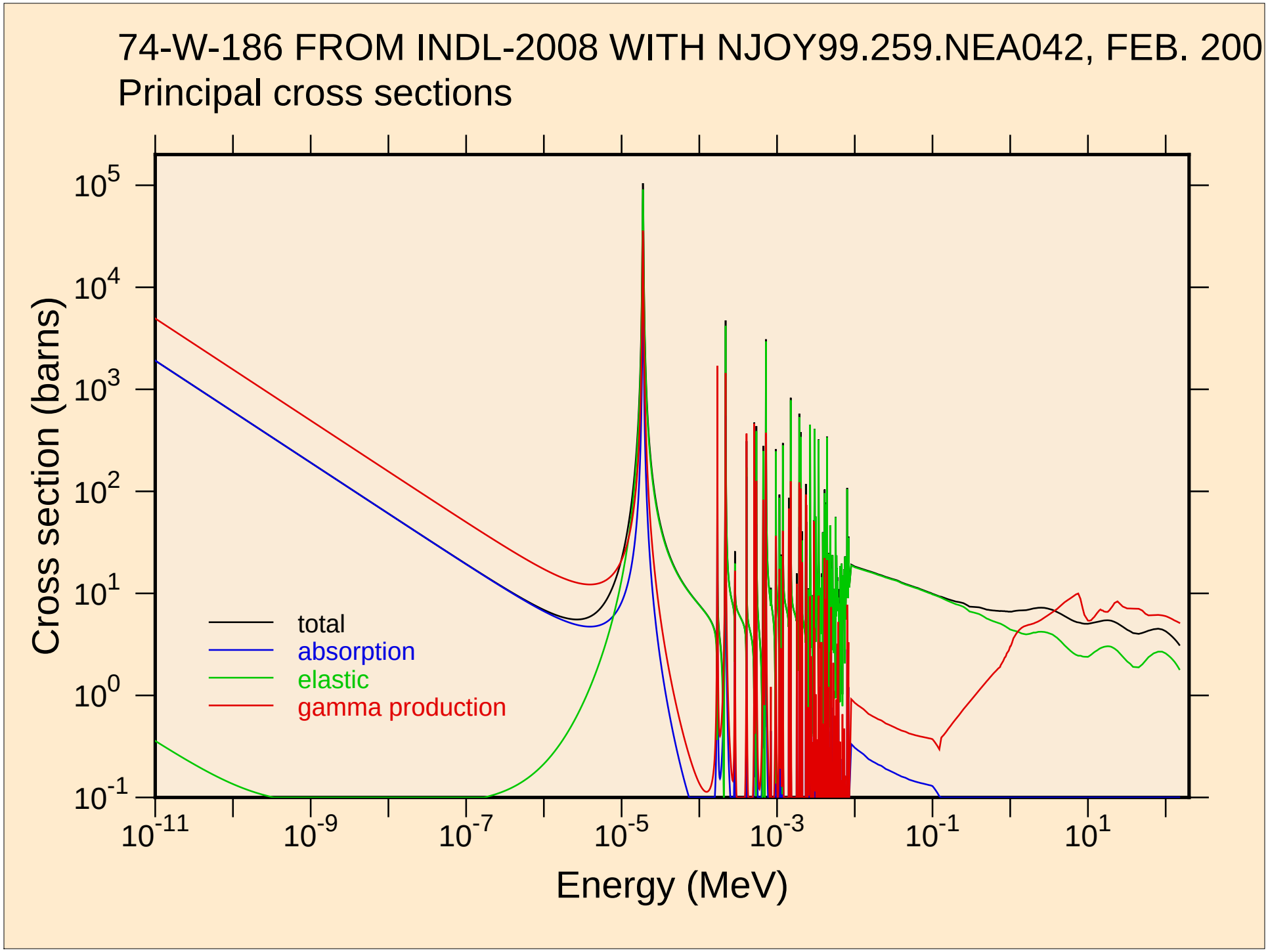
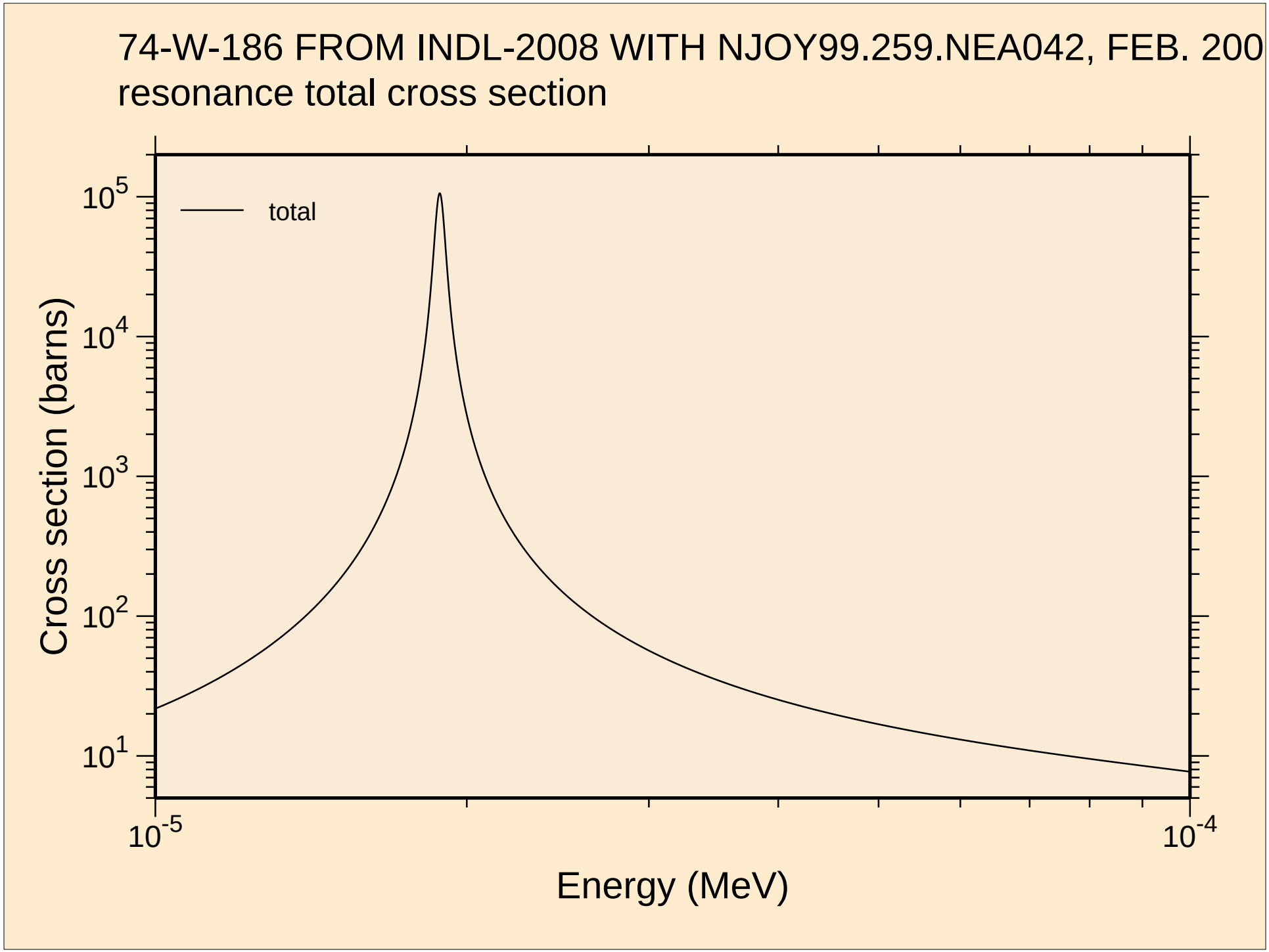
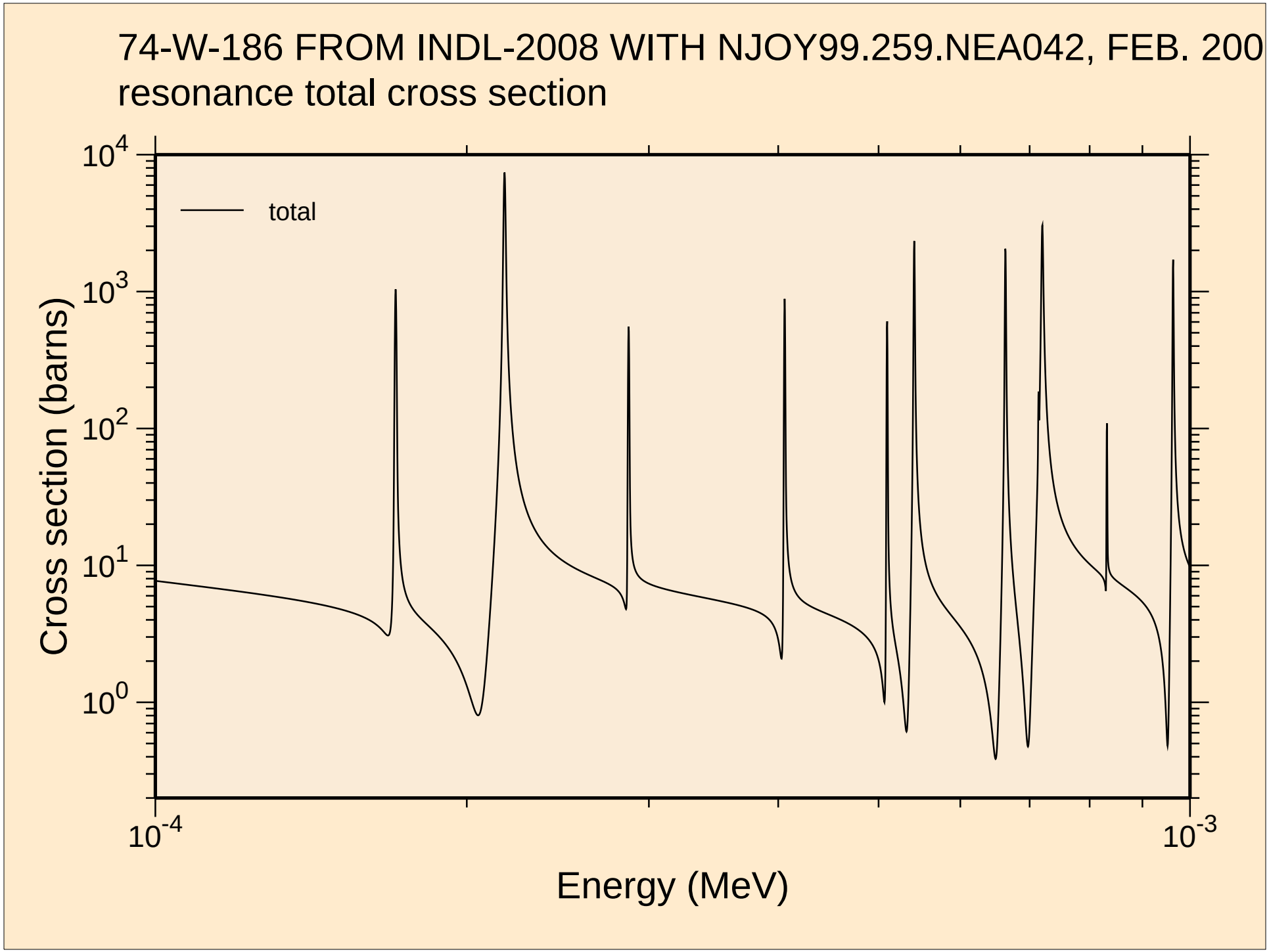
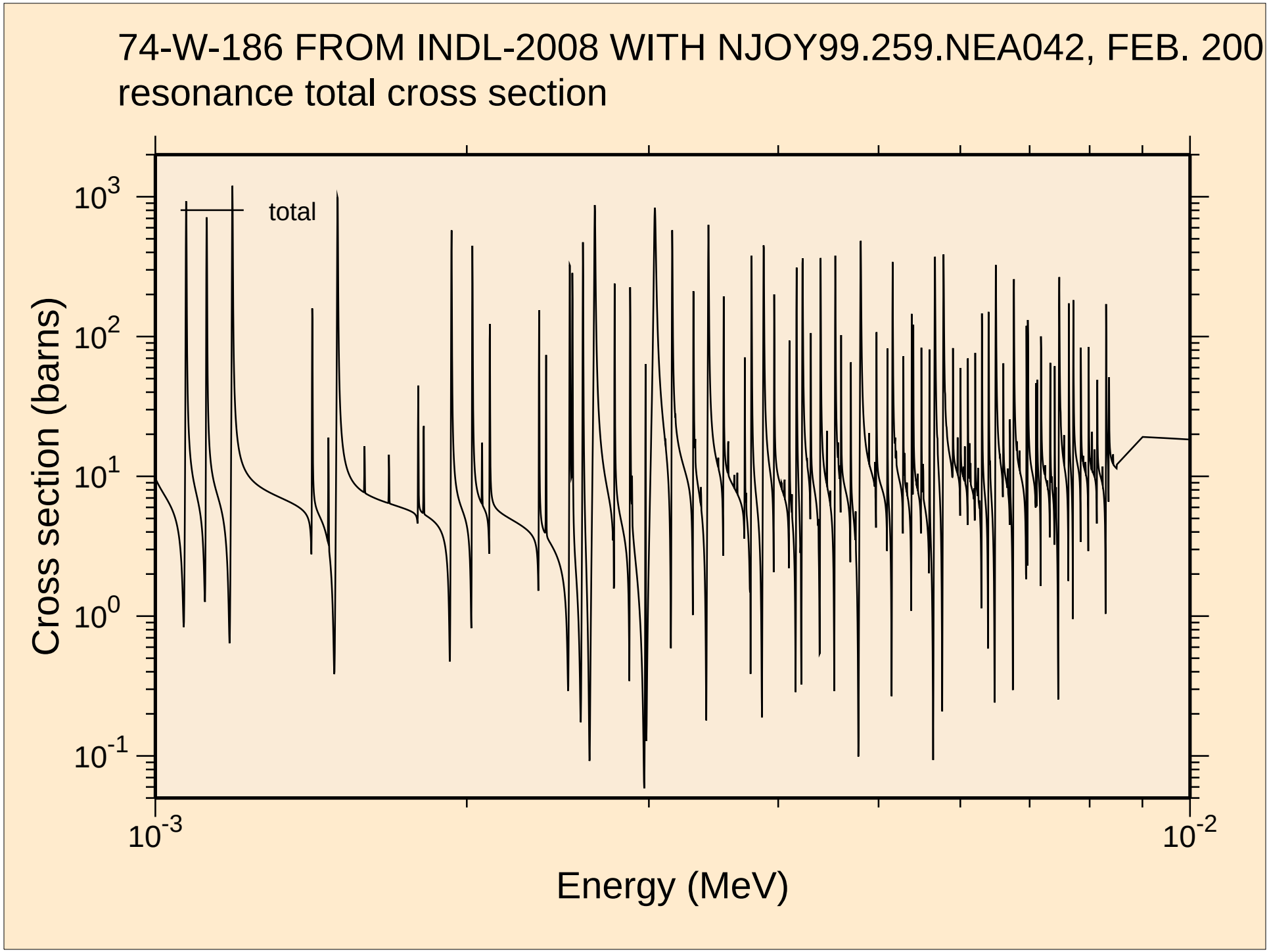
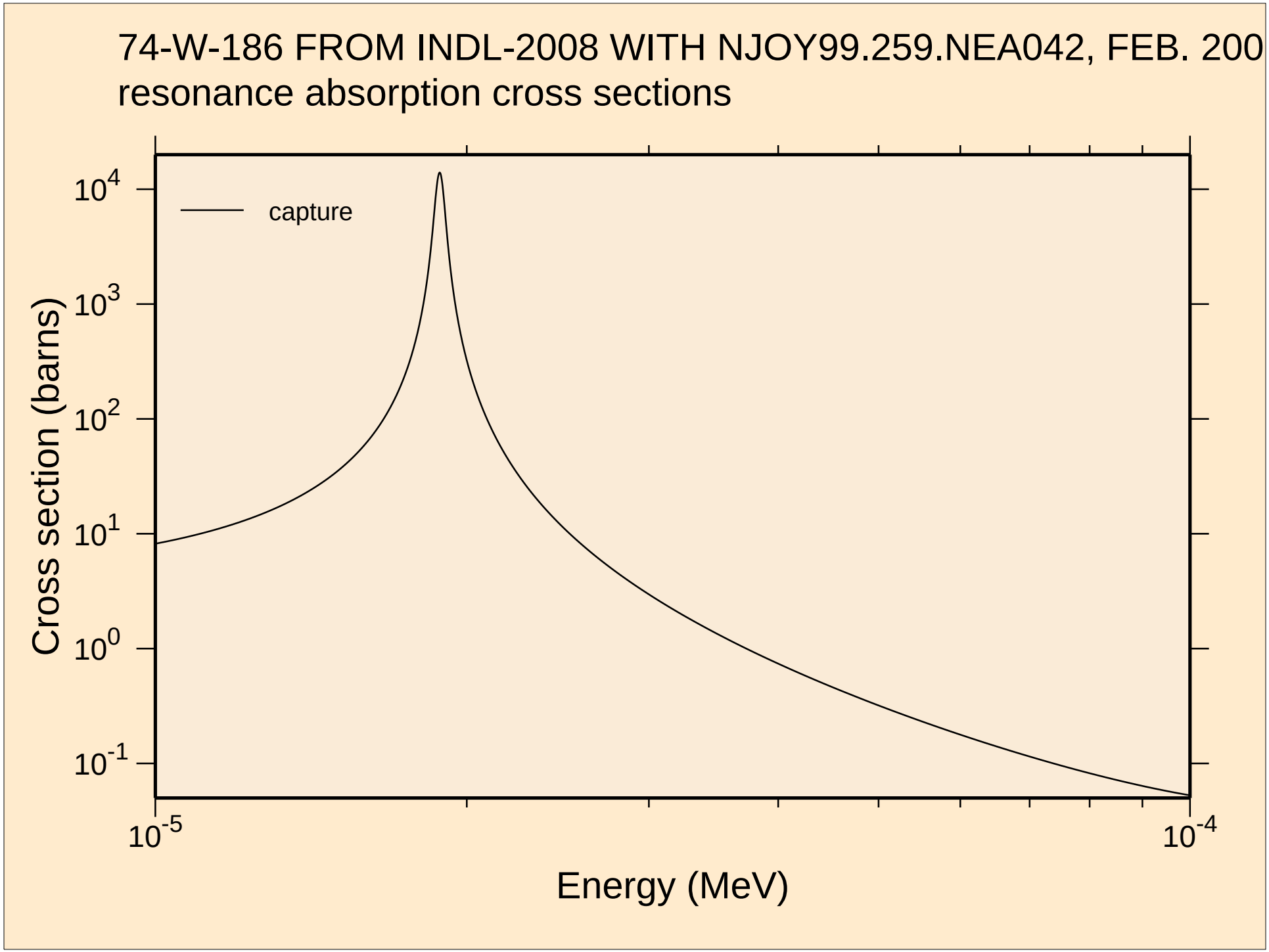
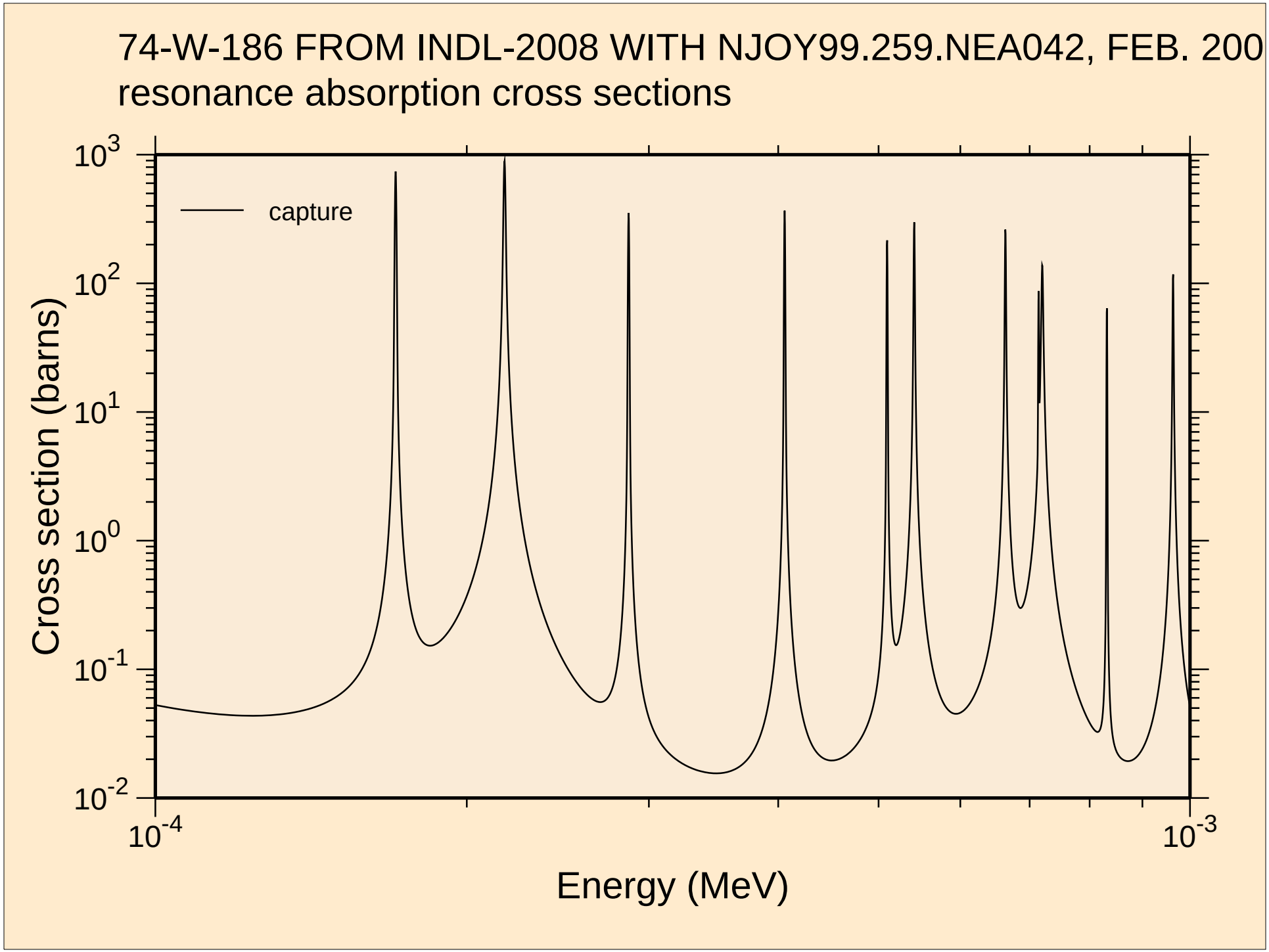

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production
10^5
10^4
10^3
10^2
10^1
10^0
10^-1
10^-11
10^-9
10^-7
10^-5
10^-3
10^-1
10^1

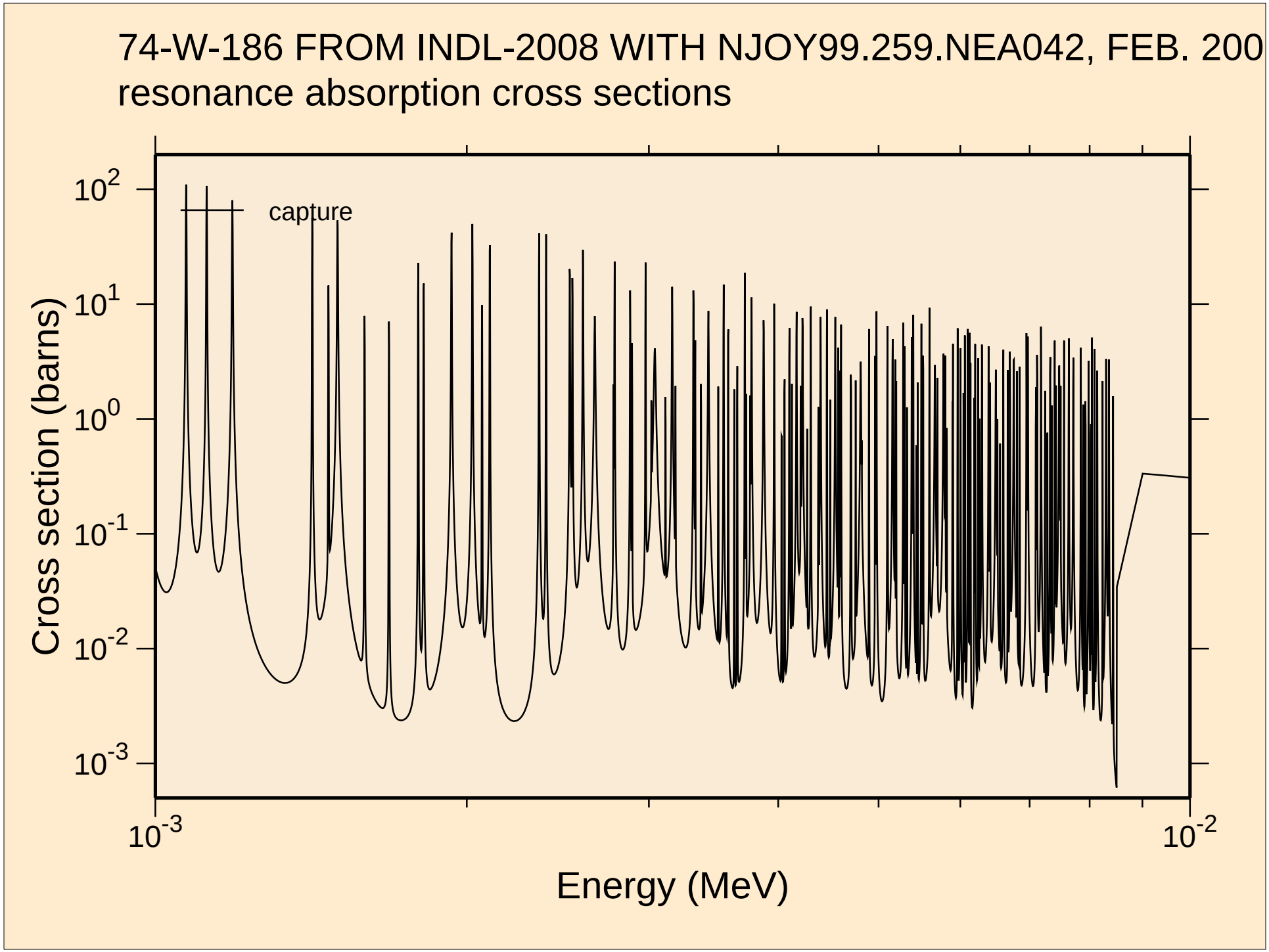

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
resonance total cross section
total
Cross section (barns)
10^5
10^4
10^3
10^2
10^1
10^-5
10^-4
Energy (MeV)

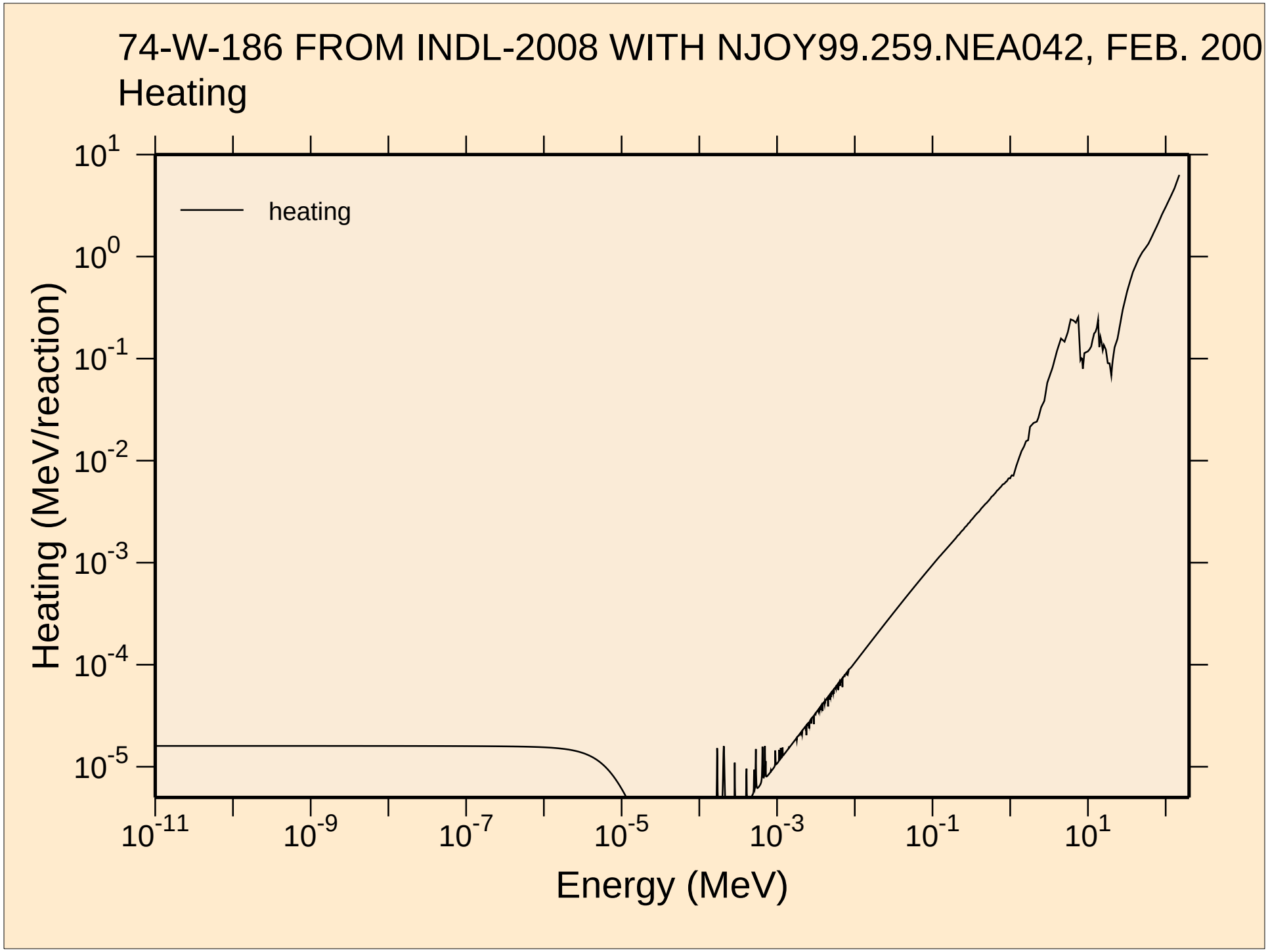

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
resonance total cross section
total
Cross section (barns)
10^4
10^3
10^2
10^1
10^0
10^{-4}
10^{-3}
Energy (MeV)

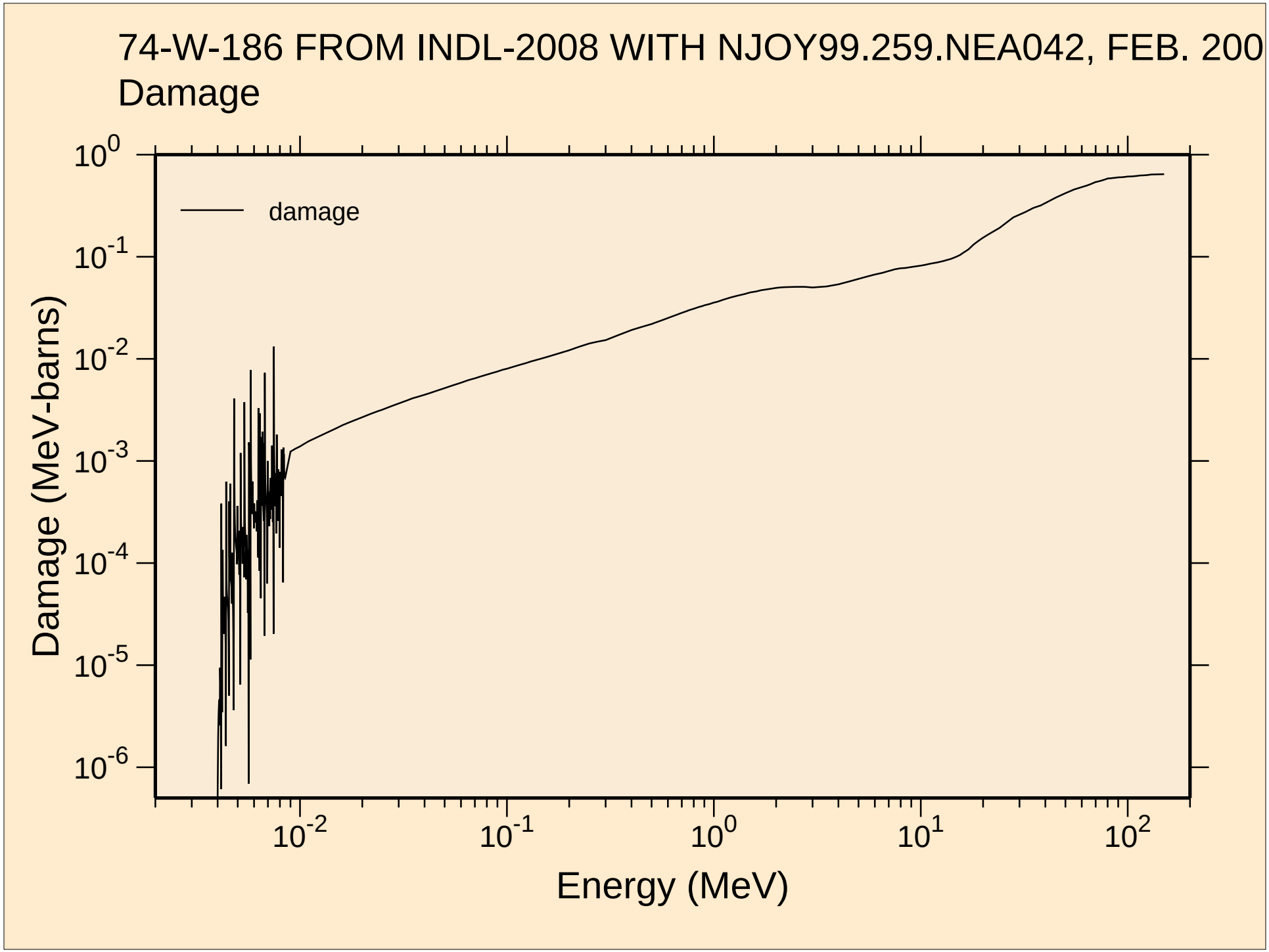

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
resonance total cross section
total
Cross section (barns)
10^{3}
10^{2}
10^{1}
10^{0}
10^{-1}
10^{-3}
10^{-2}
Energy (MeV)

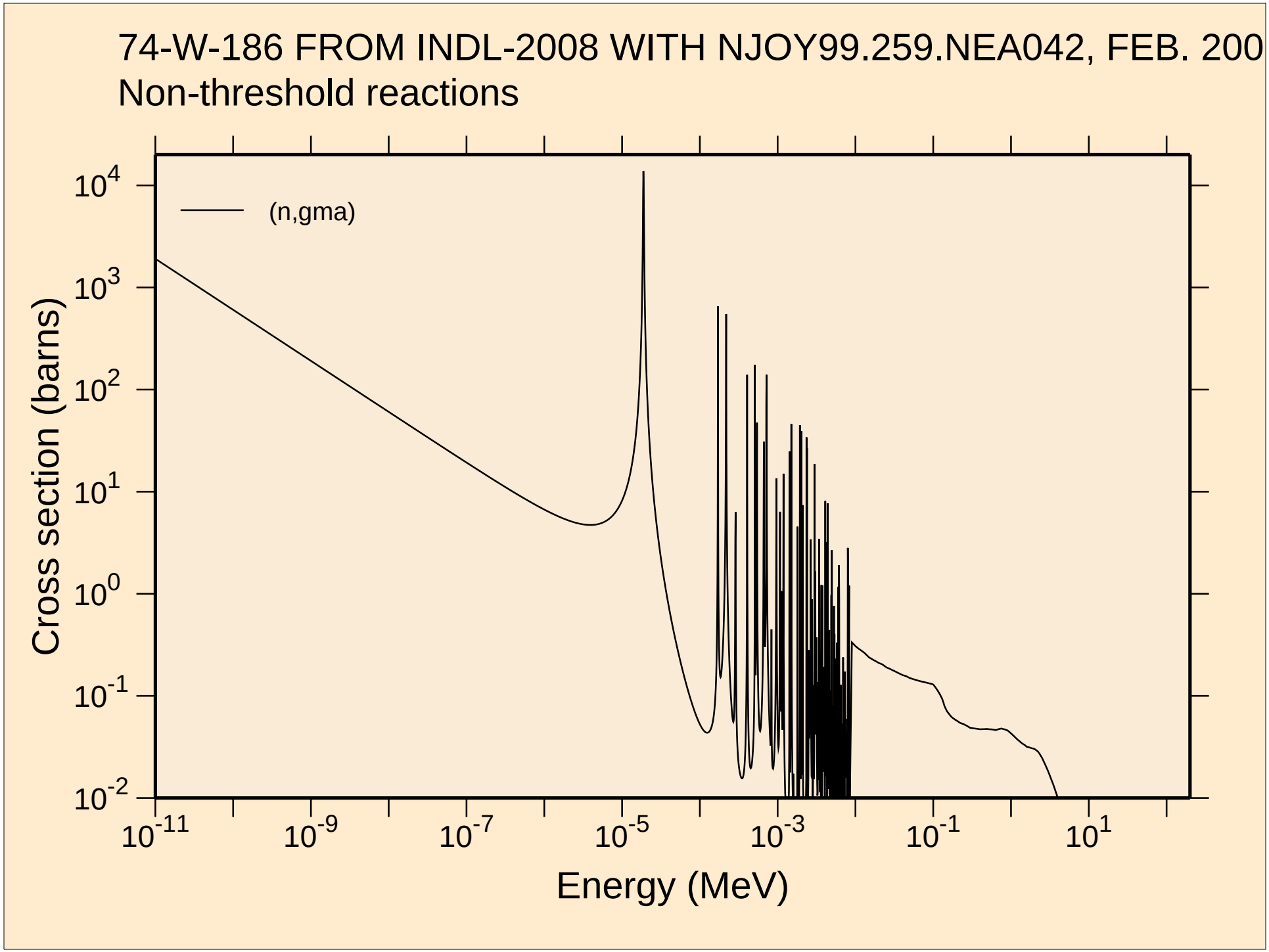

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
resonance absorption cross sections
capture
Cross section (barns)
10^4
10^3
10^2
10^1
10^0
10^-1
10^-5
10^-4
Energy (MeV)

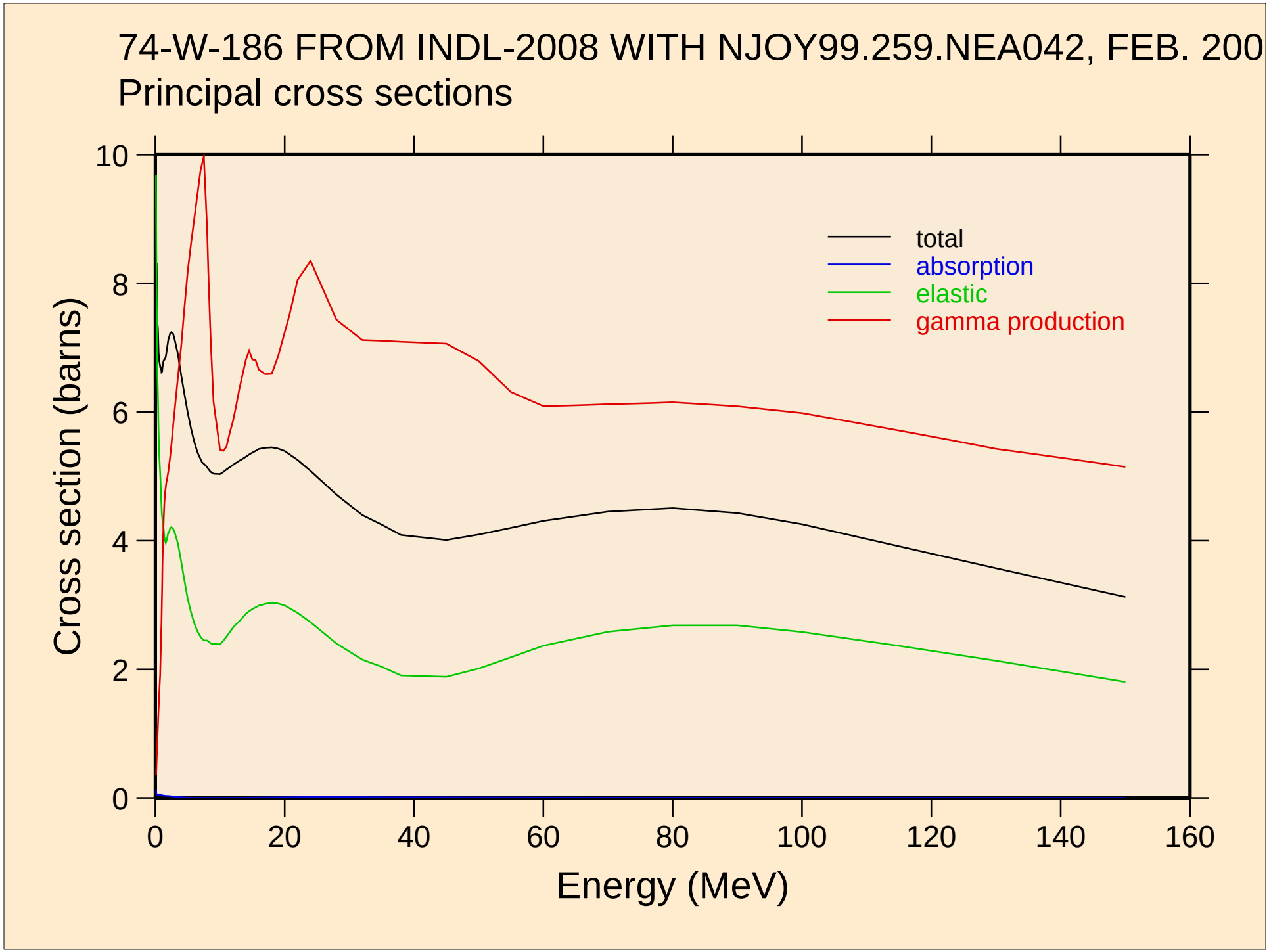

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
resonance absorption cross sections
capture
Cross section (barns)
10^3
10^2
10^1
10^0
10^-1
10^-2
10^-4
10^-3
Energy (MeV)

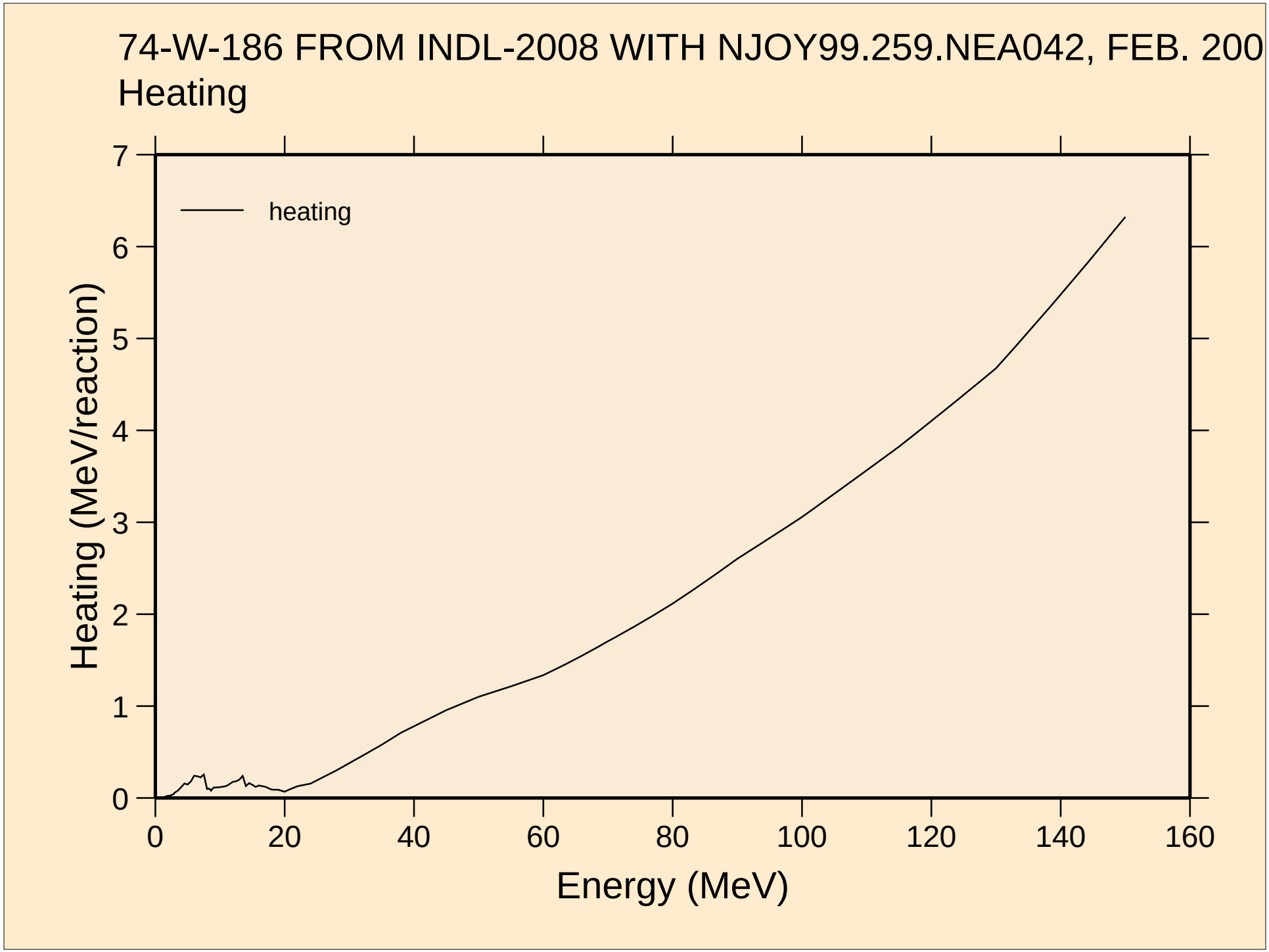

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
resonance absorption cross sections
capture
Cross section (barns)
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^-3
10^-2
Energy (MeV)

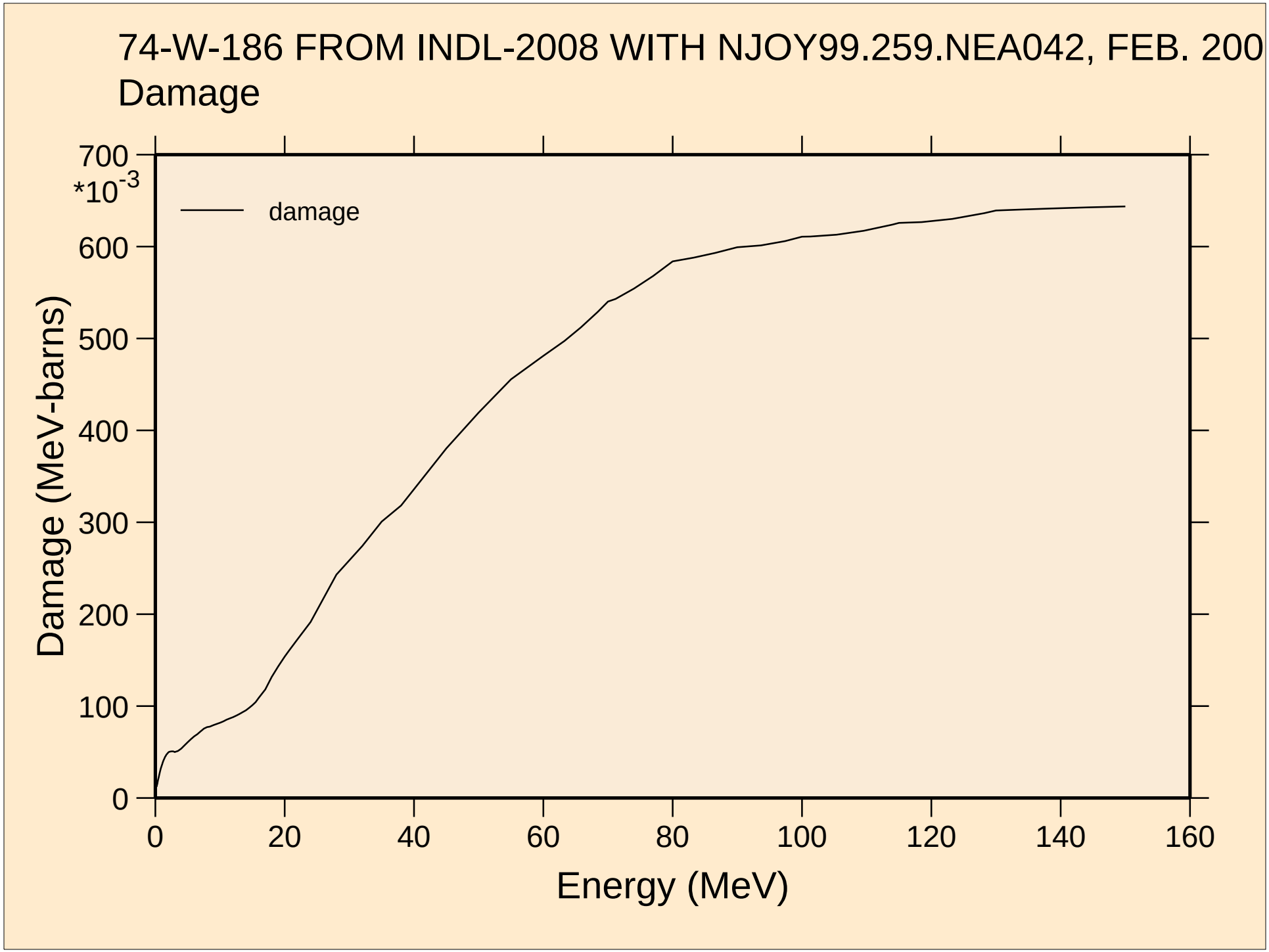

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
10^1
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
10^-11
10^-9
10^-7
10^-5
10^-3
10^-1
10^1

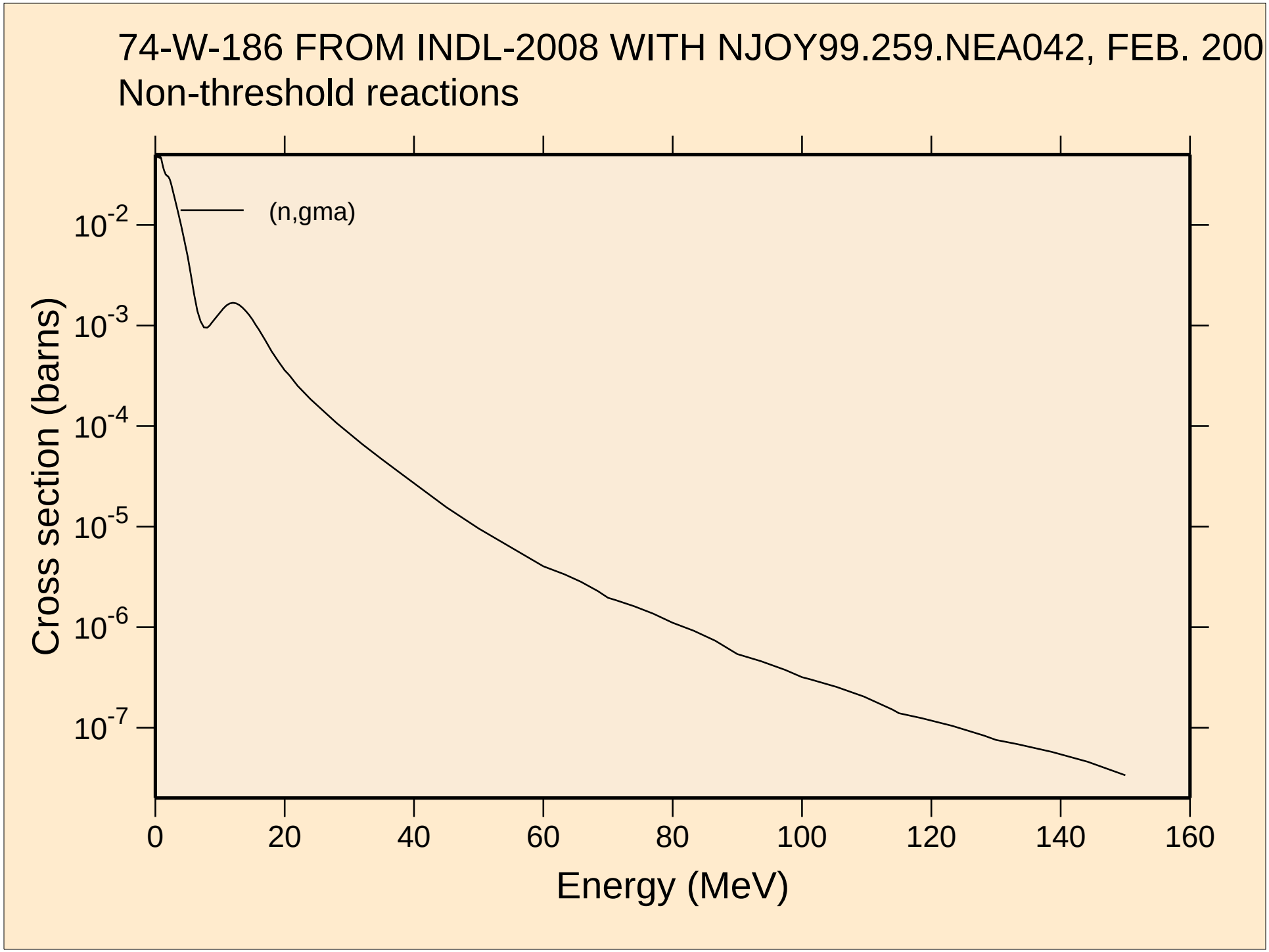

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Damage
damage
Damage (MeV-barns)
Energy (MeV)
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
10^-6
10^-2
10^-1
10^0
10^1
10^2

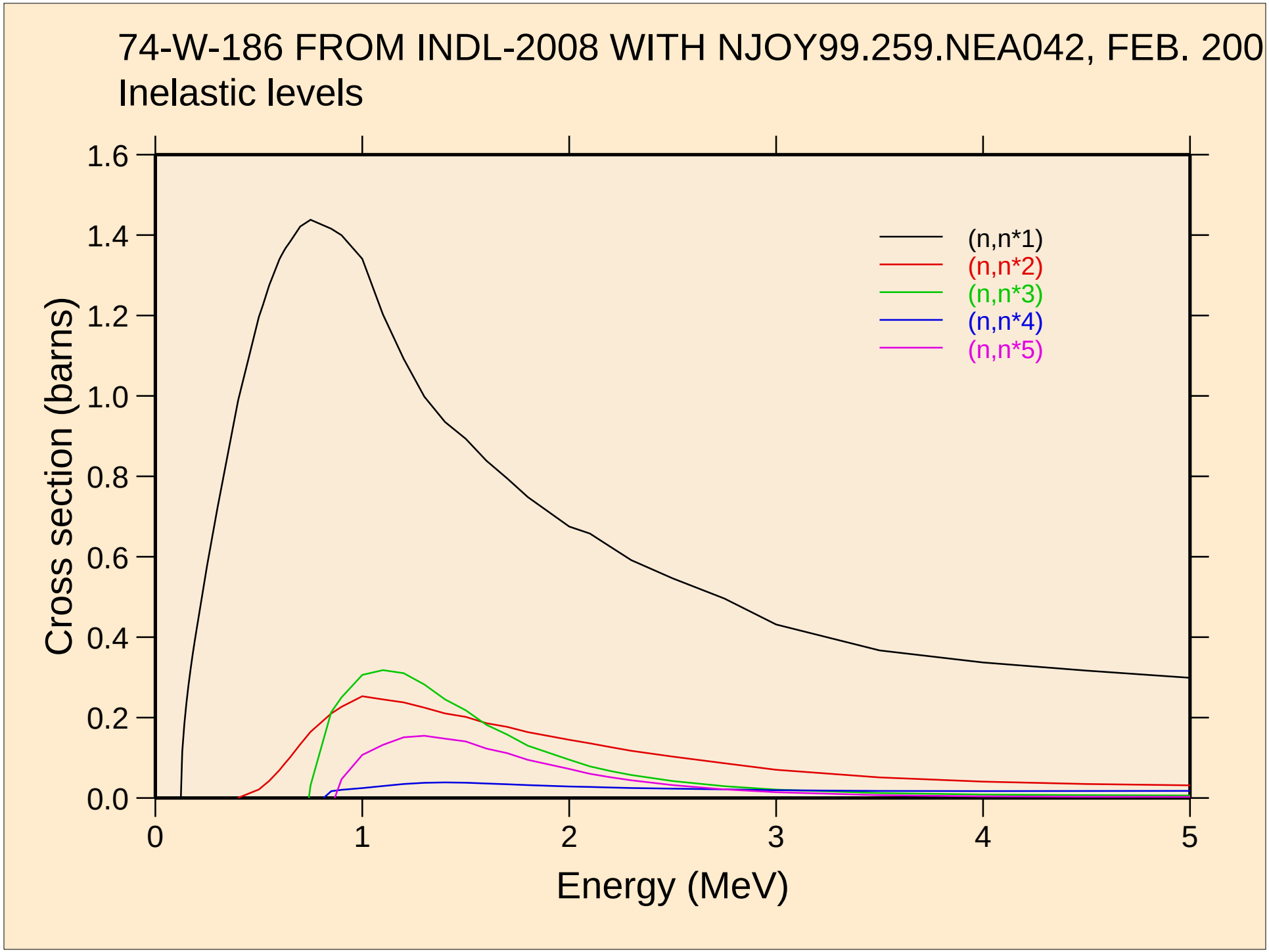

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Non-threshold reactions
(n,gma)
Cross section (barns)
Energy (MeV)
10^4
10^3
10^2
10^1
10^0
10^-1
10^-2
10^-11
10^-9
10^-7
10^-5
10^-3
10^-1
10^1

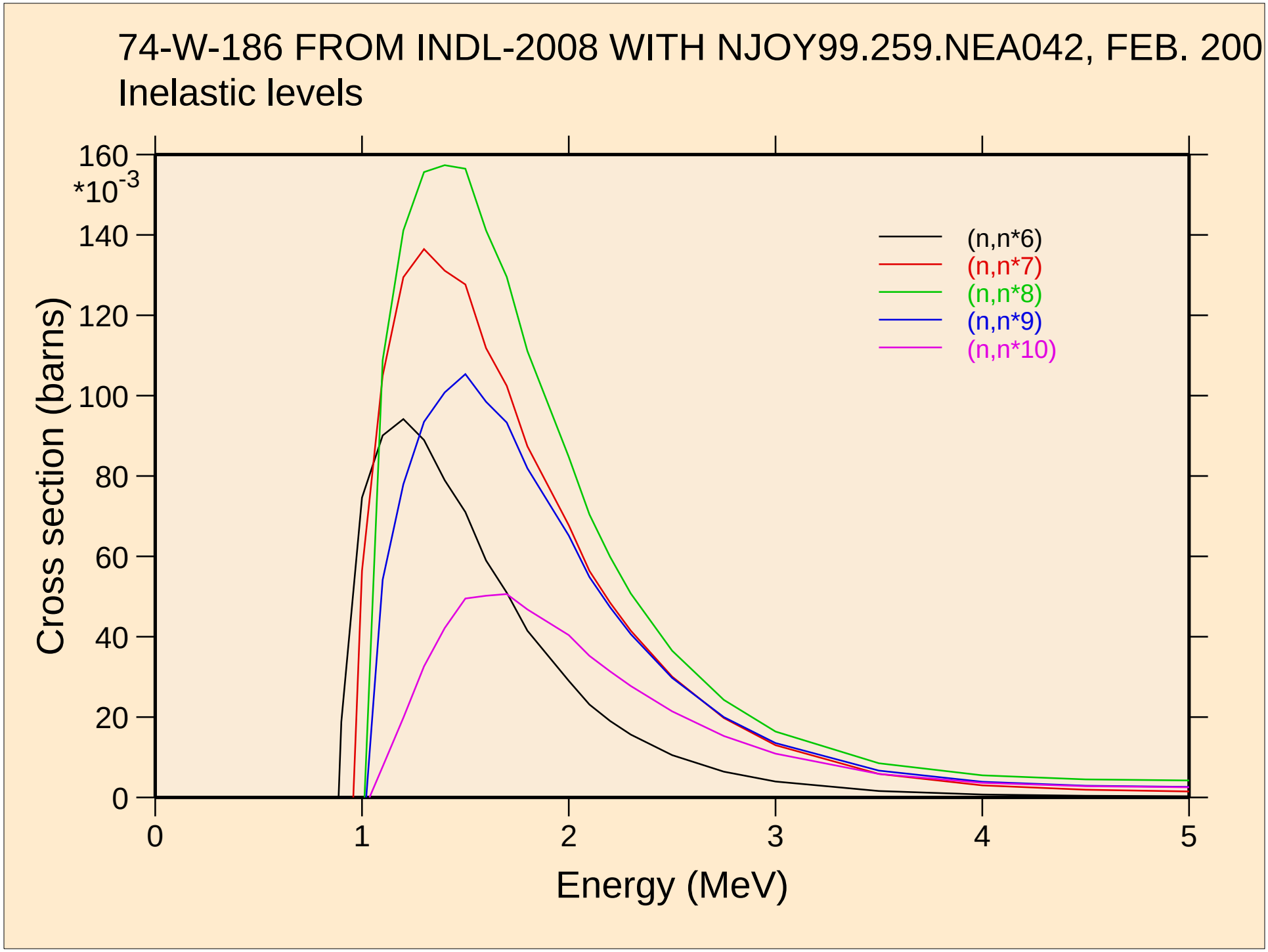

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Principal cross sections
Cross section (barns)
Energy (MeV)
0
2
4
6
8
10
0
20
40
60
80
100
120
140
160
total
absorption
elastic
gamma production

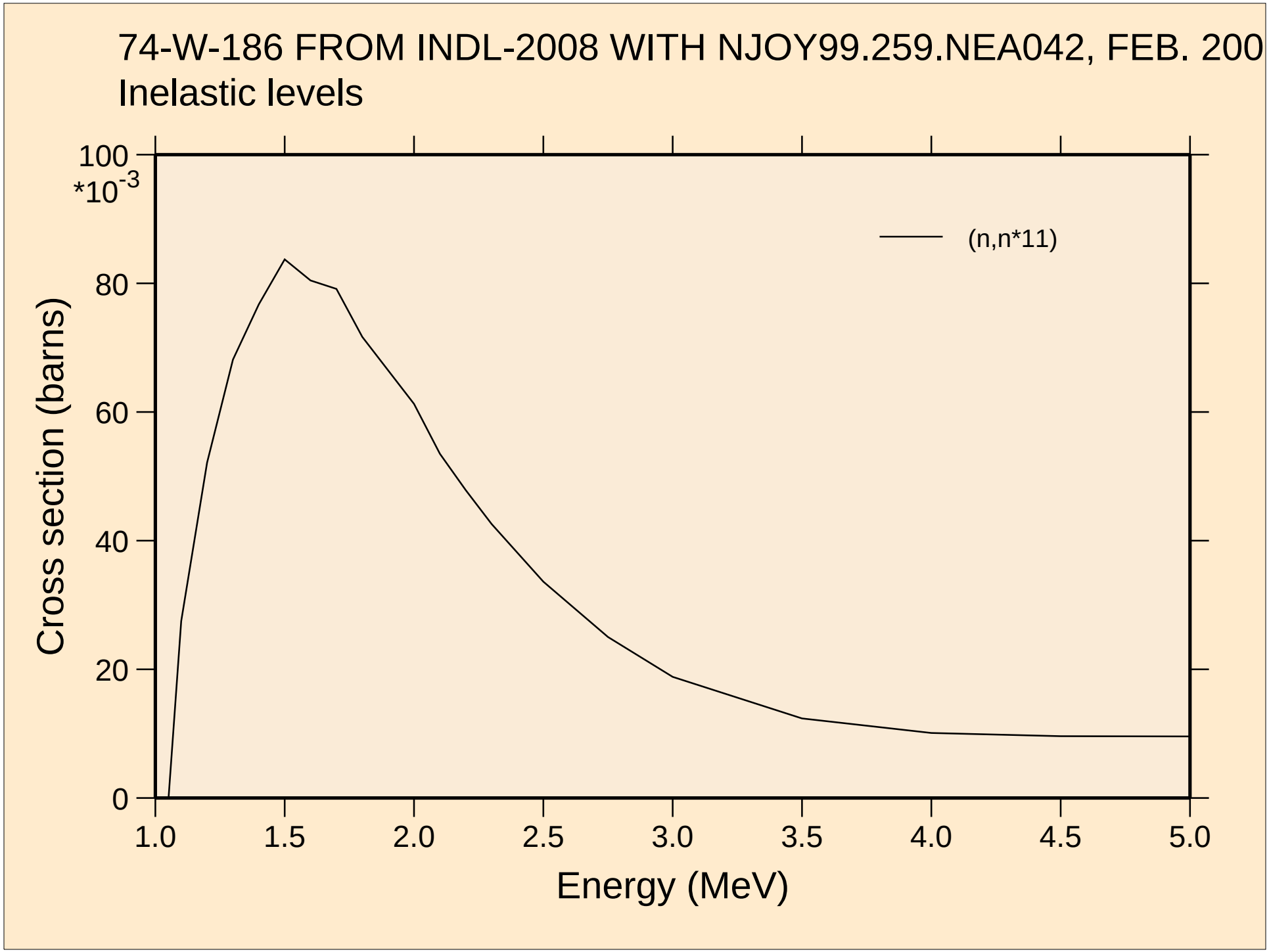

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
0
1
2
3
4
5
6
7
0
20
40
60
80
100
120
140
160

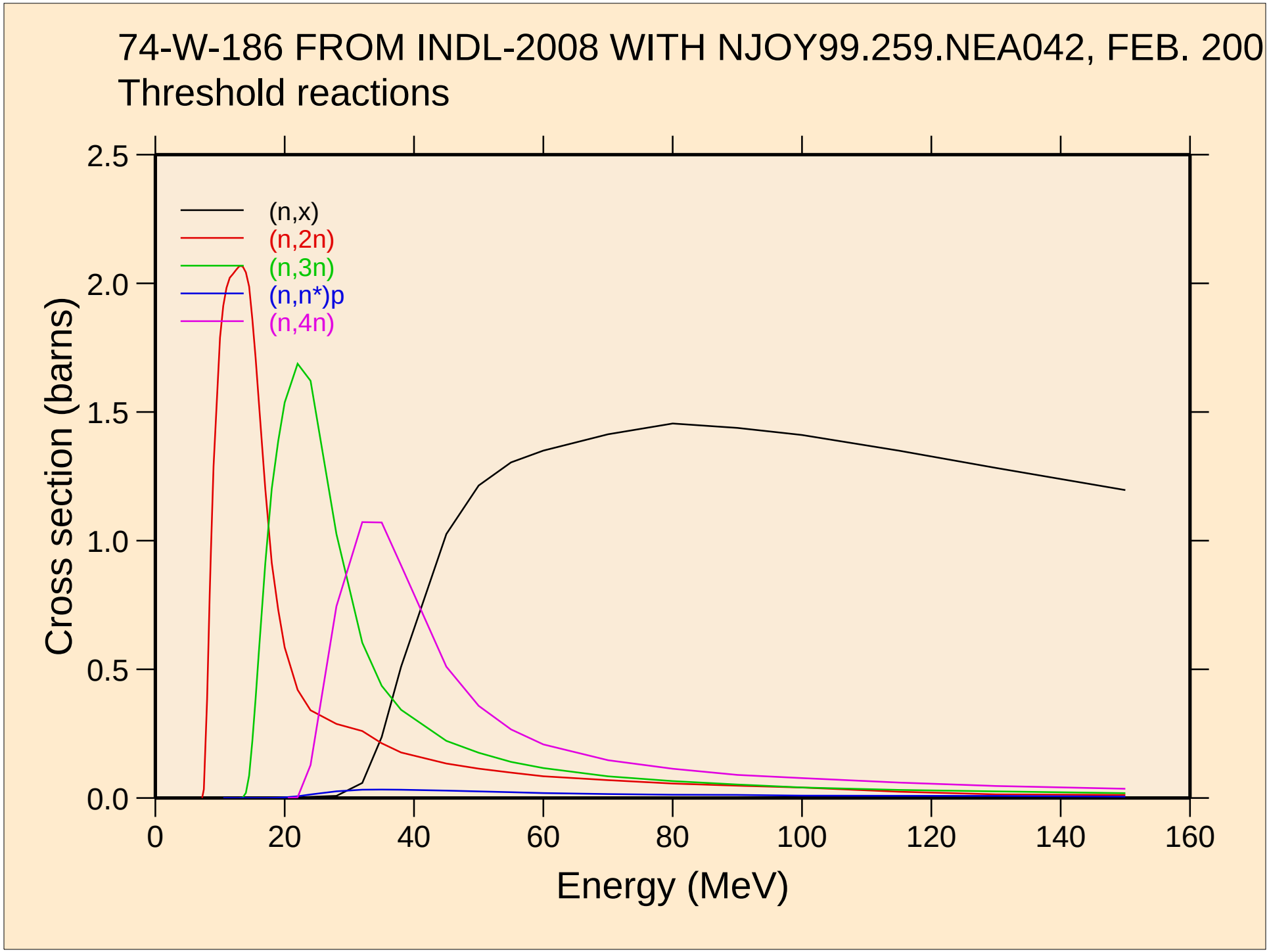

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Damage
700
*10-3
600
500
400
300
200
100
0
damage
Damage (MeV-barns)
0
20
40
60
80
100
120
140
160
Energy (MeV)

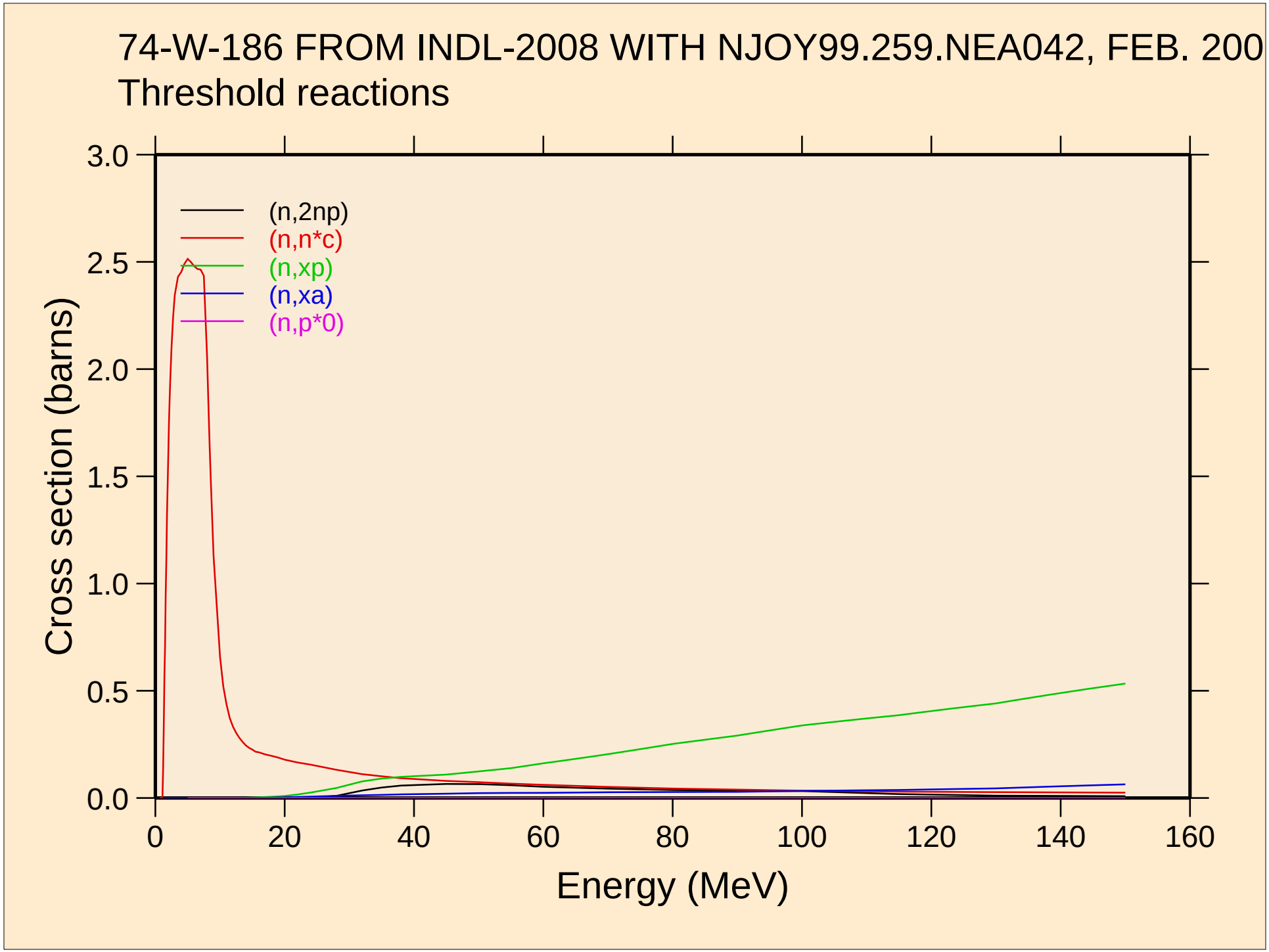

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Non-threshold reactions
(n,gma)
Cross section (barns)
10-2
10-3
10-4
10-5
10-6
10-7
0
20
40
60
80
100
120
140
160
Energy (MeV)

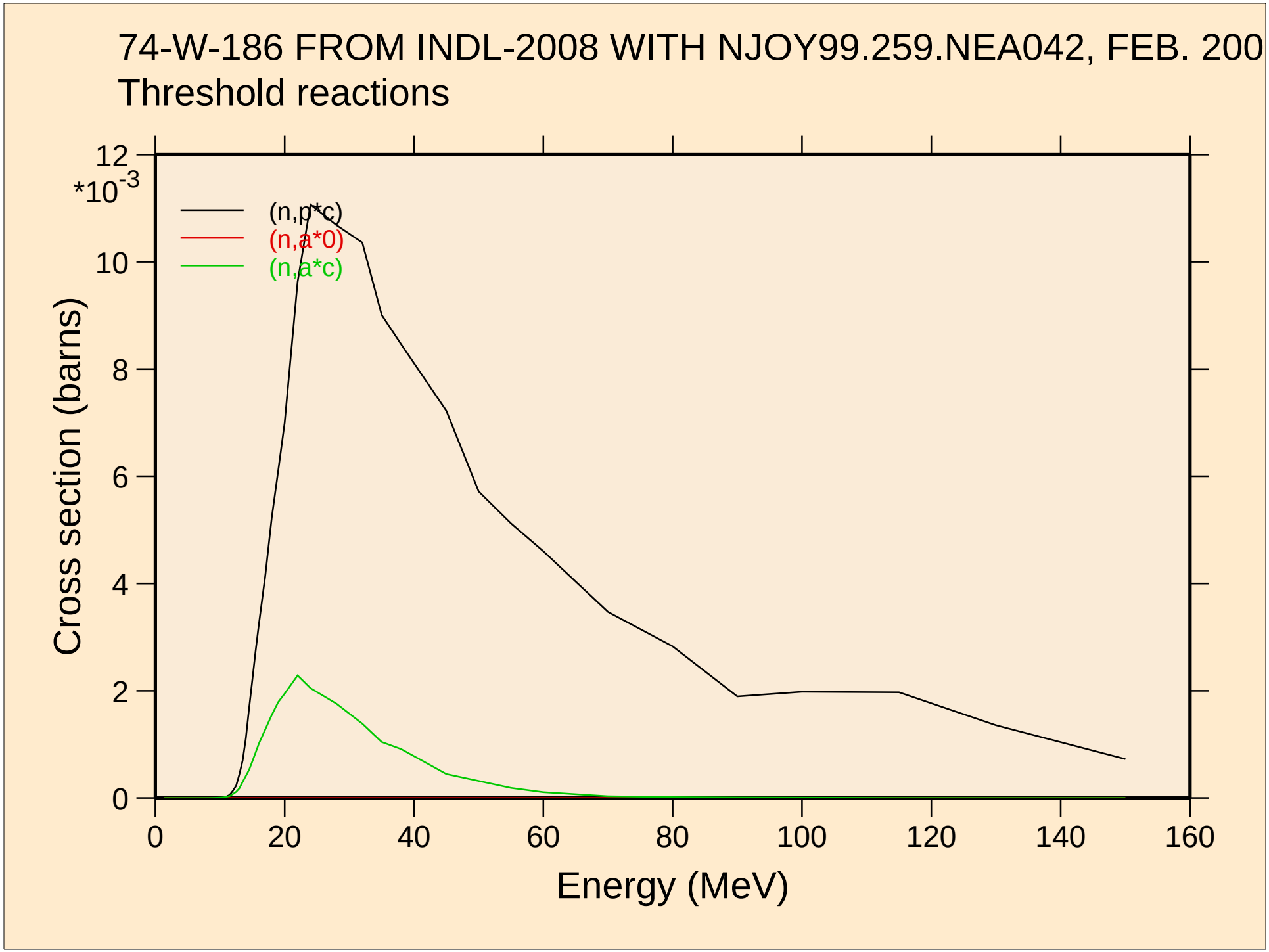

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Inelastic levels
Cross section (barns)
Energy (MeV)
(n,n*1)
(n,n*2)
(n,n*3)
(n,n*4)
(n,n*5)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
0
1
2
3
4
5

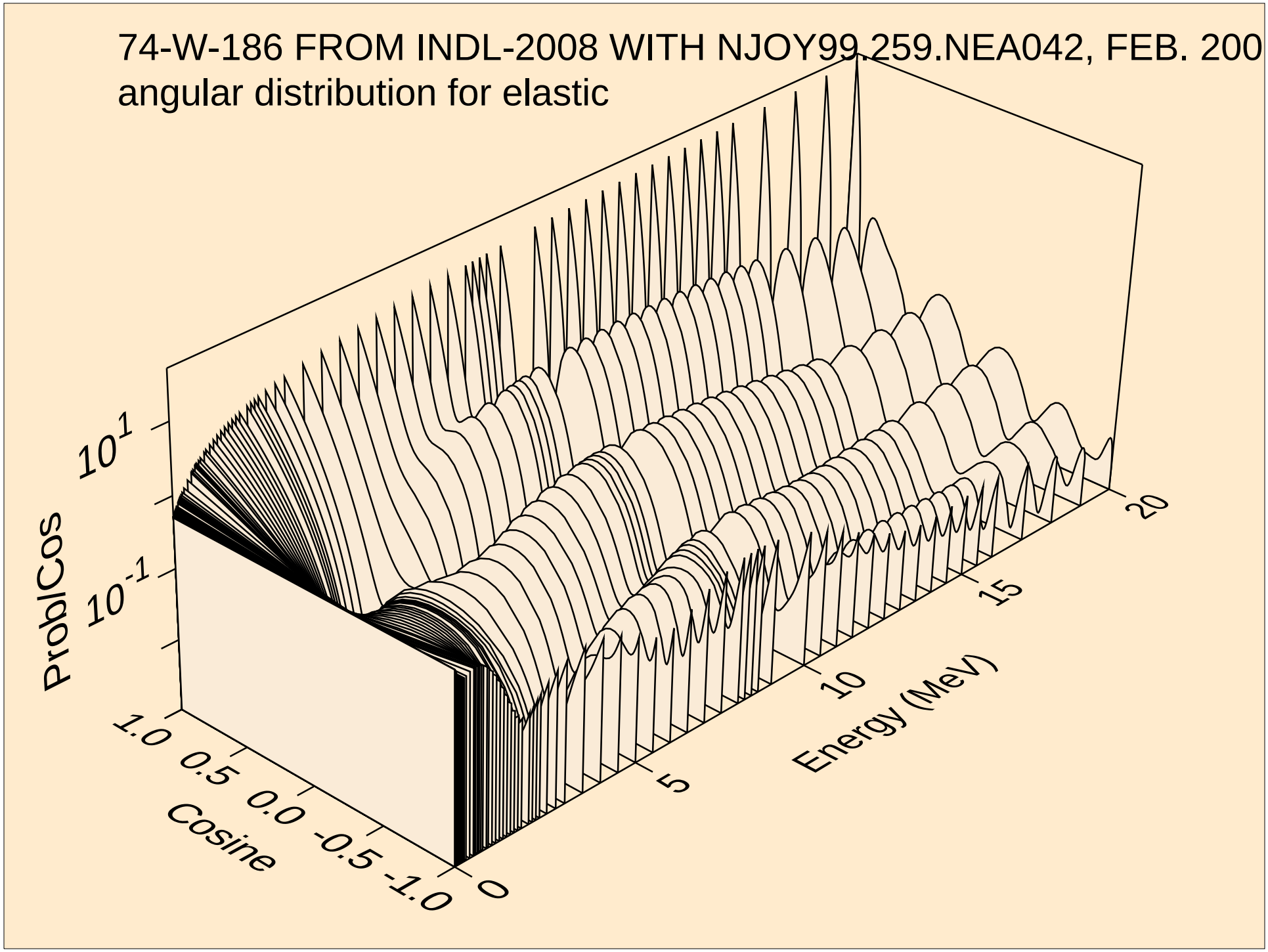

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Inelastic levels
Cross section (barns)
*10-3
160
140
120
100
80
60
40
20
0
0
1
2
3
4
5
Energy (MeV)
(n,n*6)
(n,n*7)
(n,n*8)
(n,n*9)
(n,n*10)

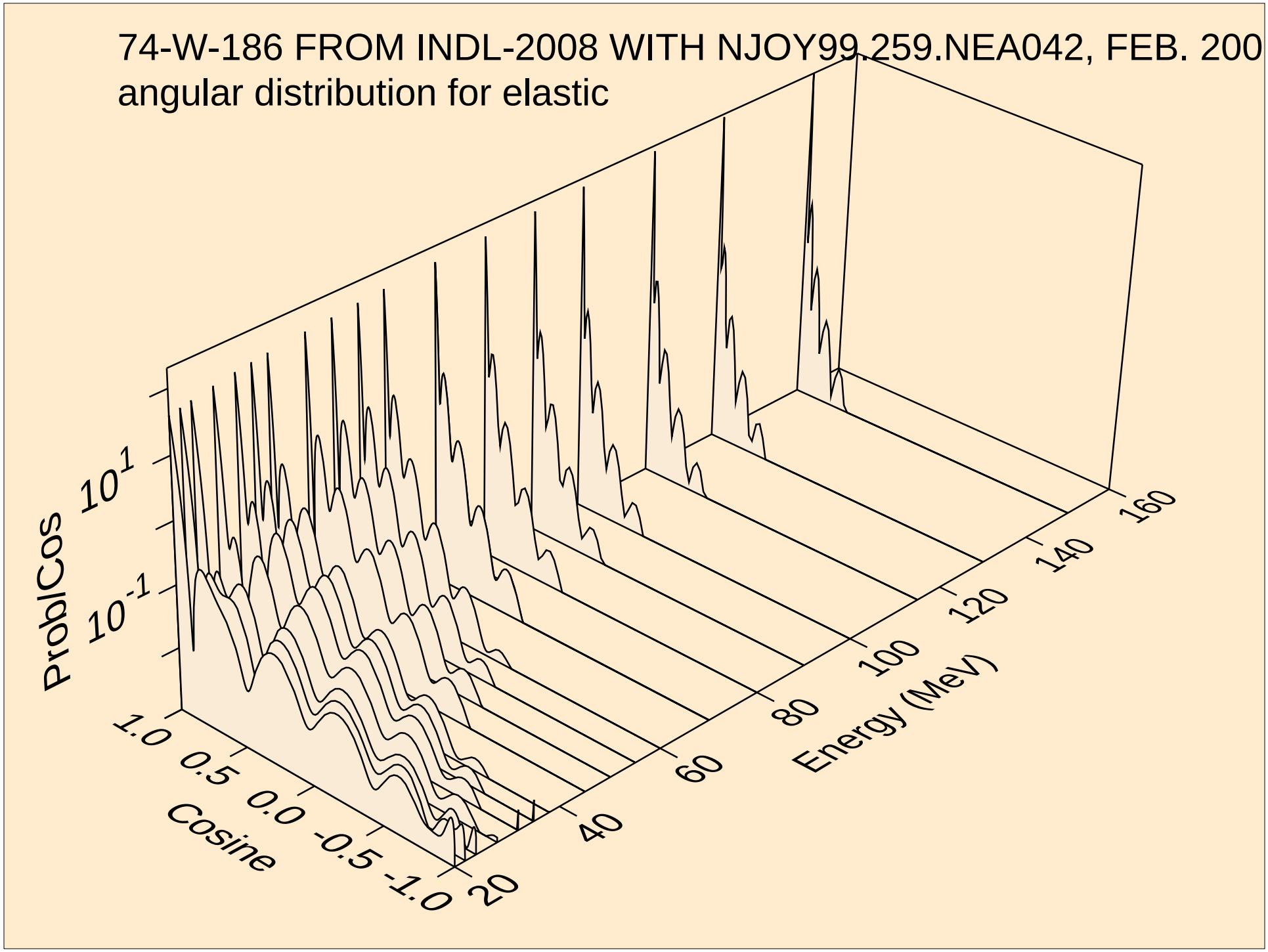

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Inelastic levels
100
*10-3
80
60
40
20
0
Cross section (barns)
(n,n*11)
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
Energy (MeV)

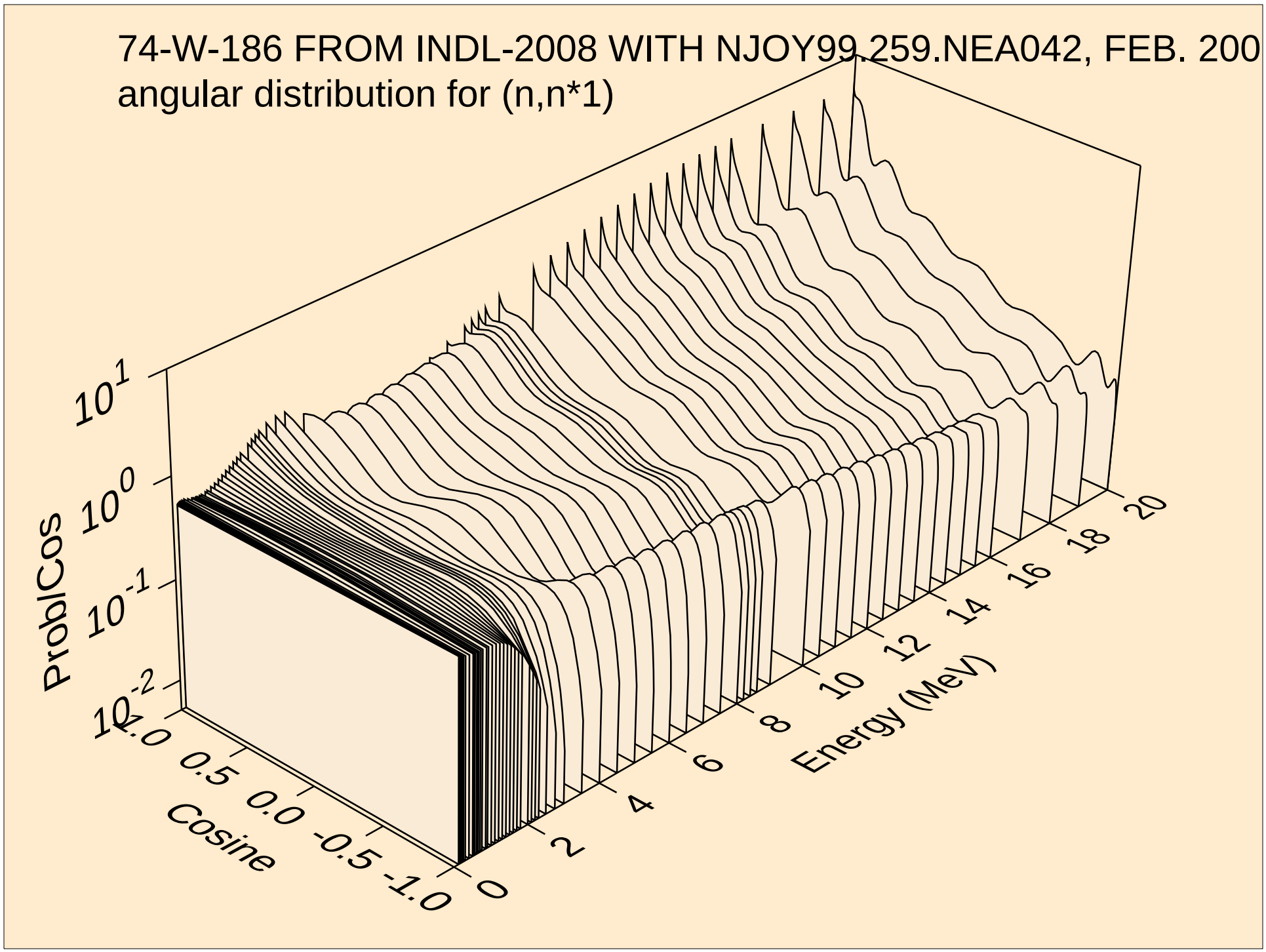

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Threshold reactions
(n,x)
(n,2n)
(n,3n)
(n,n*)p
(n,4n)
Cross section (barns)
Energy (MeV)
0.0
0.5
1.0
1.5
2.0
2.5
0
20
40
60
80
100
120
140
160

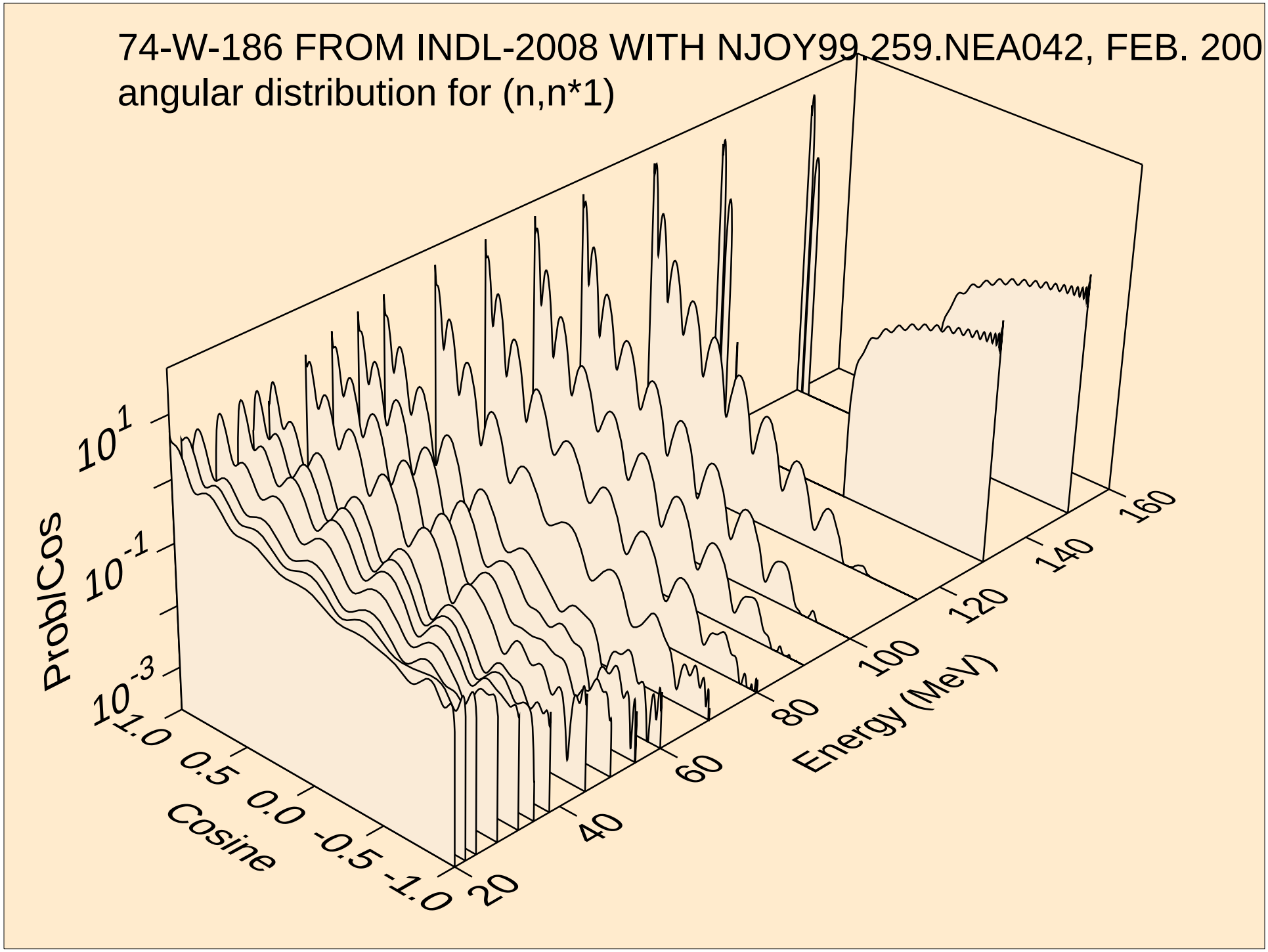

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Threshold reactions
(n,2np)
(n,n*c)
(n,xp)
(n,xa)
(n,p*0)
Cross section (barns)
Energy (MeV)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
20
40
60
80
100
120
140
160

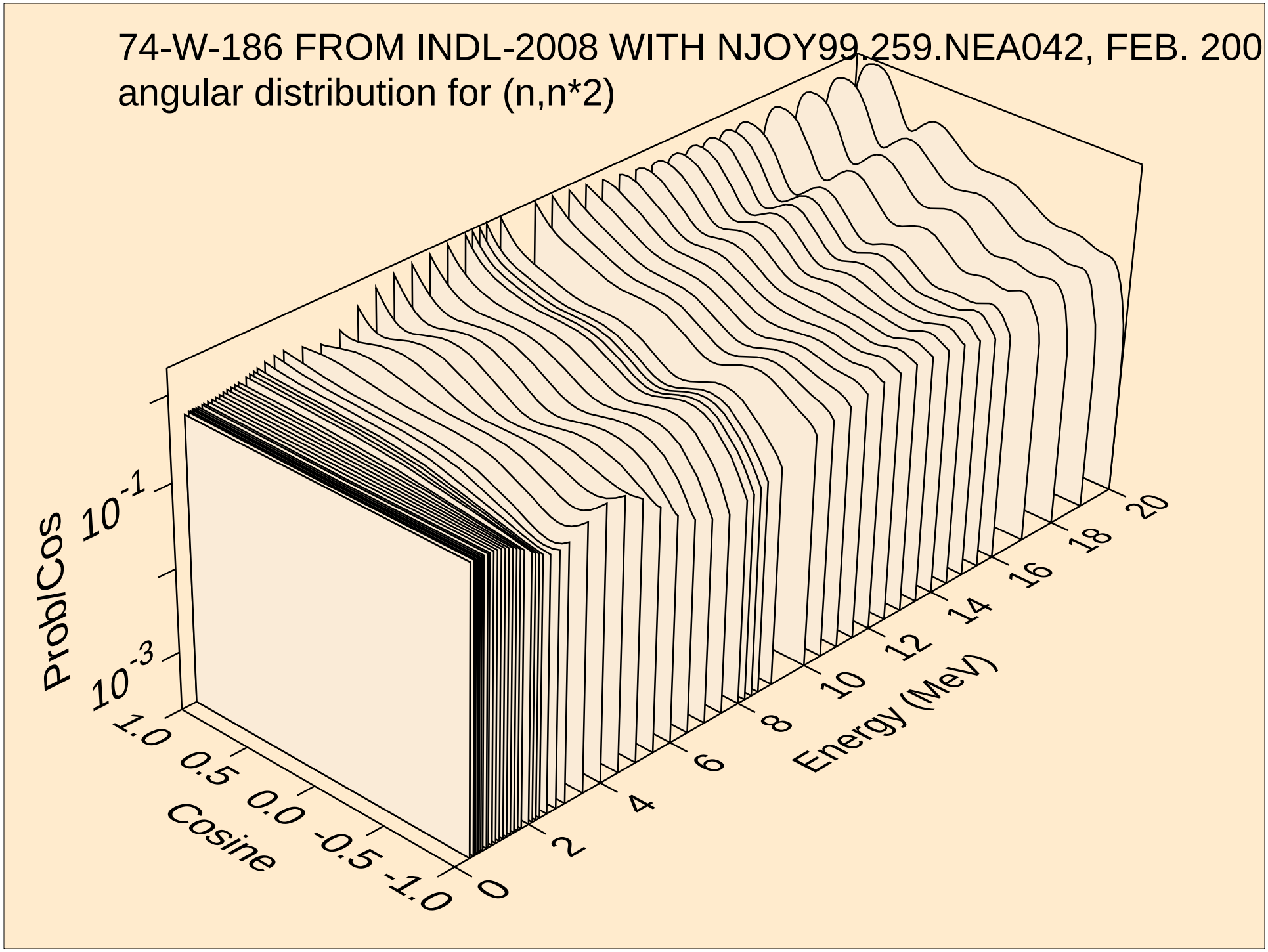

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Threshold reactions
*10-3
(n,p*c)
(n,a*0)
(n,a*c)
Cross section (barns)
Energy (MeV)
0
2
4
6
8
10
12
0
20
40
60
80
100
120
140
160

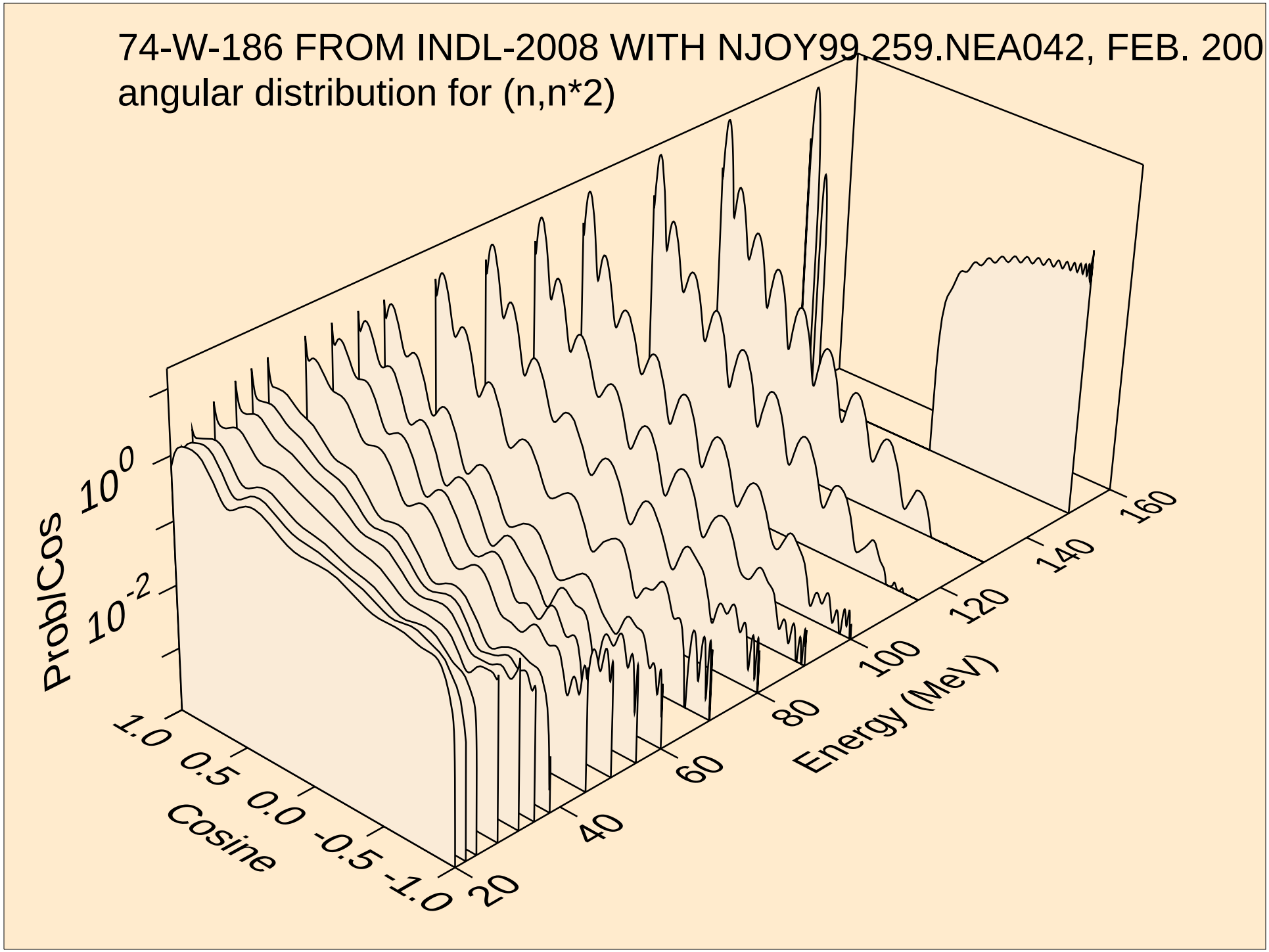

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for elastic
ProbCos
10^{1}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)

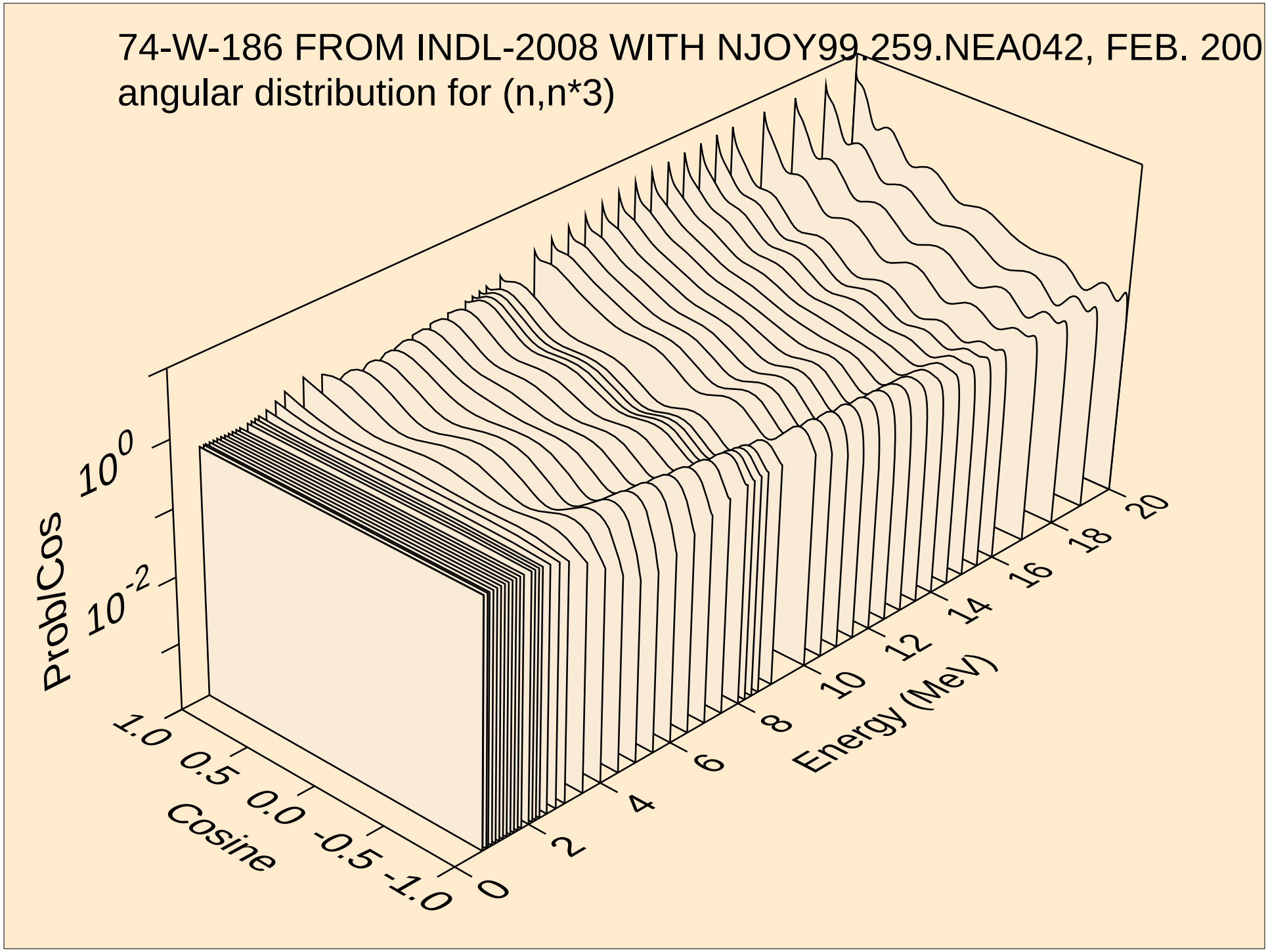

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for elastic
ProbICos
10^1
10^-1
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)

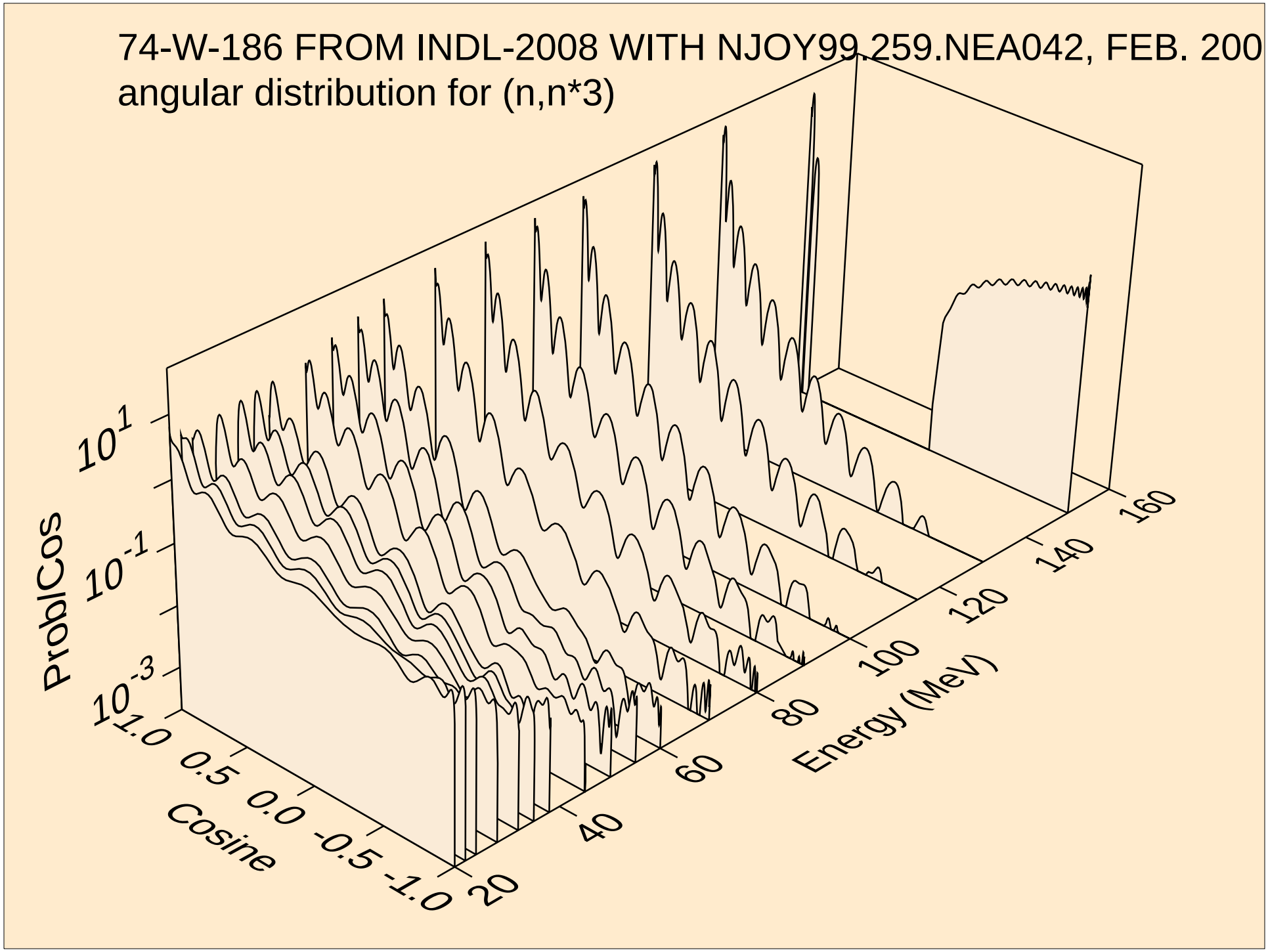

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*1)
Prob\Cos
10^{1}
10^{0}
10^{-1}
10^{-2}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

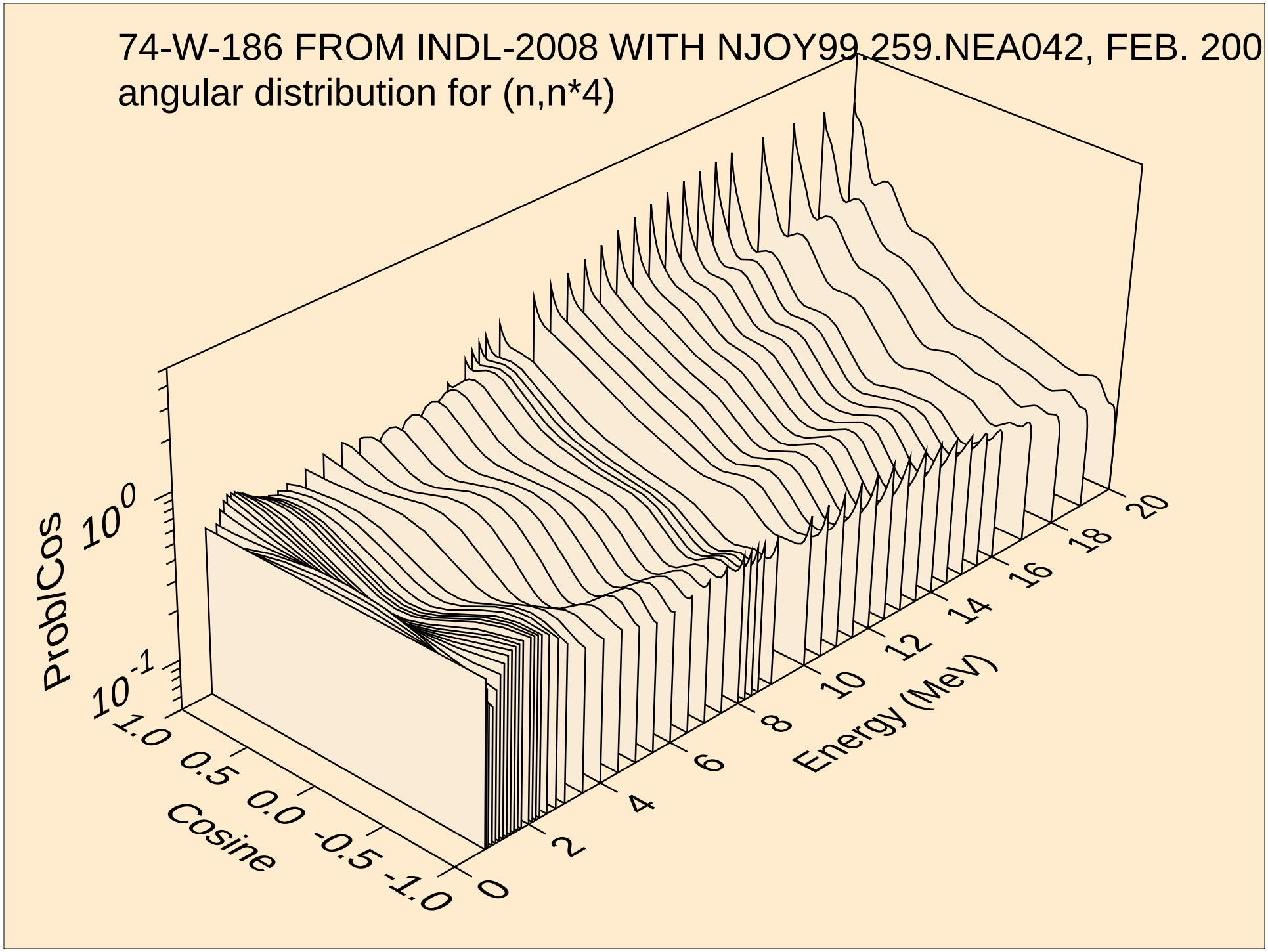

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*1)
Prob\Cos
10^1
10^-1
10^-3
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)

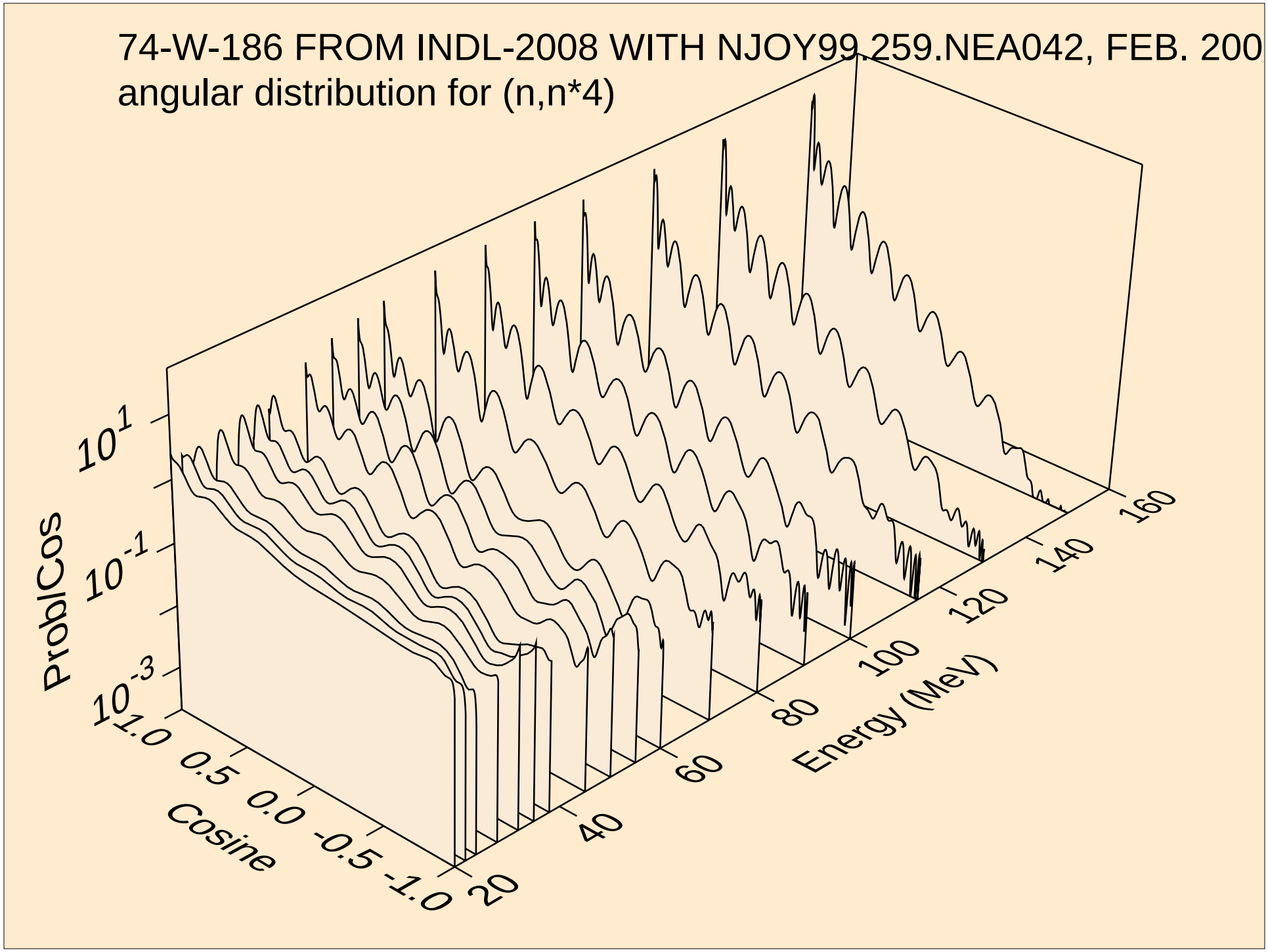

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*2)
ProbICos
10-1
10-3
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

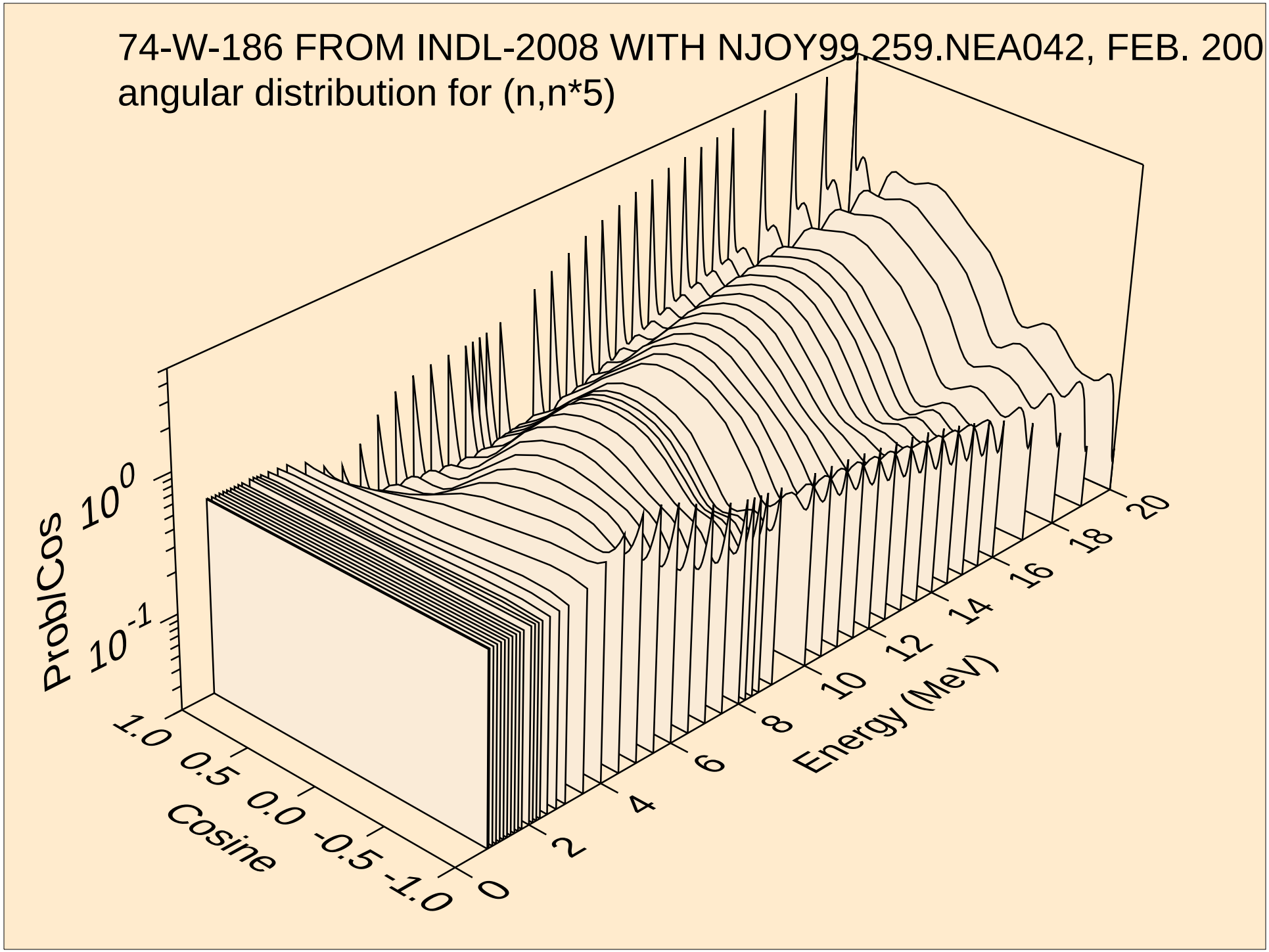

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*2)
ProbICos
10^0
10^-2
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)

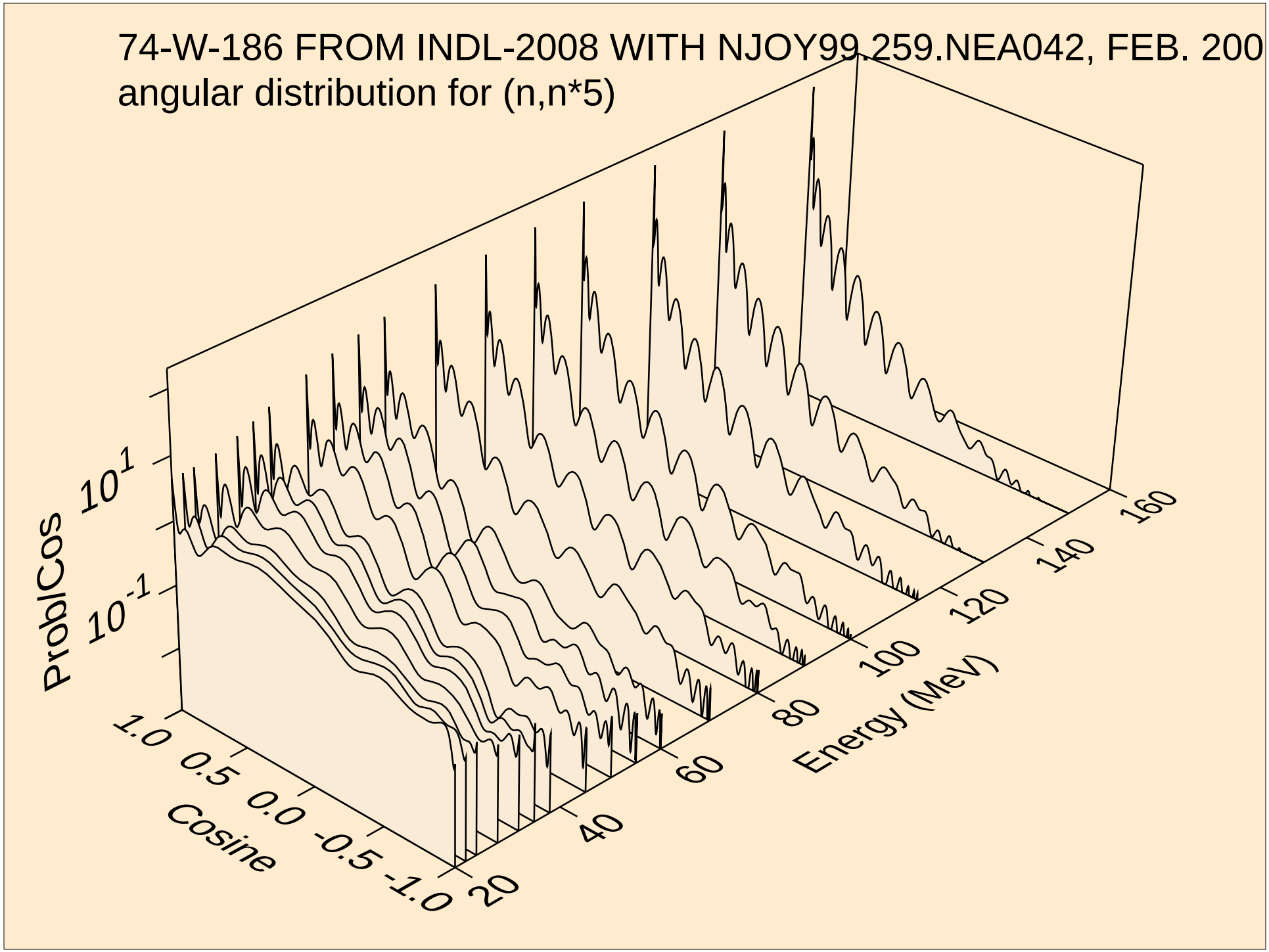

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*3)
ProbICos
10^0
10^-2
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

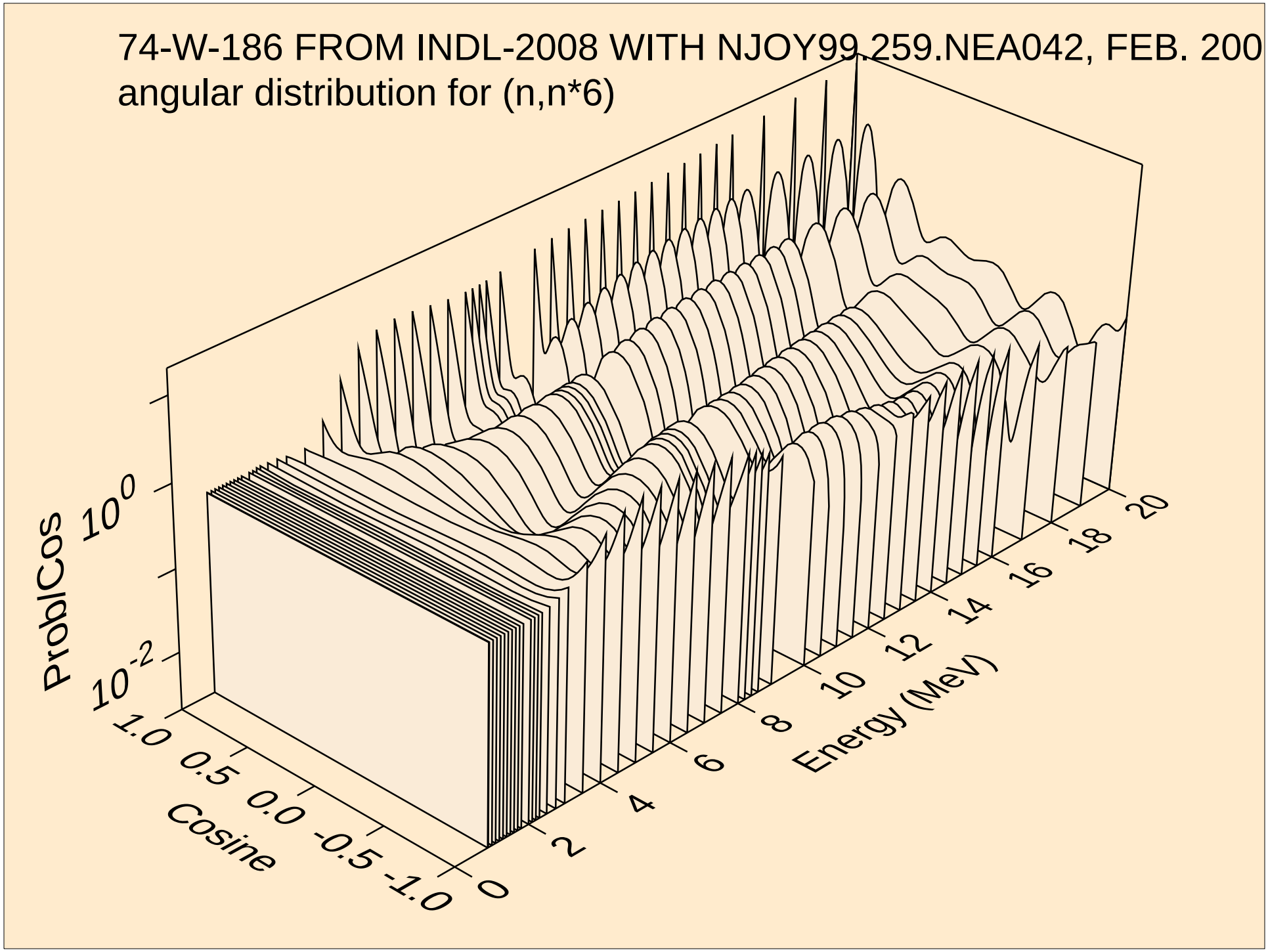

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*3)
ProbICos
10^{1}
10^{-1}
10^{-3}
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)

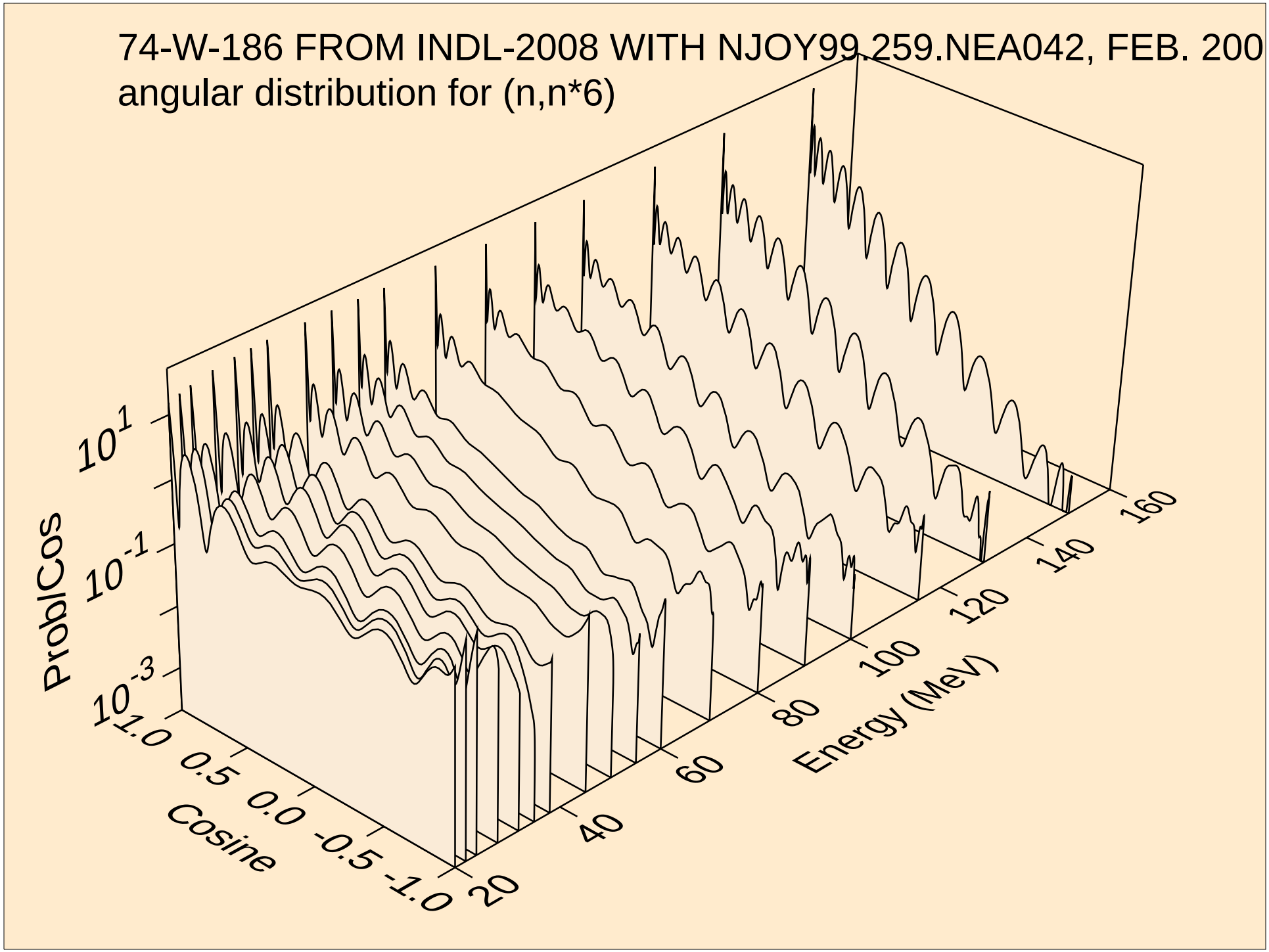

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*4)
ProbICos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

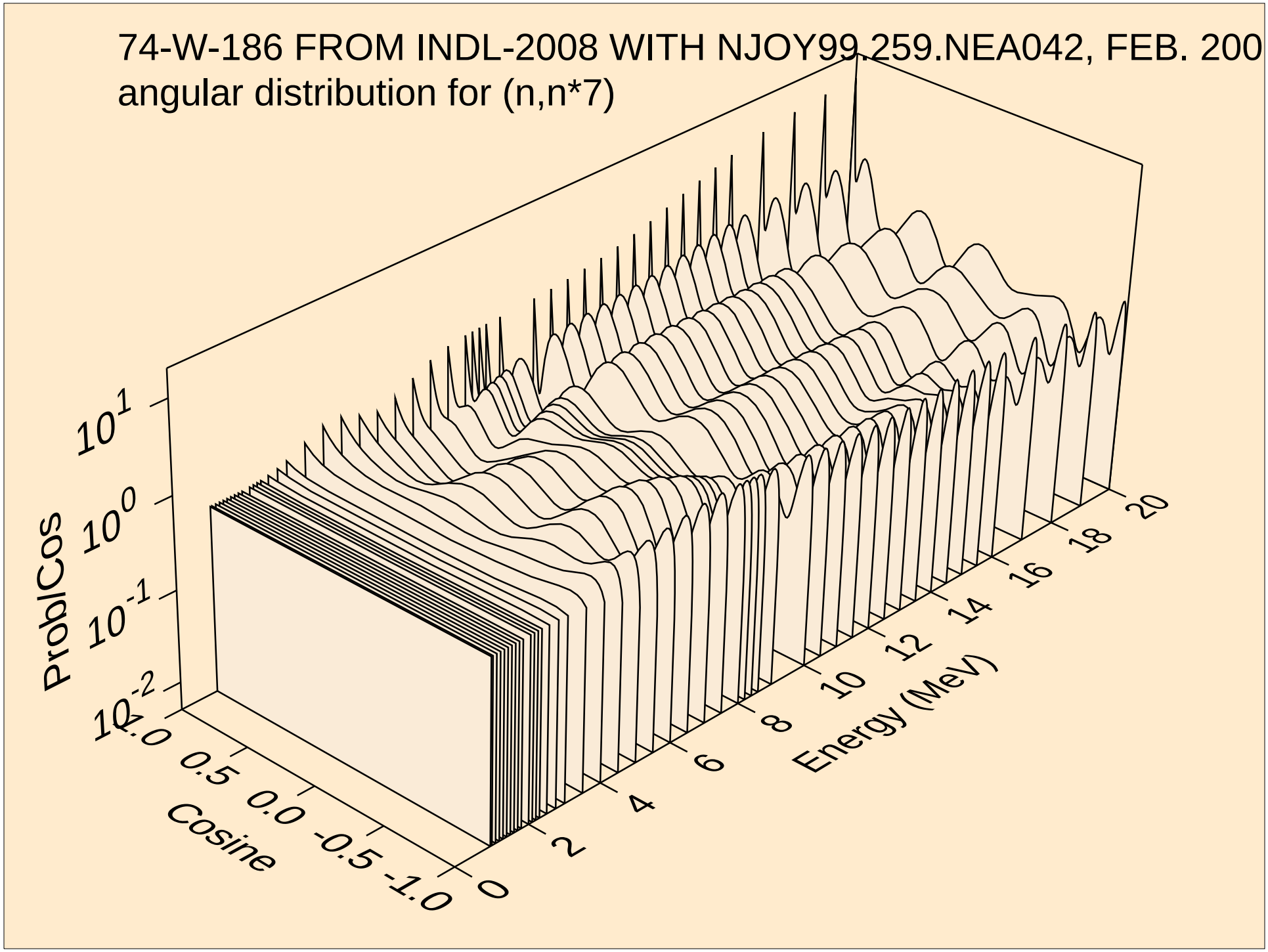

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*4)
ProbICos
10^1
10^-1
10^-3
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)

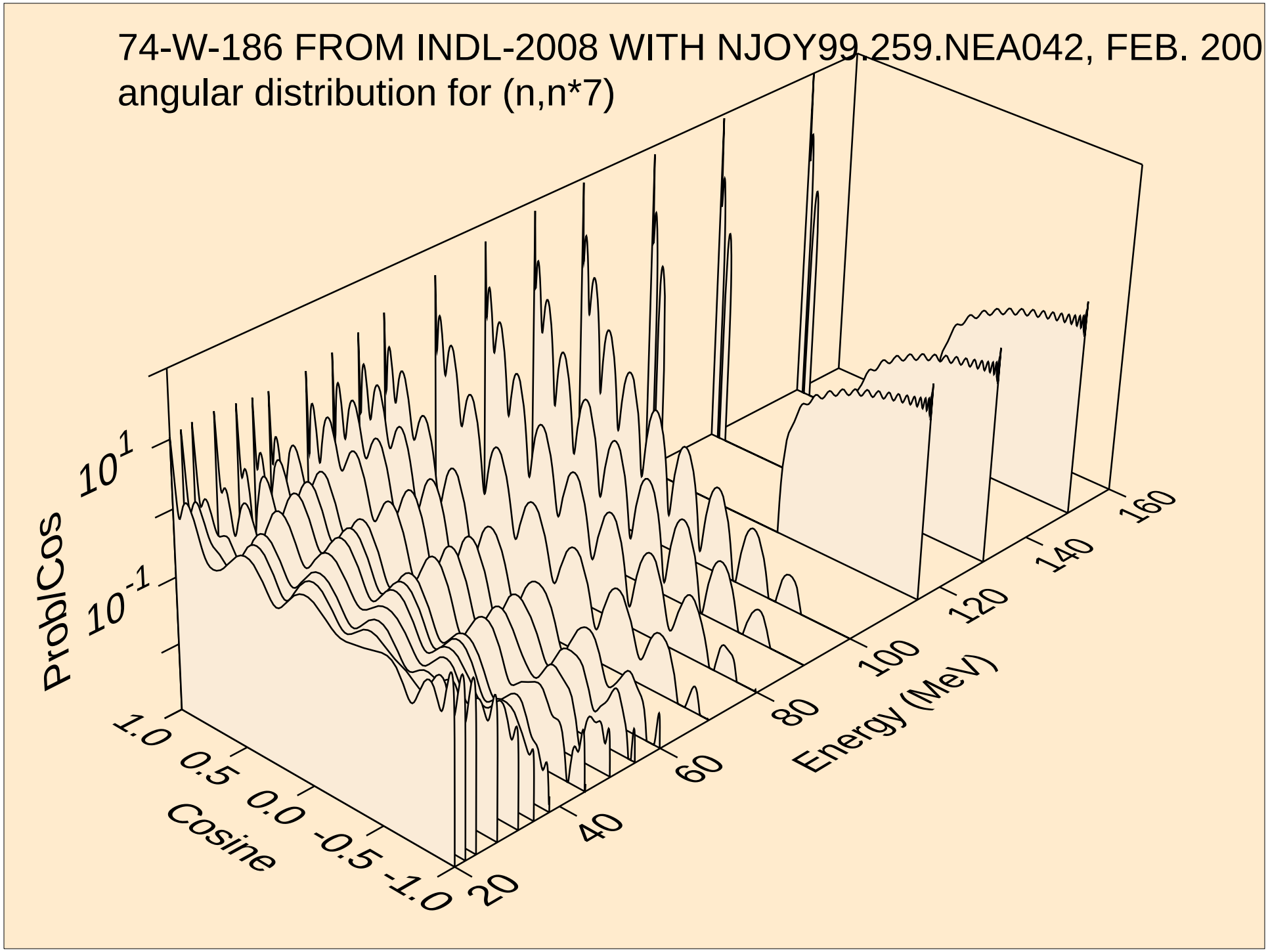

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*5)
ProbICos
10^0
10^-1
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

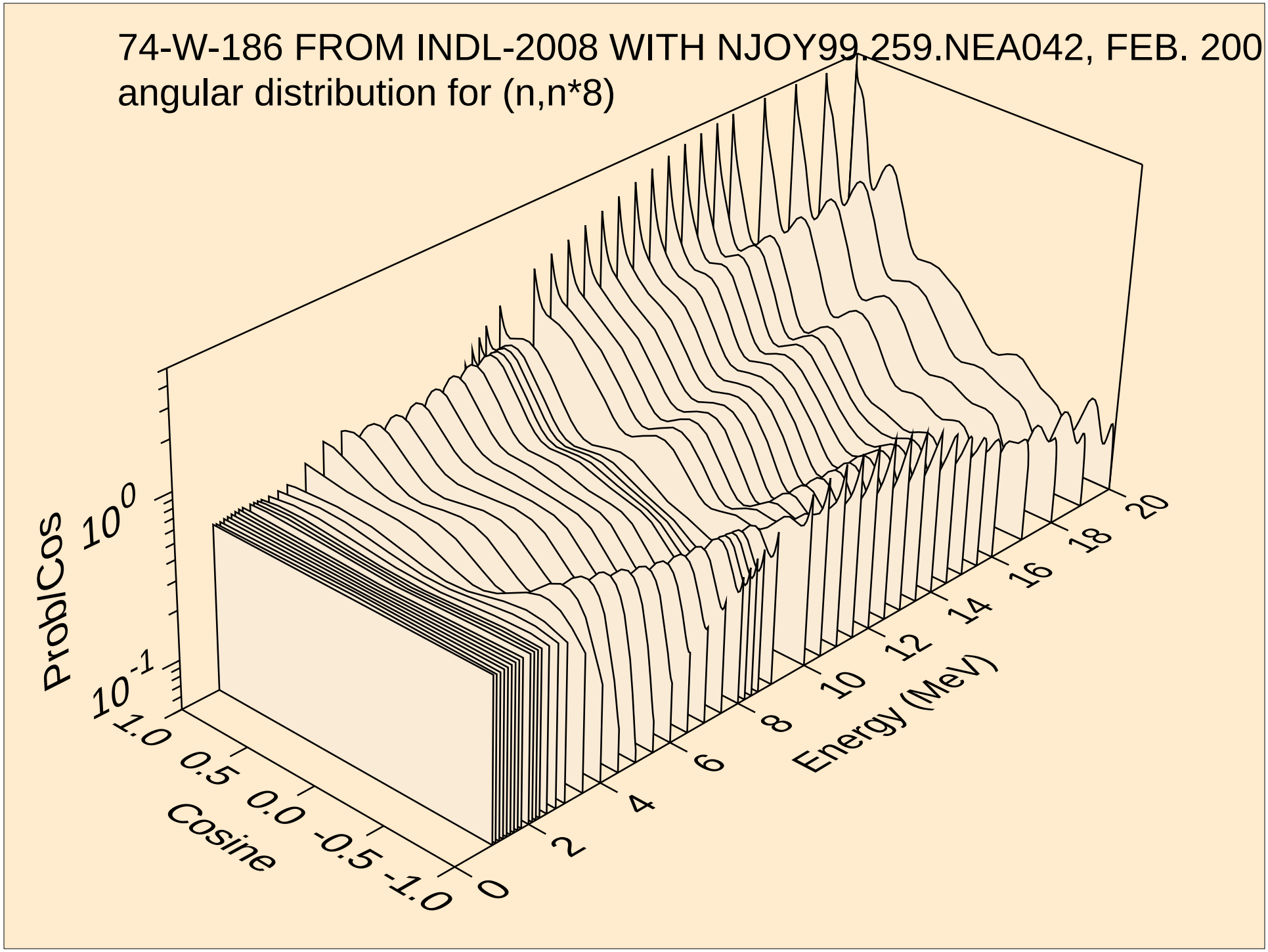

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*5)
ProbICos
10^1
10^-1
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)

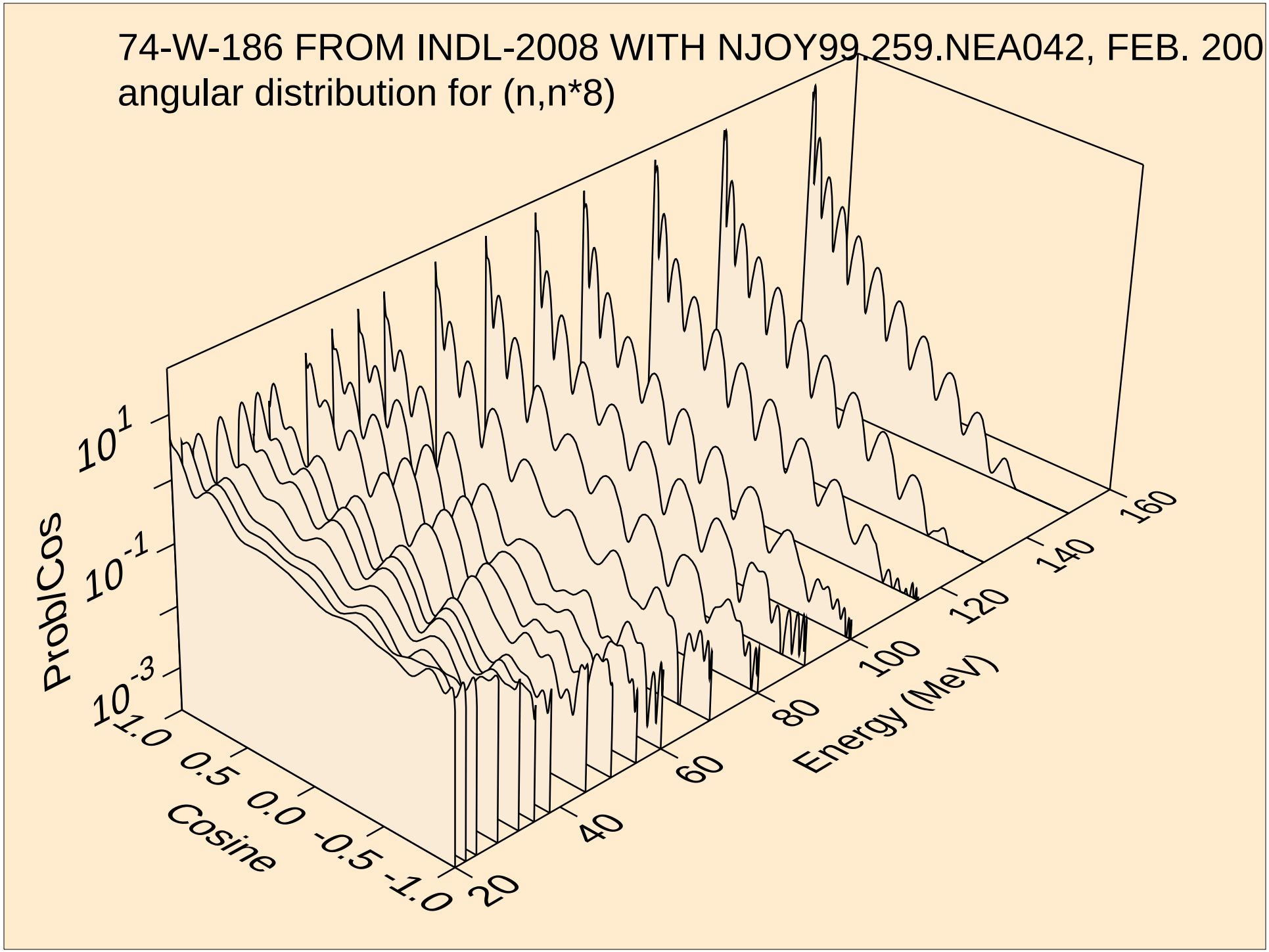

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*6)
ProbICos
10^0
10^-2
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

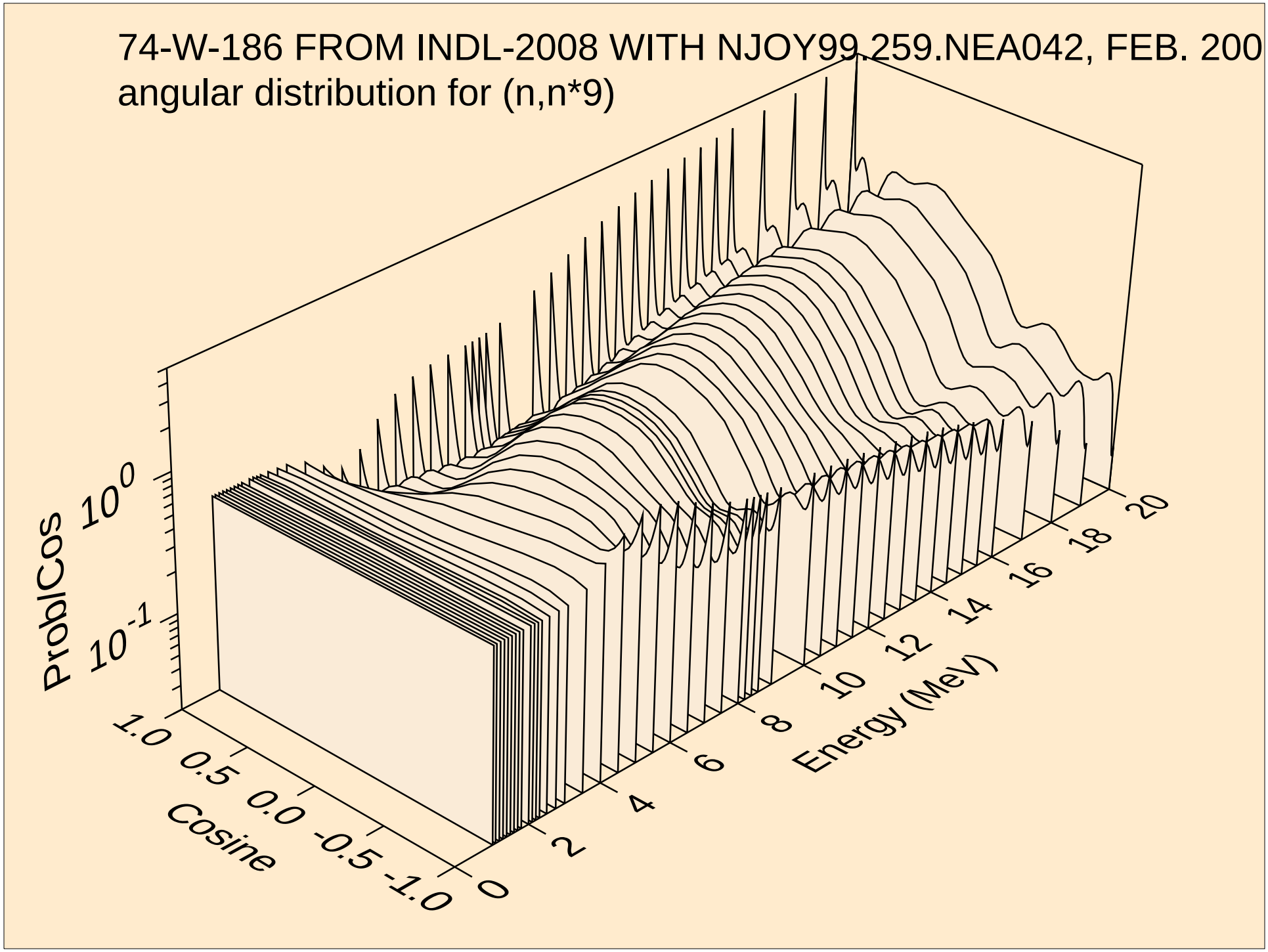

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*6)
ProbICos
10^1
10^-1
10^-3
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)

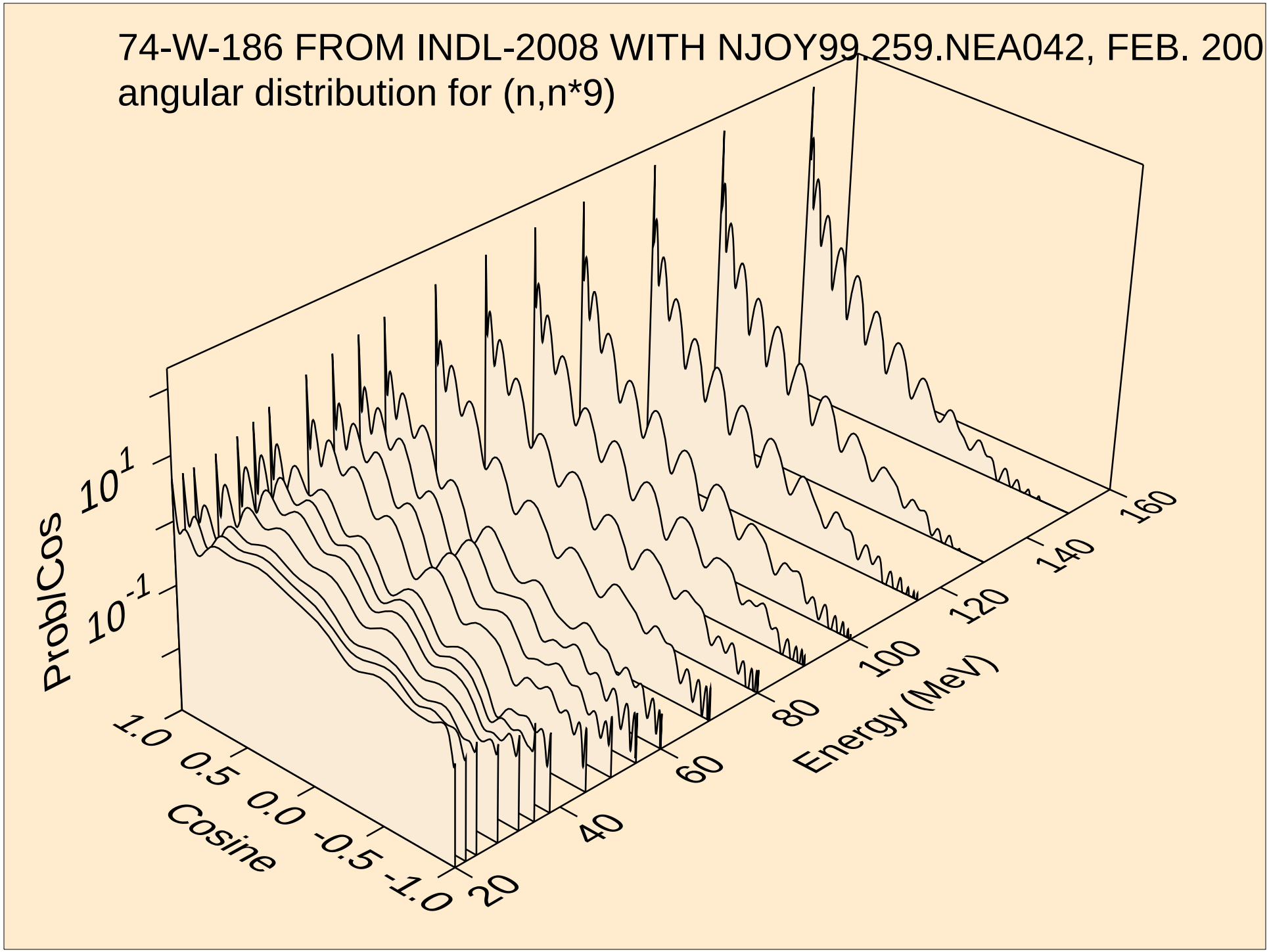

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*7)
ProbCos
10^{1}
10^{0}
10^{-1}
10^{-2}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

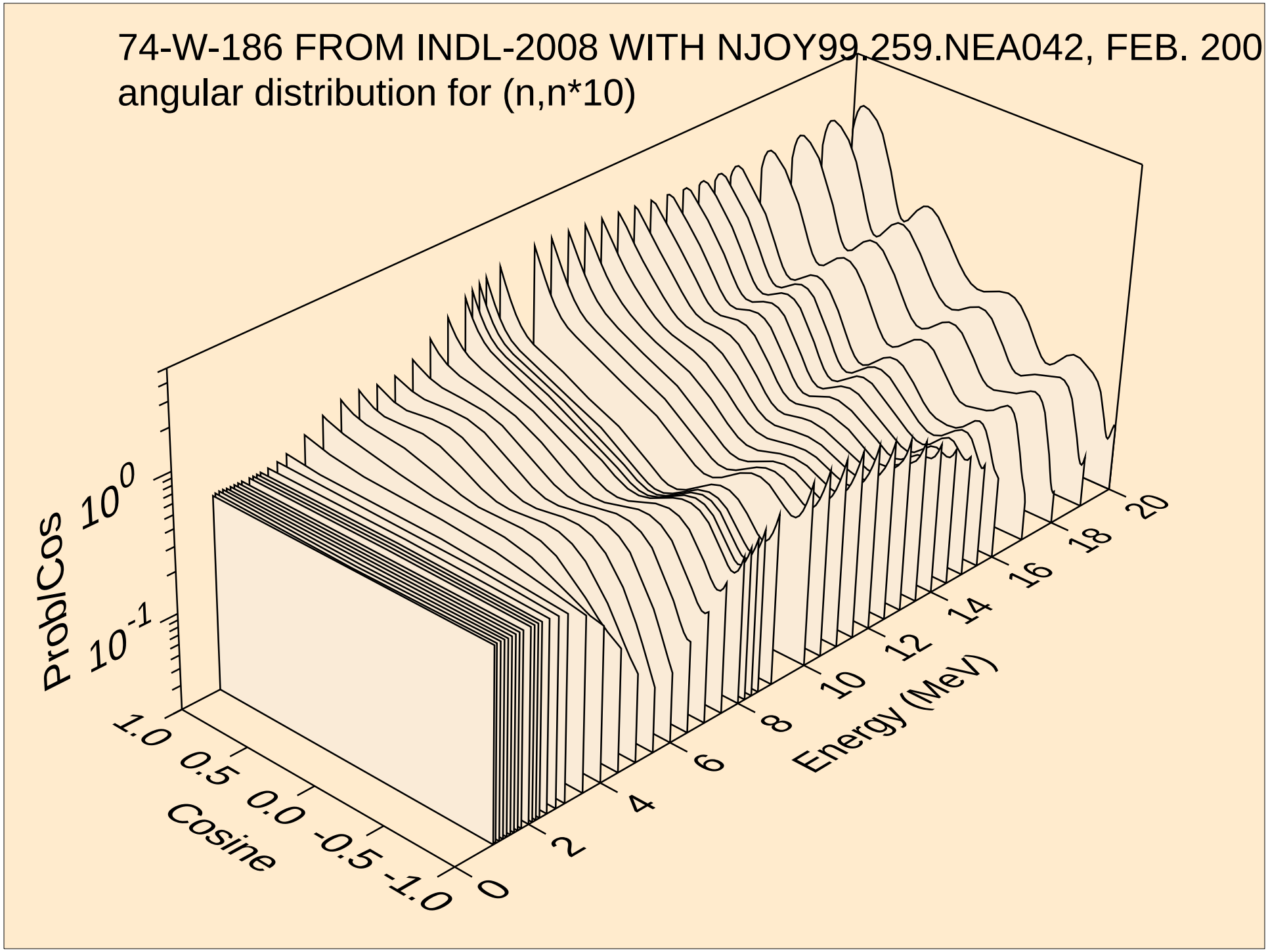

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*7)
ProbICos
10^1
10^-1
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)

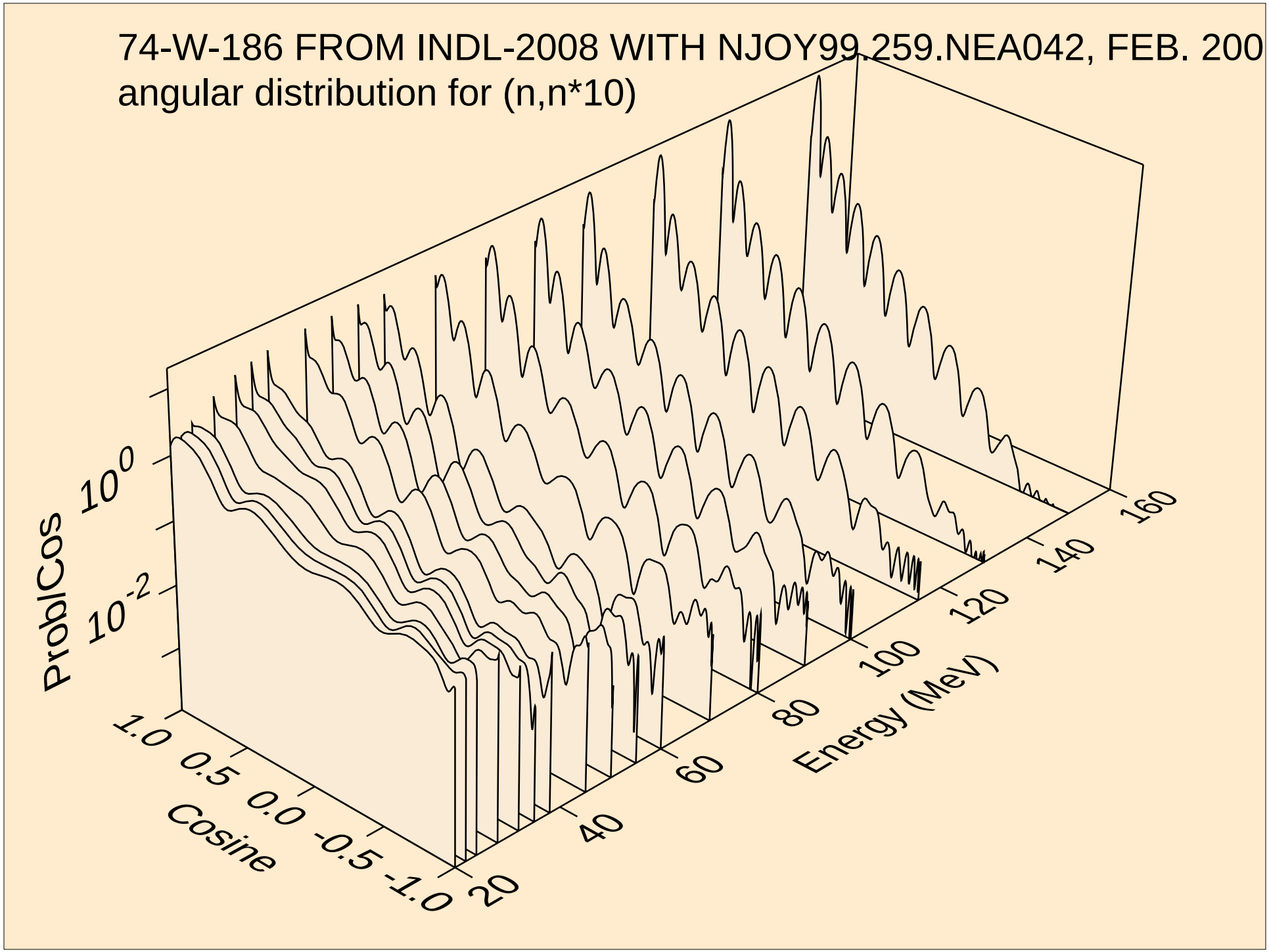

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*8)
ProbICos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

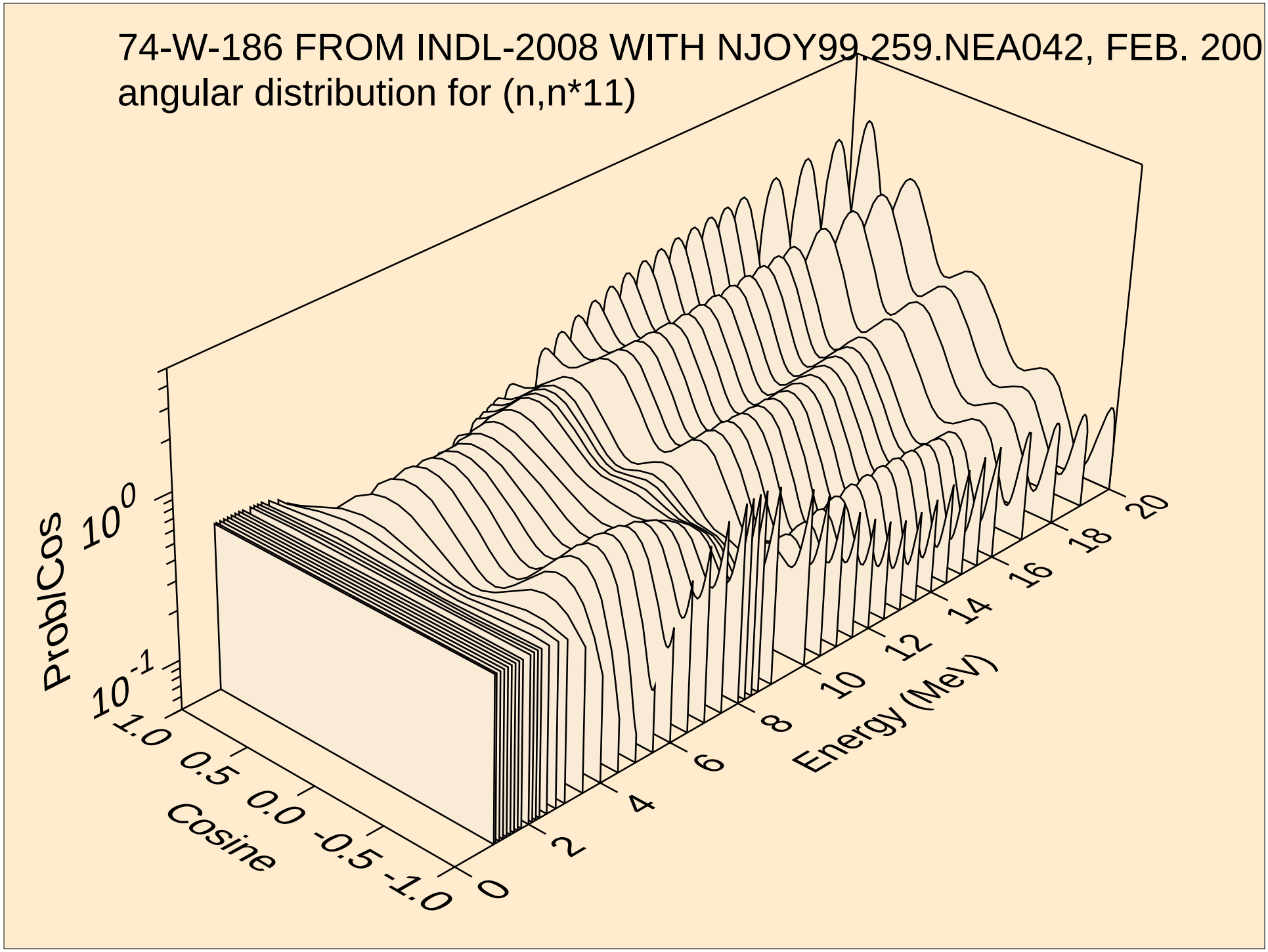

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*8)
ProbICos
10^1
10^-1
10^-3
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)

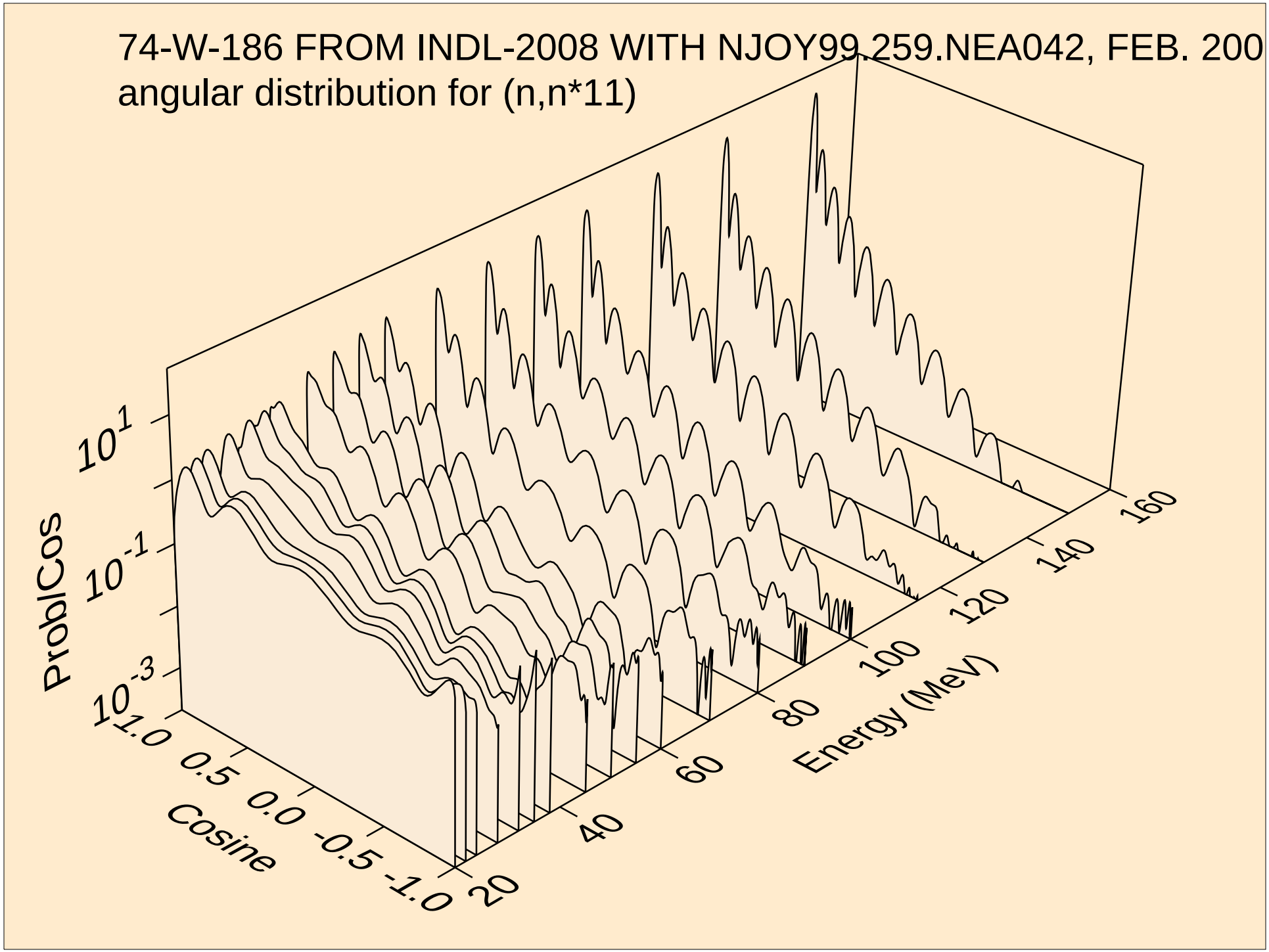

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*9)
ProbICos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

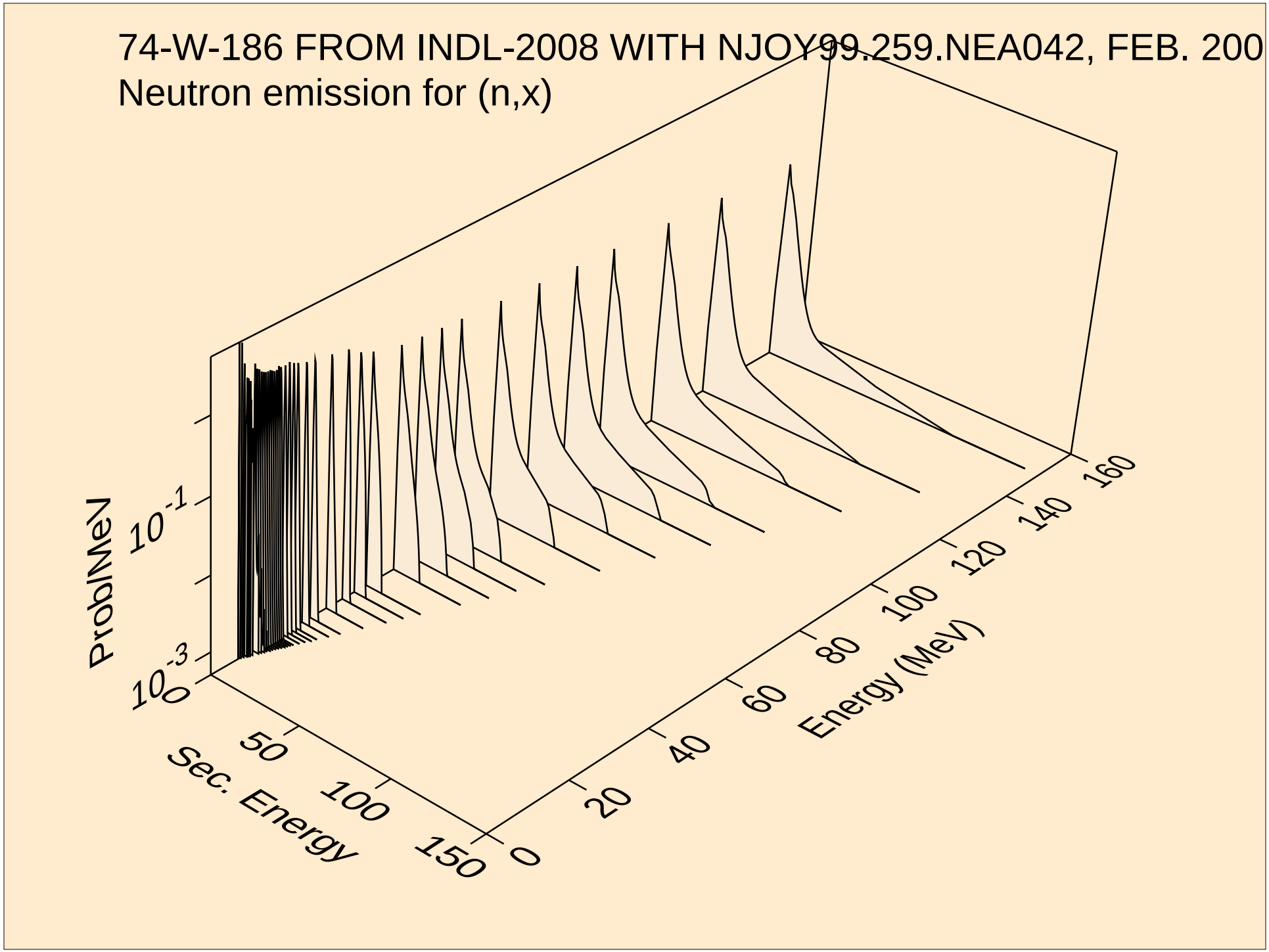

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*9)
ProbICos
10^1
10^-1
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)

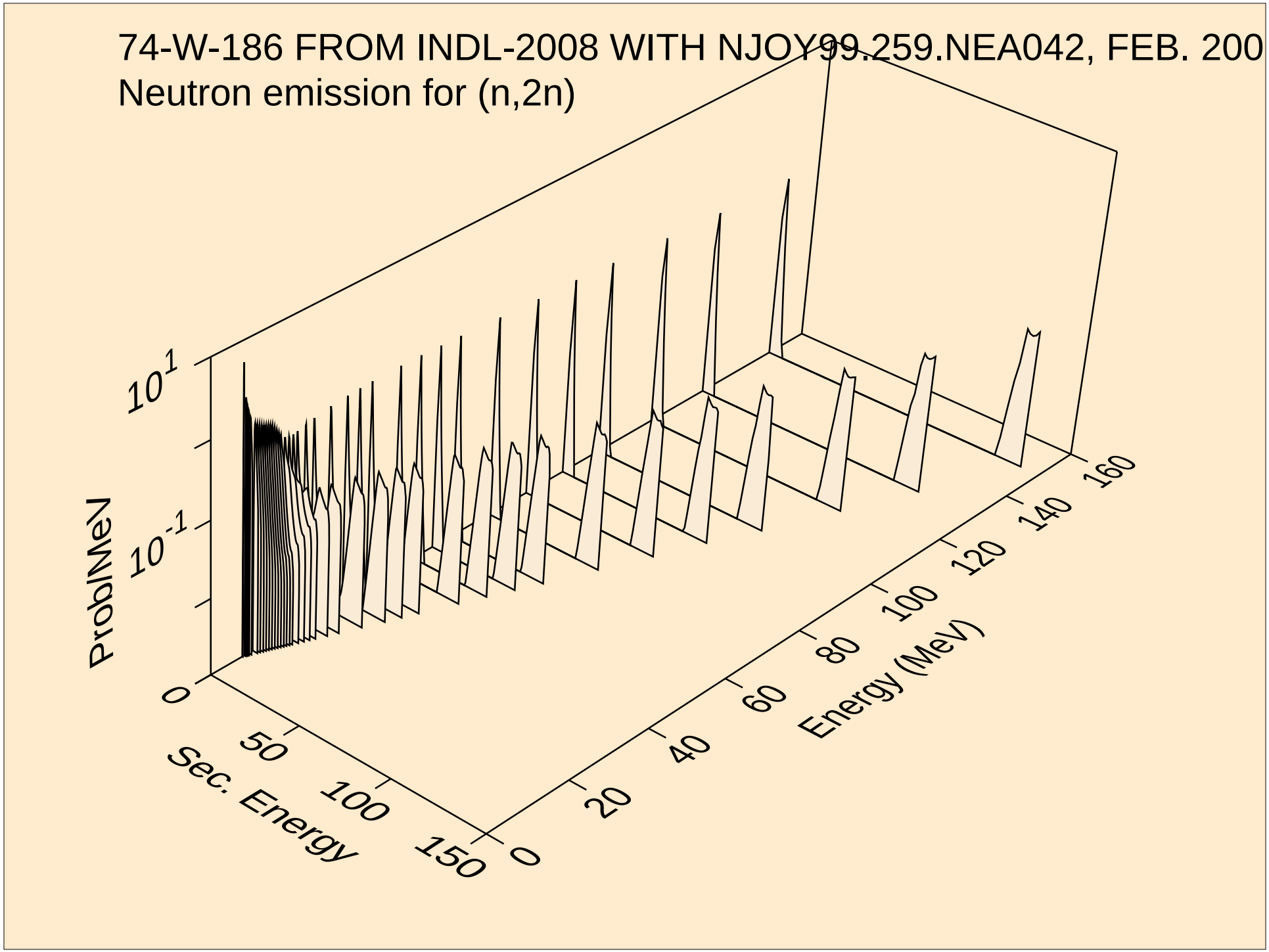

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*10)
ProbICos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

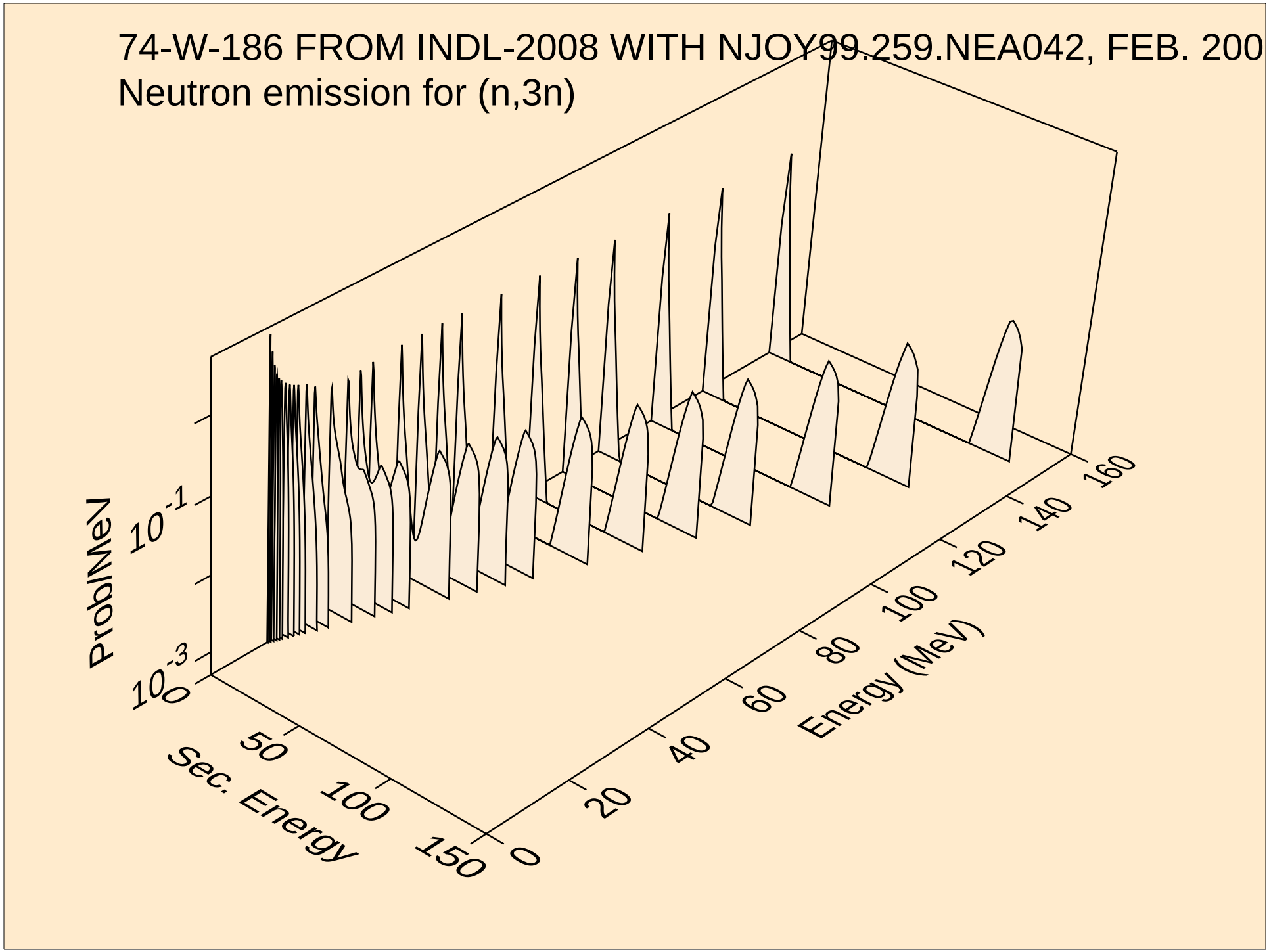

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*10)
ProbCos
10^{0}
10^{-2}
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)

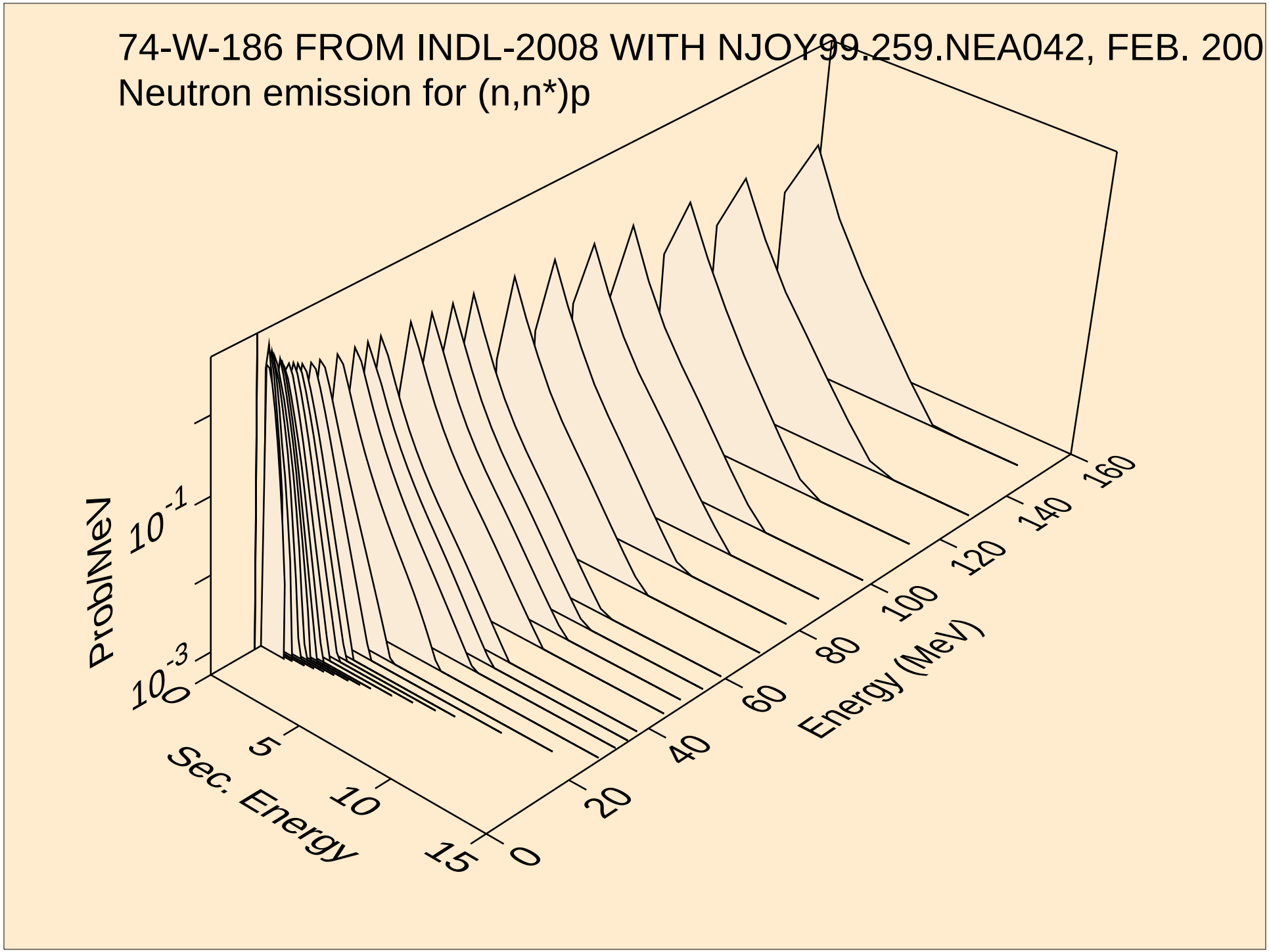

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*11)
ProbICos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

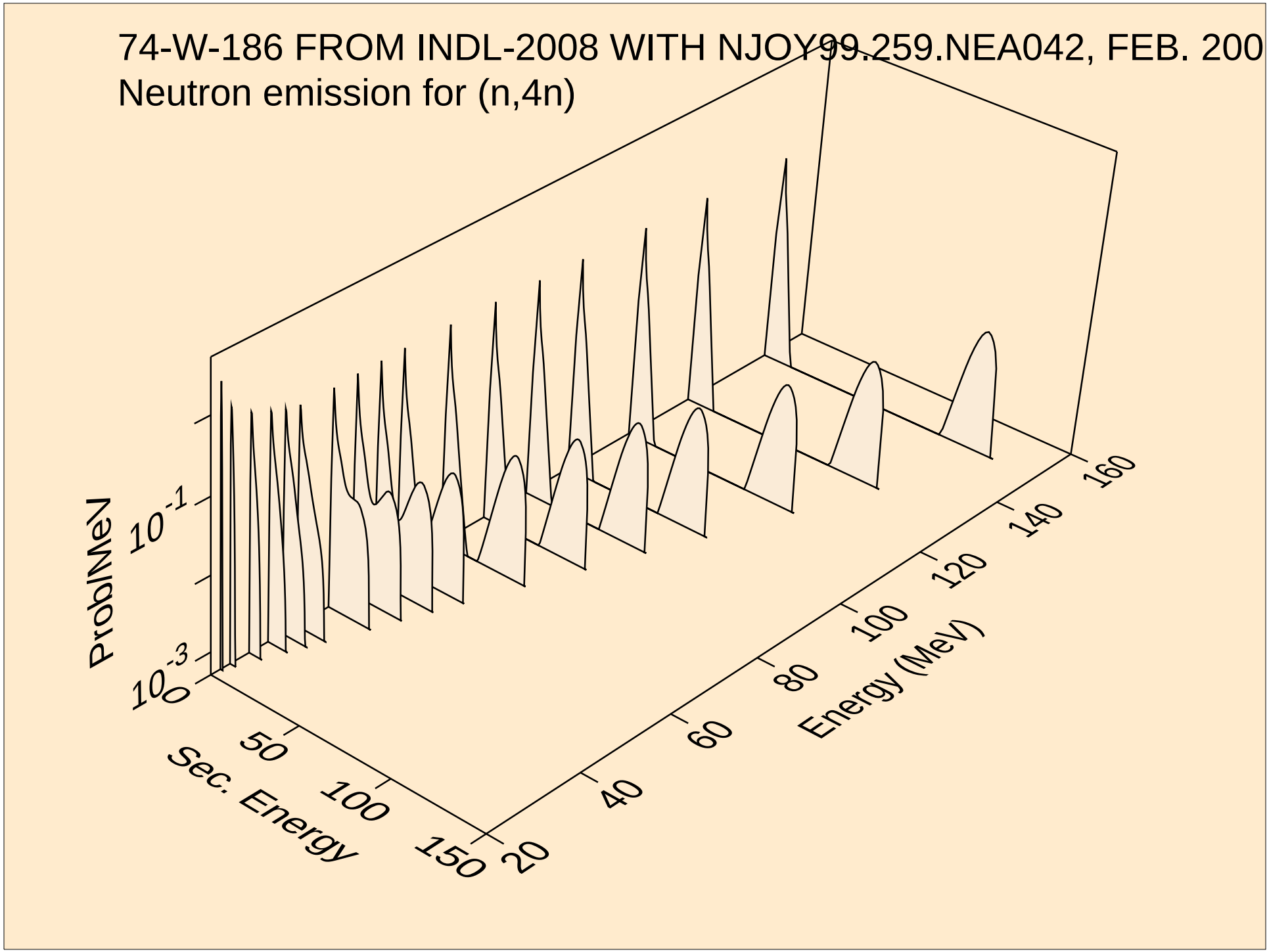

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,n*11)
Prob\Cos
10^1
10^-1
10^-3
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)

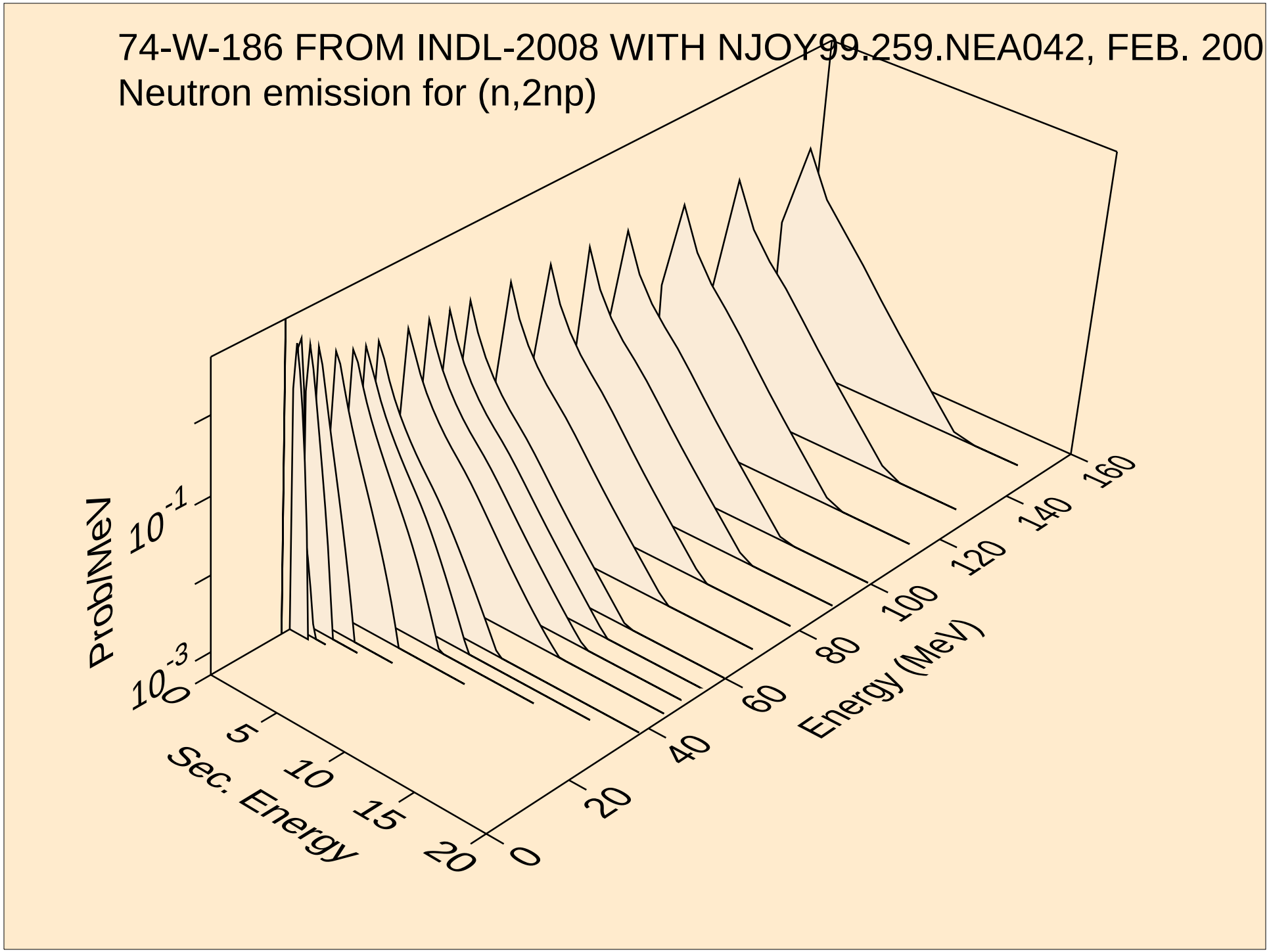

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Neutron emission for (n,x)
Prob/MeV
10-1
10-3
0
50
100
150
Sec. Energy
0
20
40
60
80
100
120
140
160
Energy (MeV)

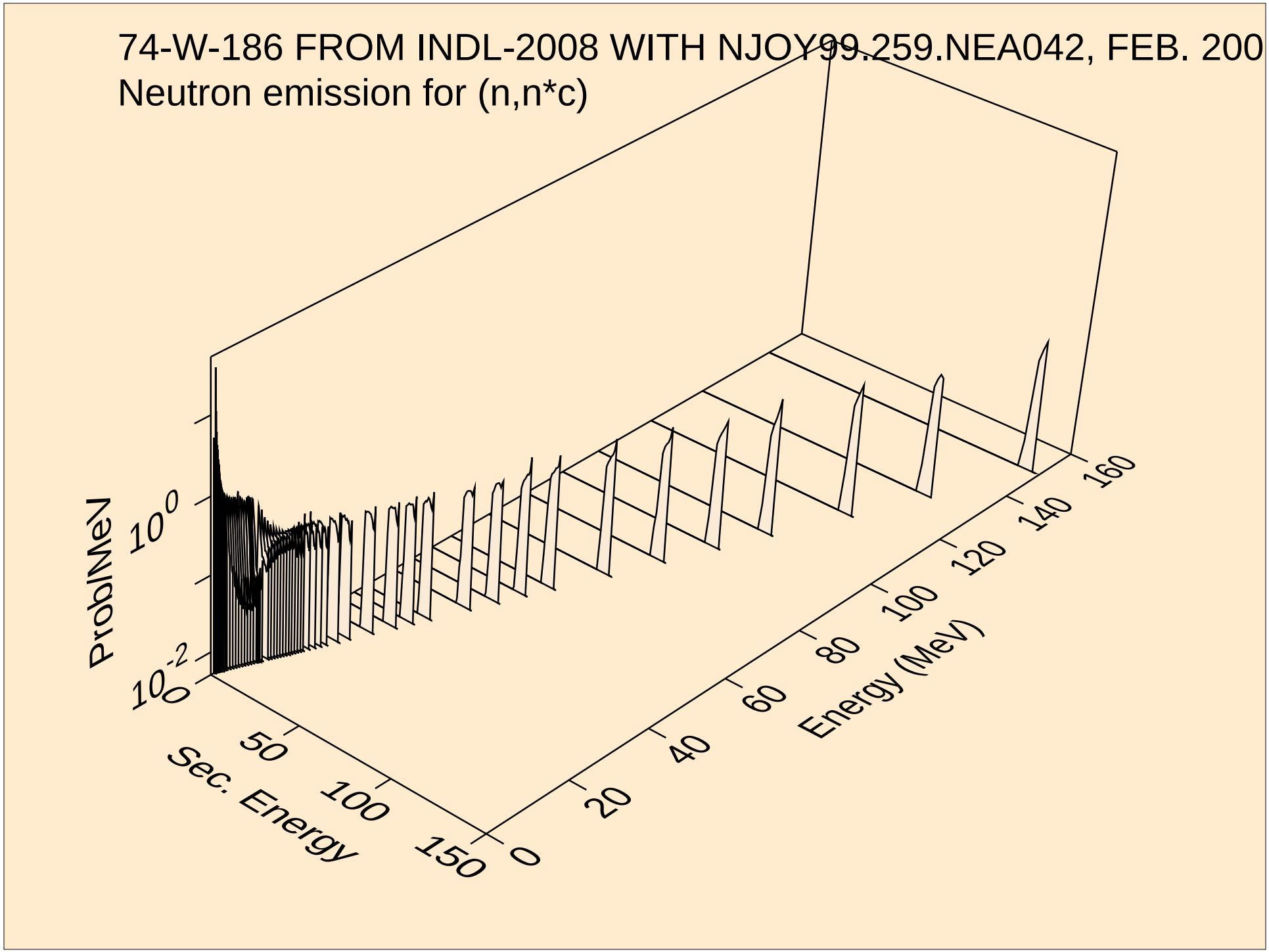

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Neutron emission for (n,2n)
Prob/MeV
10^{1}
10^{-1}
0
50
100
150
Sec. Energy
0
20
40
60
80
100
120
140
160
Energy (MeV)

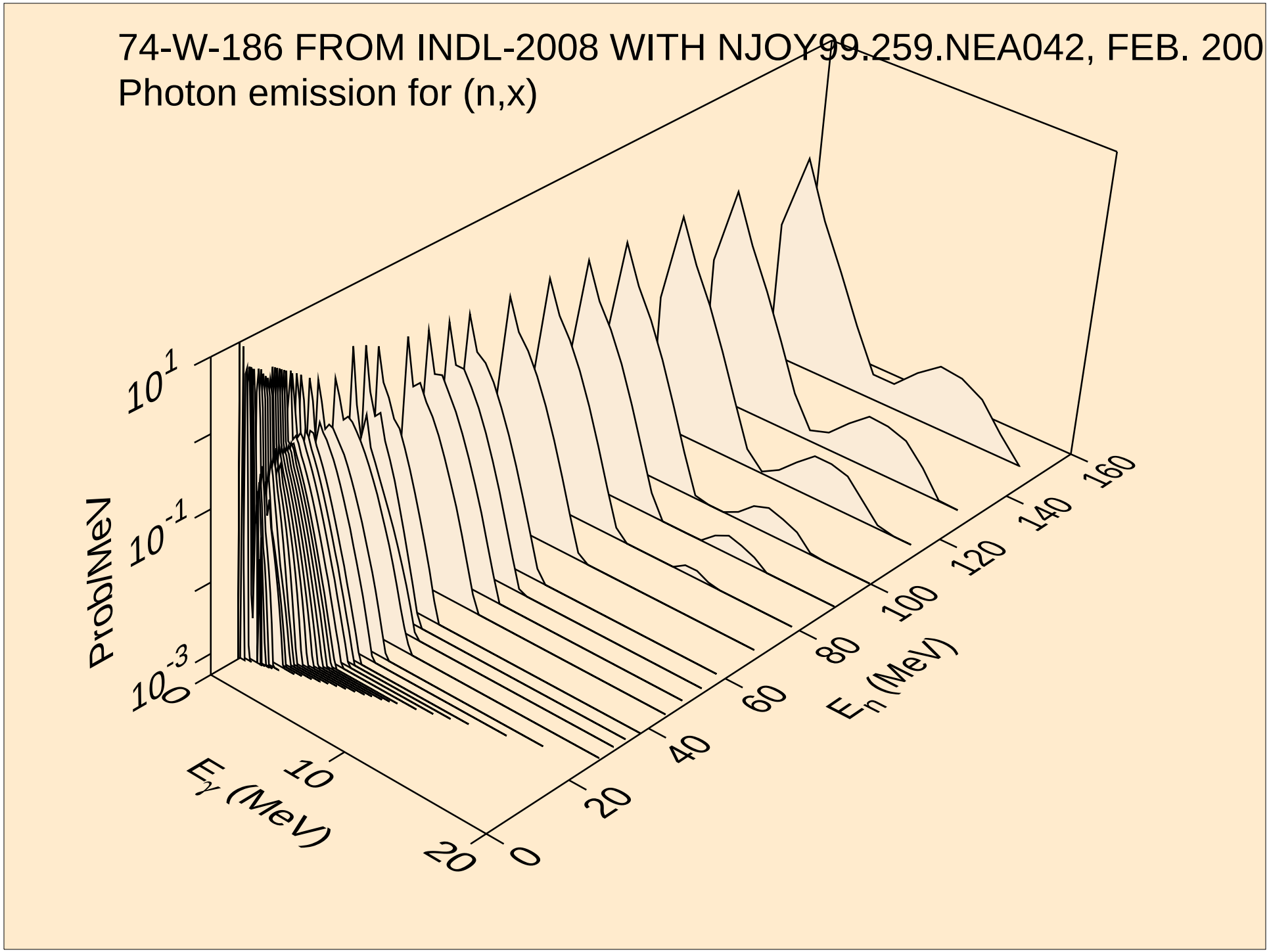

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Neutron emission for (n,3n)
Prob/MeV
10-1
10-3
0
50
100
150
Sec. Energy
0
20
40
60
80
100
120
140
160
Energy (MeV)

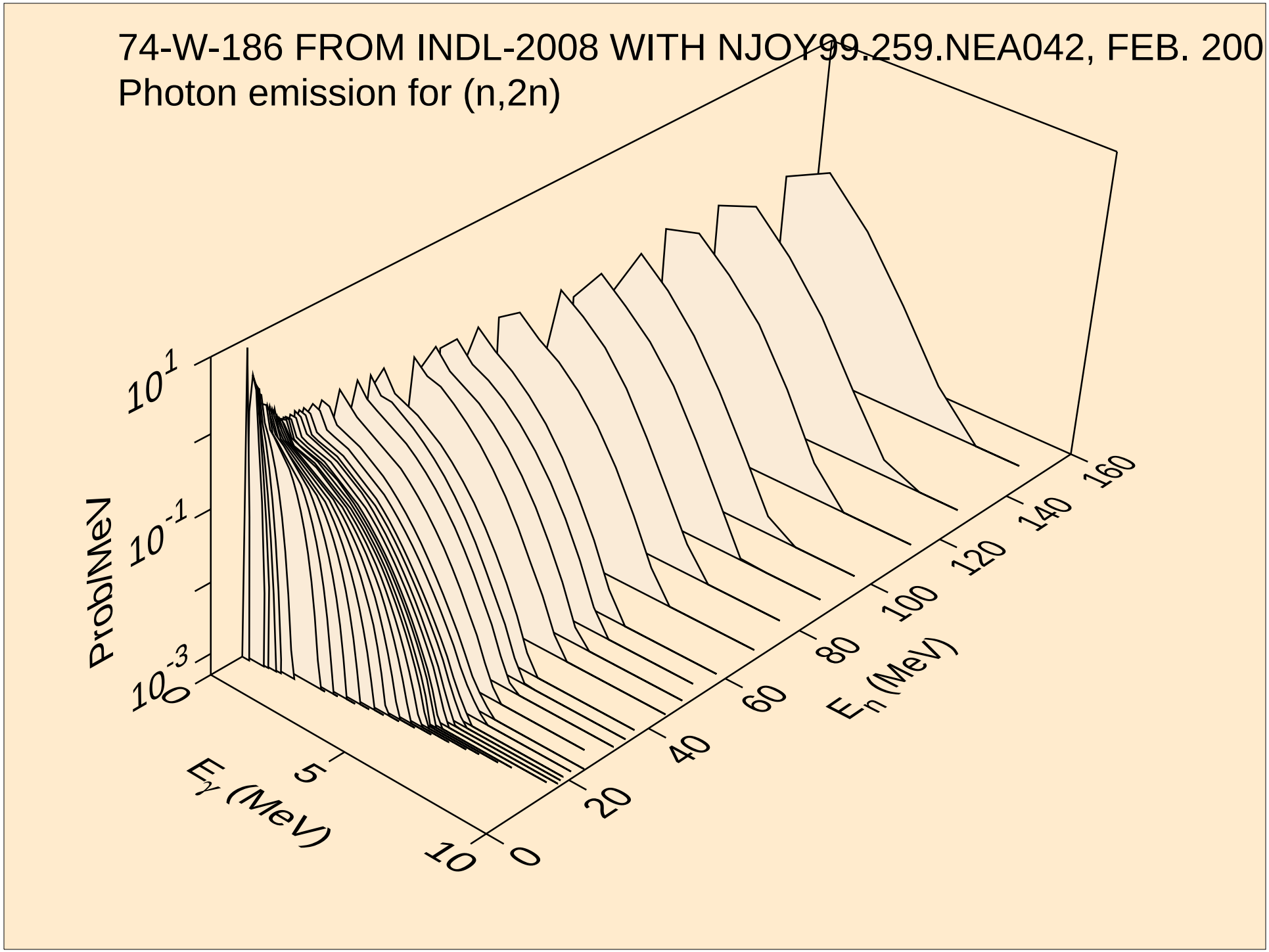

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Neutron emission for (n,n*)p
Prob/MeV
10-1
10-3
0
5
10
15
Sec. Energy
0
20
40
60
80
100
120
140
160
Energy (MeV)

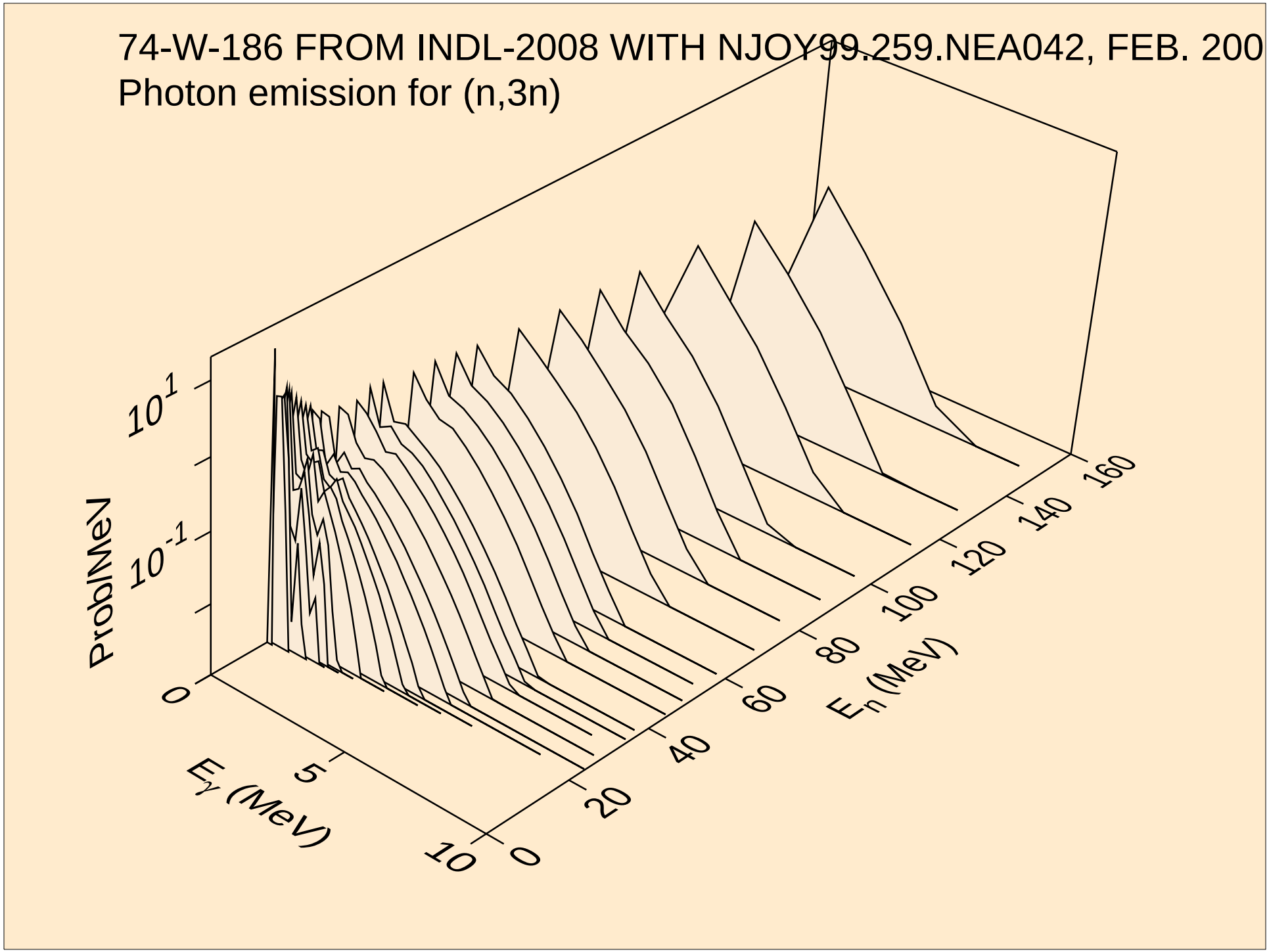

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Neutron emission for (n,4n)
Prob/MeV
10-1
10-3
0
50
100
150
Sec. Energy
20
40
60
80
100
120
140
160
Energy (MeV)

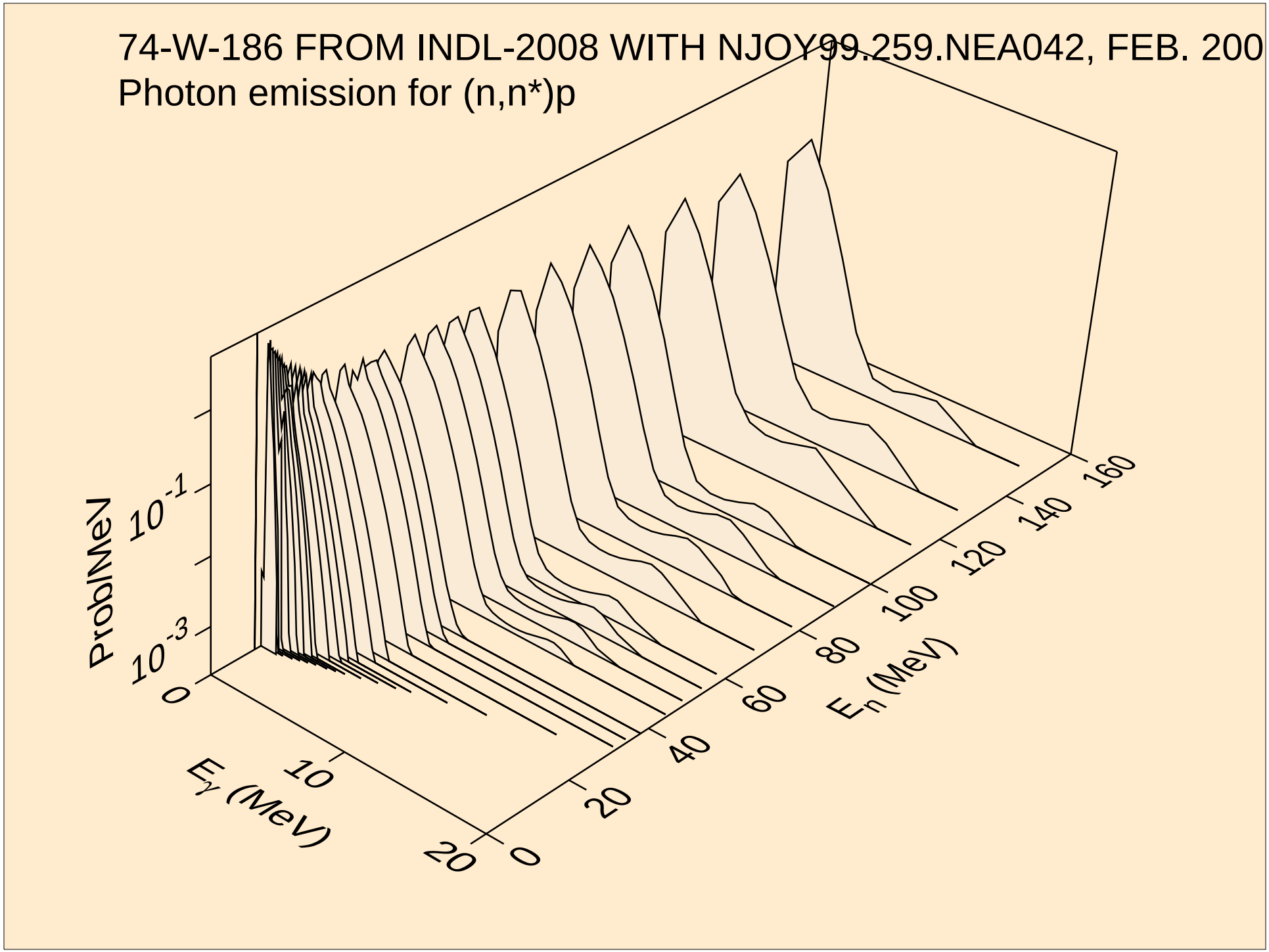

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Neutron emission for (n,2np)
Prob/MeV
10-1
10-3
0
5
10
15
20
Sec. Energy
0
20
40
60
80
100
120
140
160
Energy (MeV)

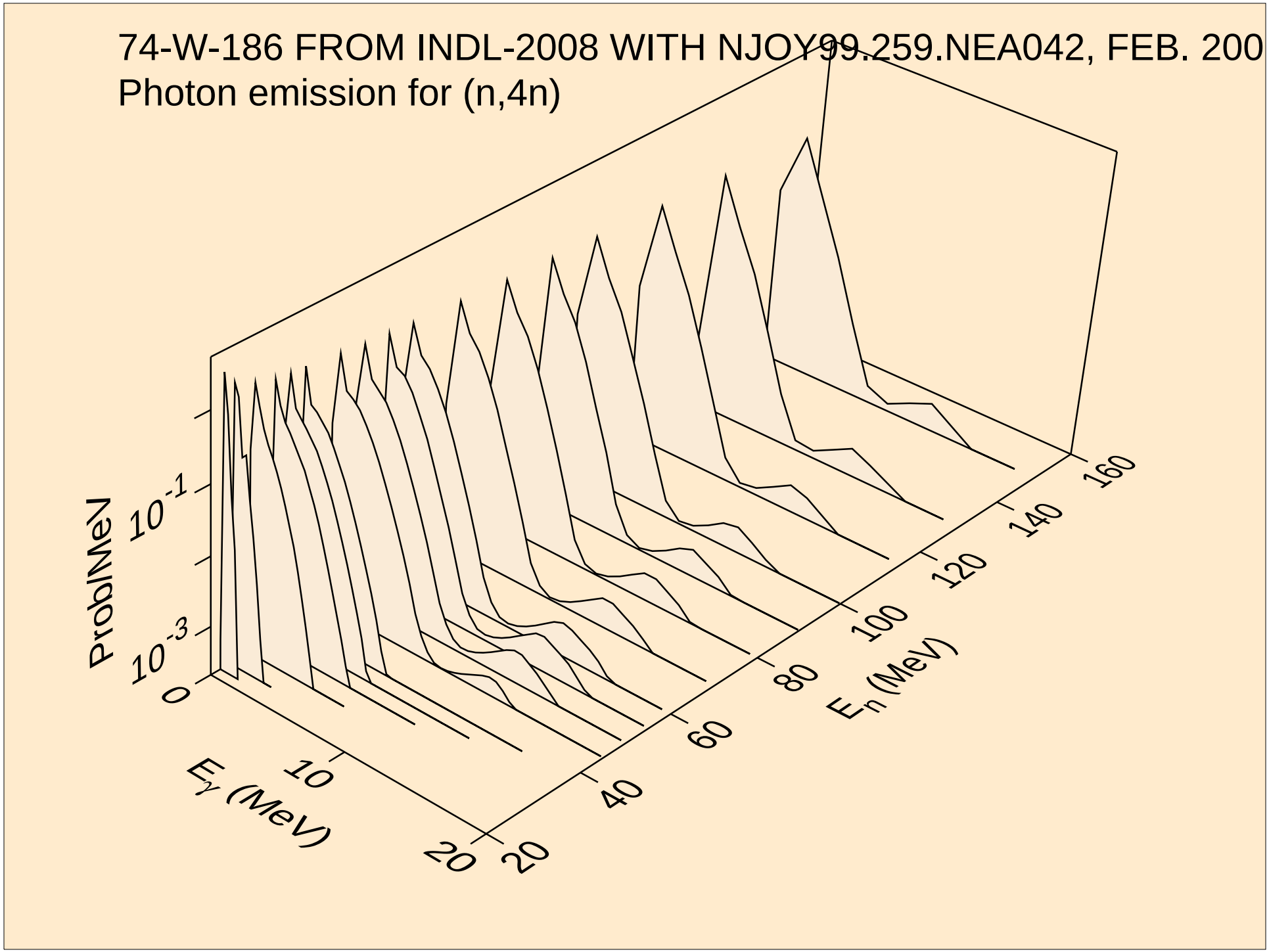

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Neutron emission for (n,n*c)
Prob/MeV
10^0
10^-2
0
50
100
150
Sec. Energy
0
20
40
60
80
100
120
140
160
Energy (MeV)

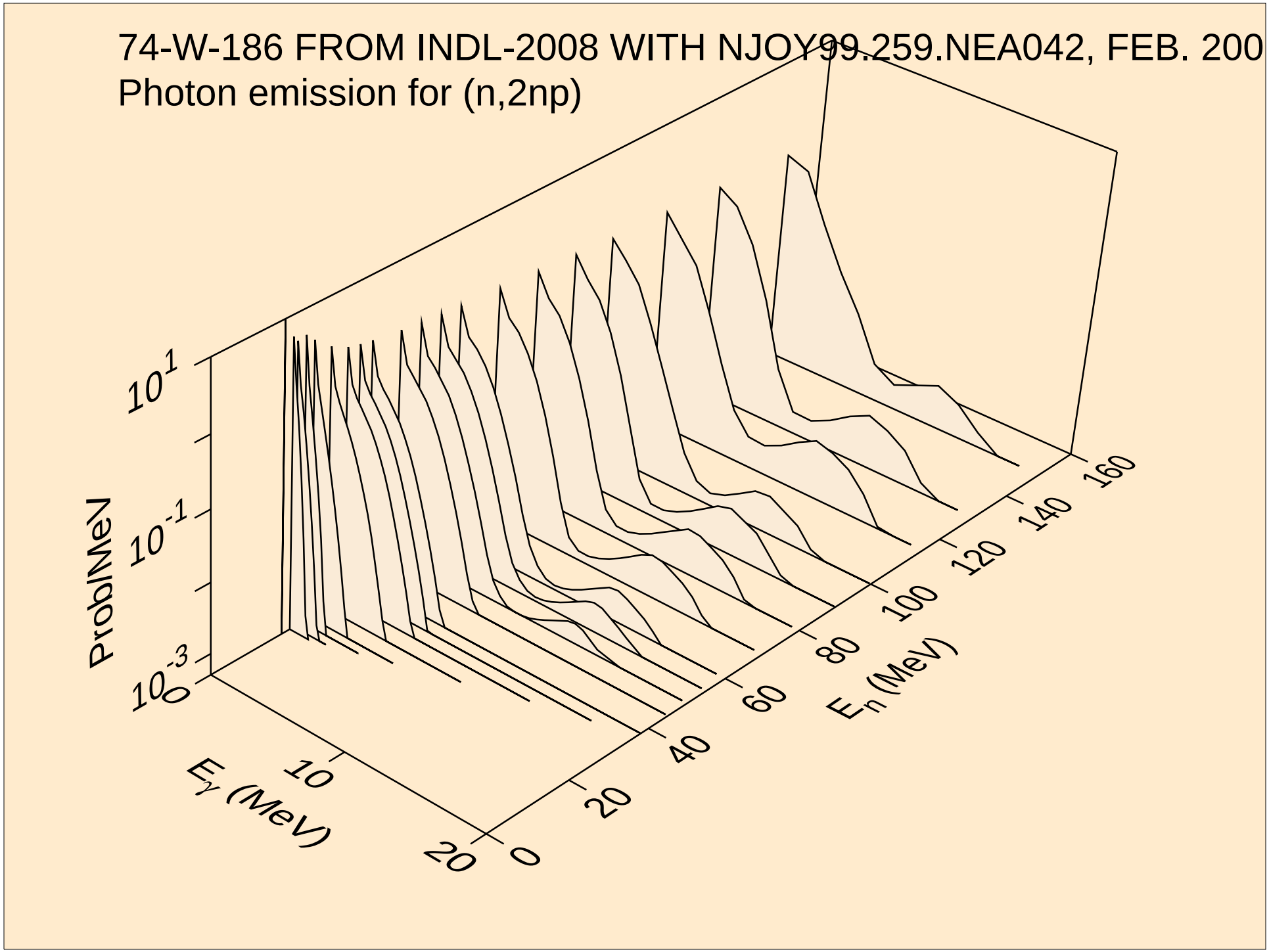

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Photon emission for (n,x)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
10
20
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

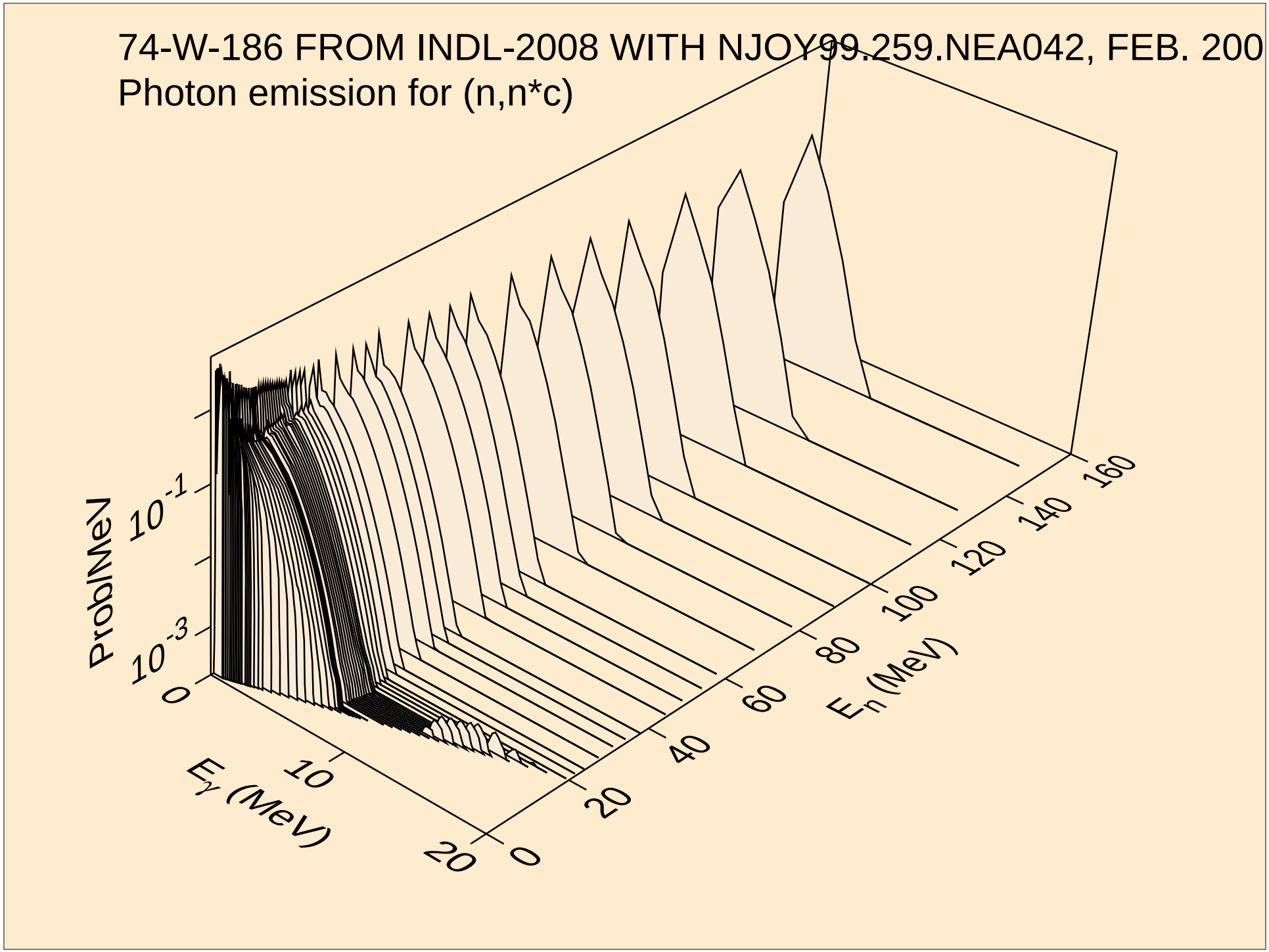

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Photon emission for (n,2n)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
5
10
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

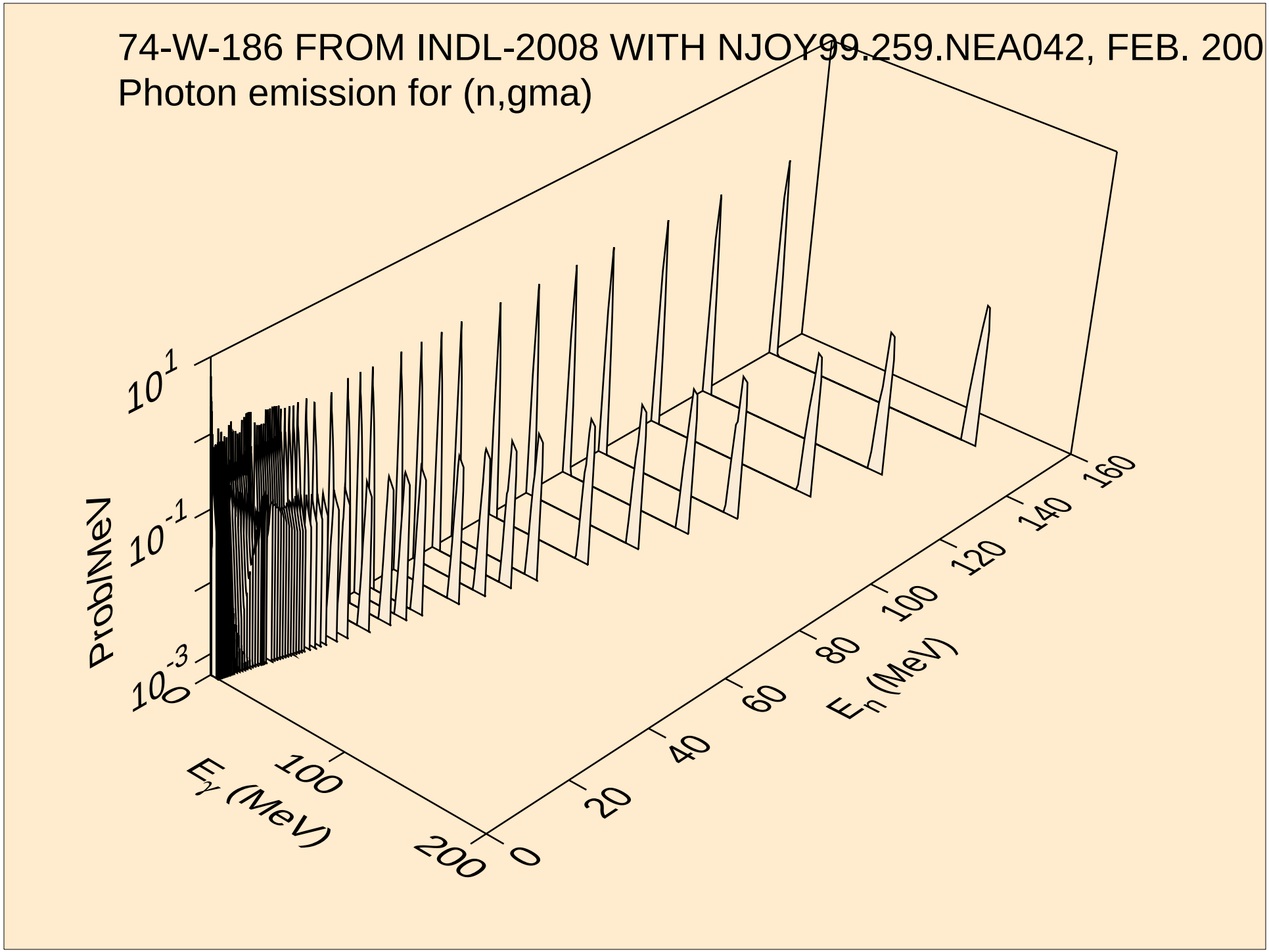

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Photon emission for (n,3n)
Prob/MeV
10^{1}
10^{-1}
0
5
10
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

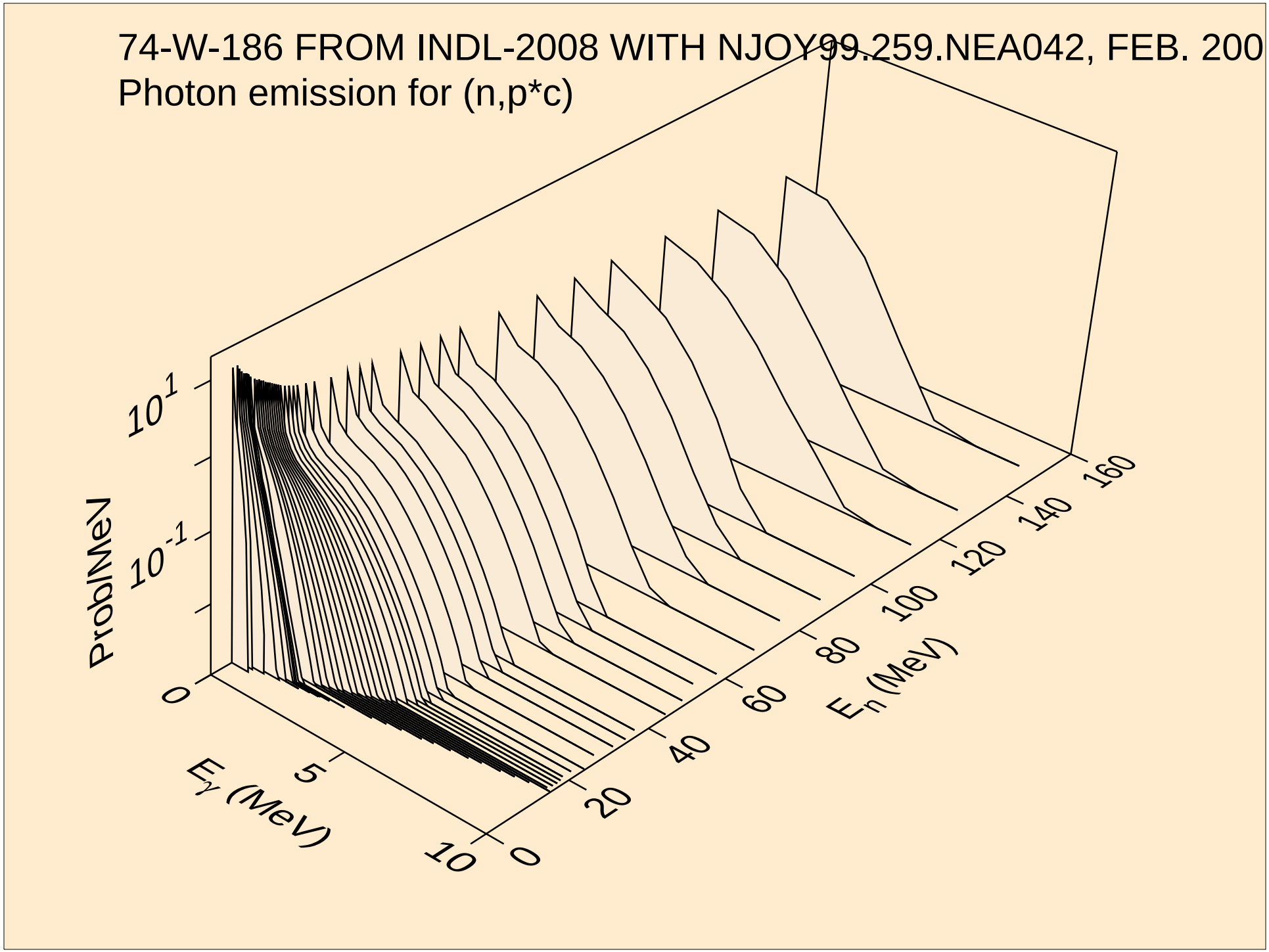

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Photon emission for (n,n*)p
Prob/MeV
10-1
10-3
0
Eγ (MeV)
10
20
0
20
40
60
80
100
120
140
160
En (MeV)

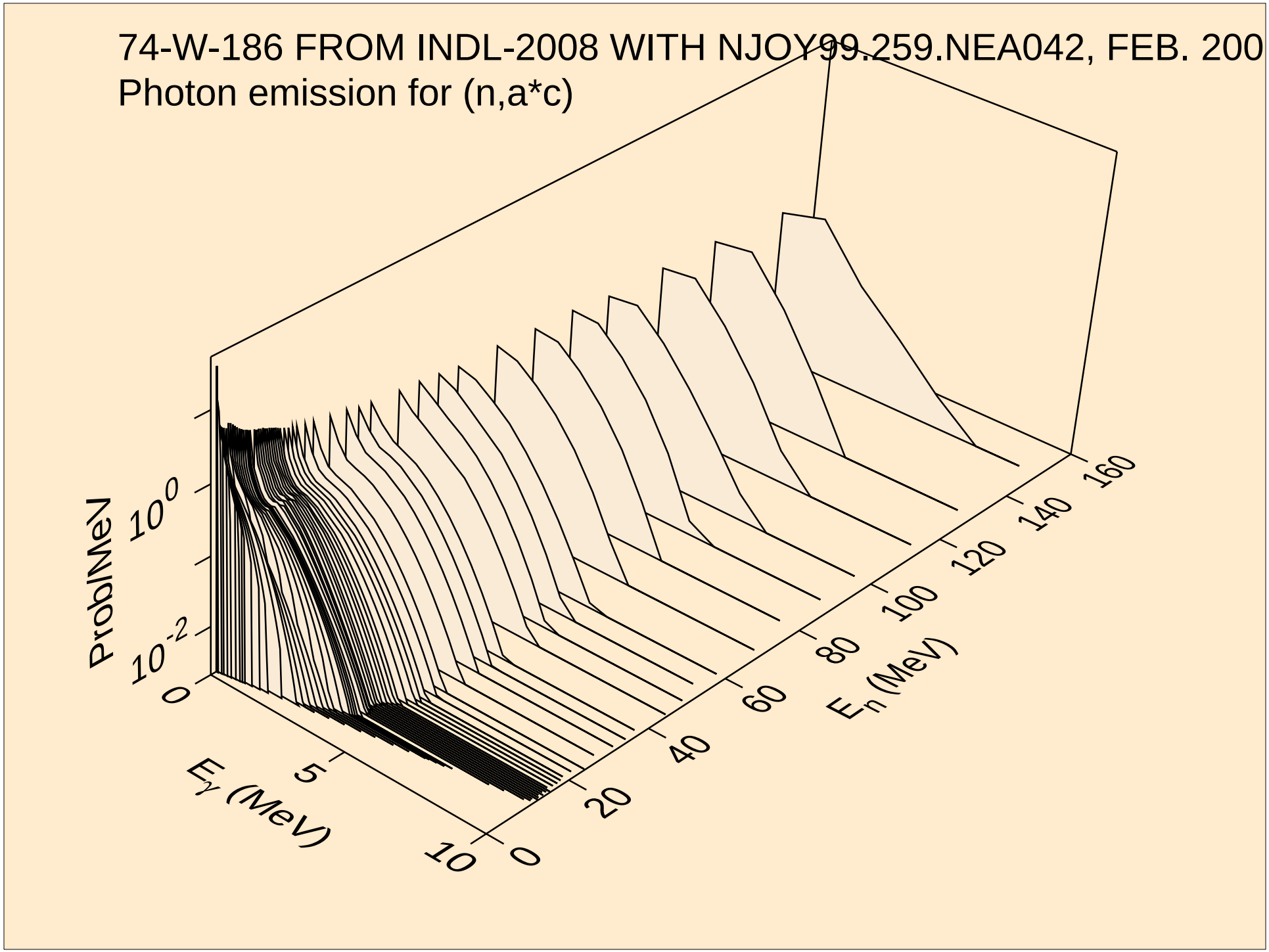

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Photon emission for (n,4n)
Prob/MeV
10-1
10-3
0
Eγ (MeV)
10
20
20
40
60
80
100
120
140
160
En (MeV)

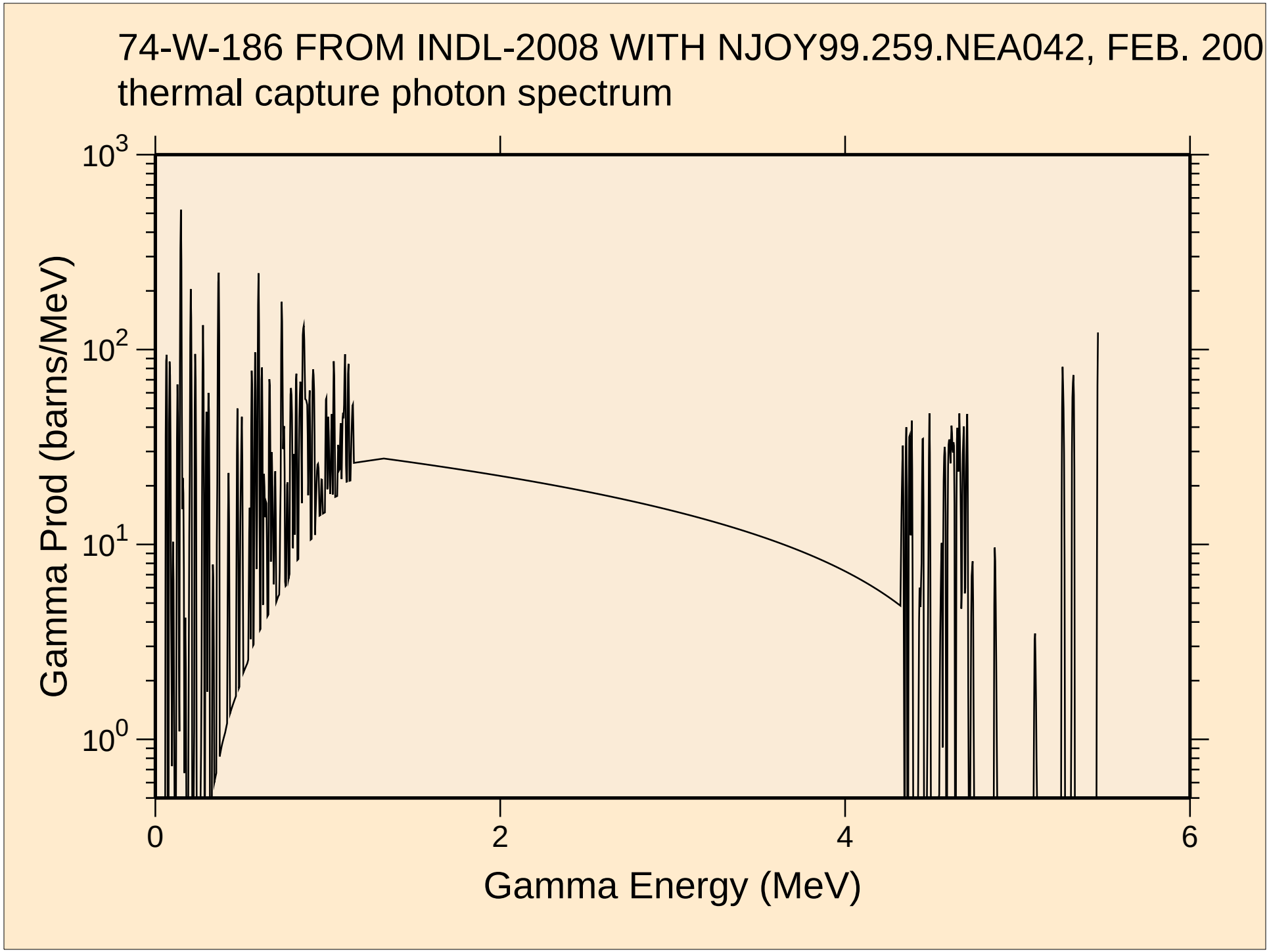

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Photon emission for (n,2np)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
E_γ (MeV)
0
10
20
E_n (MeV)
0
20
40
60
80
100
120
140
160

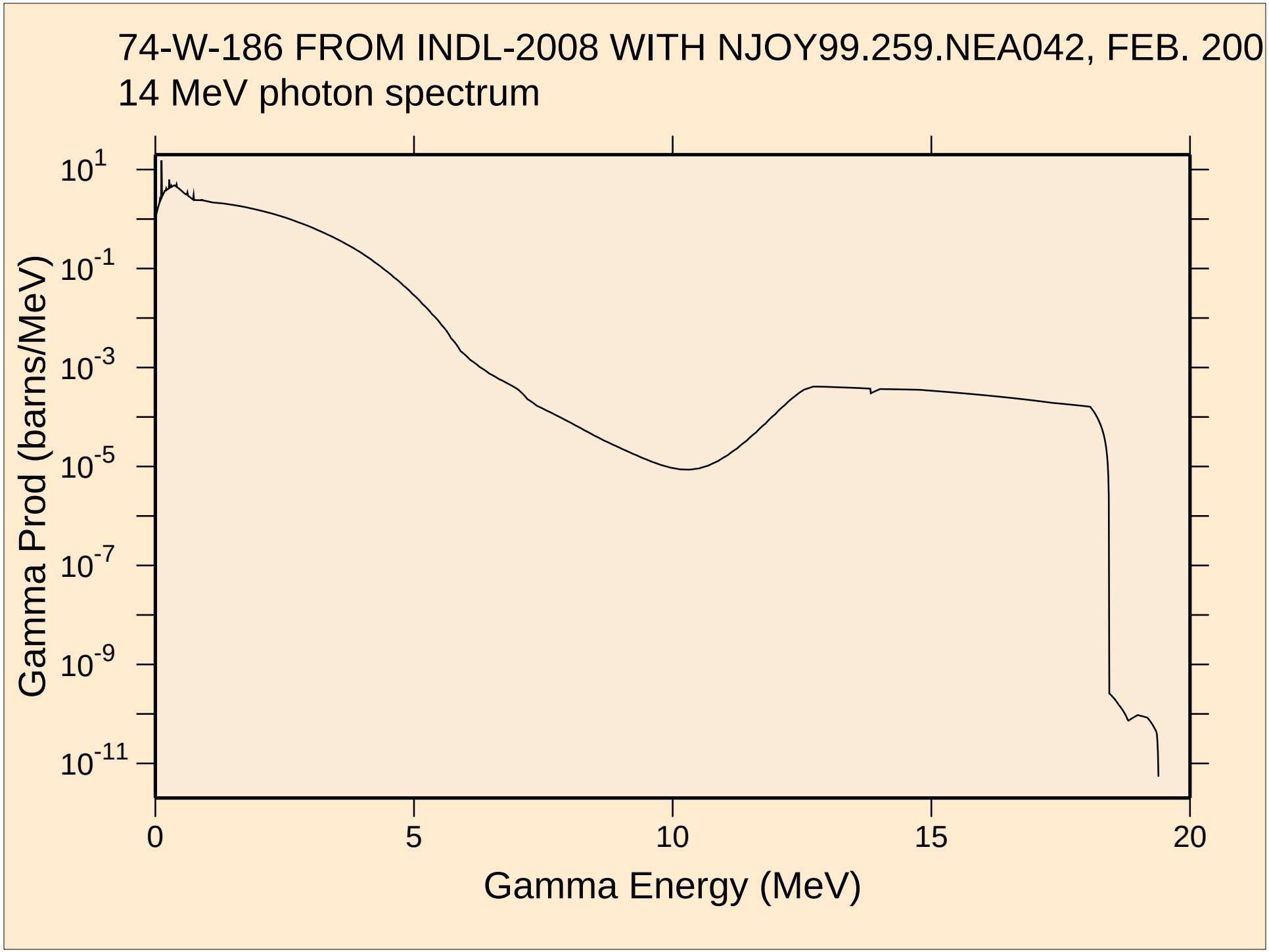

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Photon emission for (n,n*c)
Prob/MeV
10-1
10-3
0
Eγ (MeV)
10
20
0
20
40
60
80
100
120
140
160
En (MeV)

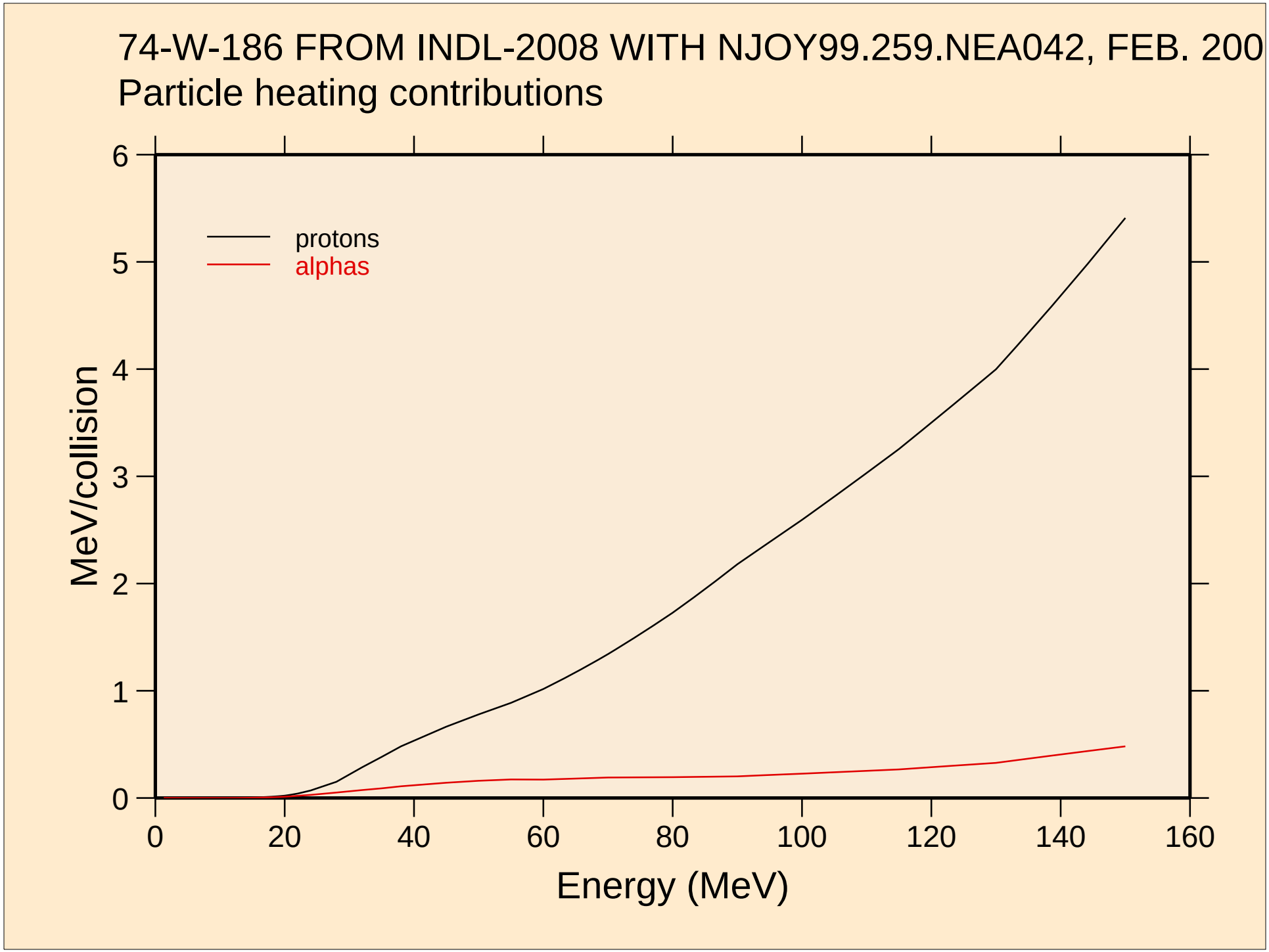

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Photon emission for (n,gma)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
100
200
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

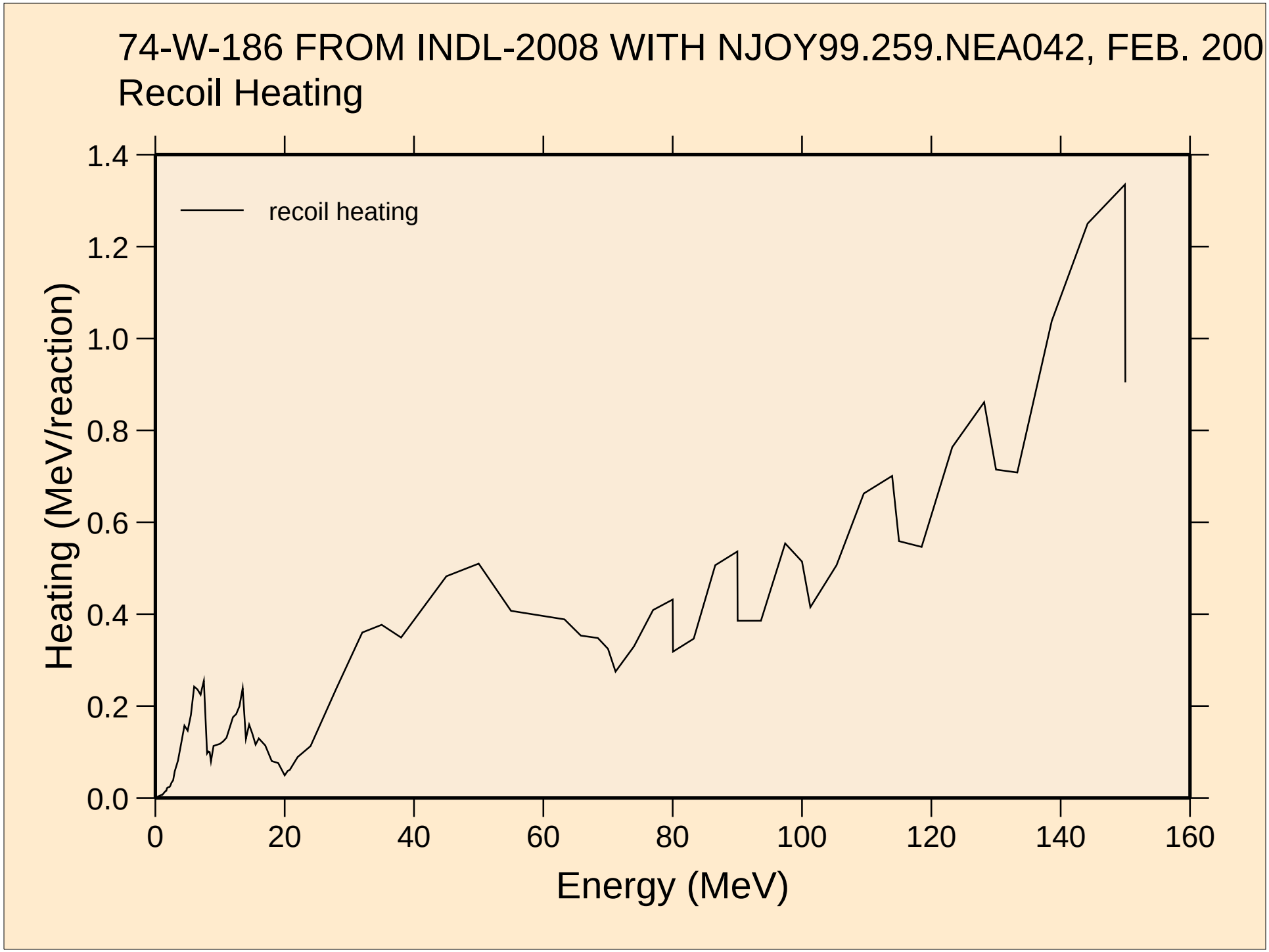

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Photon emission for (n,p*c)
Prob/MeV
10^{1}
10^{-1}
0
5
10
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

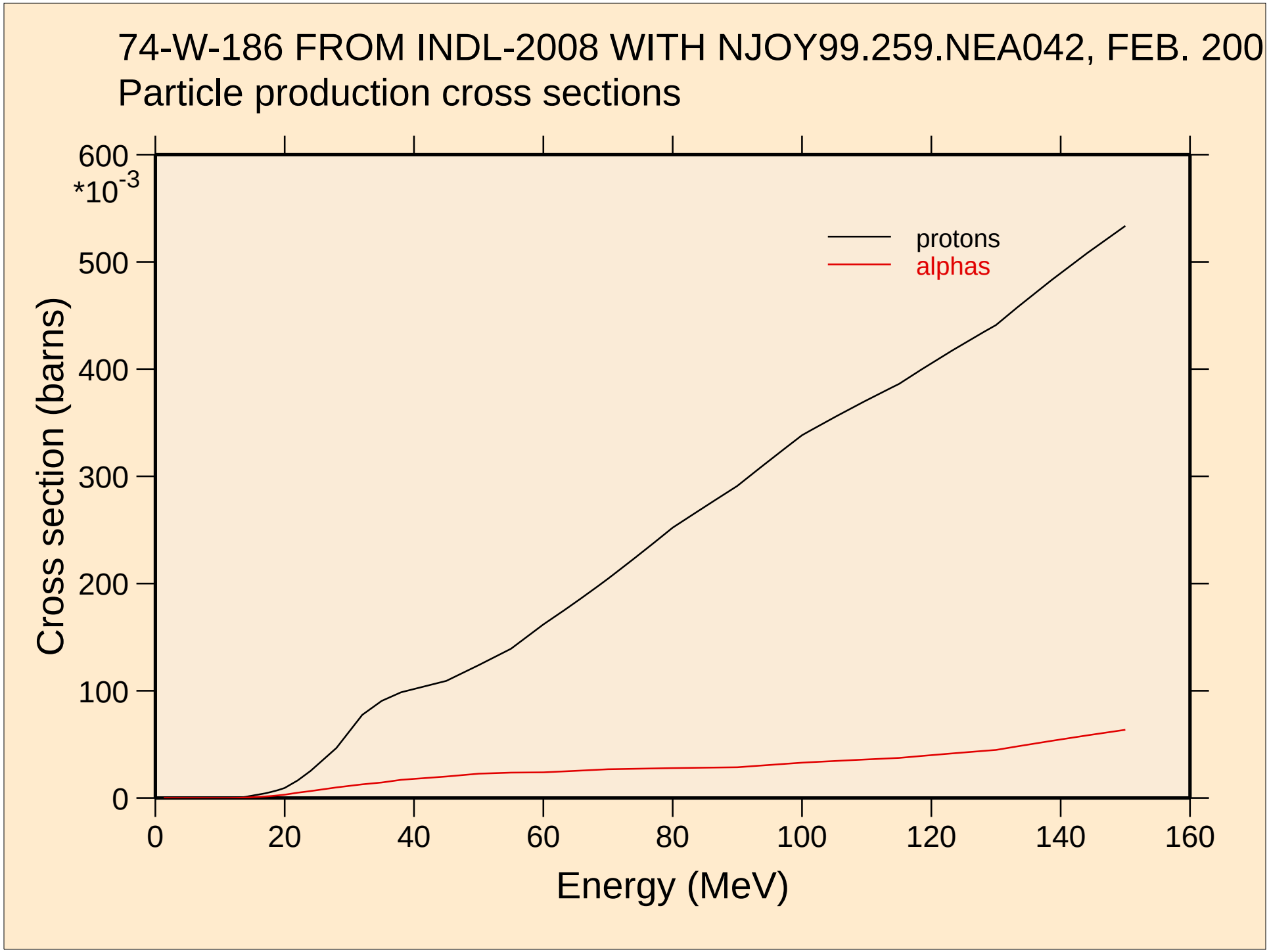

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Photon emission for (n,a*c)
Prob/MeV
10^0
10^-2
0
E_γ (MeV)
5
10
0
20
40
60
80
100
120
140
160
E_n (MeV)

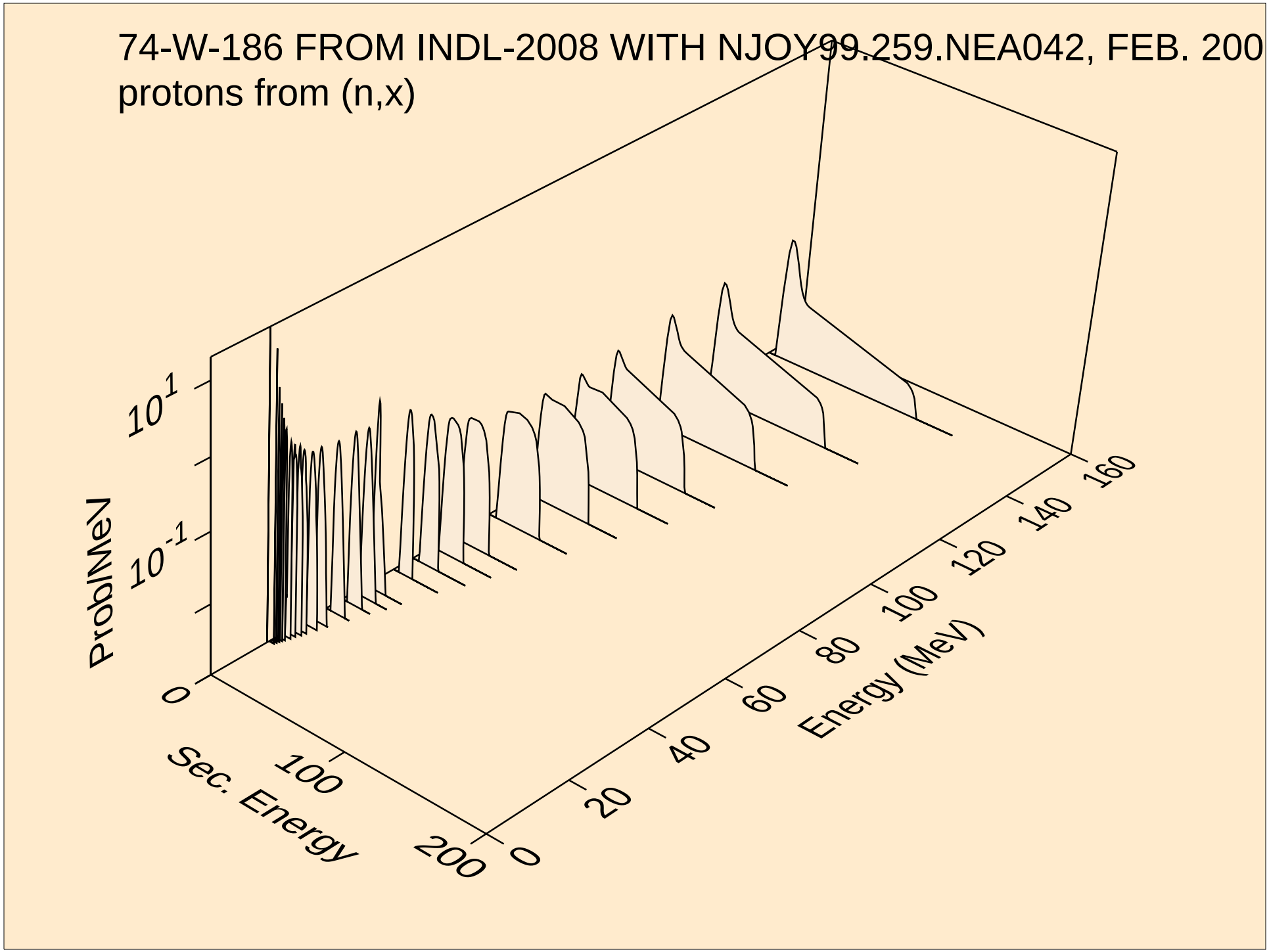

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
thermal capture photon spectrum
Gamma Prod (barns/MeV)
10^3
10^2
10^1
10^0
0
2
4
6
Gamma Energy (MeV)

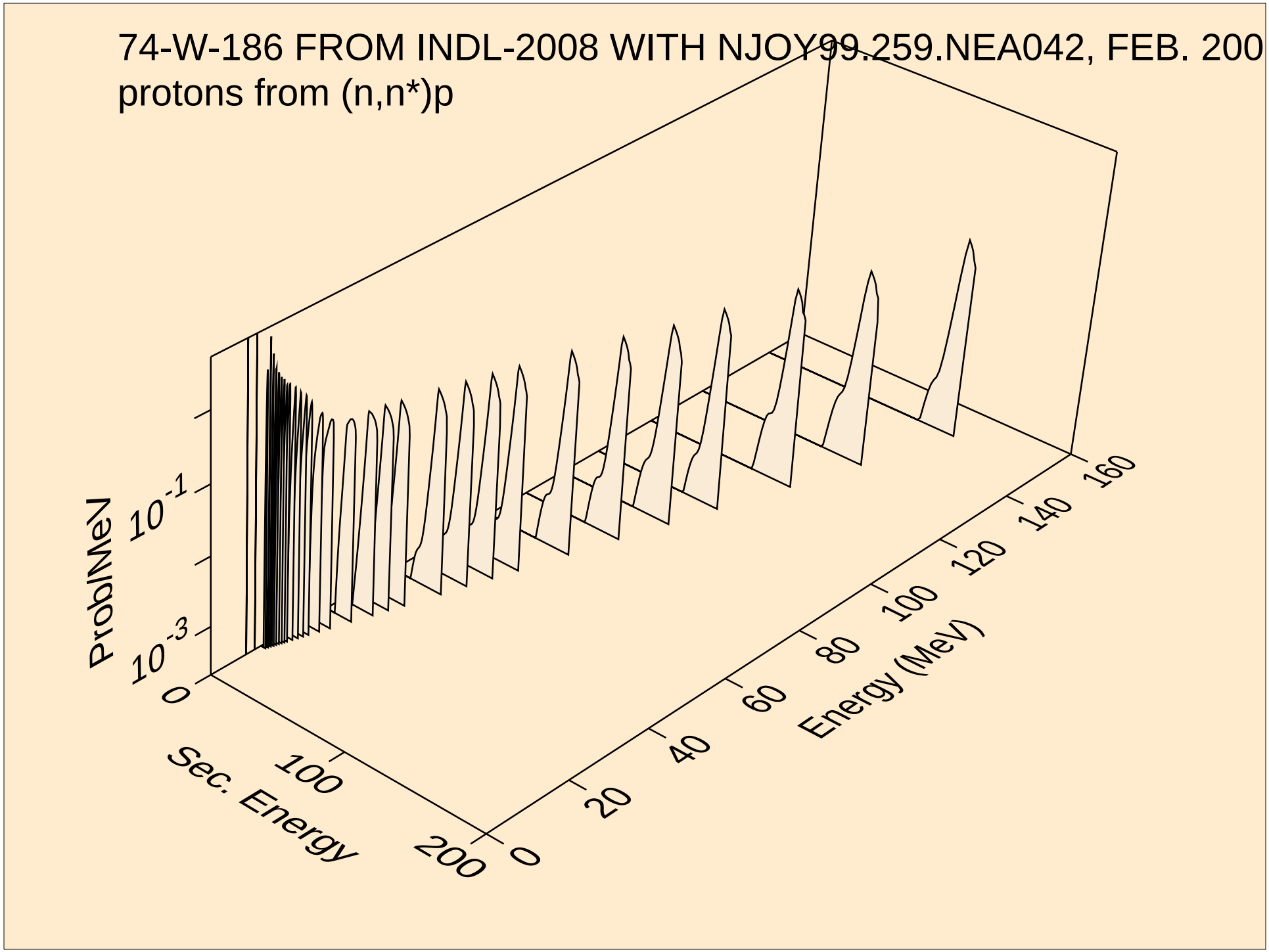

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
14 MeV photon spectrum
Gamma Prod (barns/MeV)
10^1
10^-1
10^-3
10^-5
10^-7
10^-9
10^-11
0
5
10
15
20
Gamma Energy (MeV)

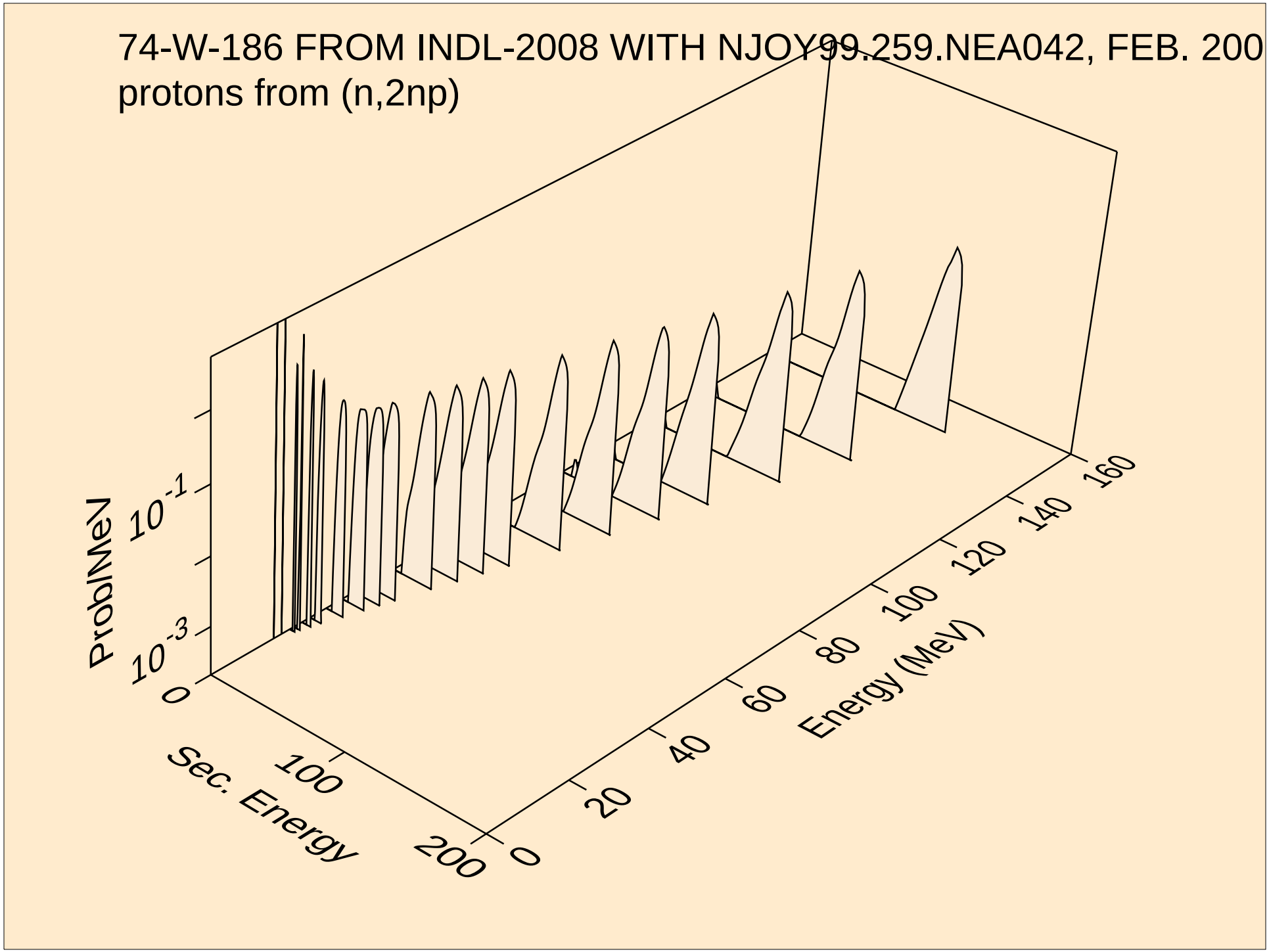

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Particle heating contributions
protons
alphas
MeV/collision
Energy (MeV)
0
1
2
3
4
5
6
0
20
40
60
80
100
120
140
160

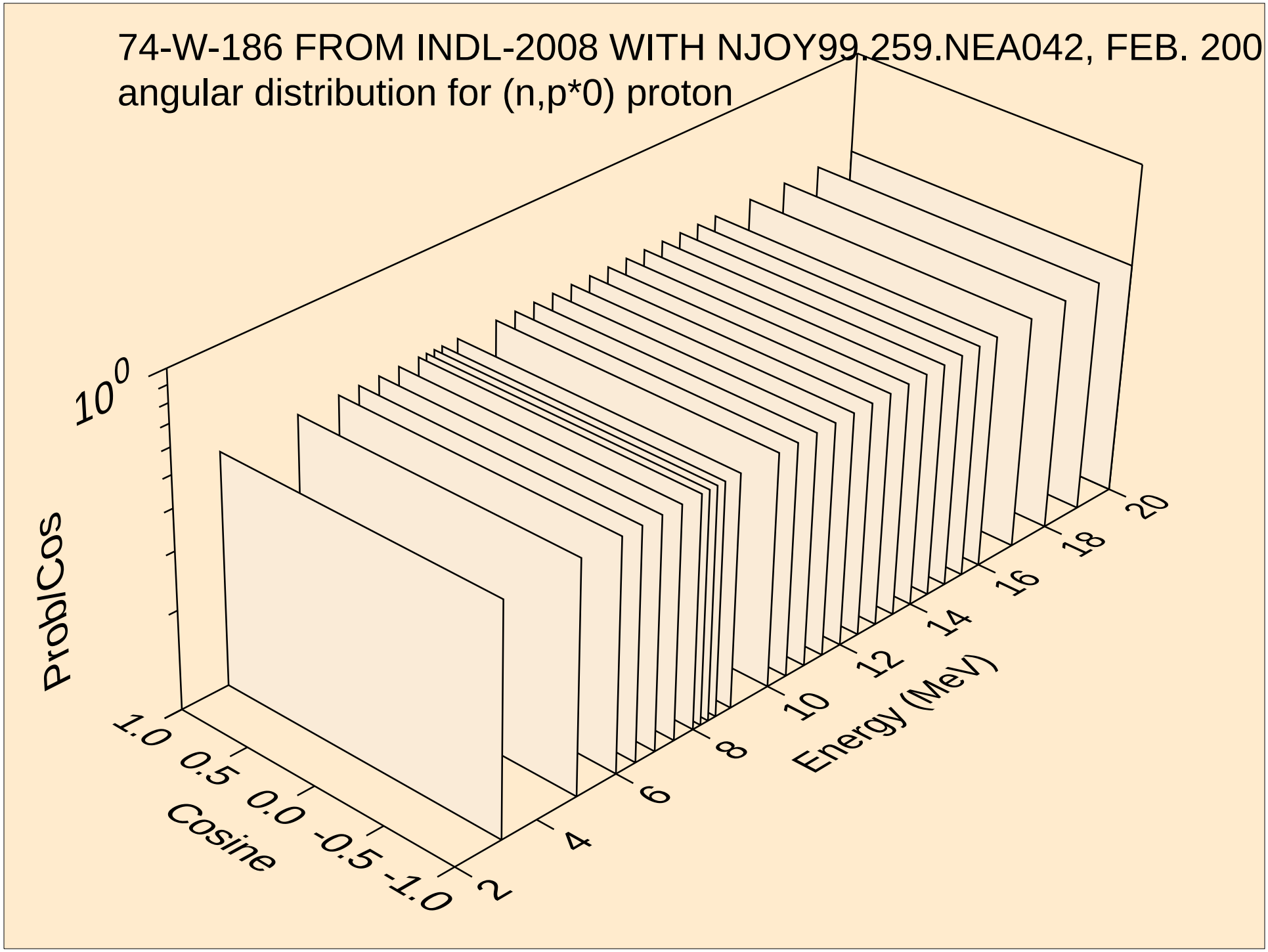

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Recoil Heating
recoil heating
Heating (MeV/reaction)
Energy (MeV)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
0
20
40
60
80
100
120
140
160

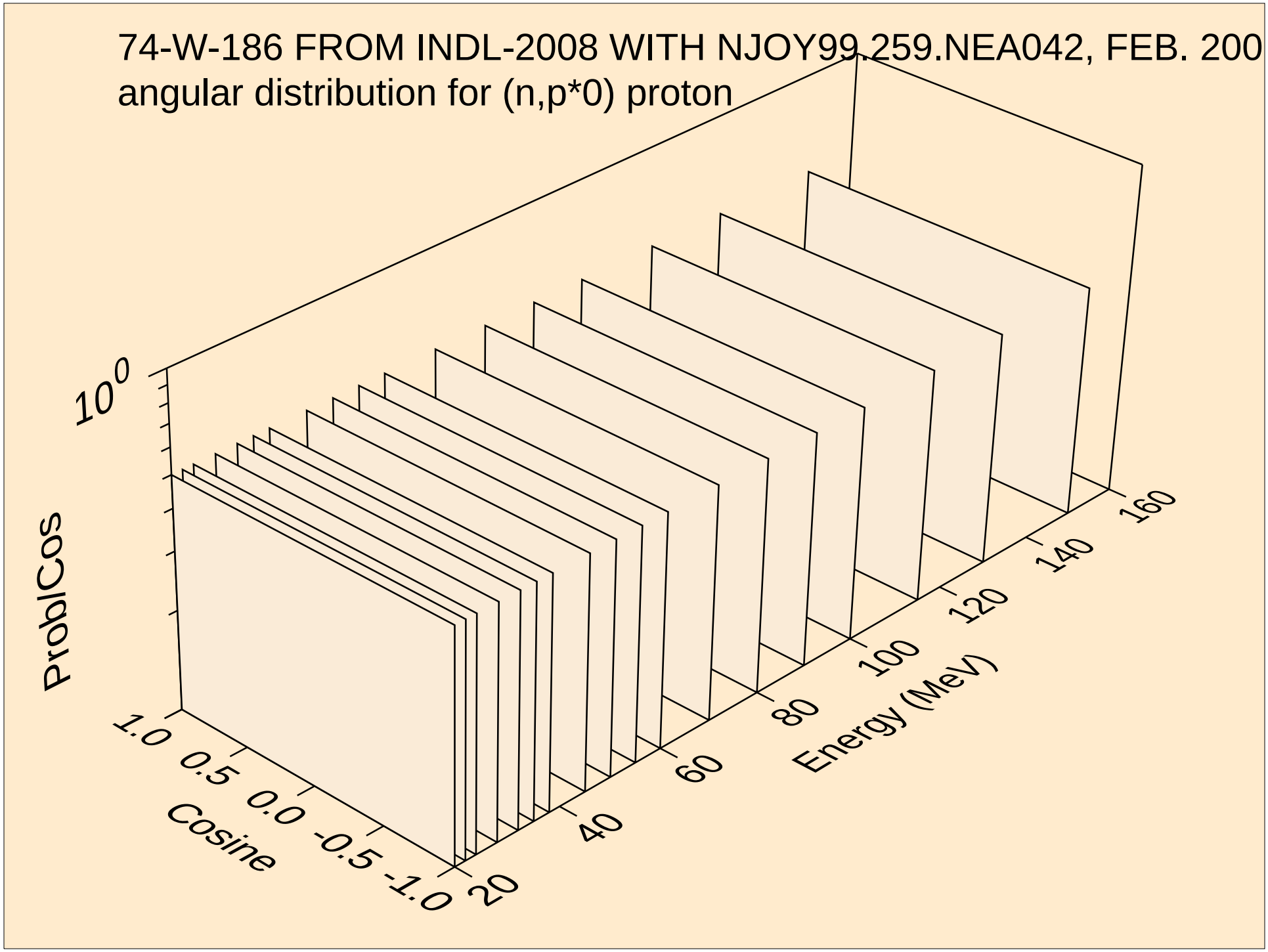

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
Particle production cross sections
600
*10-3
500
400
300
200
100
0
Cross section (barns)
protons
alphas
0
20
40
60
80
100
120
140
160
Energy (MeV)

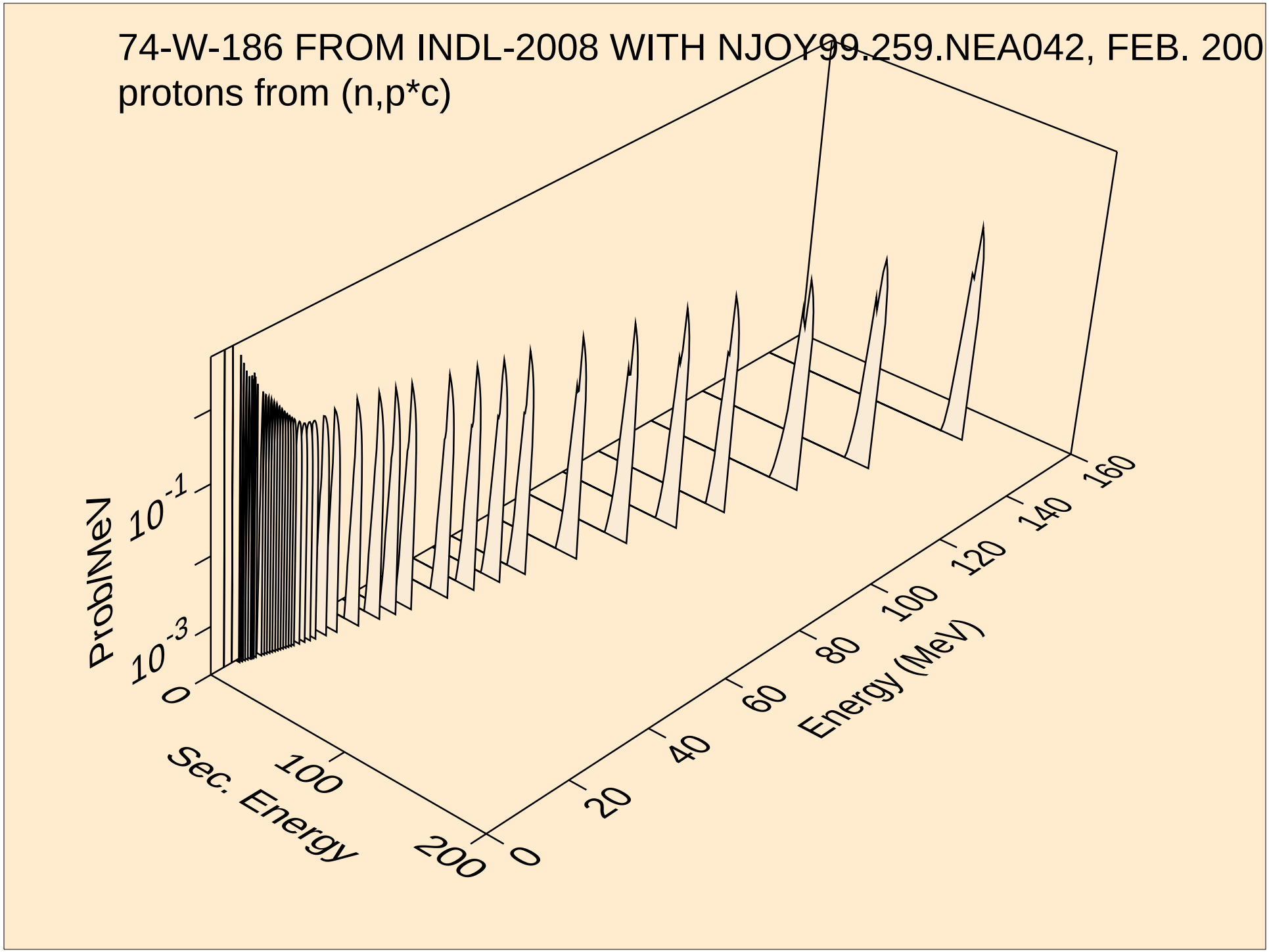

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
protons from (n,x)
Prob/MeV
10^1
10^-1
0
Sec. Energy
100
200
0
20
40
60
80
100
120
140
160
Energy (MeV)

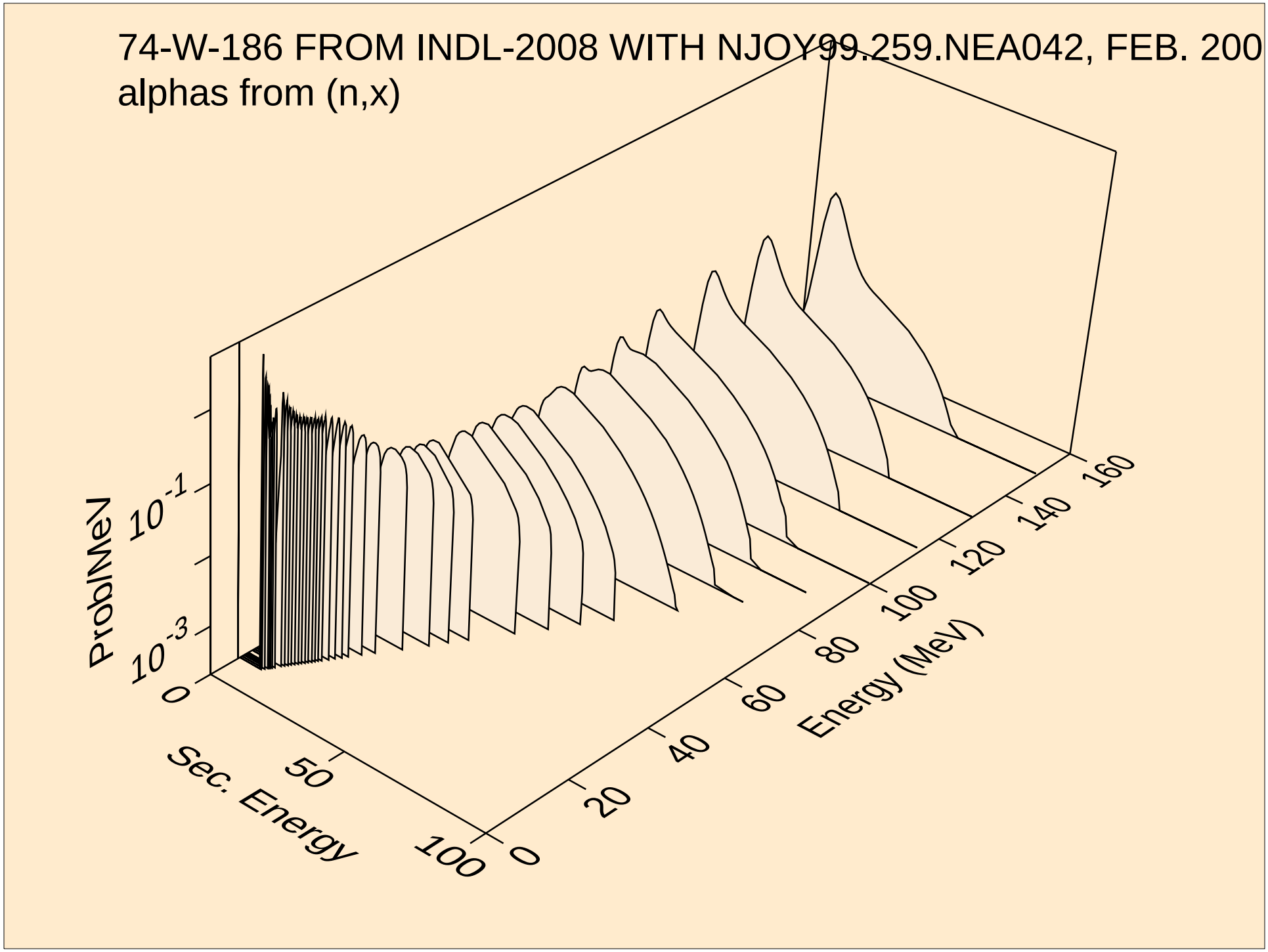

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
protons from (n,n*)p
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
20
40
60
80
100
120
140
160
Energy (MeV)

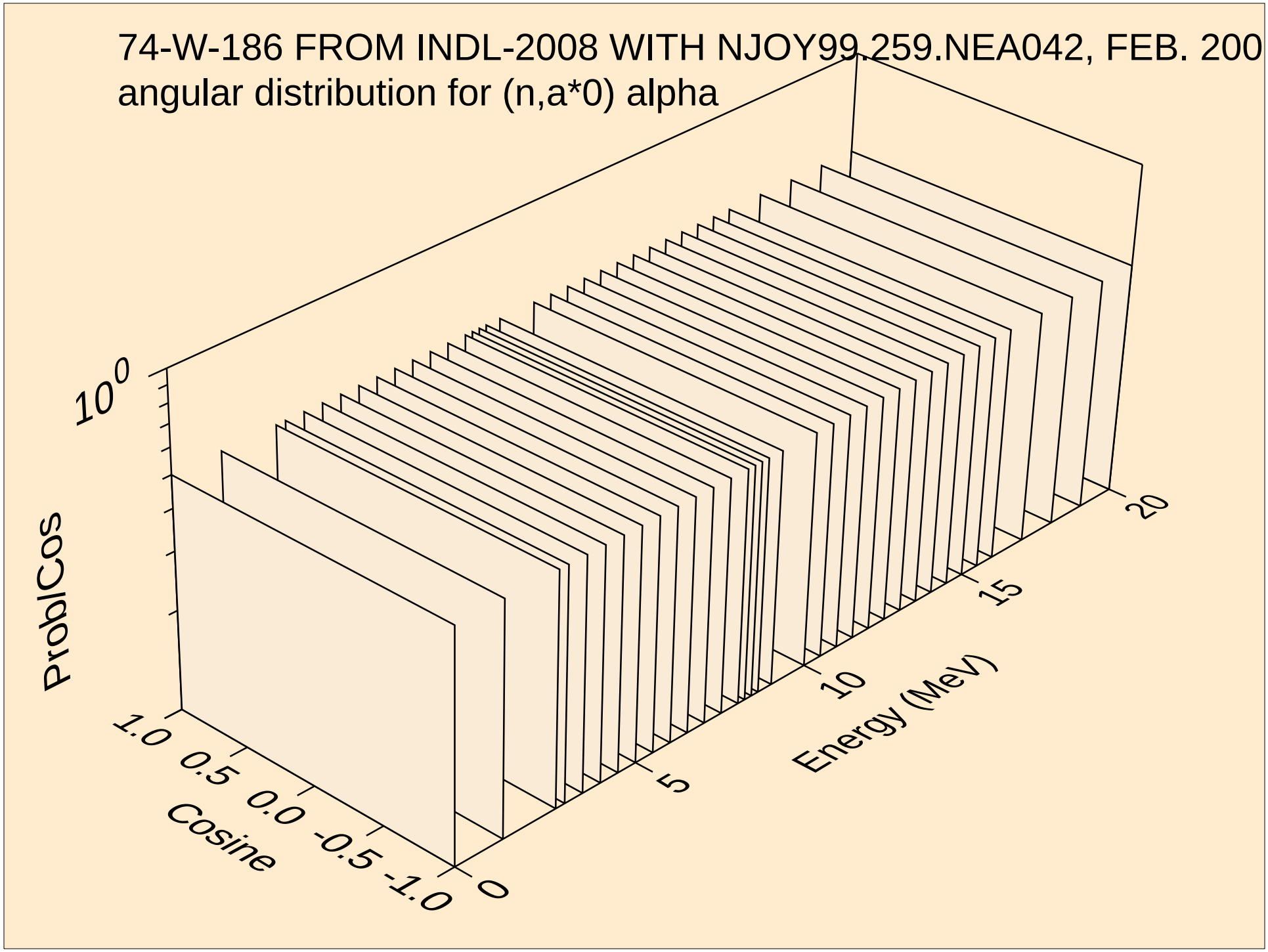

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
protons from (n,2np)
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
20
40
60
80
100
120
140
160
Energy (MeV)

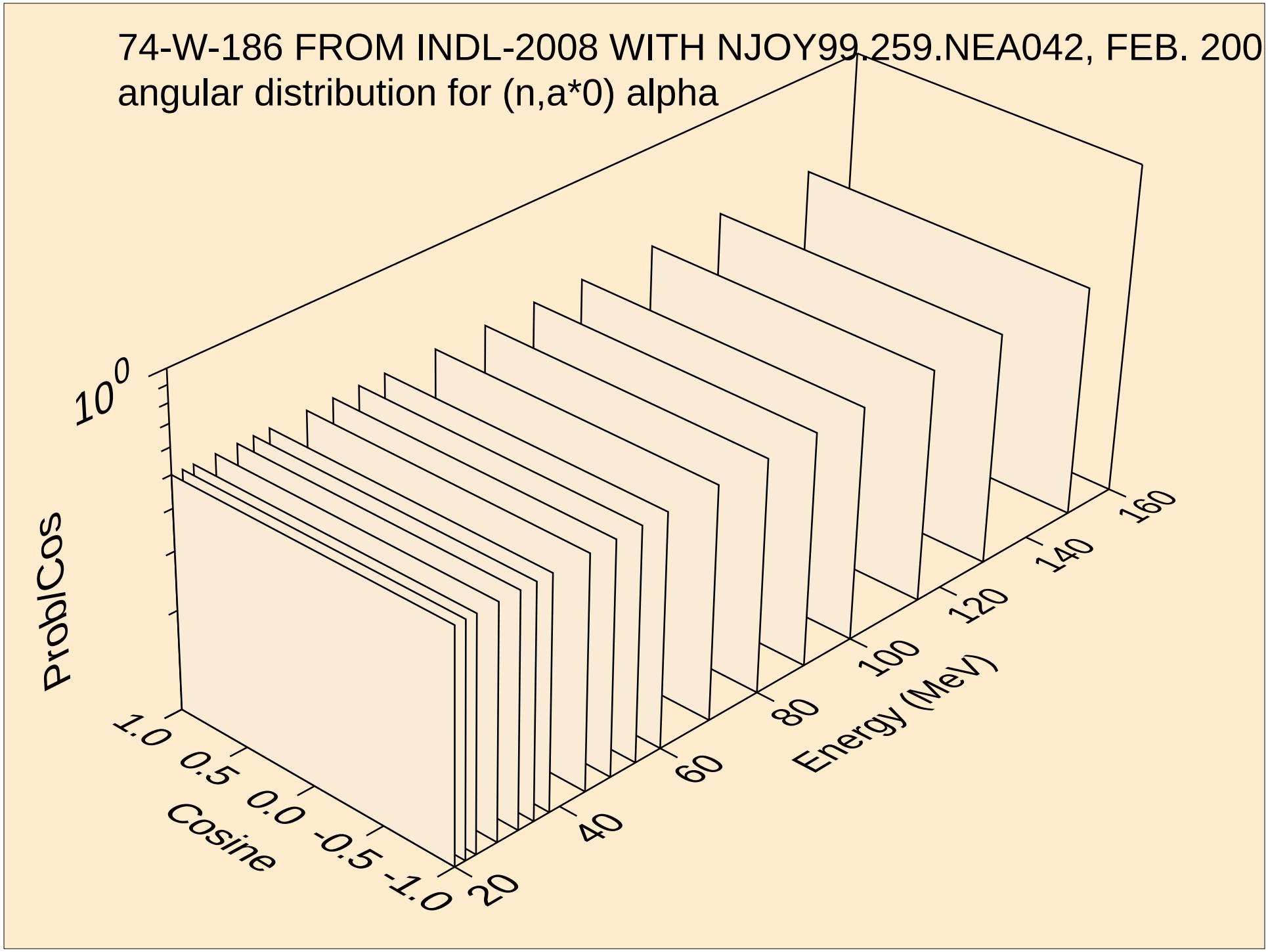

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,p*0) proton
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

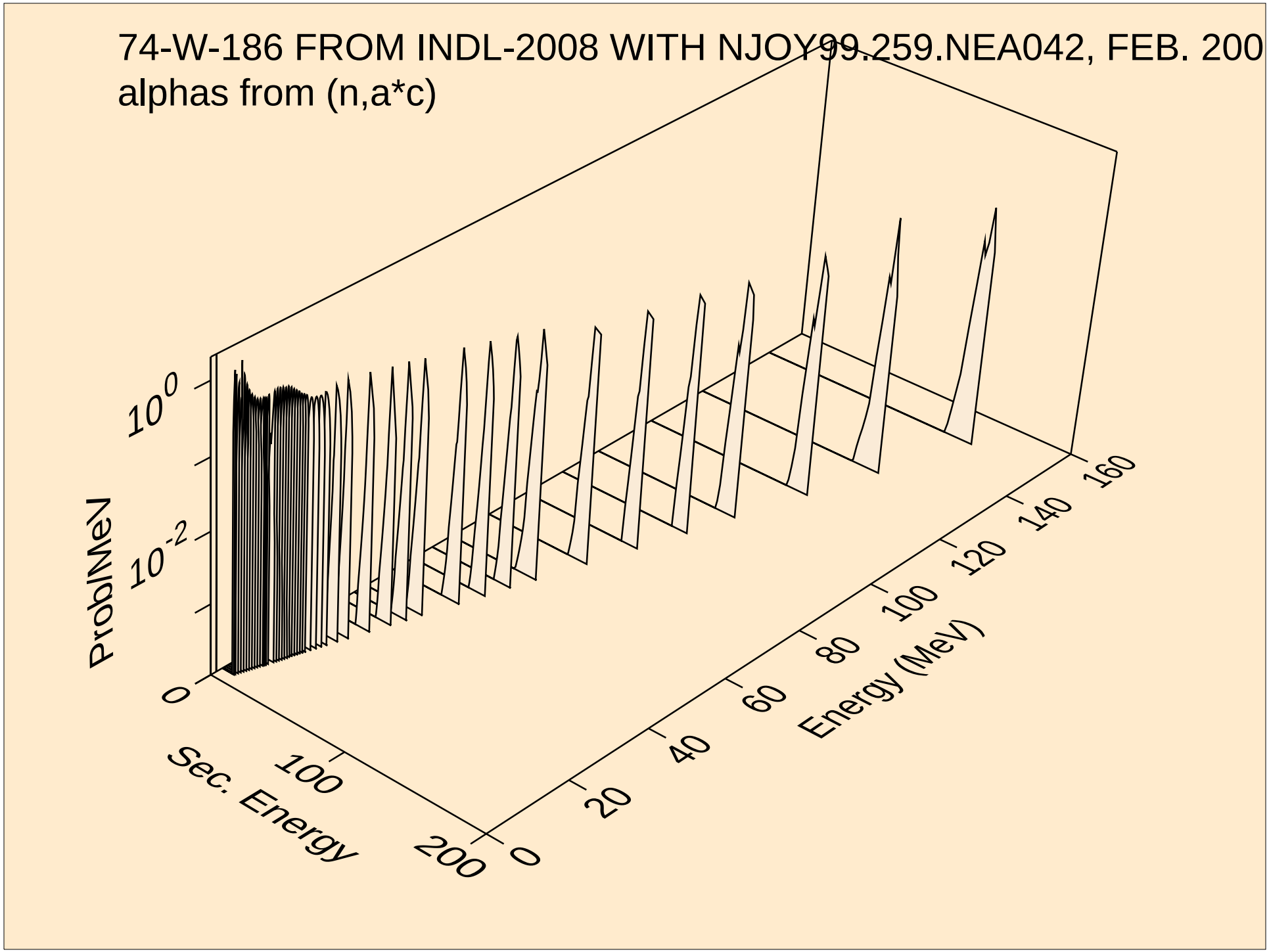

74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,p*0) proton
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)


74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
protons from (n,p*c)
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
20
40
60
80
100
120
140
160
Energy (MeV)


74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
alphas from (n,x)
Prob/MeV
10-1
10-3
0
Sec. Energy
50
100
0
20
40
60
80
100
120
140
160
Energy (MeV)


74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,a*0) alpha
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
5
10
15
20
Energy (MeV)


74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
angular distribution for (n,a*0) alpha
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)


74-W-186 FROM INDL-2008 WITH NJOY99.259.NEA042, FEB. 200
alphas from (n,a*c)
Prob/MeV
10^0
10^-2
0
Sec. Energy
100
200
0
20
40
60
80
100
120
140
160
Energy (MeV)