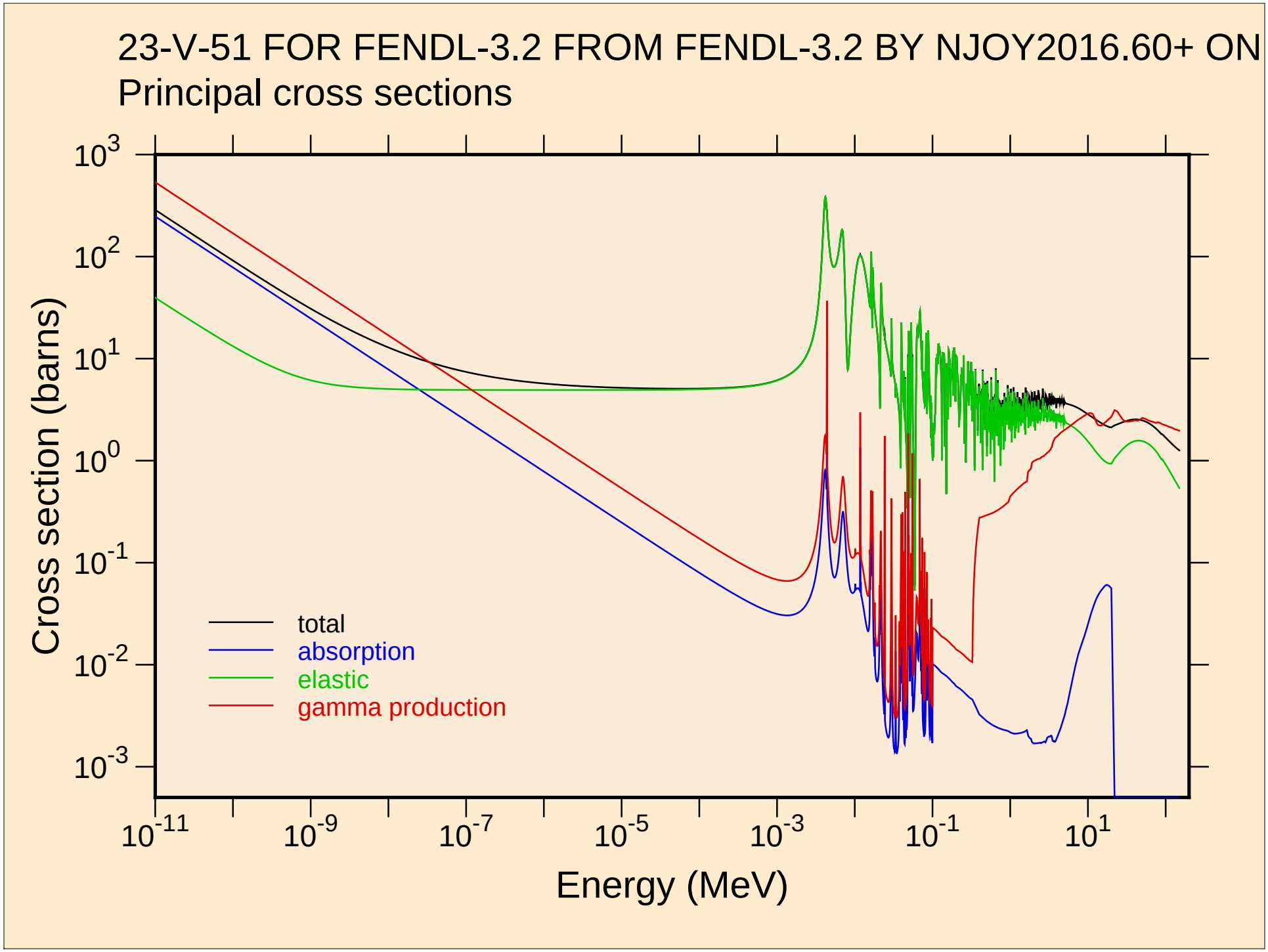
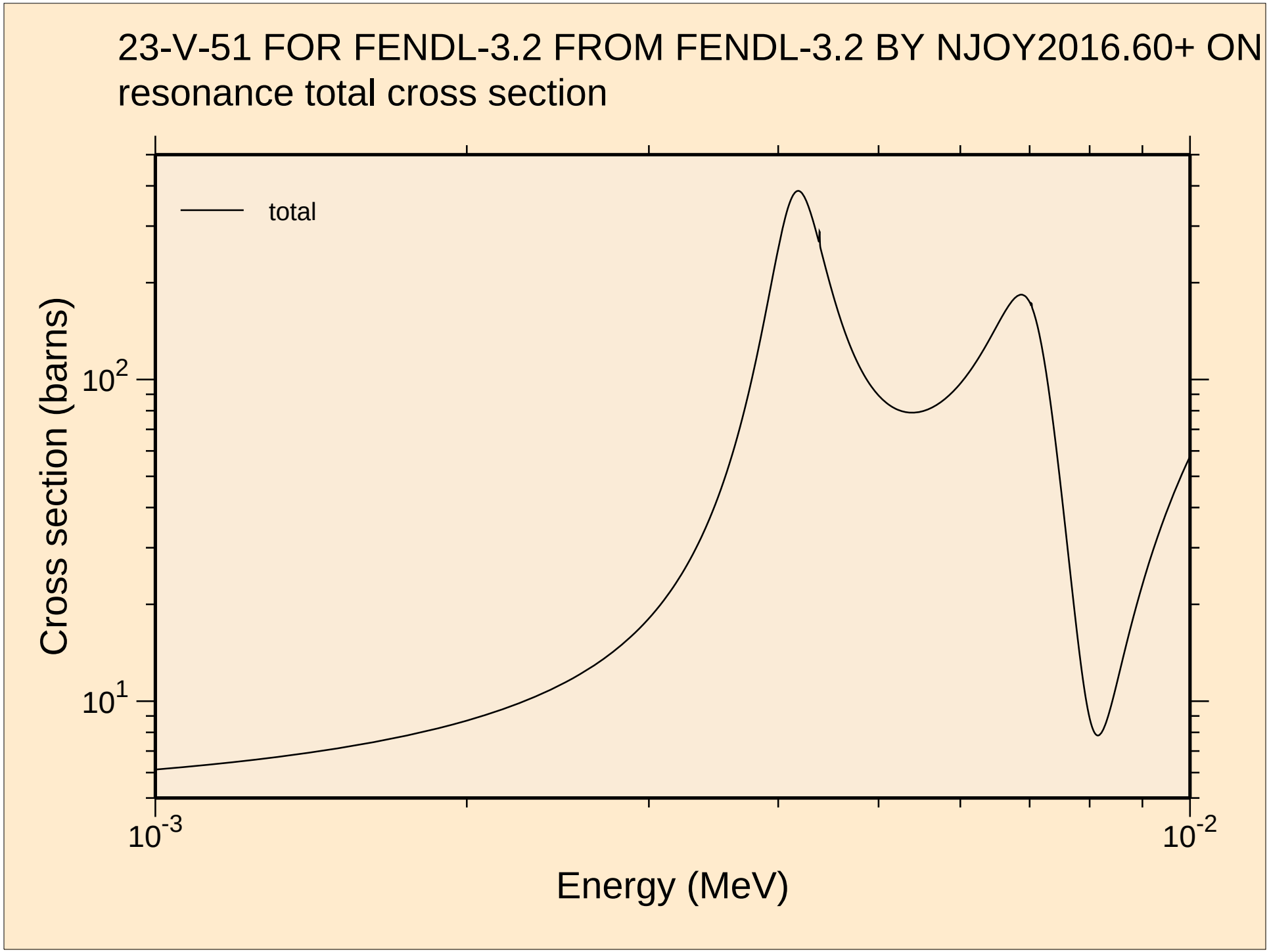
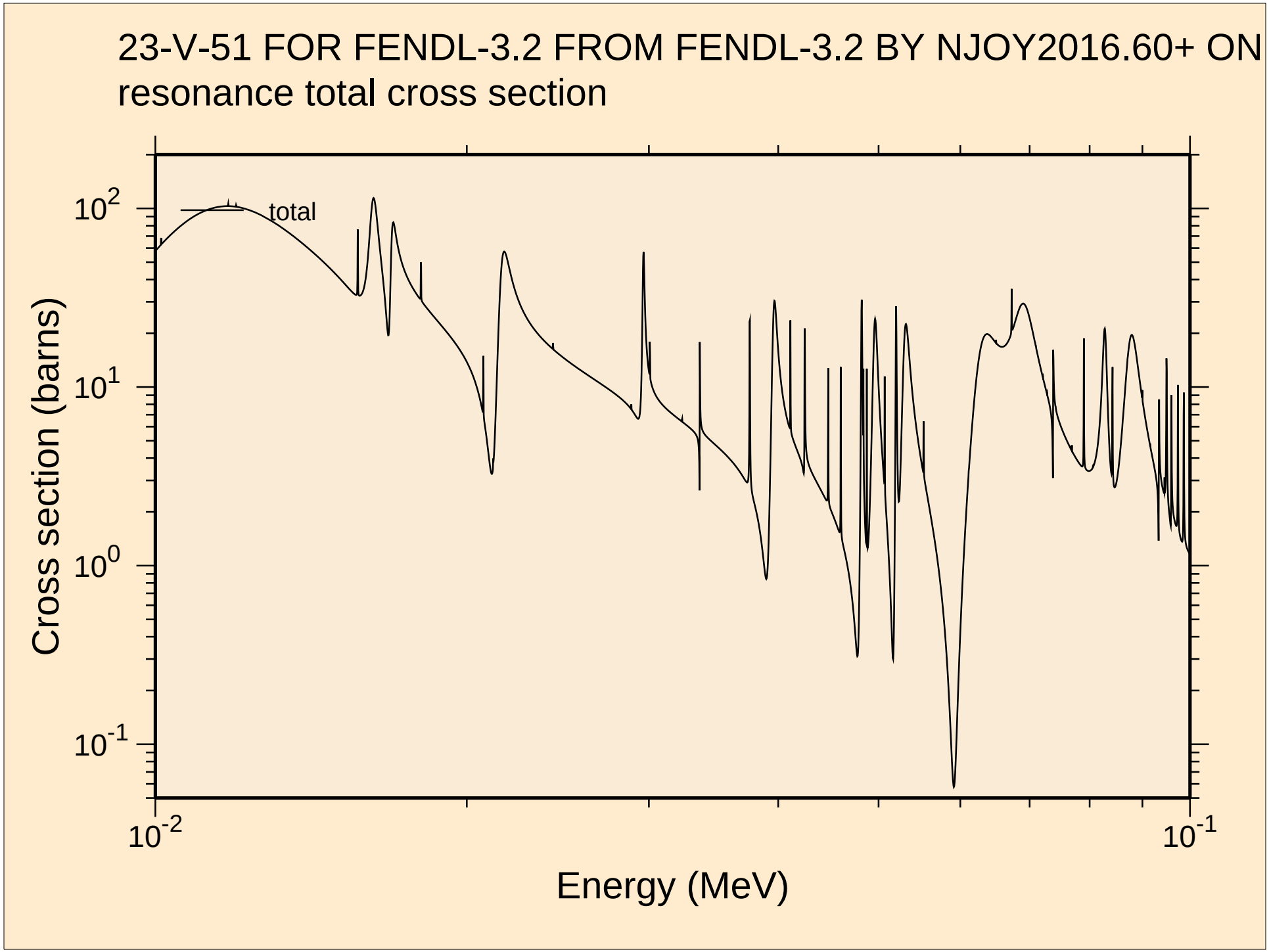
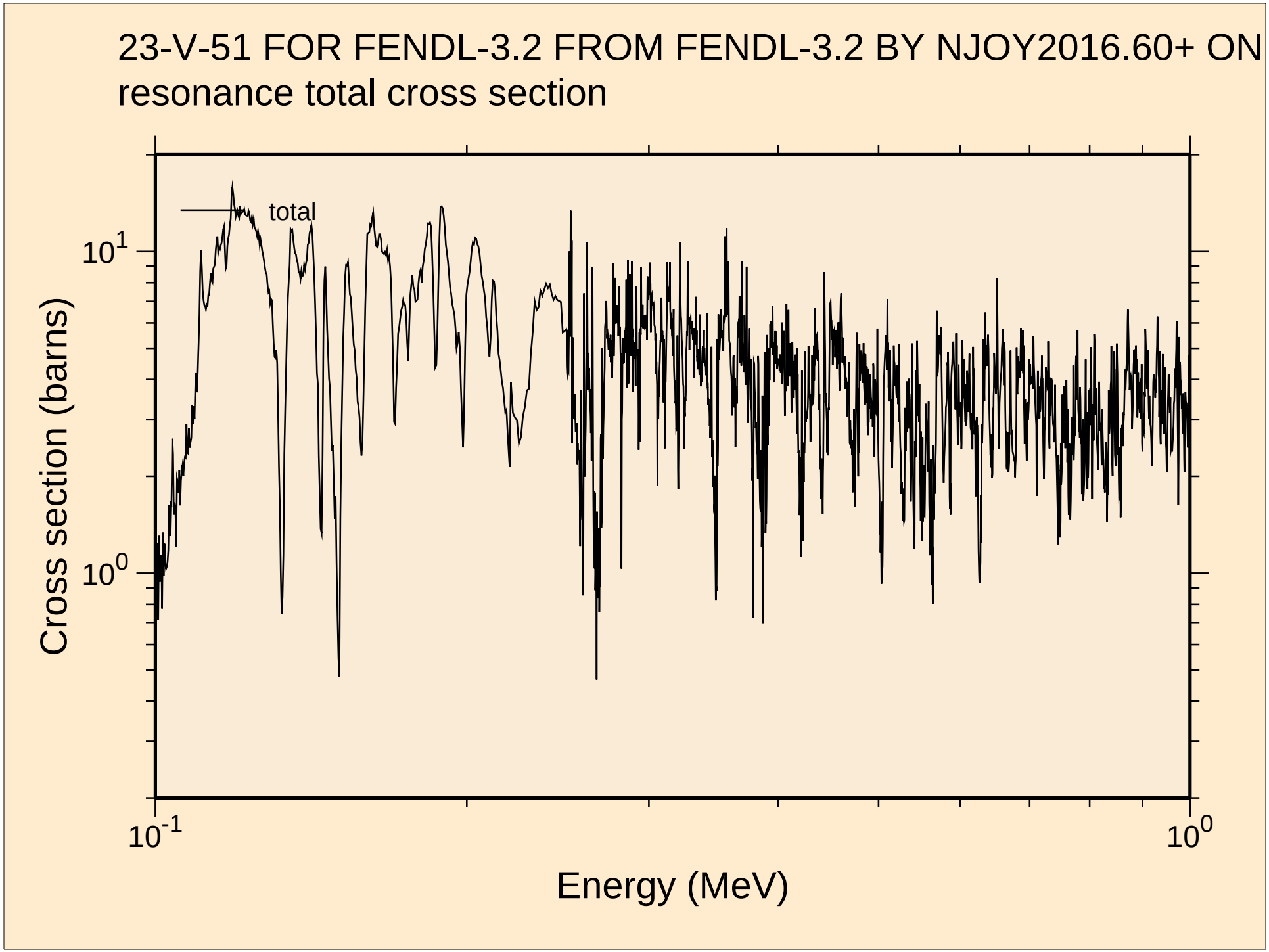
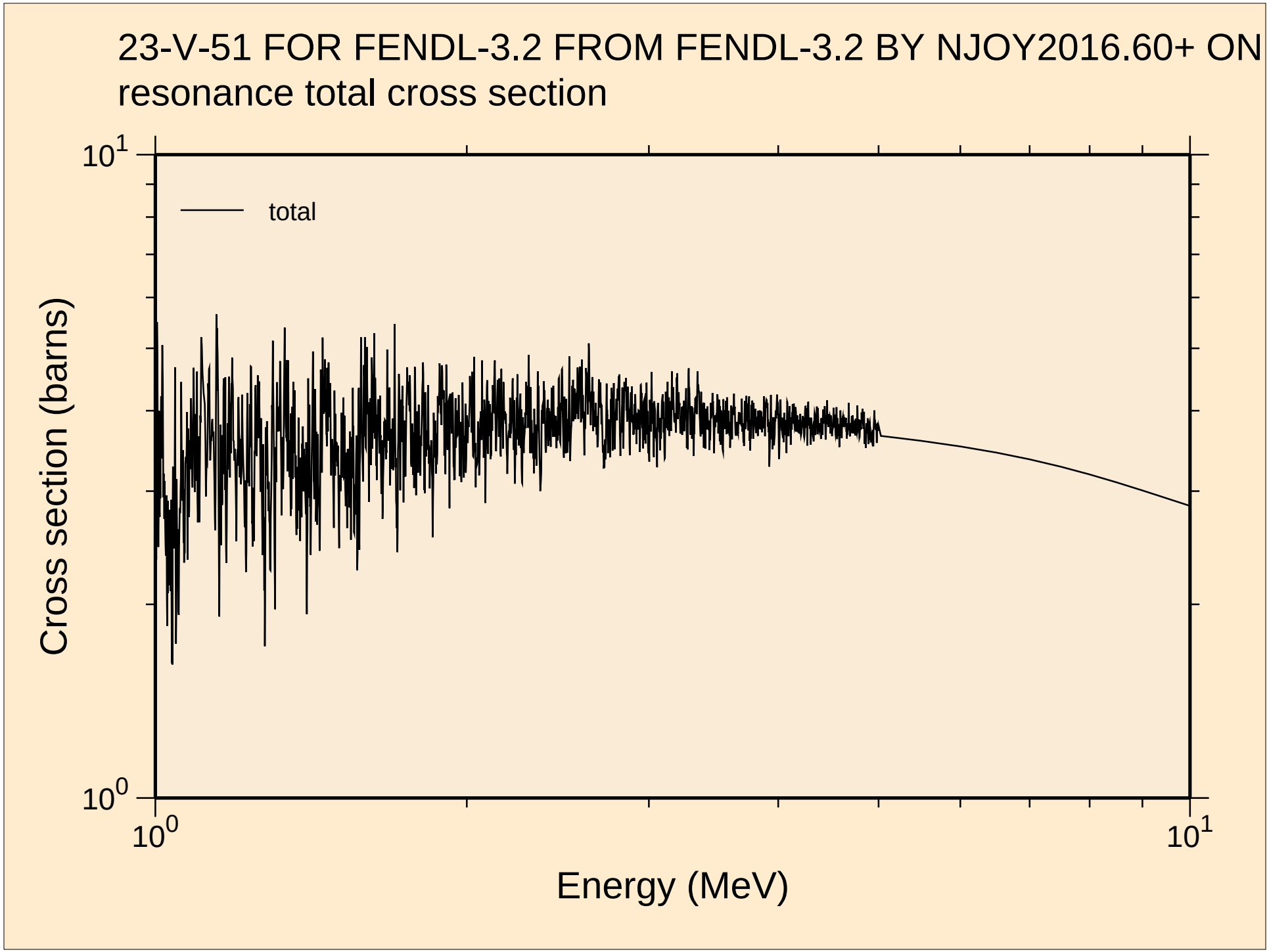
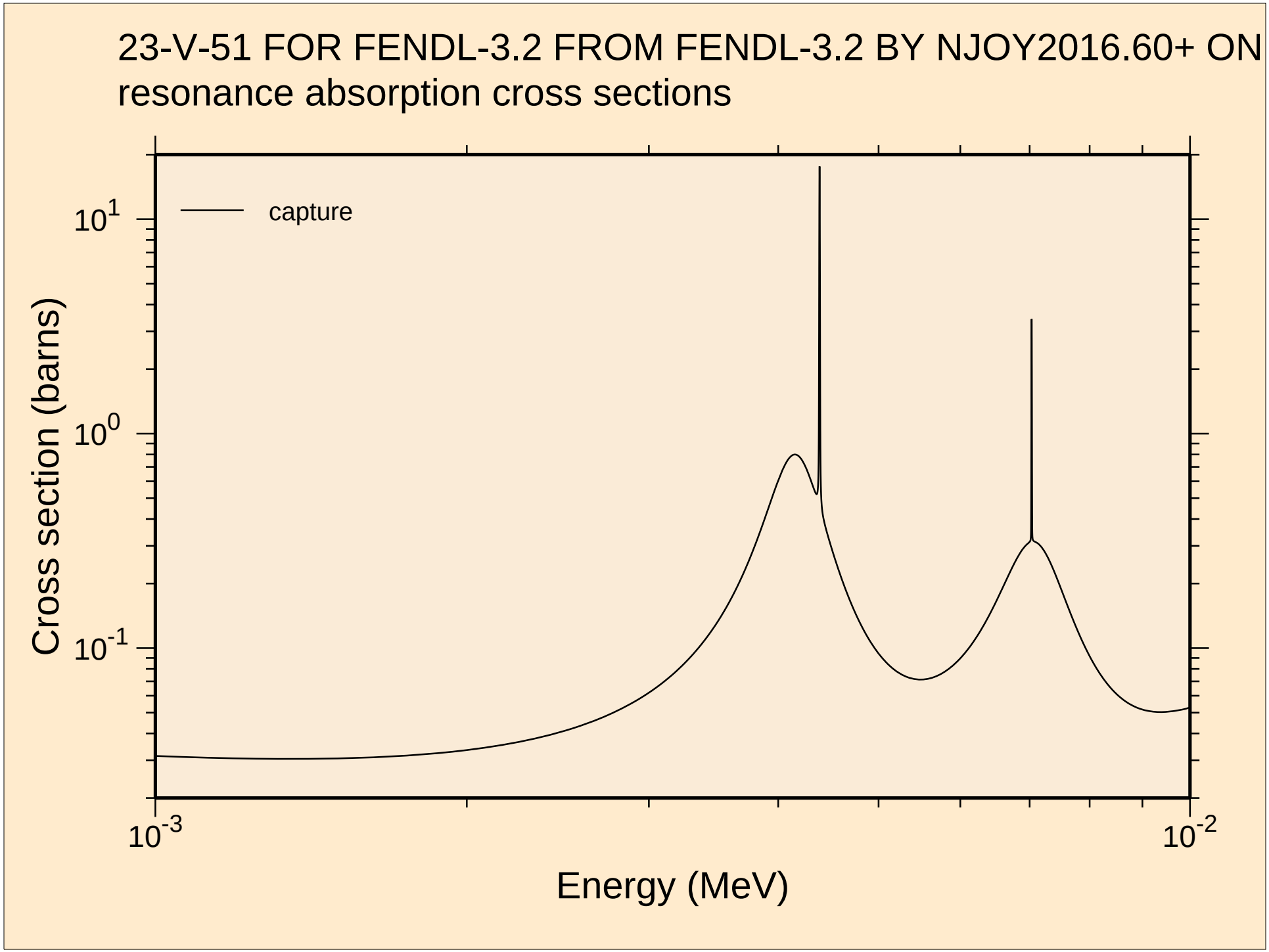

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Principal cross sections
Cross section (barns)
Energy (MeV)
total
absorption
elastic
gamma production

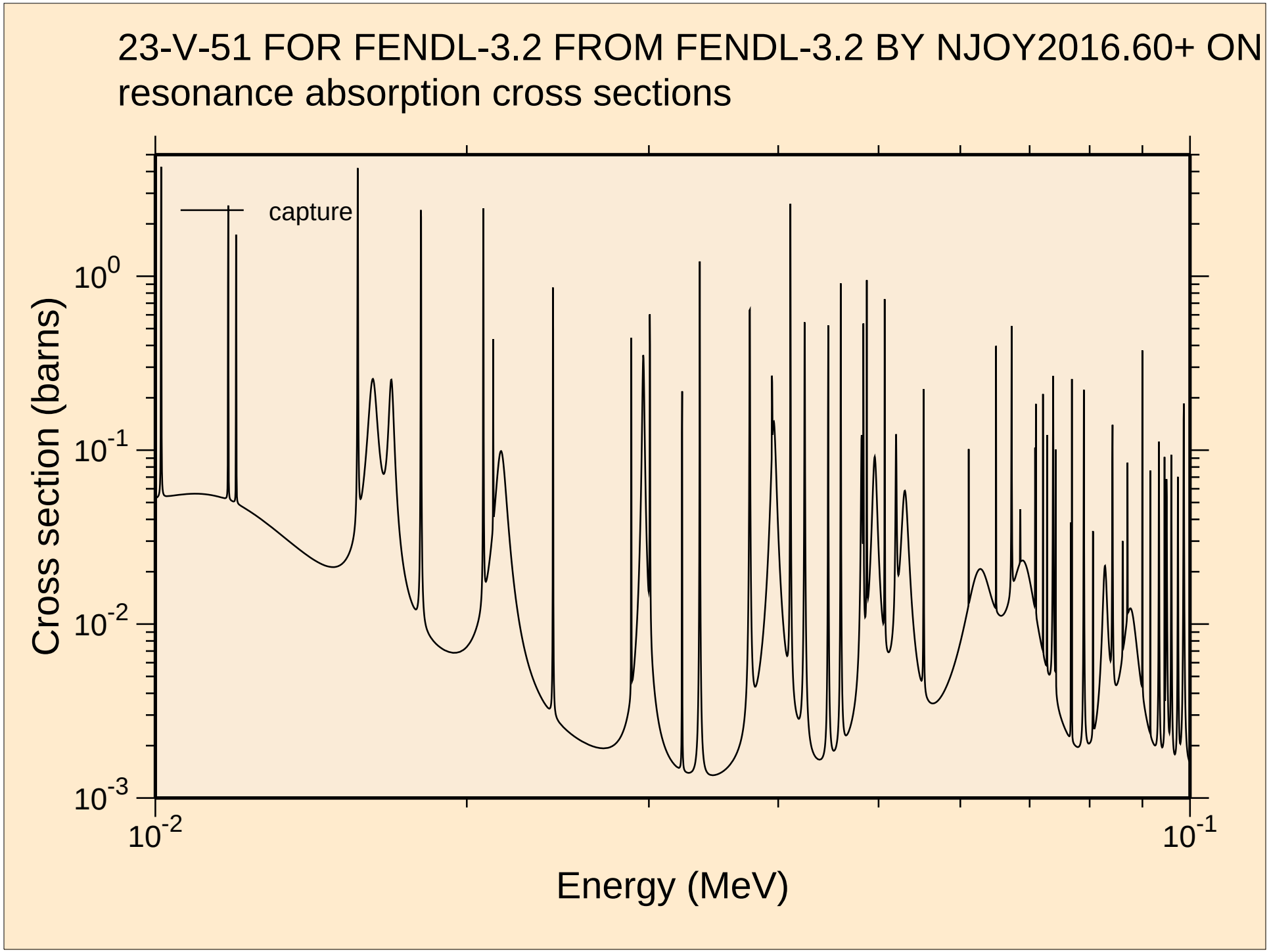

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
resonance total cross section
total
Cross section (barns)
10^2
10^1
10^-3
10^-2
Energy (MeV)

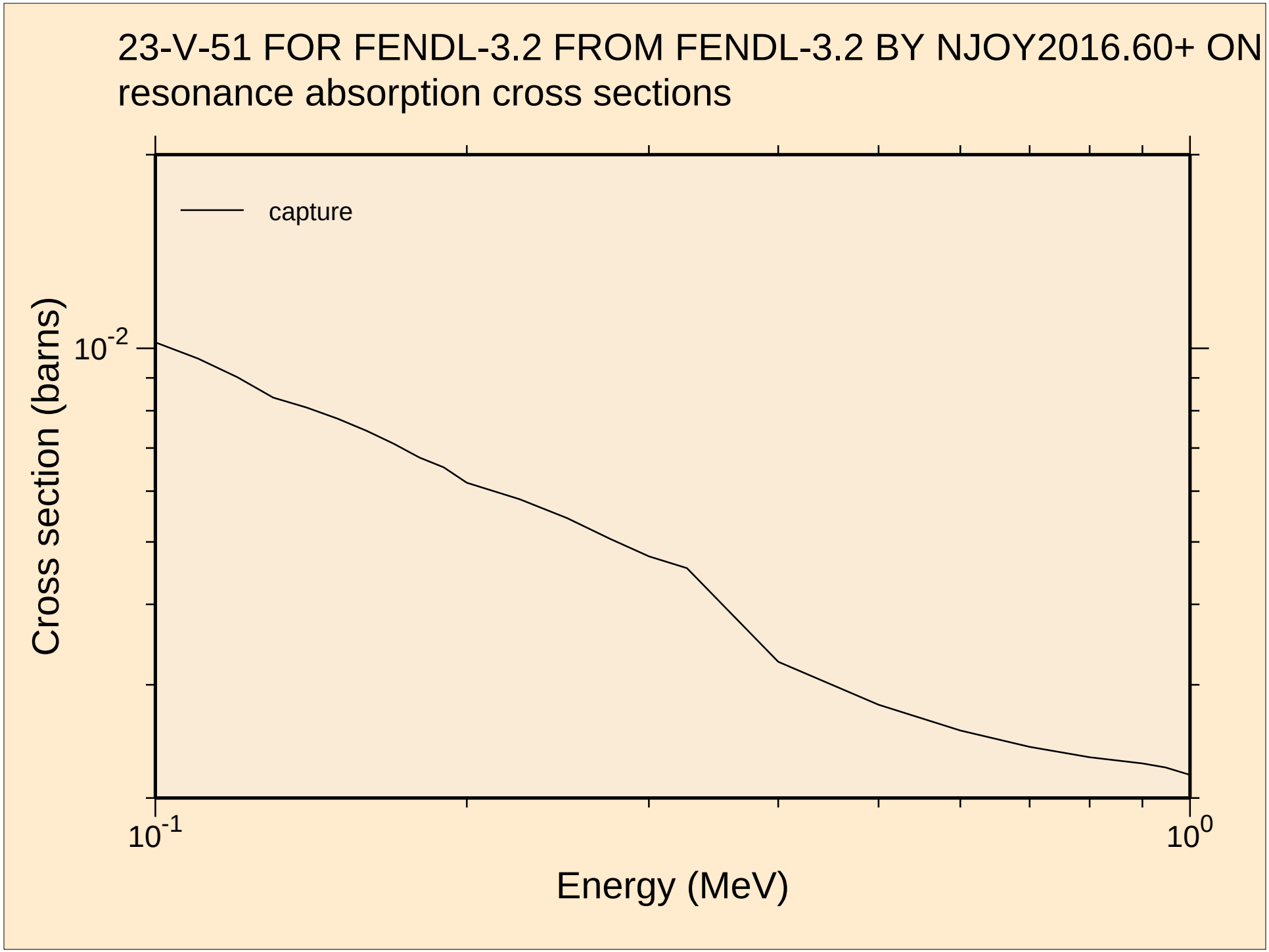

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
resonance total cross section
total
Cross section (barns)
10^2
10^1
10^0
10^-1
10^-2
10^-1
Energy (MeV)

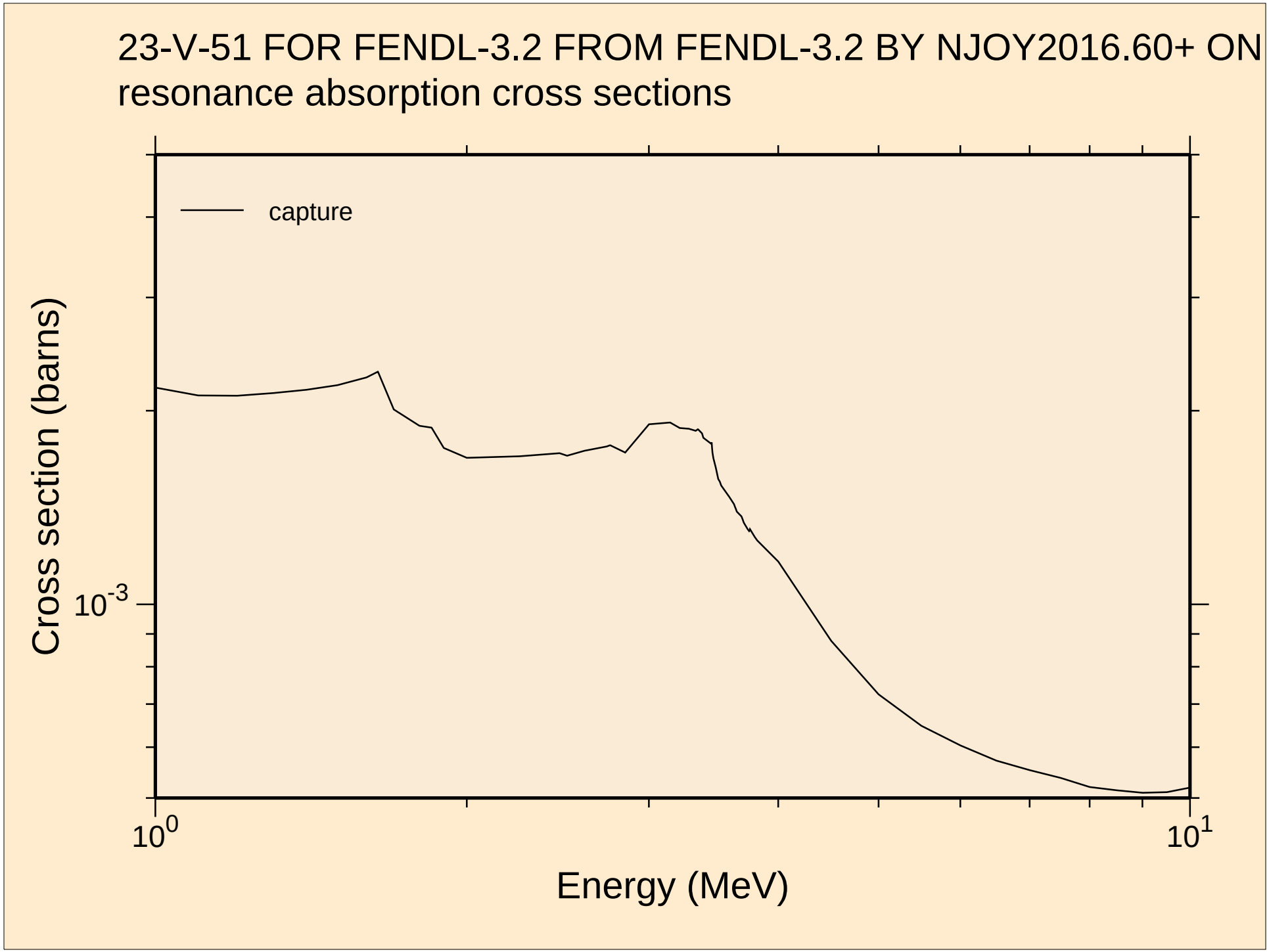

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
resonance total cross section
total
Cross section (barns)
10^1
10^0
10^-1
10^0
Energy (MeV)

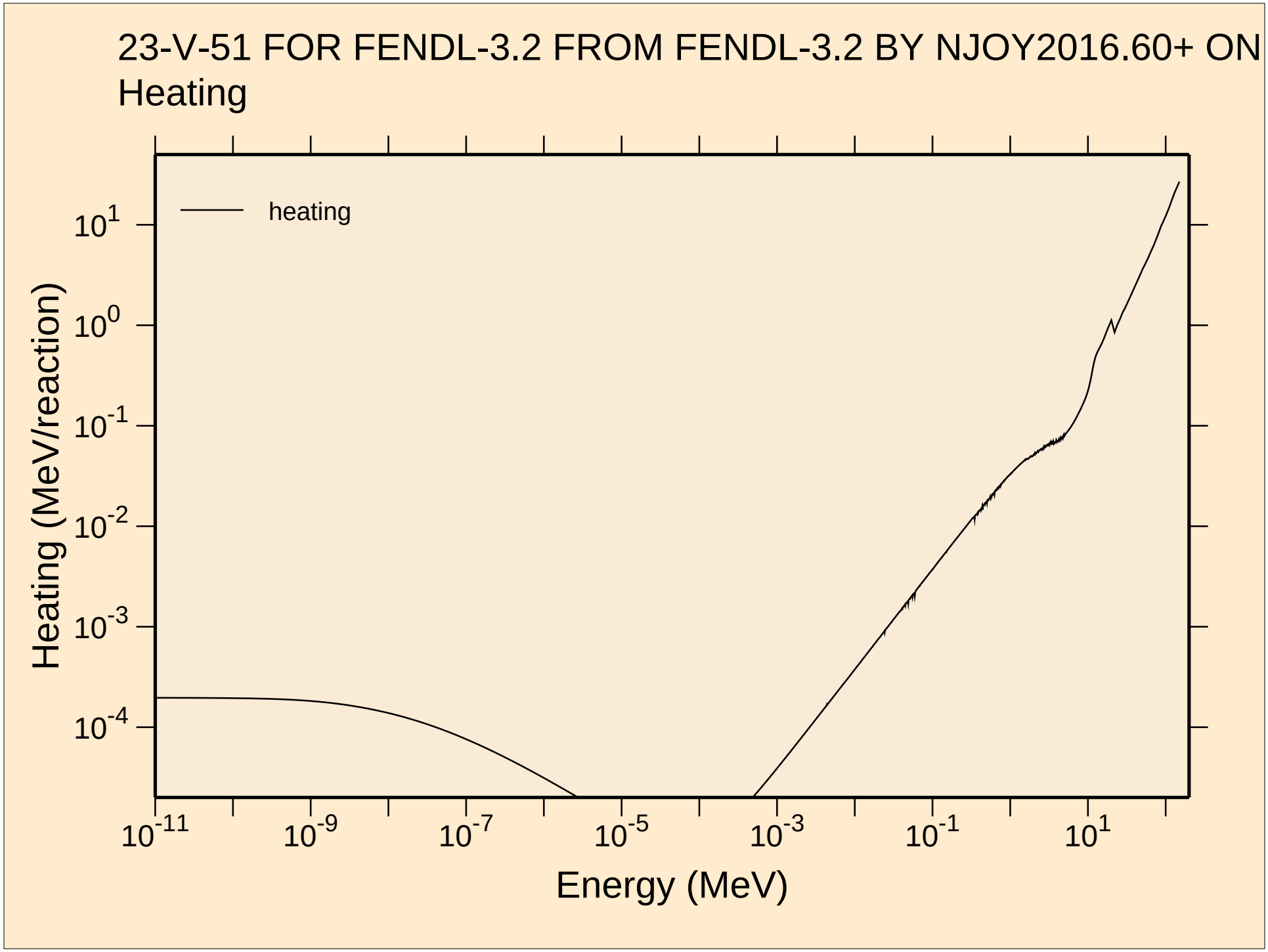

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
resonance total cross section
total
Cross section (barns)
Energy (MeV)
10^1
10^0
10^0
10^1

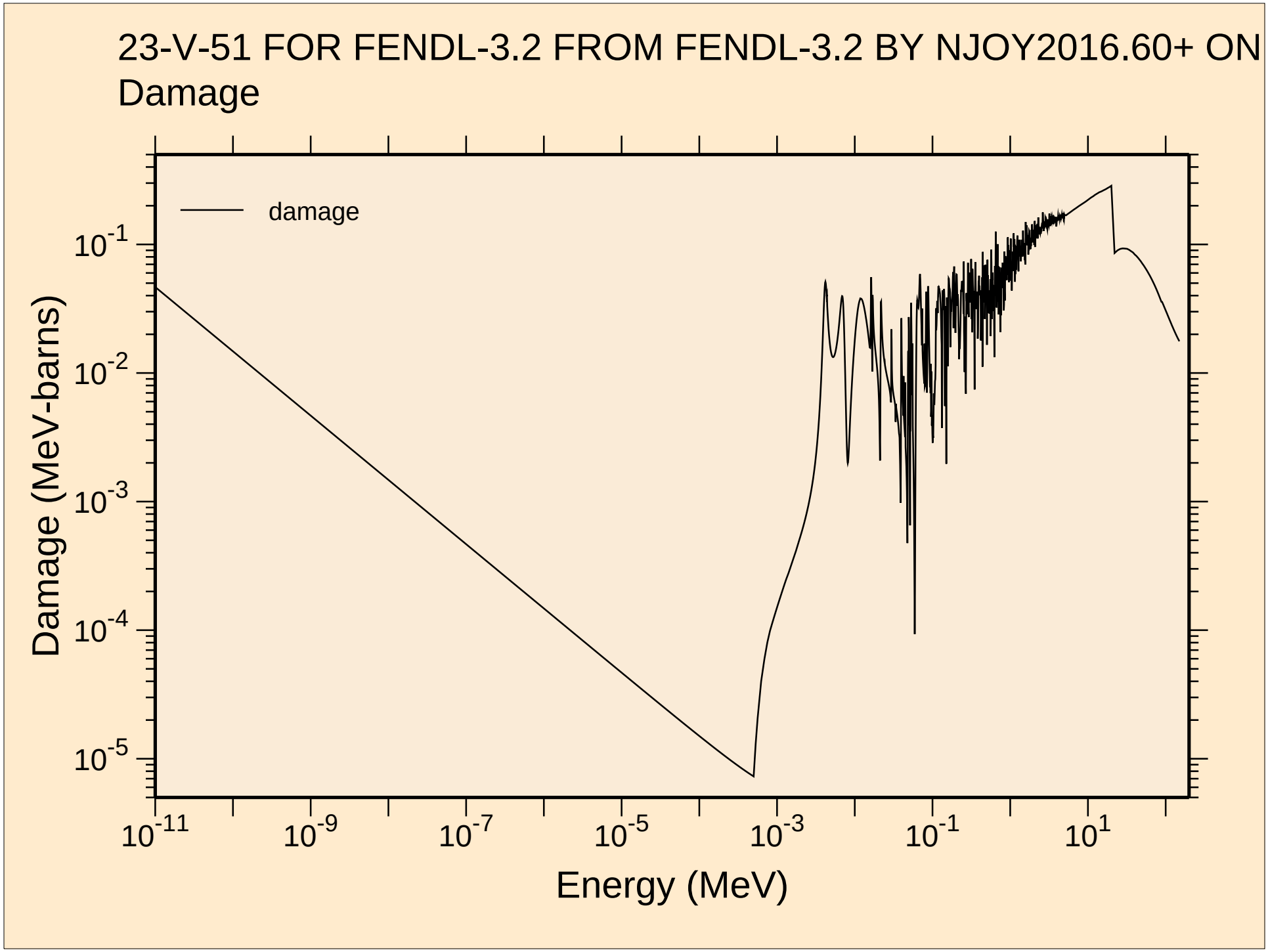

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
resonance absorption cross sections
capture
Cross section (barns)
10^1
10^0
10^-1
10^-3
10^-2
Energy (MeV)

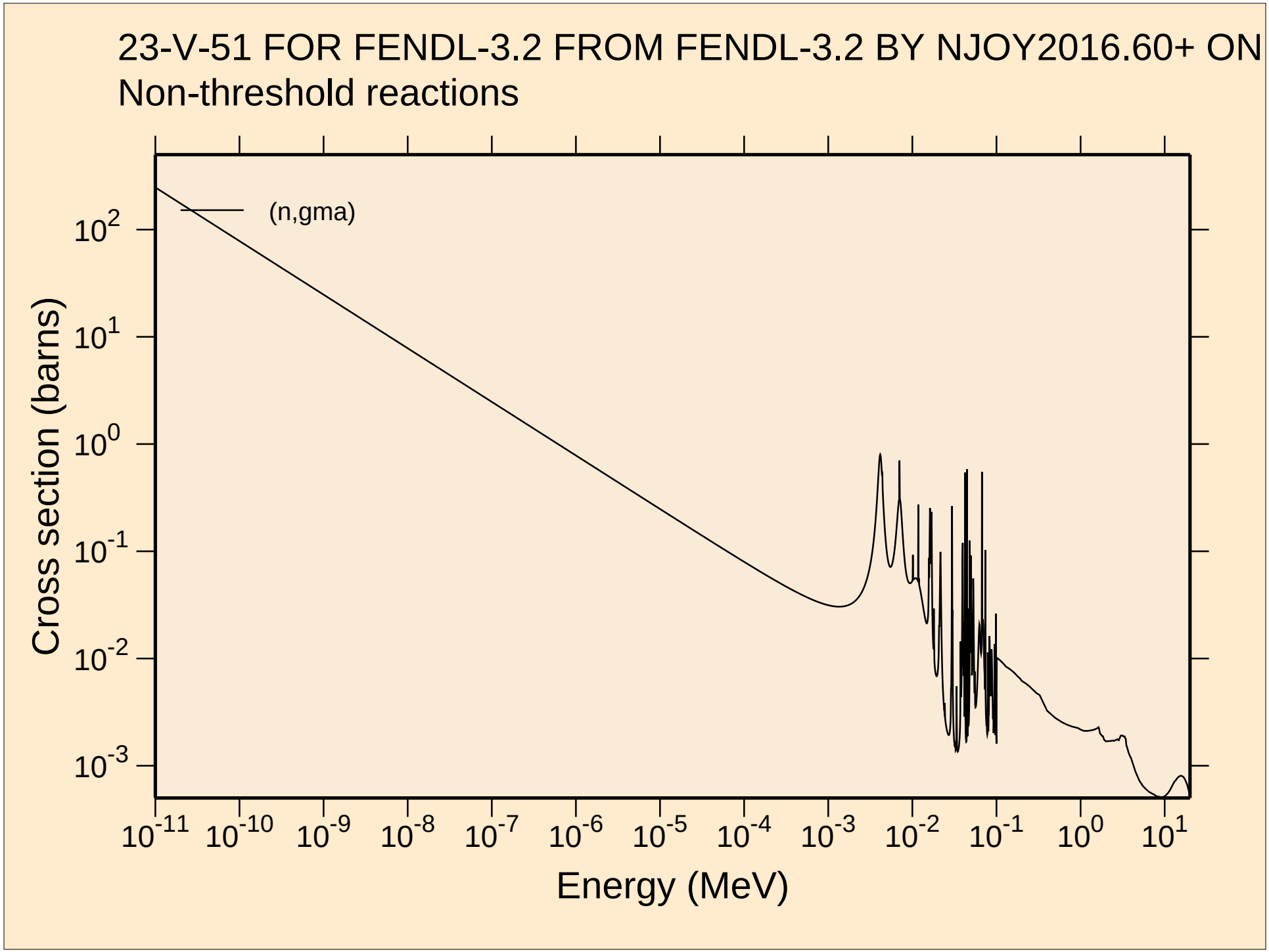

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
resonance absorption cross sections
capture
Cross section (barns)
10^0
10^-1
10^-2
10^-3
10^-2
10^-1
Energy (MeV)

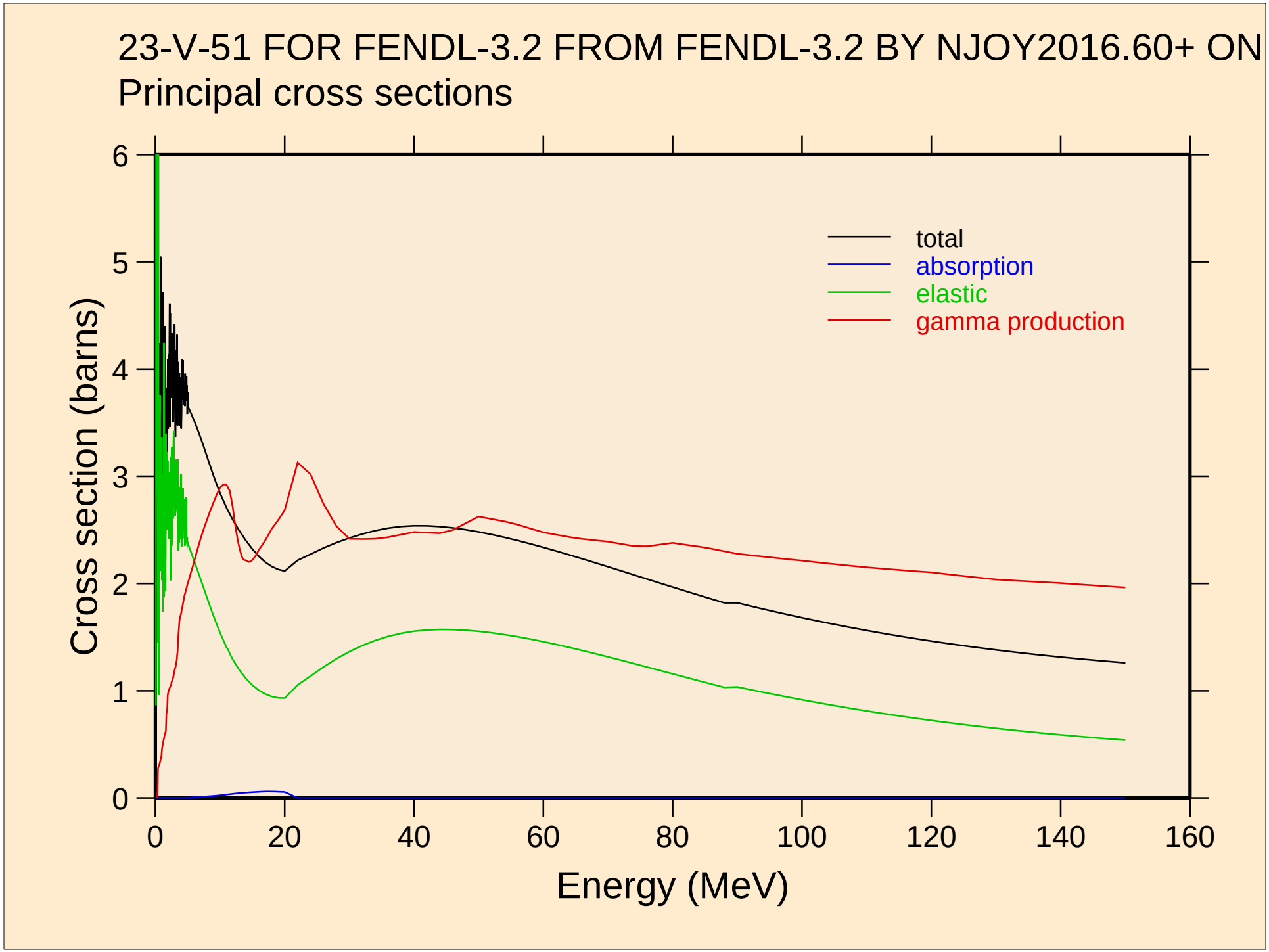

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
resonance absorption cross sections
capture
Cross section (barns)
10-2
10-1
100
Energy (MeV)

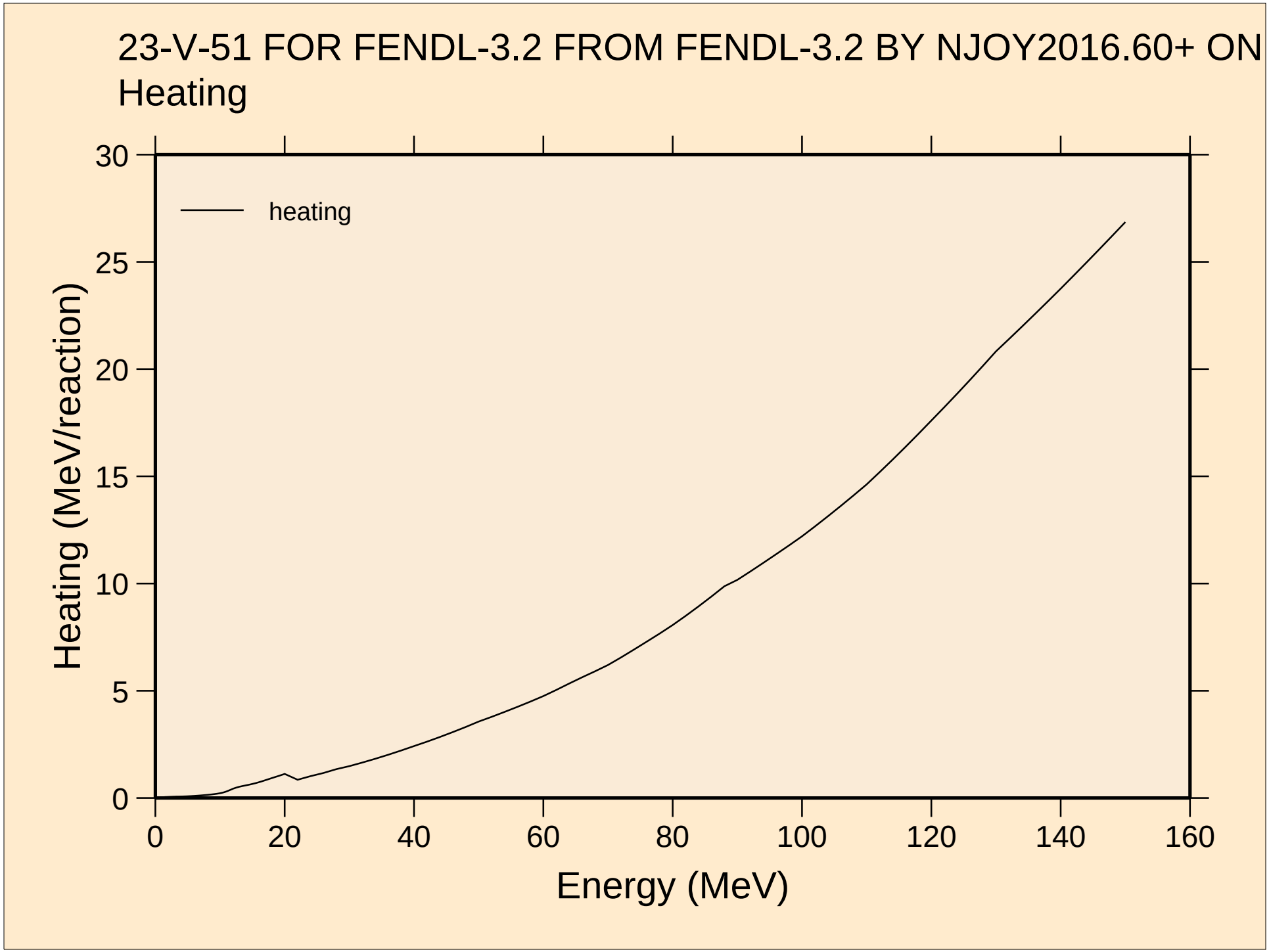

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
resonance absorption cross sections
capture
Cross section (barns)
10-3
100
101
Energy (MeV)

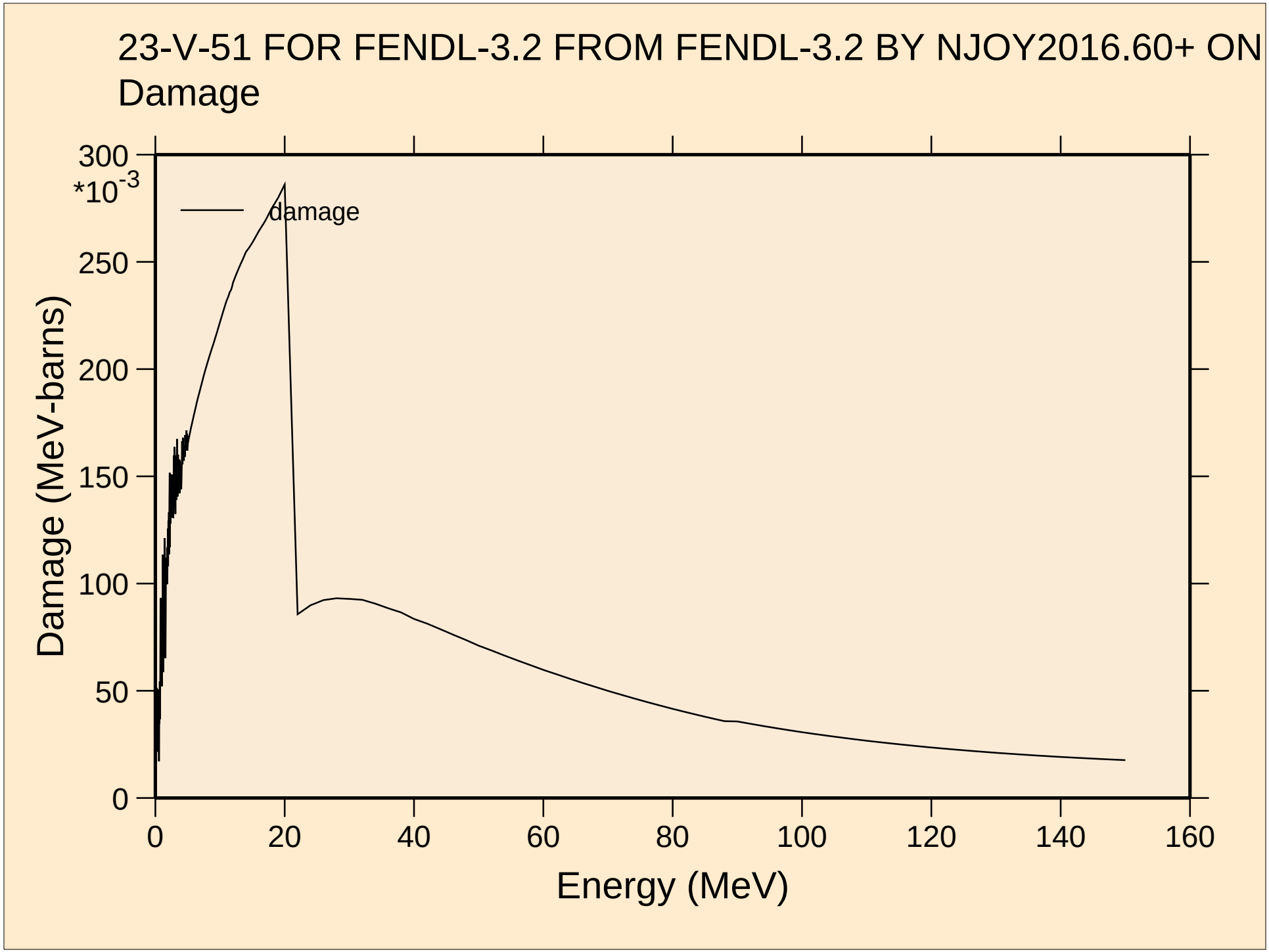

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Heating
heating
Heating (MeV/reaction)
10^1
10^0
10^-1
10^-2
10^-3
10^-4
10^-11
10^-9
10^-7
10^-5
10^-3
10^-1
10^1
Energy (MeV)

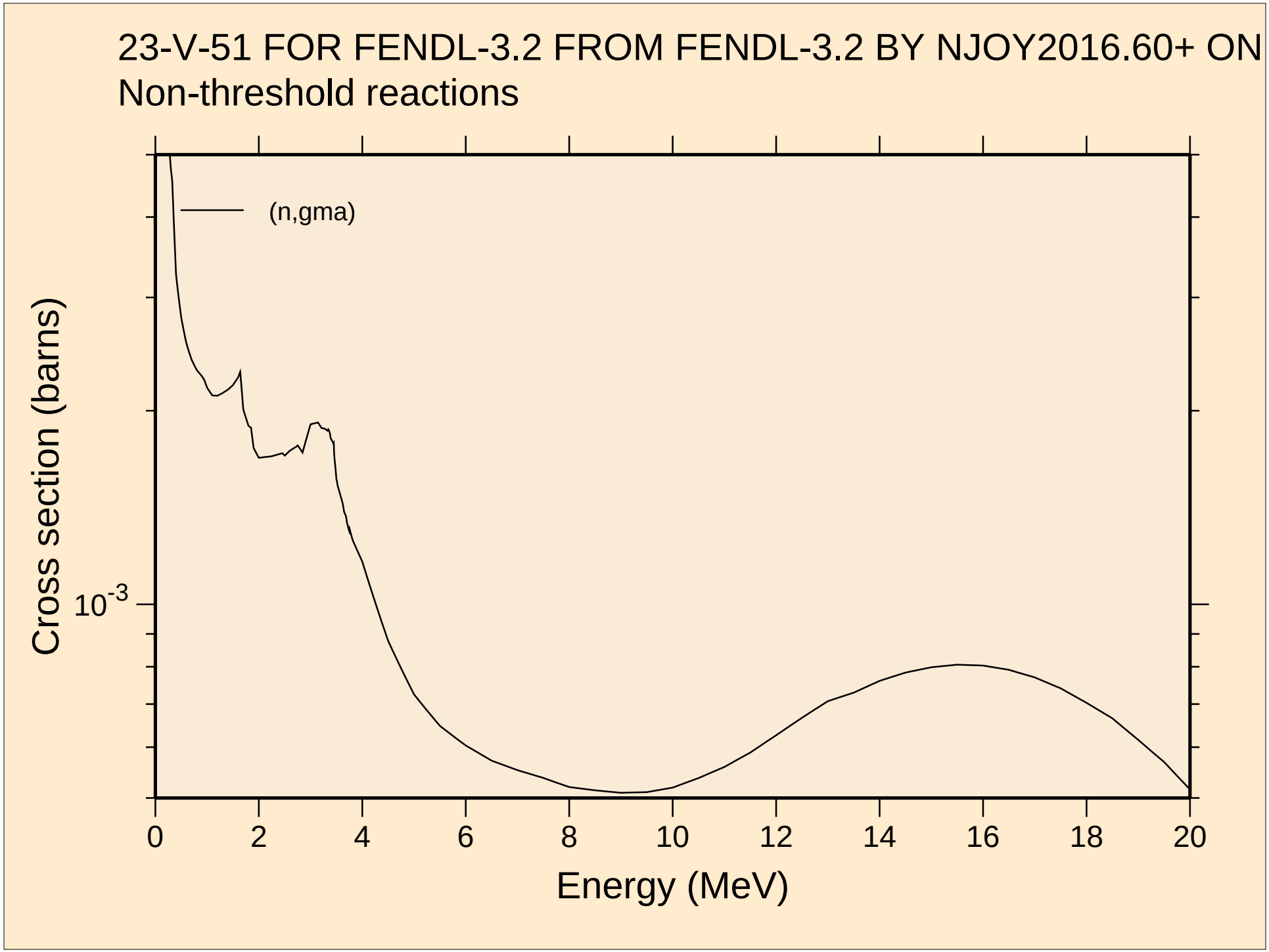

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Damage
damage
Damage (MeV-barns)
10-1
10-2
10-3
10-4
10-5
10-11
10-9
10-7
10-5
10-3
10-1
101
Energy (MeV)

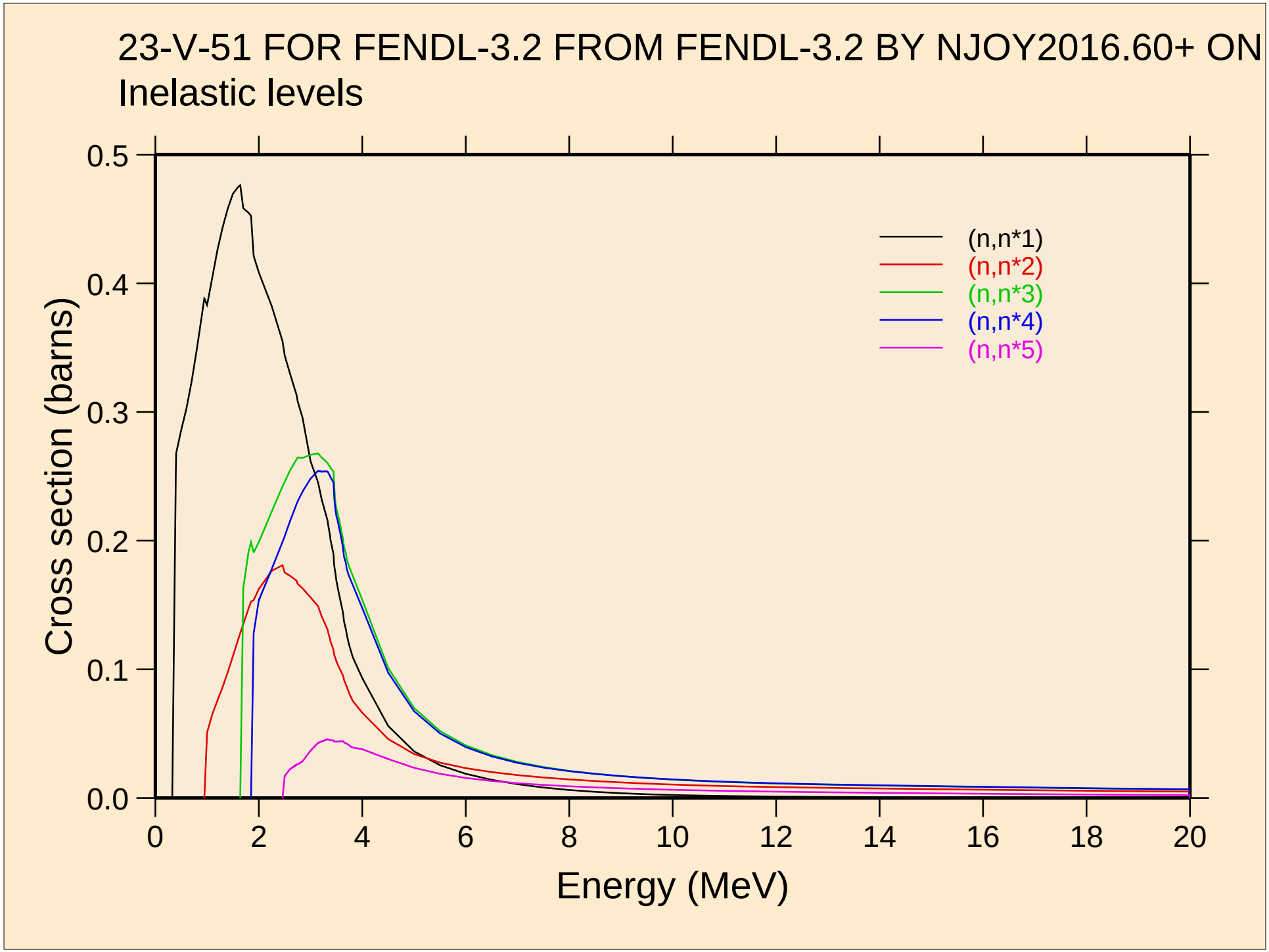

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Non-threshold reactions
(n,gma)
Cross section (barns)
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^-11 10^-10 10^-9 10^-8 10^-7 10^-6 10^-5 10^-4 10^-3 10^-2 10^-1 10^0 10^1
Energy (MeV)

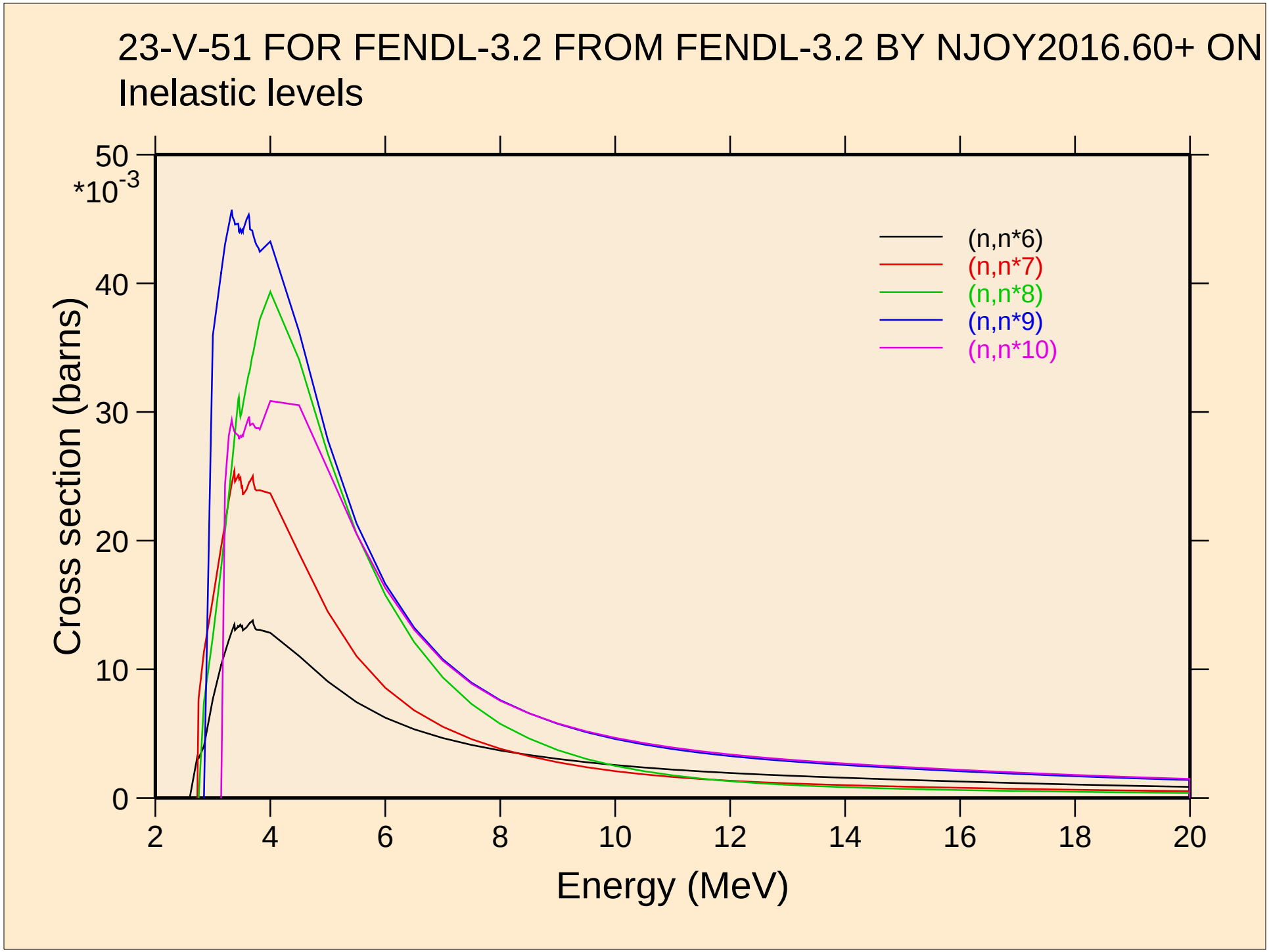

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Principal cross sections
Cross section (barns)
Energy (MeV)
0
1
2
3
4
5
6
0
20
40
60
80
100
120
140
160
total
absorption
elastic
gamma production

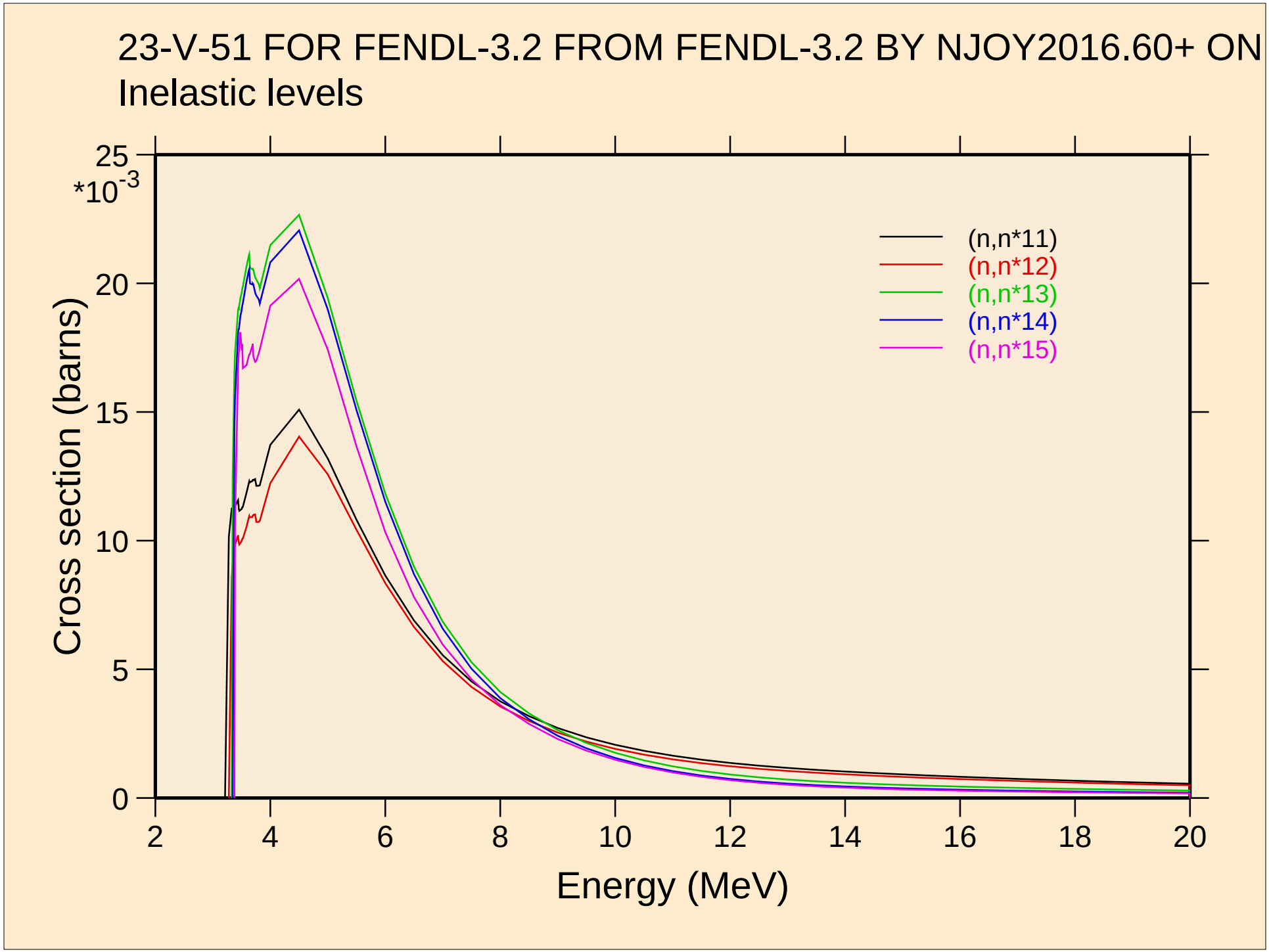

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
0
5
10
15
20
25
30
0
20
40
60
80
100
120
140
160

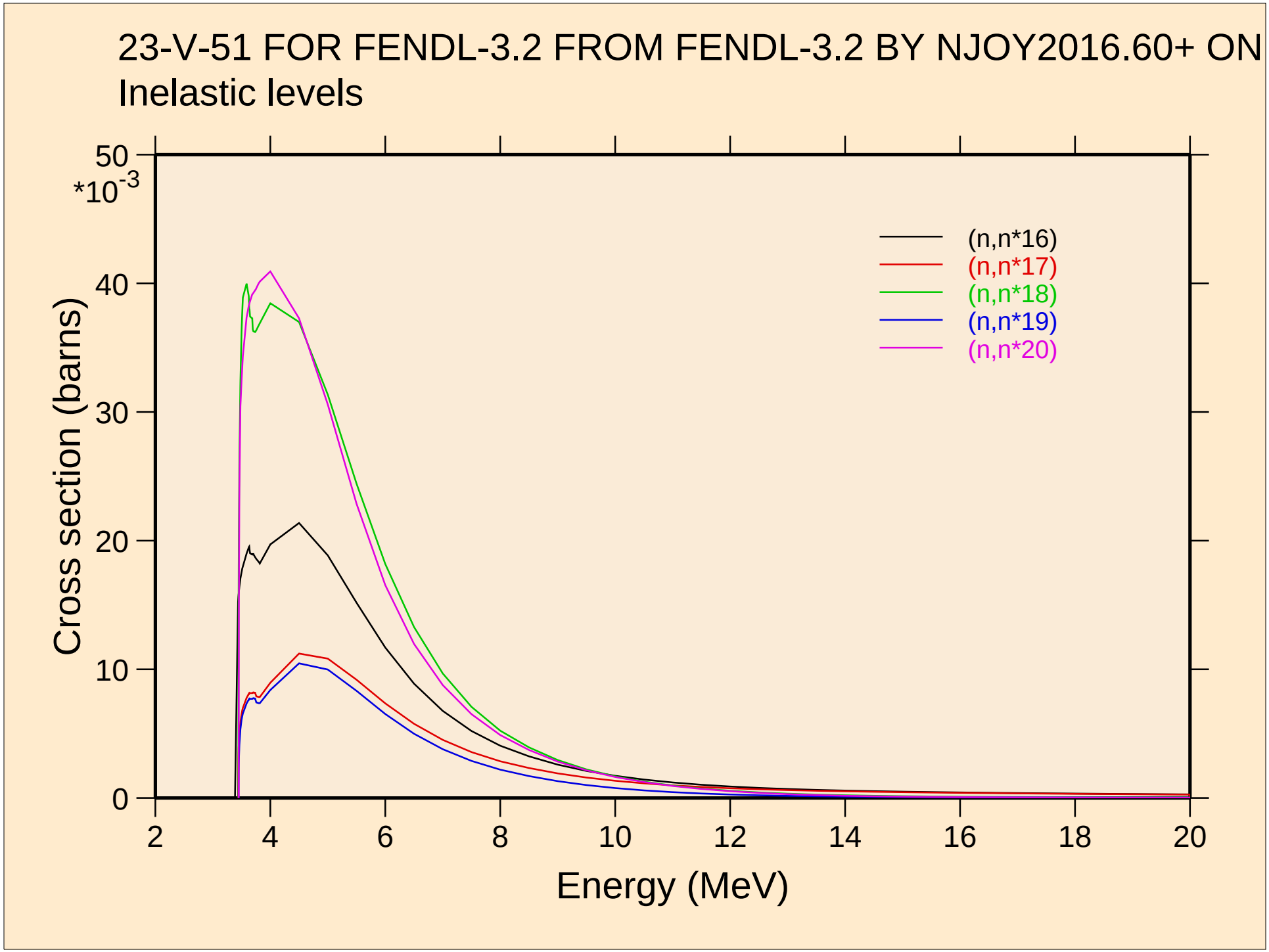

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Damage
300
*10-3
damage
250
200
150
100
50
0
Damage (MeV-barns)
0
20
40
60
80
100
120
140
160
Energy (MeV)

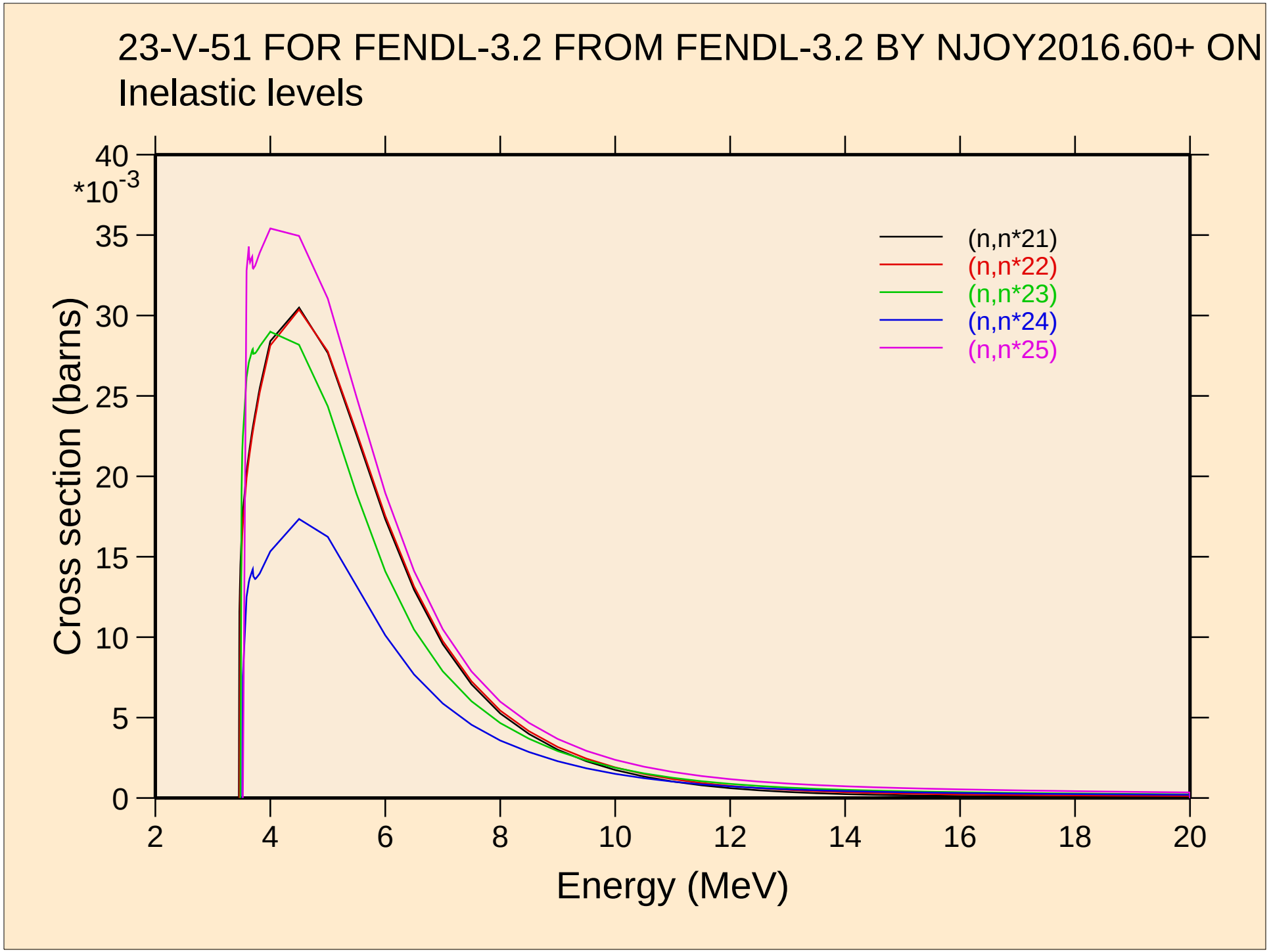

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Non-threshold reactions
(n,gma)
Cross section (barns)
10-3
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

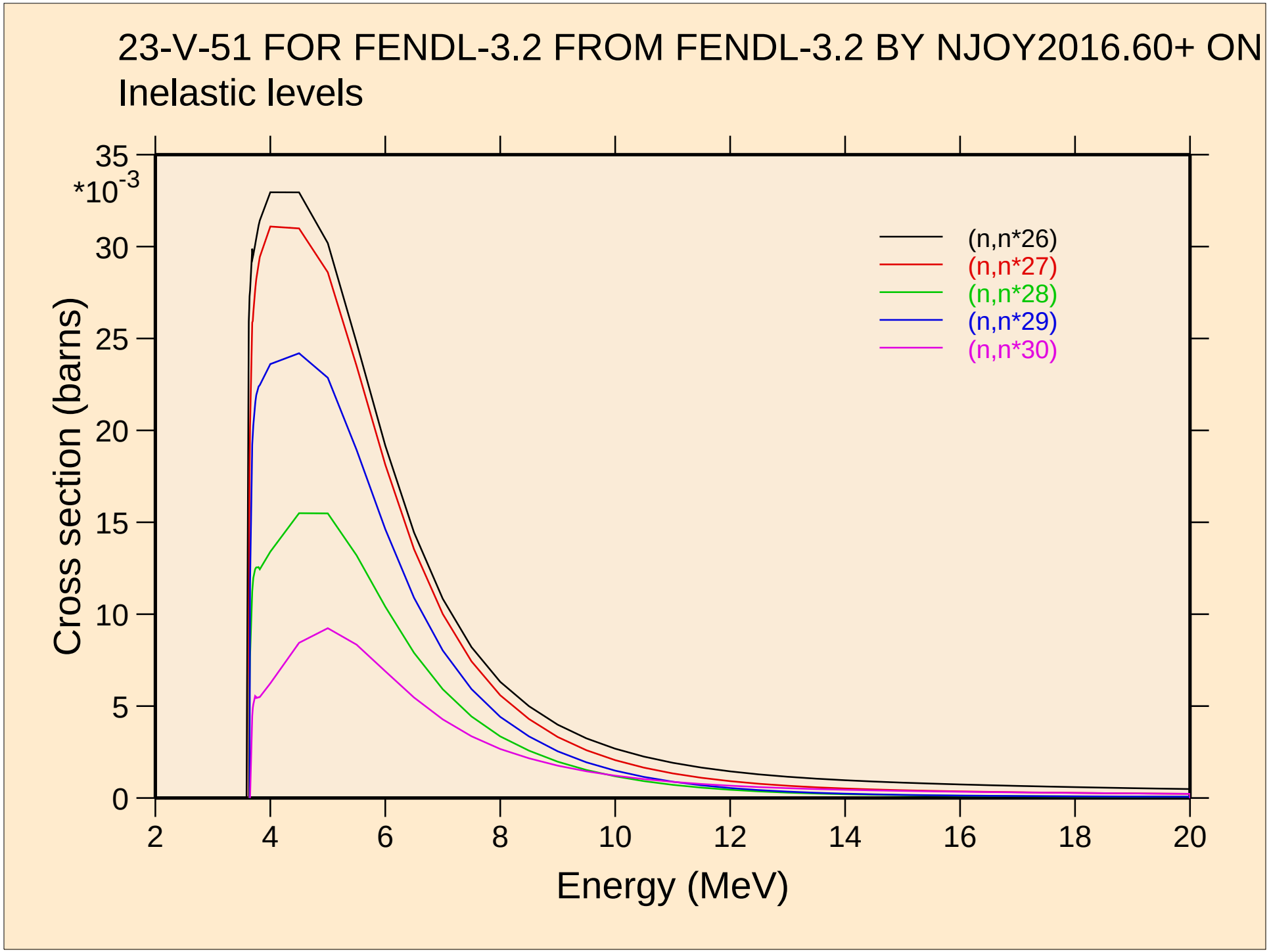

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Inelastic levels
Cross section (barns)
Energy (MeV)
0.0
0.1
0.2
0.3
0.4
0.5
0
2
4
6
8
10
12
14
16
18
20
(n,n*1)
(n,n*2)
(n,n*3)
(n,n*4)
(n,n*5)

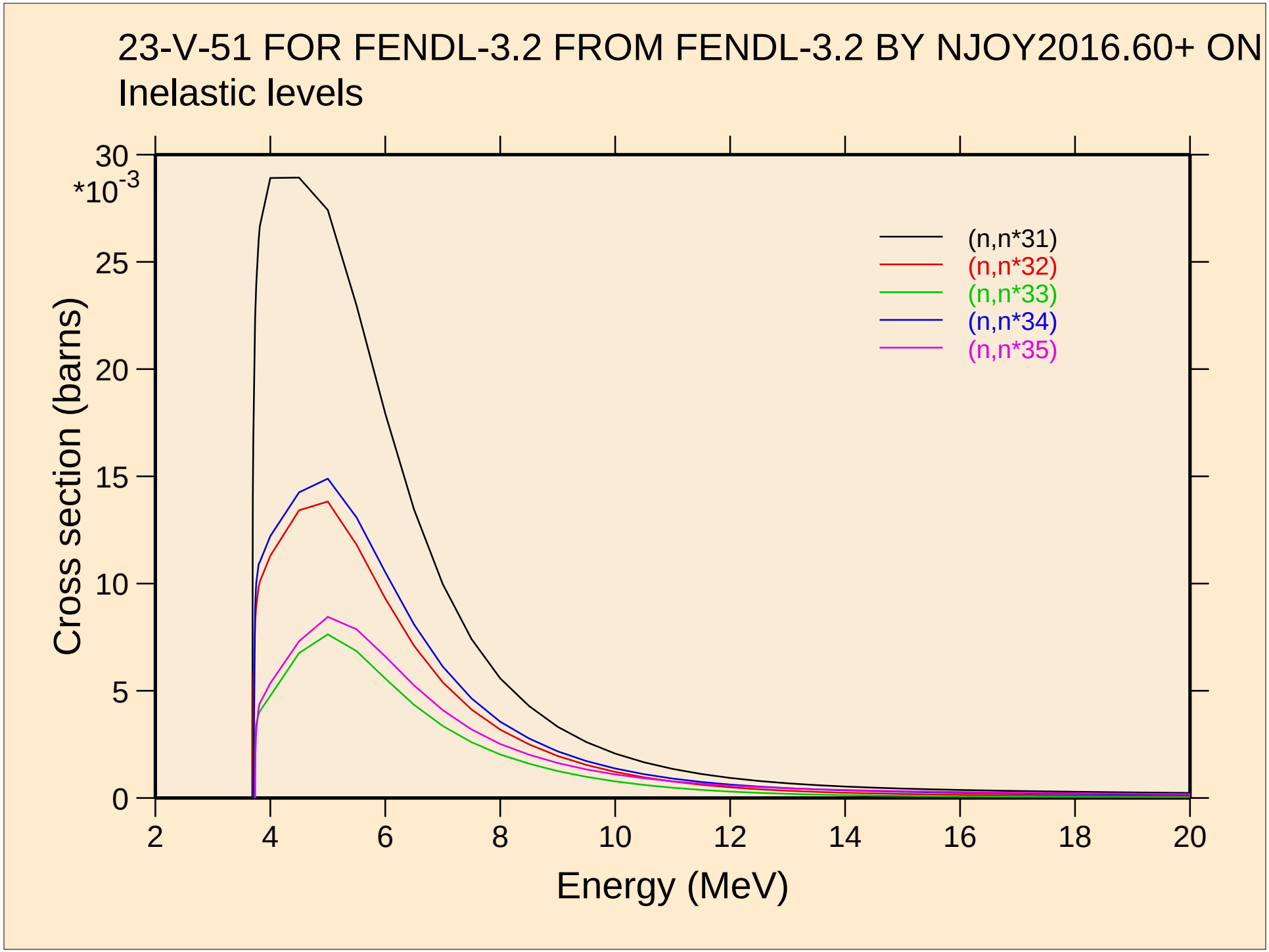

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Inelastic levels
Cross section (barns)
*10-3
50
40
30
20
10
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*6)
(n,n*7)
(n,n*8)
(n,n*9)
(n,n*10)

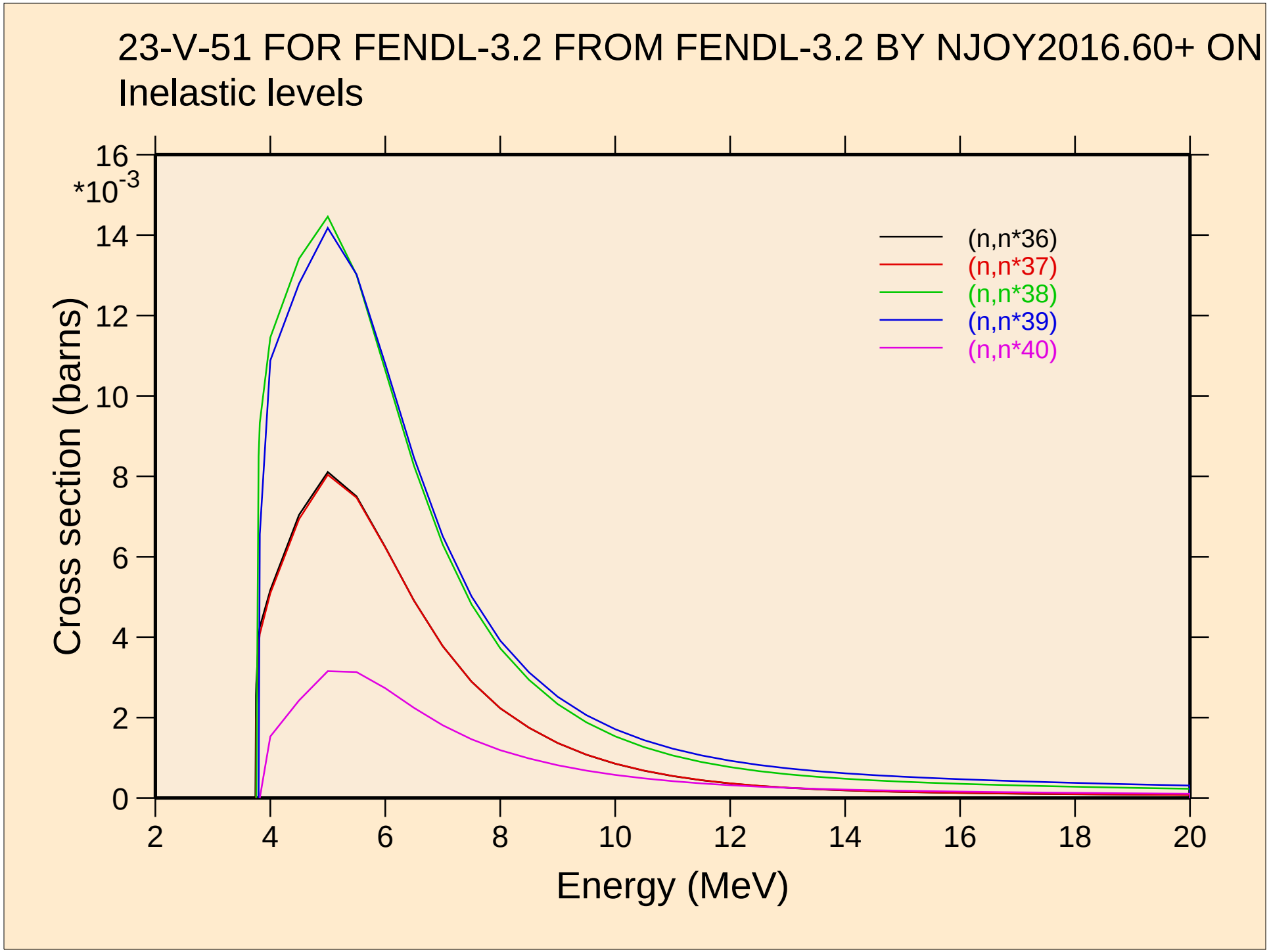

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Inelastic levels
Cross section (barns)
*10-3
25
20
15
10
5
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*11)
(n,n*12)
(n,n*13)
(n,n*14)
(n,n*15)

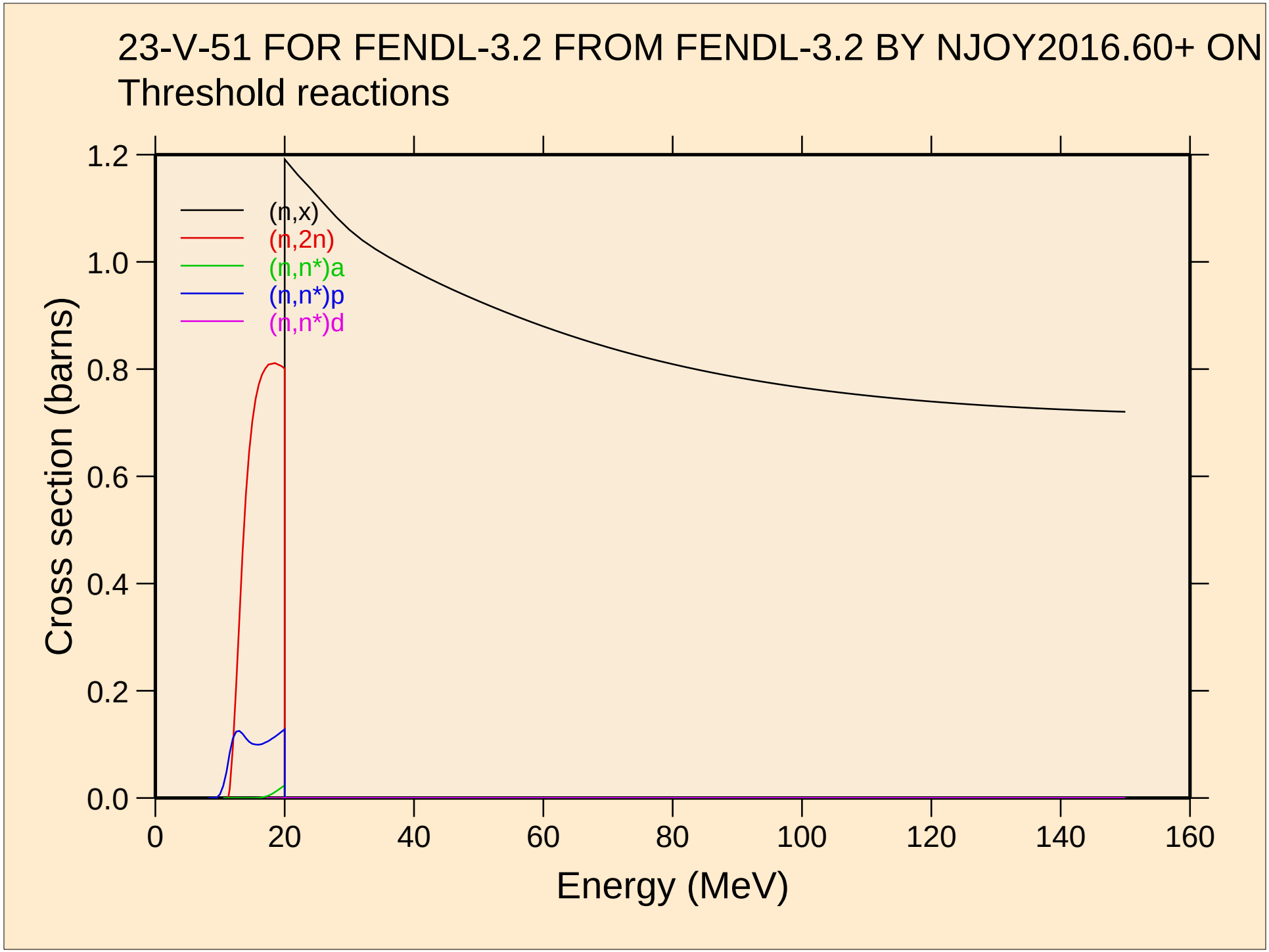

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Inelastic levels
*10-3
50
40
30
20
10
0
Cross section (barns)
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*16)
(n,n*17)
(n,n*18)
(n,n*19)
(n,n*20)

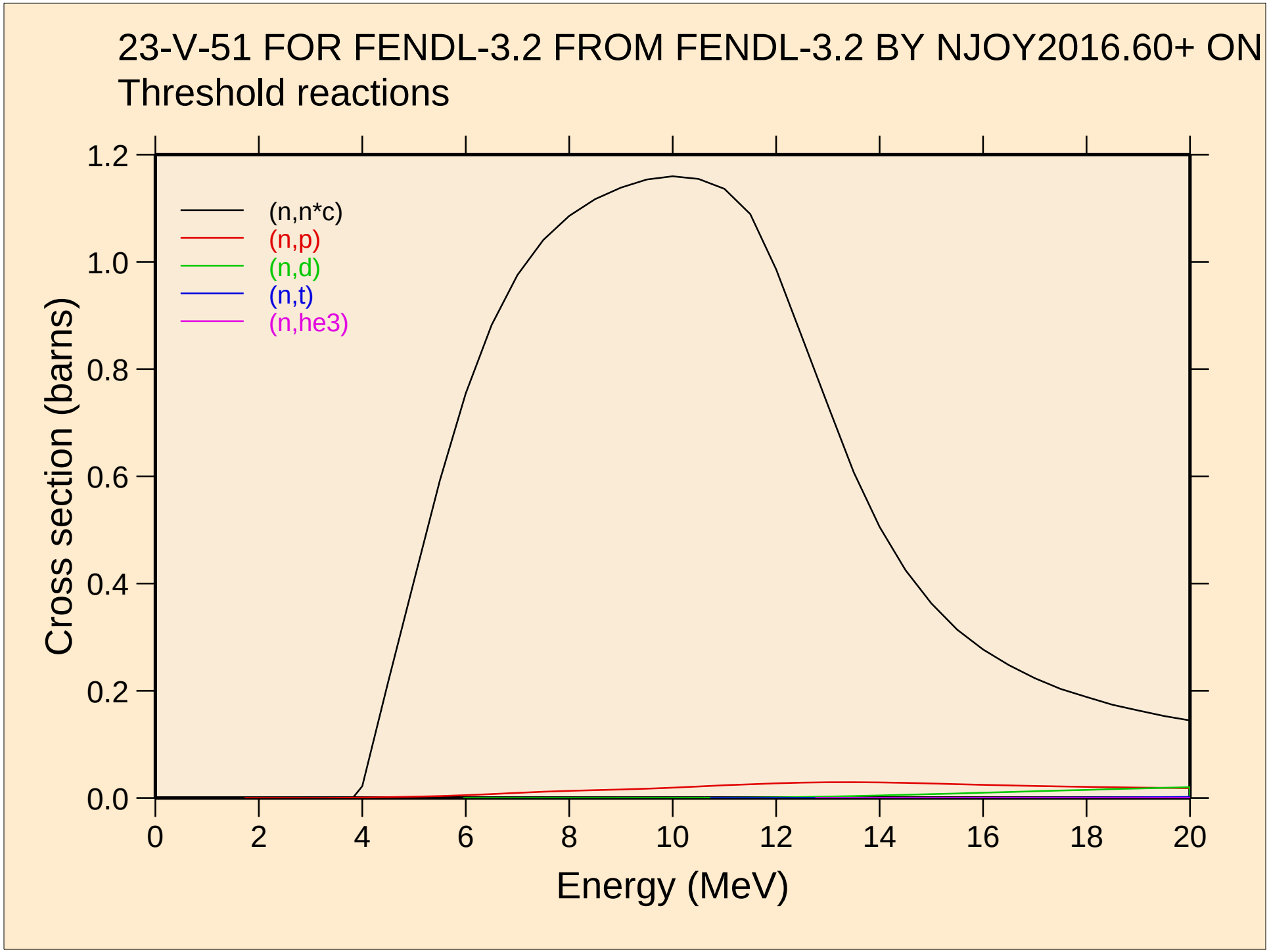

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Inelastic levels
Cross section (barns)
*10-3
40
35
30
25
20
15
10
5
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*21)
(n,n*22)
(n,n*23)
(n,n*24)
(n,n*25)

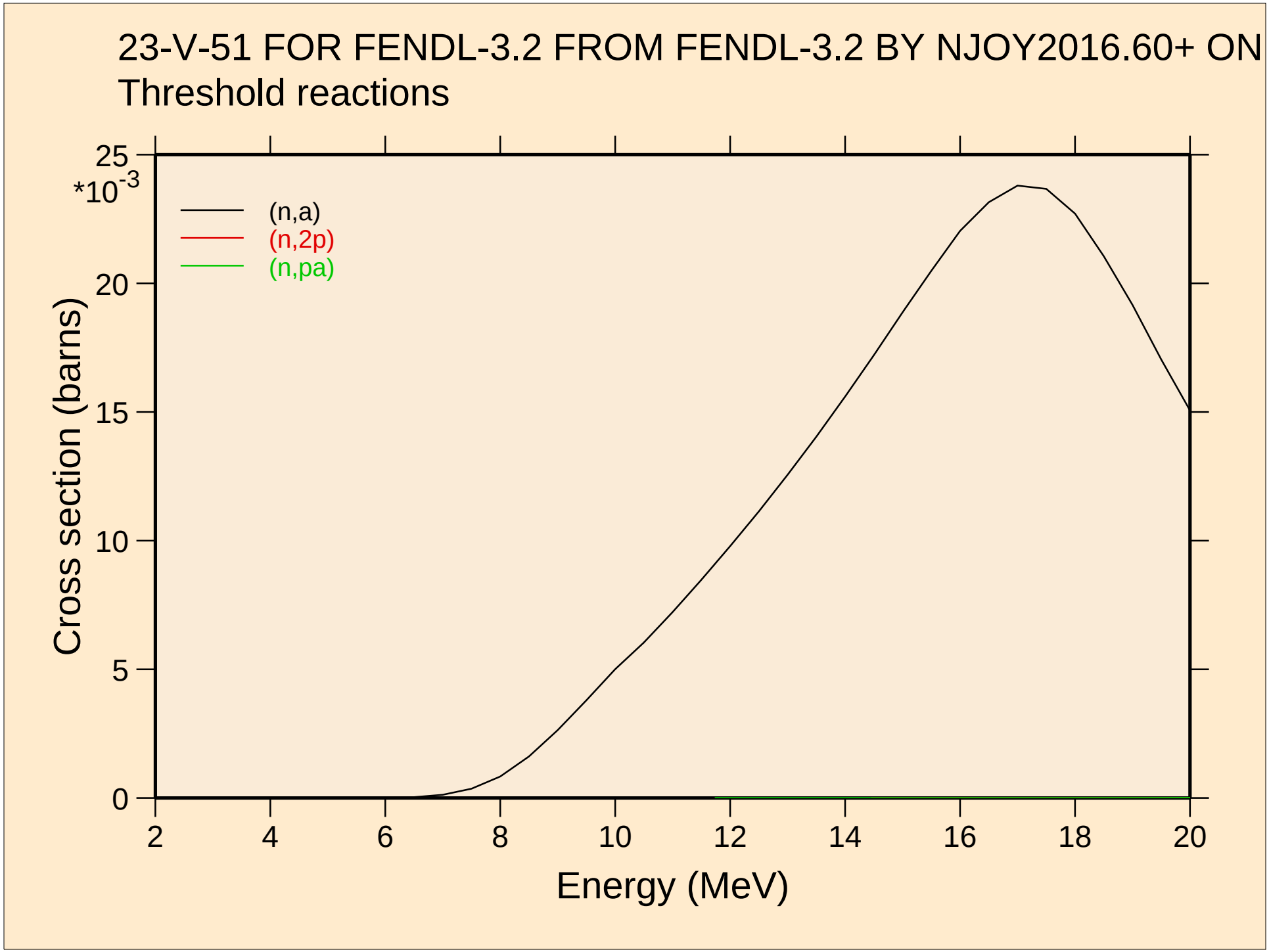

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Inelastic levels
Cross section (barns)
*10-3
35
30
25
20
15
10
5
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*26)
(n,n*27)
(n,n*28)
(n,n*29)
(n,n*30)

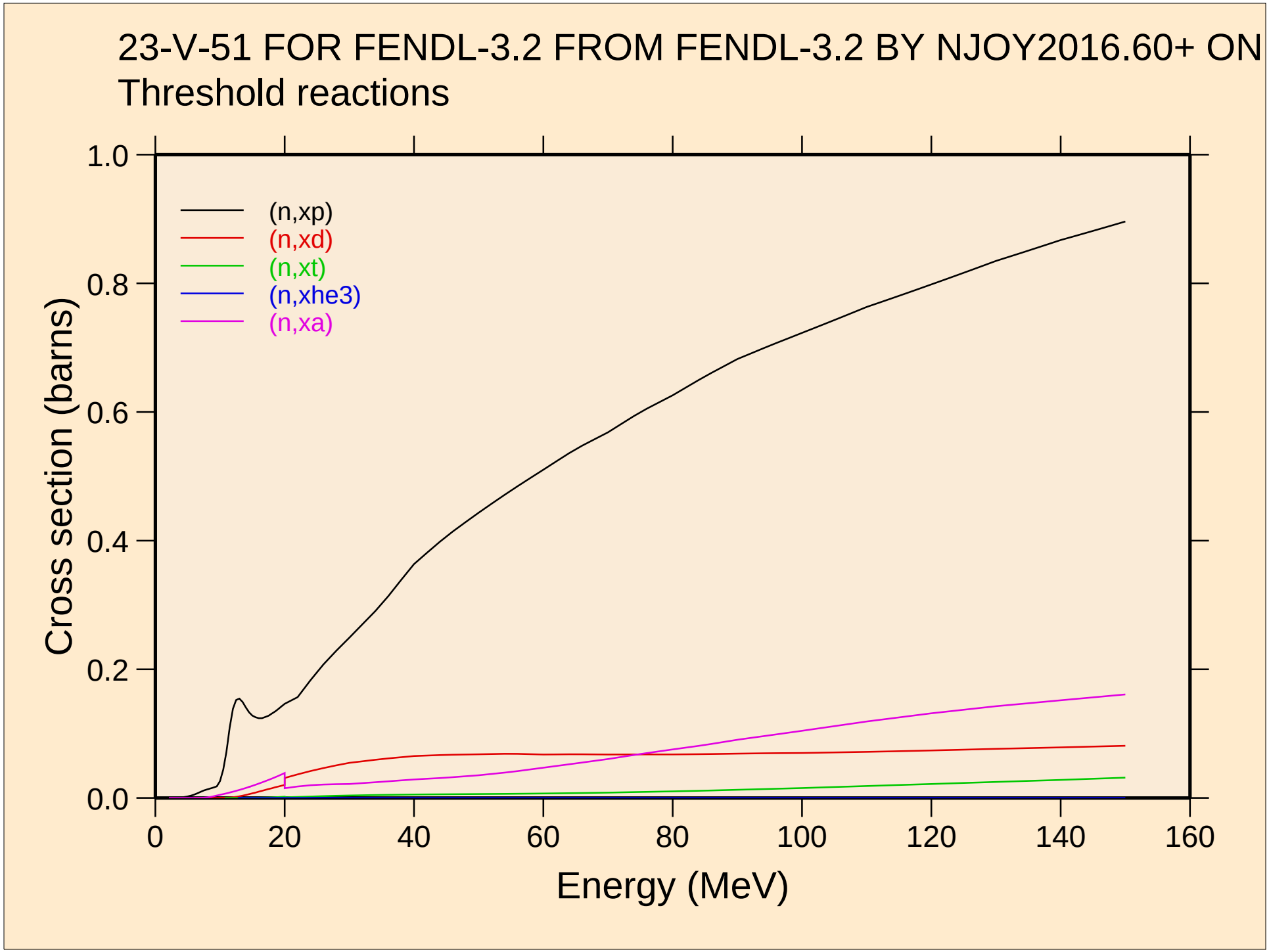

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Inelastic levels
Cross section (barns)
*10-3
30
25
20
15
10
5
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*31)
(n,n*32)
(n,n*33)
(n,n*34)
(n,n*35)

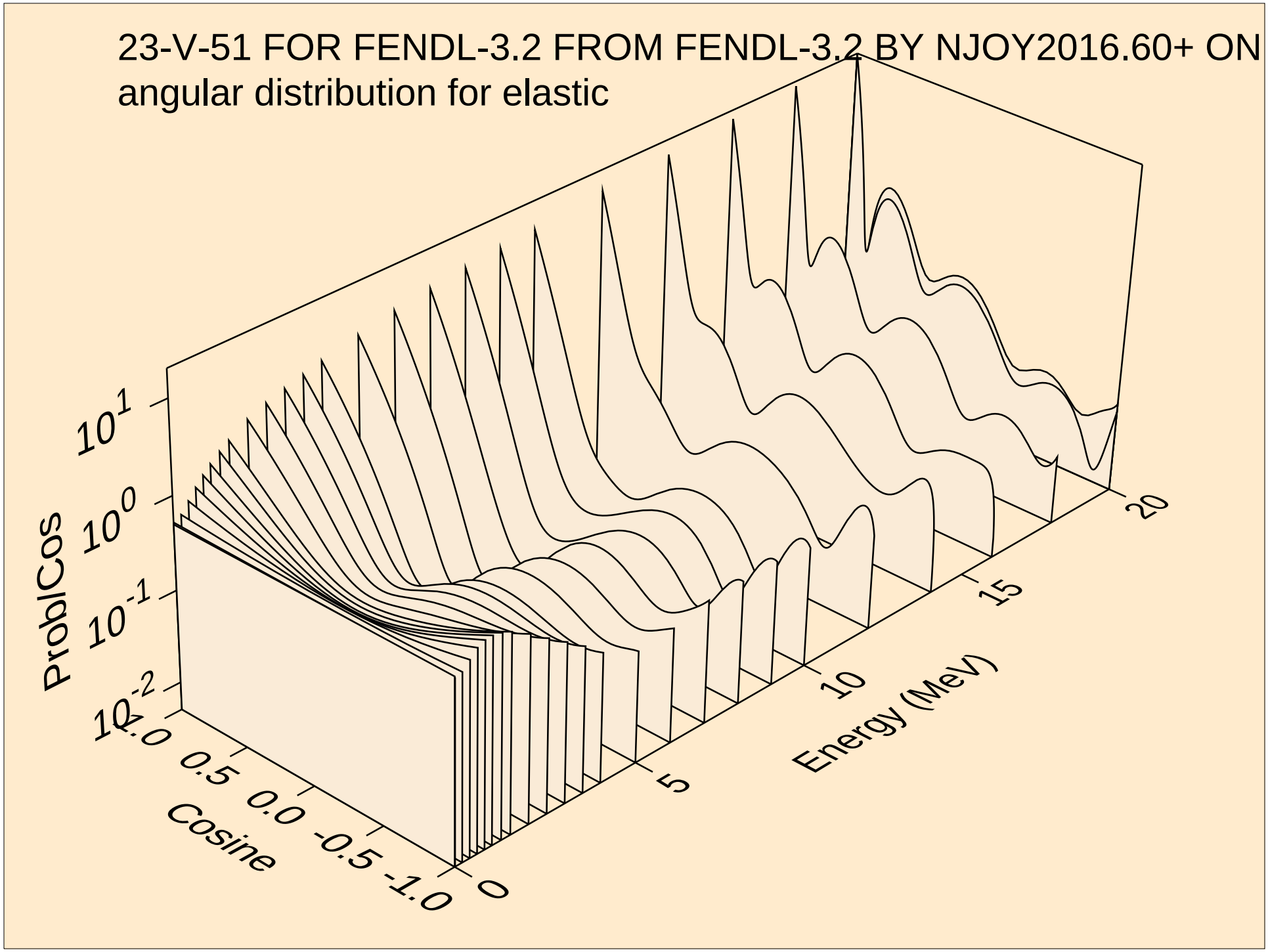

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Inelastic levels
Cross section (barns)
*10-3
16
14
12
10
8
6
4
2
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)
(n,n*36)
(n,n*37)
(n,n*38)
(n,n*39)
(n,n*40)

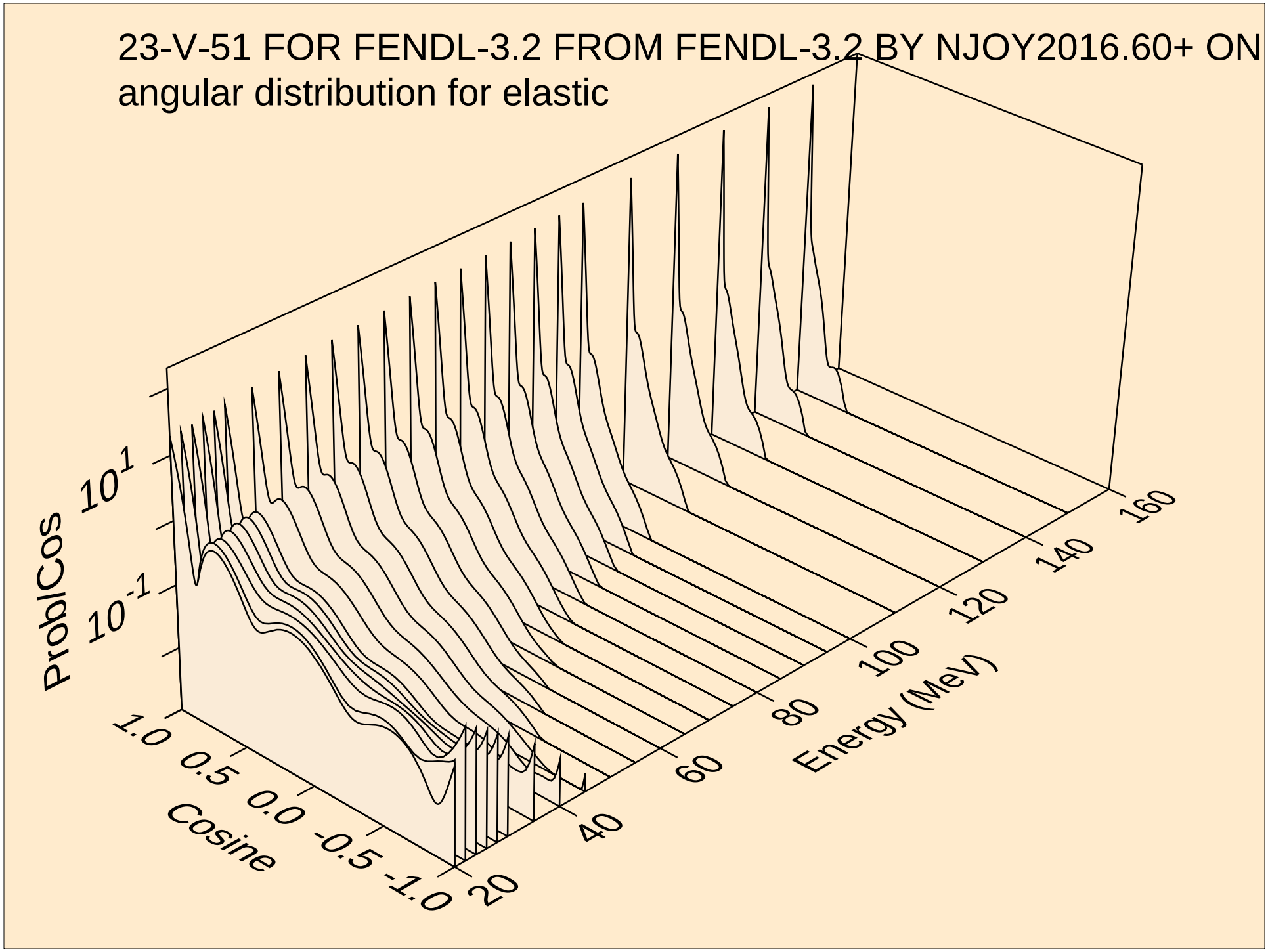

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Threshold reactions
(n,x)
(n,2n)
(n,n*)a
(n,n*)p
(n,n*)d
Cross section (barns)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
20
40
60
80
100
120
140
160
Energy (MeV)

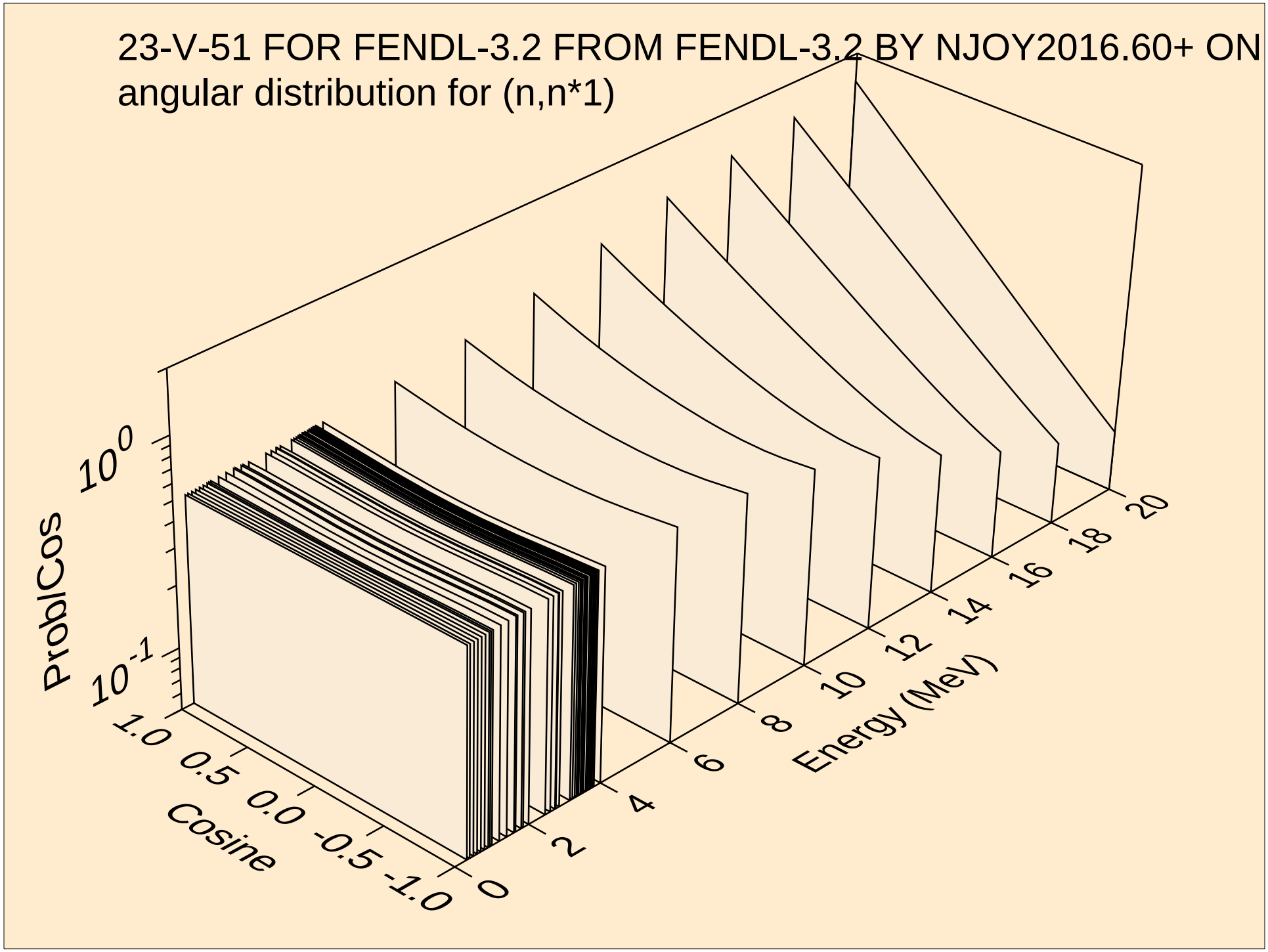

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Threshold reactions
(n,n*c)
(n,p)
(n,d)
(n,t)
(n,he3)
Cross section (barns)
Energy (MeV)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
0
2
4
6
8
10
12
14
16
18
20

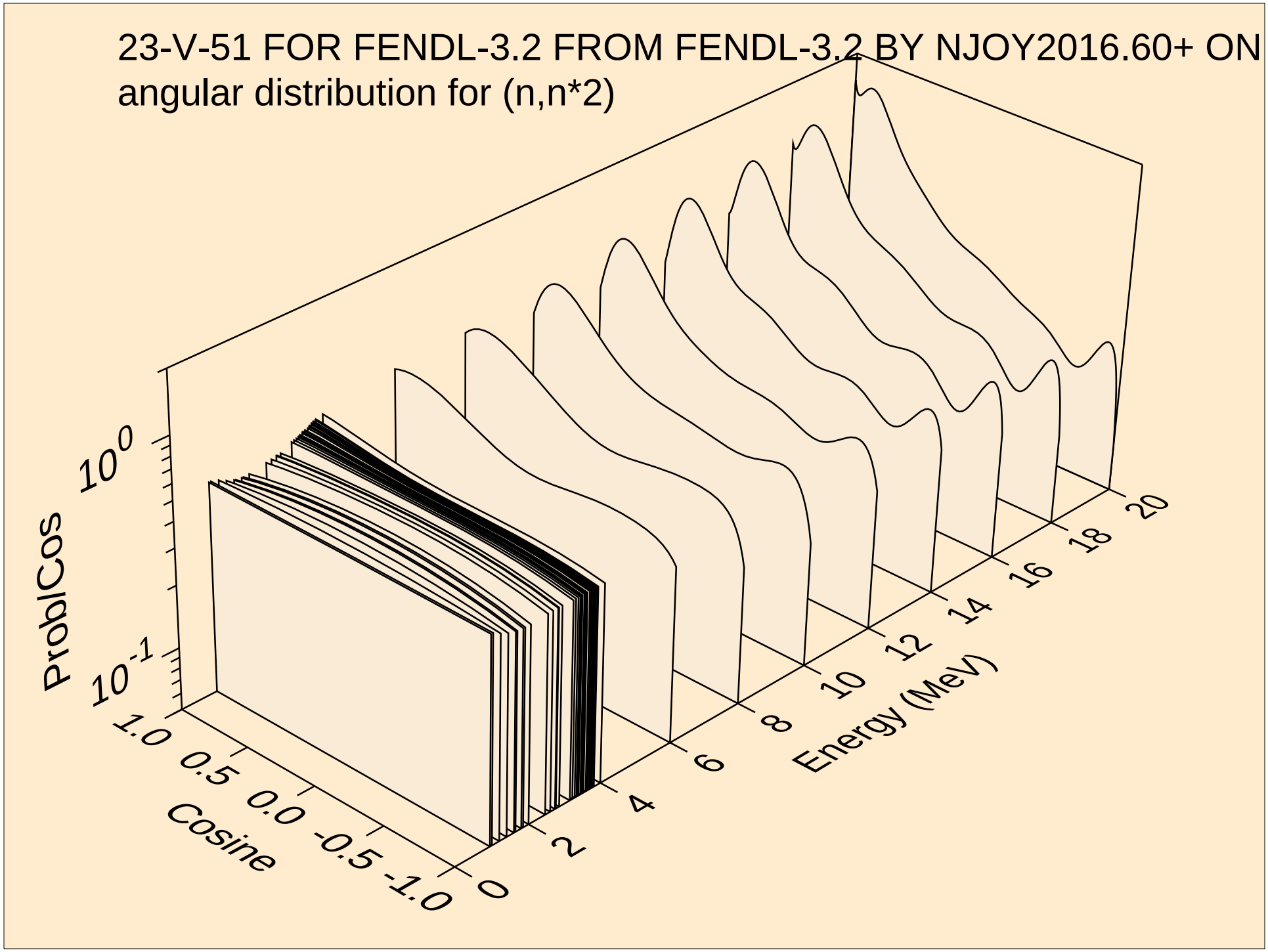

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Threshold reactions
*10-3
(n,a)
(n,2p)
(n,pa)
Cross section (barns)
Energy (MeV)
0
5
10
15
20
25
2
4
6
8
10
12
14
16
18
20

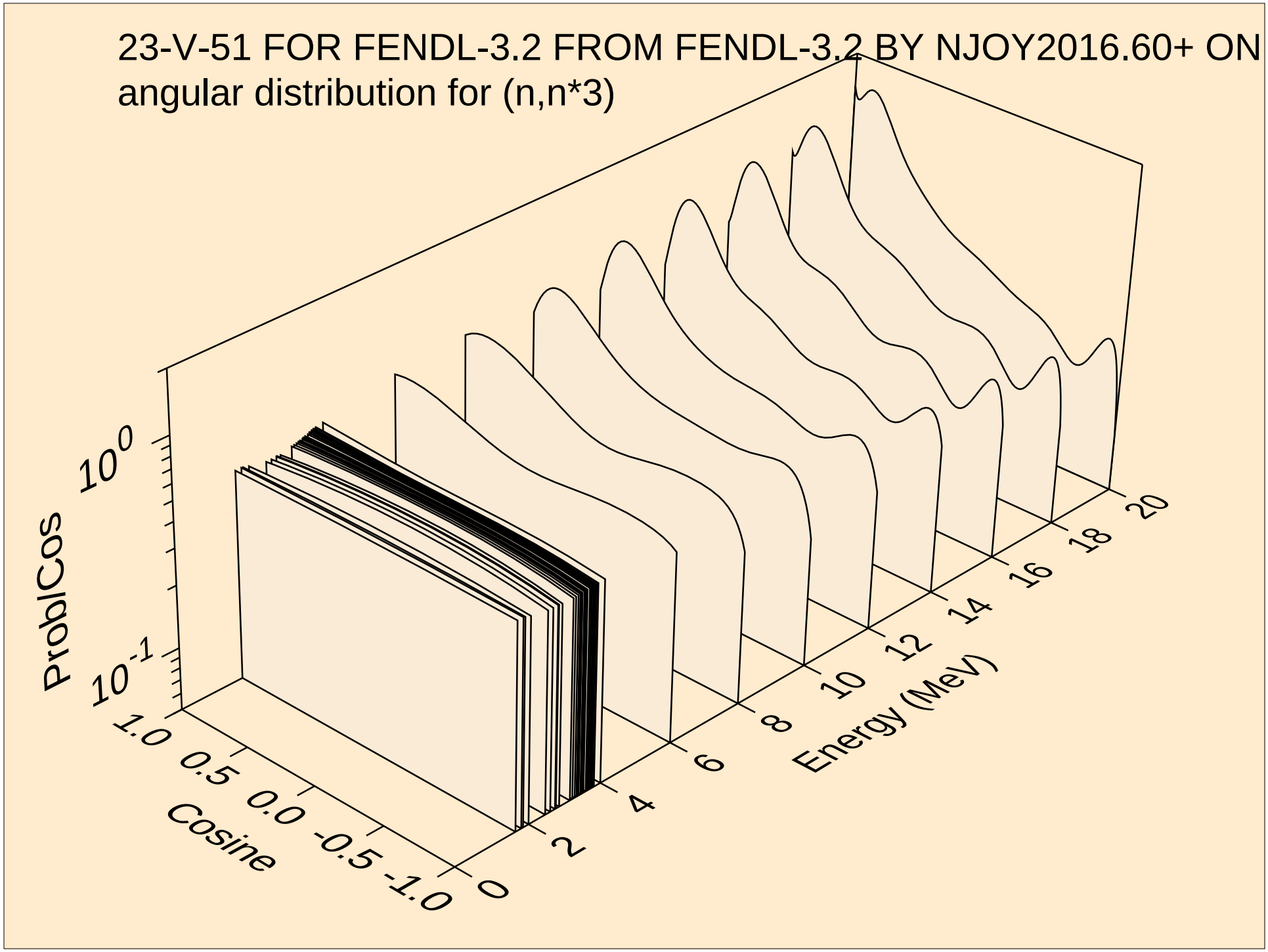

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Threshold reactions
(n,xp)
(n,xd)
(n,xt)
(n,xhe3)
(n,xa)
Cross section (barns)
1.0
0.8
0.6
0.4
0.2
0.0
0
20
40
60
80
100
120
140
160
Energy (MeV)

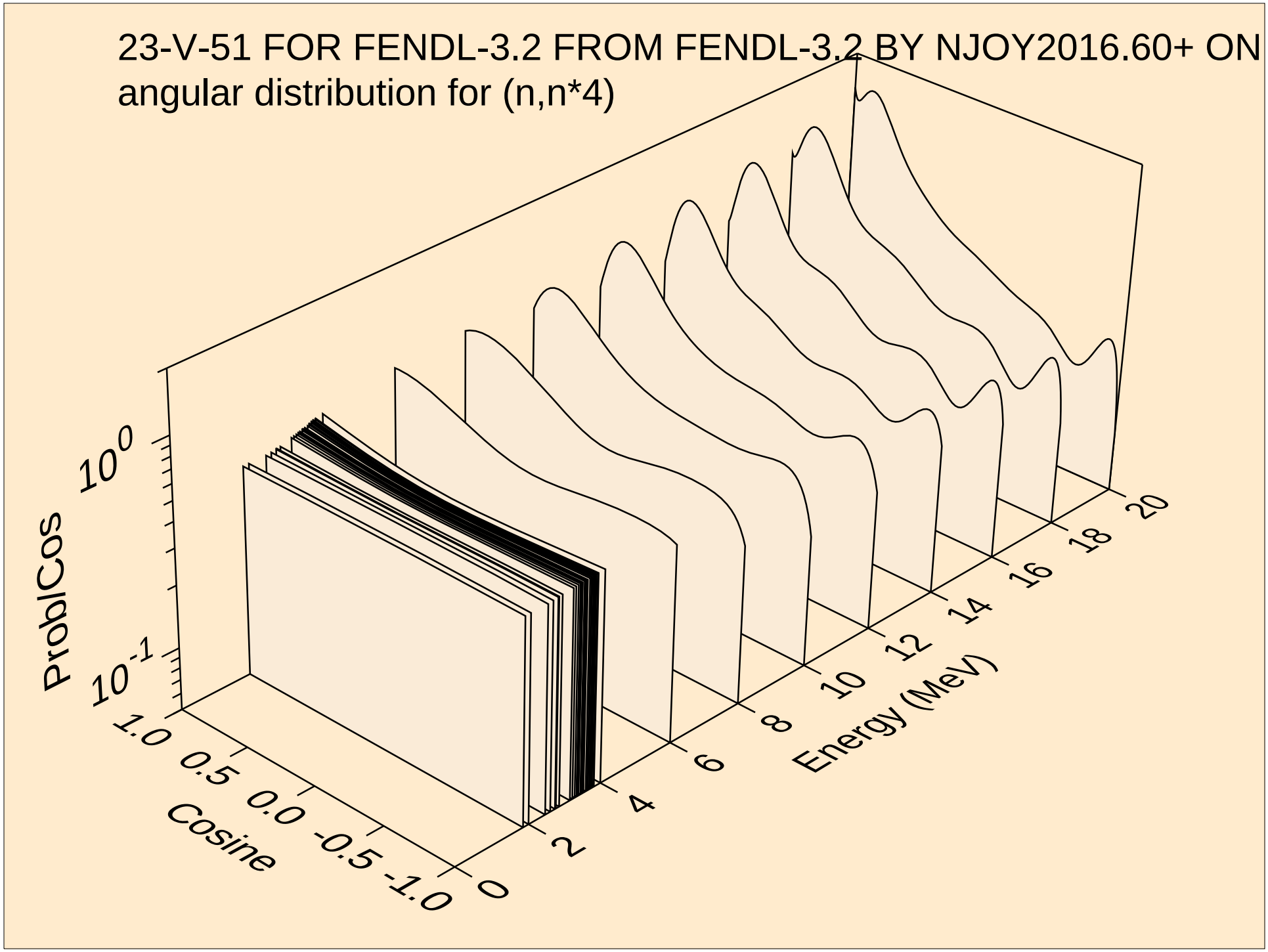

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for elastic
ProbICos
10^{1}
10^{0}
10^{-1}
10^{-2}
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
5
10
15
20

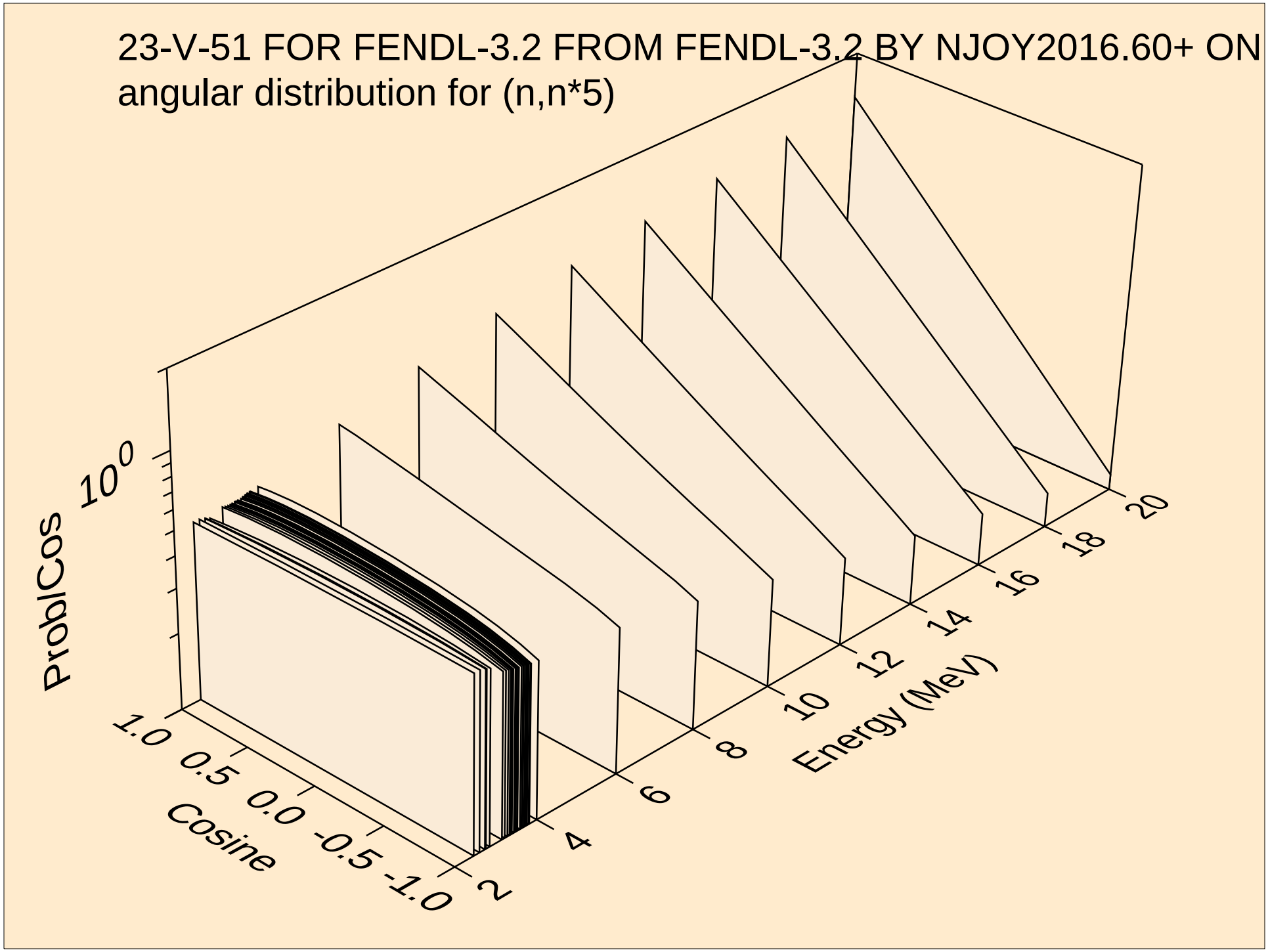

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for elastic
ProbICos
10^1
10^-1
1.0
0.5
0.0
-0.5
-1.0
Cosine
20
40
60
80
100
120
140
160
Energy (MeV)

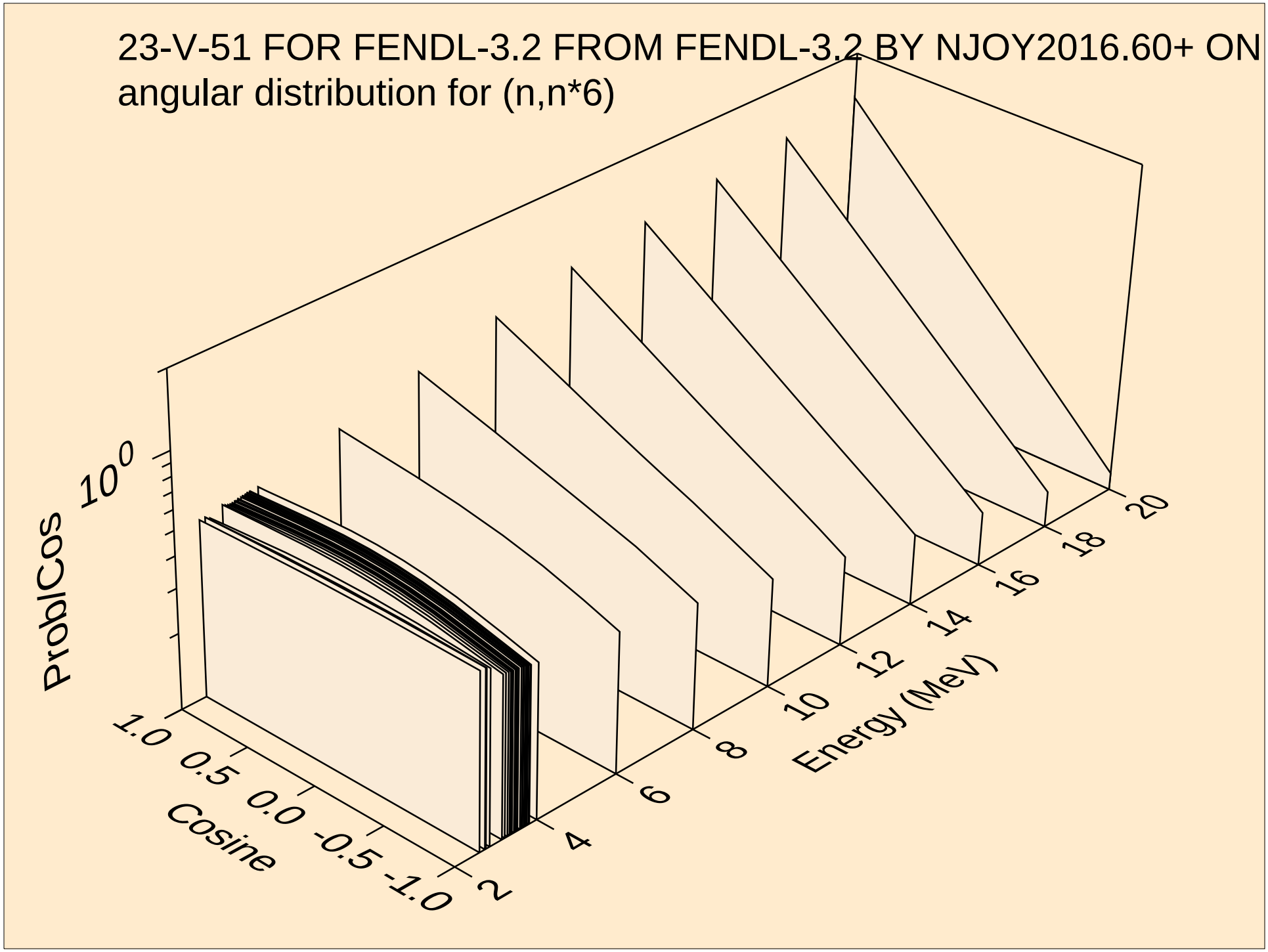

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*1)
ProbICos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

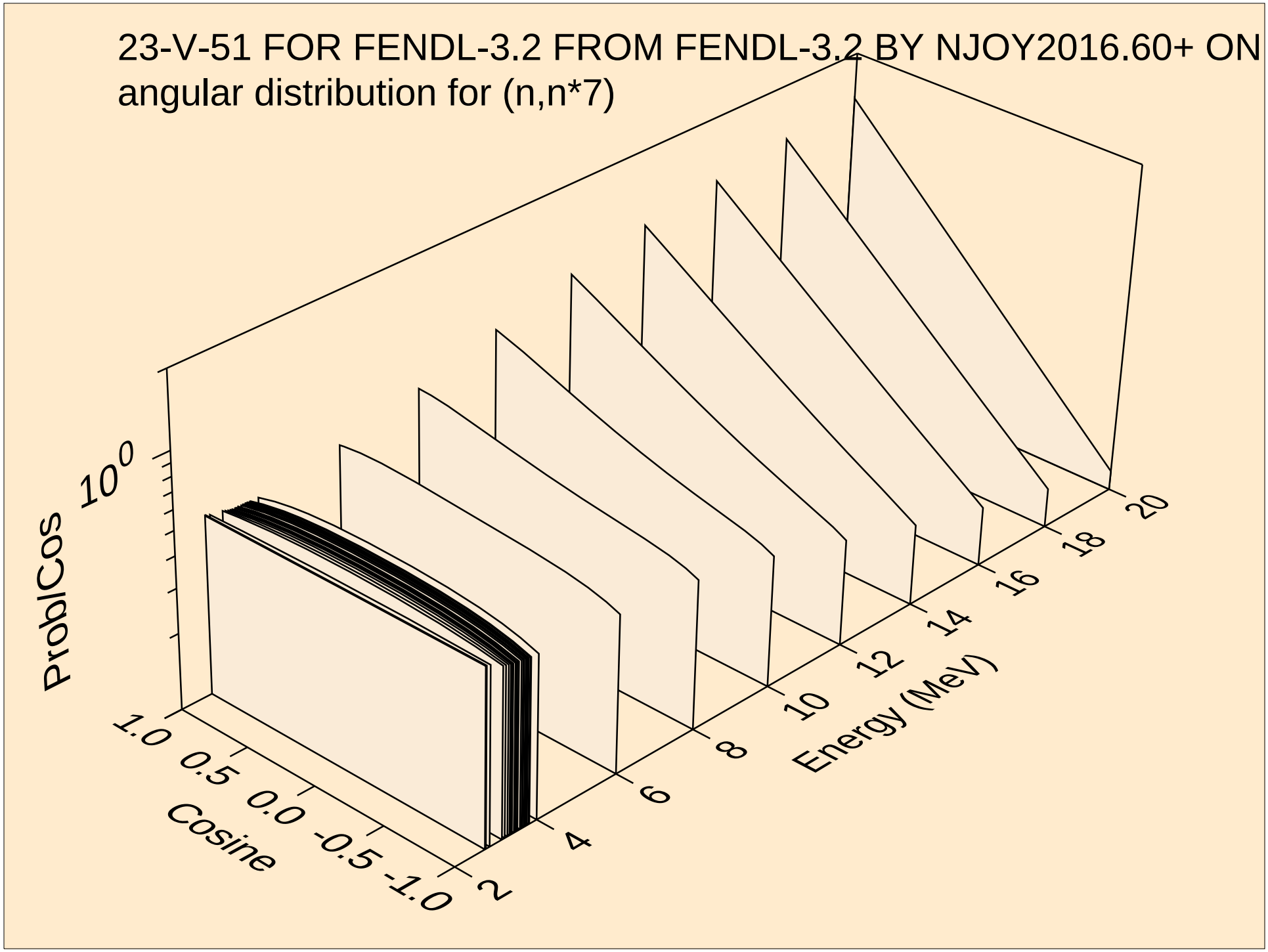

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*2)
ProbICos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

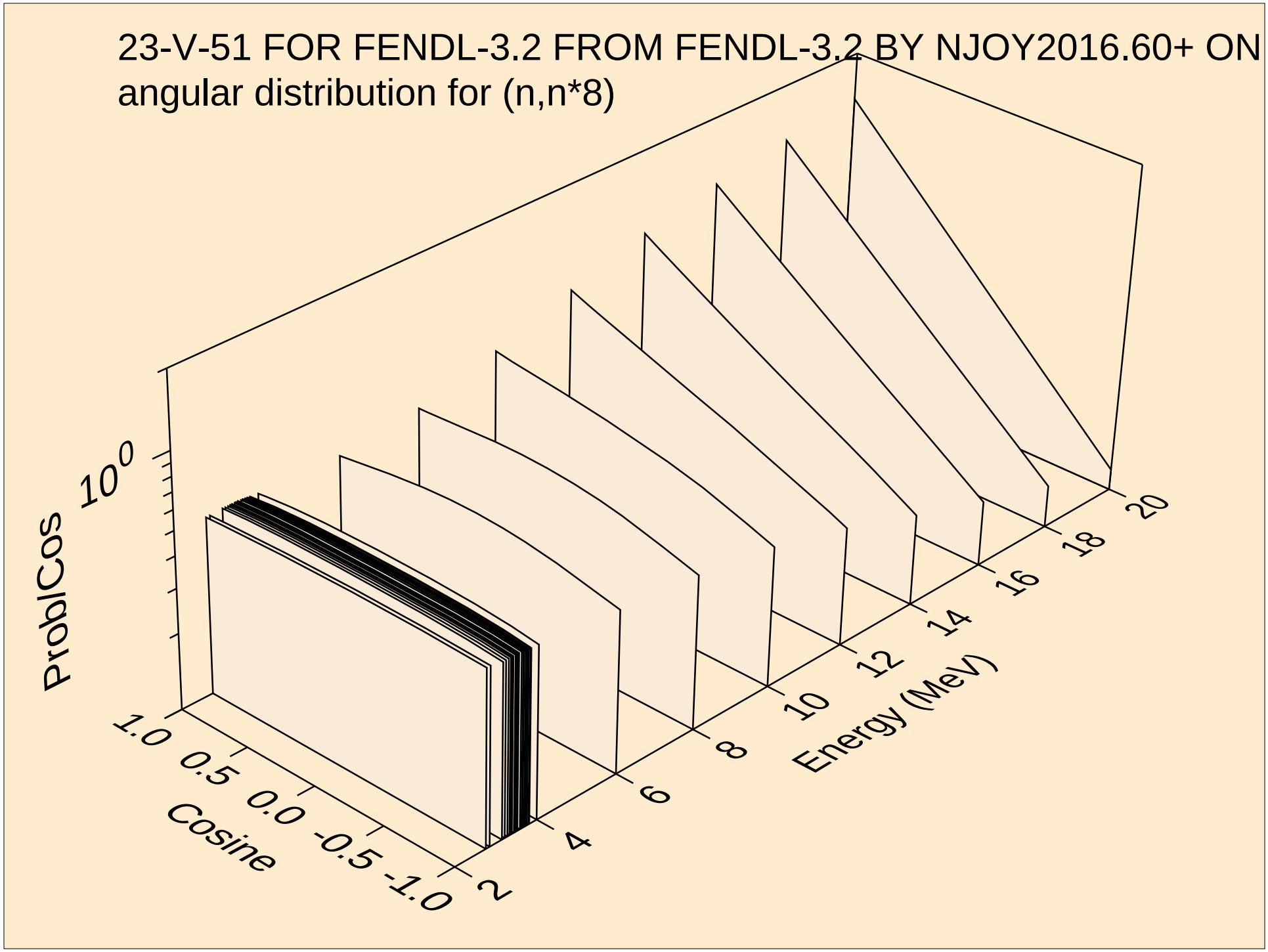

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*3)
ProblCos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

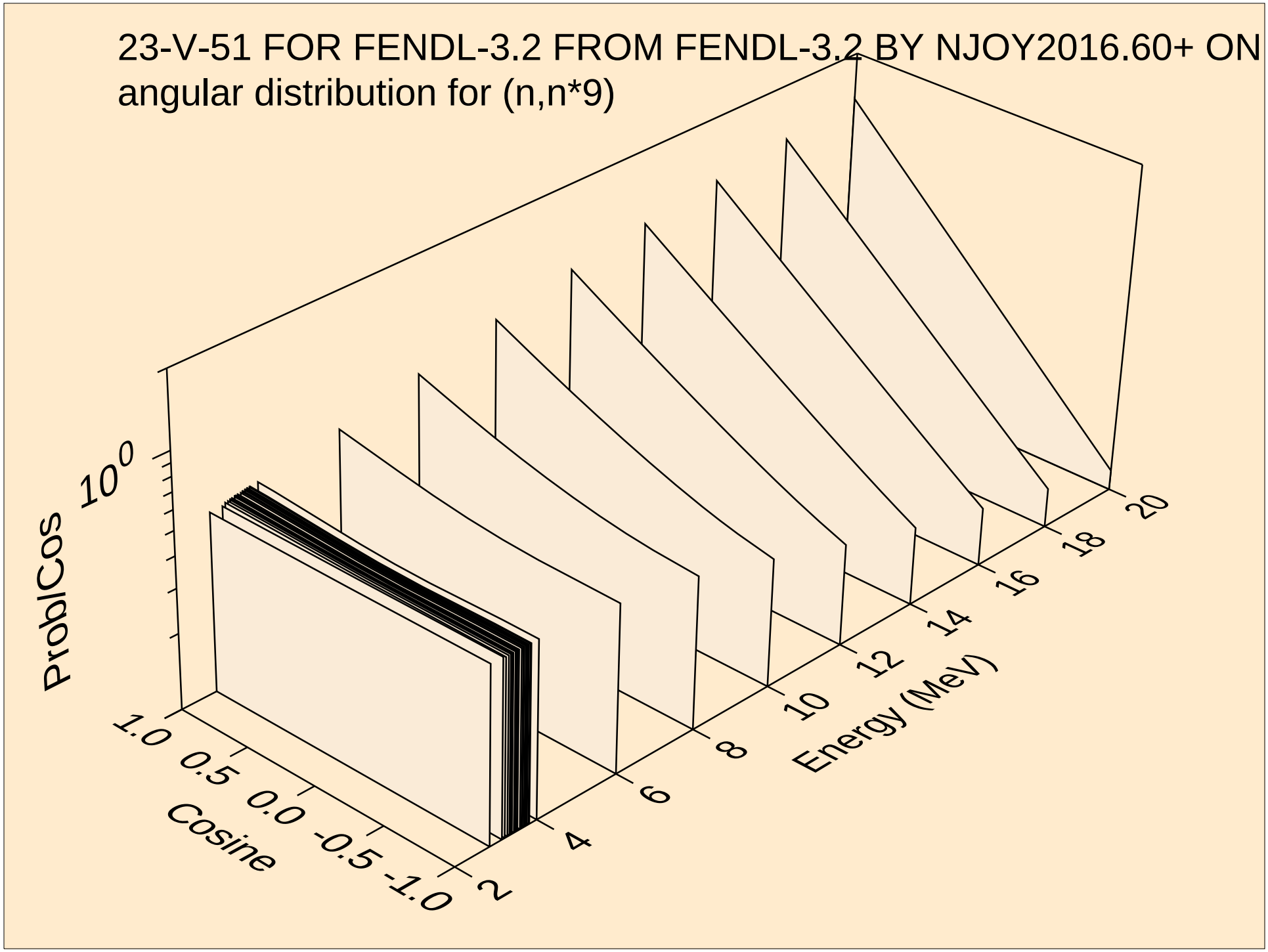

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*4)
ProbICos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

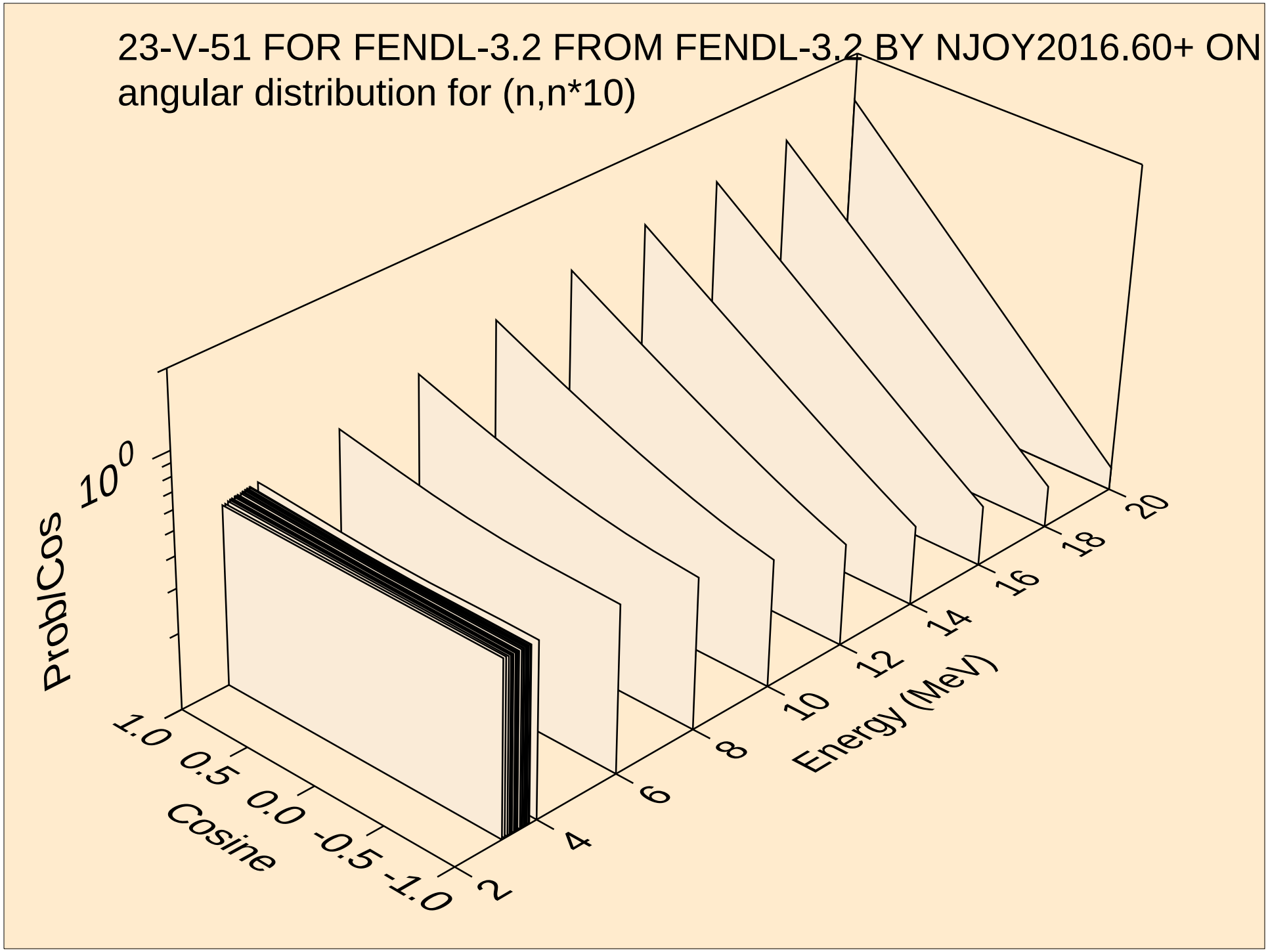

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*5)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

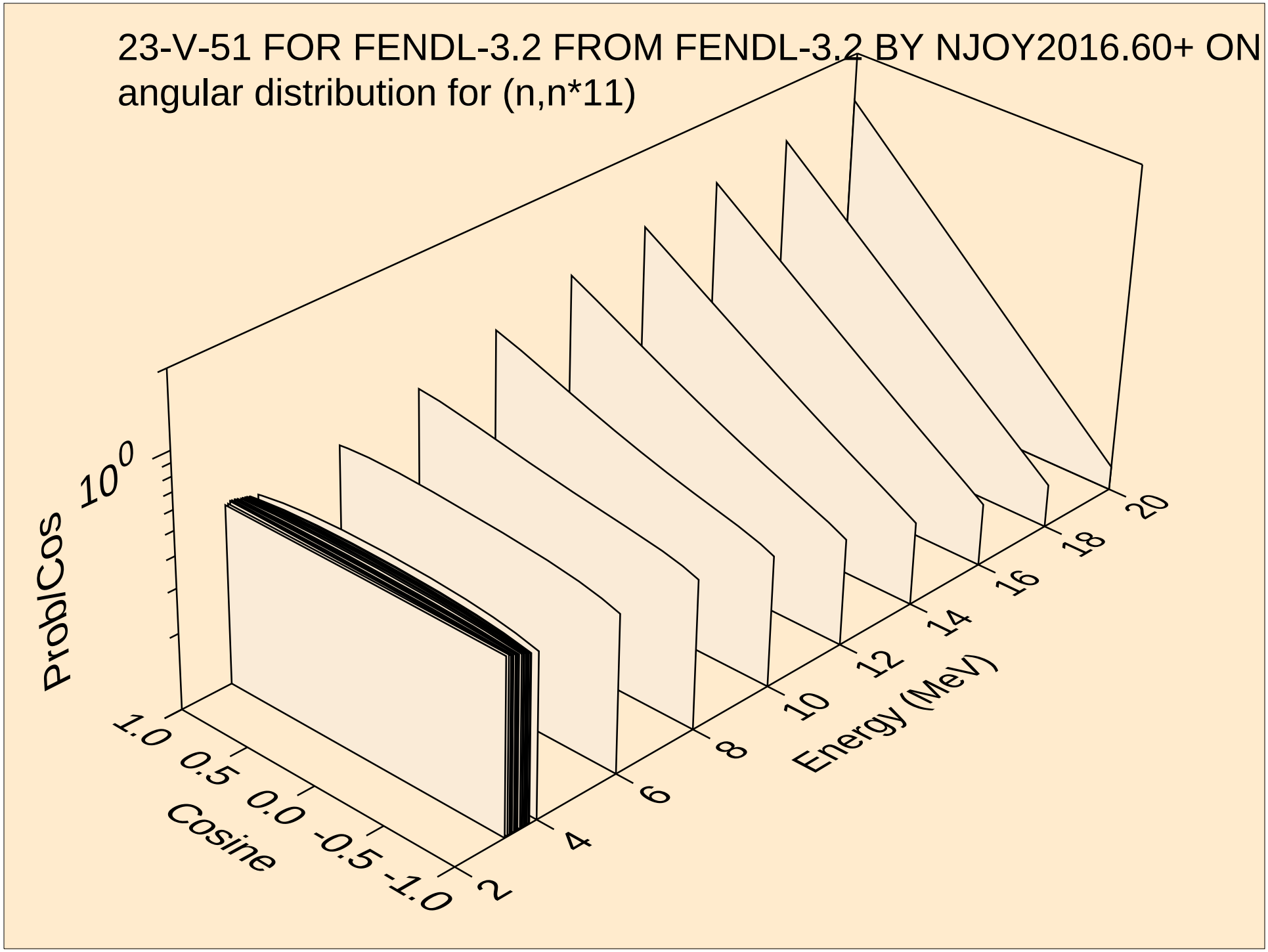

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*6)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

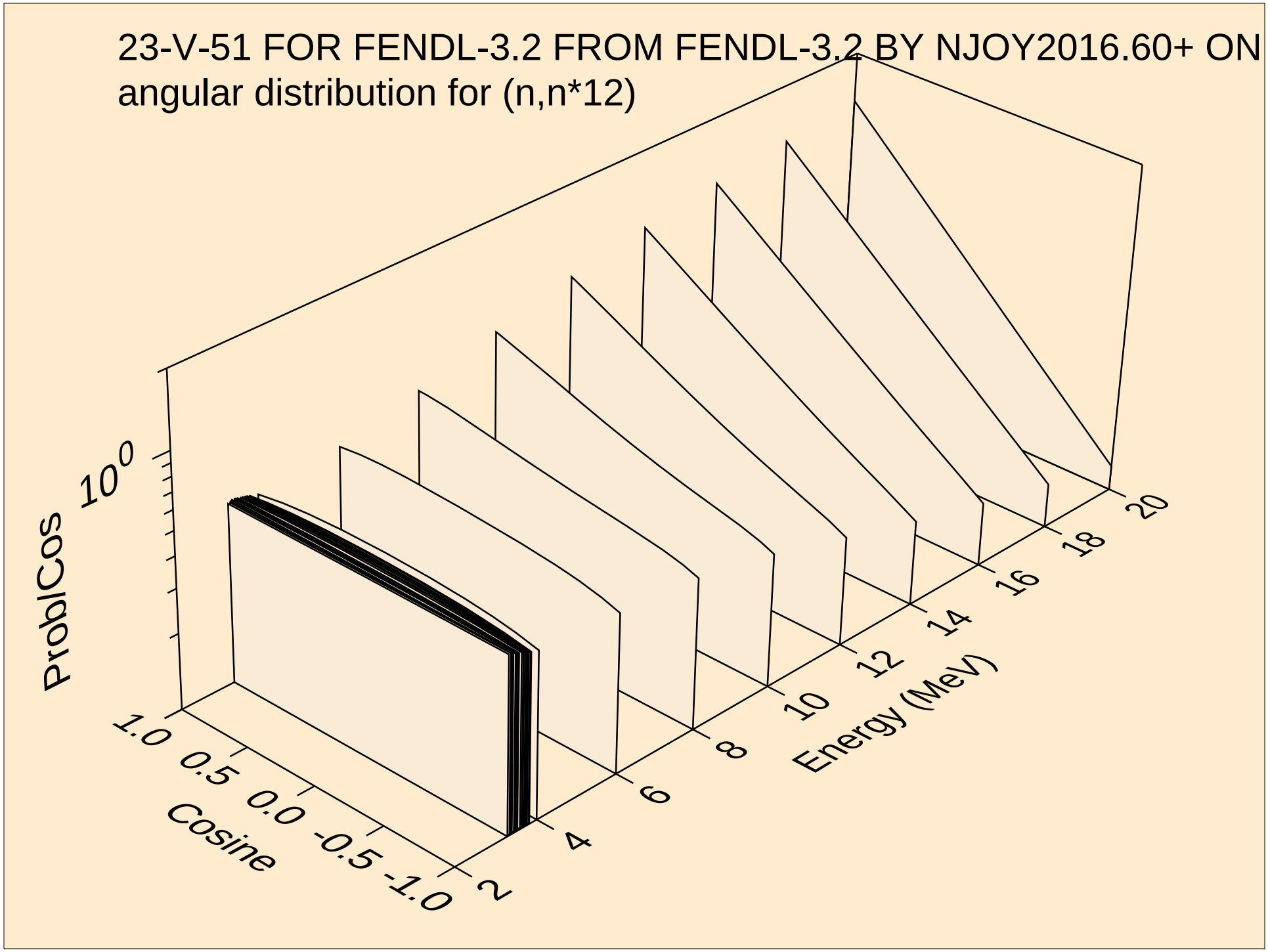

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*7)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

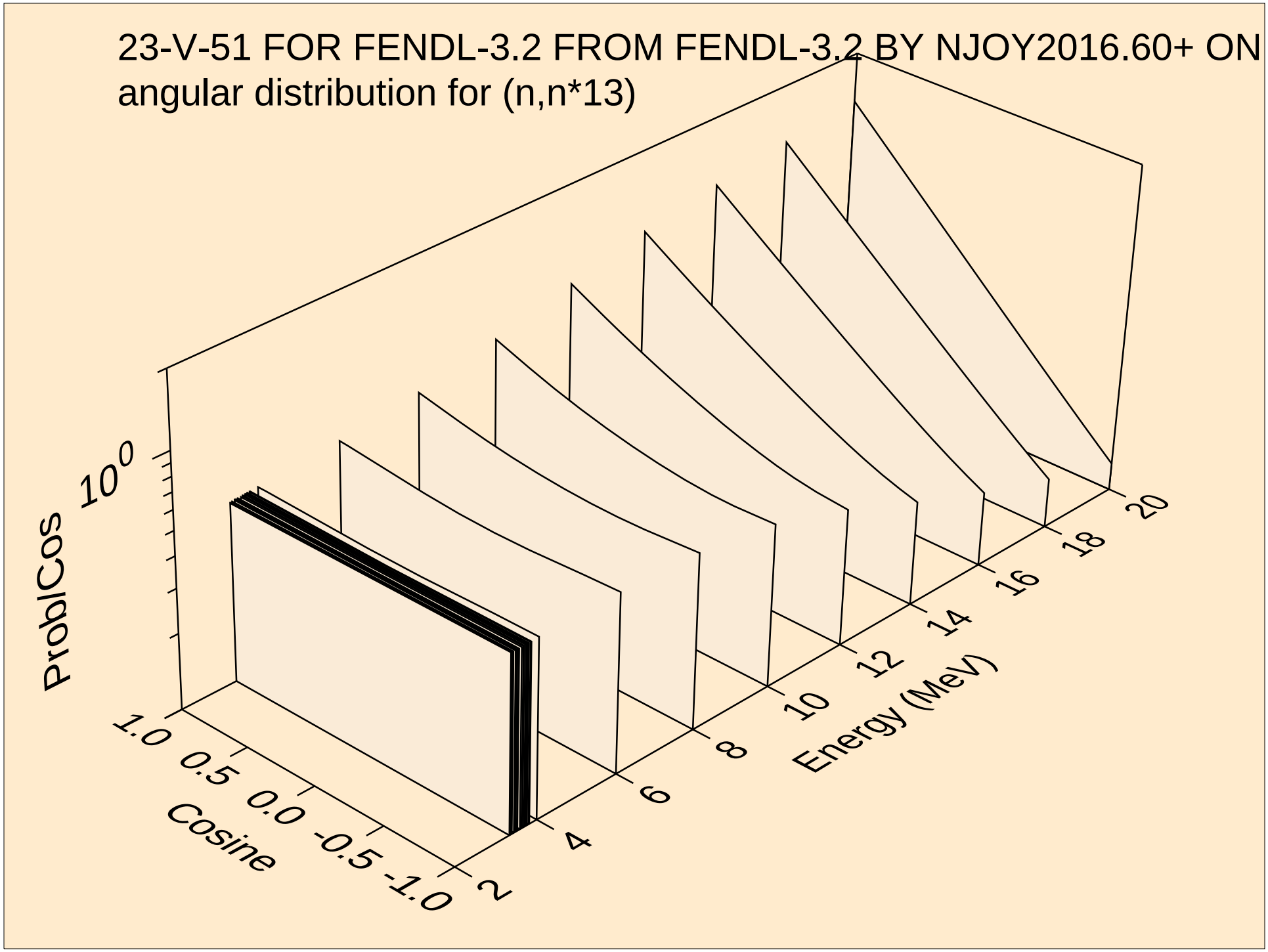

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*8)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

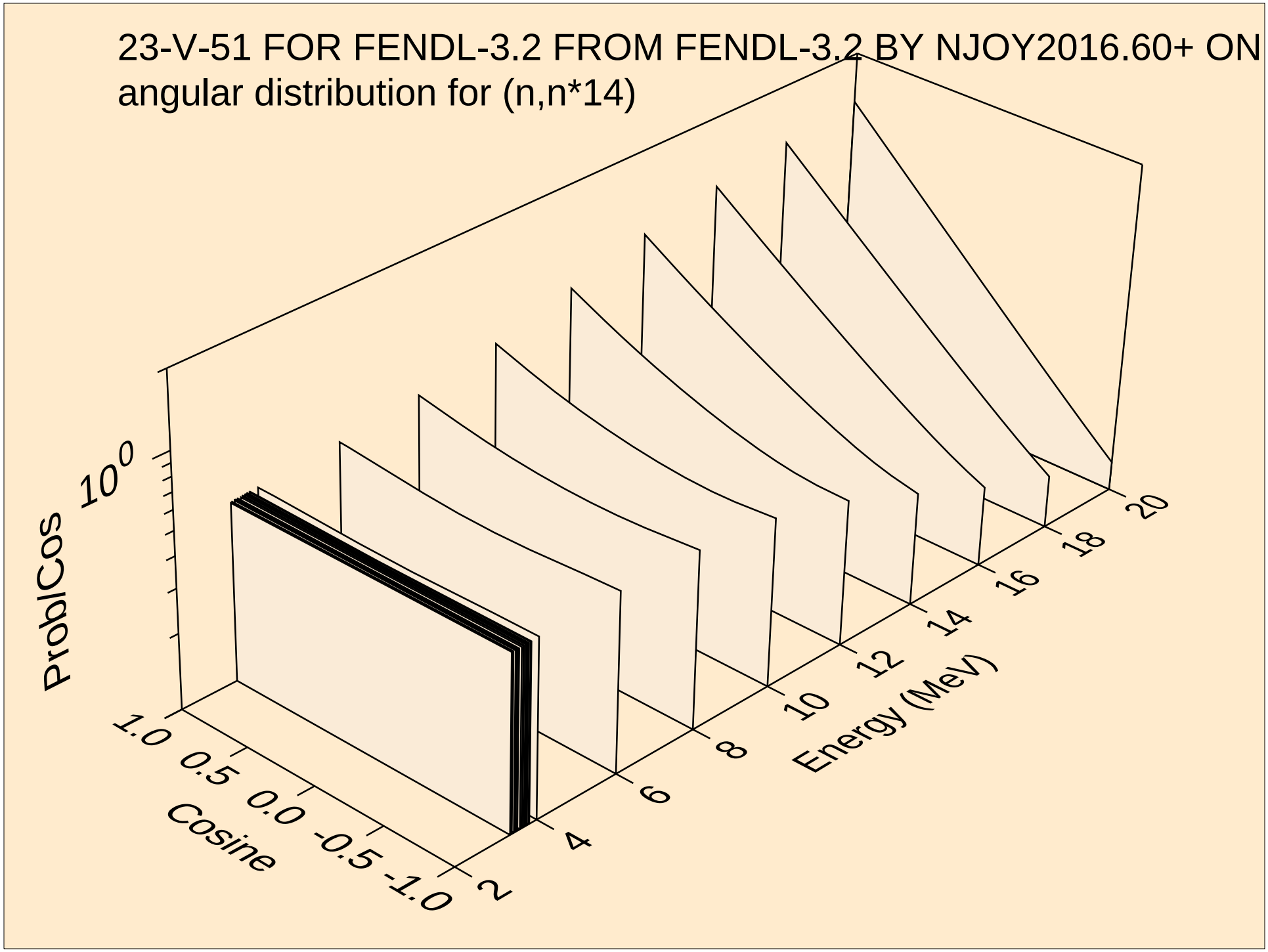

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*9)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

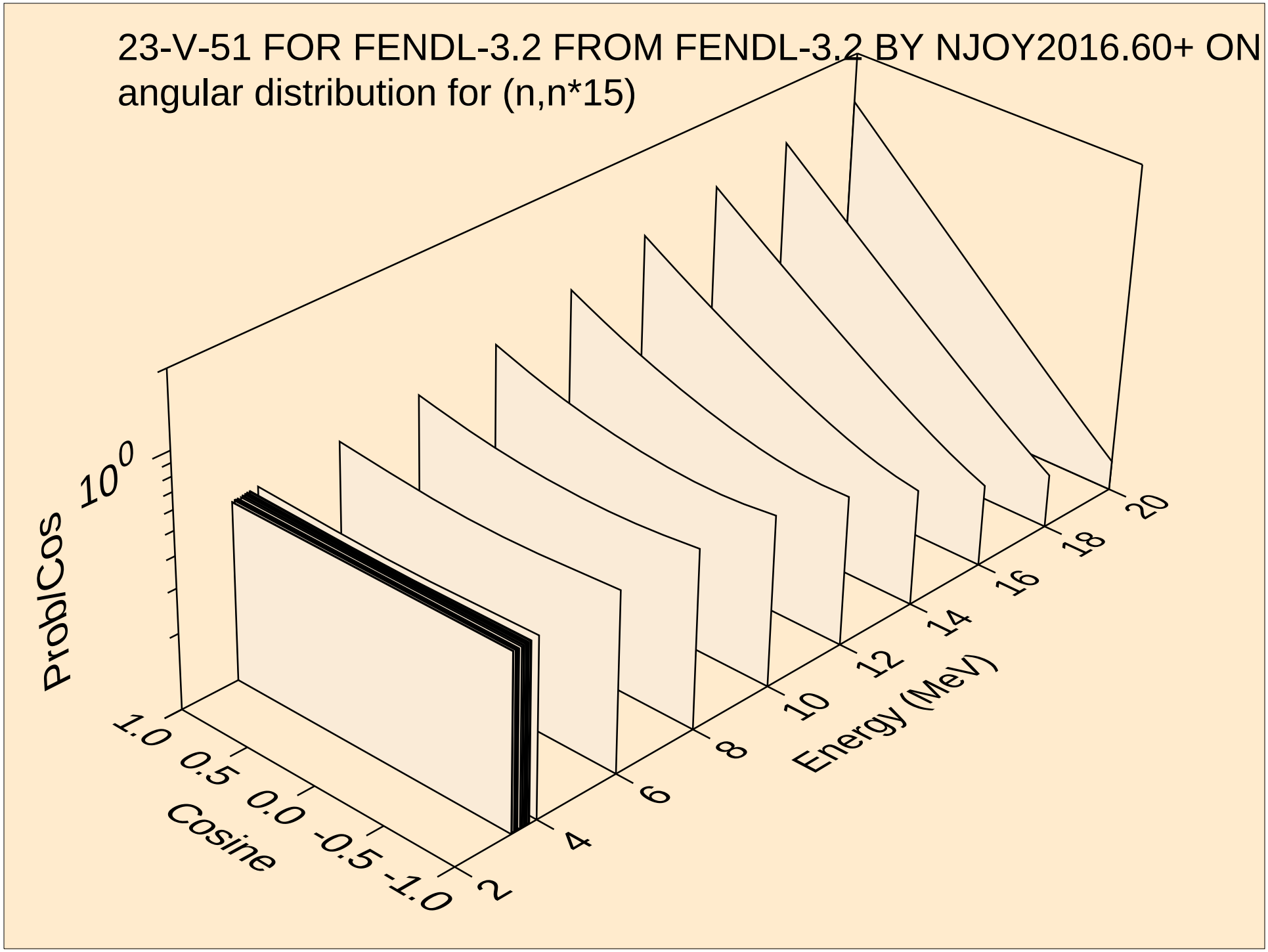

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*10)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

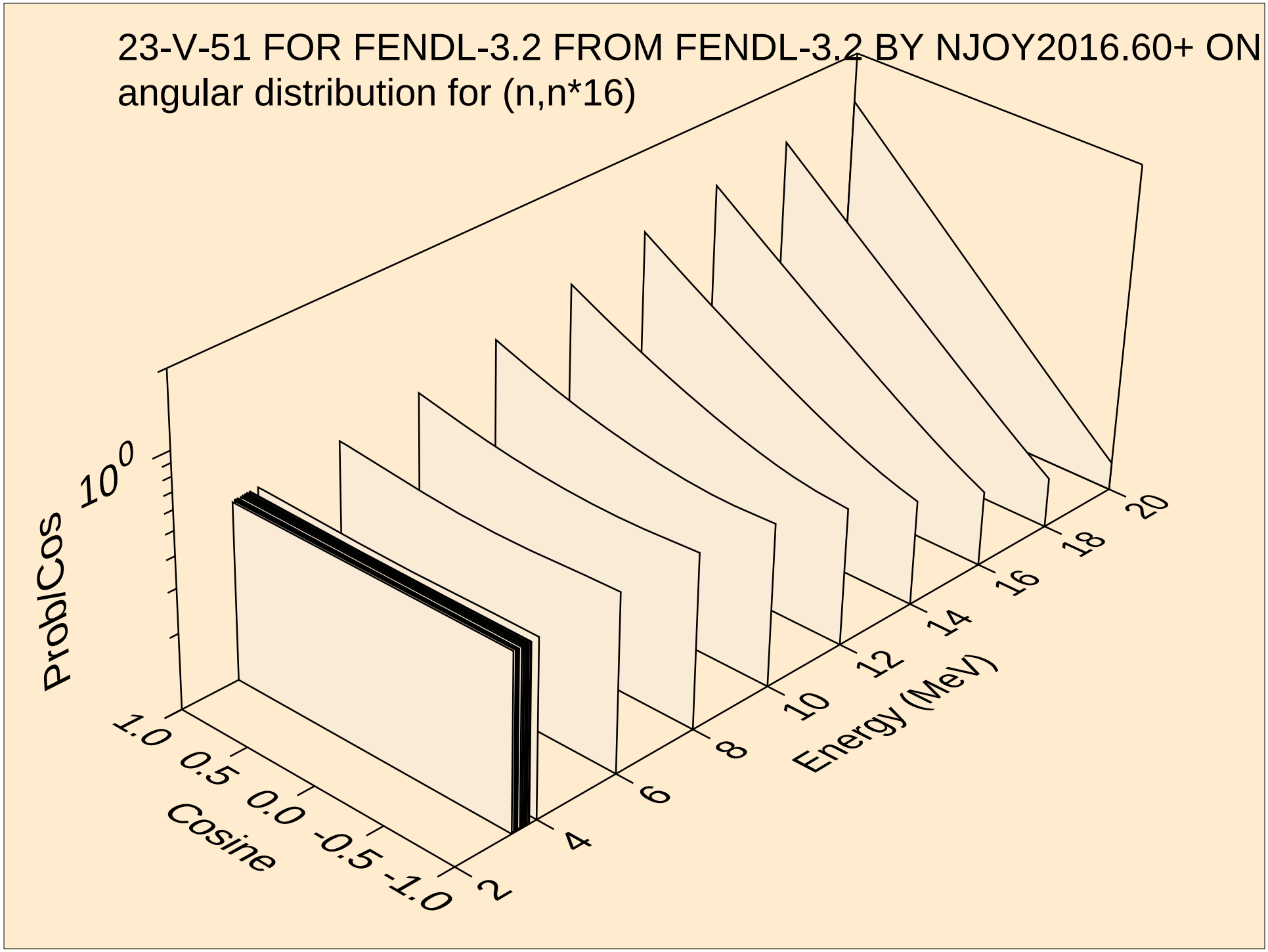

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*11)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

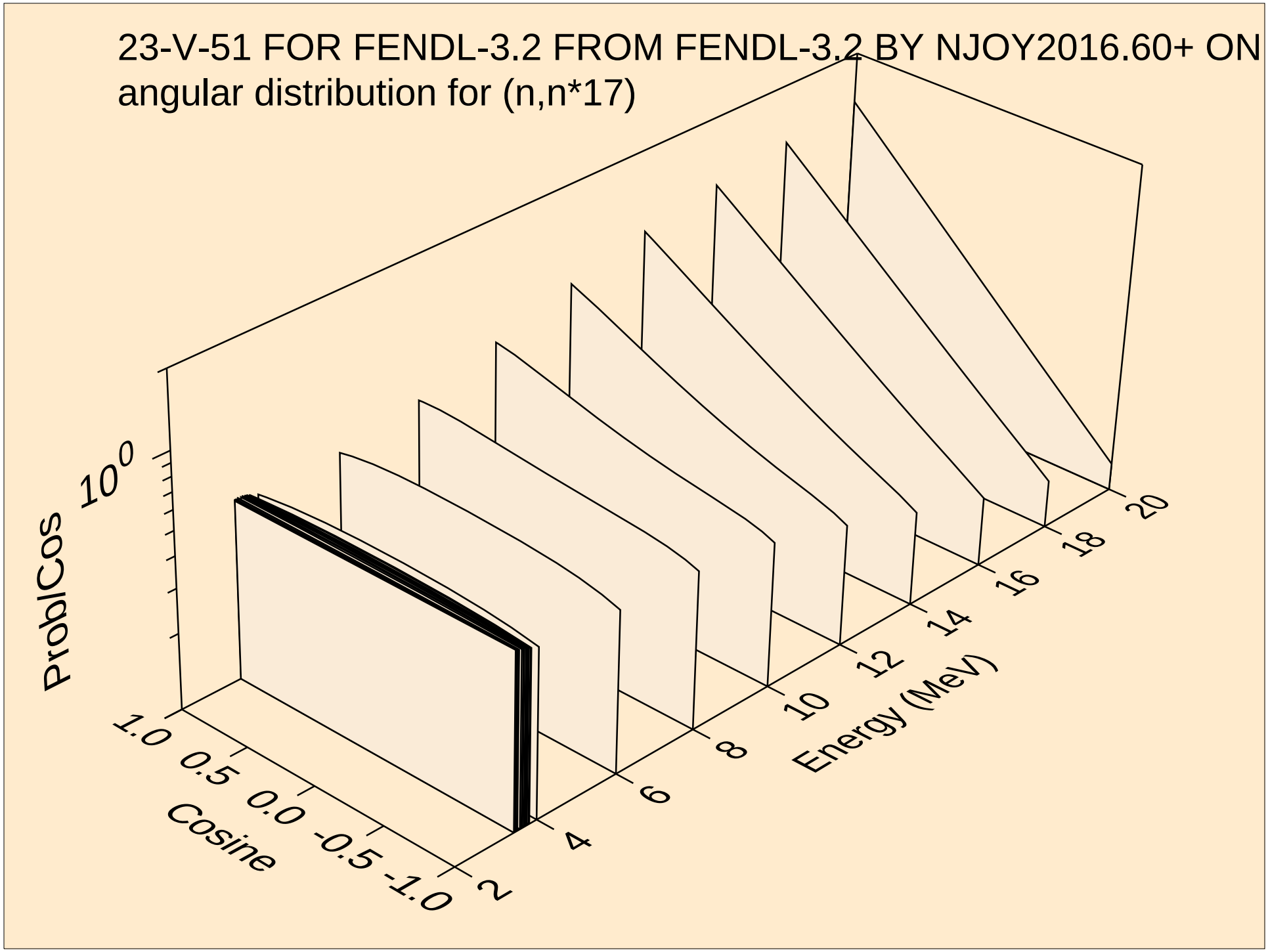

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*12)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

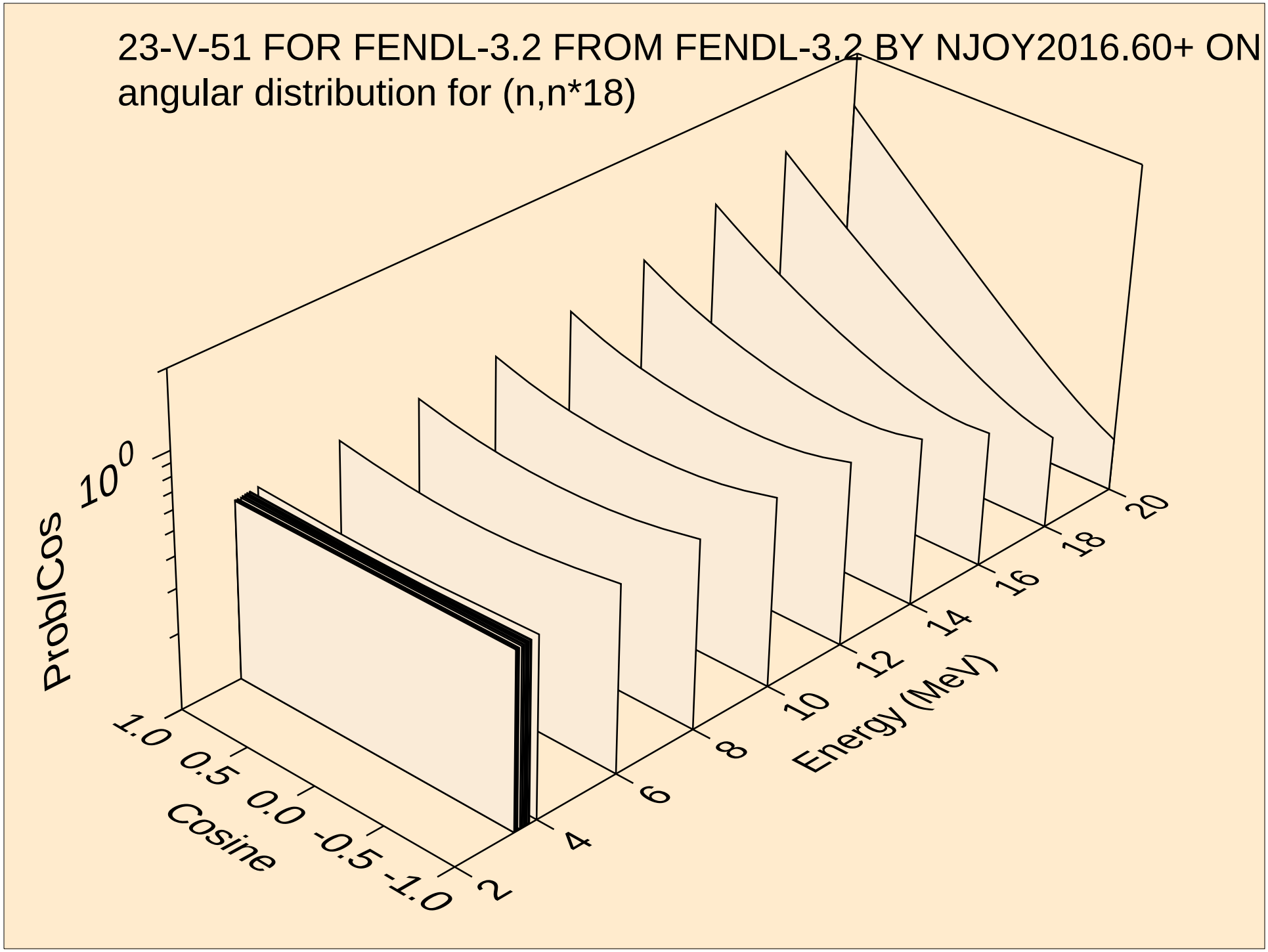

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*13)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

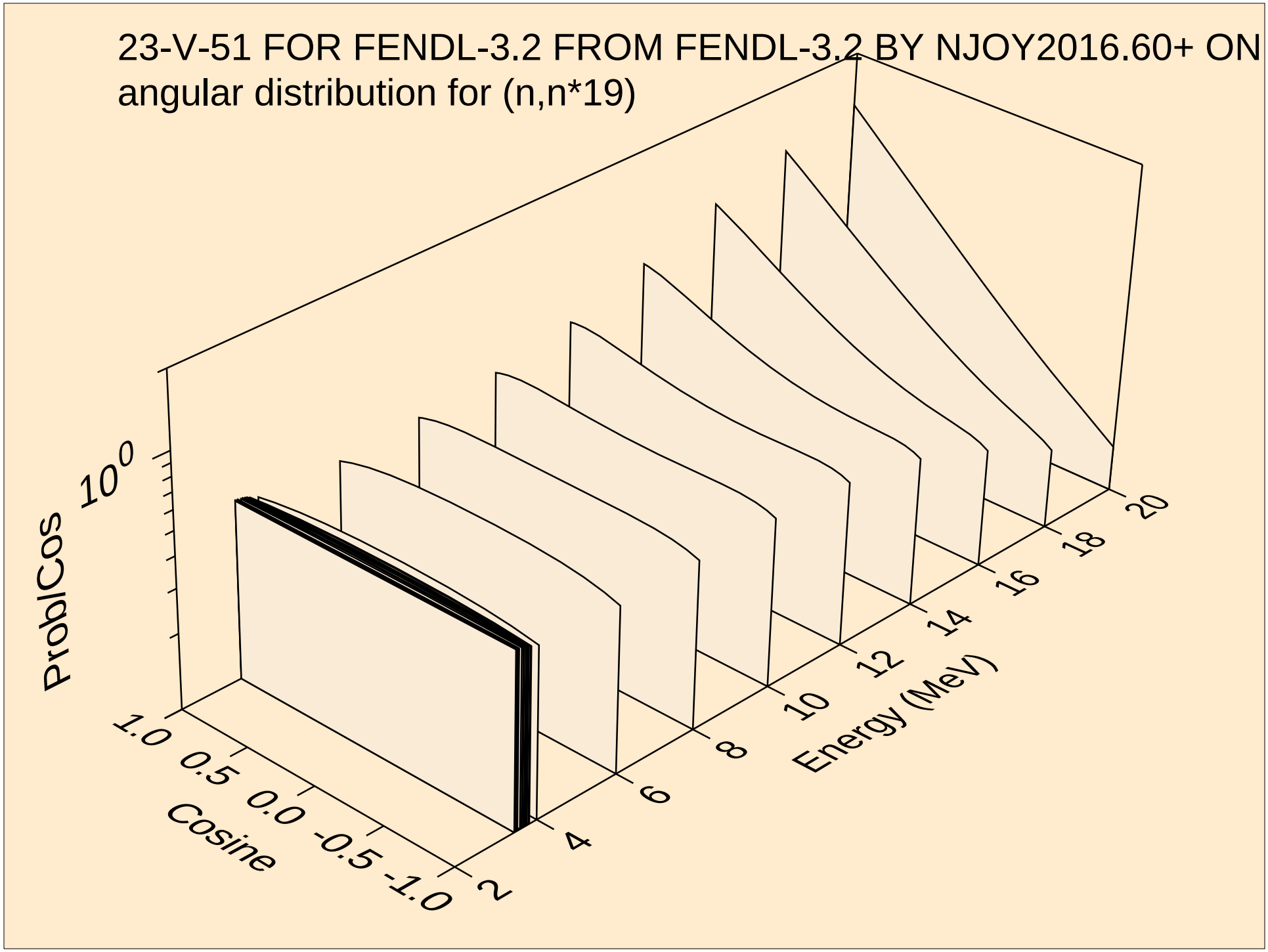

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*14)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

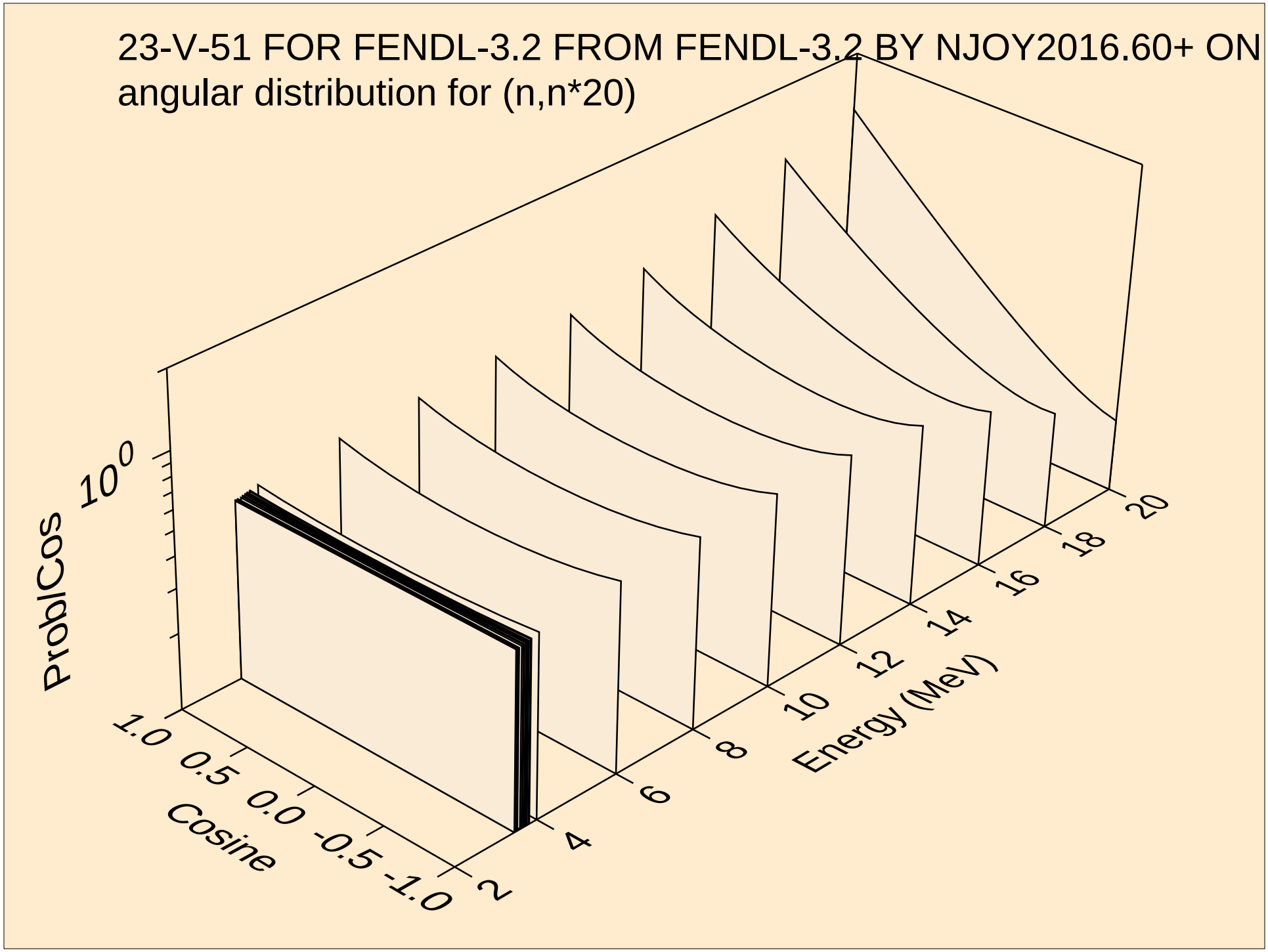

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*15)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

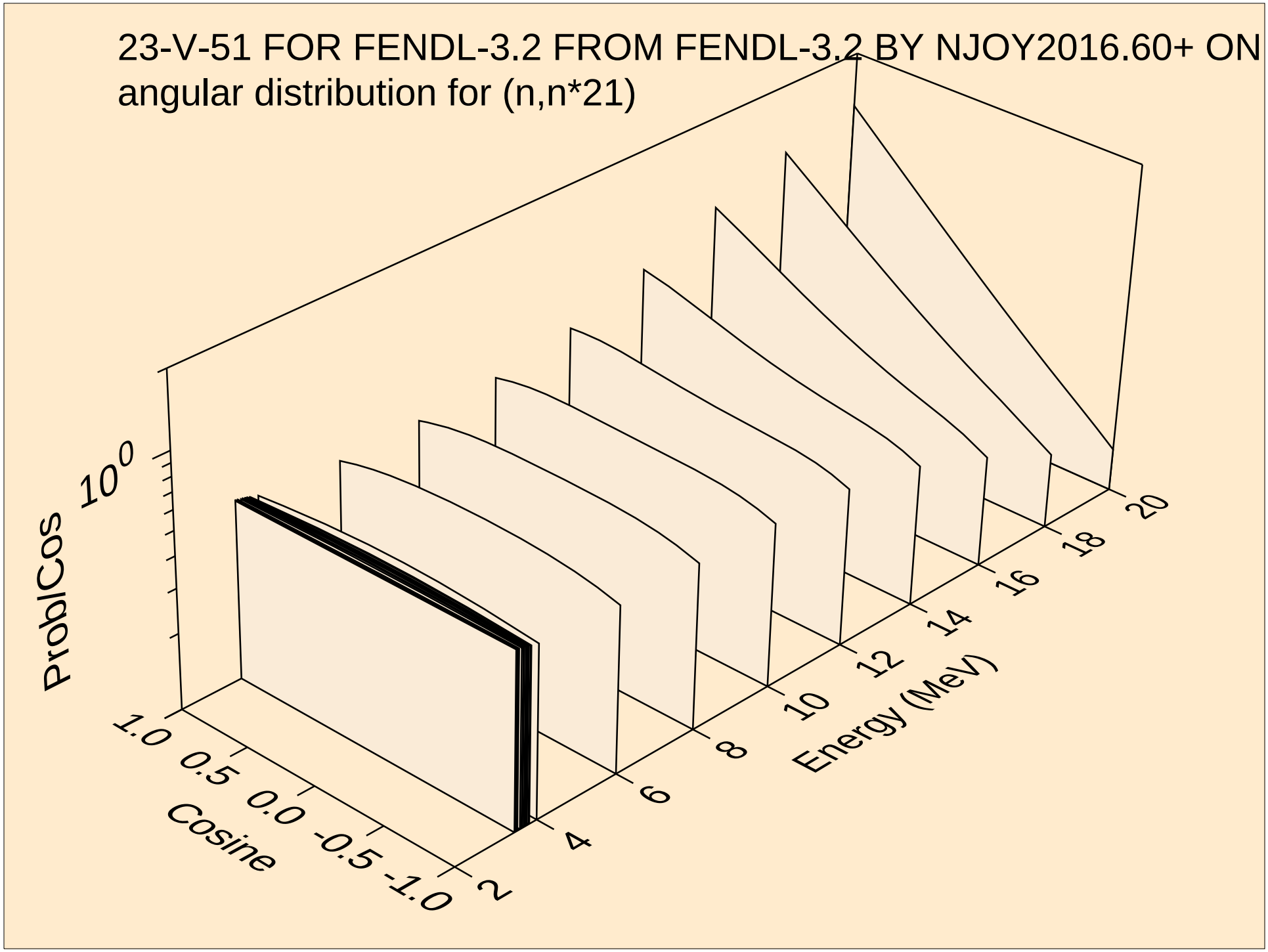

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*16)
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

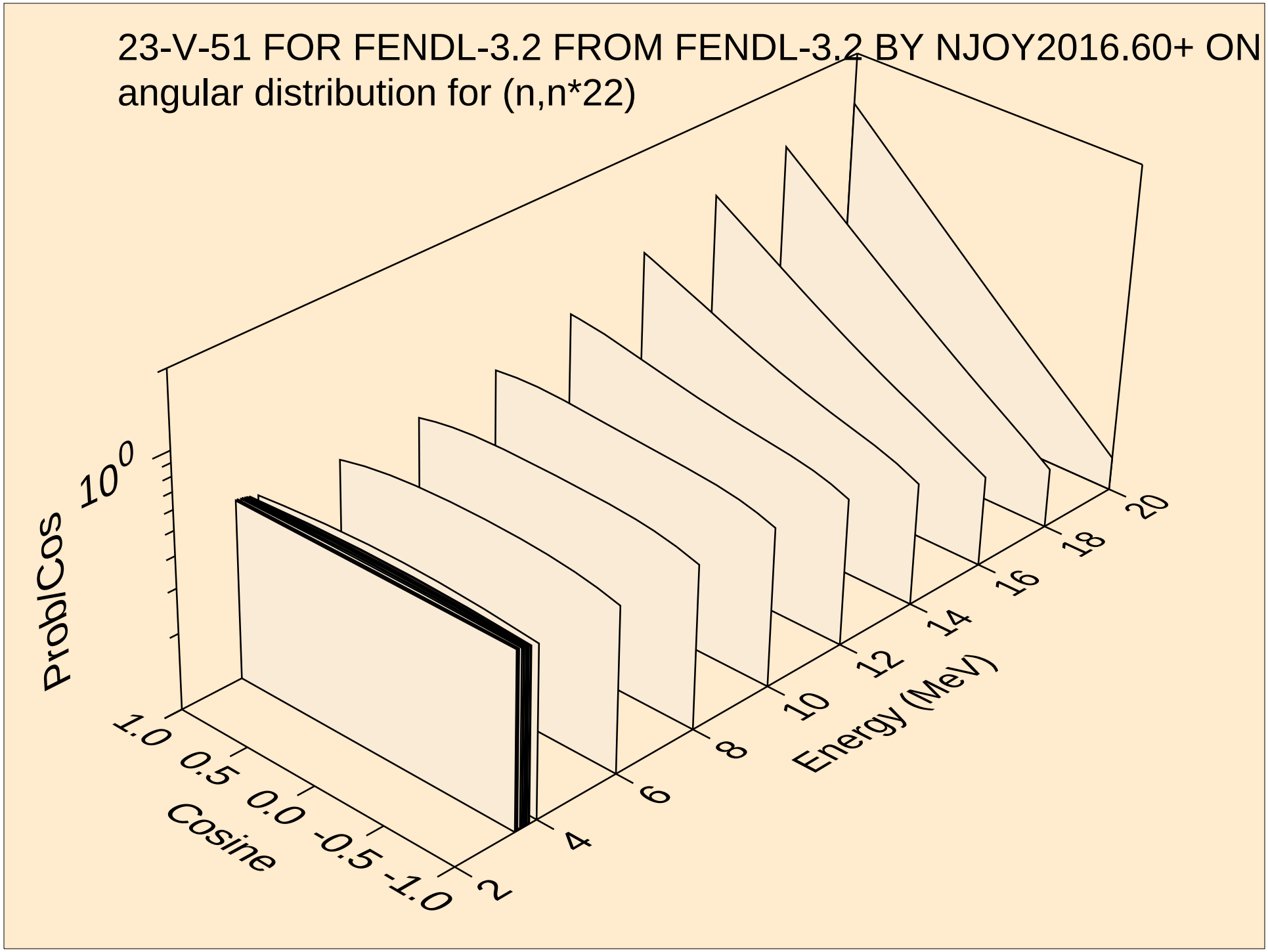

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*17)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

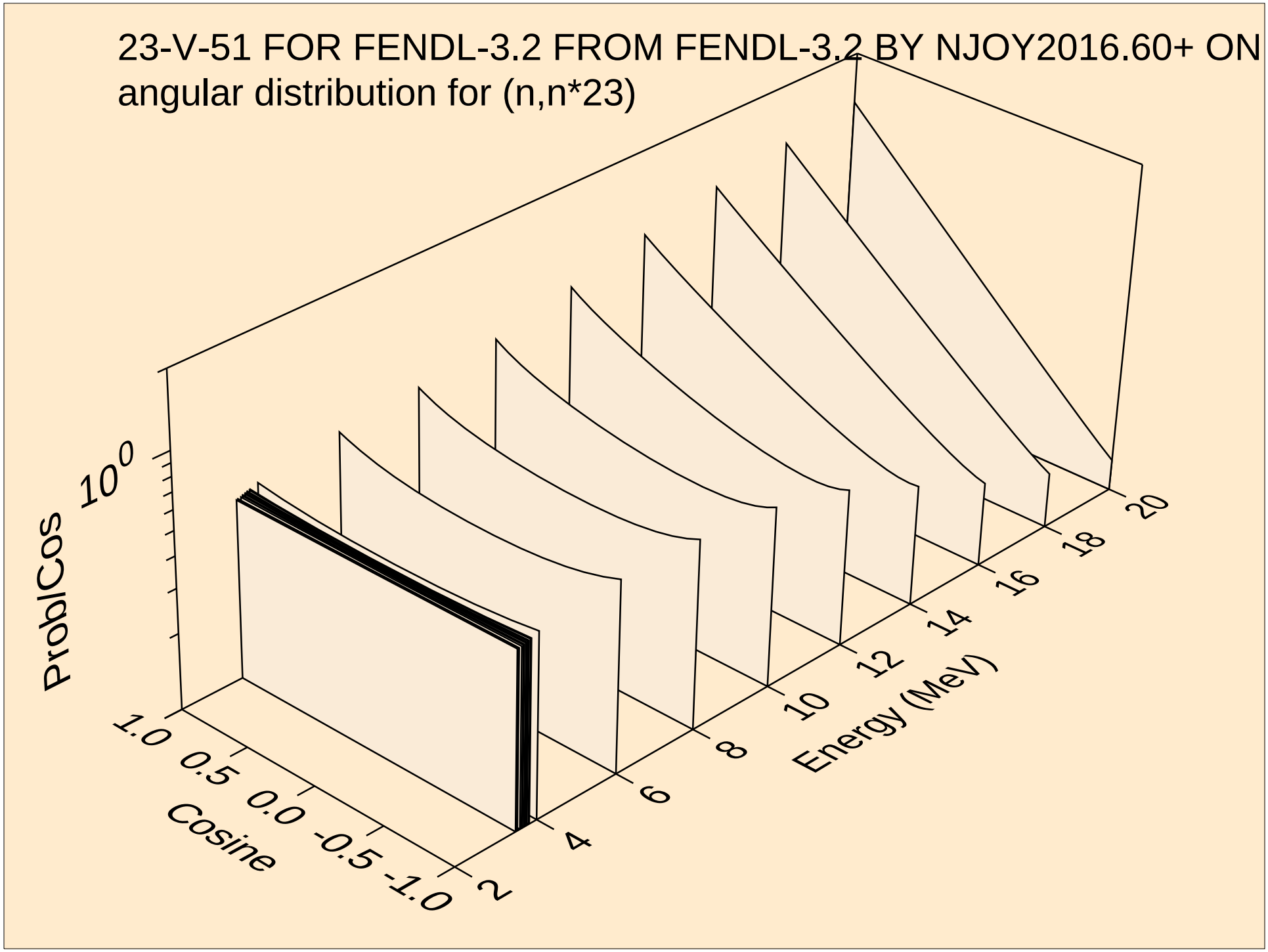

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*18)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

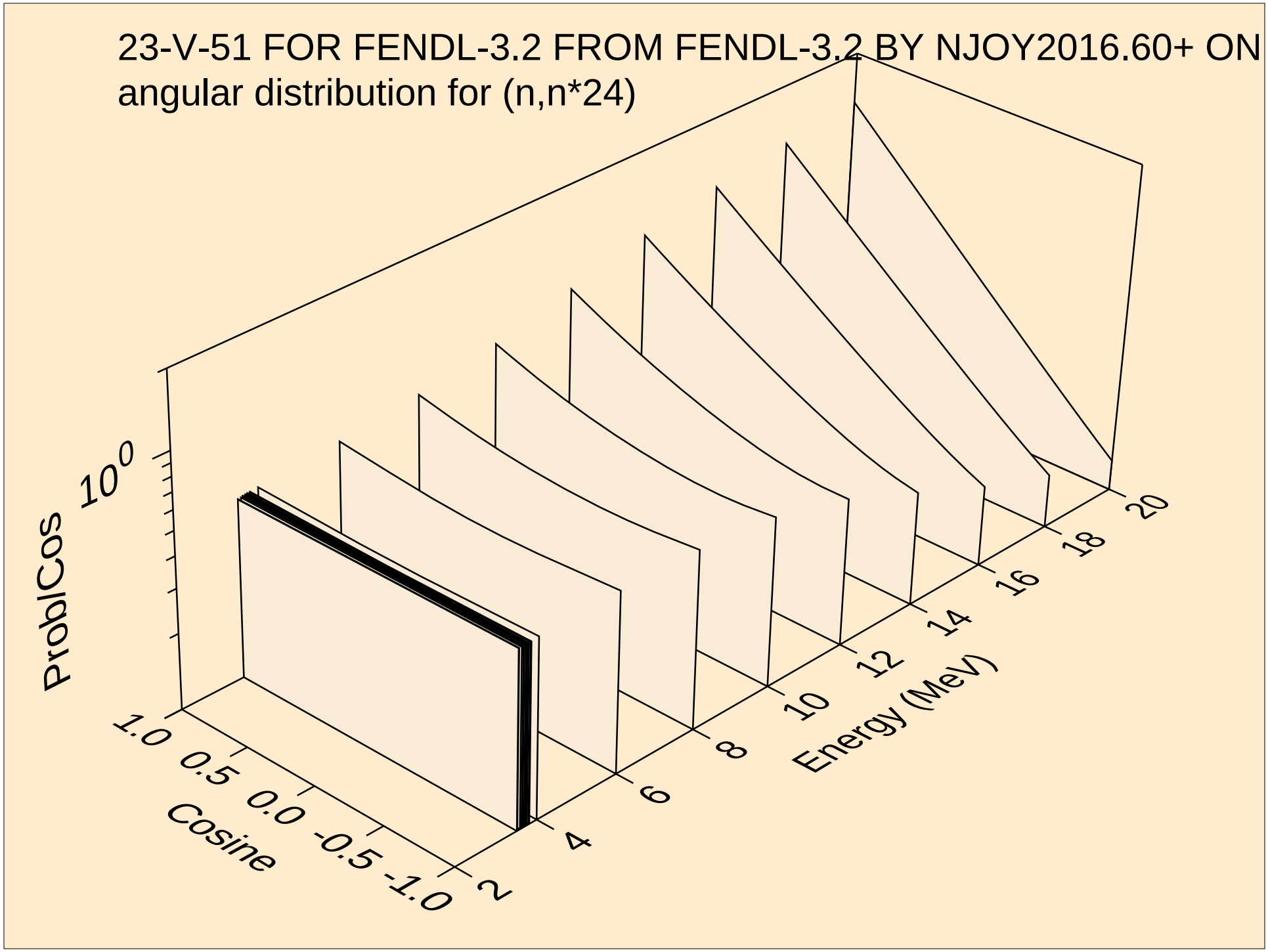

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*19)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

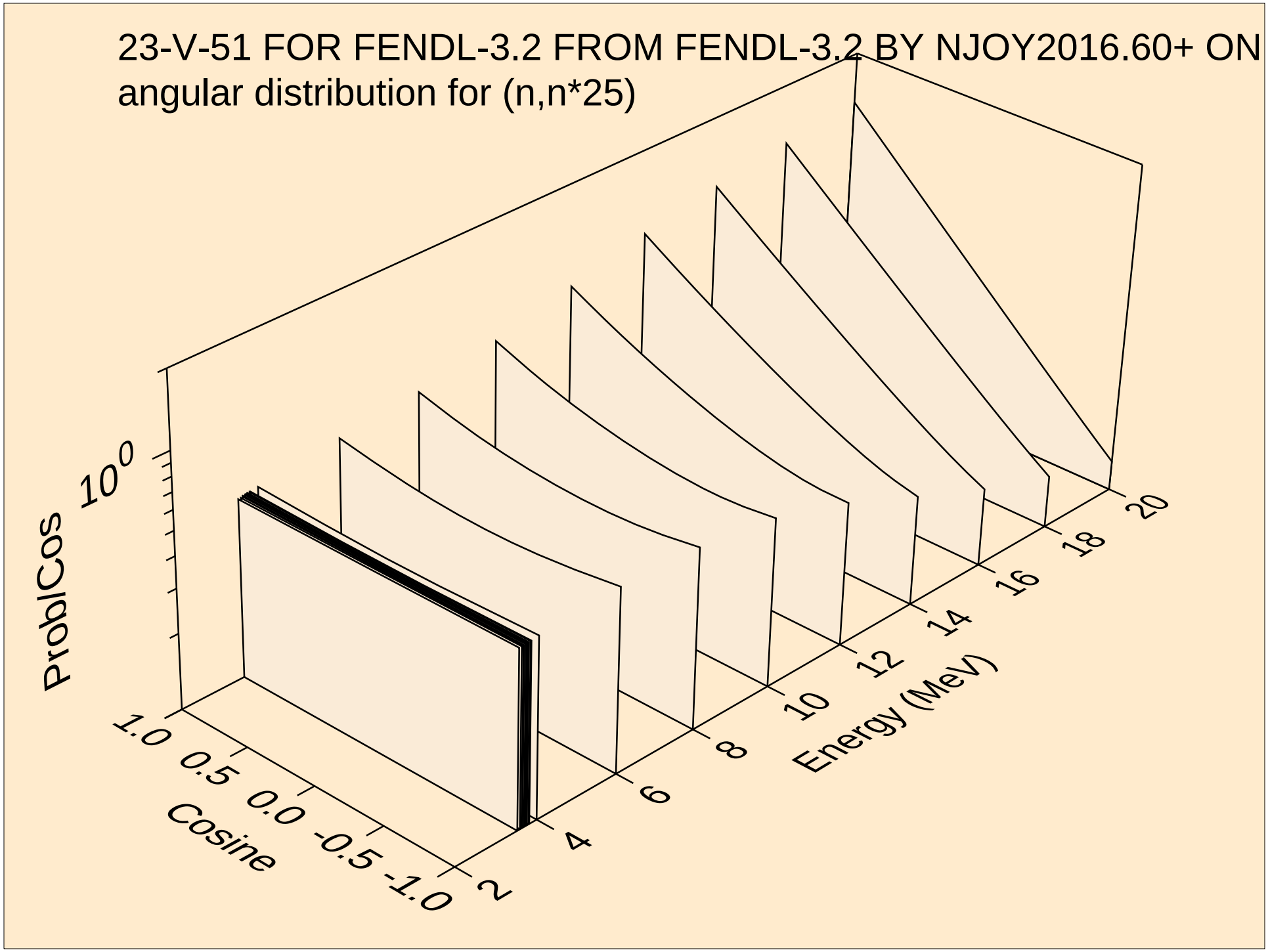

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*20)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

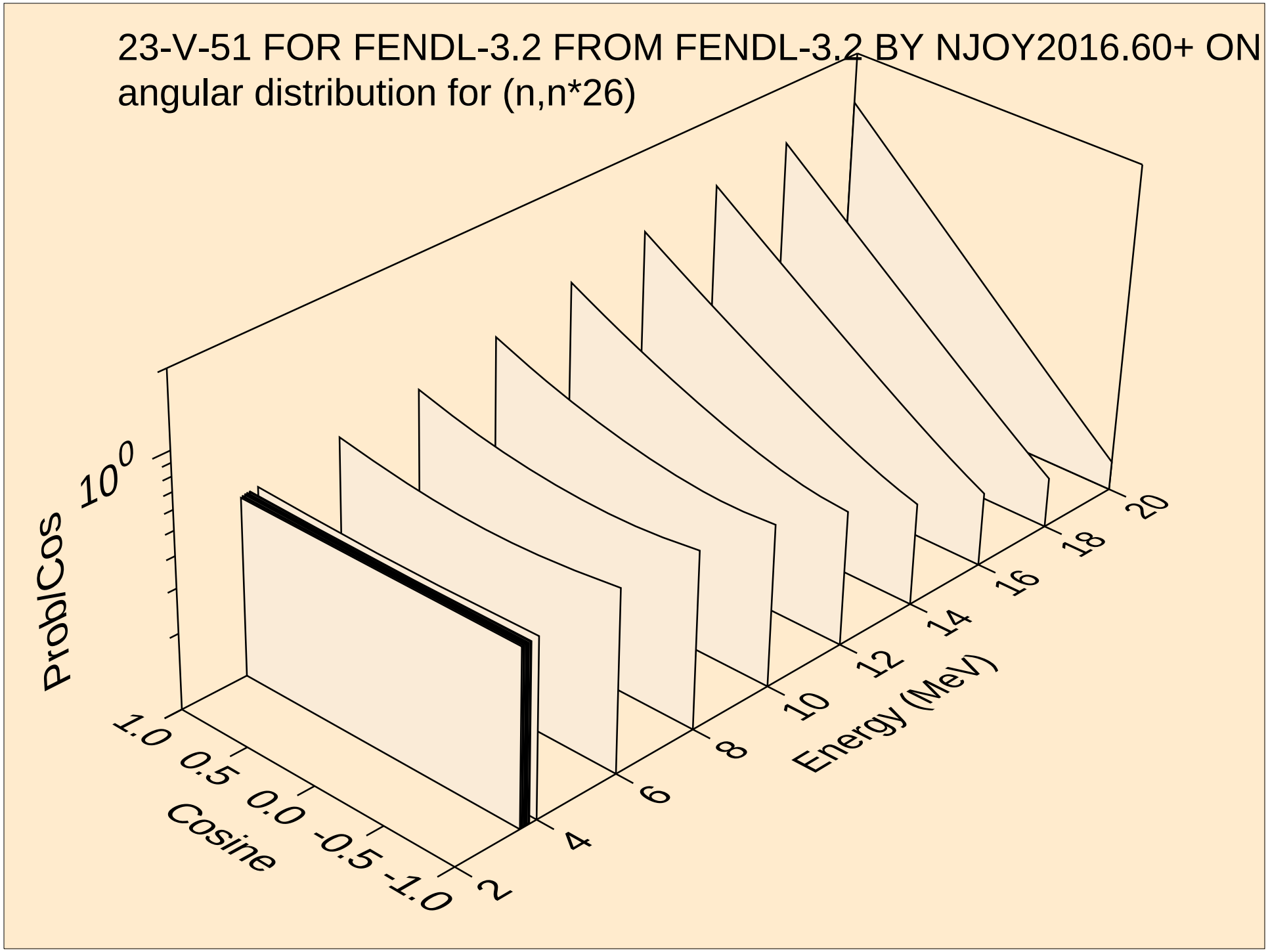

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*21)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

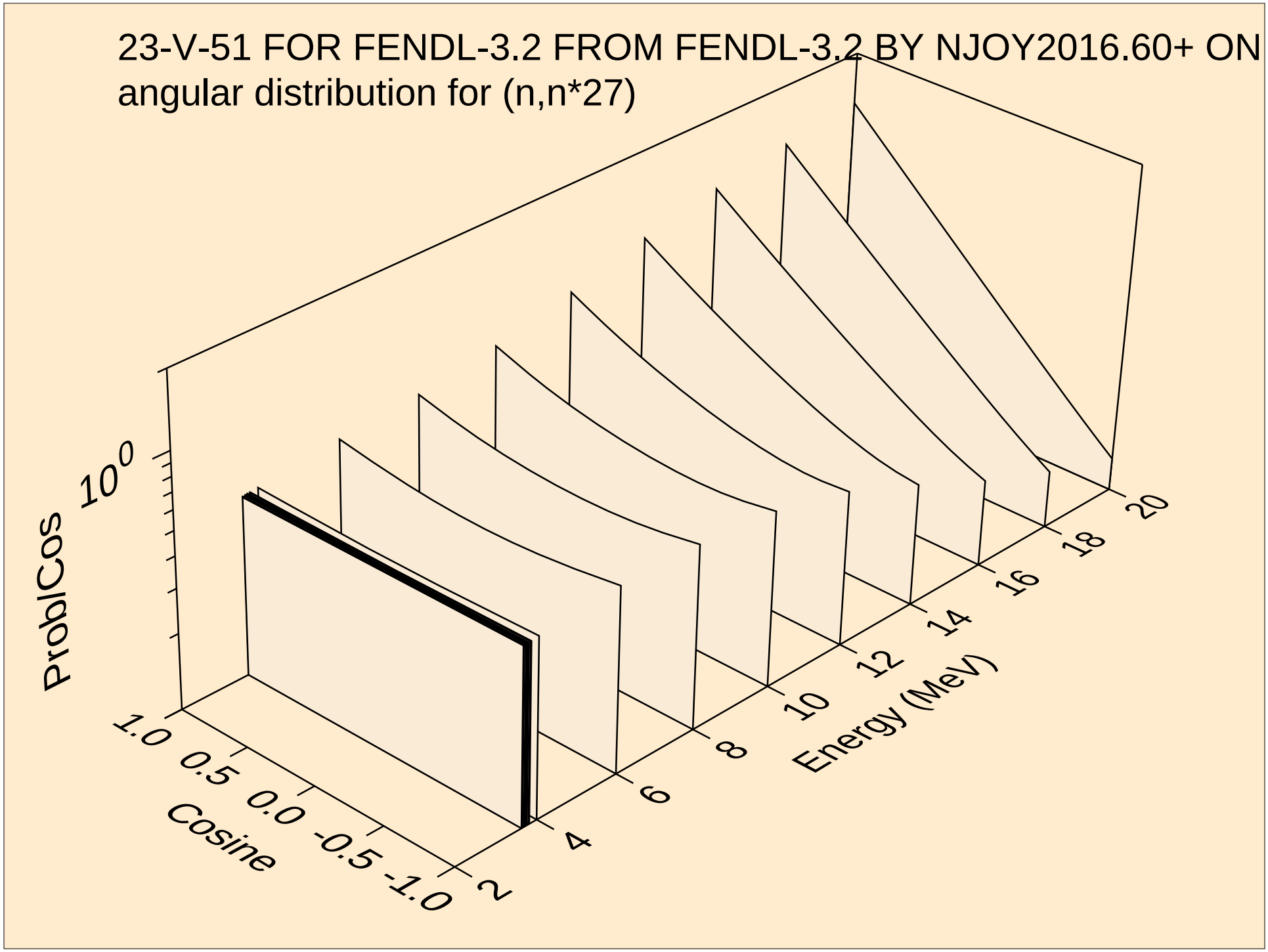

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*22)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

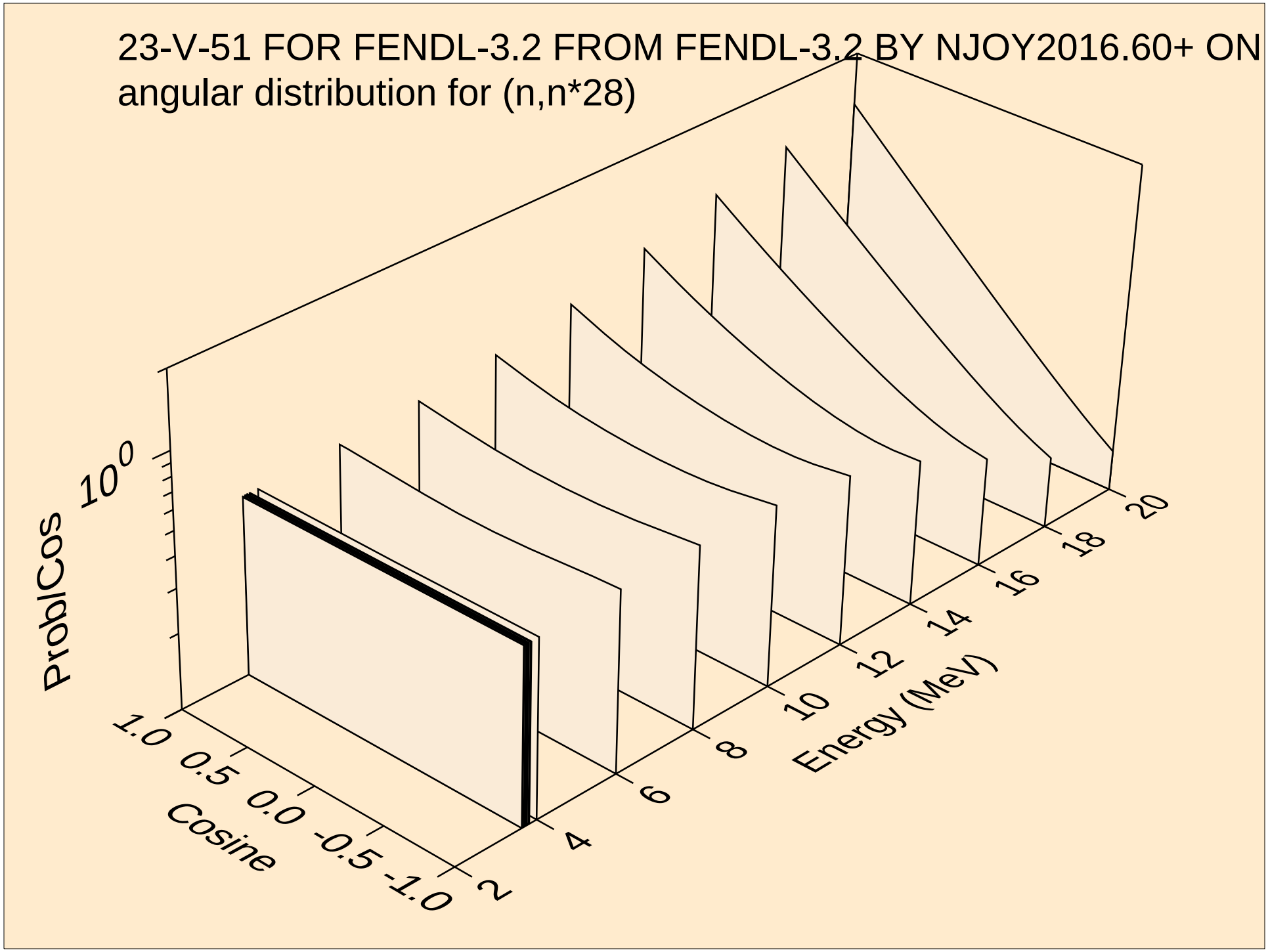

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*23)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

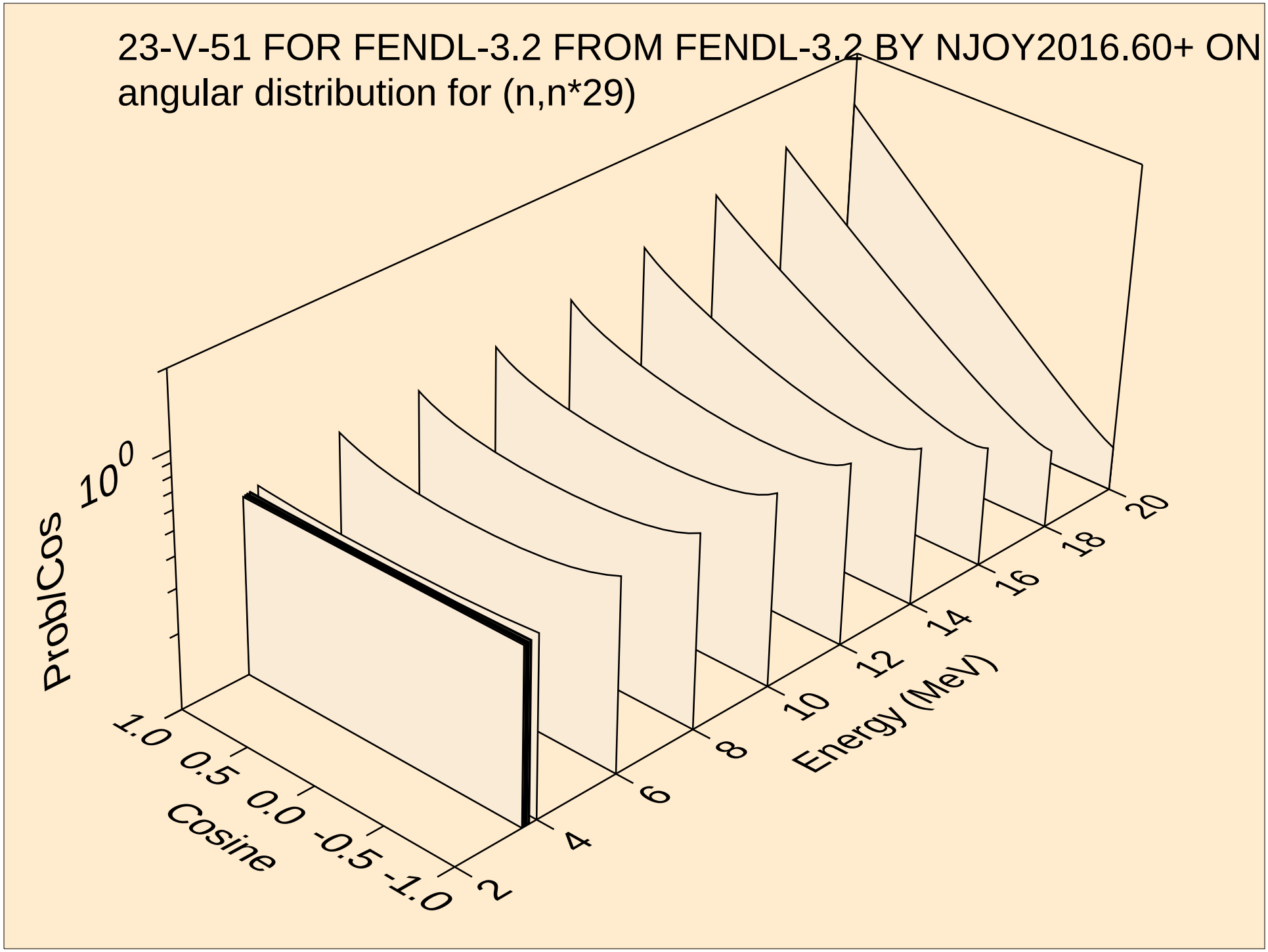

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*24)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

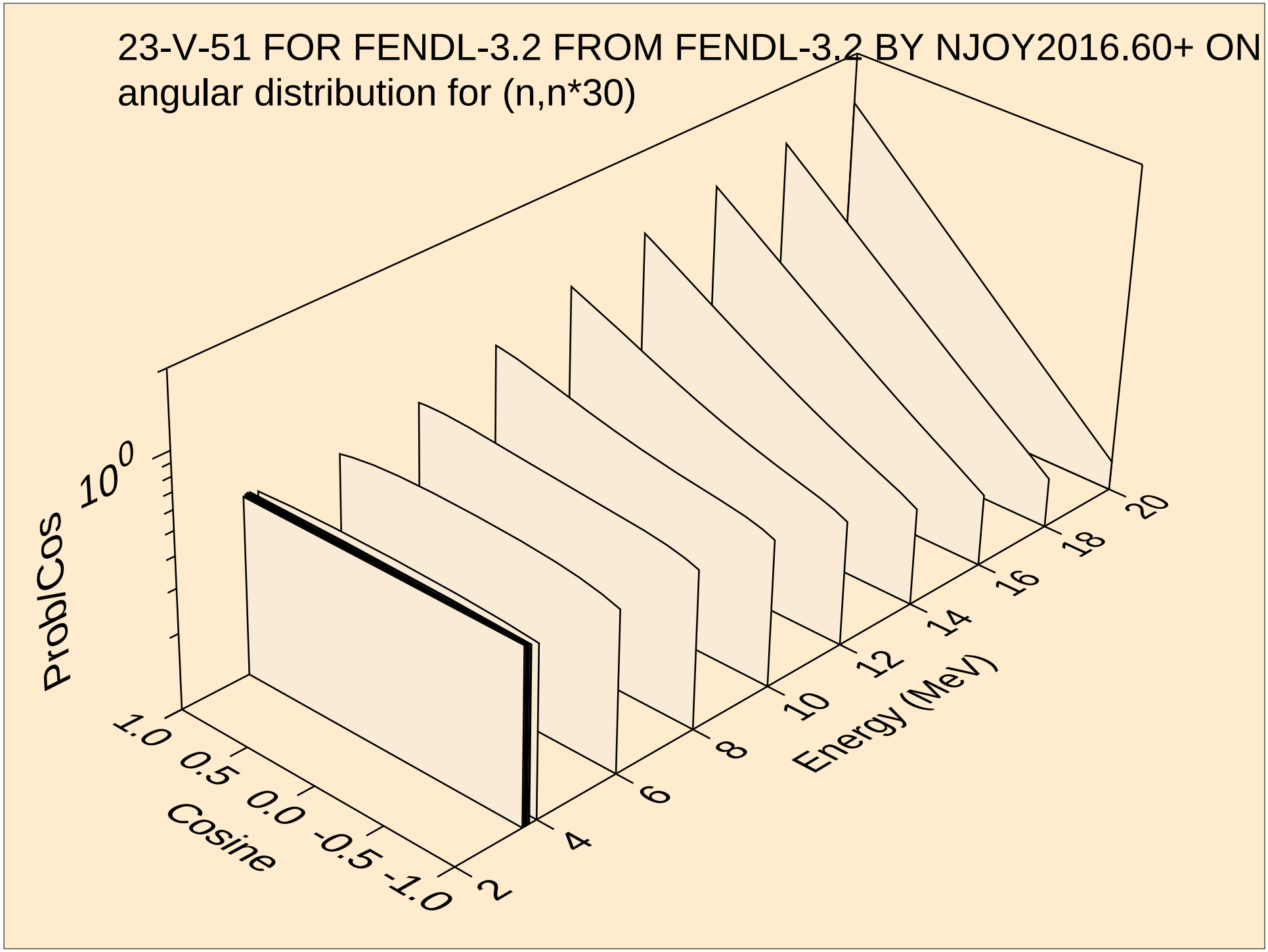

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*25)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

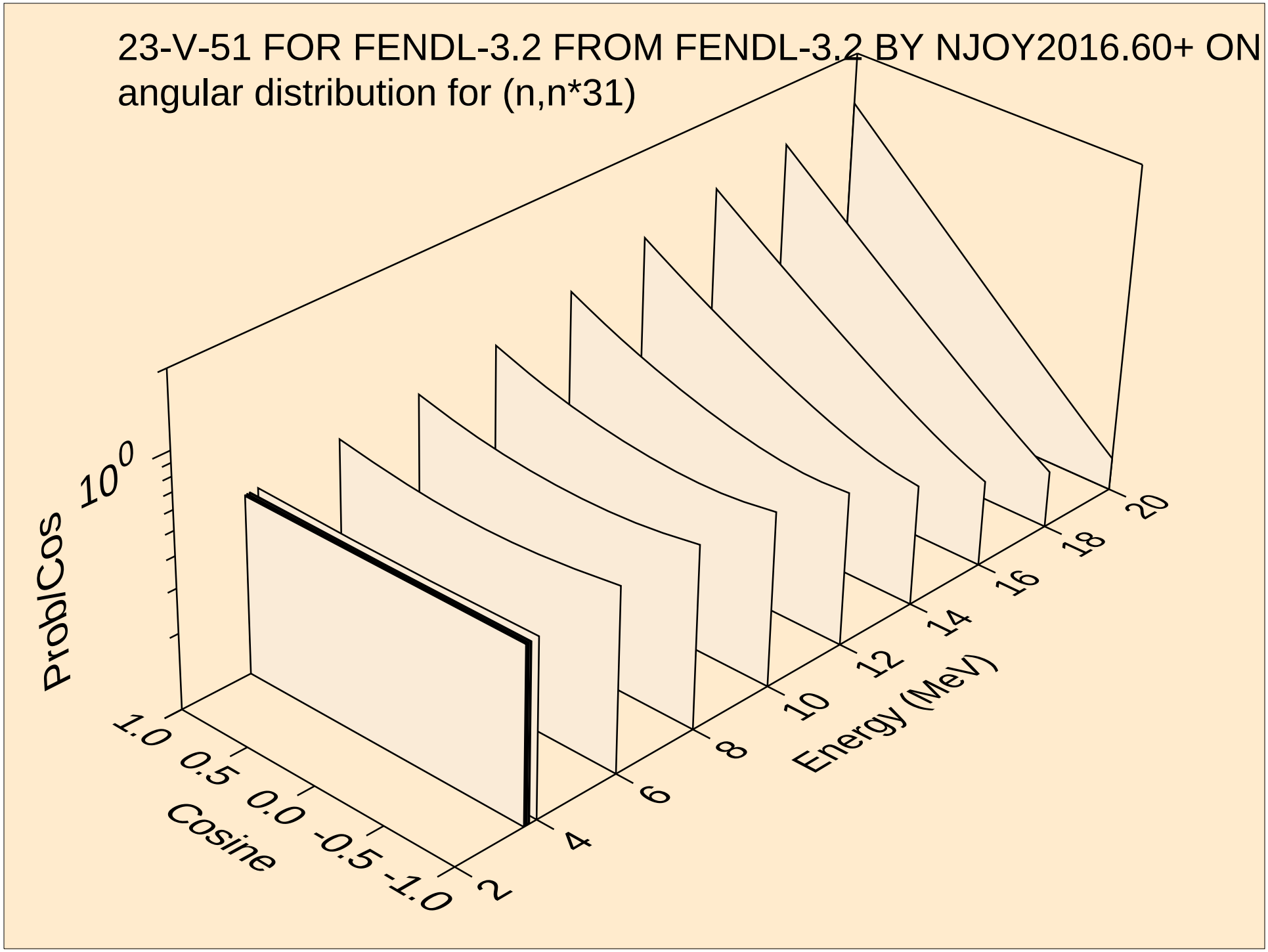

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*26)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

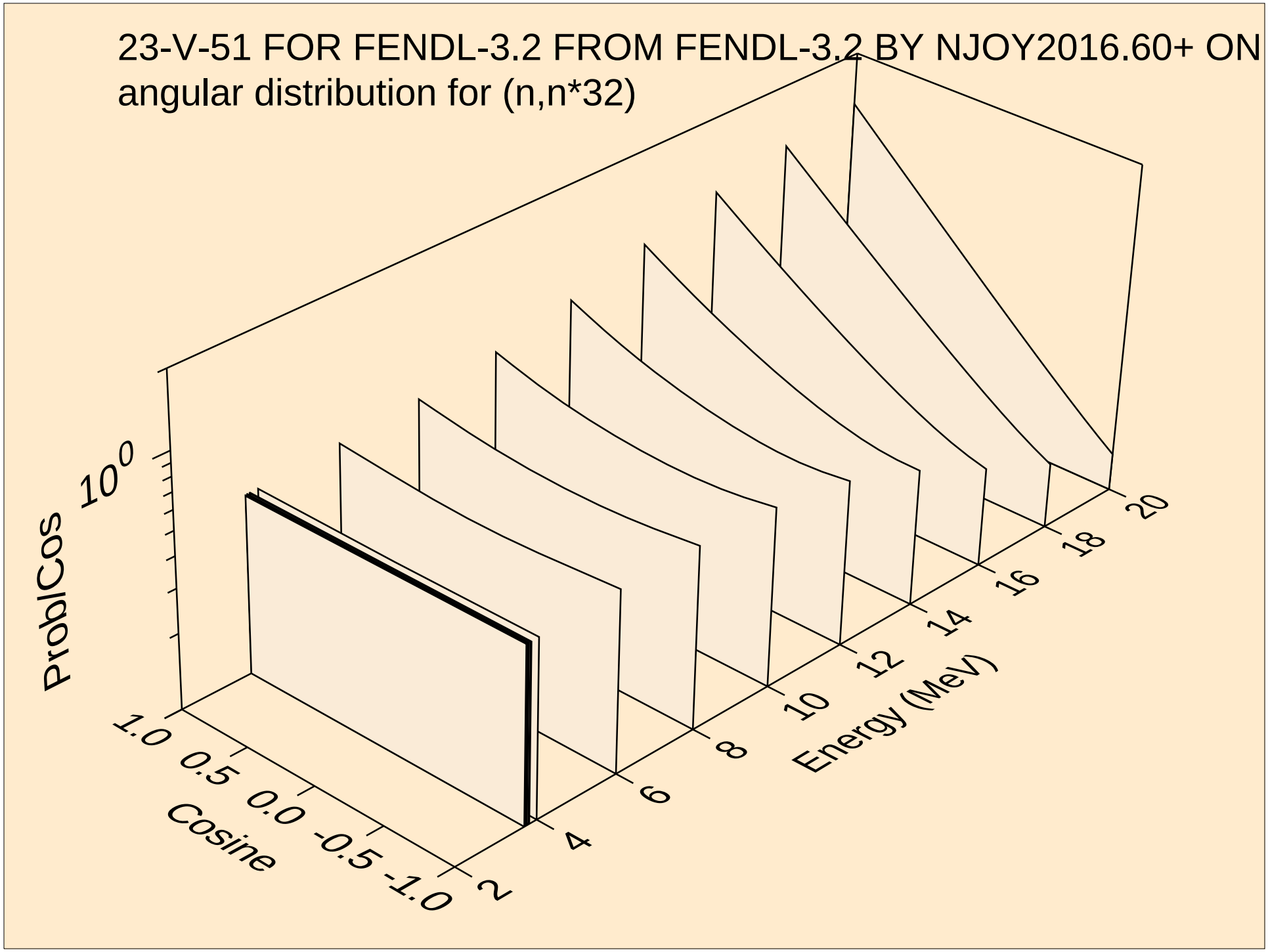

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*27)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

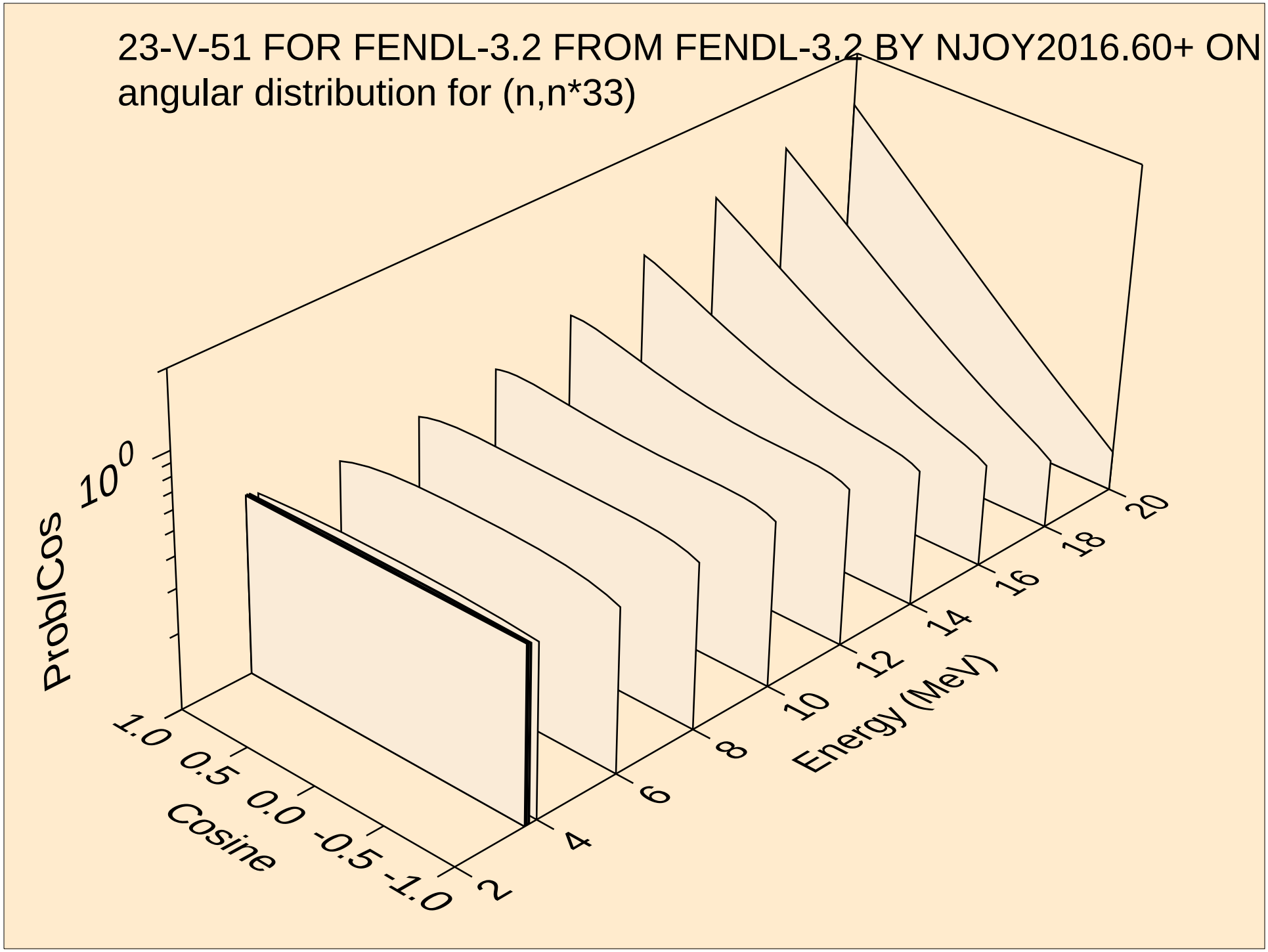

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*28)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

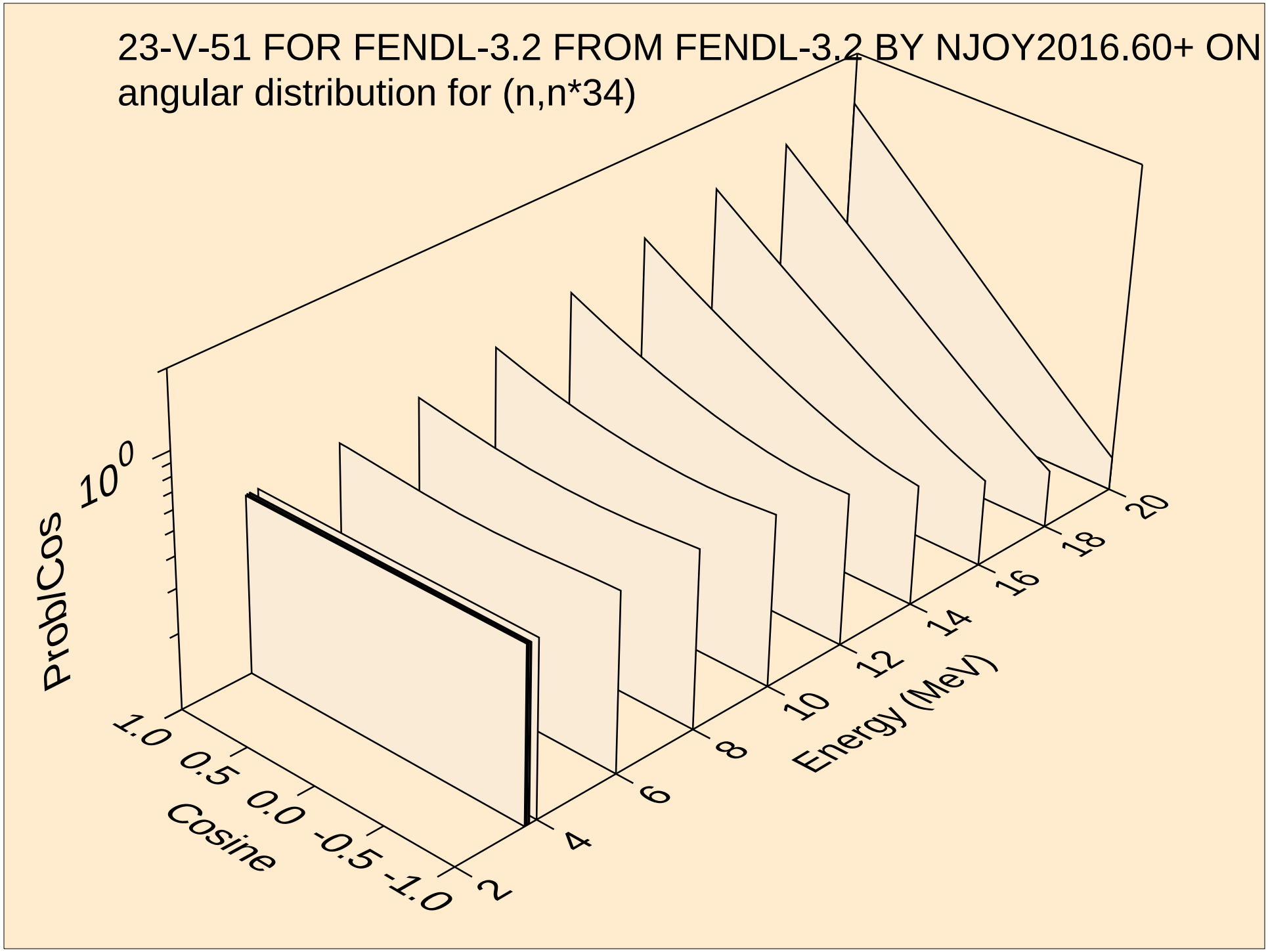

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*29)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

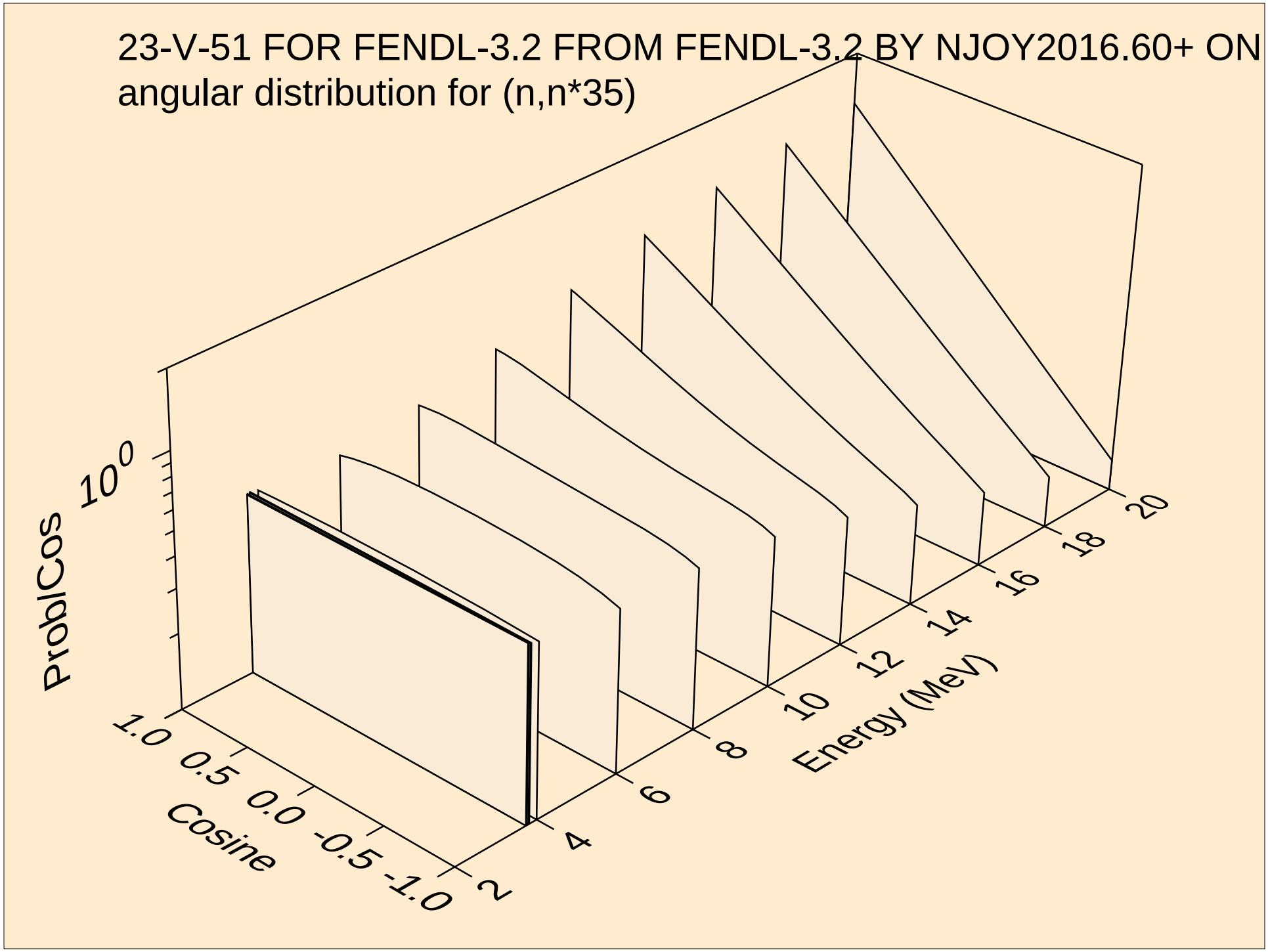

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*30)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

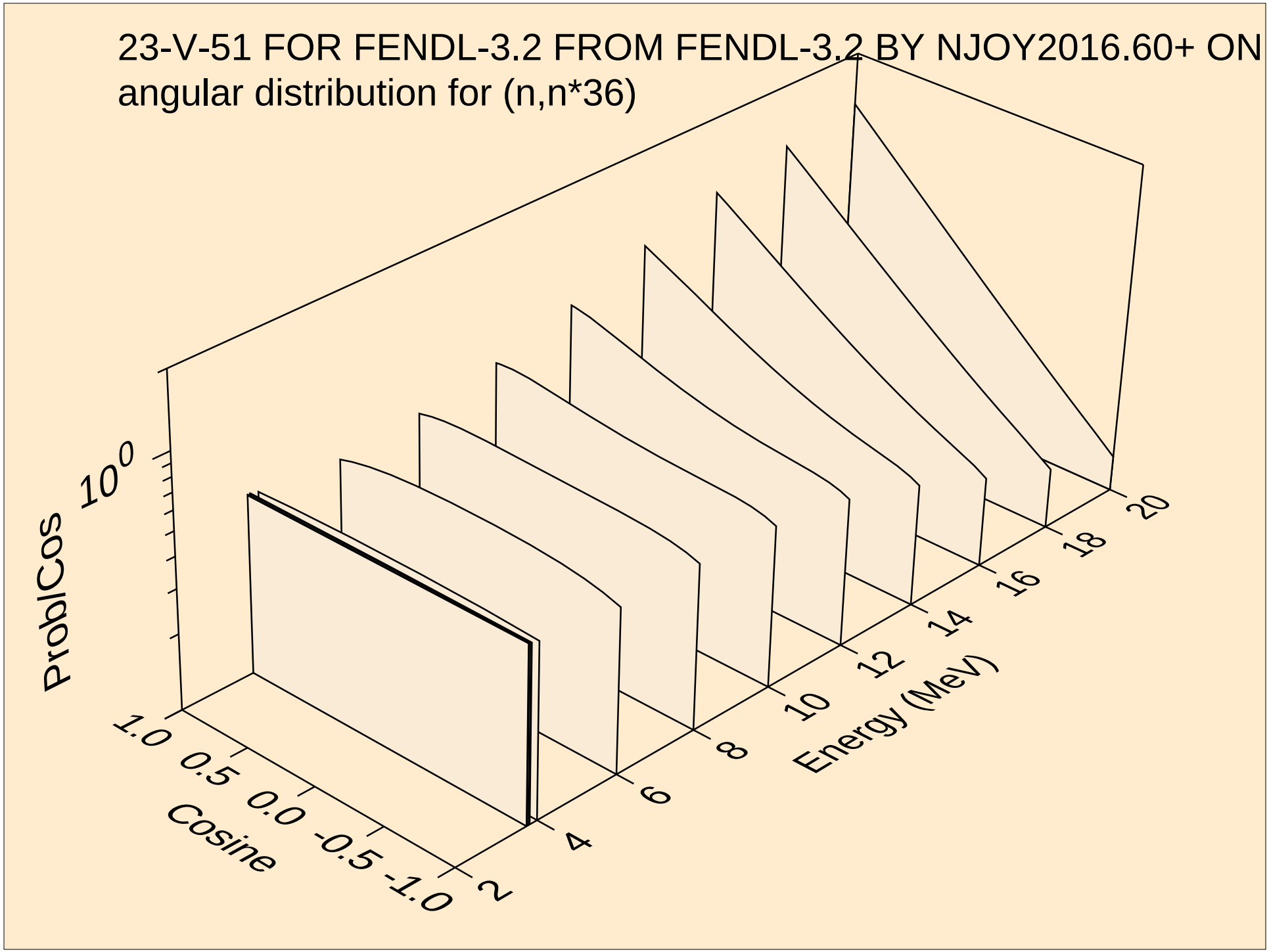

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*31)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

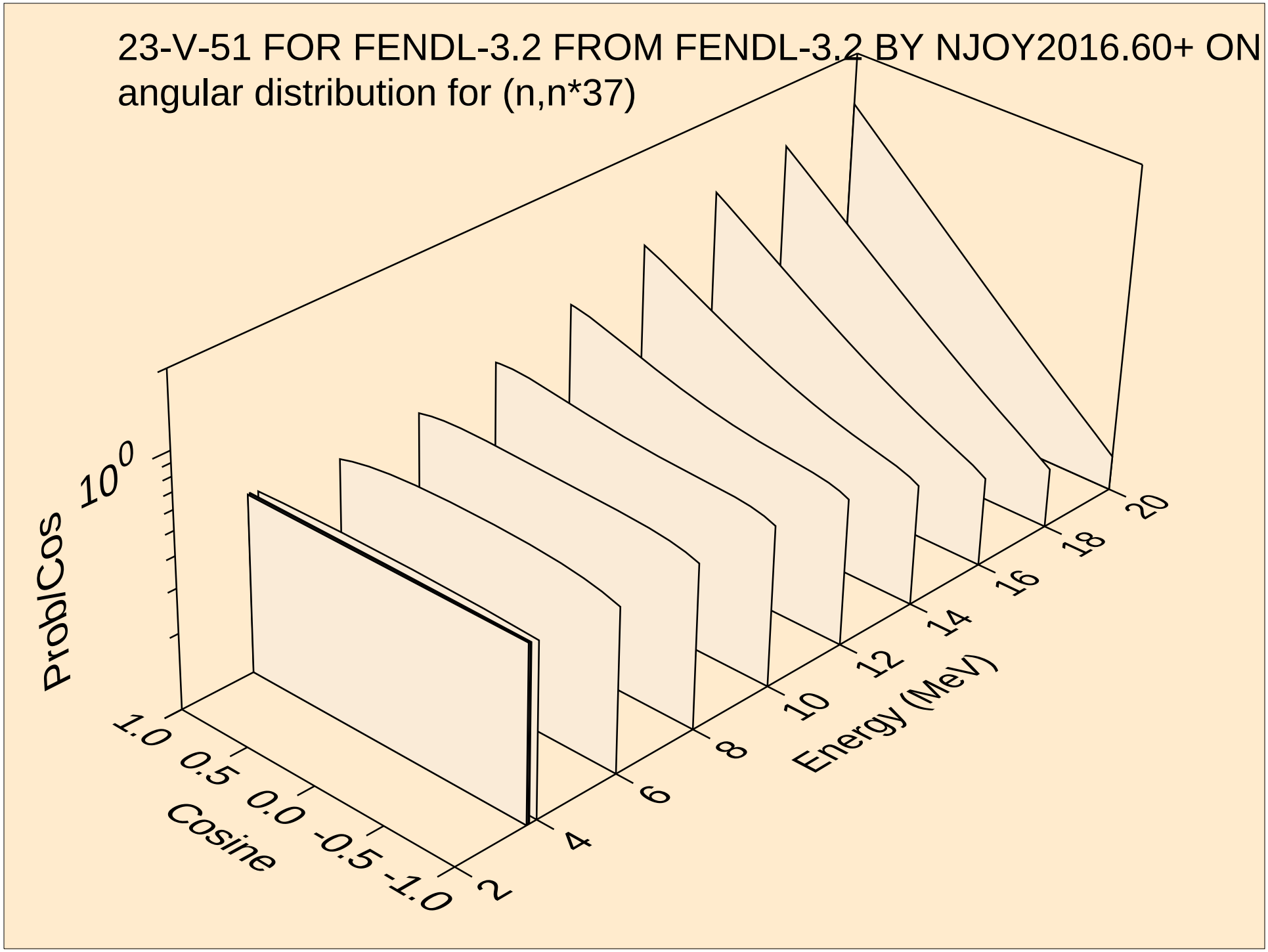

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*32)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

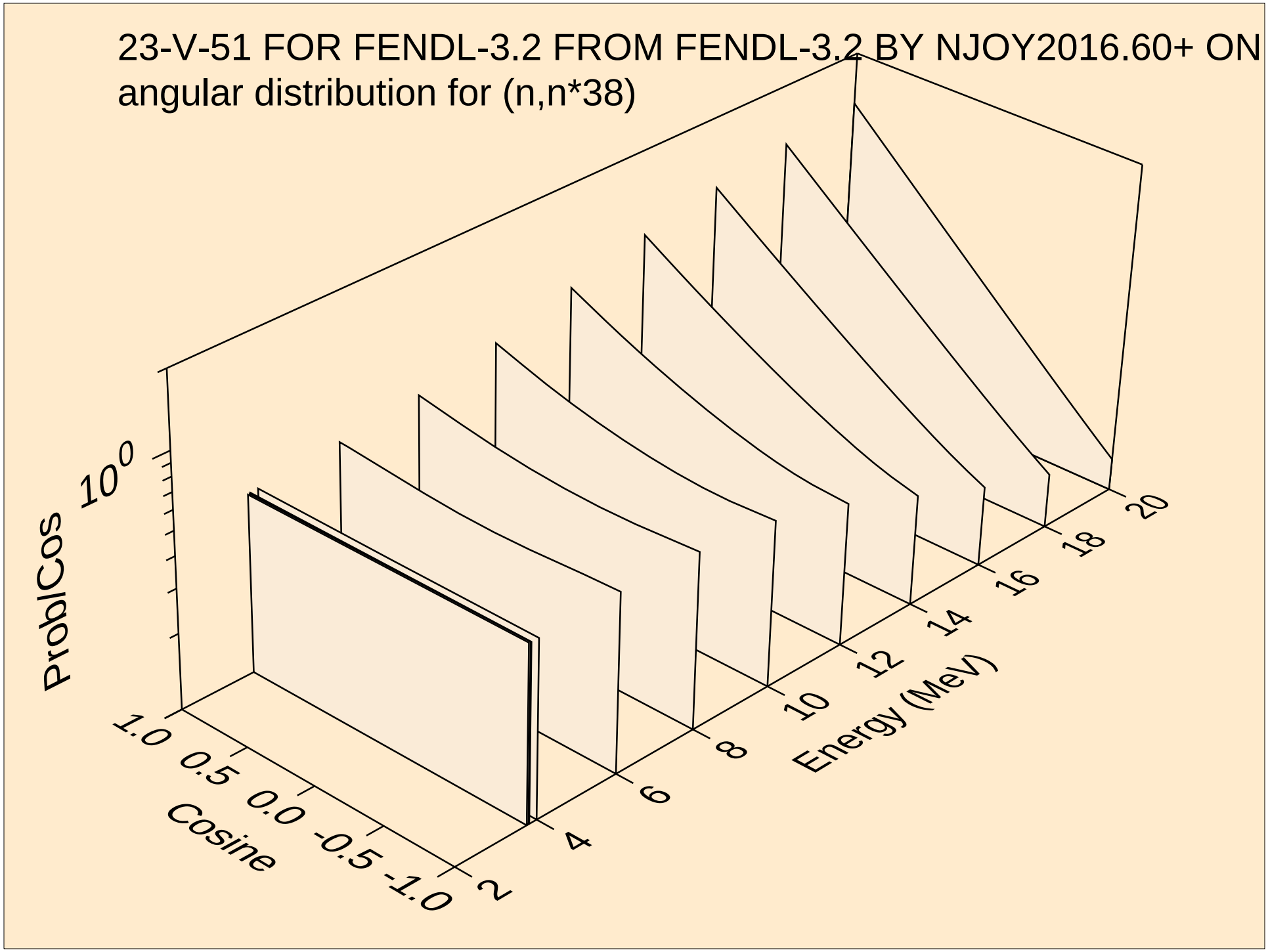

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*33)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

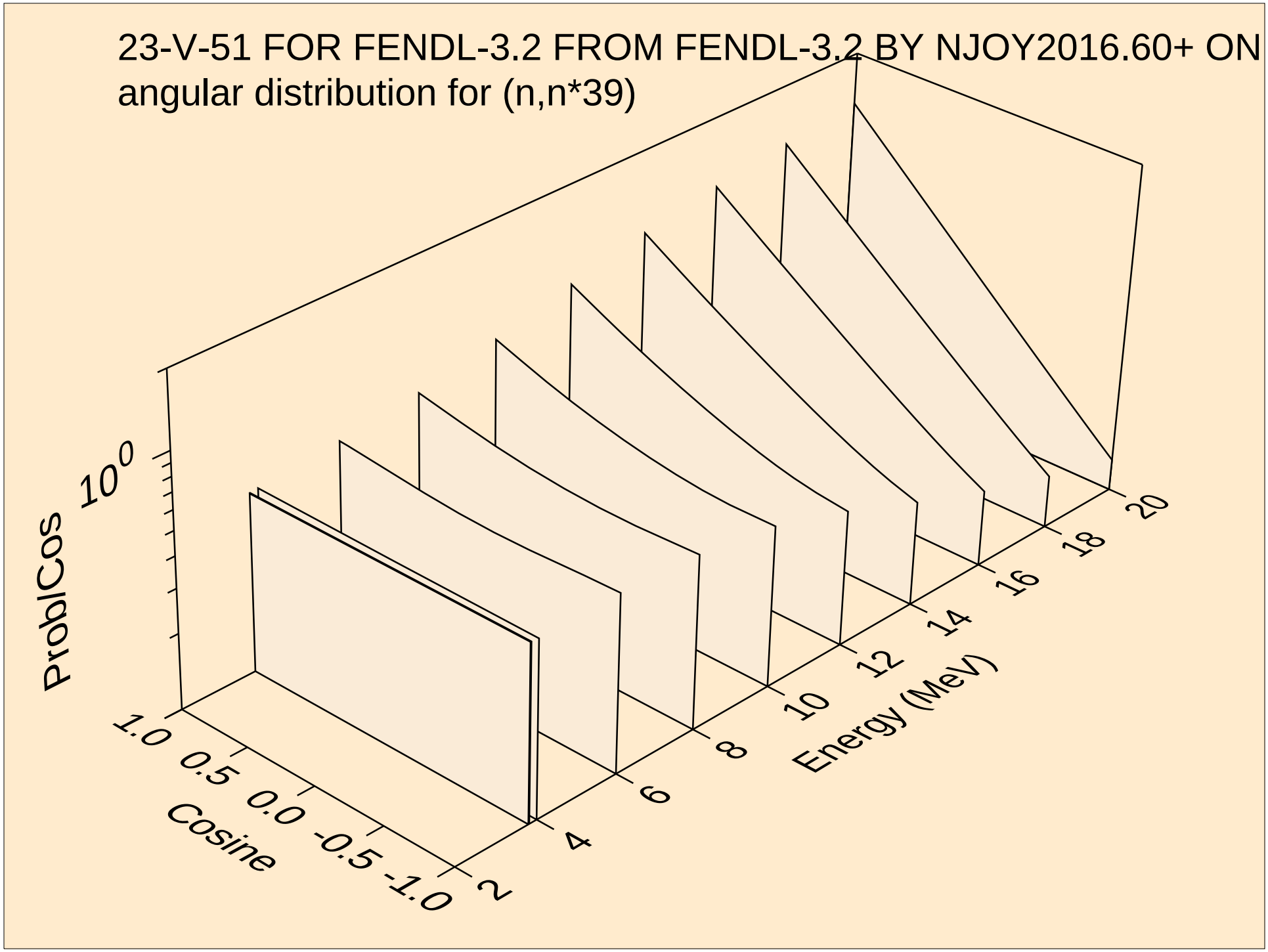

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*34)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

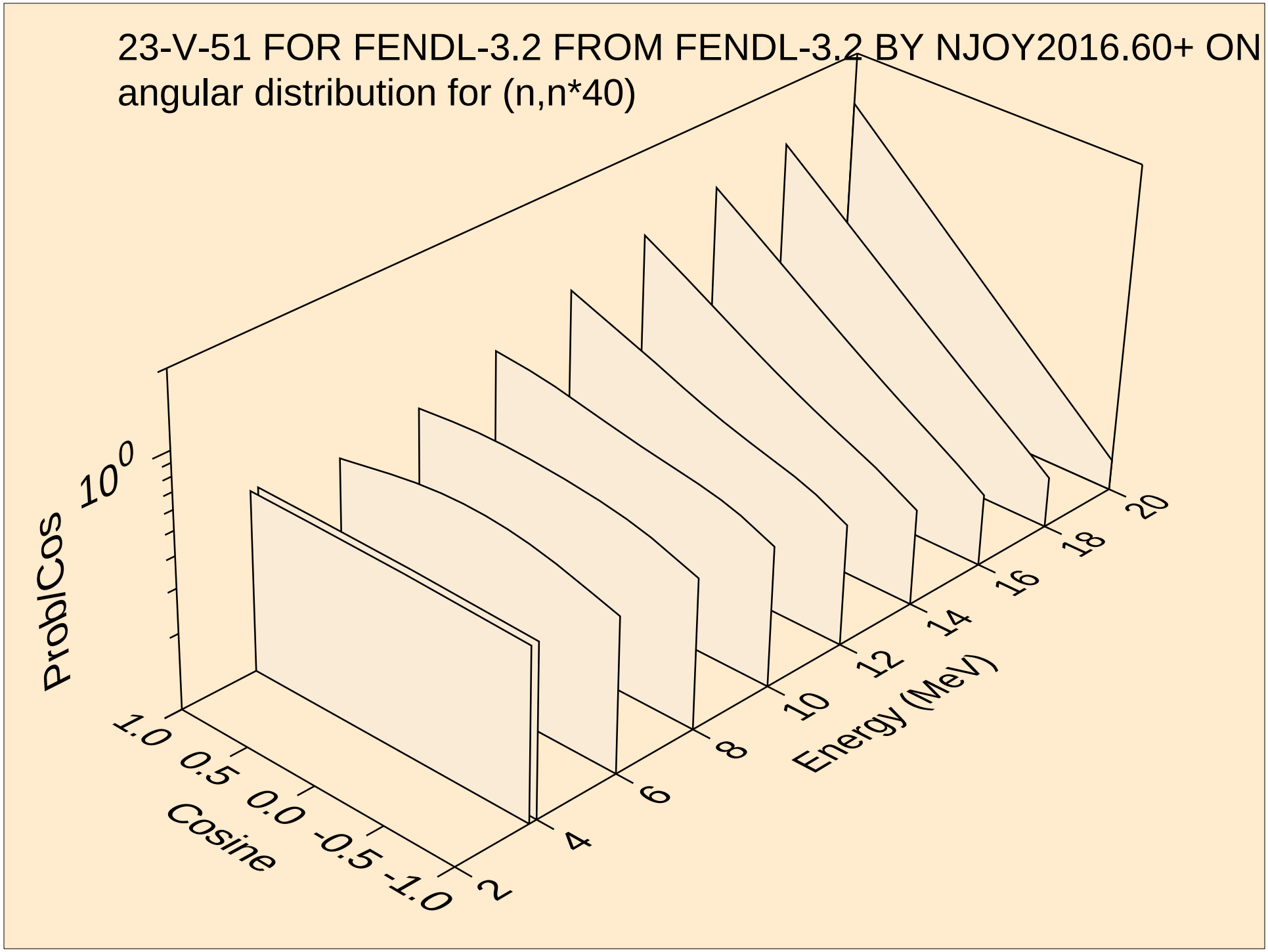

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*35)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

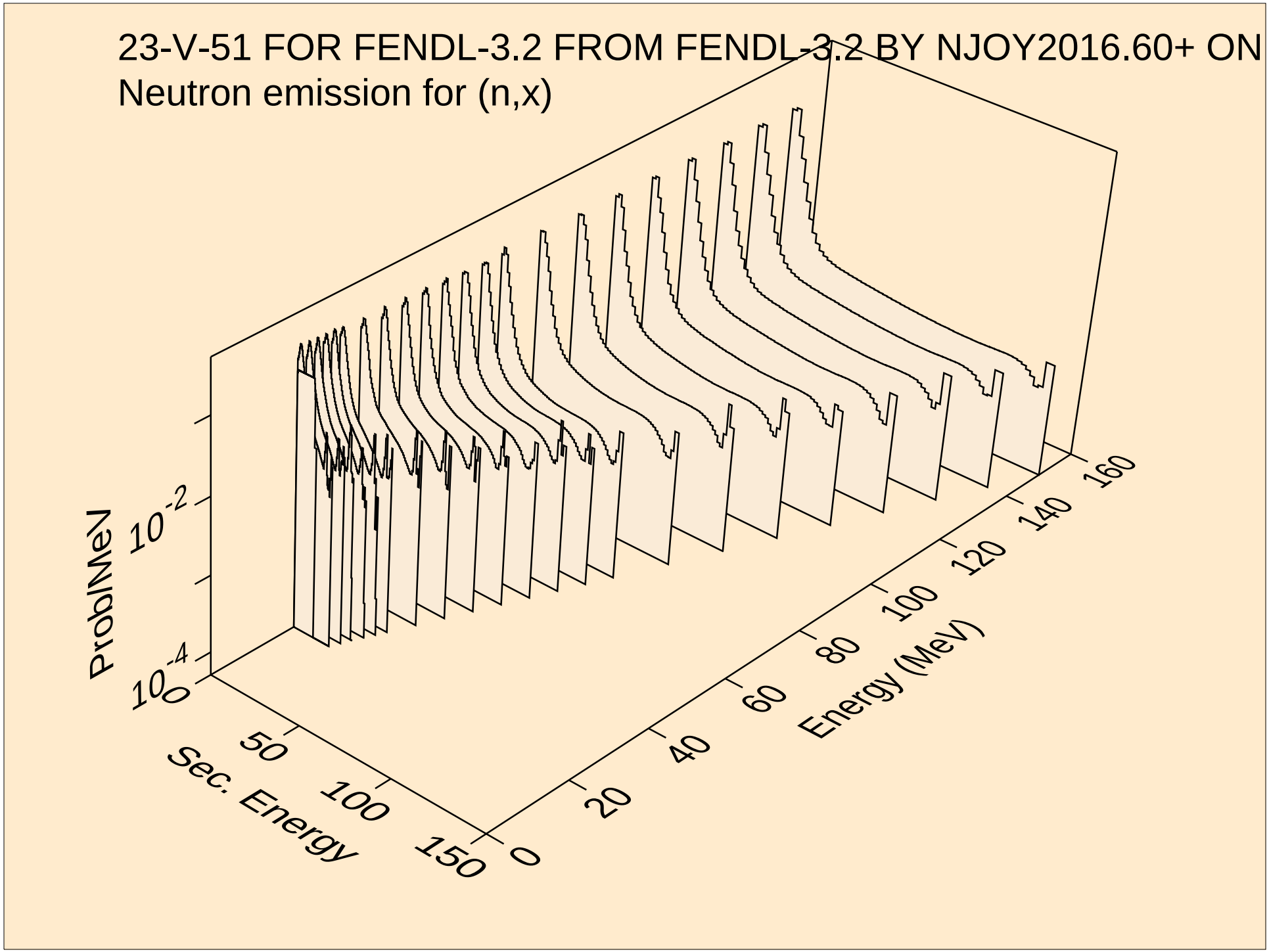

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*36)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

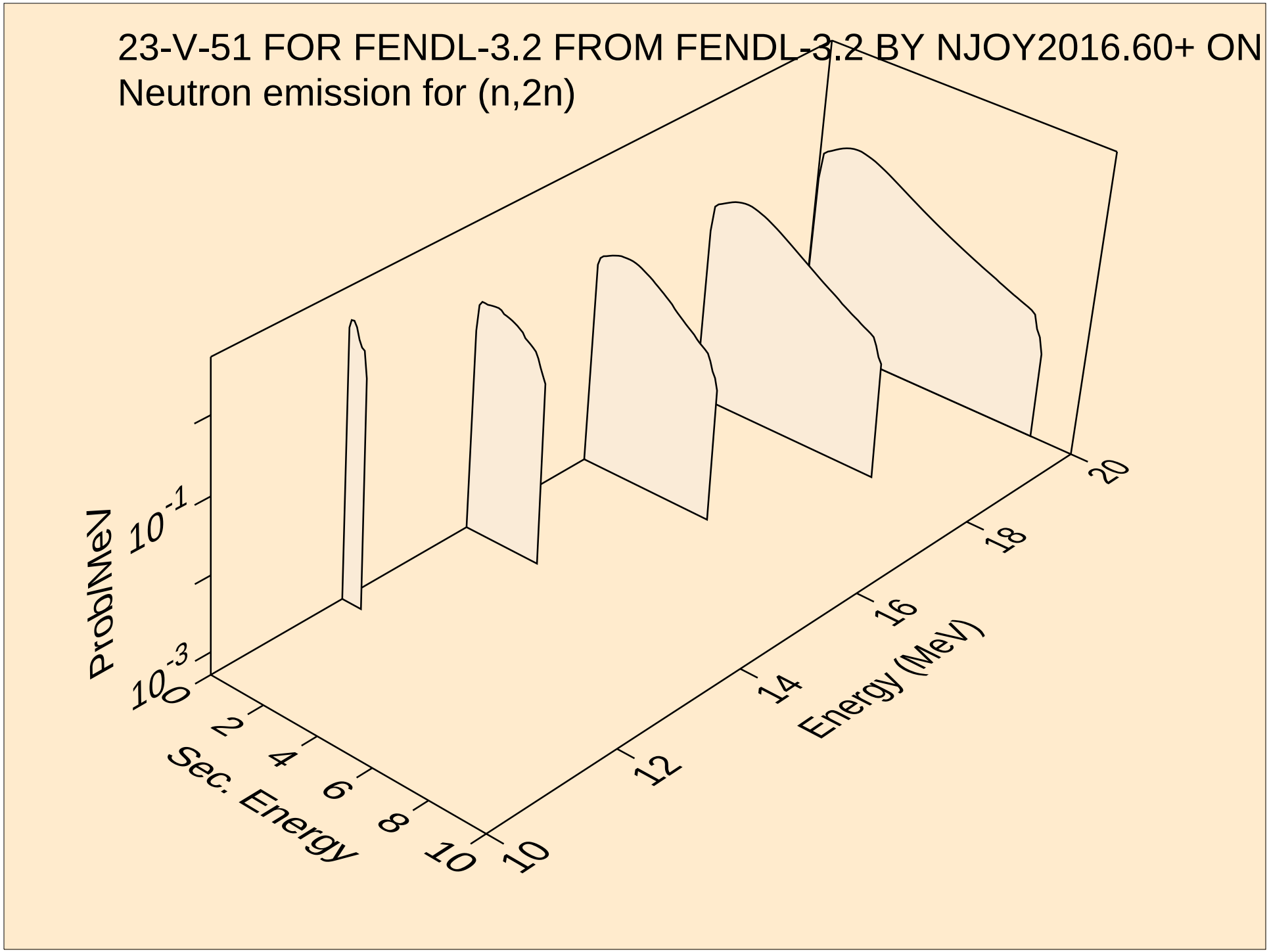

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*37)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

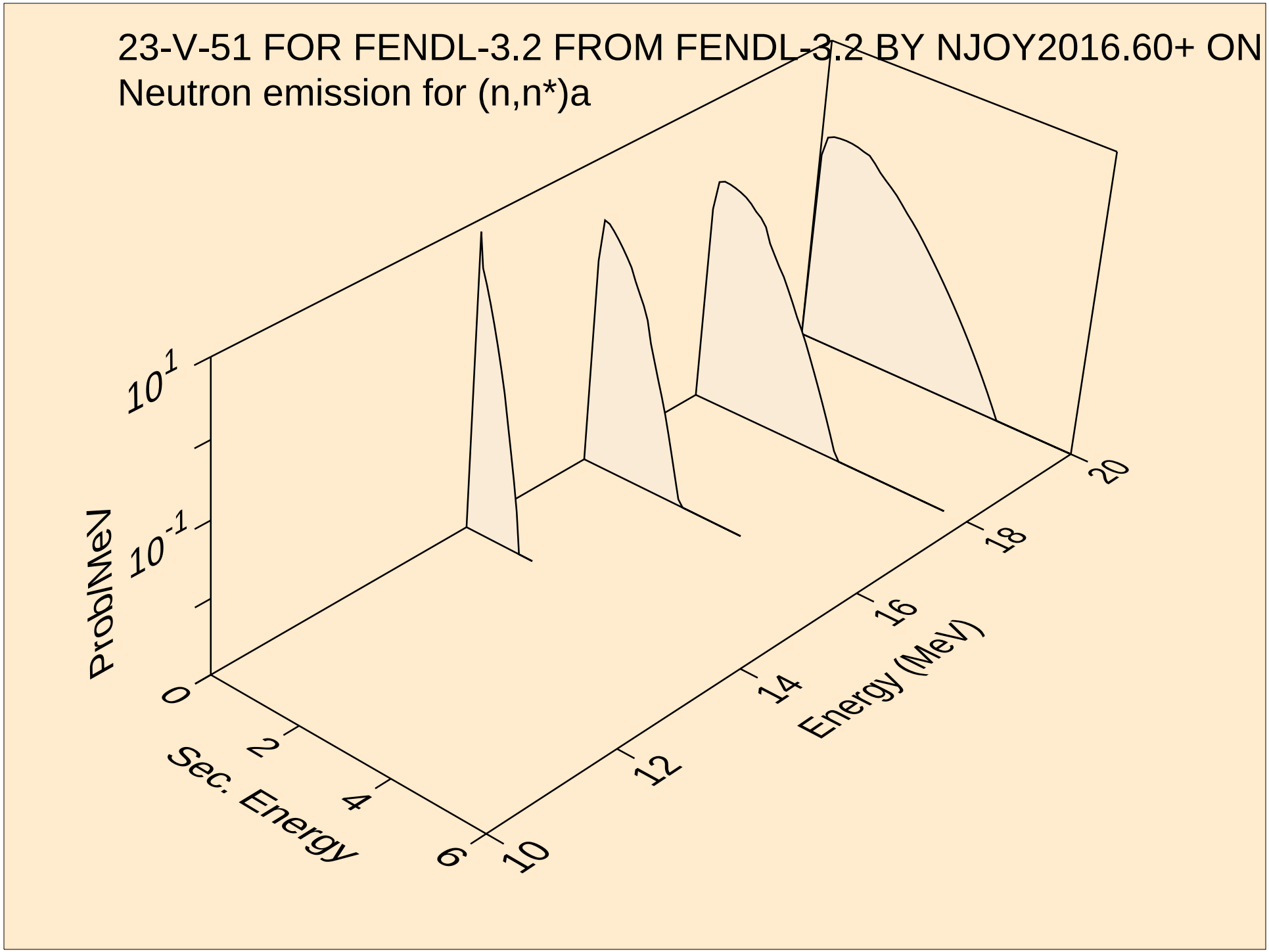

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*38)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

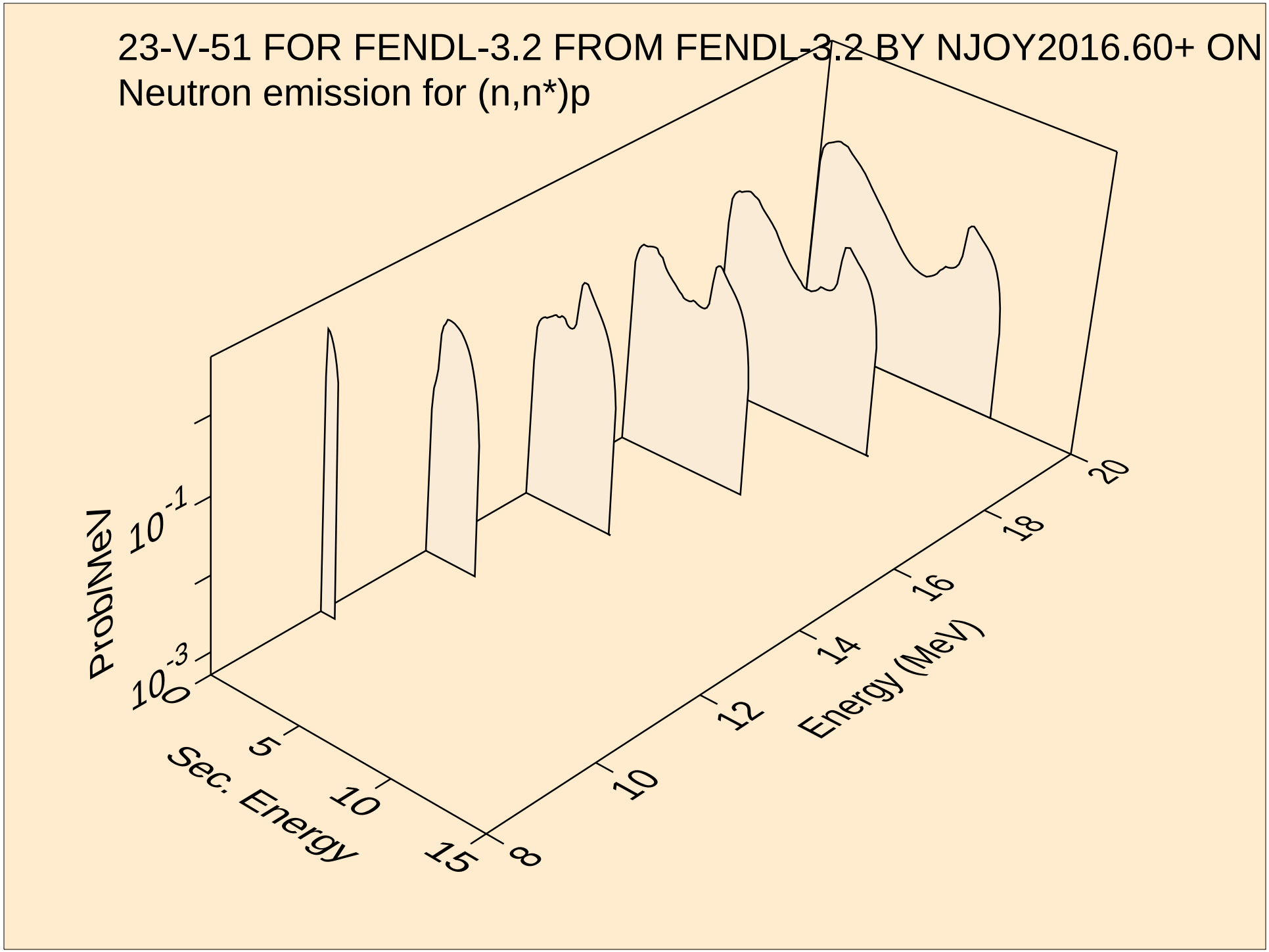

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*39)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

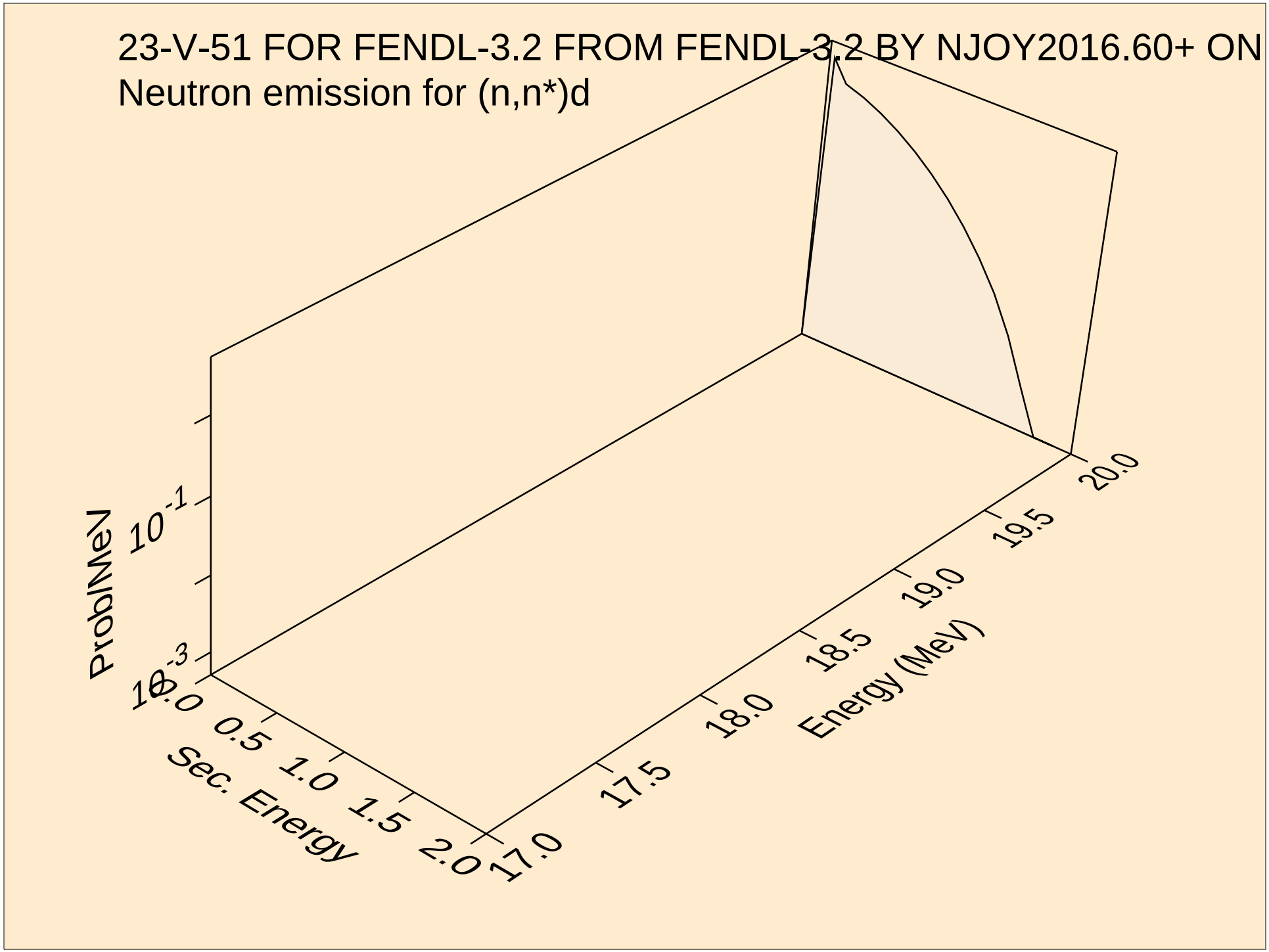

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
angular distribution for (n,n*40)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

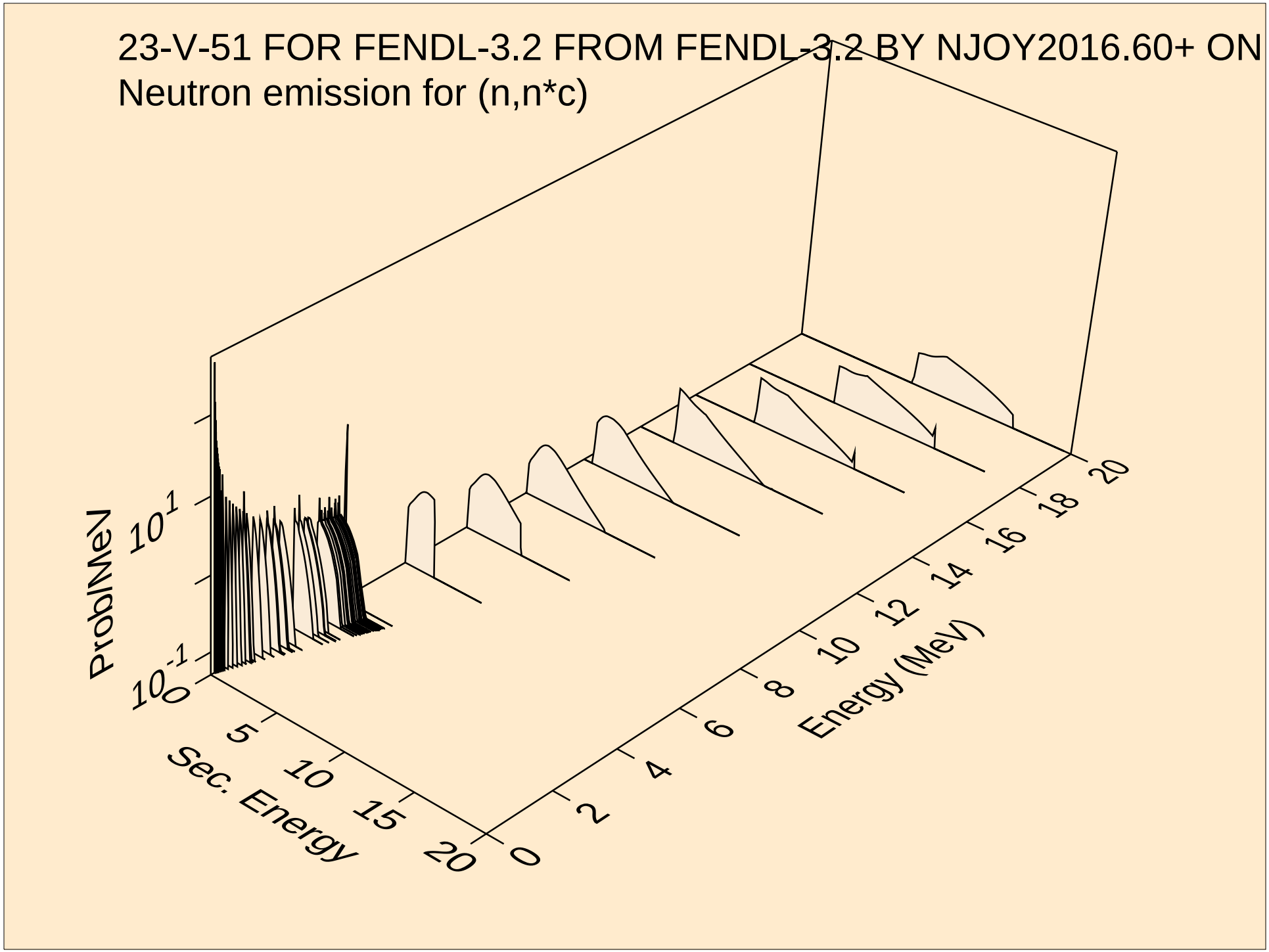

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Neutron emission for (n,x)
Prob/MeV
10-2
10-4
0
50
100
150
Sec. Energy
0
20
40
60
80
100
120
140
160
Energy (MeV)

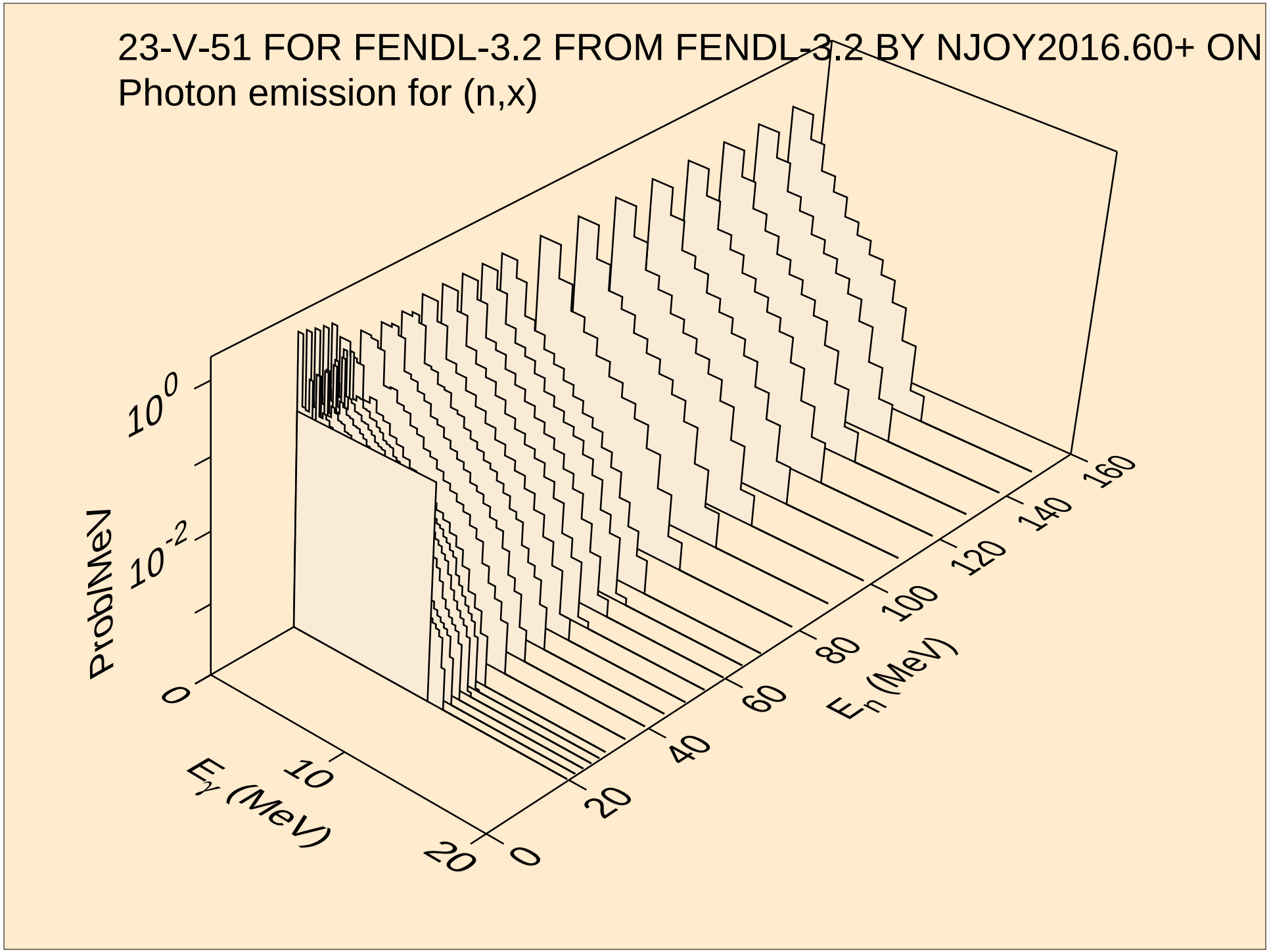

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Neutron emission for (n,2n)
Prob/MeV
10-1
10-3
0
2
4
6
8
10
Sec. Energy
10
12
14
16
18
20
Energy (MeV)

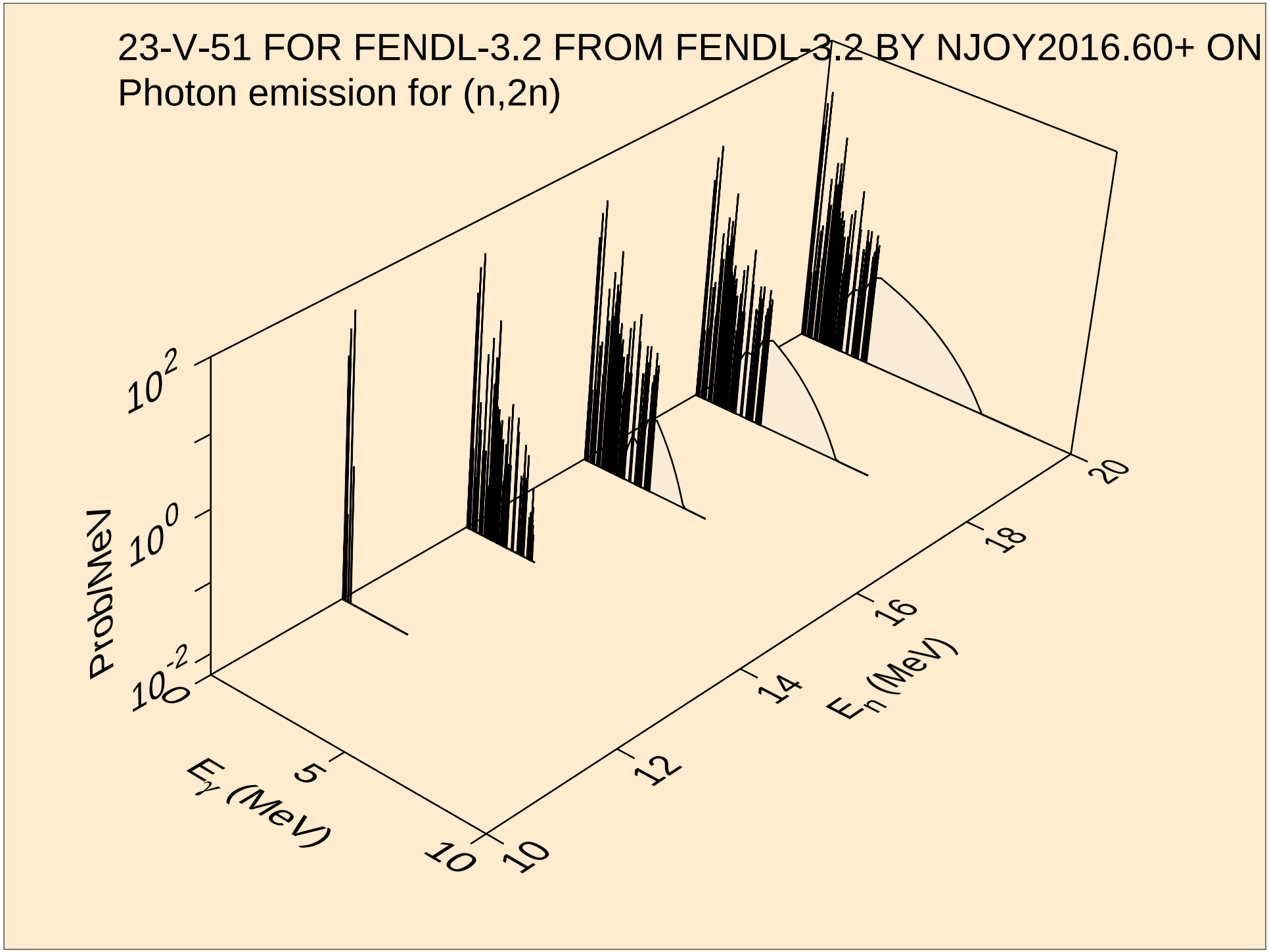

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Neutron emission for (n,n*)a
Prob/MeV
10^1
10^-1
0
2
4
6
Sec. Energy
10
12
14
16
18
20
Energy (MeV)

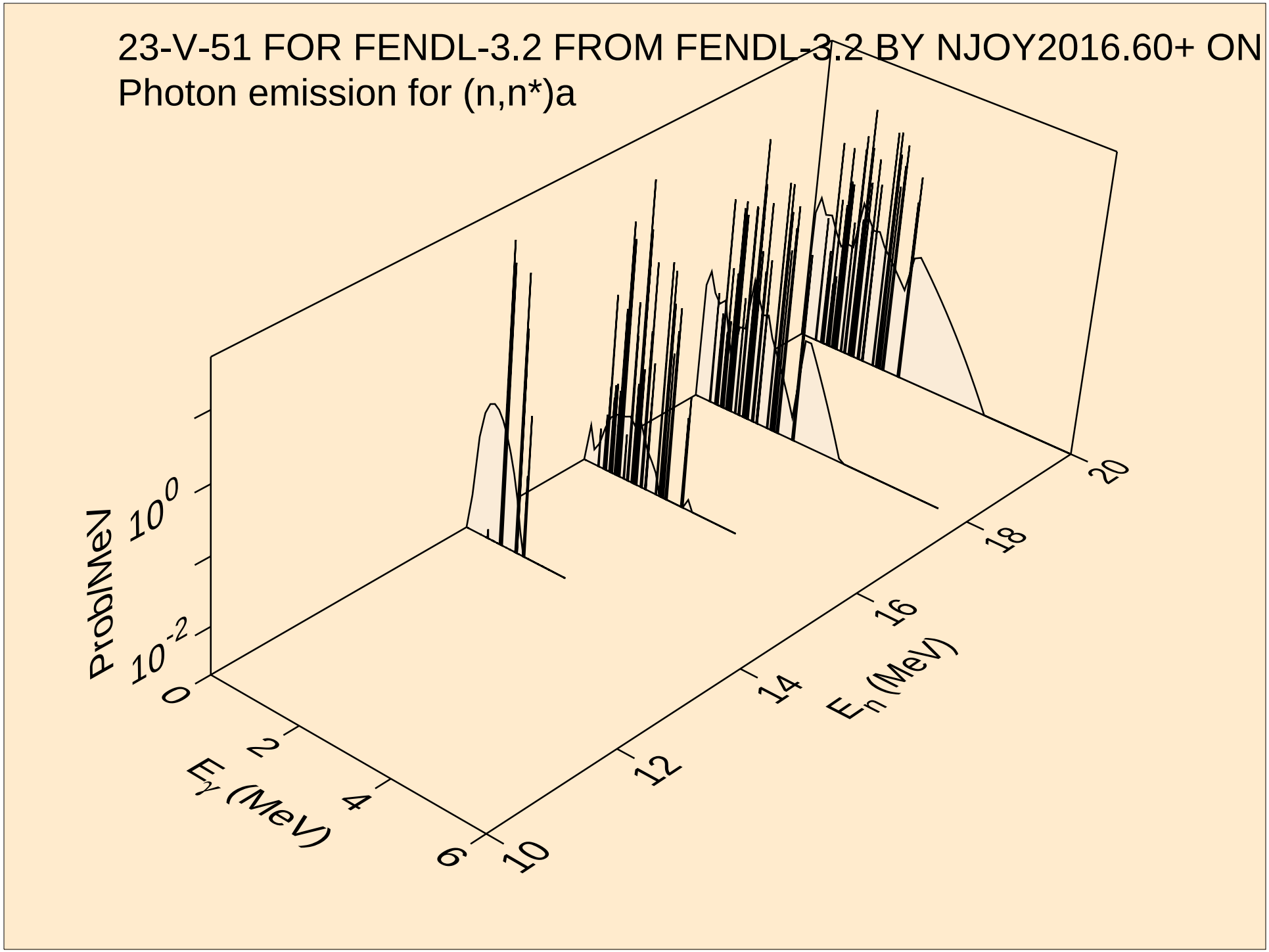

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Neutron emission for (n,n*)p
Prob/MeV
10-1
10-3
0
5
10
15
Sec. Energy
8
10
12
14
16
18
20
Energy (MeV)

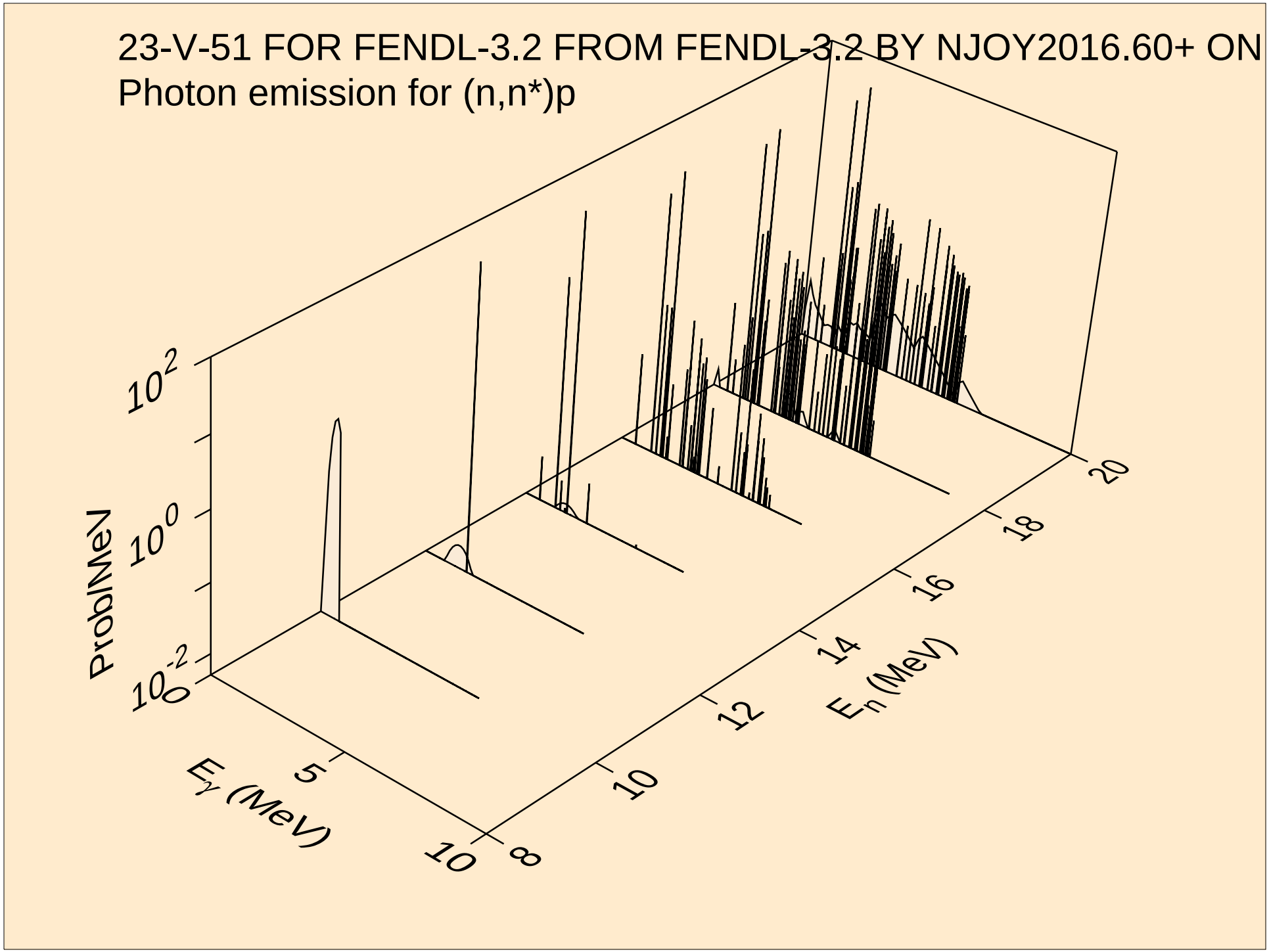

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Neutron emission for (n,n*)d
Prob/MeV
10-1
10-3
0.0
0.5
1.0
1.5
2.0
Sec. Energy
17.0
17.5
18.0
18.5
19.0
19.5
20.0
Energy (MeV)

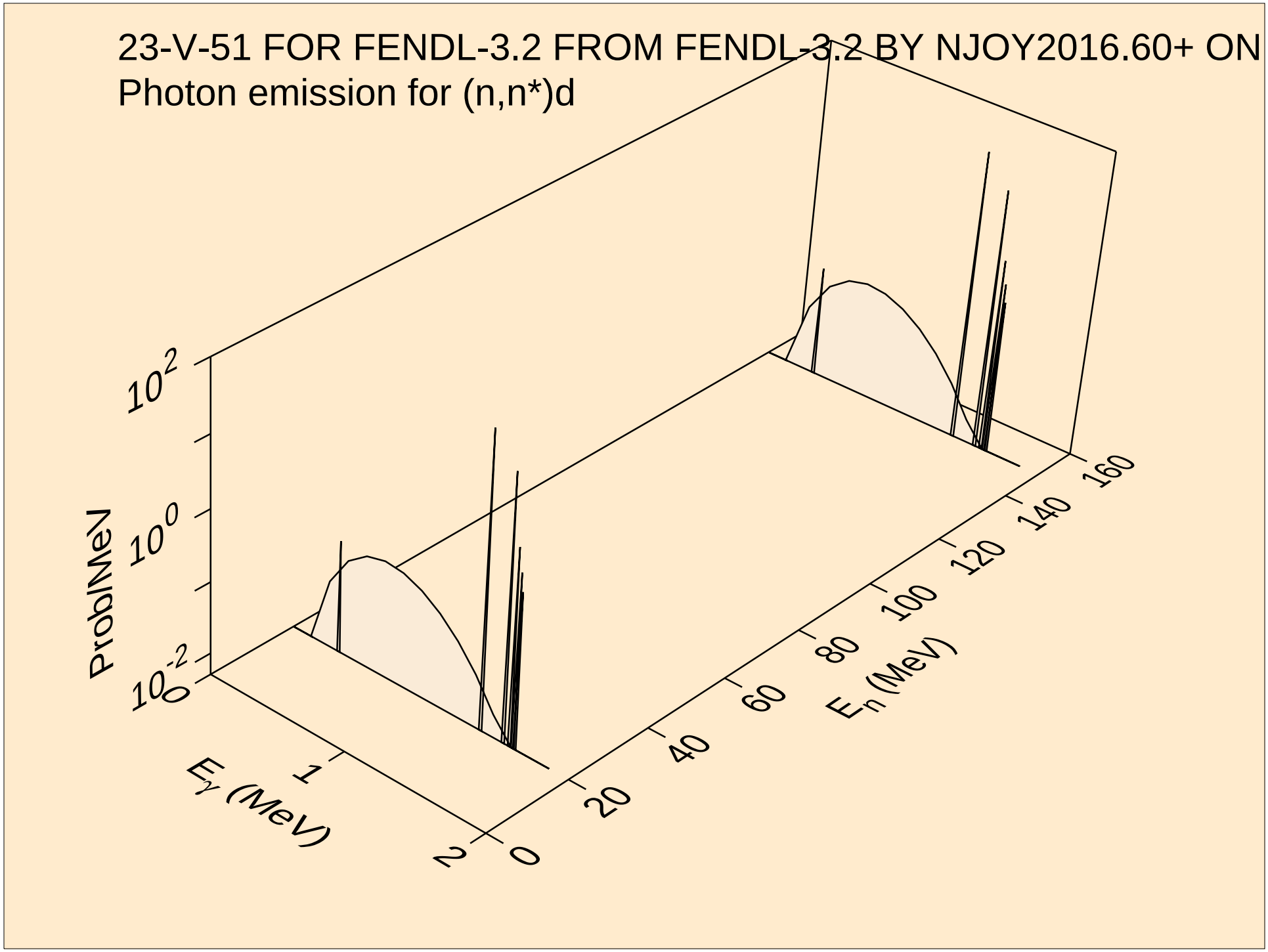

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Neutron emission for (n,n*c)
Prob/MeV
10^1
10^-1
0
5
10
15
20
Sec. Energy
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

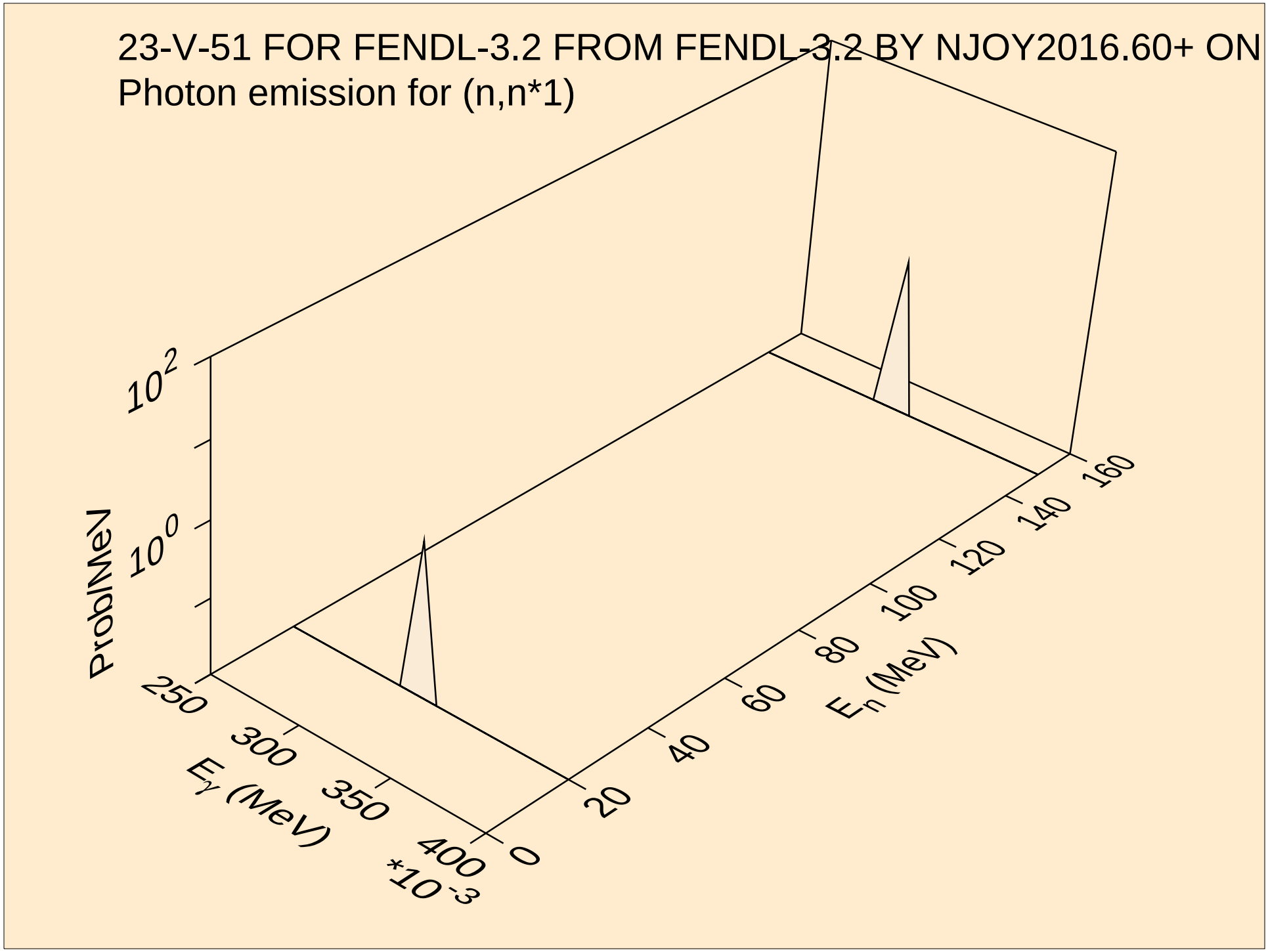

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,x)
Prob/MeV
10^0
10^-2
0
10
20
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

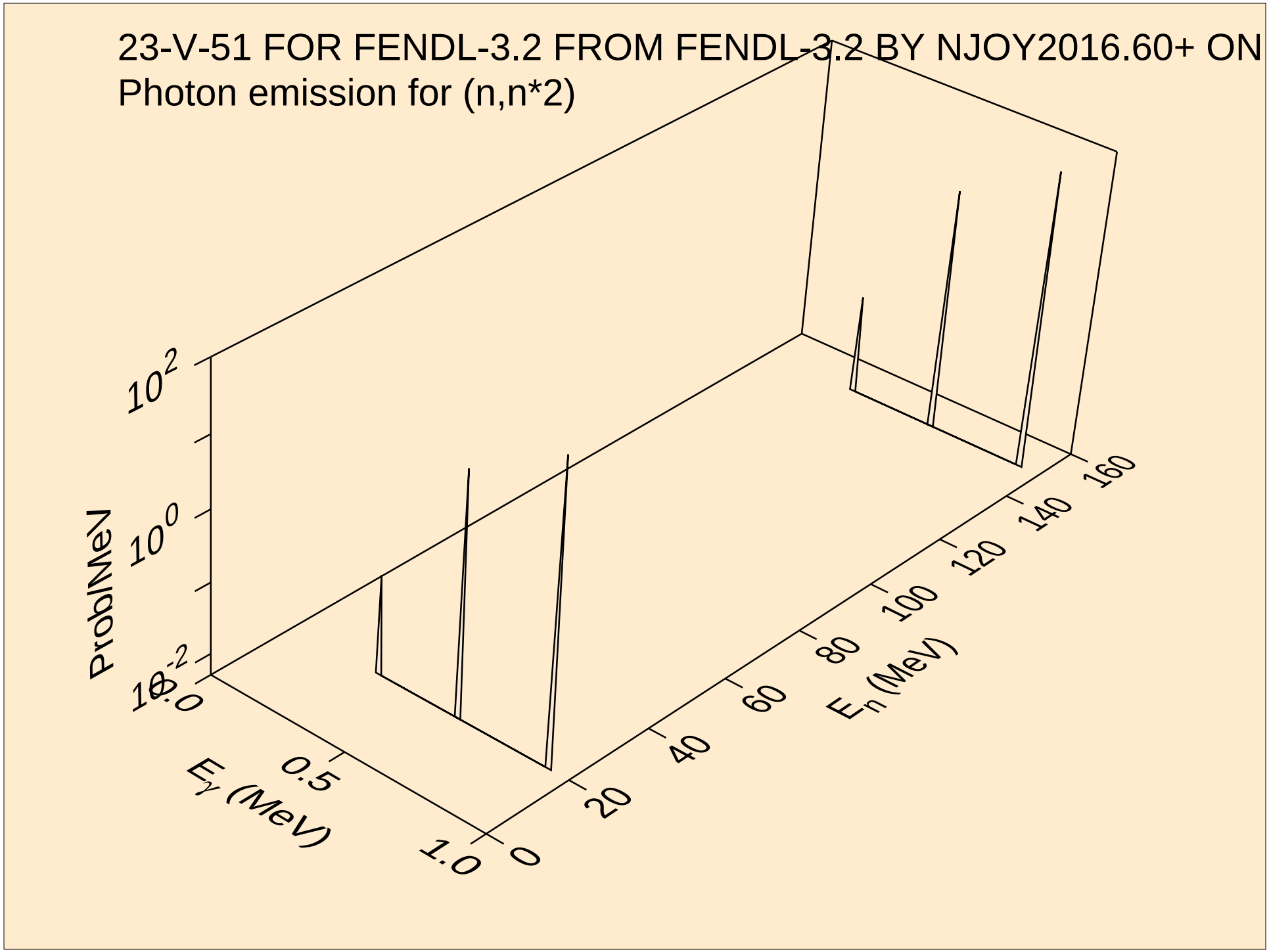

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,2n)
Prob/MeV
10^{2}
10^{0}
10^{-2}
0
5
10
E_γ (MeV)
10
12
14
16
18
20
E_n (MeV)

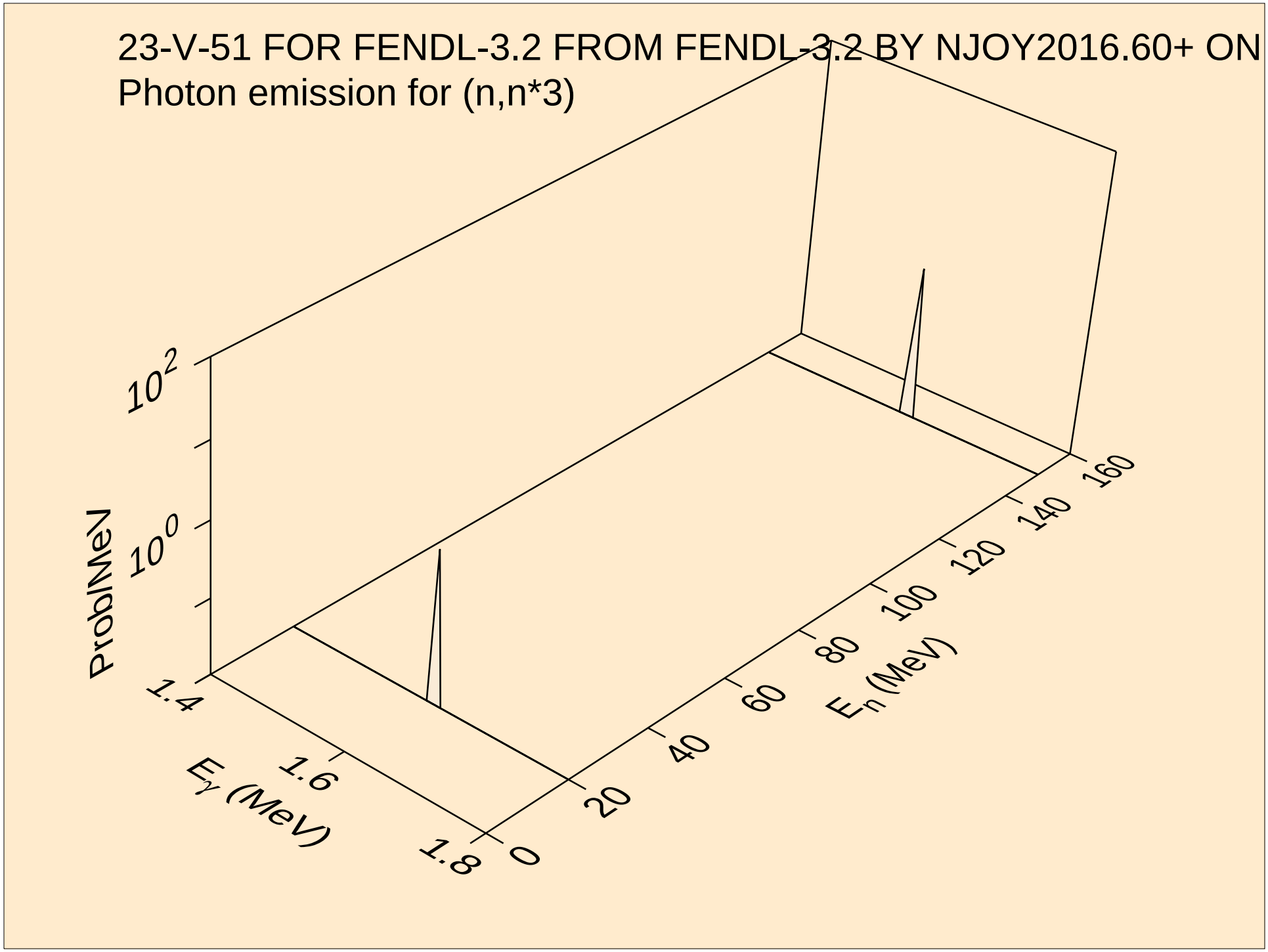

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*)a
Prob/MeV
10^0
10^-2
0
2
4
6
E_γ (MeV)
10
12
14
16
18
20
E_n (MeV)

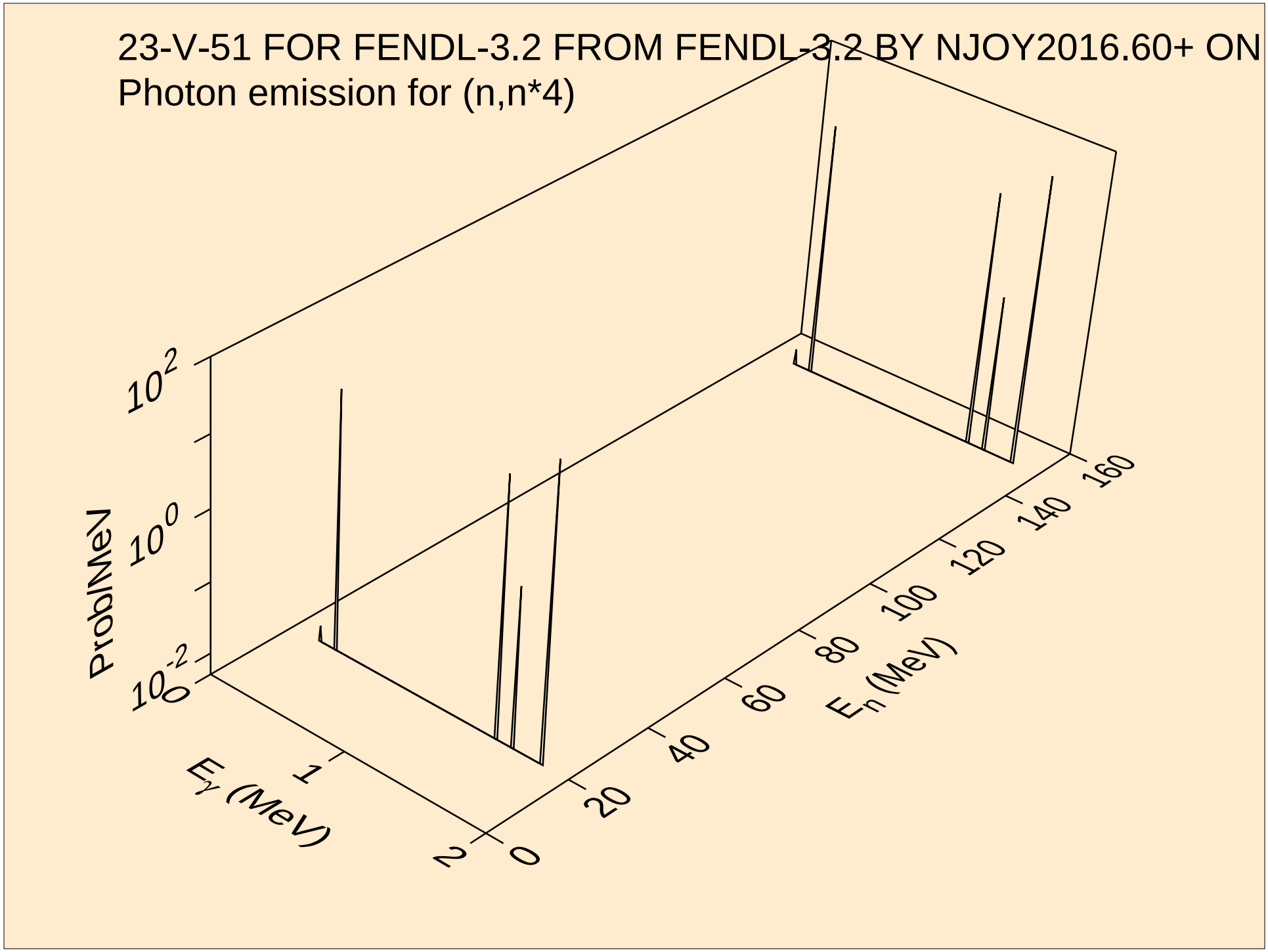

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*)p
Prob/MeV
10^{2}
10^{0}
10^{-2}
0
5
10
E_γ (MeV)
8
10
12
14
16
18
20
E_n (MeV)

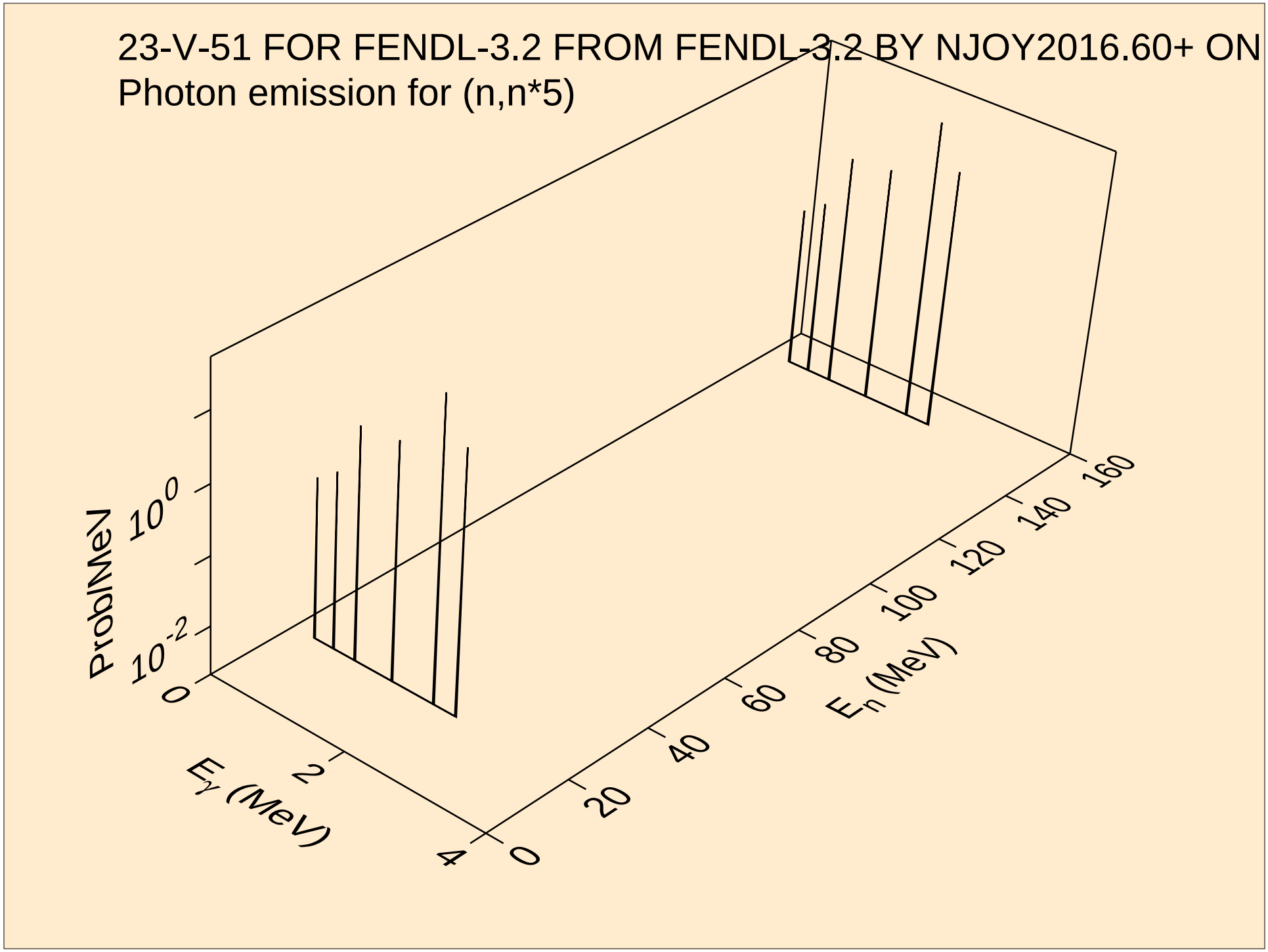

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*)d
Prob/MeV
10^{2}
10^{0}
10^{-2}
E_γ (MeV)
0
1
2
E_n (MeV)
20
40
60
80
100
120
140
160

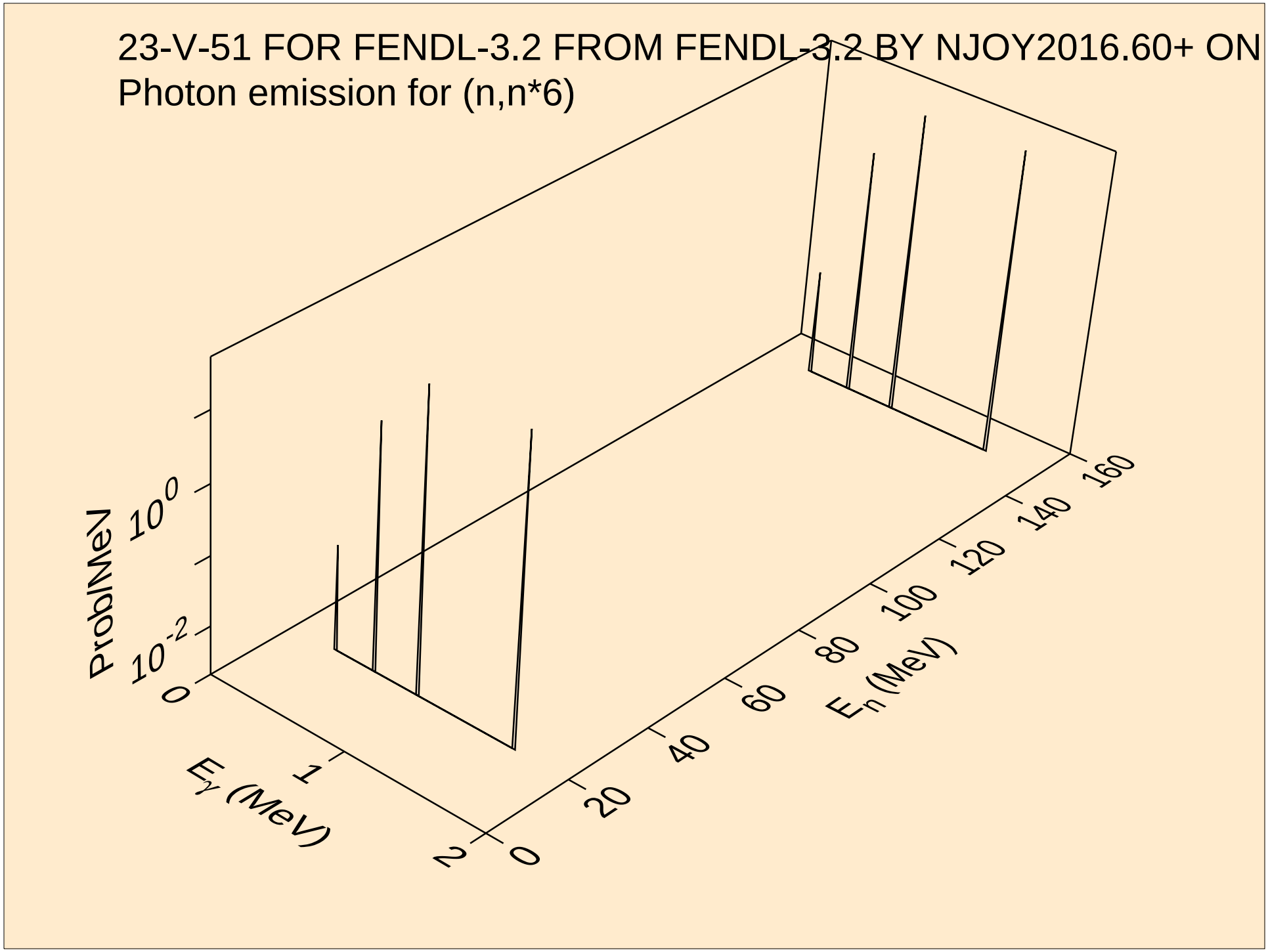

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*1)
Prob/MeV
10^2
10^0
250
300
350
400
E_γ (MeV)
*10 -3
0
20
40
60
80
100
120
140
160
E_n (MeV)

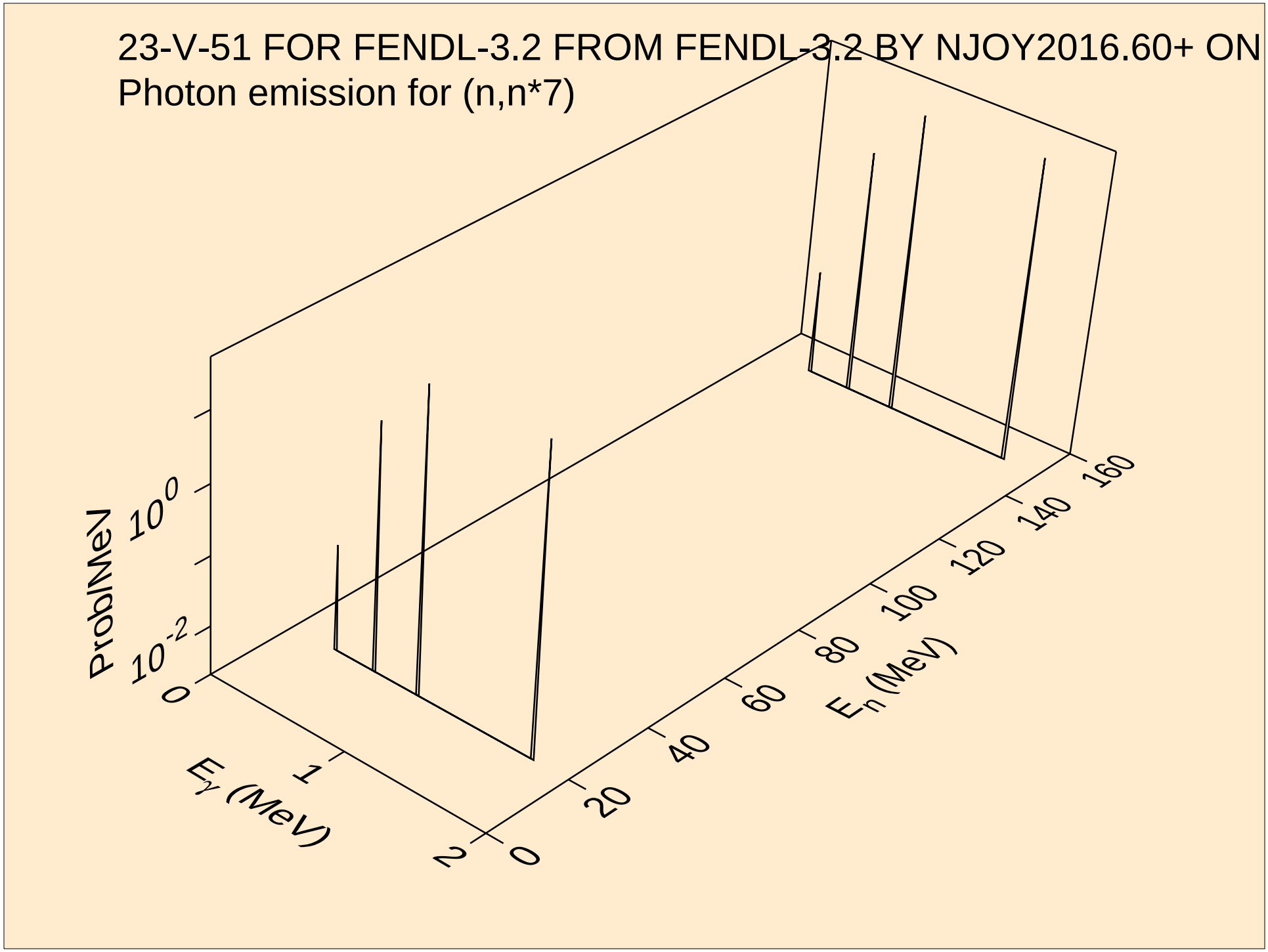

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*2)
Prob/MeV
10^{2}
10^{0}
10^{-2}
0.0
0.5
1.0
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

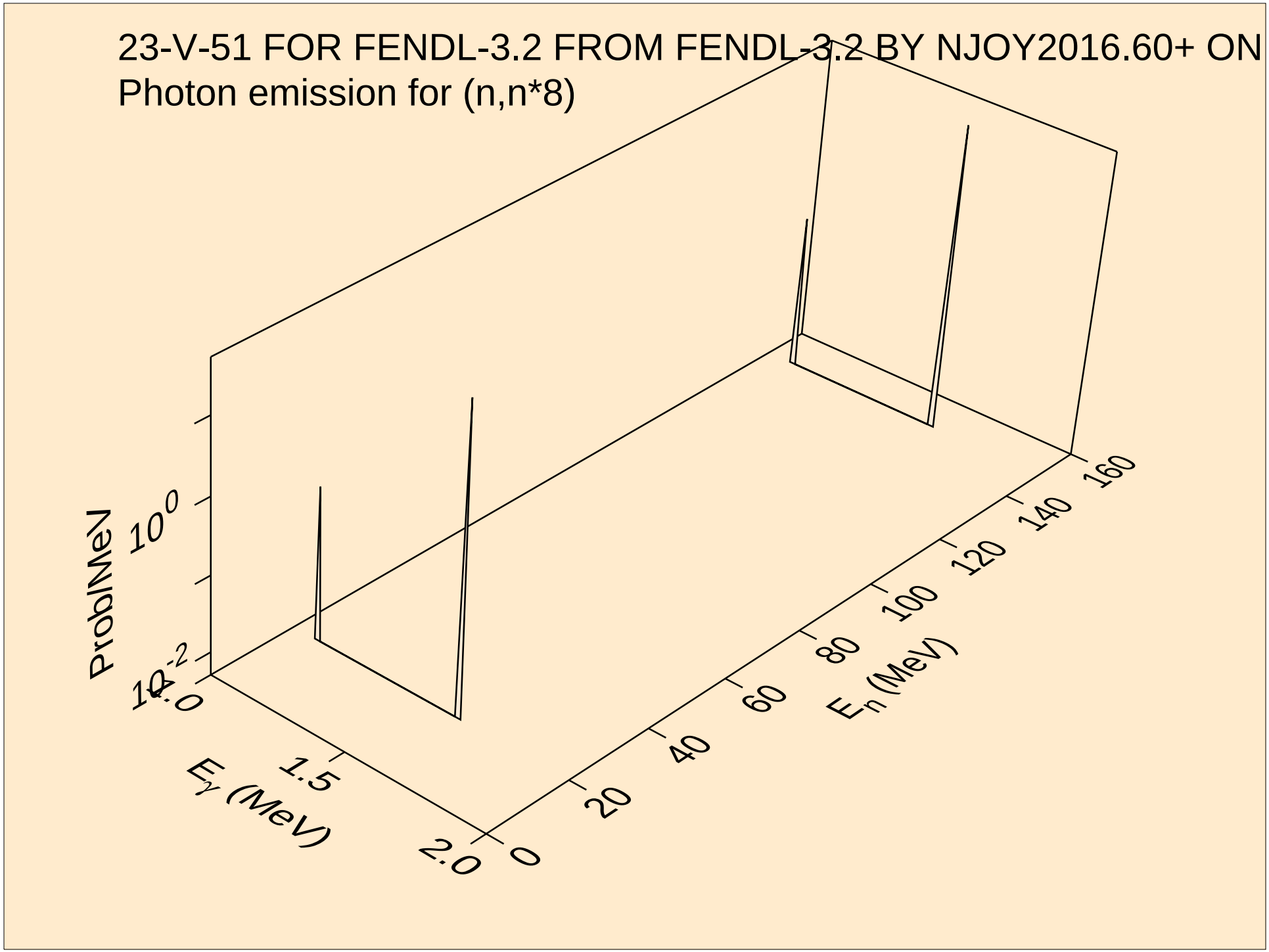

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*3)
Prob/MeV
10^2
10^0
1.4
1.6
1.8
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

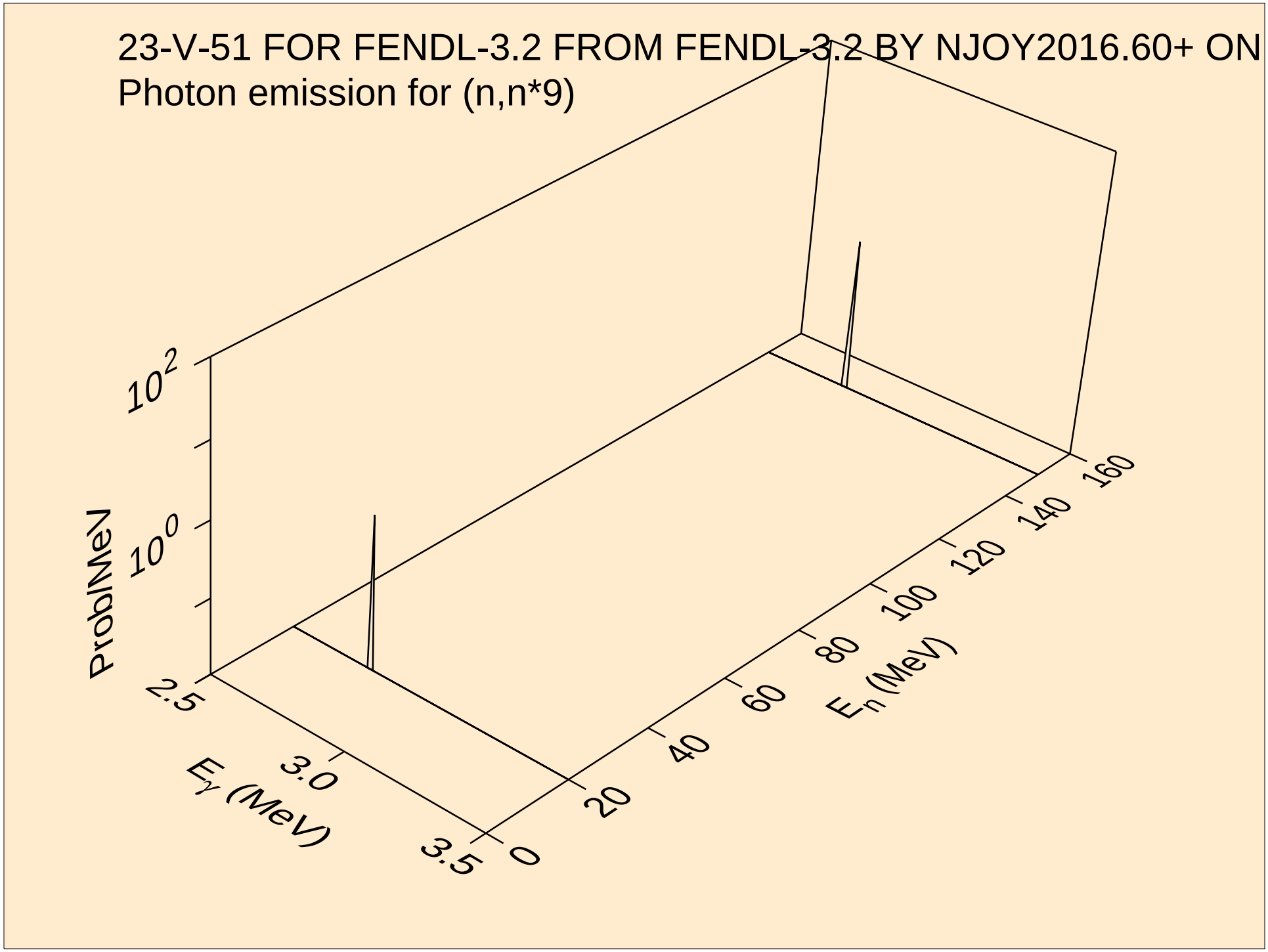

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*4)
Prob/MeV
10^{2}
10^{0}
10^{-2}
E_γ (MeV)
0
1
2
E_n (MeV)
0
20
40
60
80
100
120
140
160

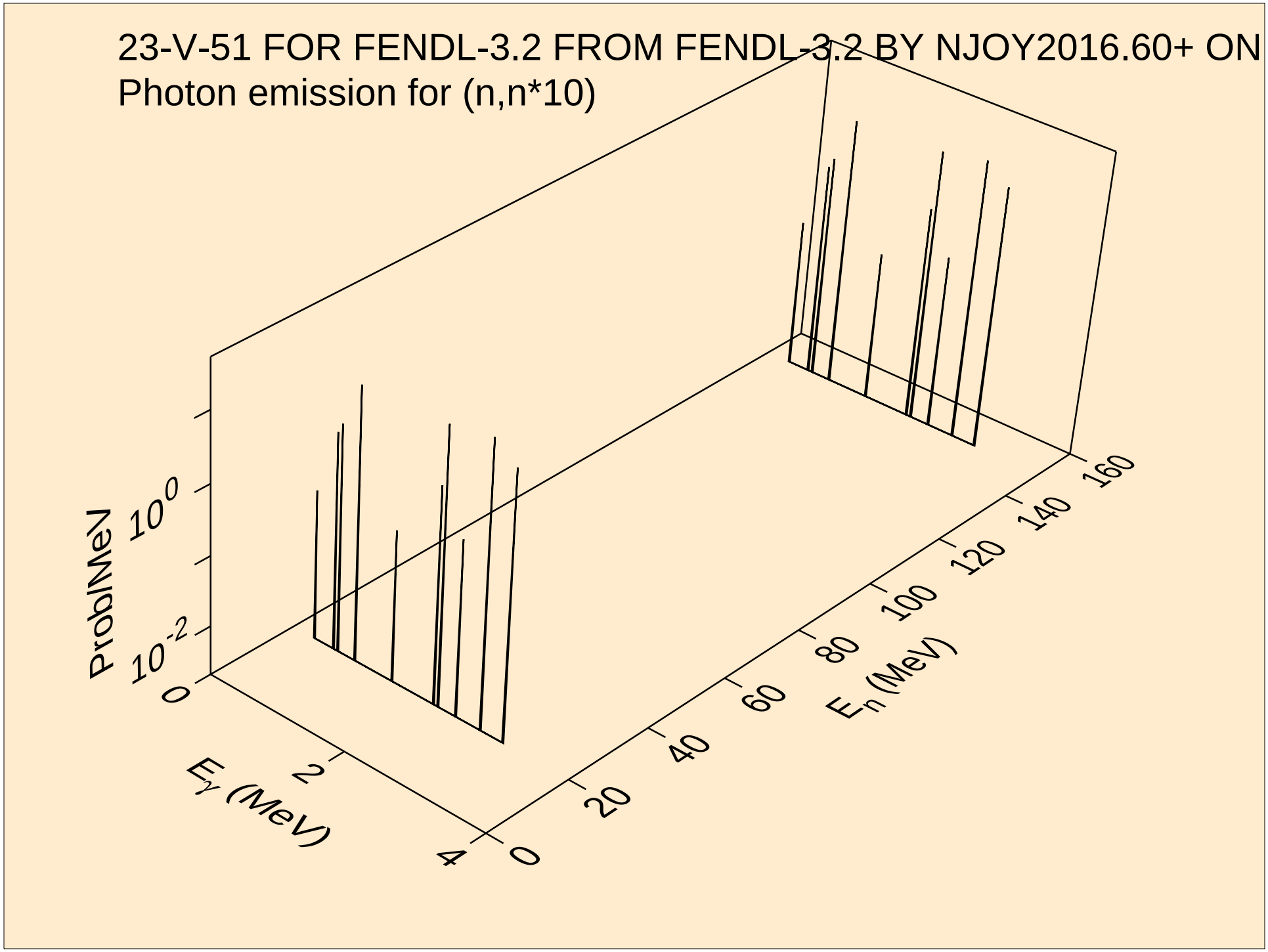

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*5)
Prob/MeV
10^0
10^-2
0
2
4
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

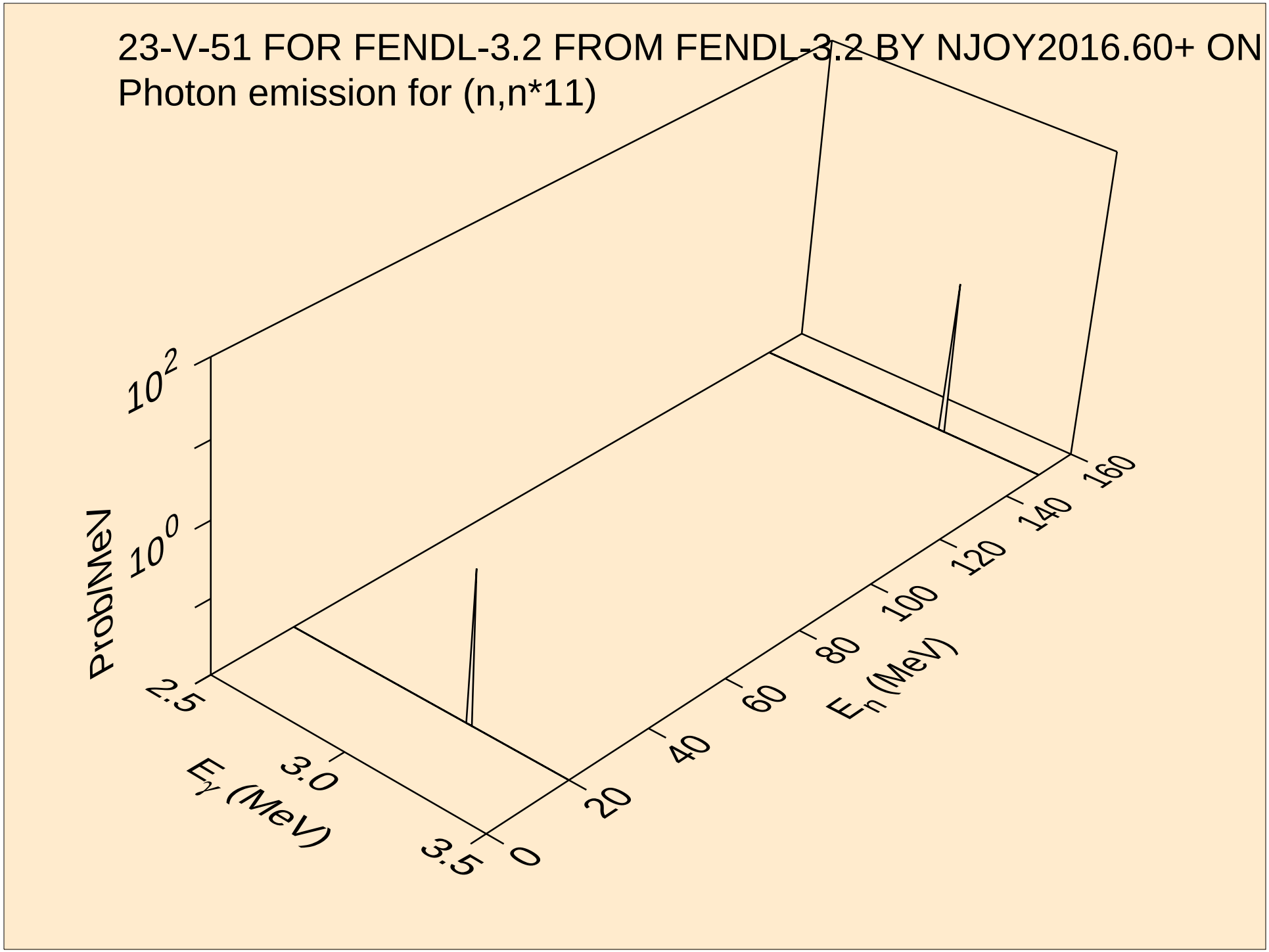

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*6)
Prob/MeV
10^0
10^-2
0
E_γ (MeV)
1
2
0
20
40
60
80
100
120
140
160
E_n (MeV)

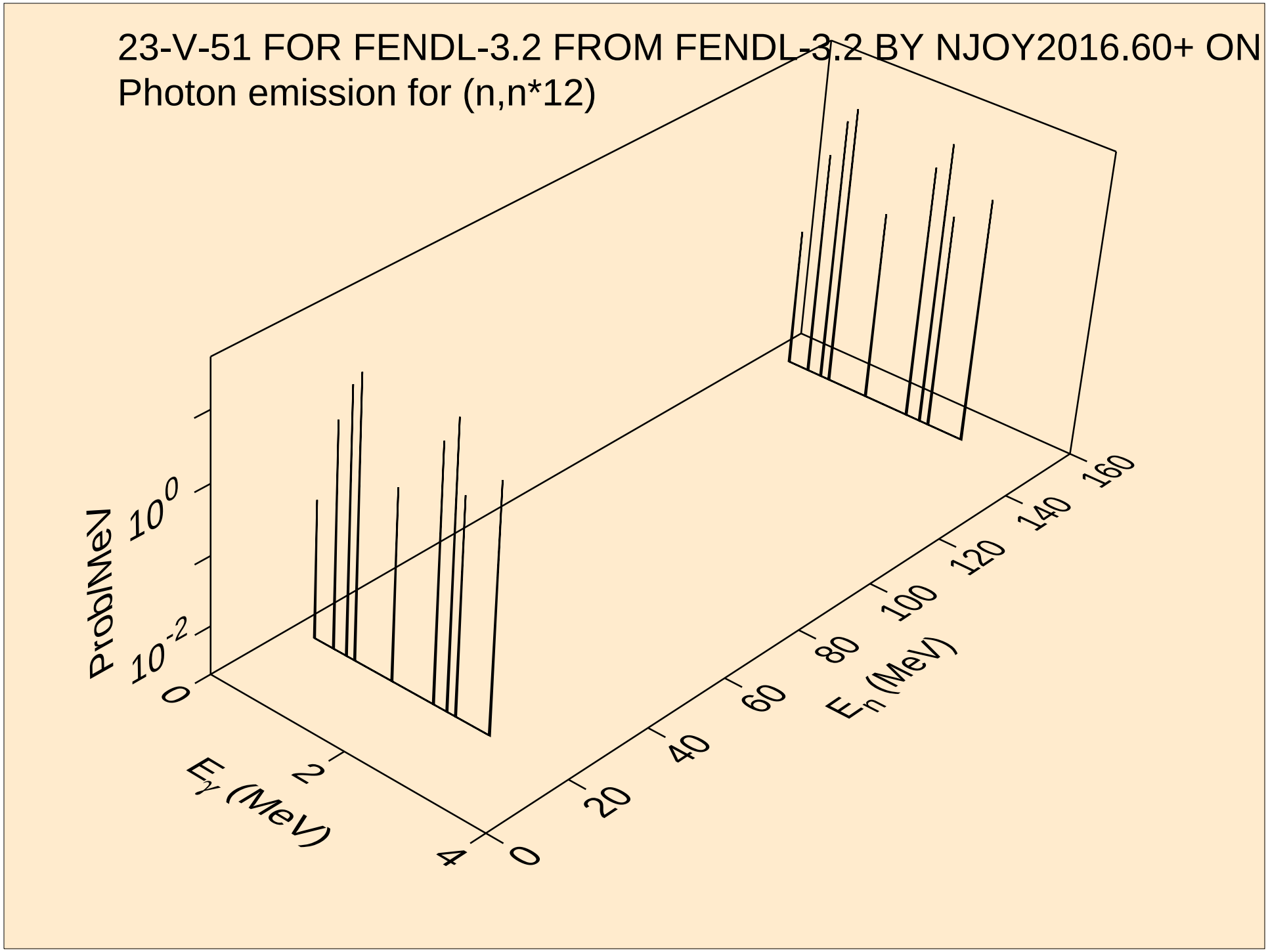

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*7)
Prob/MeV
10^0
10^-2
0
E_γ (MeV)
1
2
0
20
40
60
80
100
120
140
160
E_n (MeV)

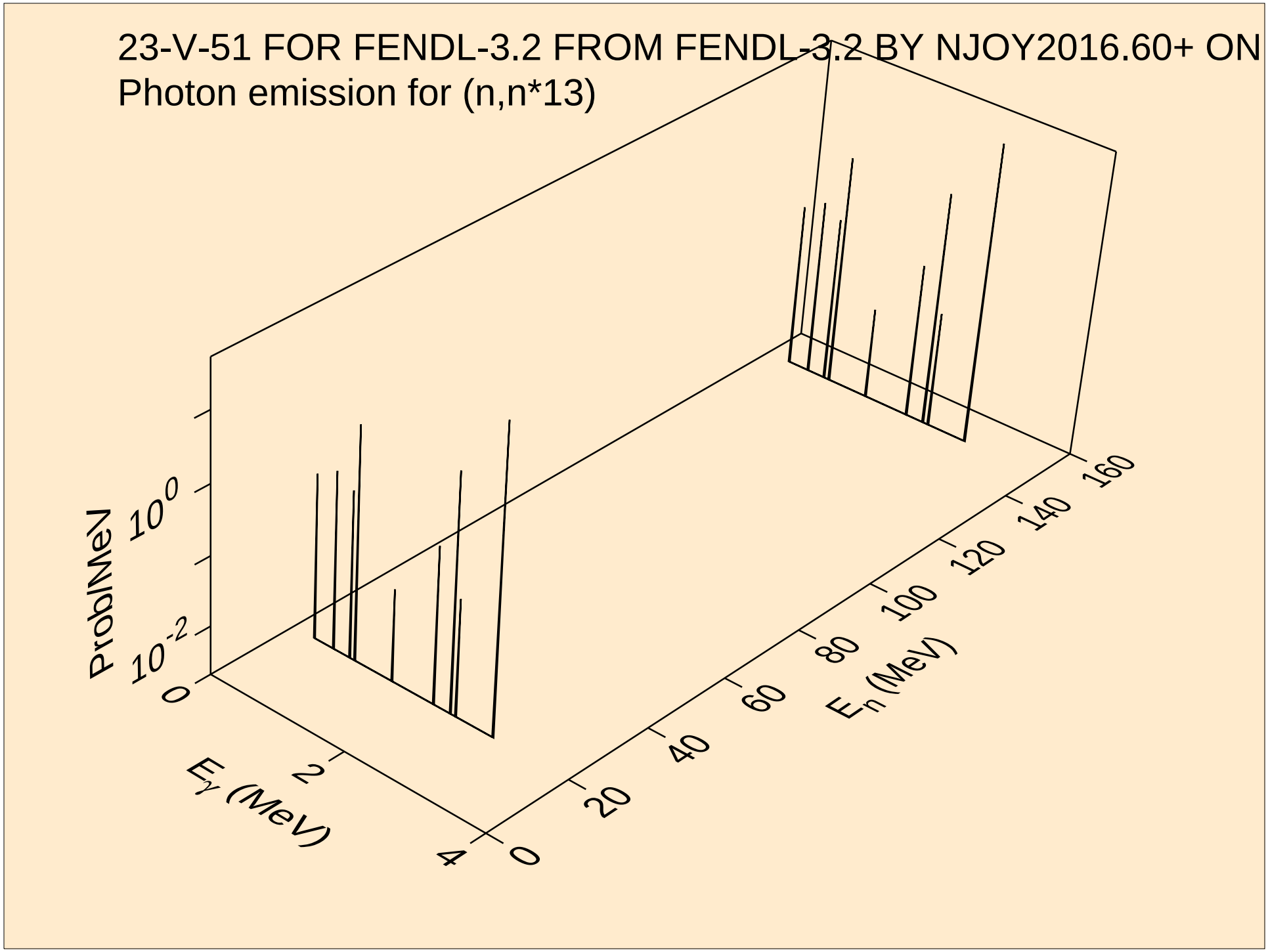

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*8)
Prob/MeV
10^0
10^-2
0.0
1.5
2.0
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

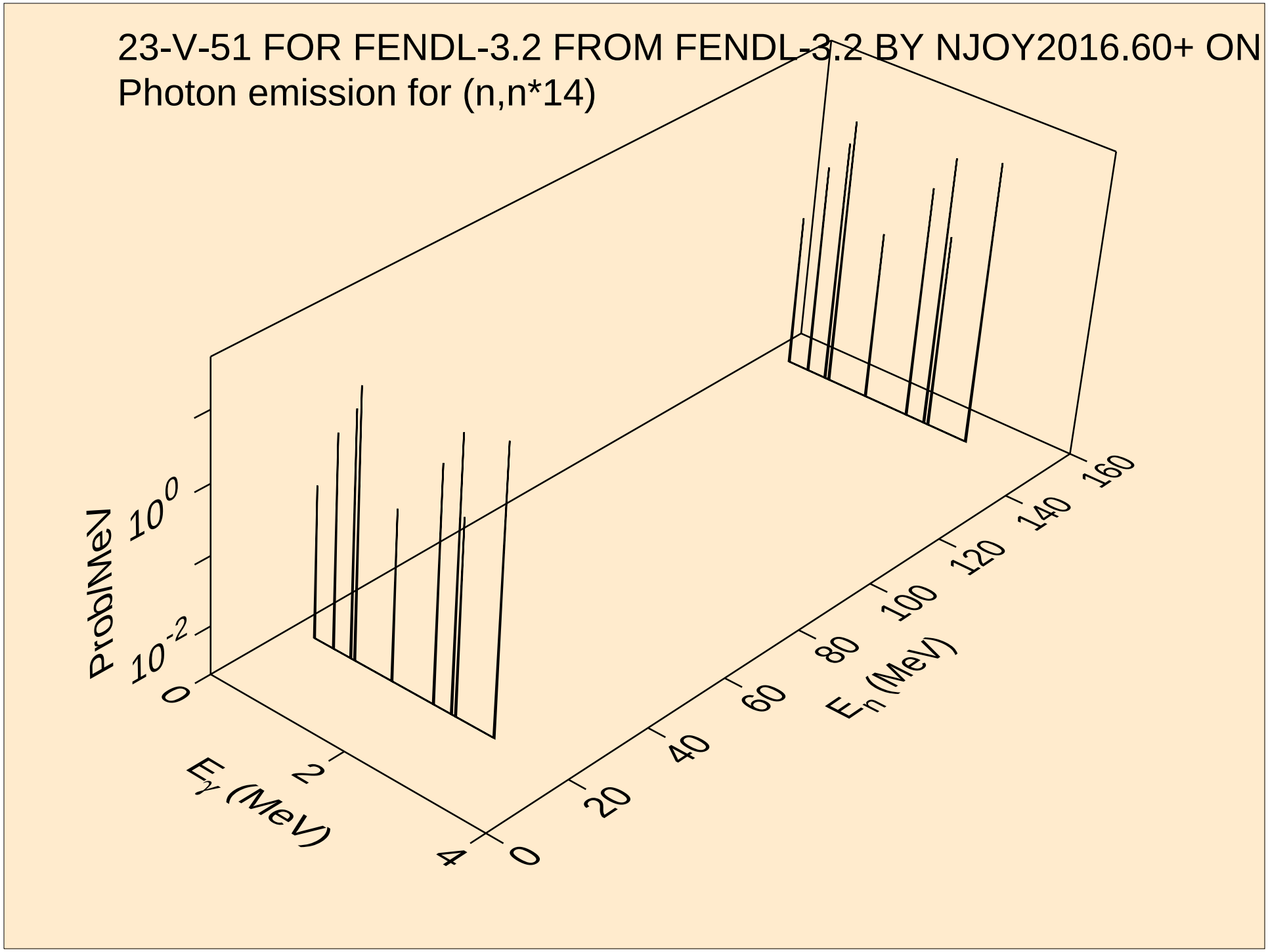

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*9)
Prob/MeV
10^2
10^0
2.5
3.0
3.5
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

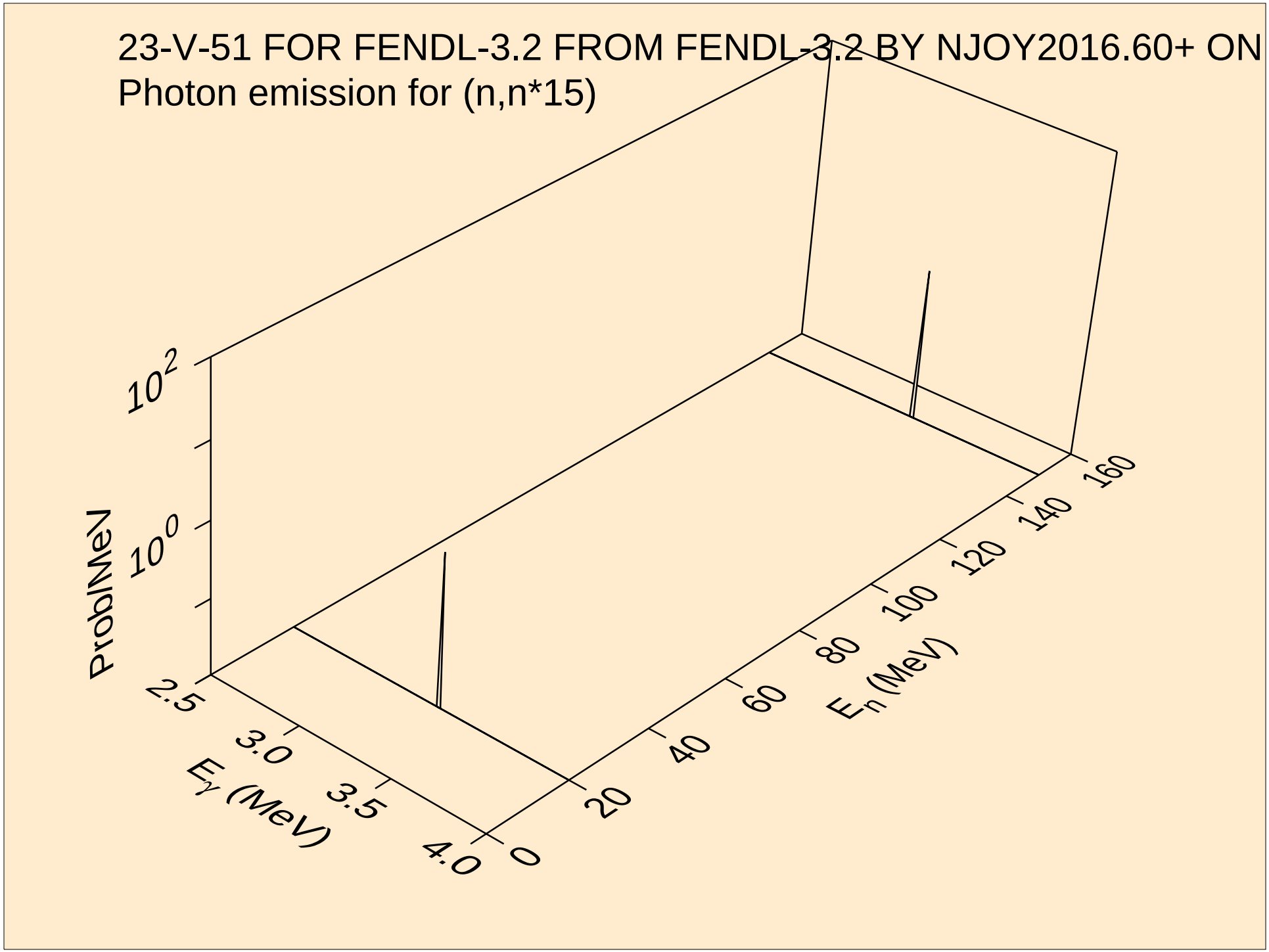

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*10)
Prob/MeV
10^0
10^-2
0
2
4
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

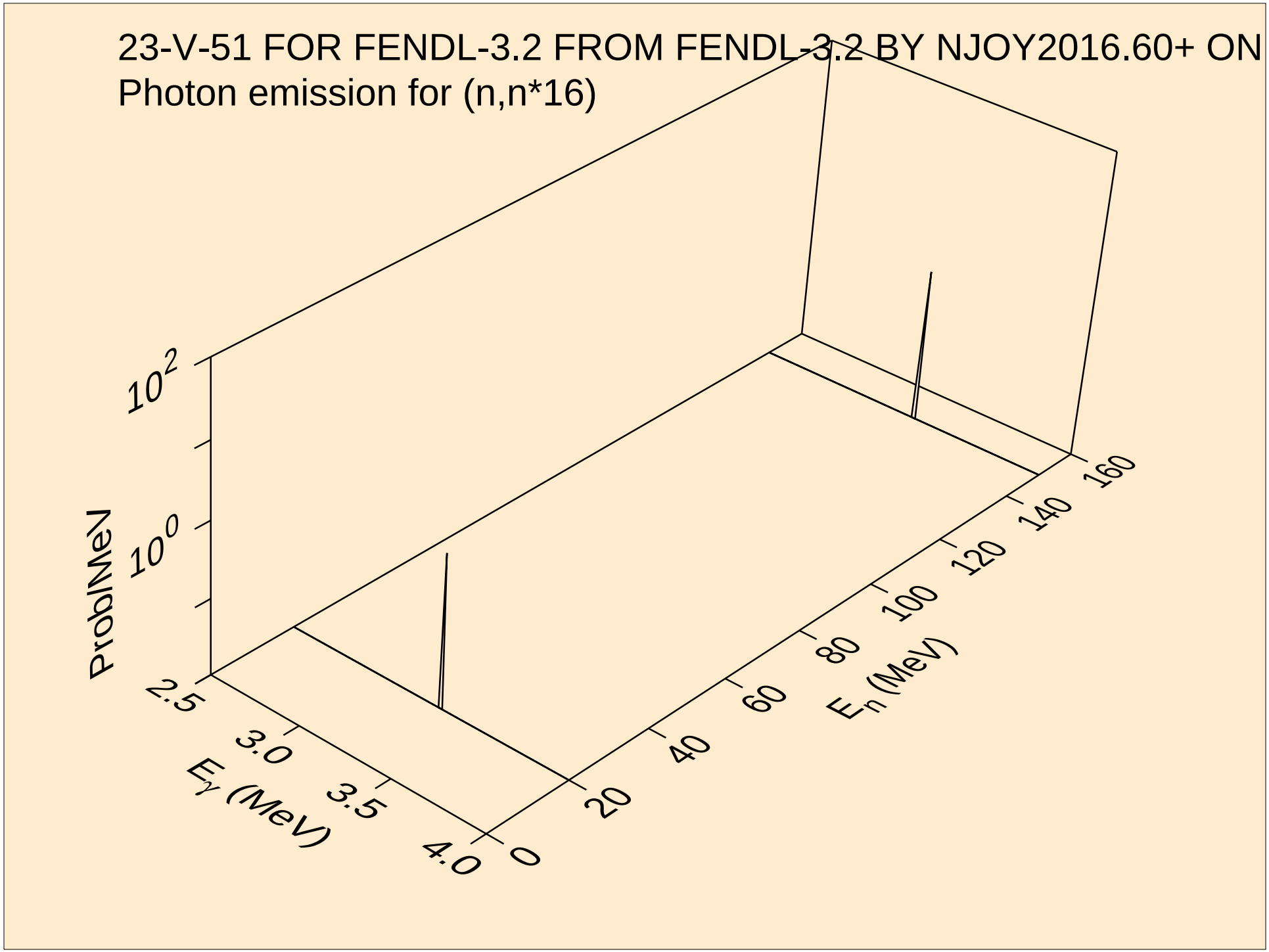

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*11)
Prob/MeV
10^2
10^0
2.5
3.0
3.5
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

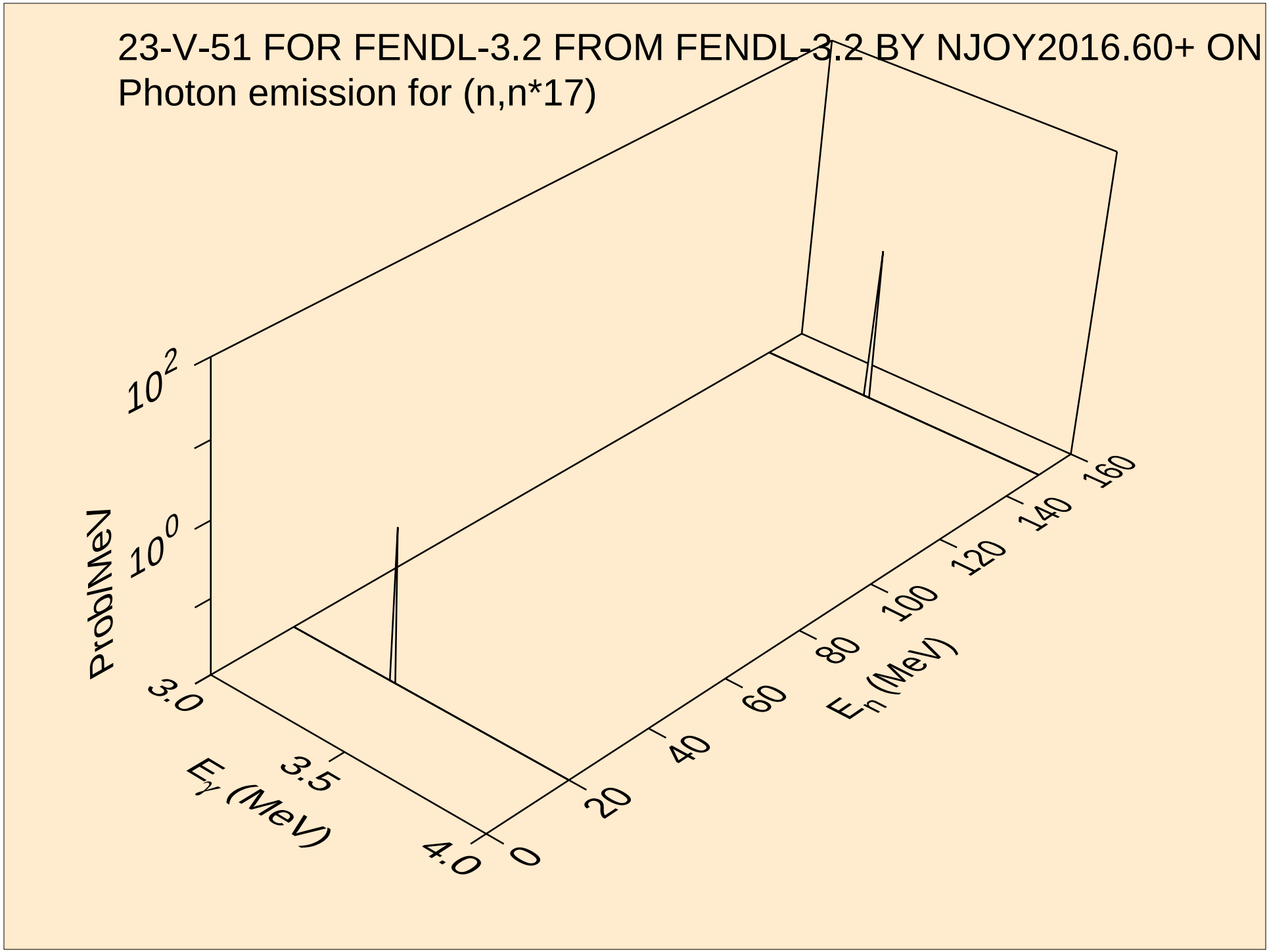

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*12)
Prob/MeV
10^0
10^-2
0
2
4
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

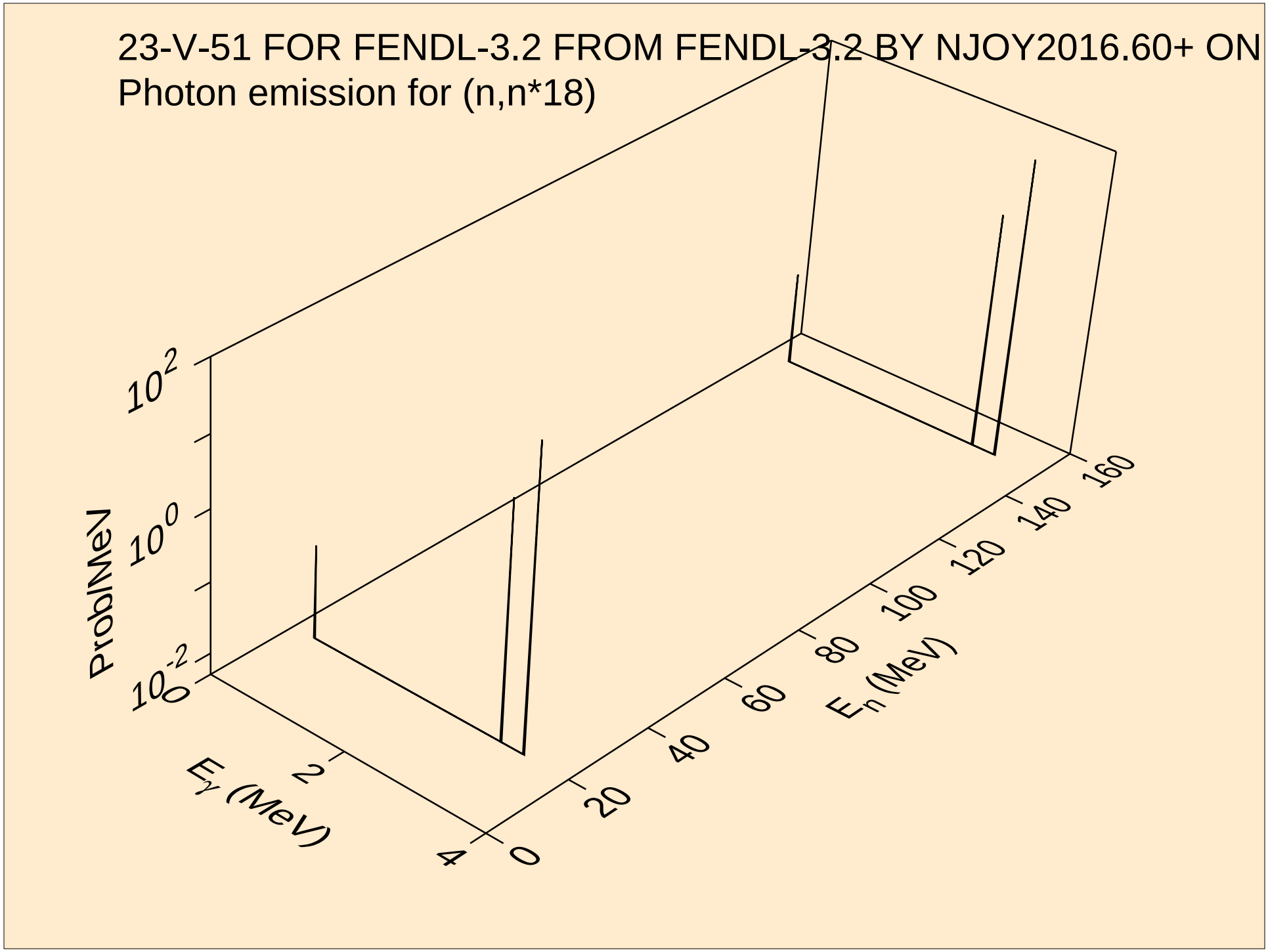

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*13)
Prob/MeV
10^0
10^-2
0
2
4
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

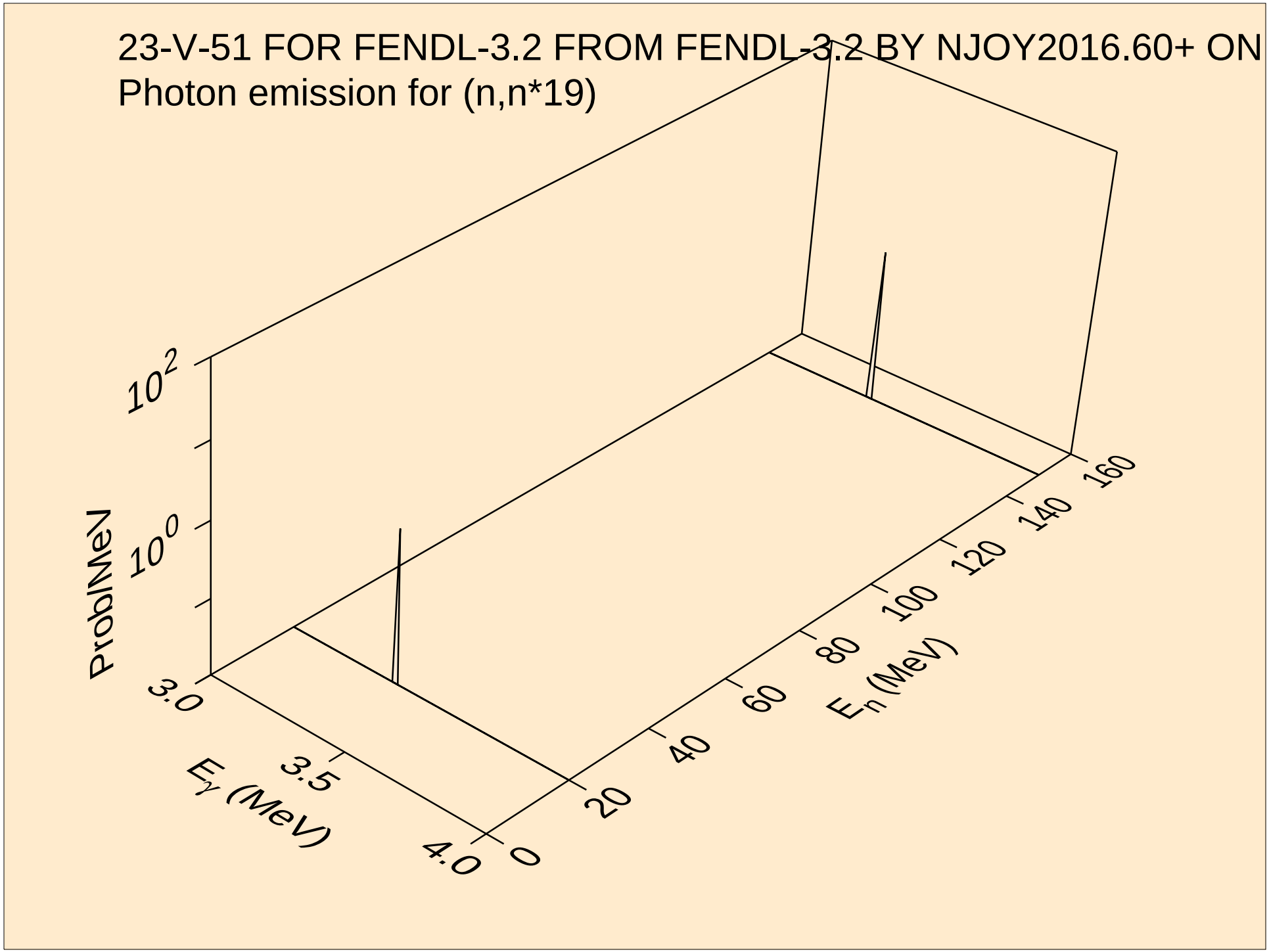

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*14)
Prob/MeV
10^0
10^-2
0
2
4
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

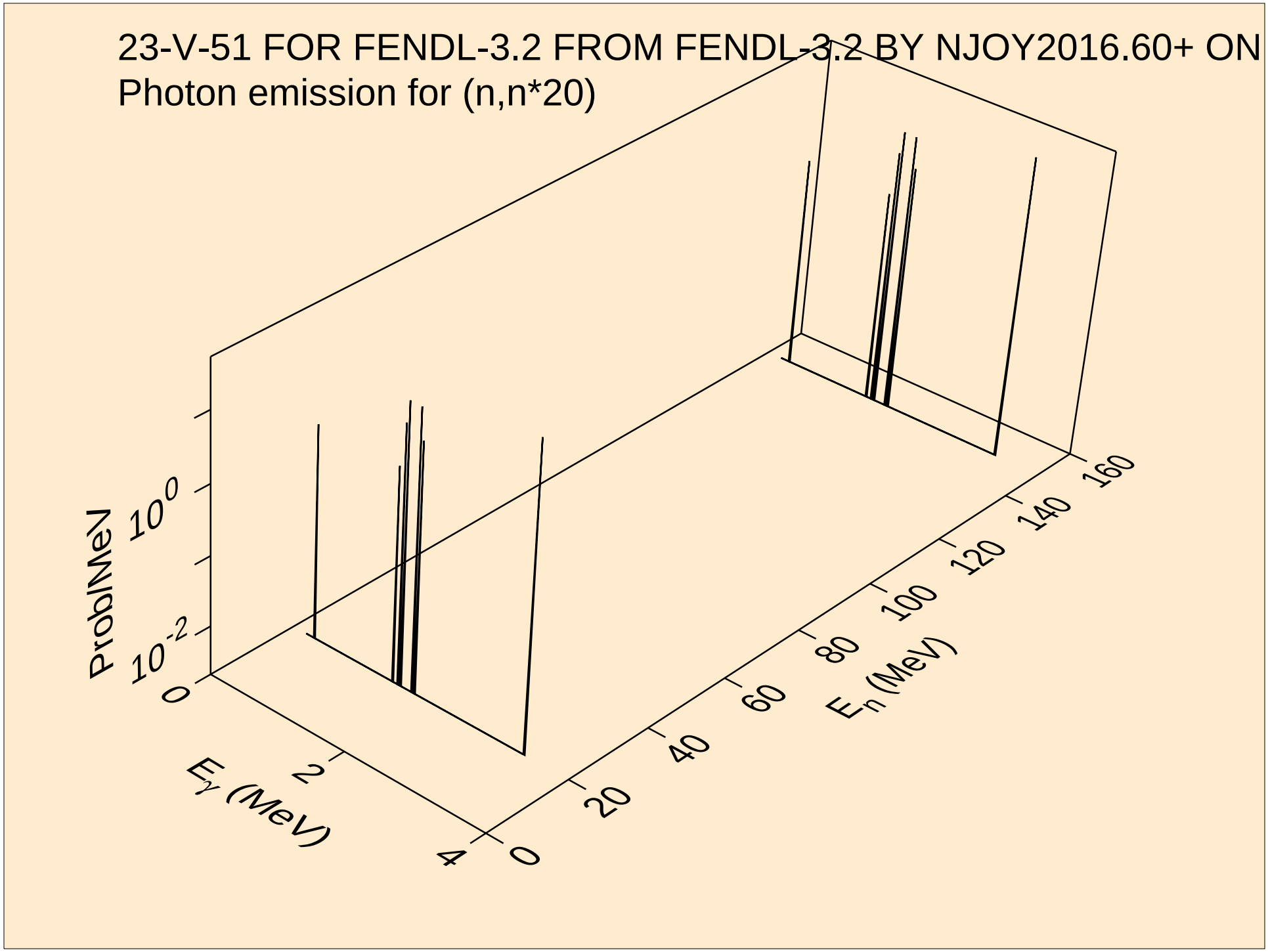

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*15)
Prob/MeV
10^2
10^0
2.5
3.0
3.5
4.0
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

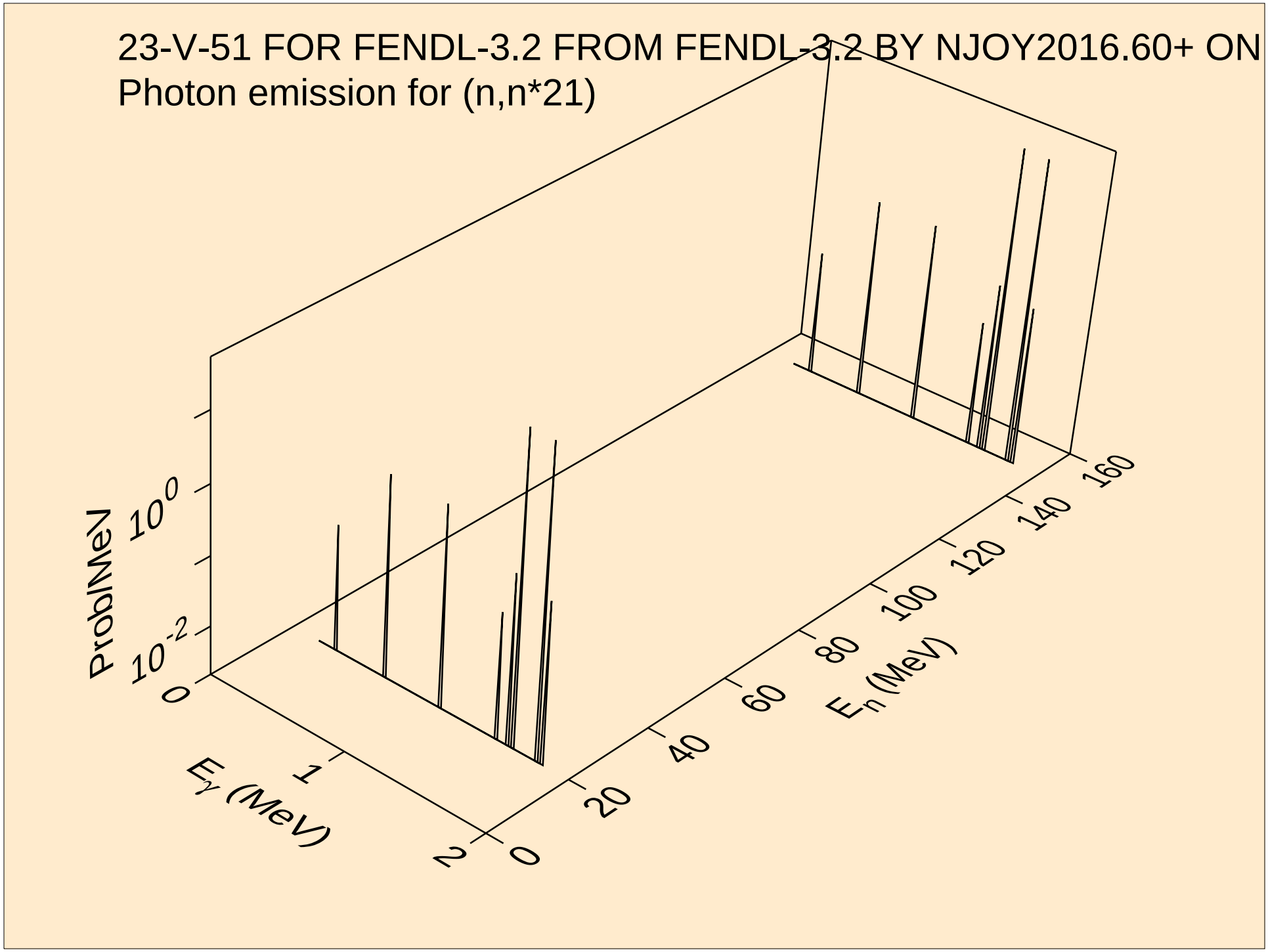

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*16)
10^2
10^0
Prob/MeV
2.5
3.0
3.5
4.0
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

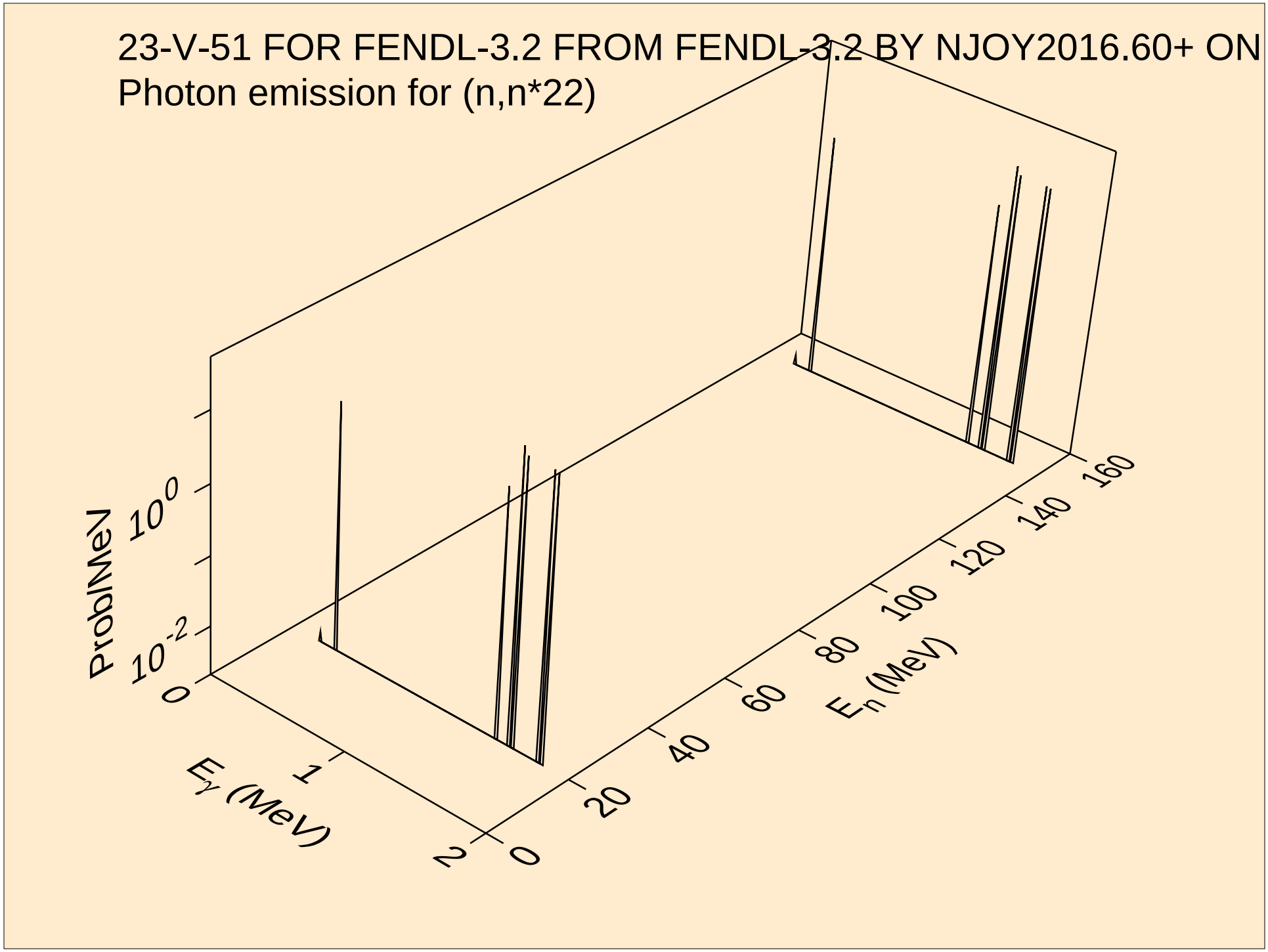

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*17)
Prob/MeV
10^2
10^0
3.0
3.5
4.0
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

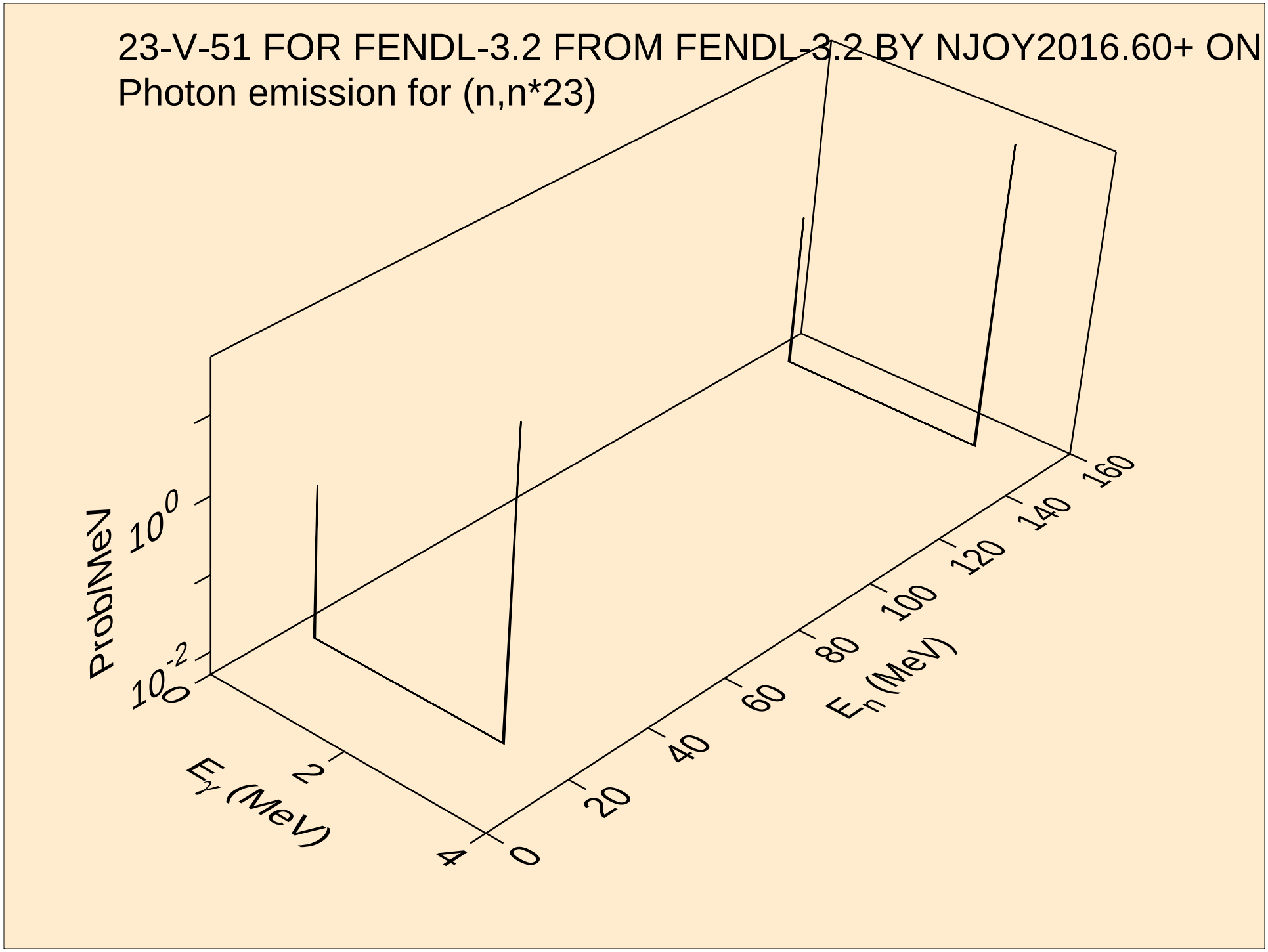

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*18)
Prob/MeV
10^{2}
10^{0}
10^{-2}
E_γ (MeV)
0
2
4
E_n (MeV)
0
20
40
60
80
100
120
140
160

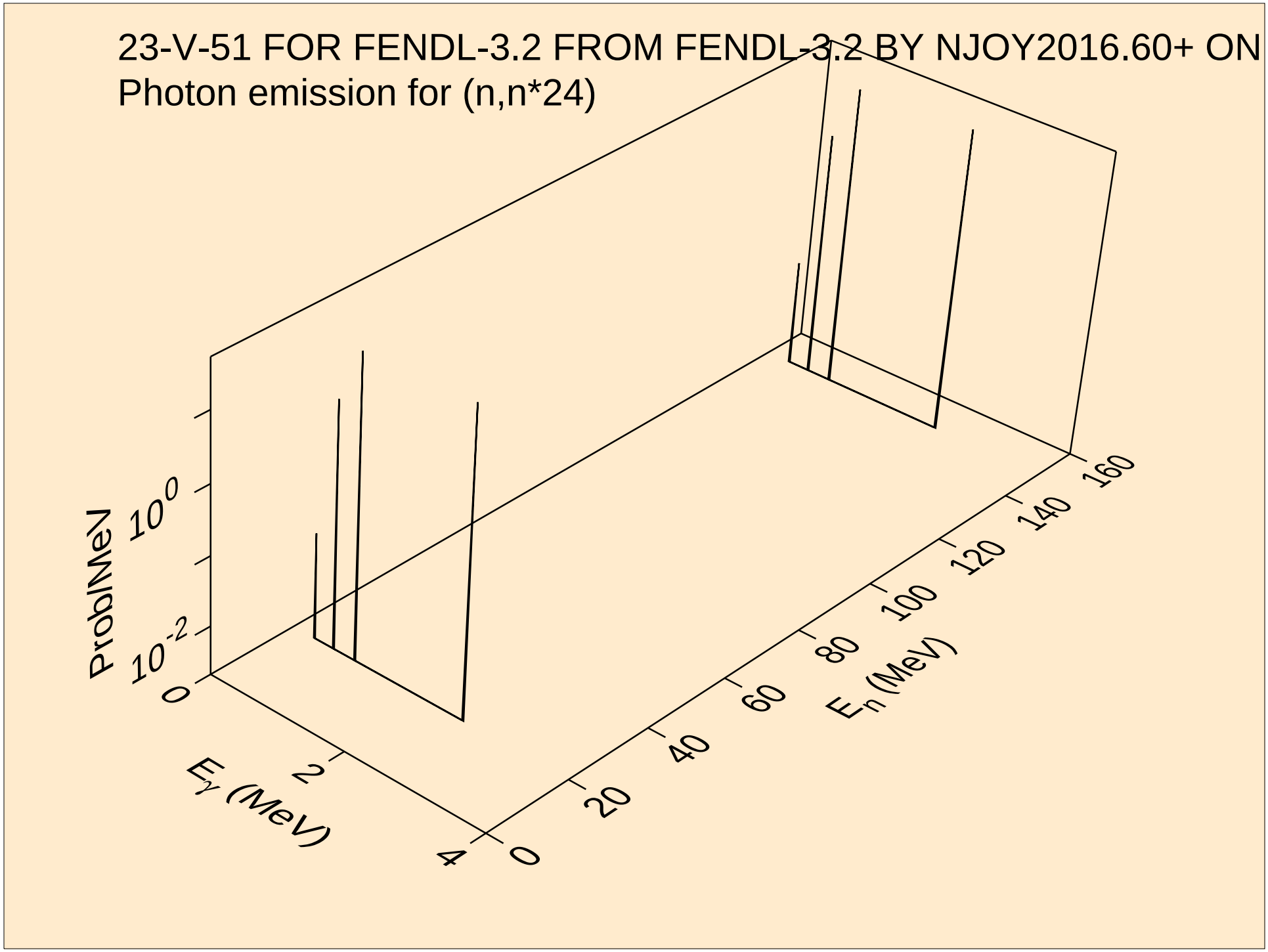

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*19)
Prob/MeV
10^2
10^0
3.0
3.5
4.0
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

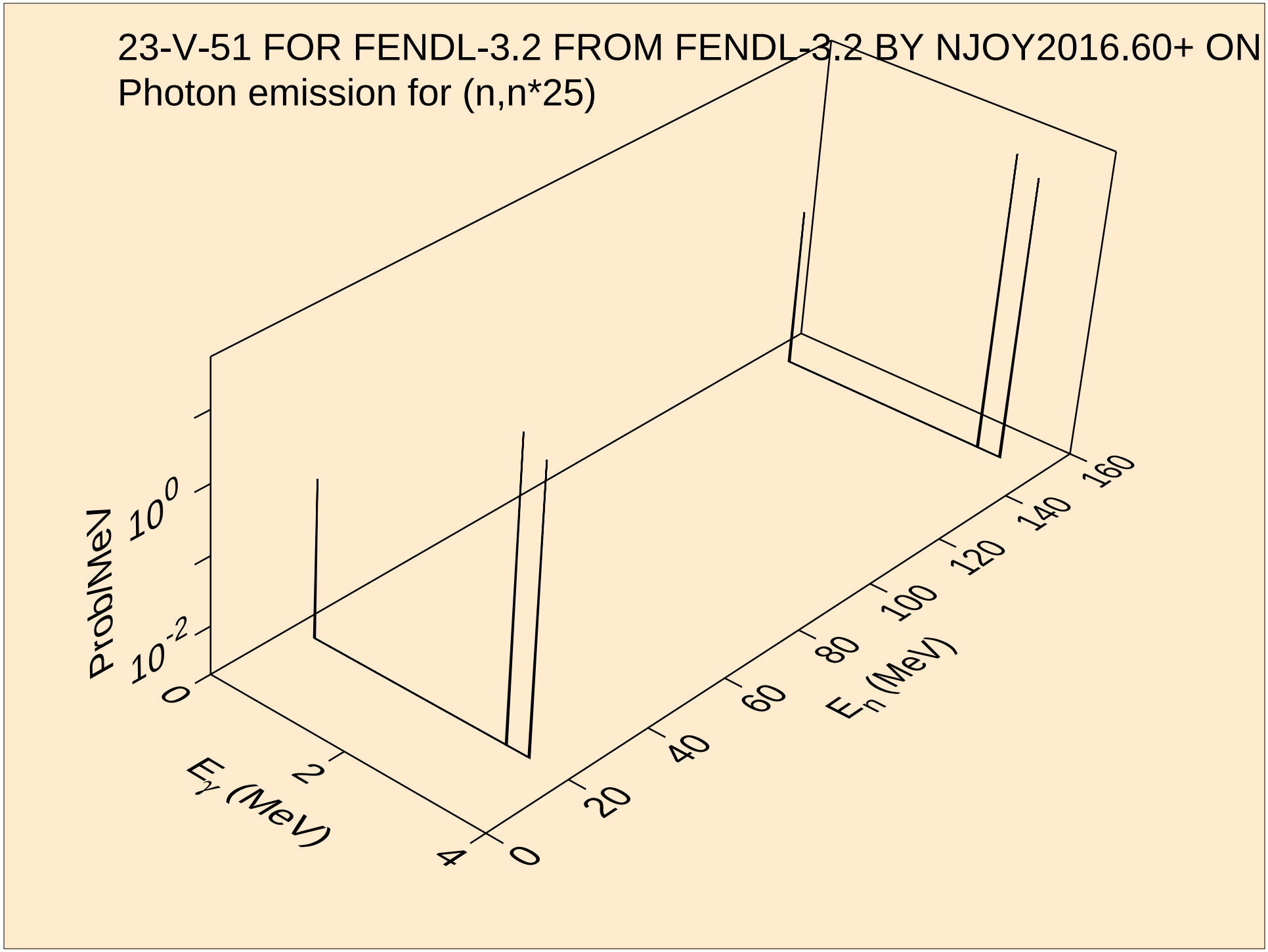

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*20)
Prob/MeV
10^0
10^-2
0
2
4
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

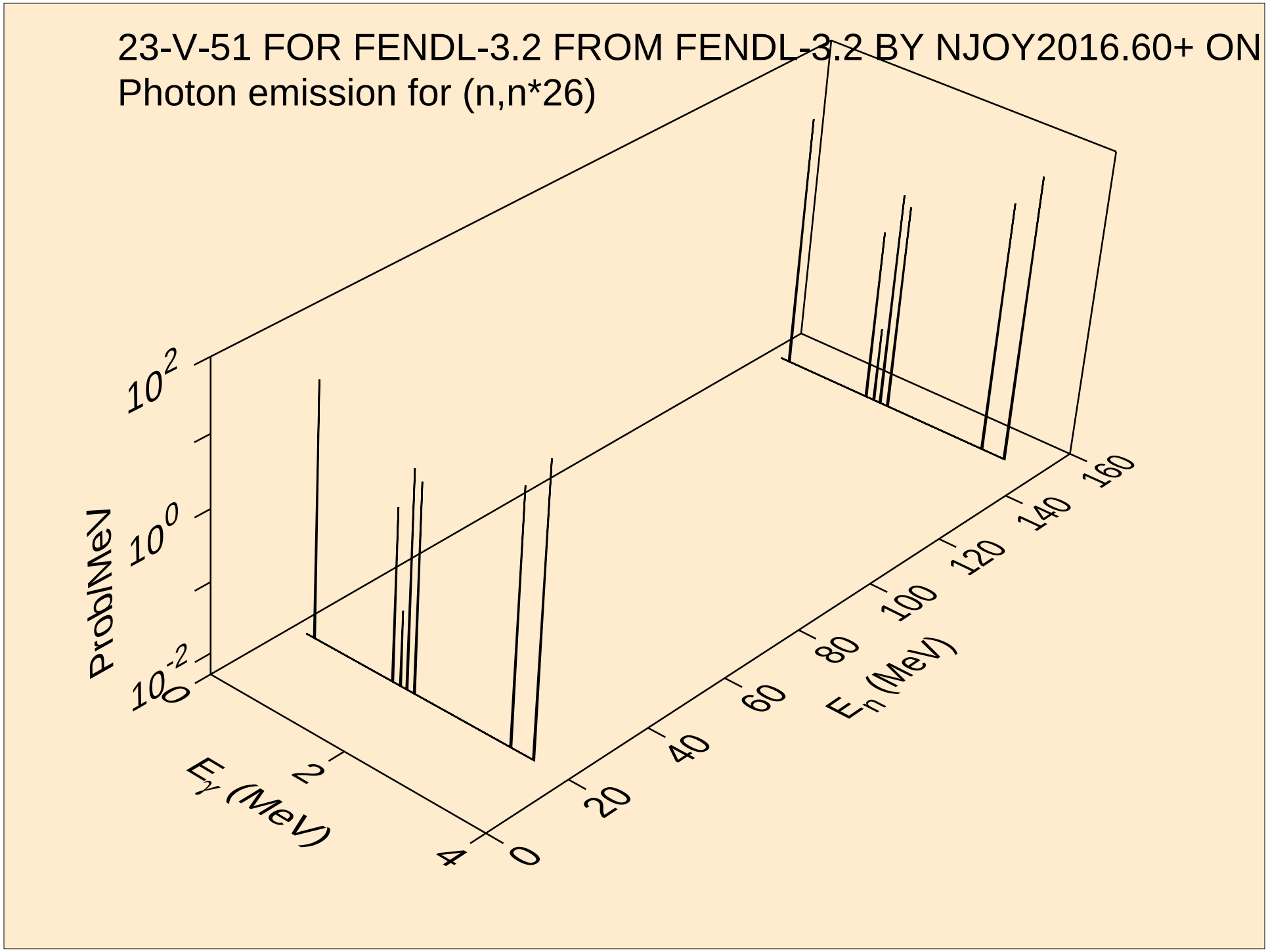

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*21)
Prob/MeV
10^0
10^-2
0
E_γ (MeV)
1
2
0
20
40
60
80
100
120
140
160
E_n (MeV)

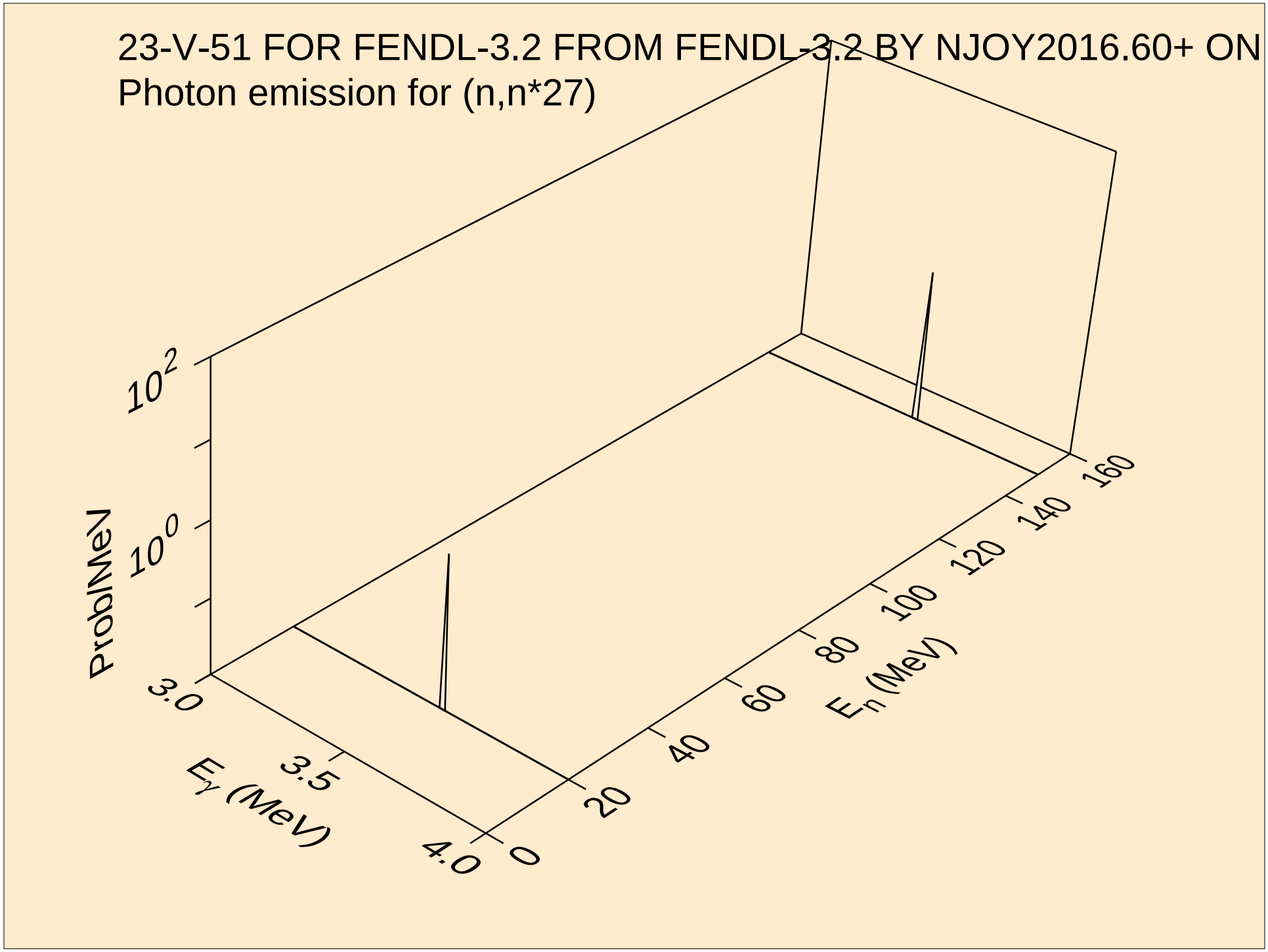

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*22)
Prob/MeV
10^0
10^-2
0
E_γ (MeV)
1
2
0
20
40
60
80
100
120
140
160
E_n (MeV)

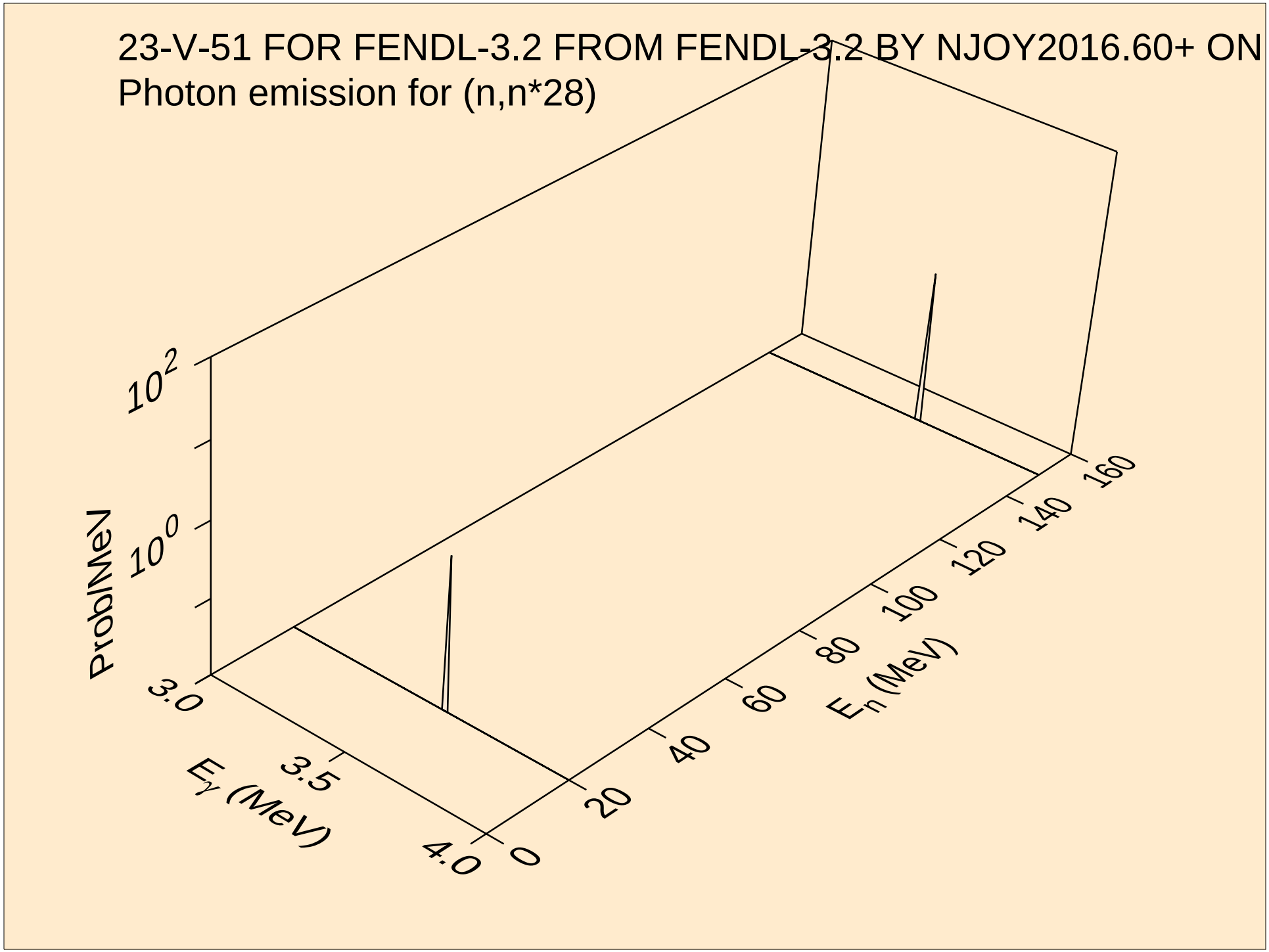

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*23)
Prob/MeV
10^{0}
10^{-2}
0
2
4
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

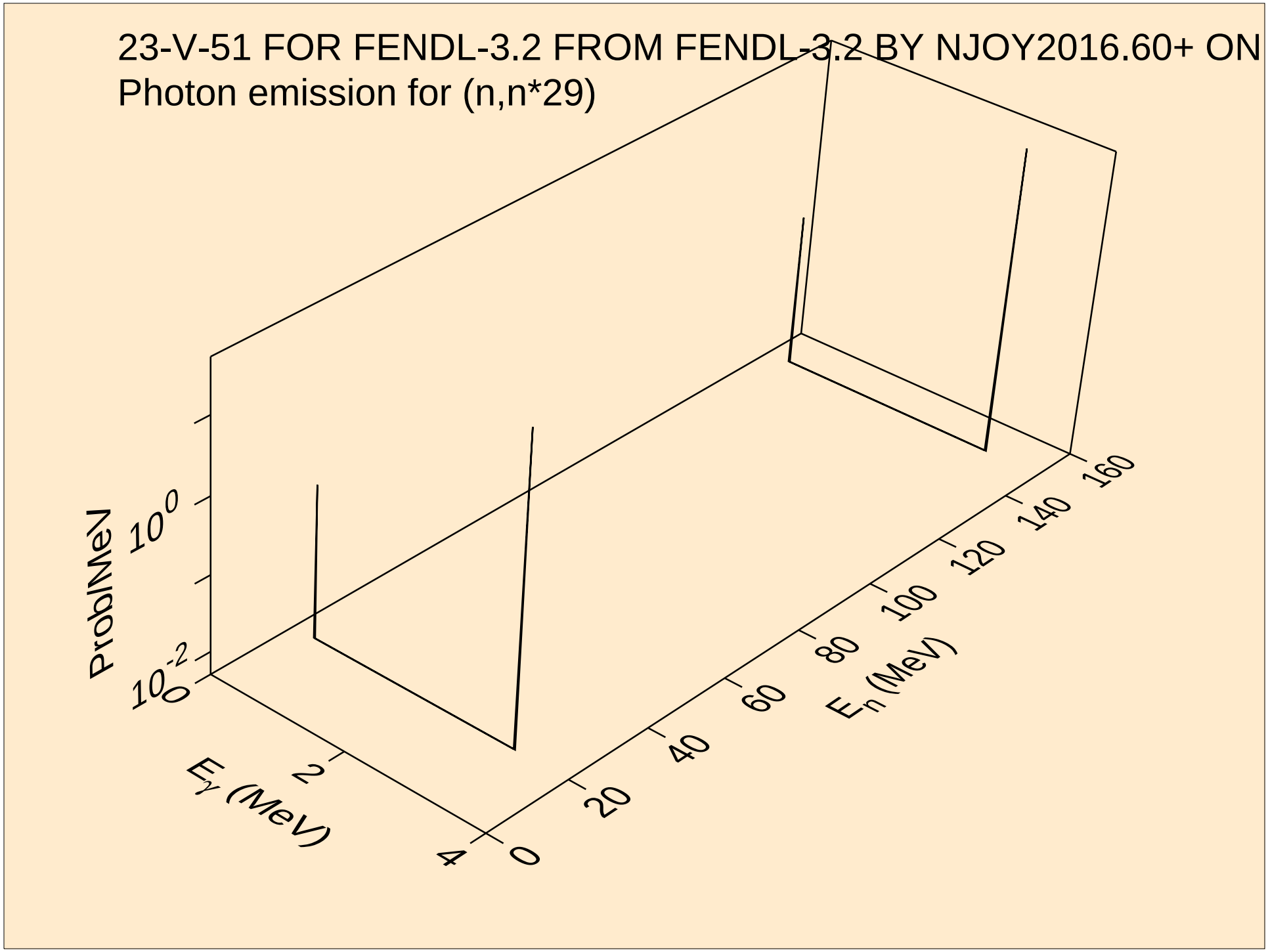

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*24)
Prob/MeV
10^{0}
10^{-2}
0
E_γ (MeV)
2
4
0
20
40
60
80
100
120
140
160
E_n (MeV)

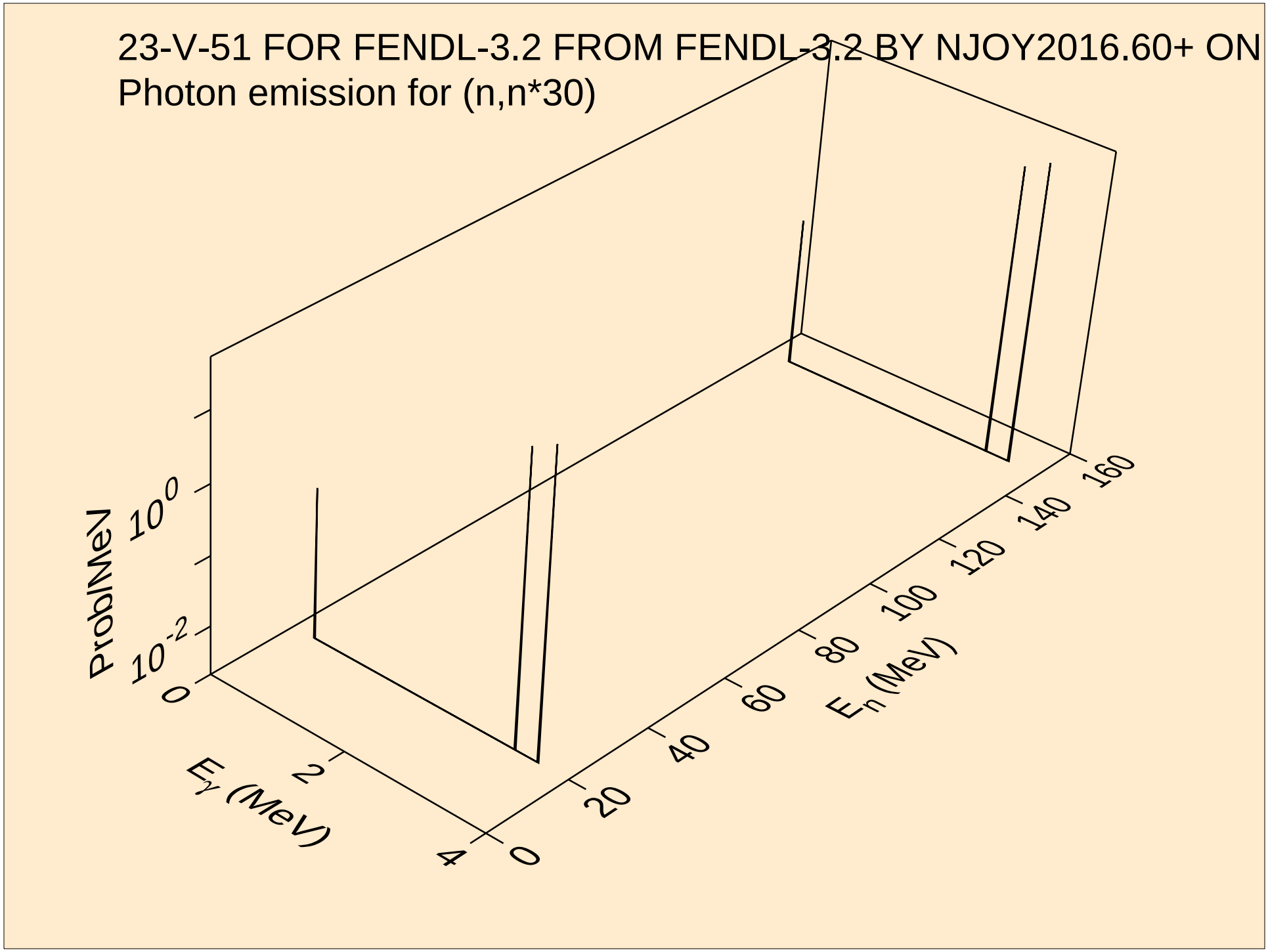

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*25)
Prob/MeV
10^0
10^-2
0
2
4
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

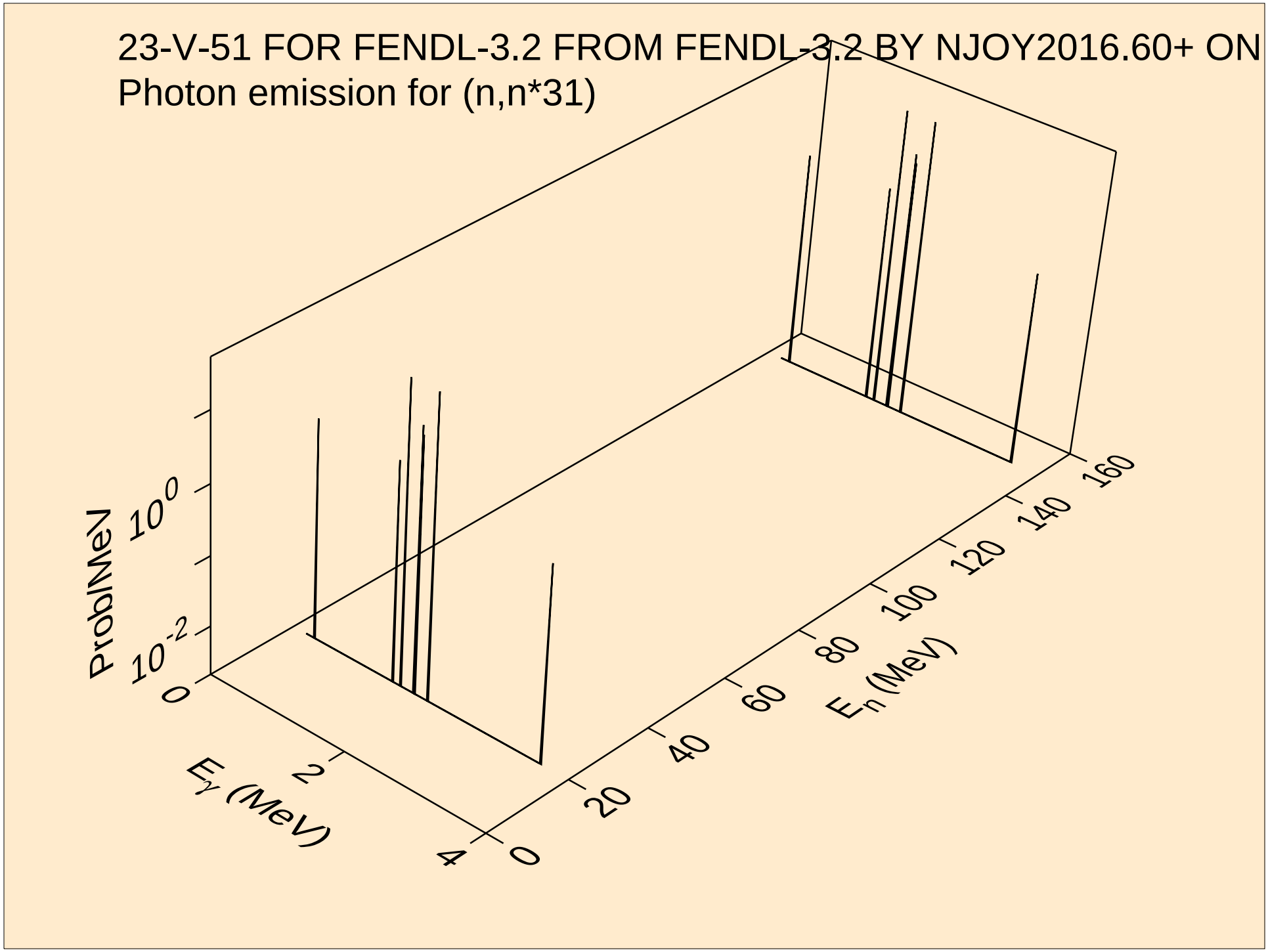

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*26)
Prob/MeV
10^{2}
10^{0}
10^{-2}
E_γ (MeV)
0
2
4
E_n (MeV)
0
20
40
60
80
100
120
140
160

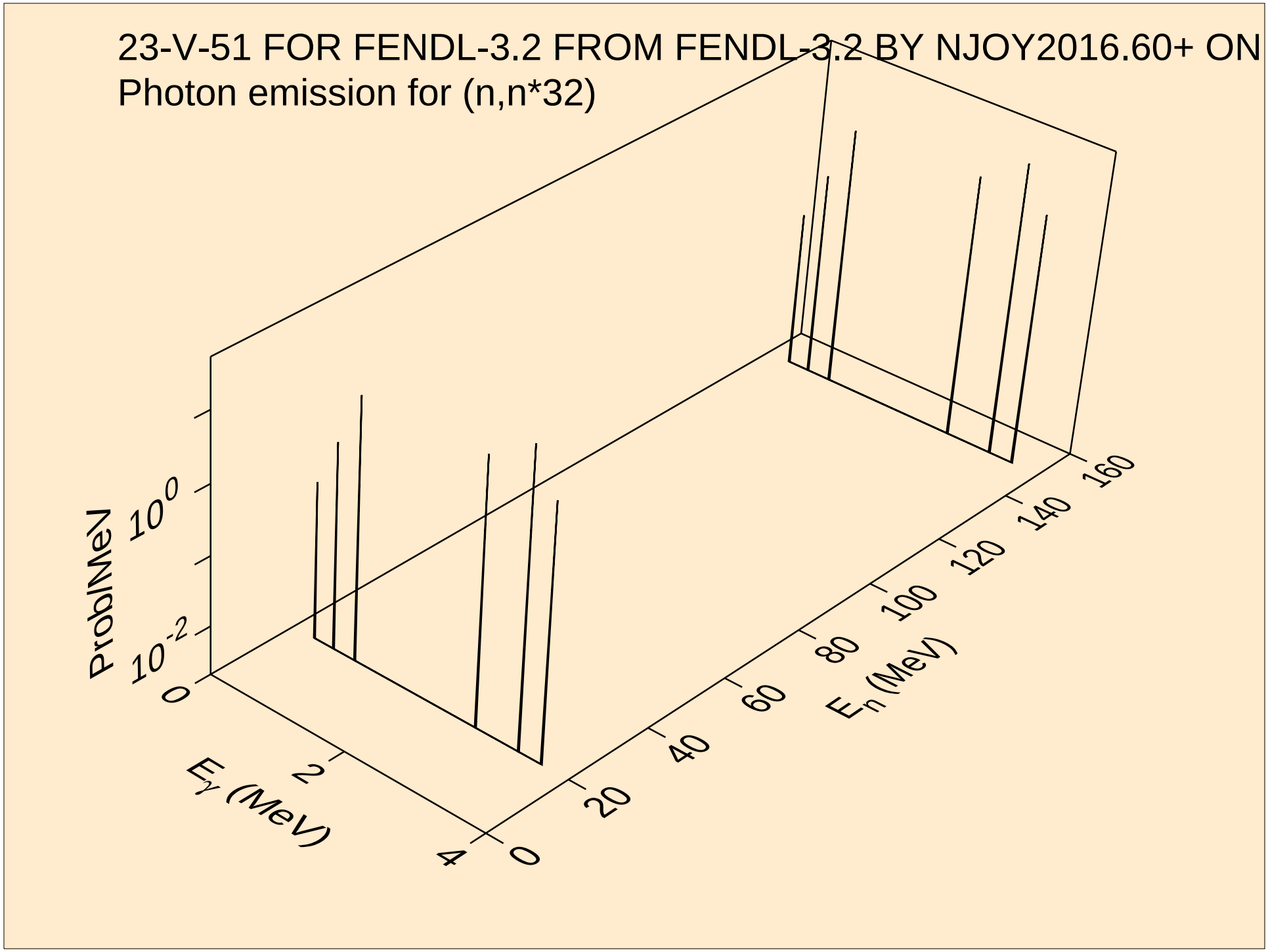

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*27)
Prob/MeV
10^2
10^0
3.0
3.5
4.0
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

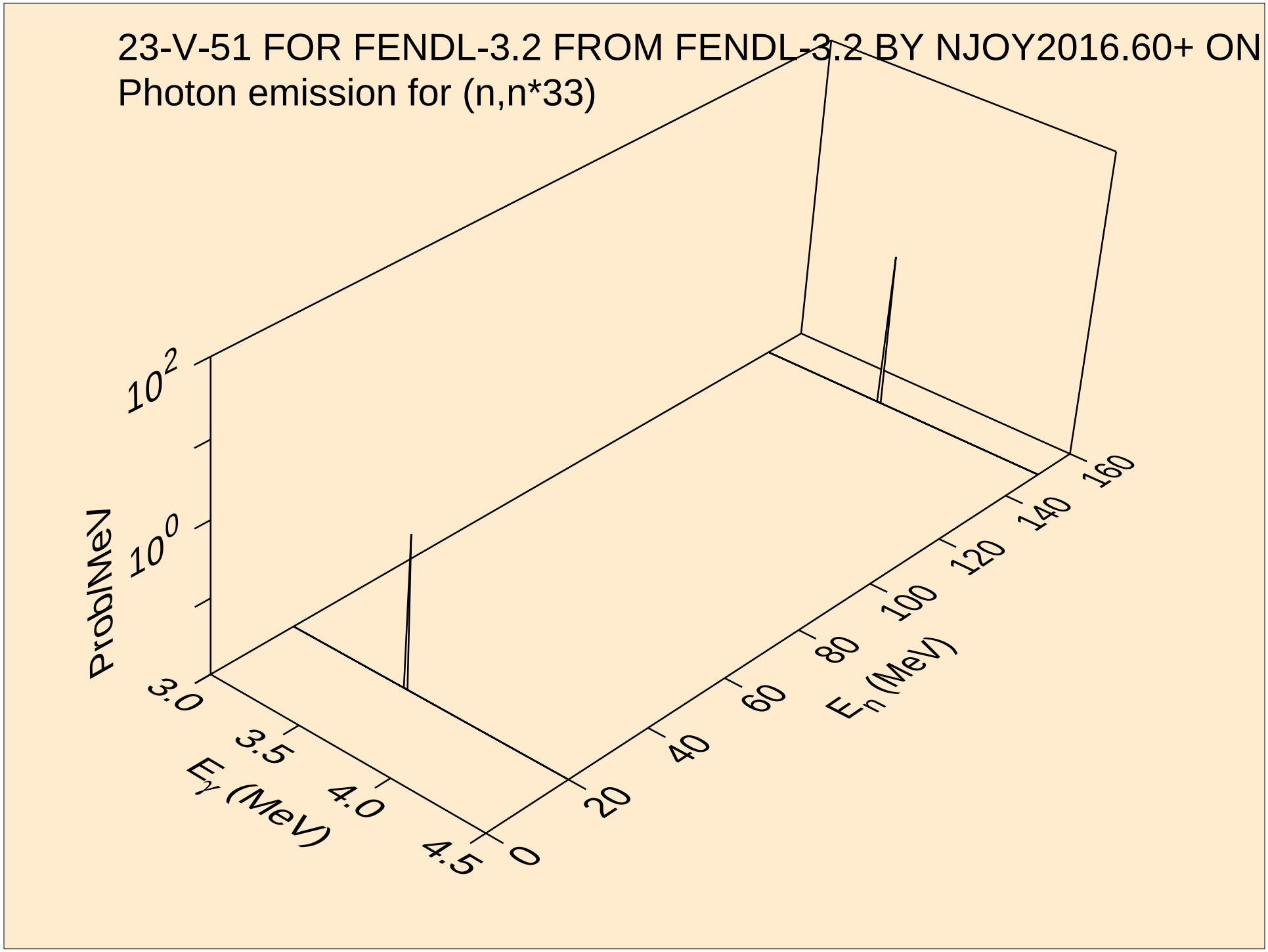

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*28)
Prob/MeV
10^2
10^0
3.0
3.5
4.0
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

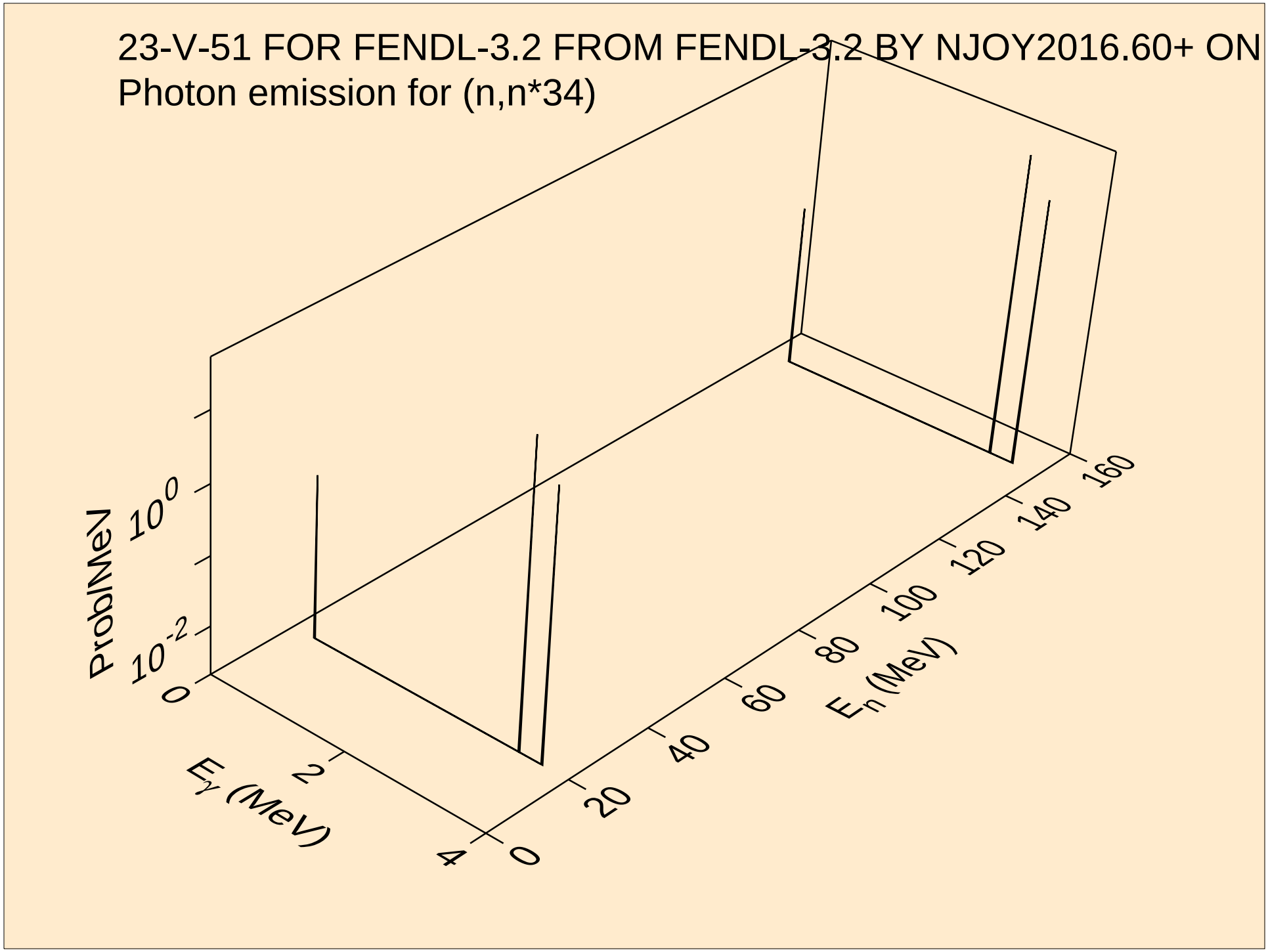

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*29)
Prob/MeV
10^{0}
10^{-2}
0
2
4
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

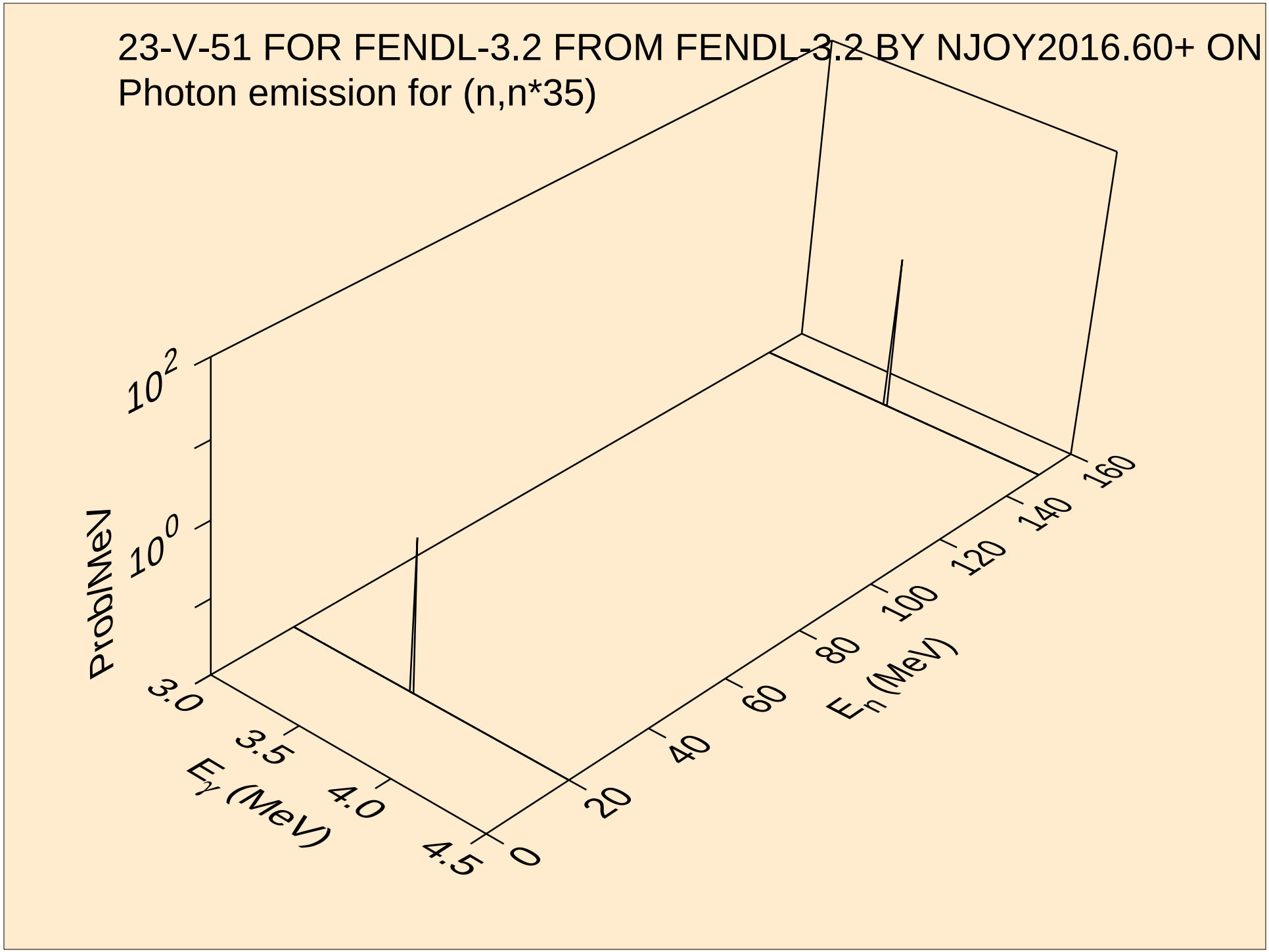

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*30)
Prob/MeV
10^0
10^-2
0
2
4
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

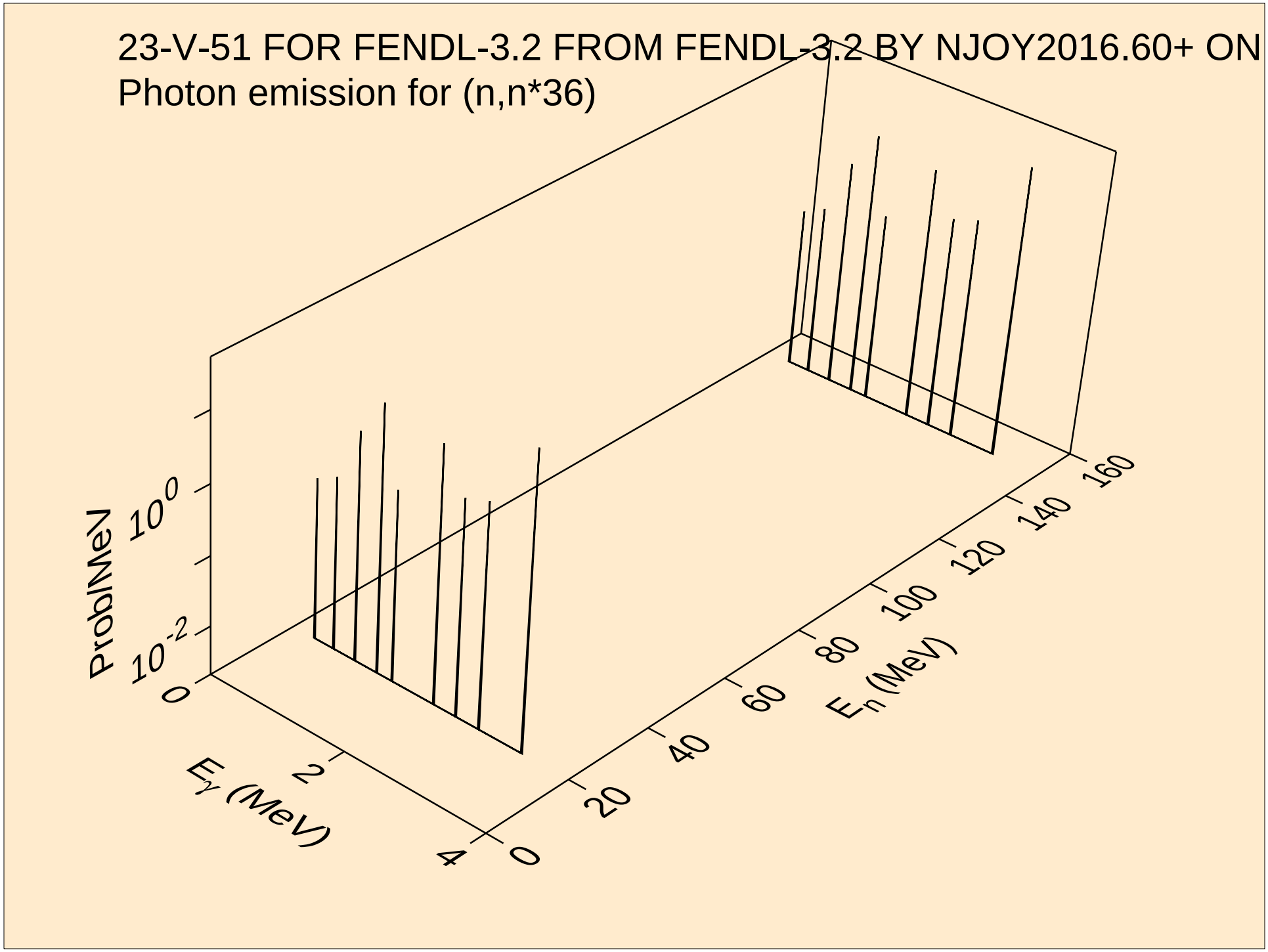

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*31)
Prob/MeV
10^0
10^-2
0
2
4
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

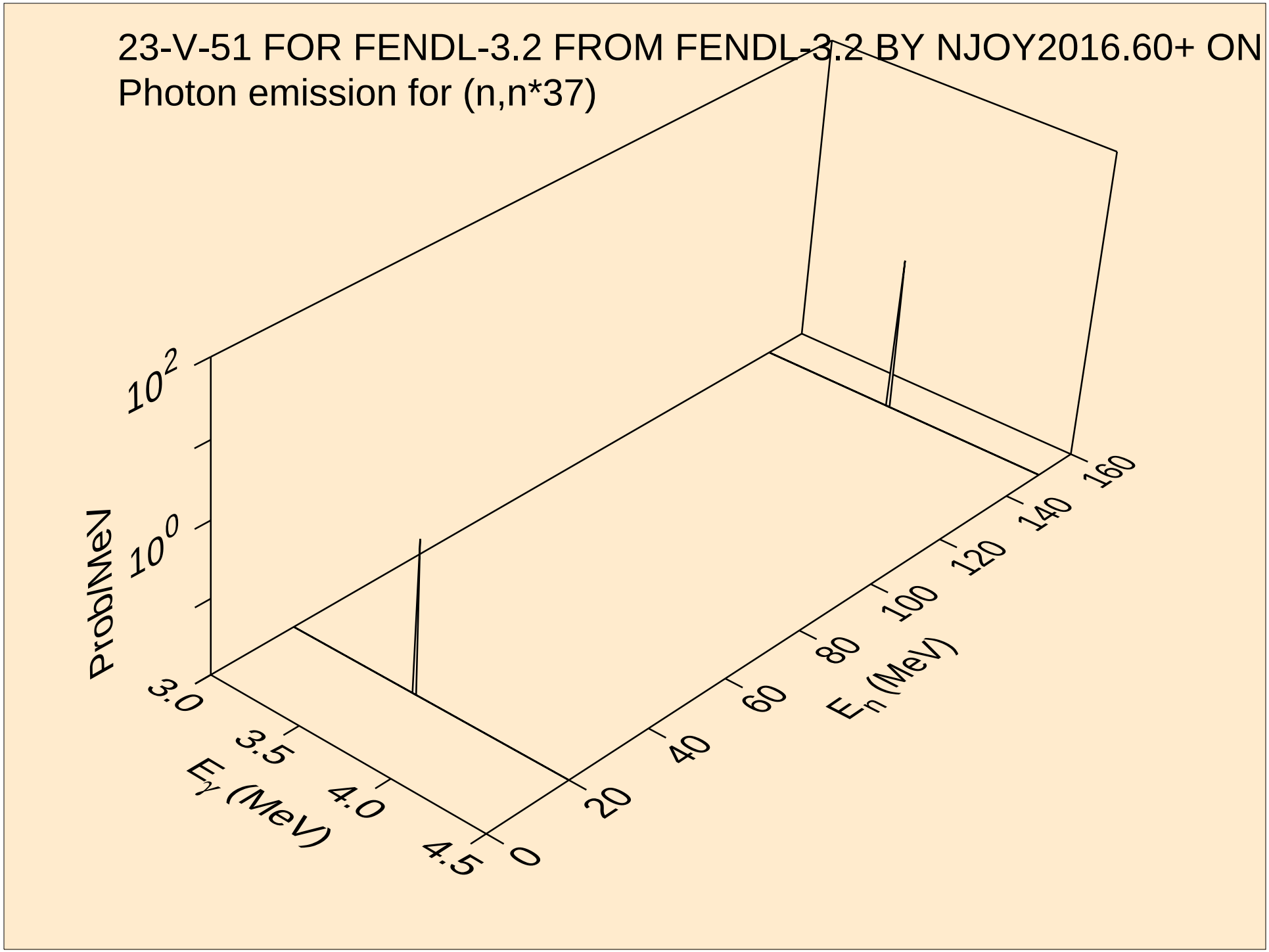

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*32)
Prob/MeV
10^{0}
10^{-2}
0
2
4
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

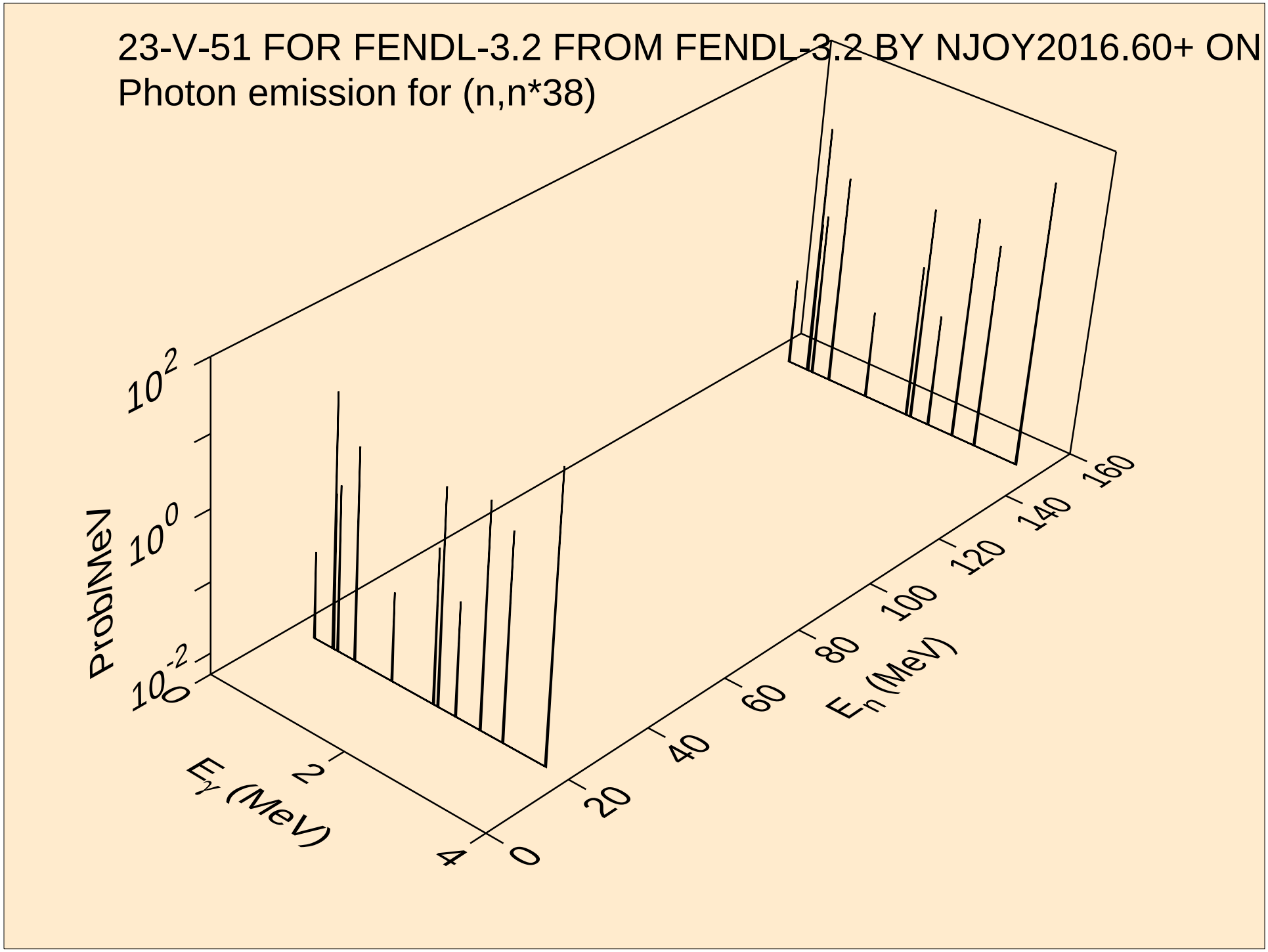

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*33)
Prob/MeV
10^2
10^0
3.0
3.5
4.0
4.5
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

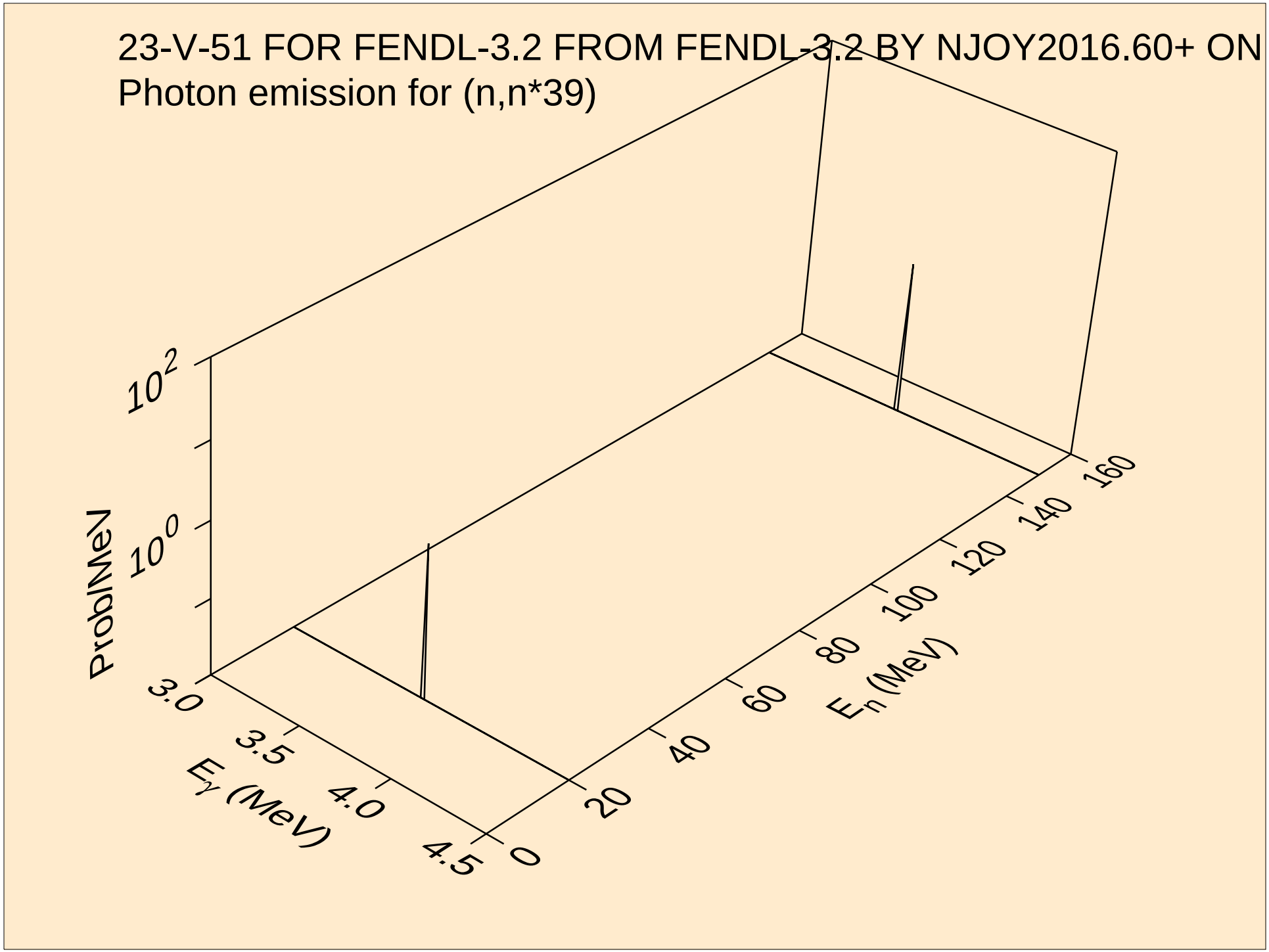

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*34)
Prob/MeV
10^0
10^-2
0
2
4
Eγ (MeV)
0
20
40
60
80
100
120
140
160
En (MeV)

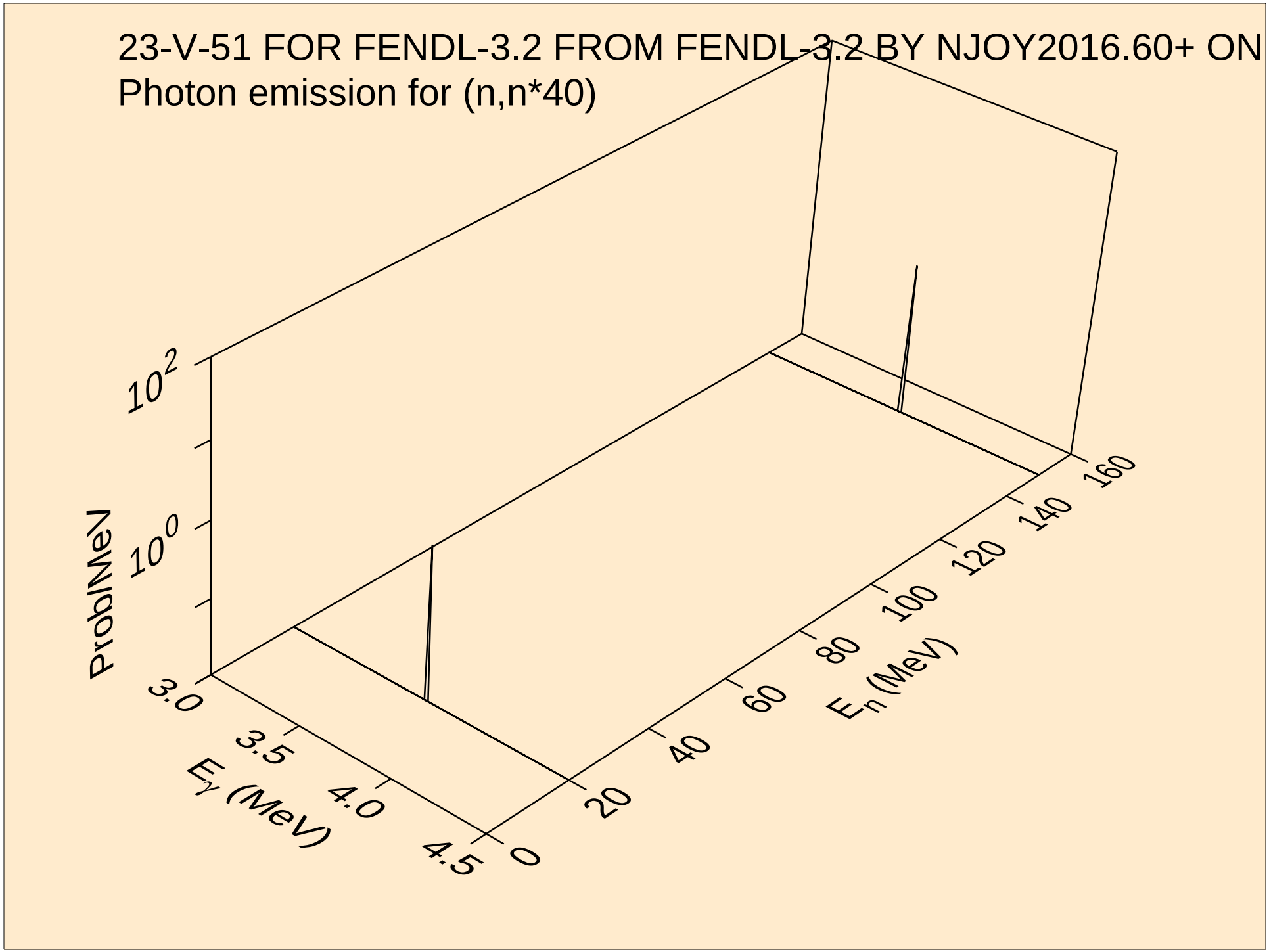

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*35)
Prob/MeV
10^2
10^0
3.0
3.5
4.0
4.5
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

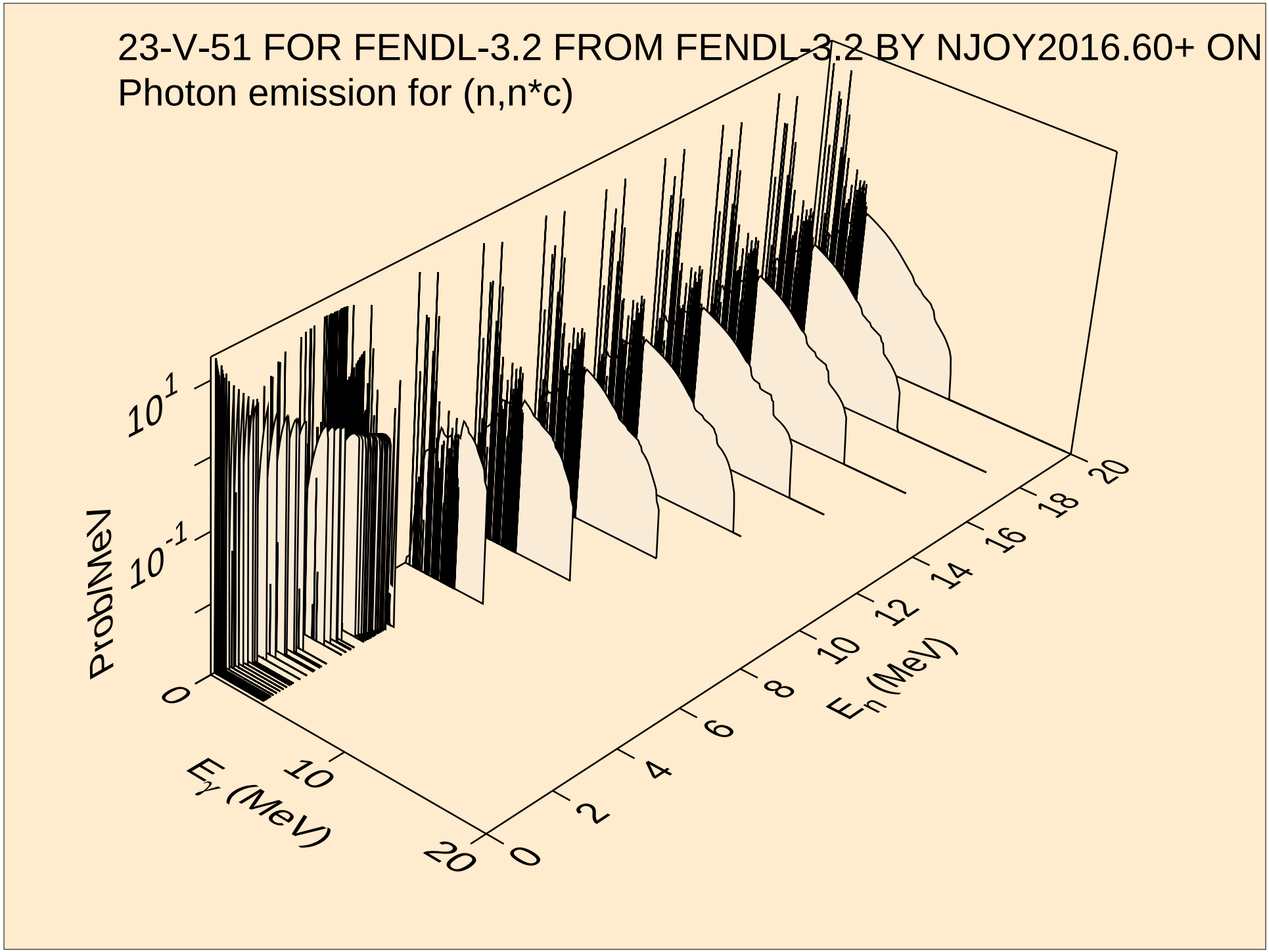

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*36)
Prob/MeV
10^0
10^-2
0
2
4
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

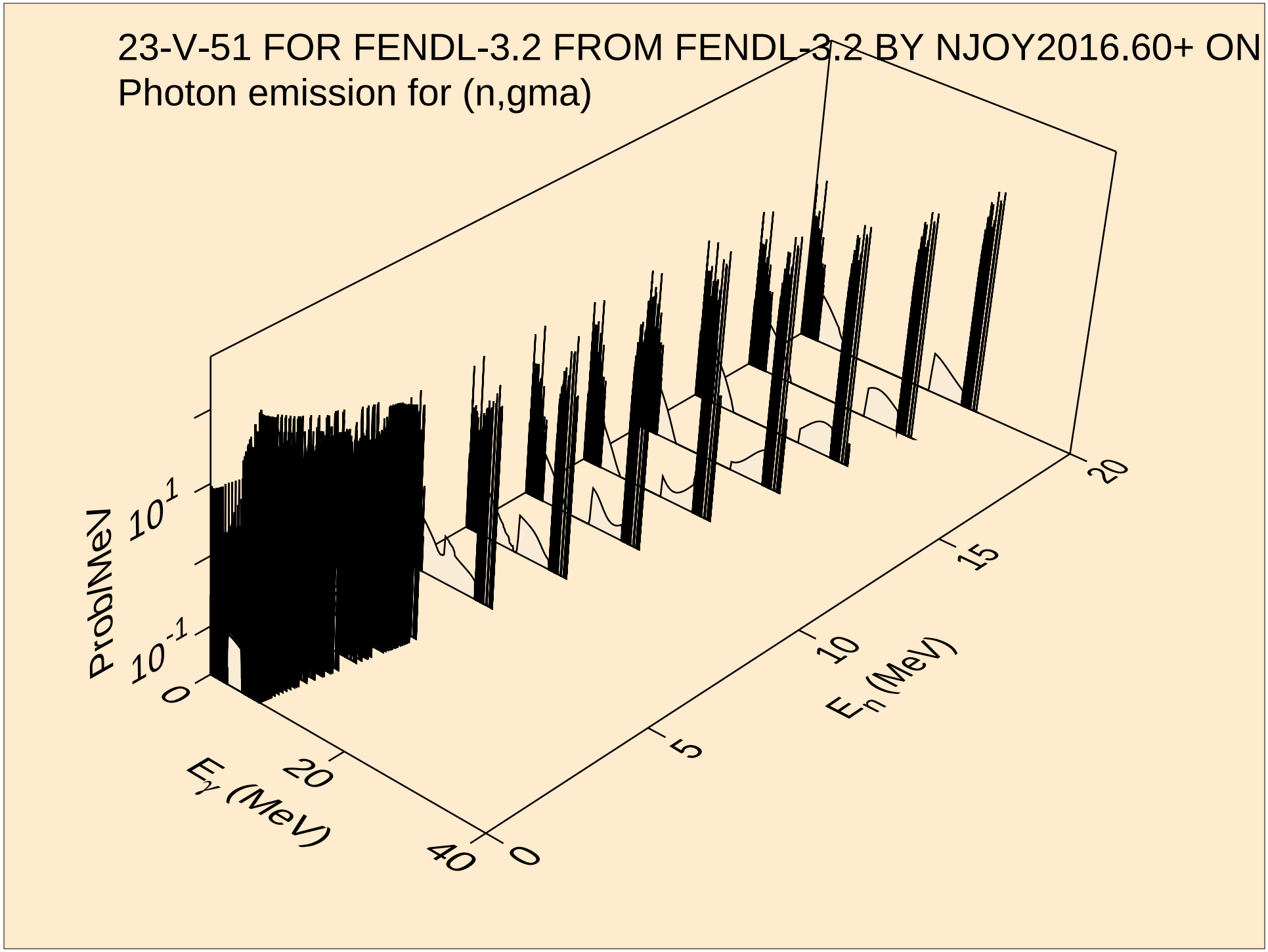

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*37)
Prob/MeV
10^2
10^0
3.0
3.5
4.0
4.5
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

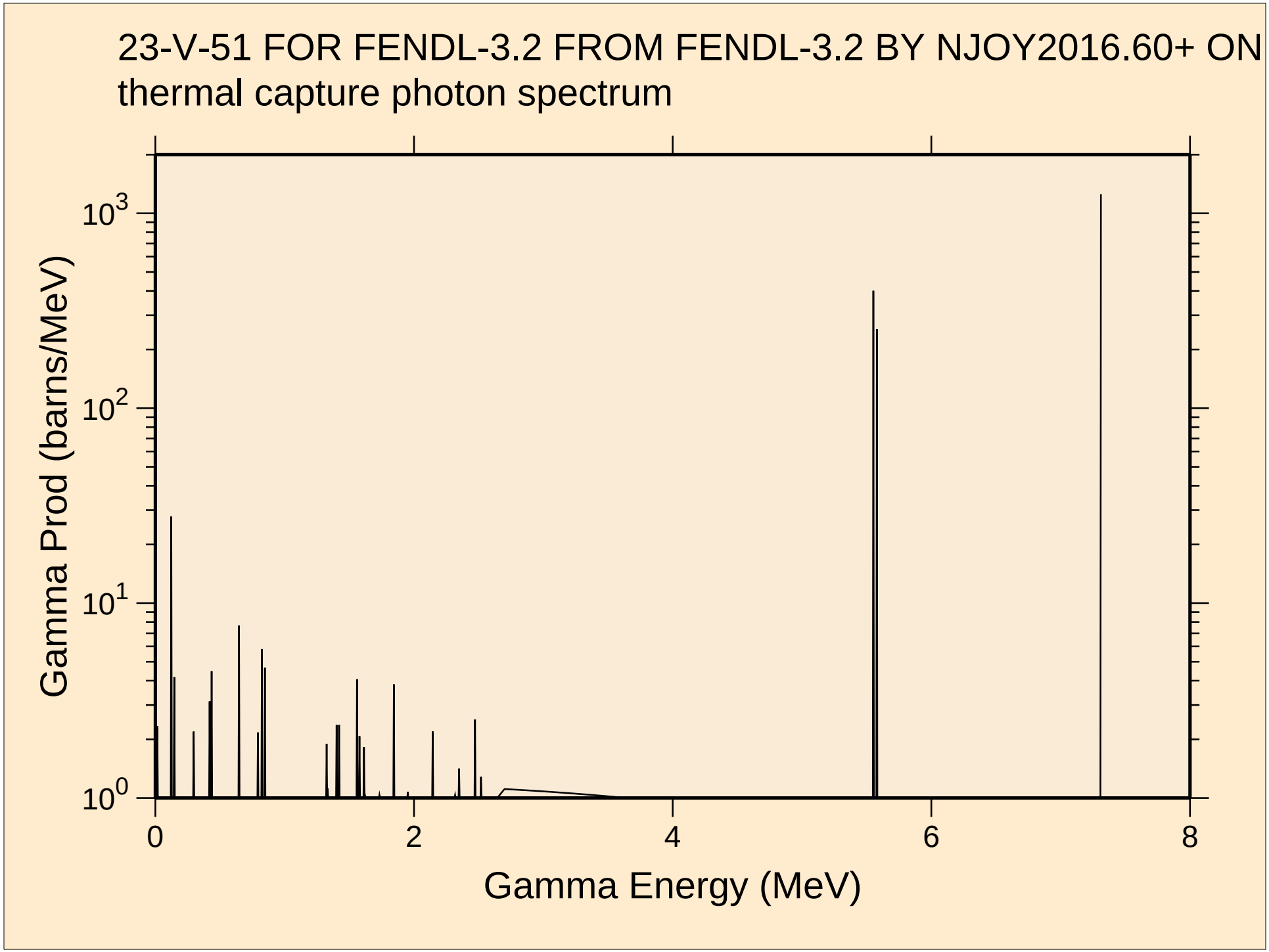

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*38)
Prob/MeV
10^{2}
10^{0}
10^{-2}
E_γ (MeV)
0
2
4
E_n (MeV)
0
20
40
60
80
100
120
140
160

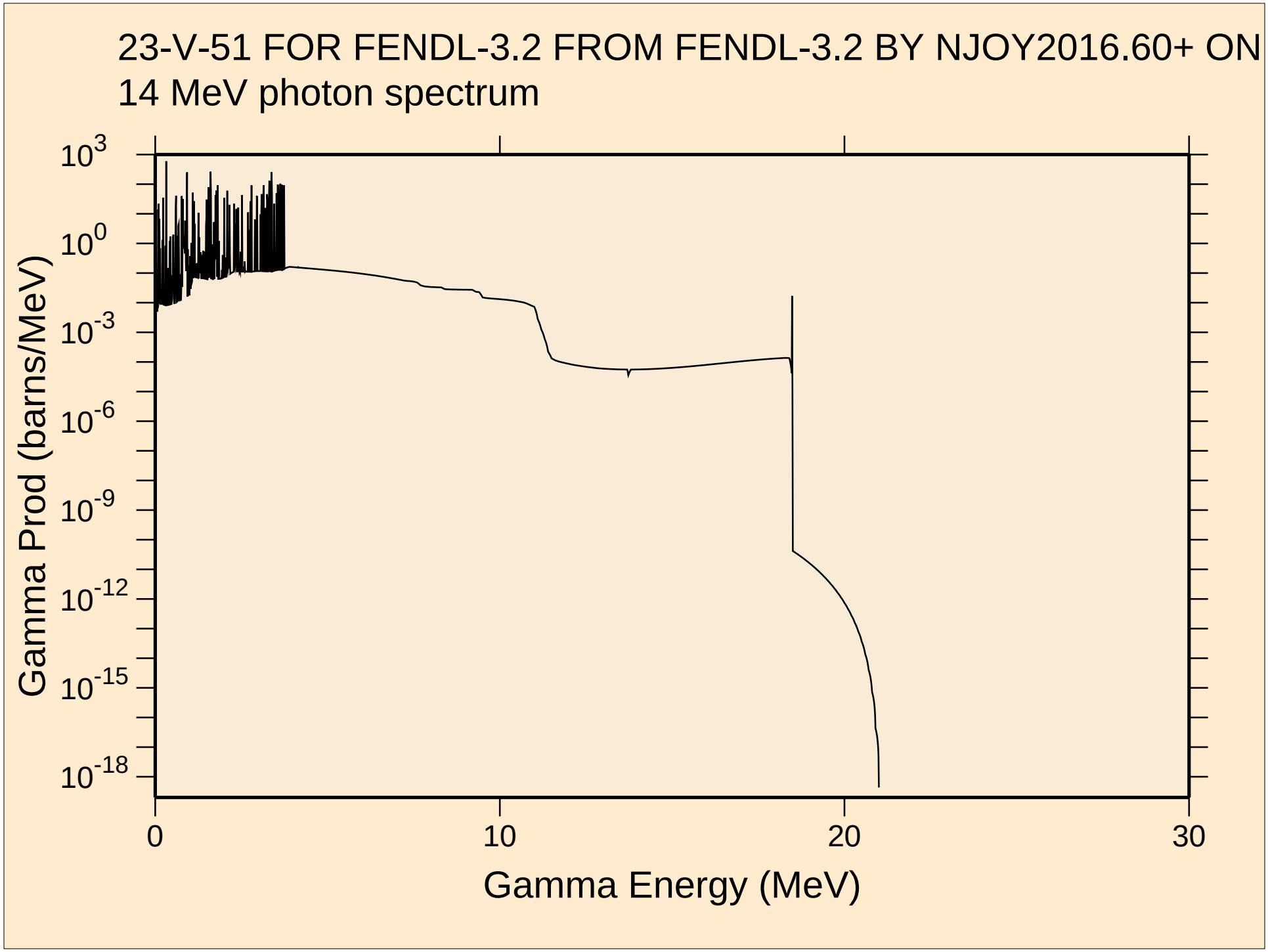

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*39)
Prob/MeV
10^2
10^0
3.0
3.5
4.0
4.5
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

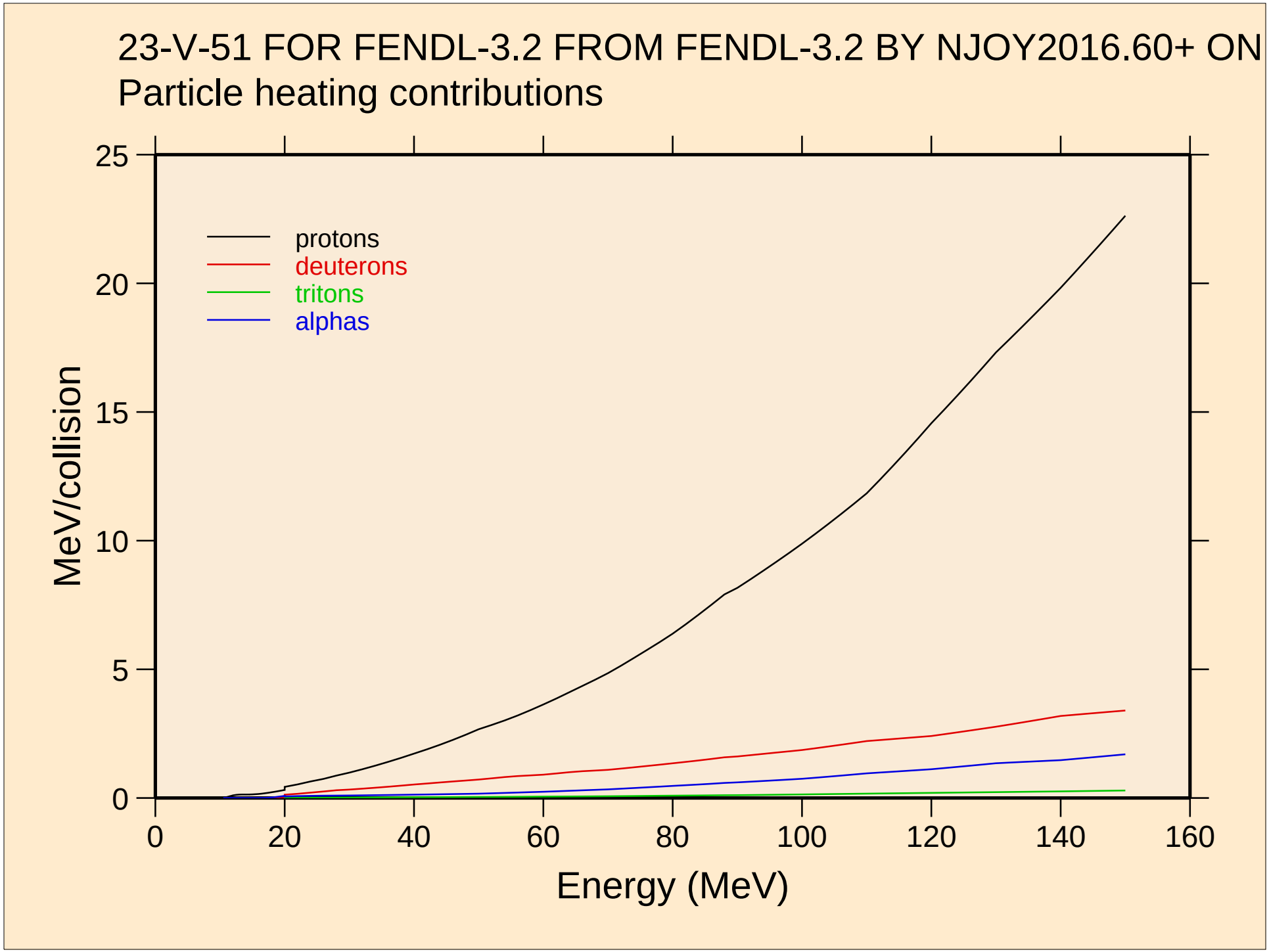

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*40)
10^2
10^0
Prob/MeV
3.0
3.5
4.0
4.5
E_γ (MeV)
0
20
40
60
80
100
120
140
160
E_n (MeV)

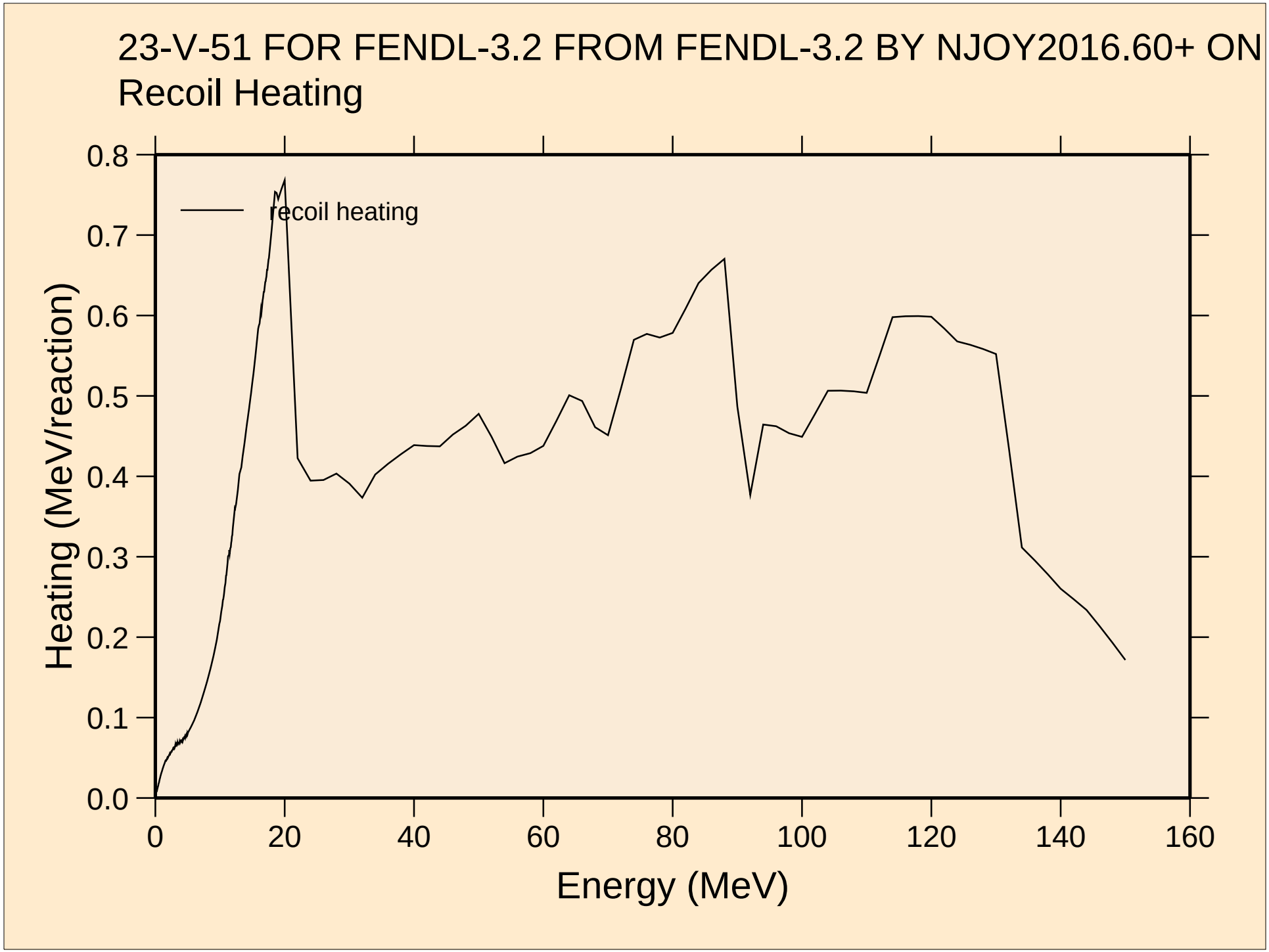

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,n*c)
Prob/MeV
10^{1}
10^{-1}
0
10
20
E_γ (MeV)
0
2
4
6
8
10
12
14
16
18
20
E_n (MeV)

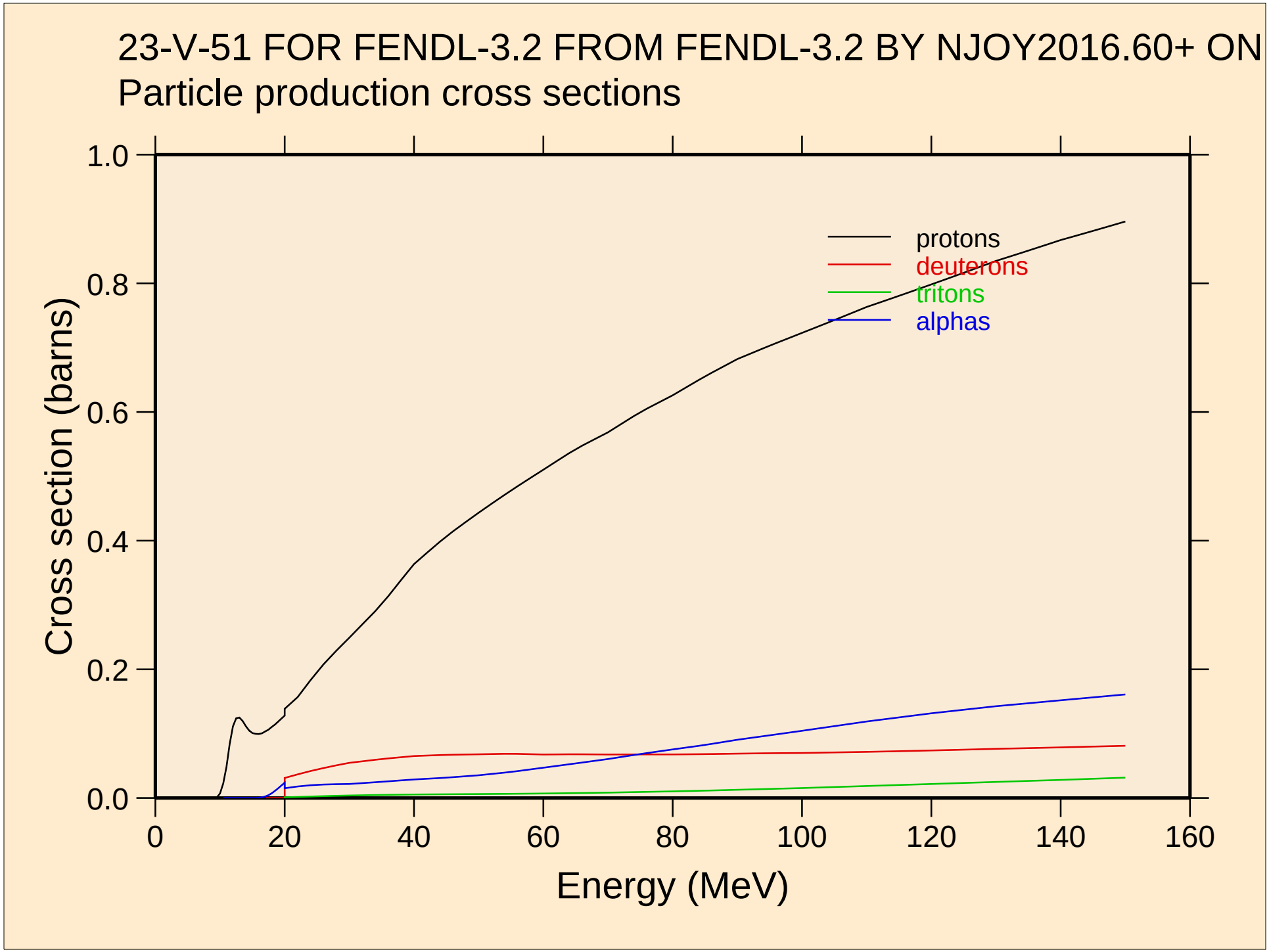

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Photon emission for (n,gma)
Prob/MeV
10^1
10^-1
0
E_γ (MeV)
20
40
0
5
10
15
20
E_n (MeV)

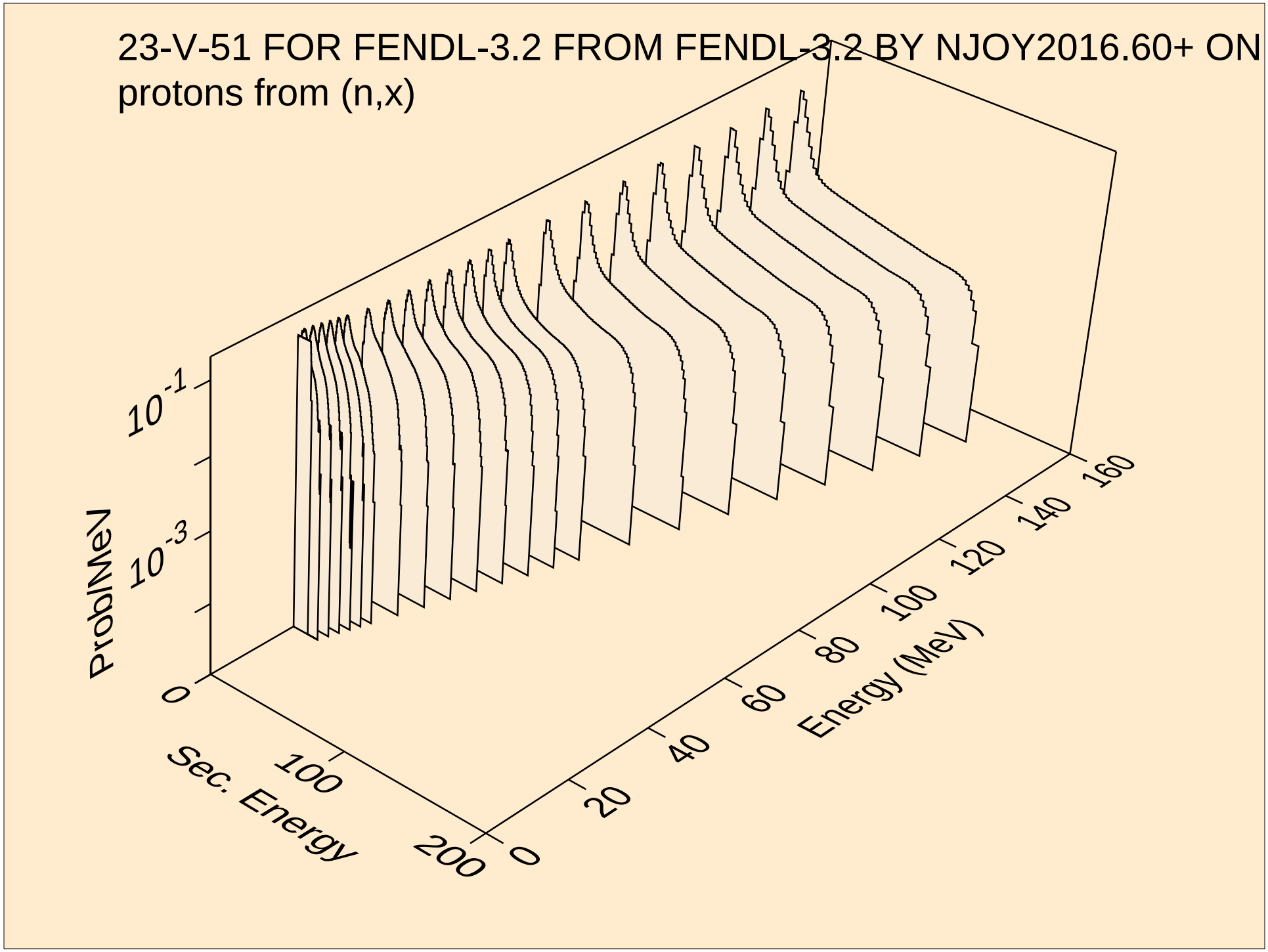

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
thermal capture photon spectrum
Gamma Prod (barns/MeV)
10^3
10^2
10^1
10^0
0
2
4
6
8
Gamma Energy (MeV)

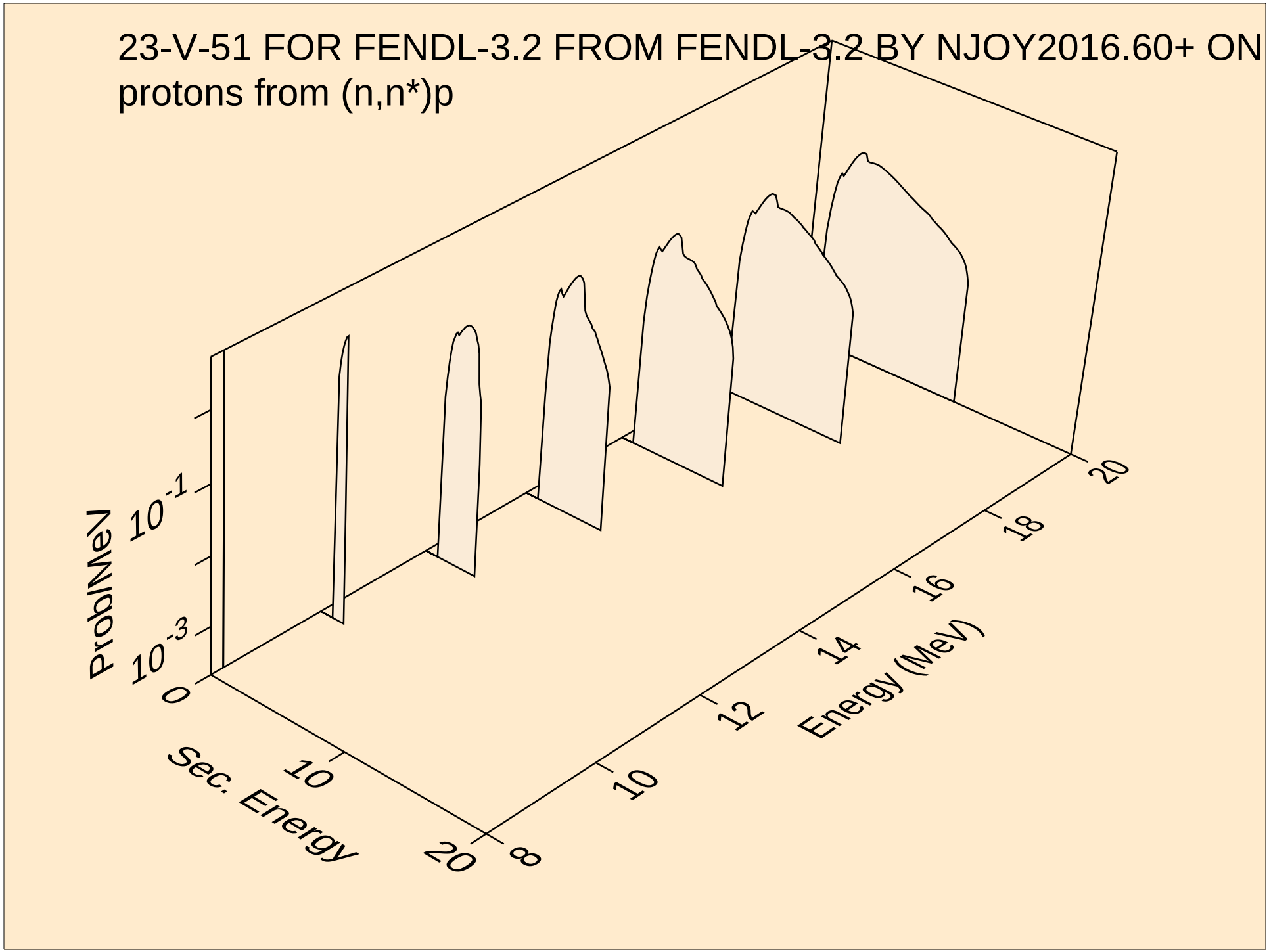

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
14 MeV photon spectrum
Gamma Prod (barns/MeV)
10^3
10^0
10^-3
10^-6
10^-9
10^-12
10^-15
10^-18
0
10
20
30
Gamma Energy (MeV)

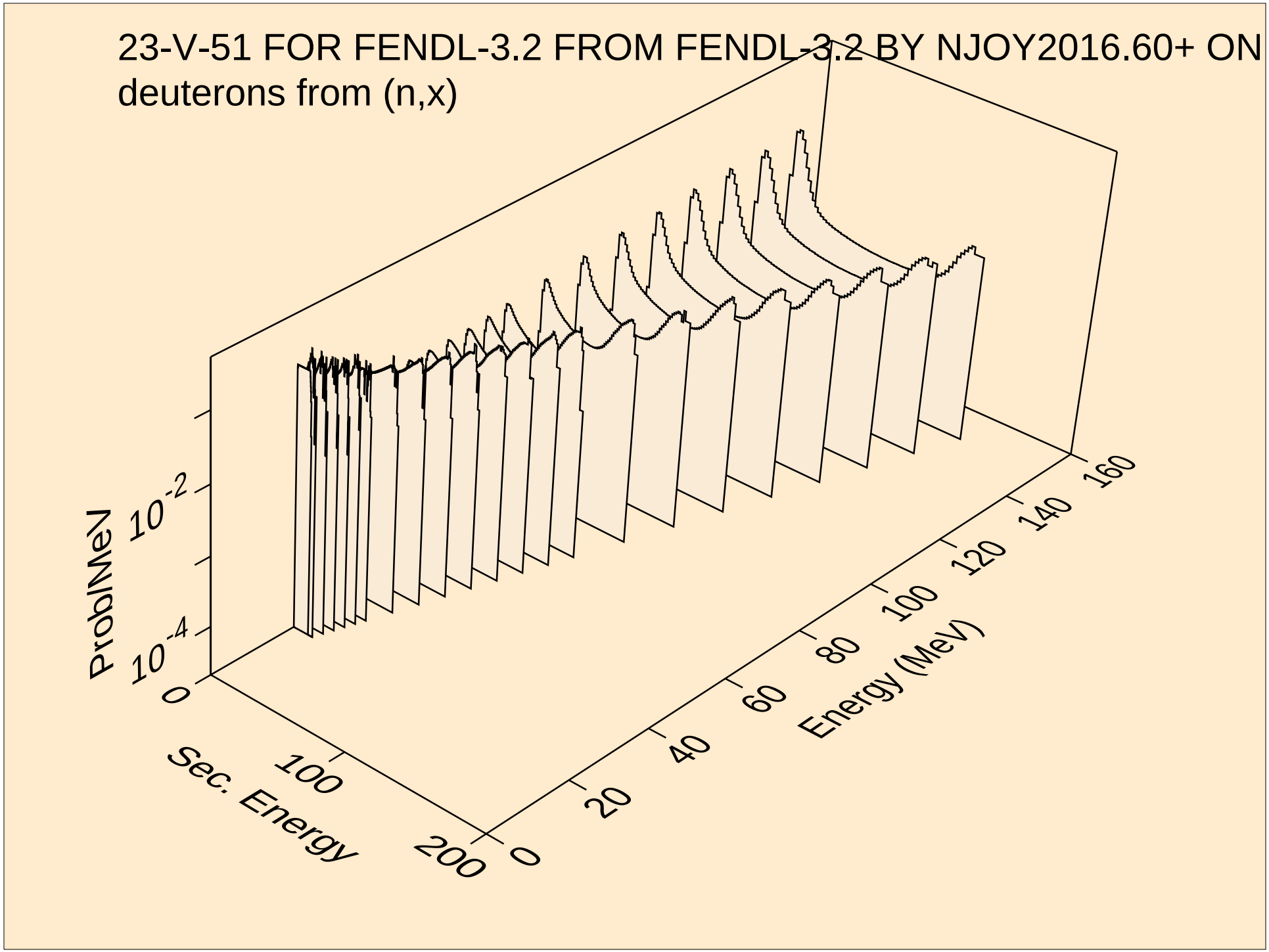

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Particle heating contributions
protons
deuterons
tritons
alphas
MeV/collision
Energy (MeV)
0
5
10
15
20
25
0
20
40
60
80
100
120
140
160

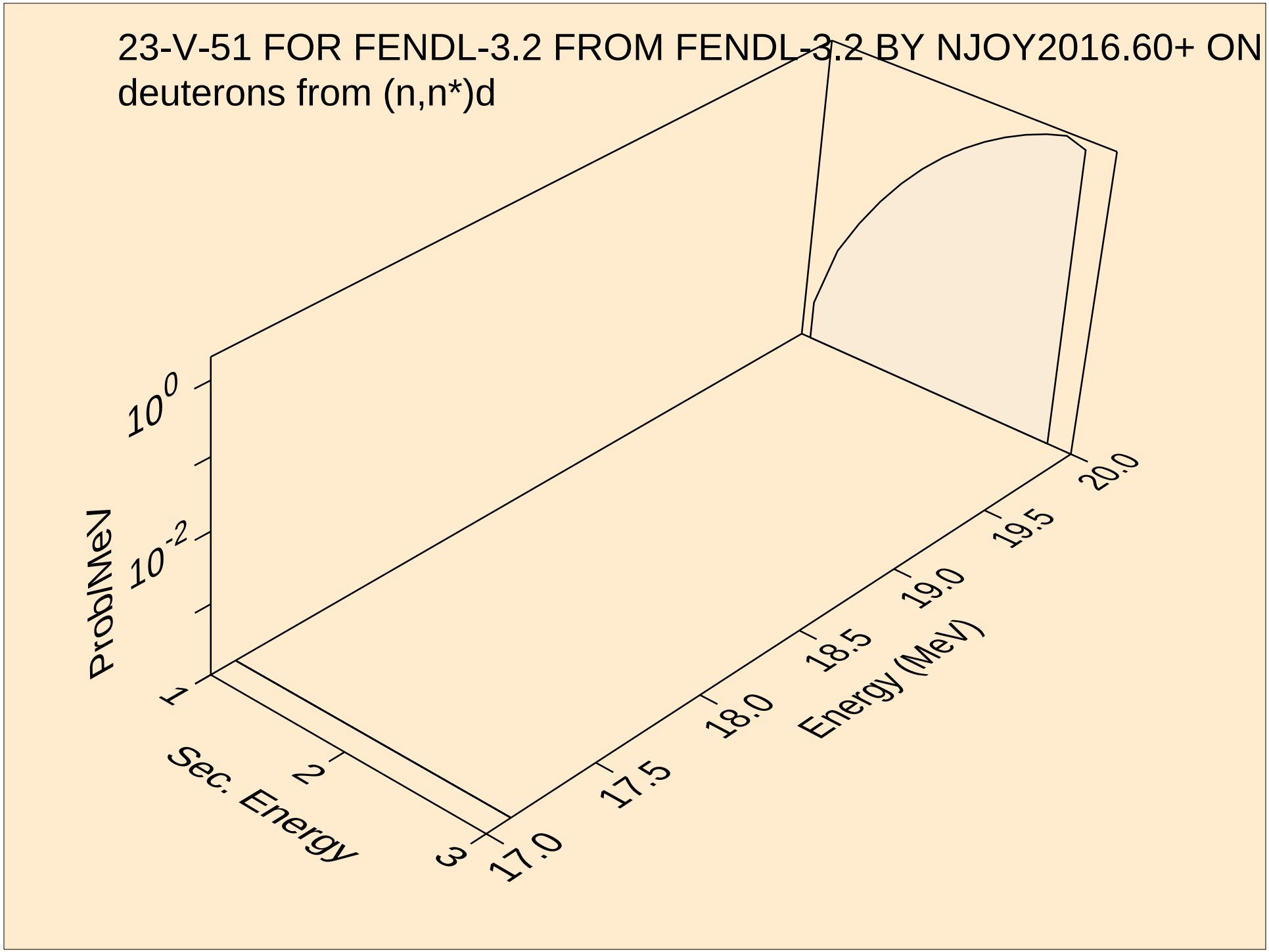

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Recoil Heating
recoil heating
Heating (MeV/reaction)
Energy (MeV)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0
20
40
60
80
100
120
140
160

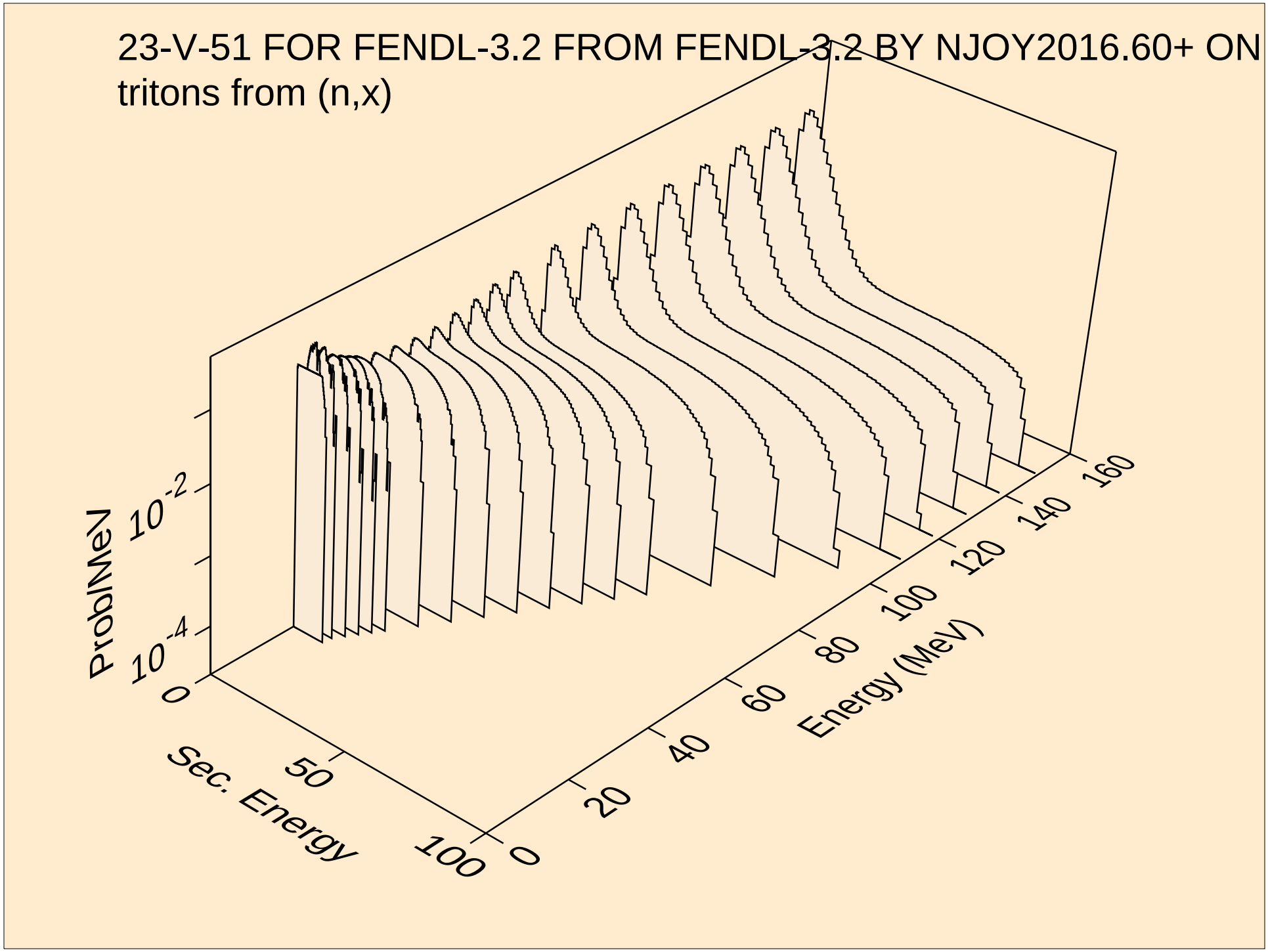

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
Particle production cross sections
Cross section (barns)
Energy (MeV)
protons
deuterons
tritons
alphas
0.0
0.2
0.4
0.6
0.8
1.0
0
20
40
60
80
100
120
140
160

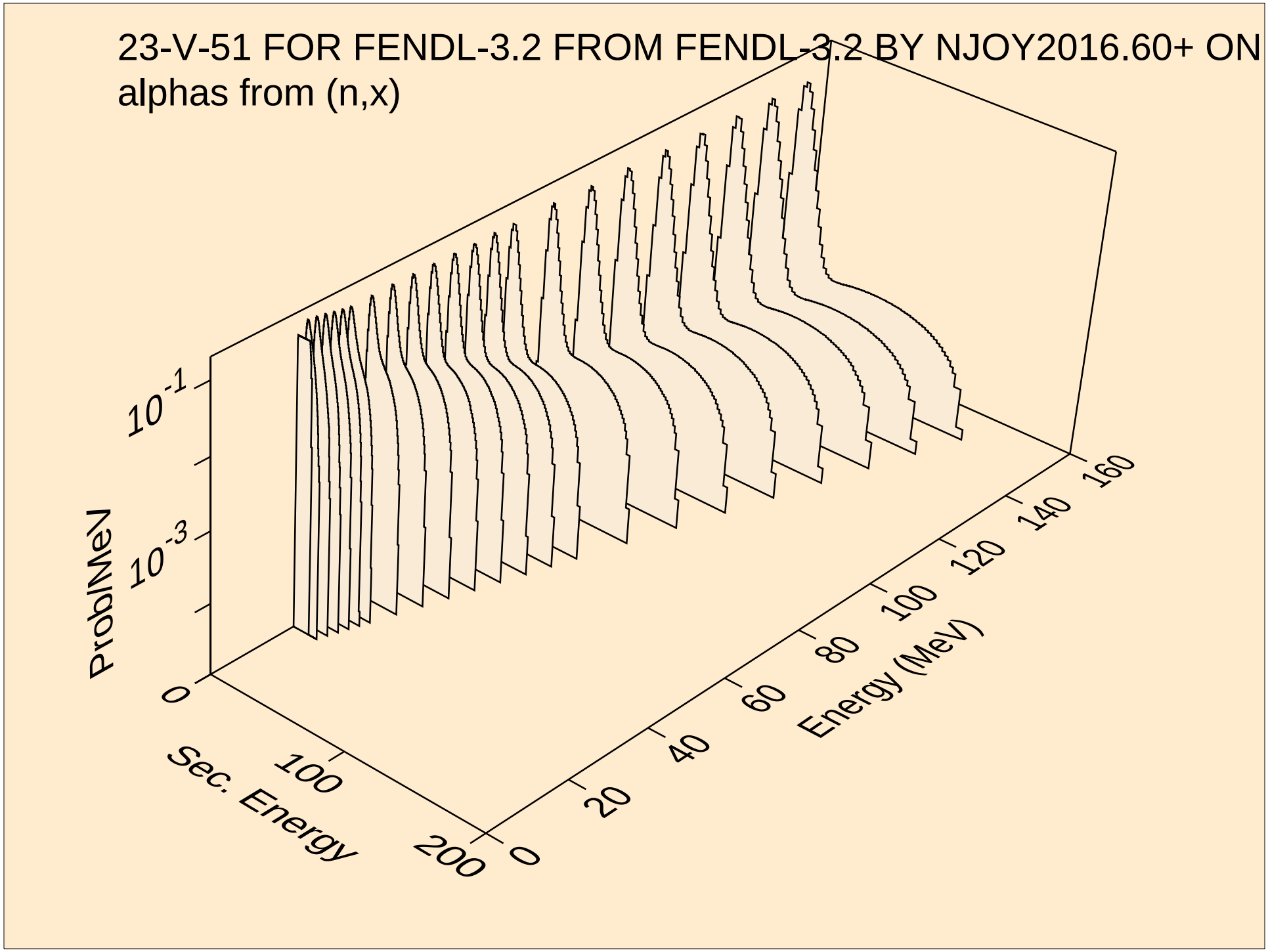

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
protons from (n,x)
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
20
40
60
80
100
120
140
160
Energy (MeV)

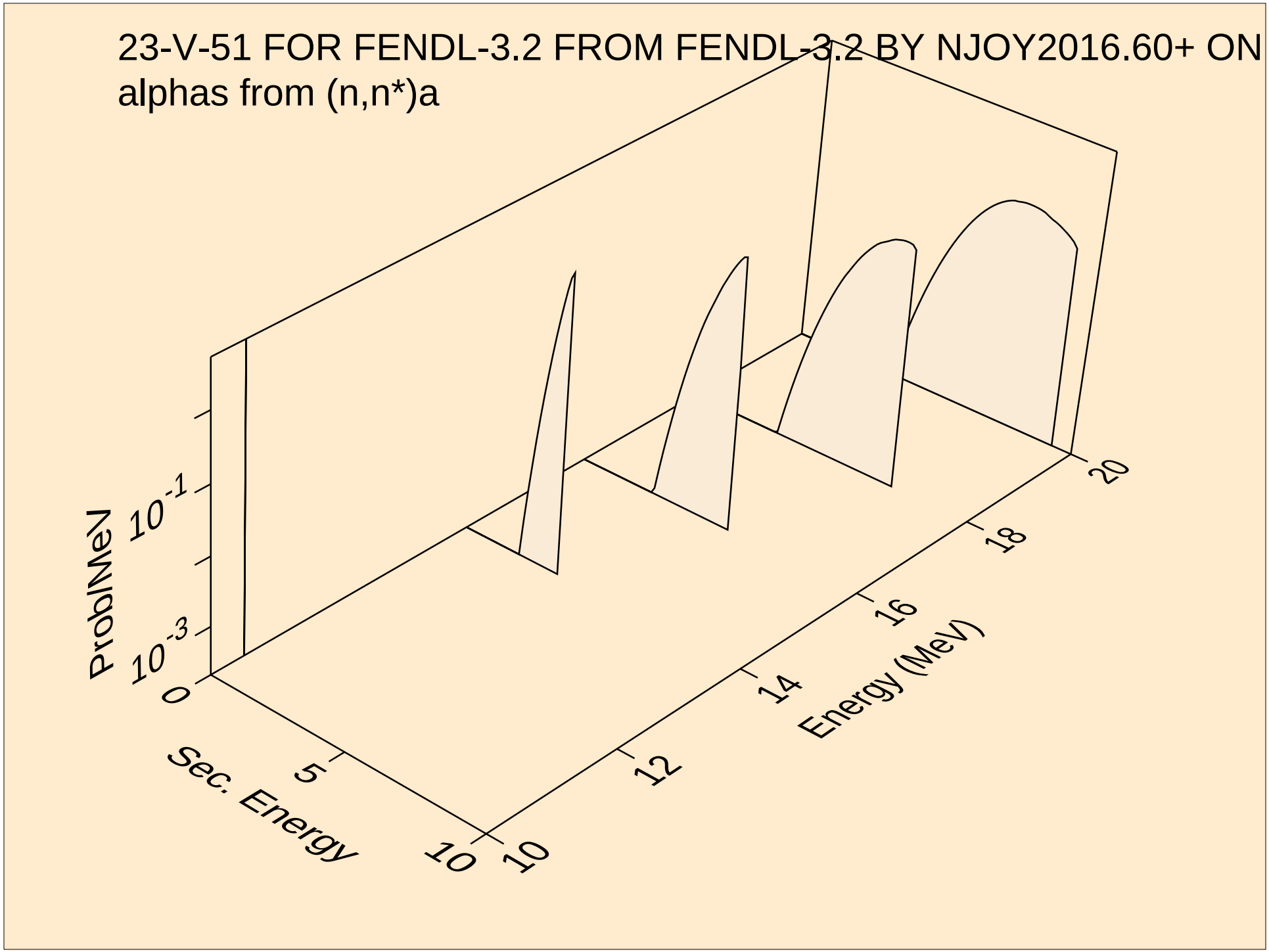

23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
protons from (n,n*)p
Prob/MeV
10-1
10-3
0
Sec. Energy
10
20
8
10
12
14
16
18
20
Energy (MeV)


23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
deuterons from (n,x)
Prob/MeV
10-2
10-4
0
Sec. Energy
100
200
0
20
40
60
80
100
120
140
160
Energy (MeV)


23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
deuterons from (n,n*)d
Prob/MeV
10^0
10^-2
1
2
3
Sec. Energy
17.0
17.5
18.0
18.5
19.0
19.5
20.0
Energy (MeV)


23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
tritons from (n,x)
Prob/MeV
10-2
10-4
0
Sec. Energy
50
100
0
20
40
60
80
100
120
140
160
Energy (MeV)


23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
alphas from (n,x)
Prob/MeV
10-1
10-3
0
Sec. Energy
100
200
0
20
40
60
80
100
120
140
160
Energy (MeV)


23-V-51 FOR FENDL-3.2 FROM FENDL-3.2 BY NJOY2016.60+ ON
alphas from (n,n*)a
Prob/MeV
10-1
10-3
0
Sec. Energy
5
10
10
12
14
16
18
20
Energy (MeV)