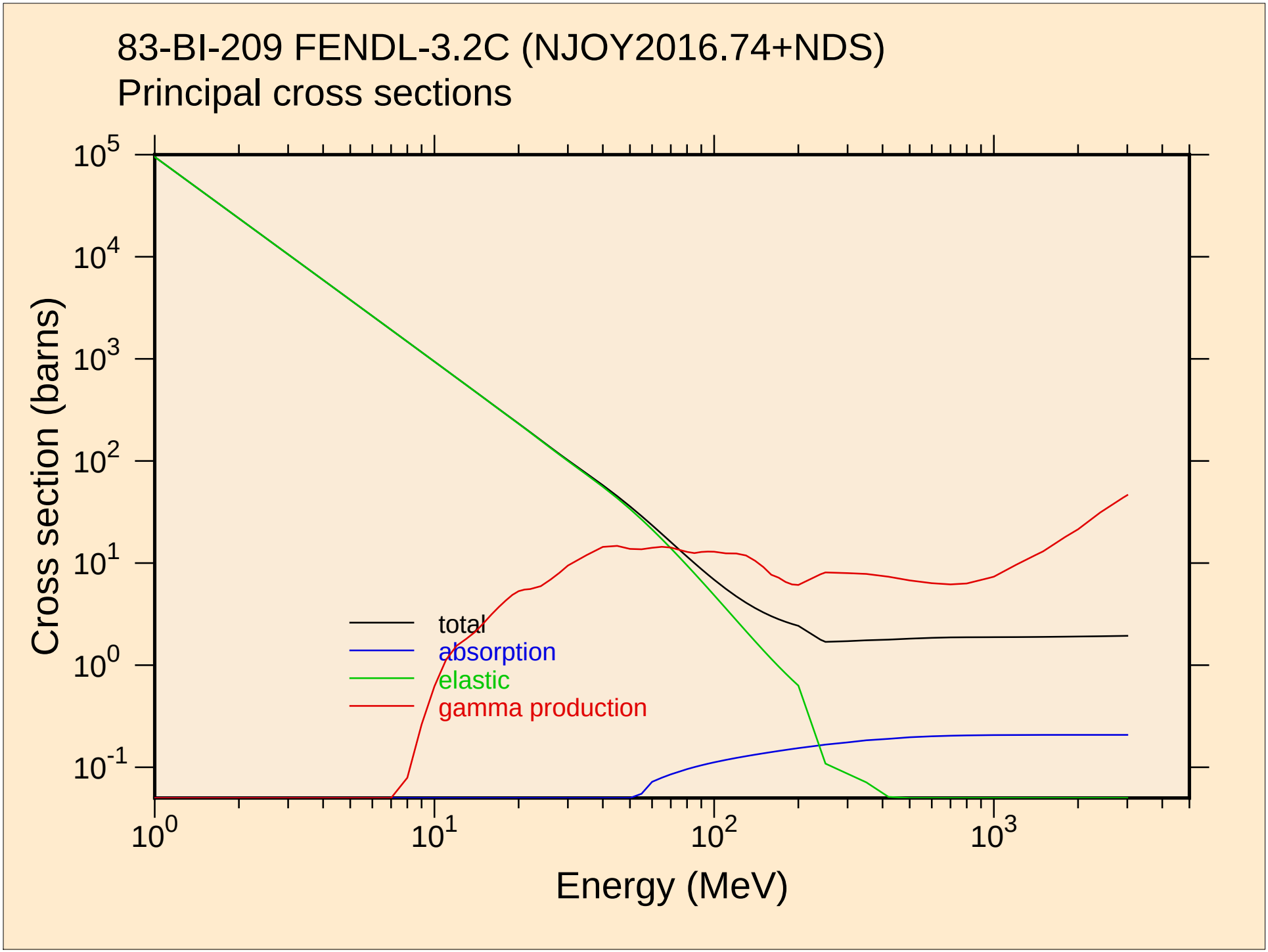
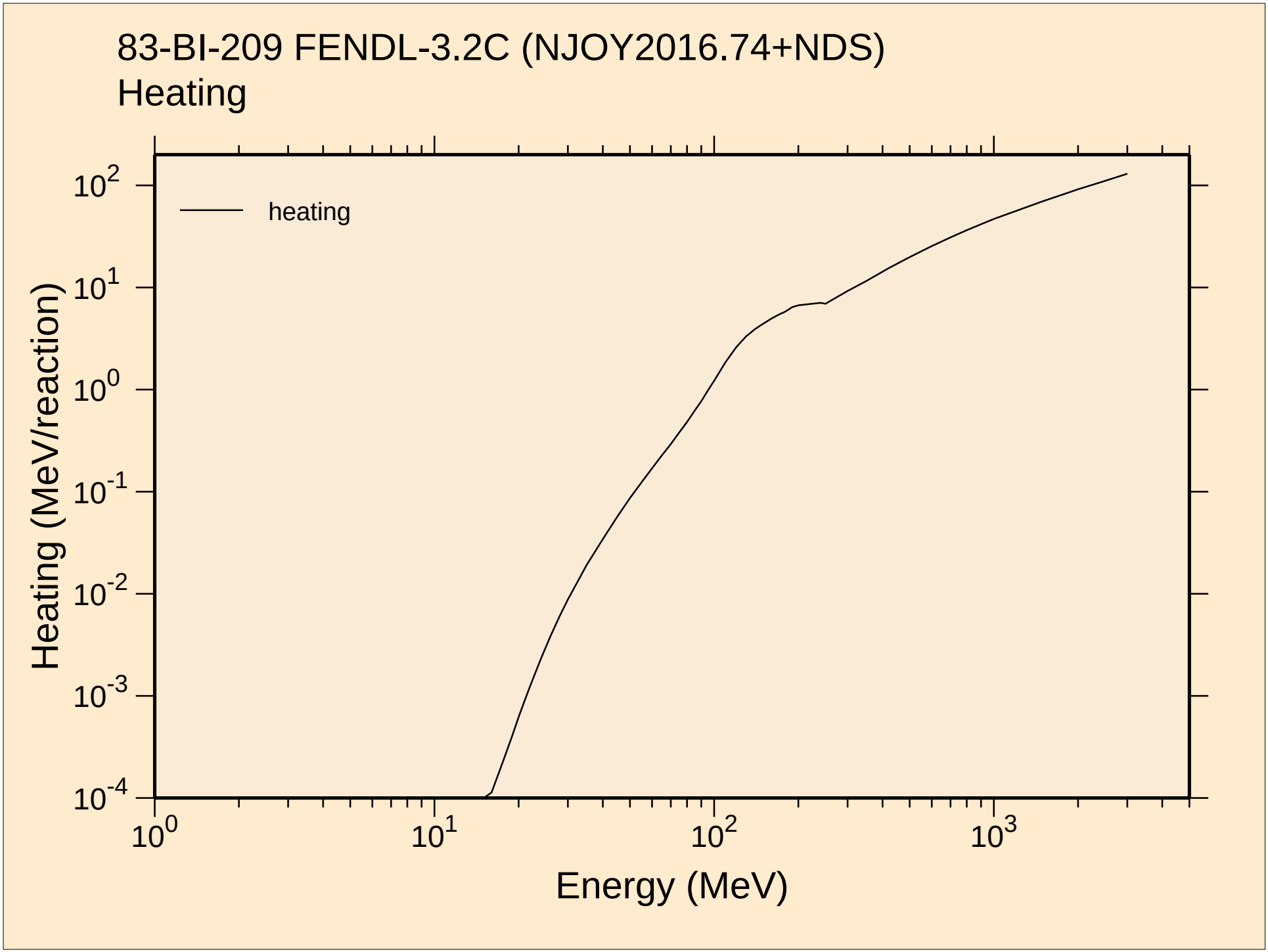
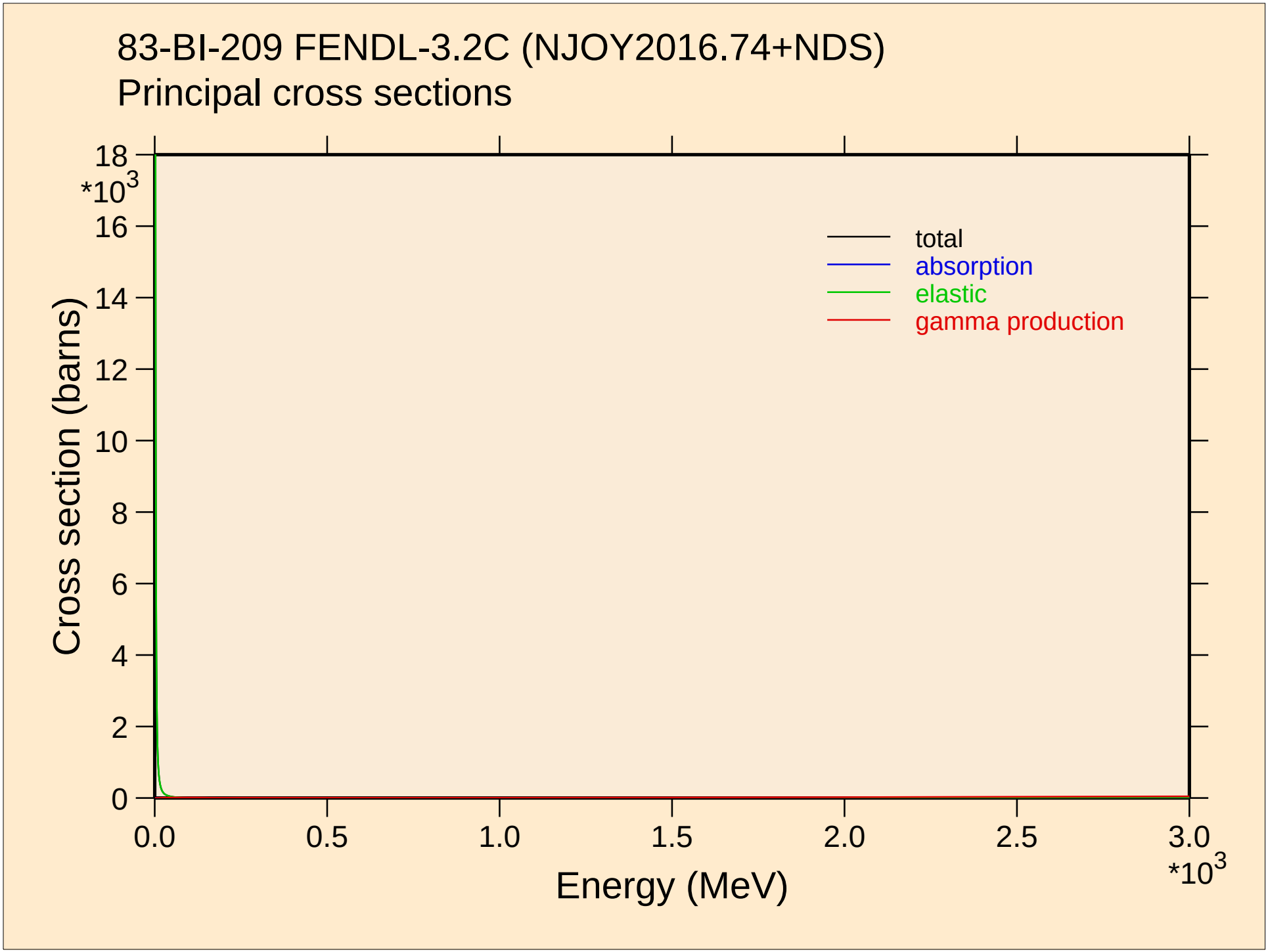
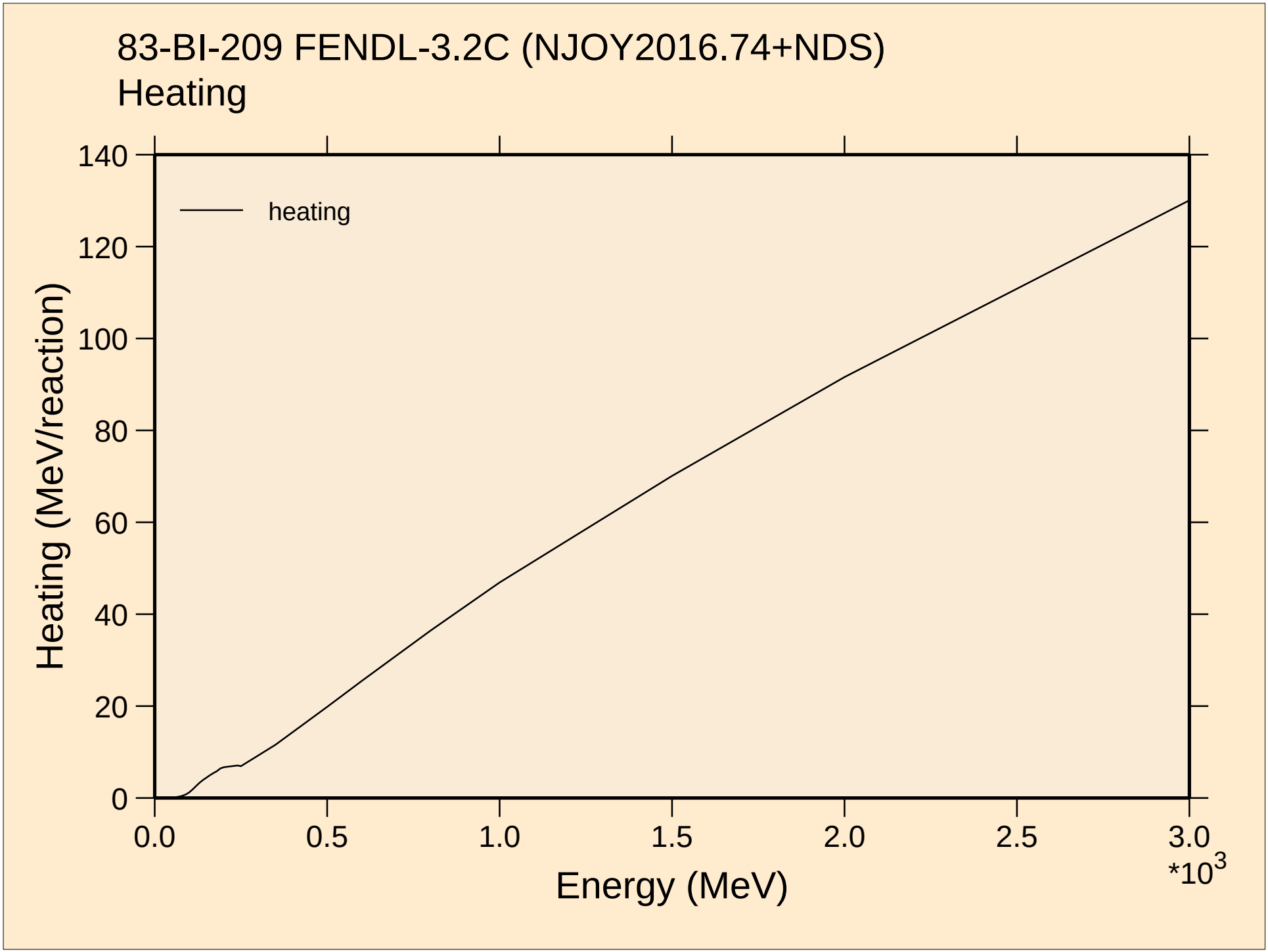
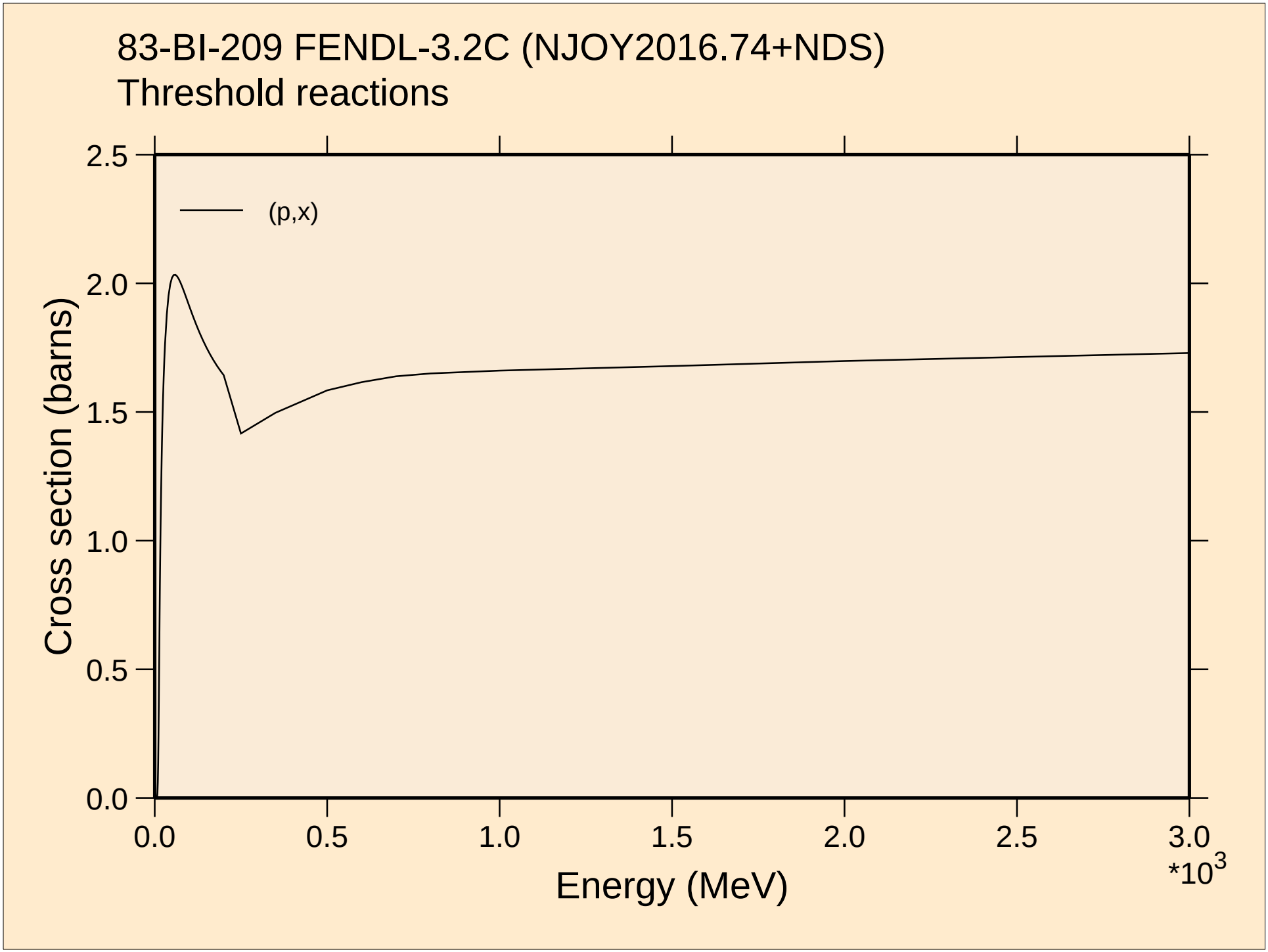
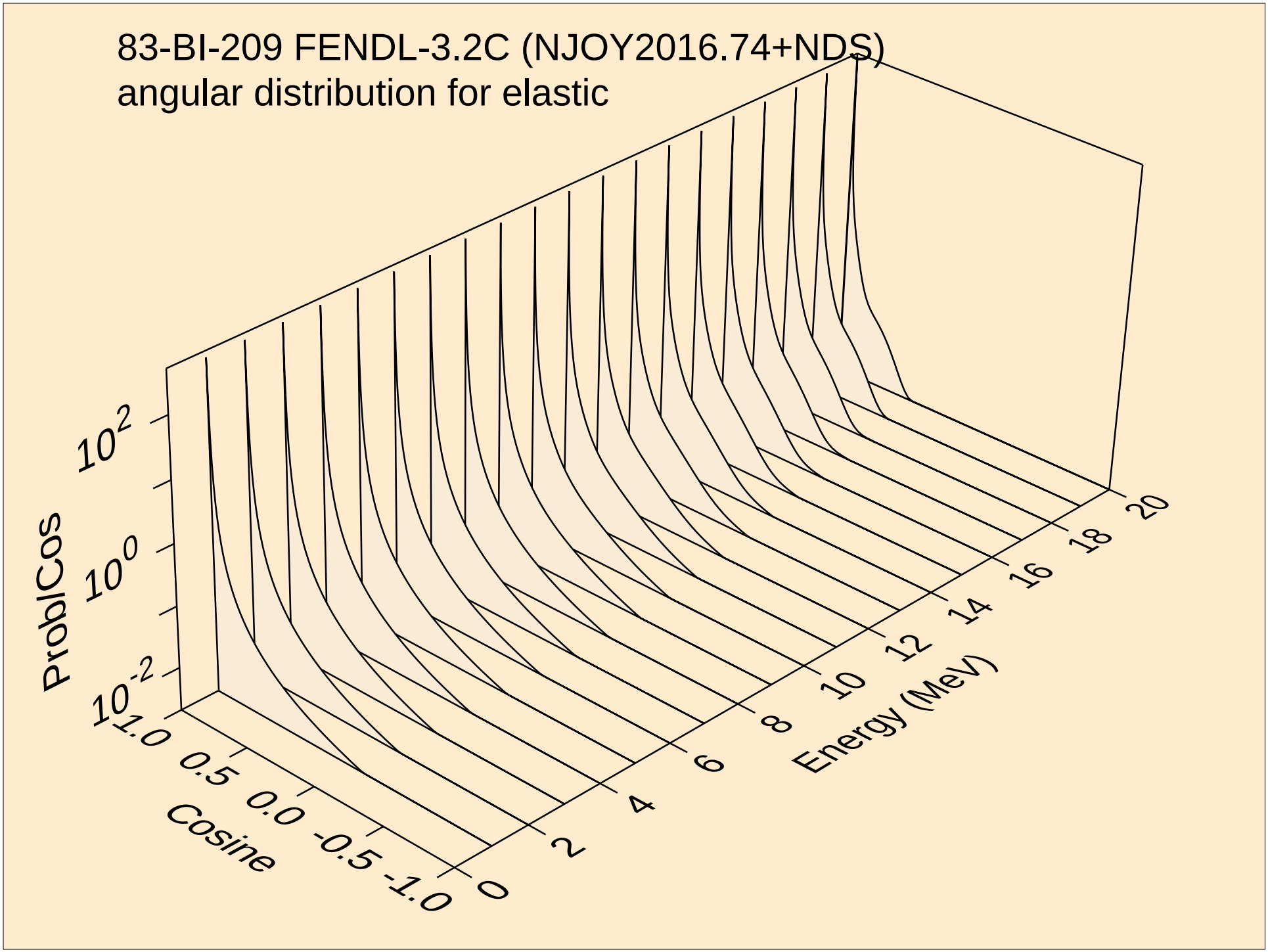

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
Principal cross sections
Cross section (barns)
Energy (MeV)
10^5
10^4
10^3
10^2
10^1
10^0
10^{-1}
10^0
10^1
10^2
10^3
total
absorption
elastic
gamma production

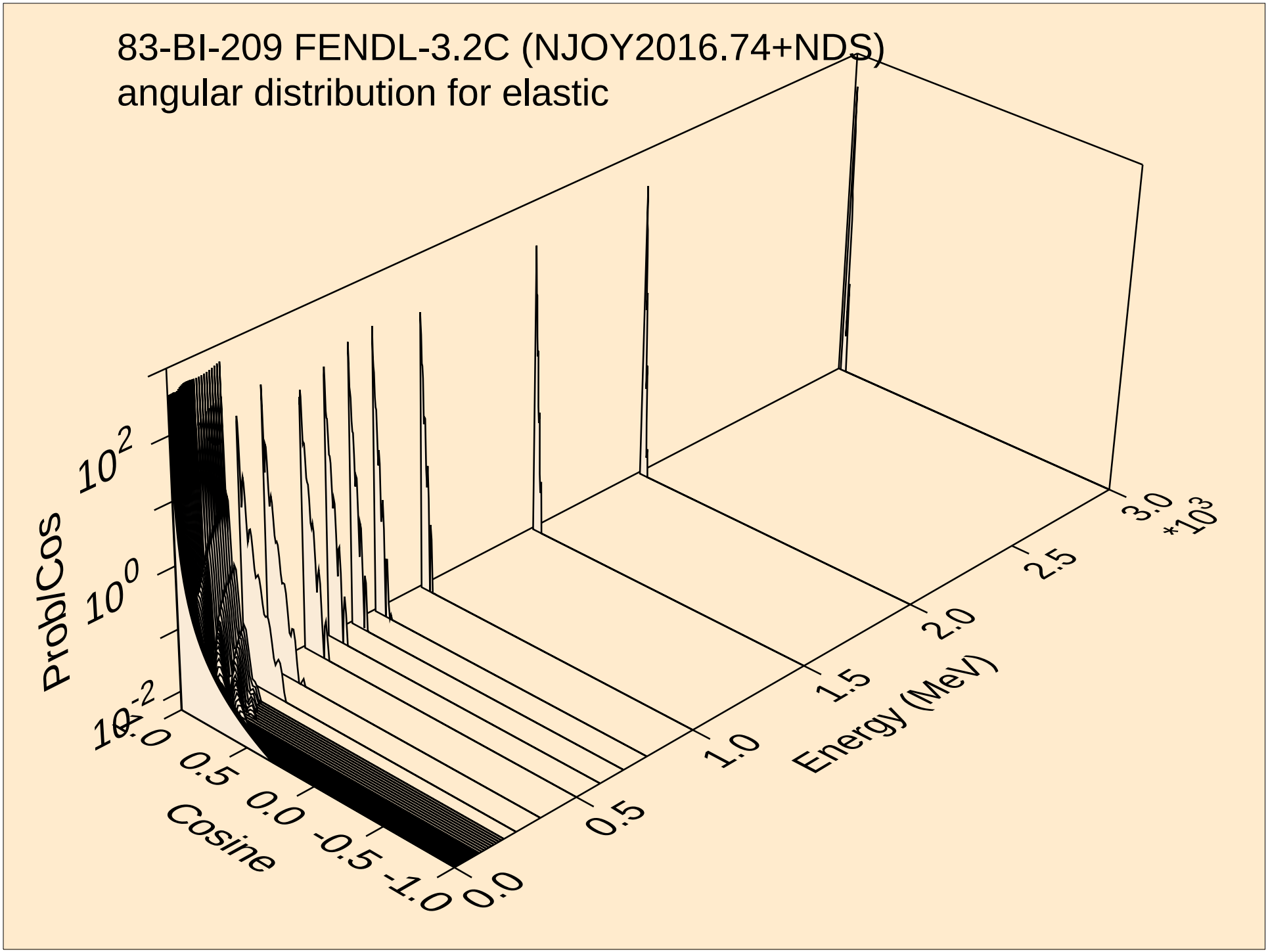

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^-4
10^0
10^1
10^2
10^3

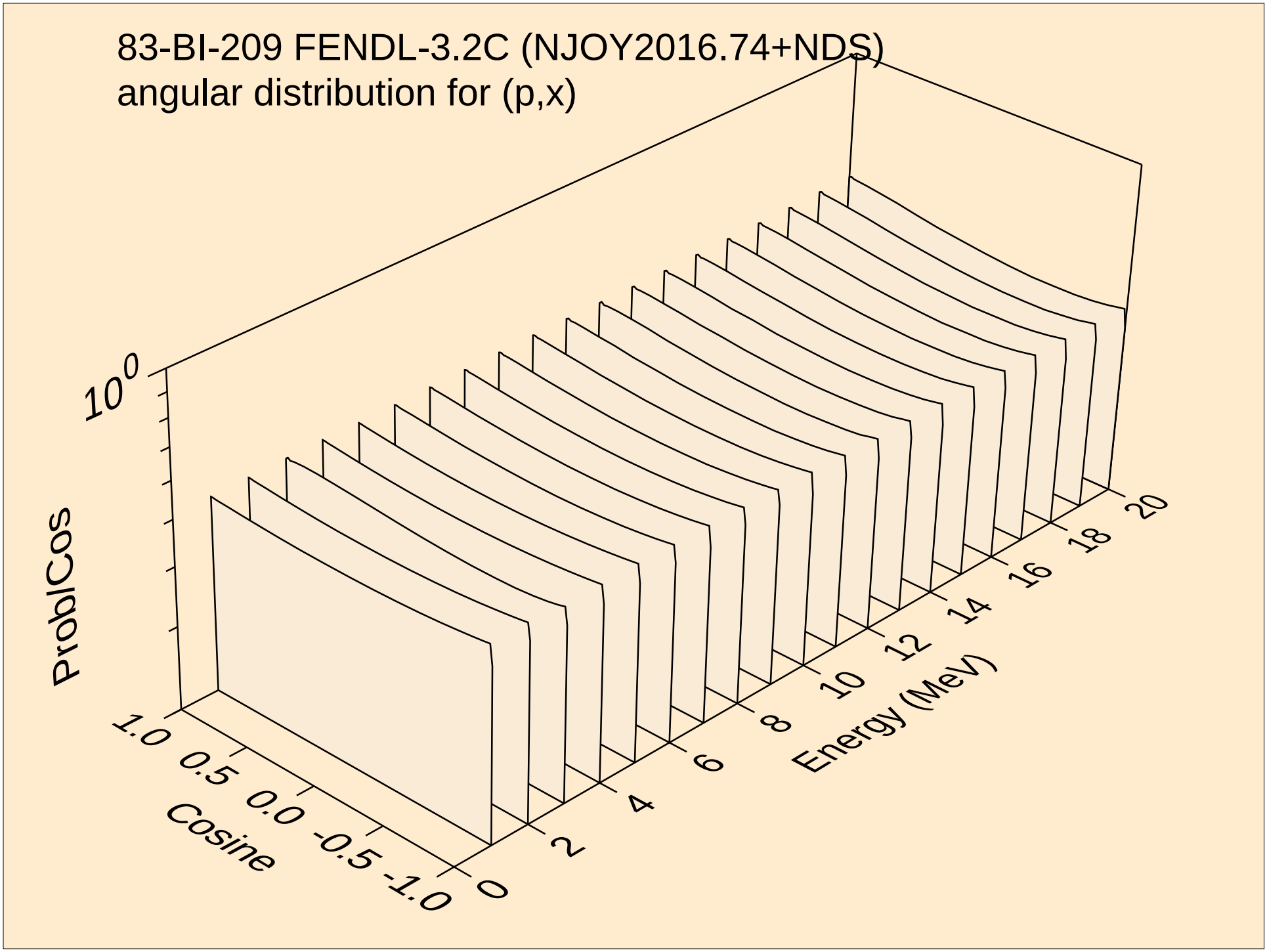

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
Principal cross sections
Cross section (barns)
*10^3
18
16
14
12
10
8
6
4
2
0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10^3
Energy (MeV)
total
absorption
elastic
gamma production

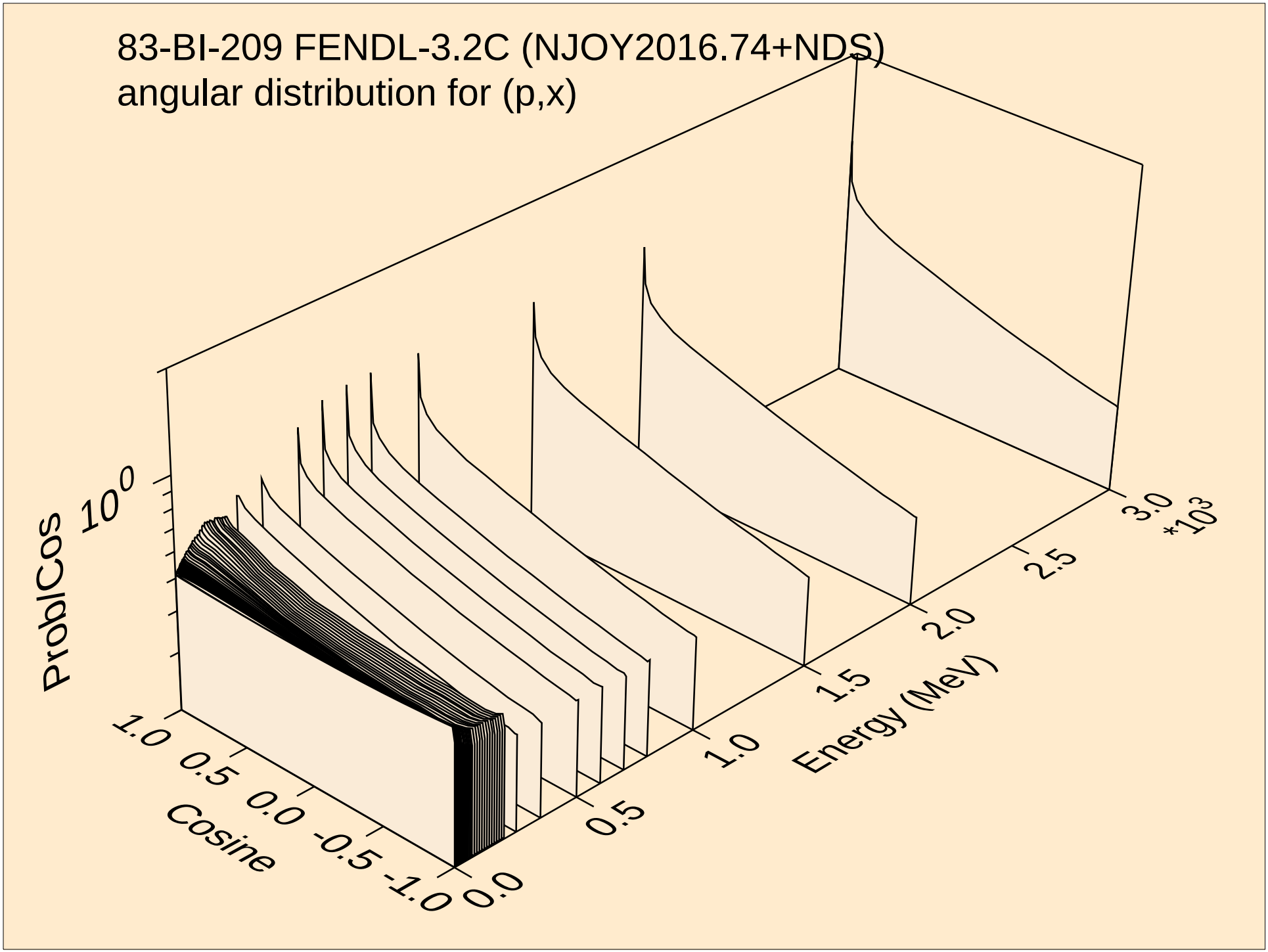

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
Heating
heating
Heating (MeV/reaction)
Energy (MeV)
*10^3
0
20
40
60
80
100
120
140
0.0
0.5
1.0
1.5
2.0
2.5
3.0

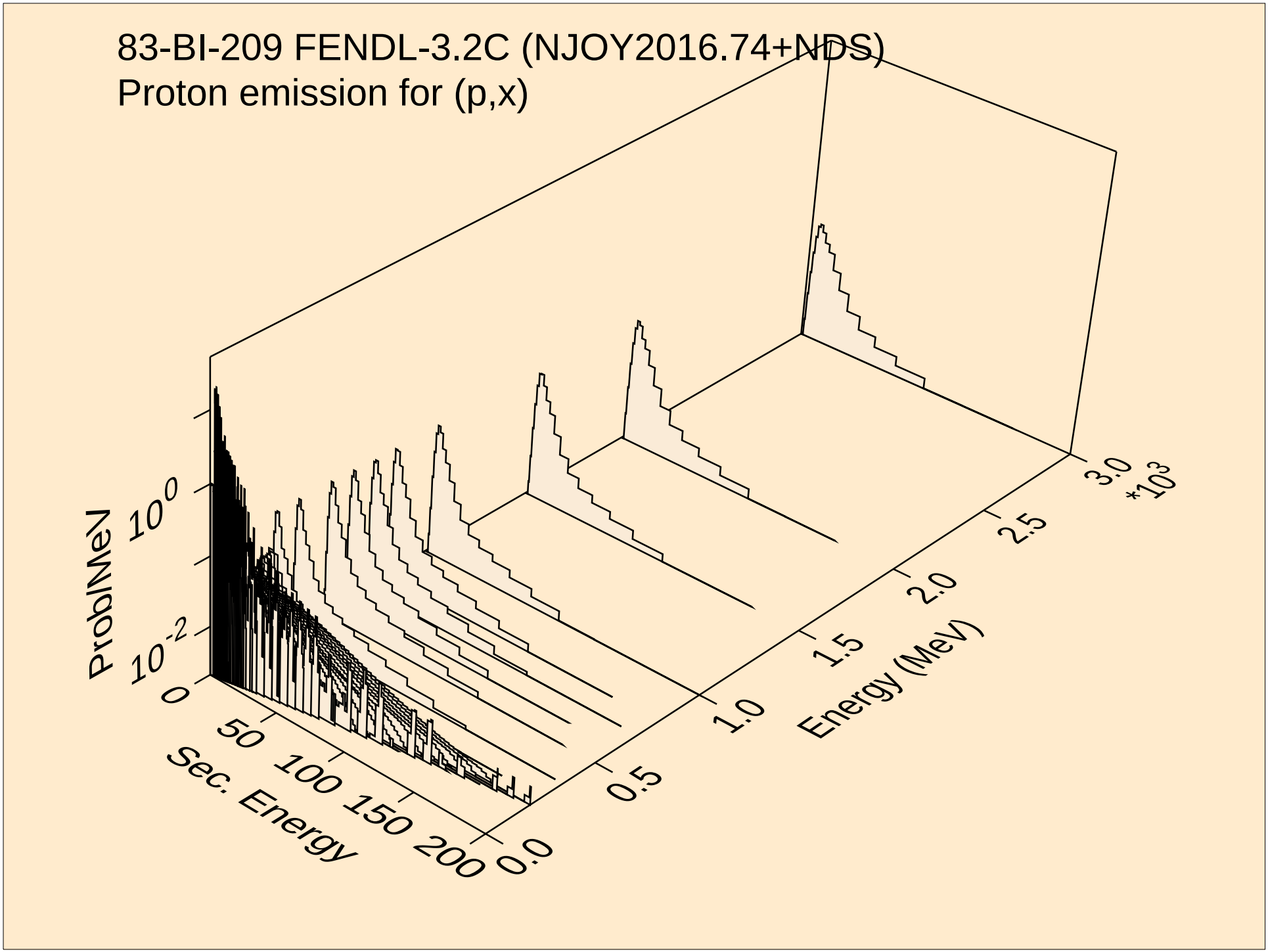

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
Threshold reactions
(p,x)
Cross section (barns)
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10^3
Energy (MeV)

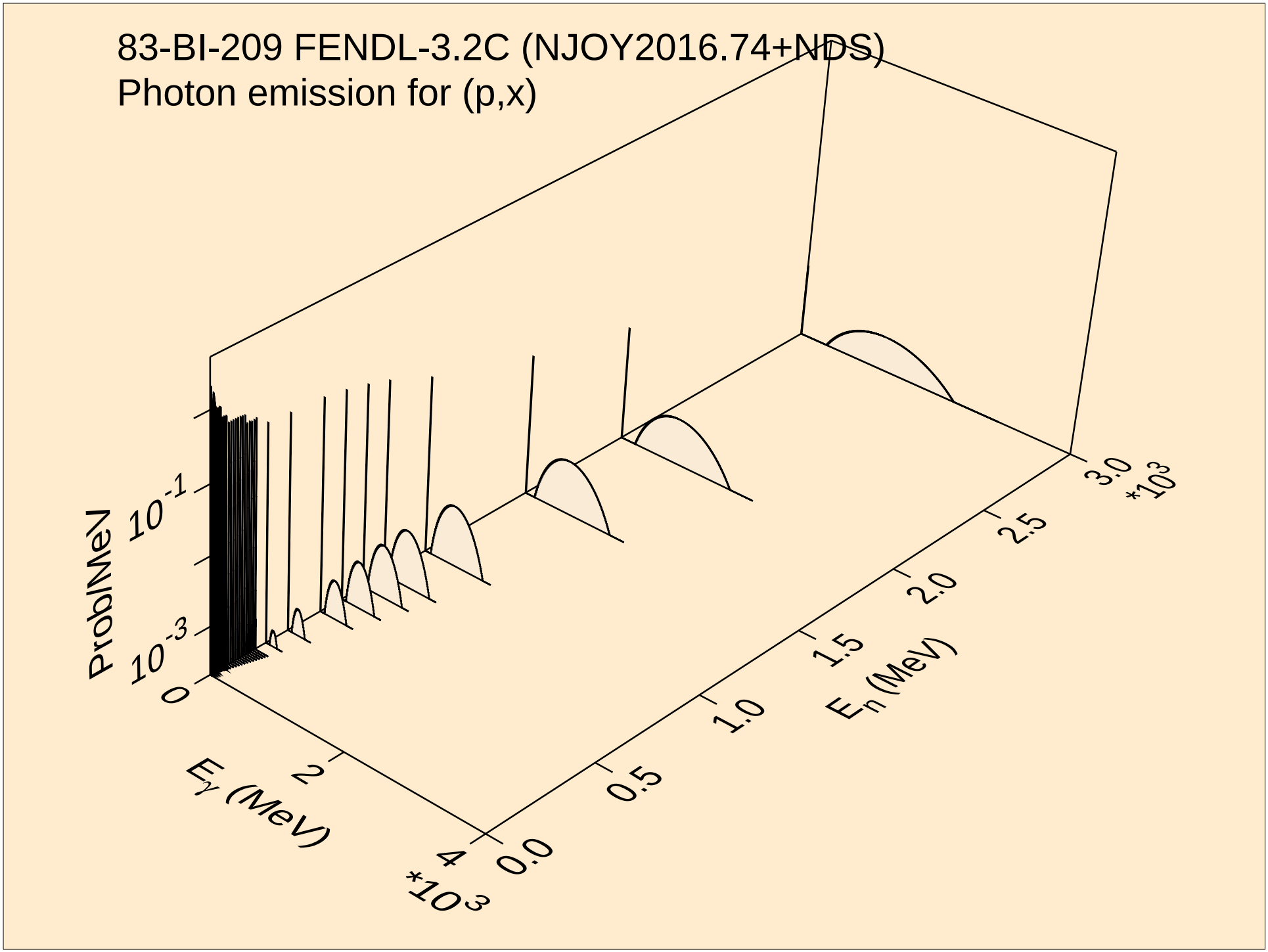

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for elastic
ProblCos
10^{2}
10^{0}
10^{-2}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

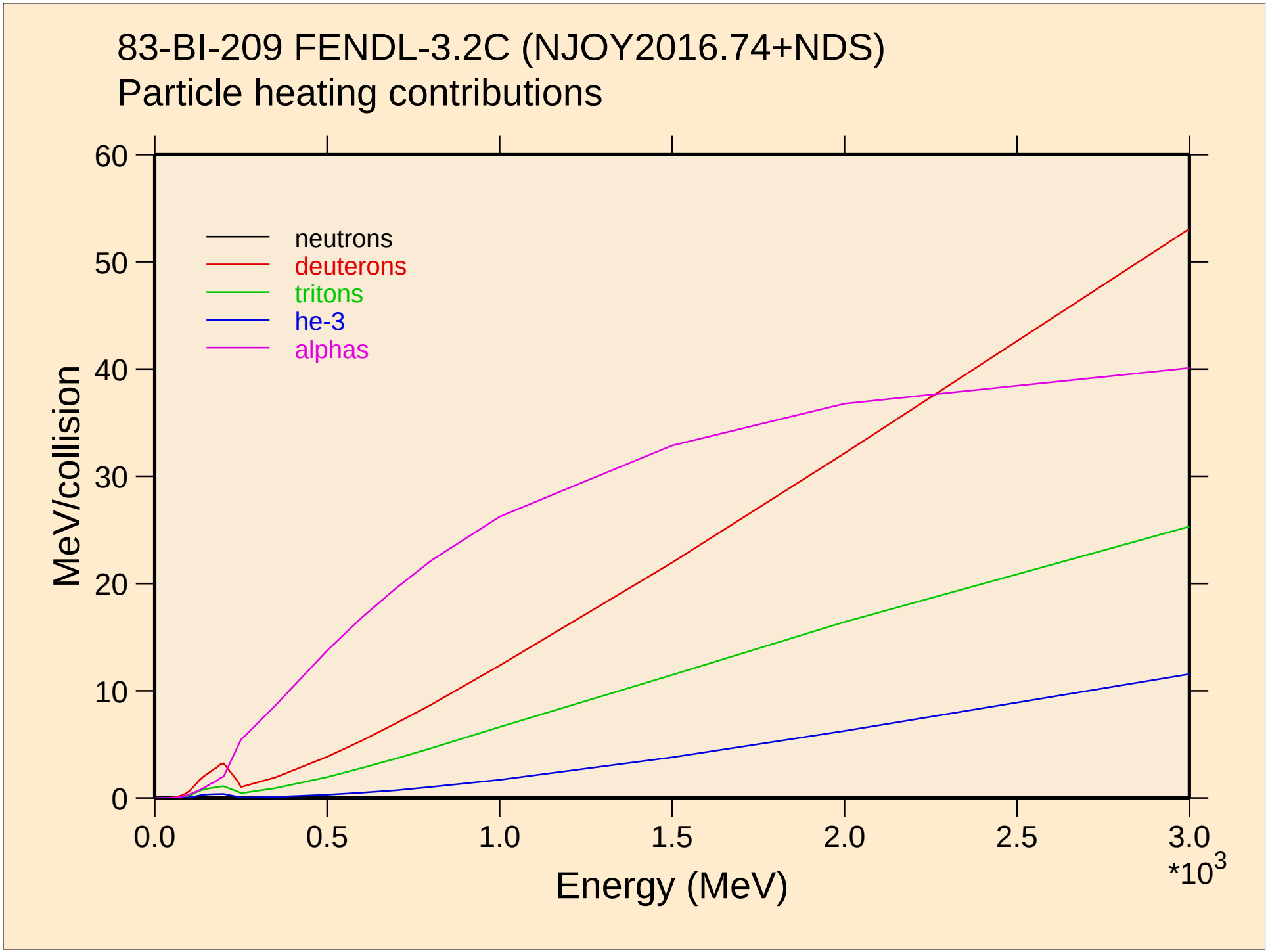

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for elastic
ProbICos
10^2
10^0
10^{-2}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10^3
Energy (MeV)

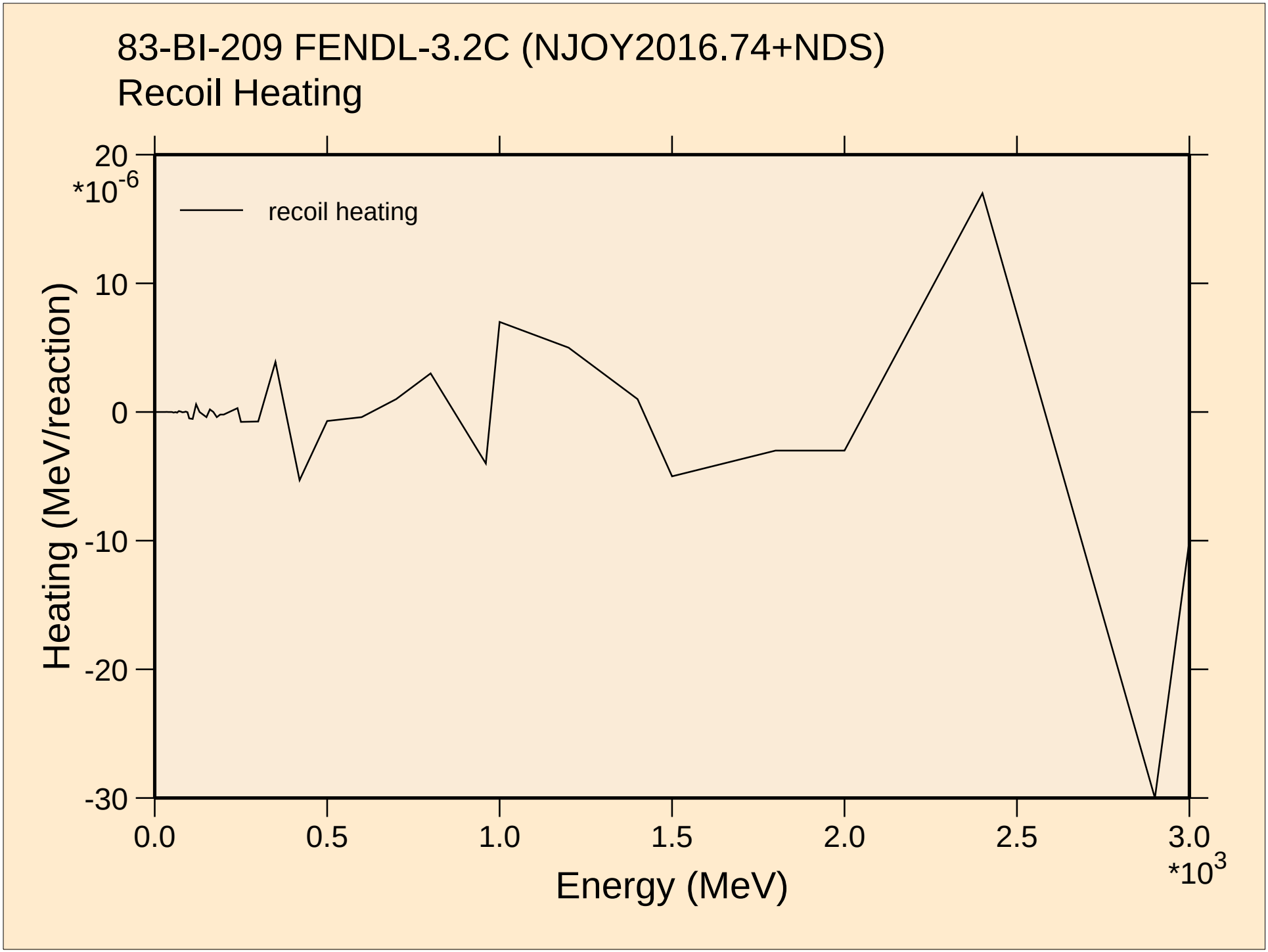

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for (p,x)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

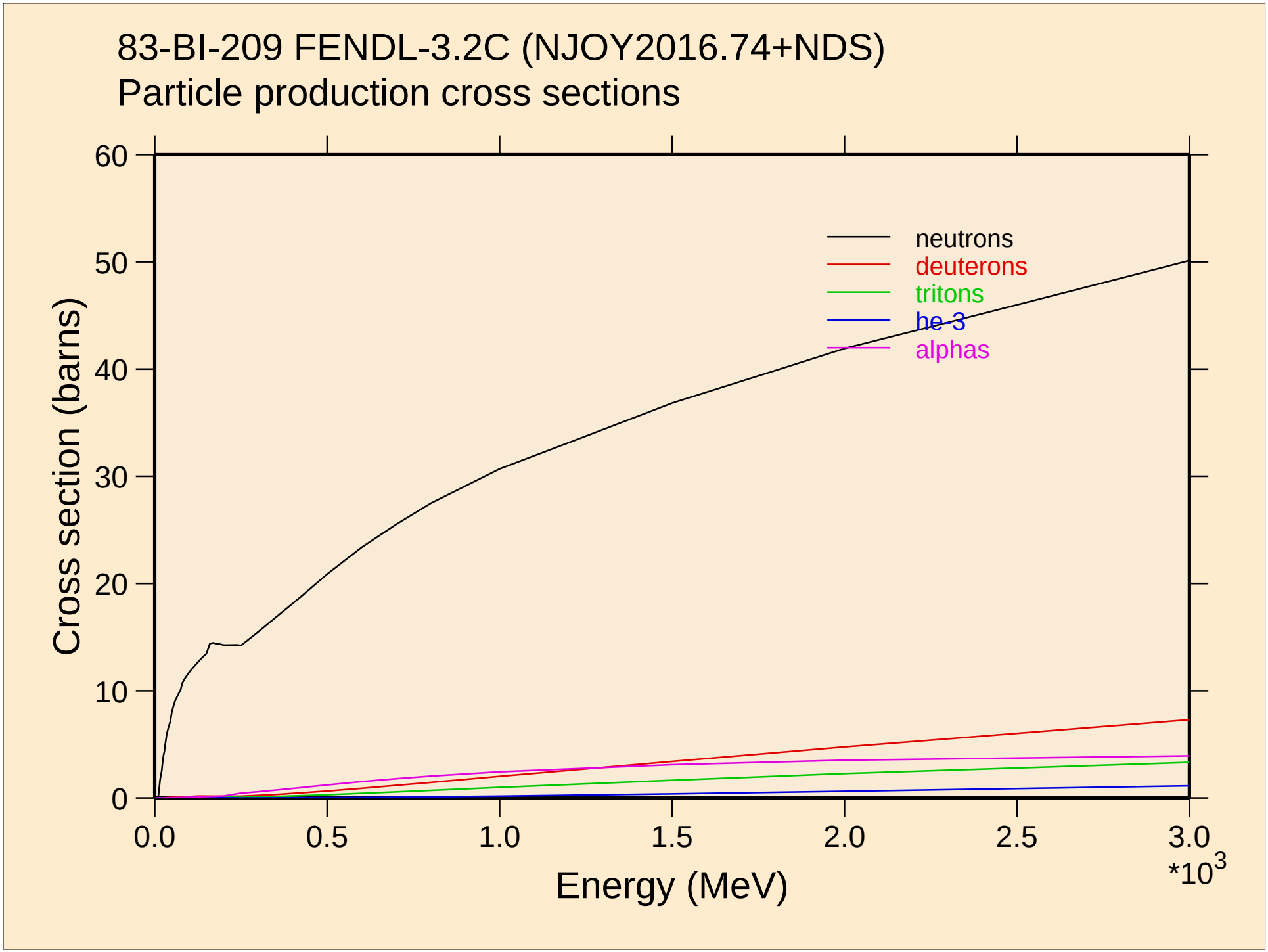

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for (p,x)
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³
Energy (MeV)

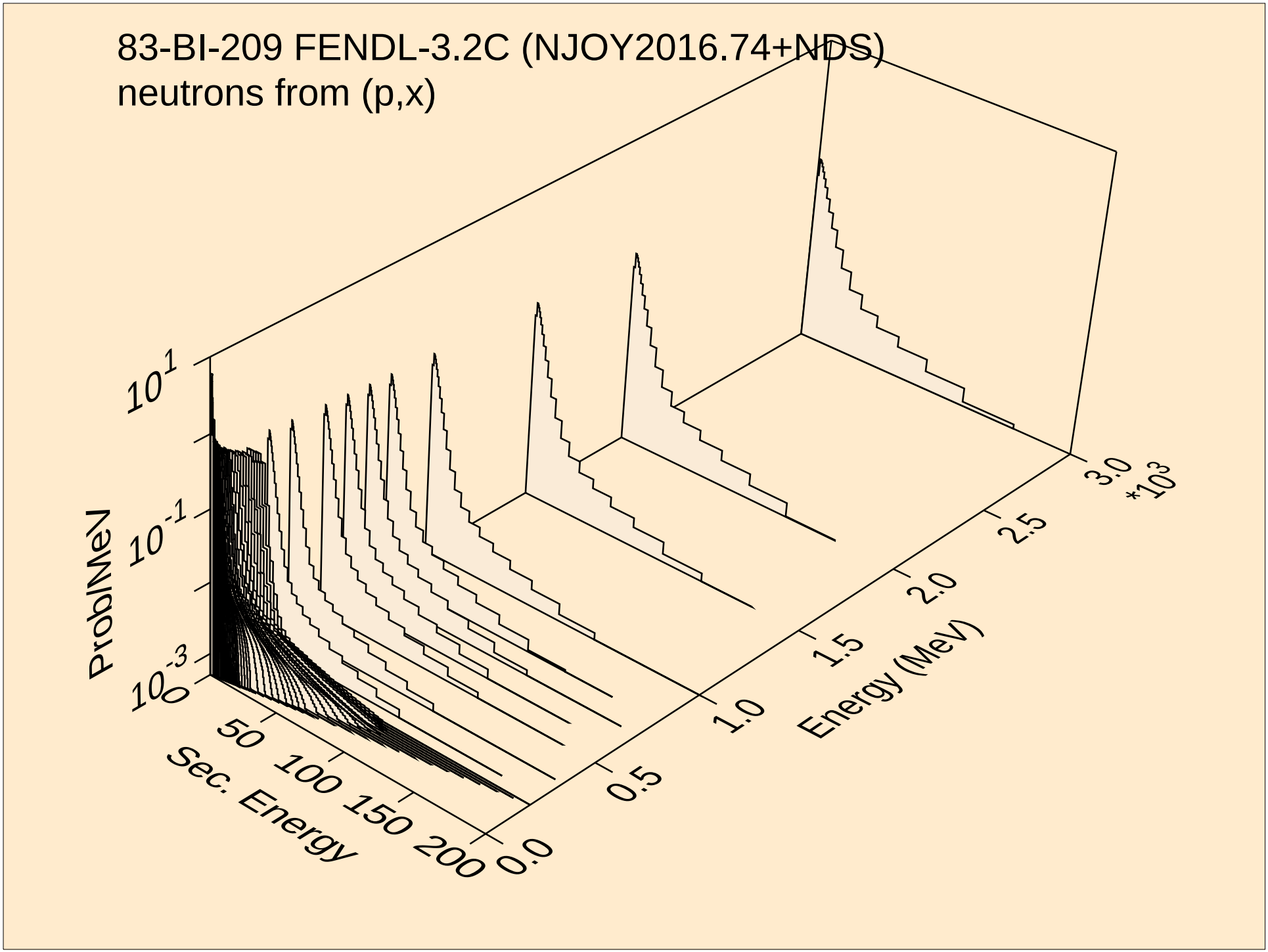

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
Proton emission for (p,x)
Prob/MeV
10^{0}
10^{-2}
0
50
100
150
200
Sec. Energy
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10^{3}
Energy (MeV)

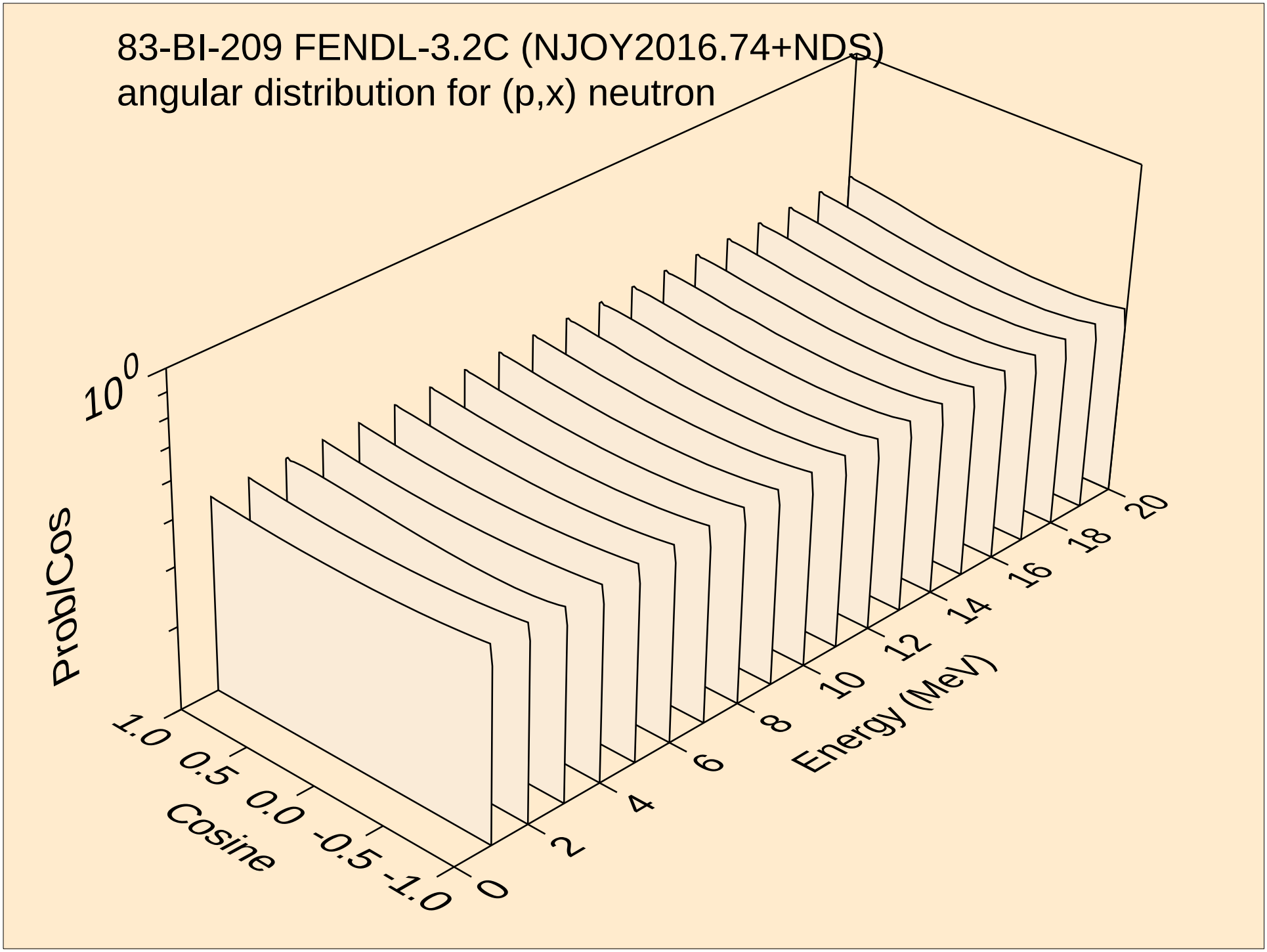

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
Photon emission for (p,x)
Prob/MeV
10-1
10-3
0
Eγ (MeV)
2
4
*10³
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³
En (MeV)

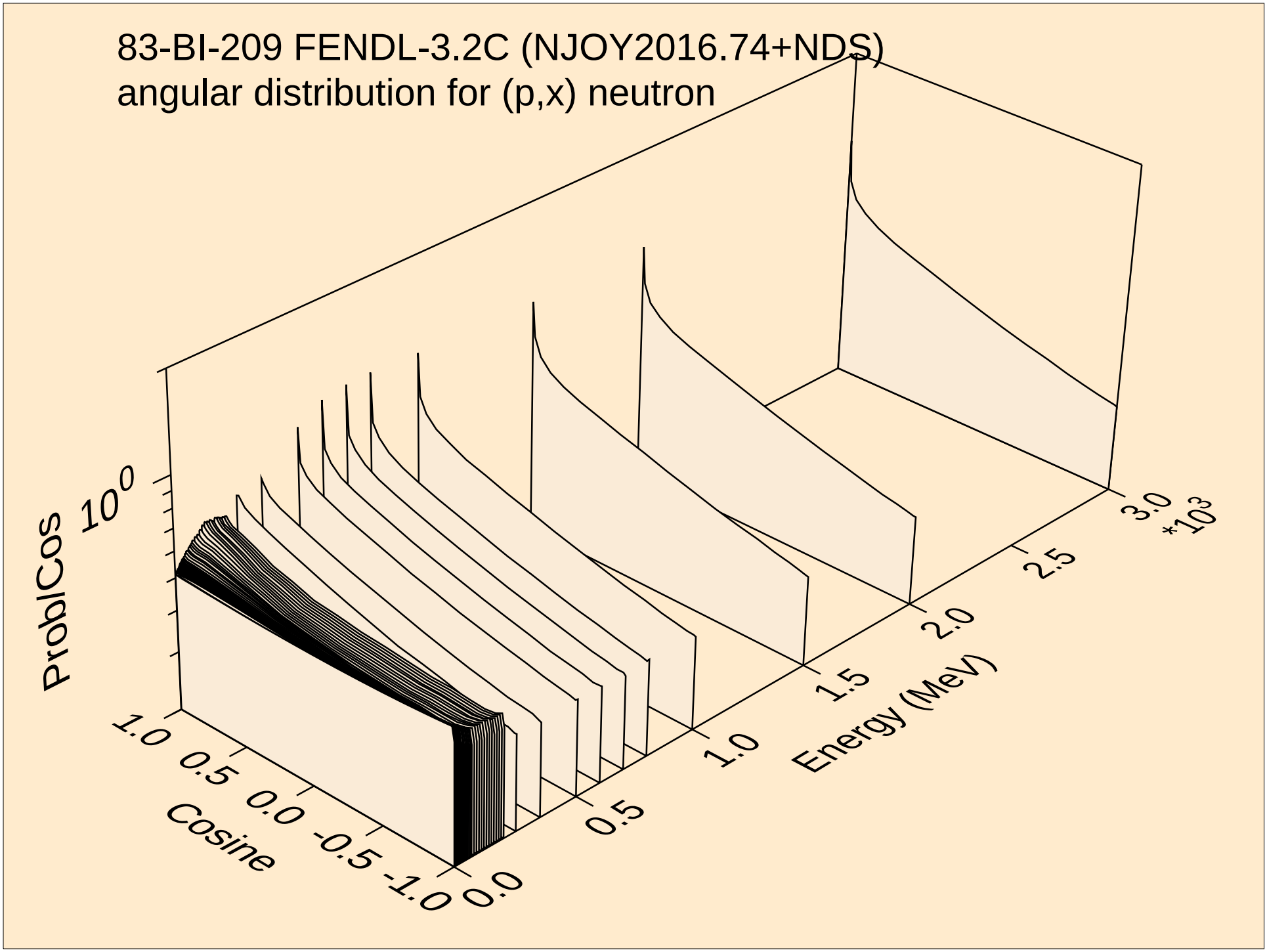

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
Particle heating contributions
neutrons
deuterons
tritons
he-3
alphas
MeV/collision
0
10
20
30
40
50
60
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10^3
Energy (MeV)

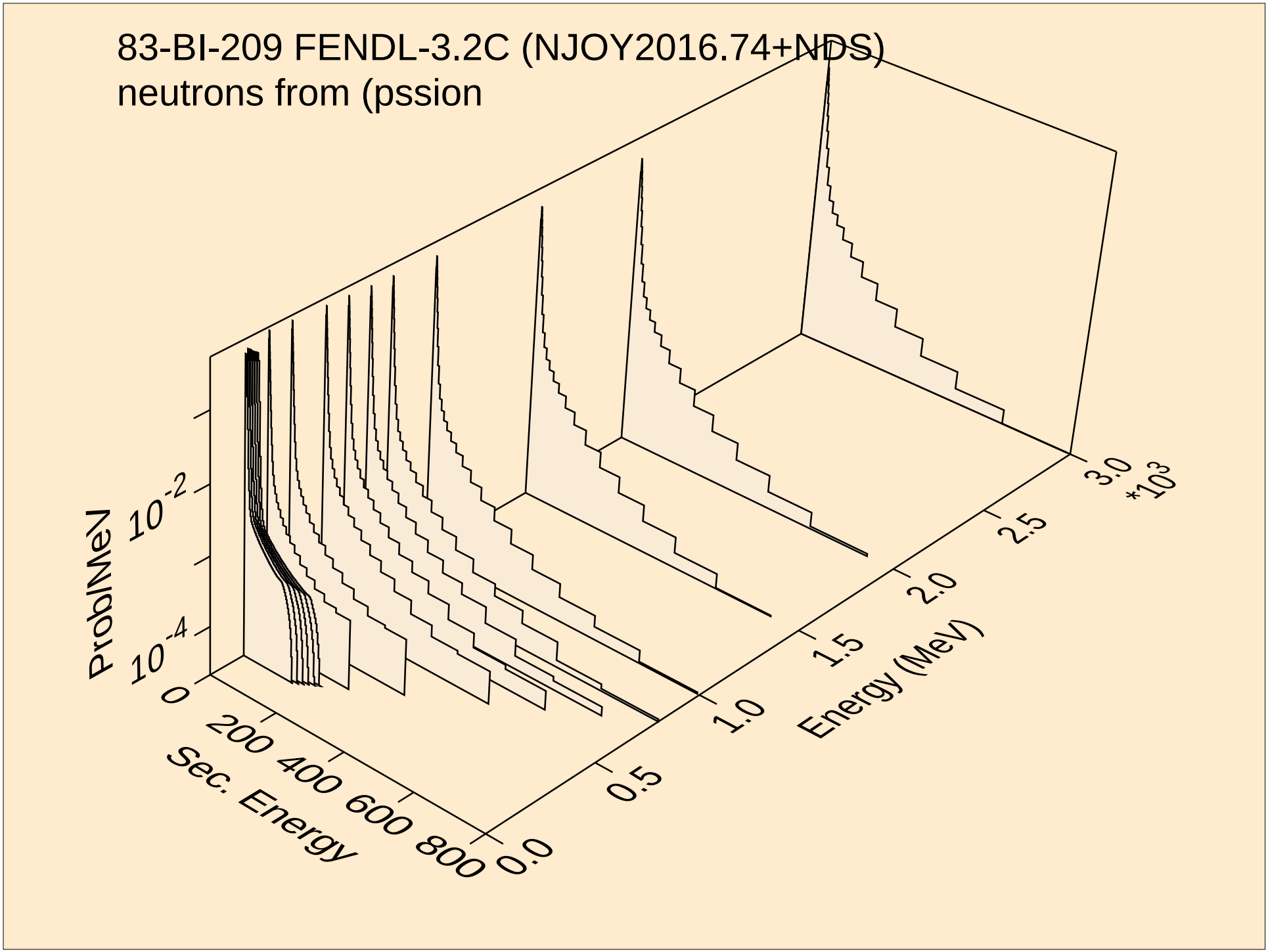

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
Recoil Heating
recoil heating
Heating (MeV/reaction)
*10-6
20
10
0
-10
-20
-30
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10^3
Energy (MeV)

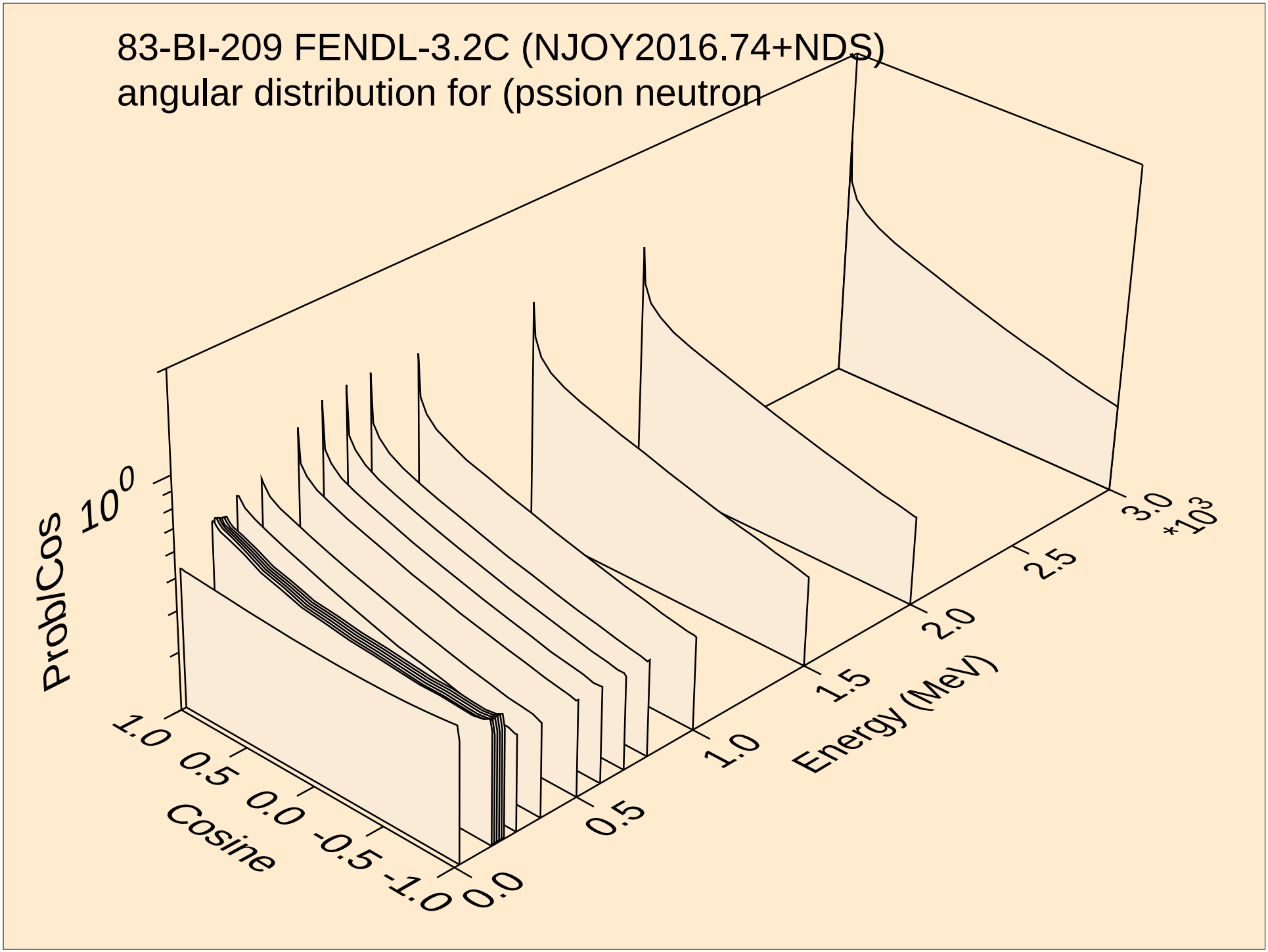

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
Particle production cross sections
Cross section (barns)
Energy (MeV)
*10^3
0
10
20
30
40
50
60
0.0
0.5
1.0
1.5
2.0
2.5
3.0
neutrons
deuterons
tritons
he-3
alphas

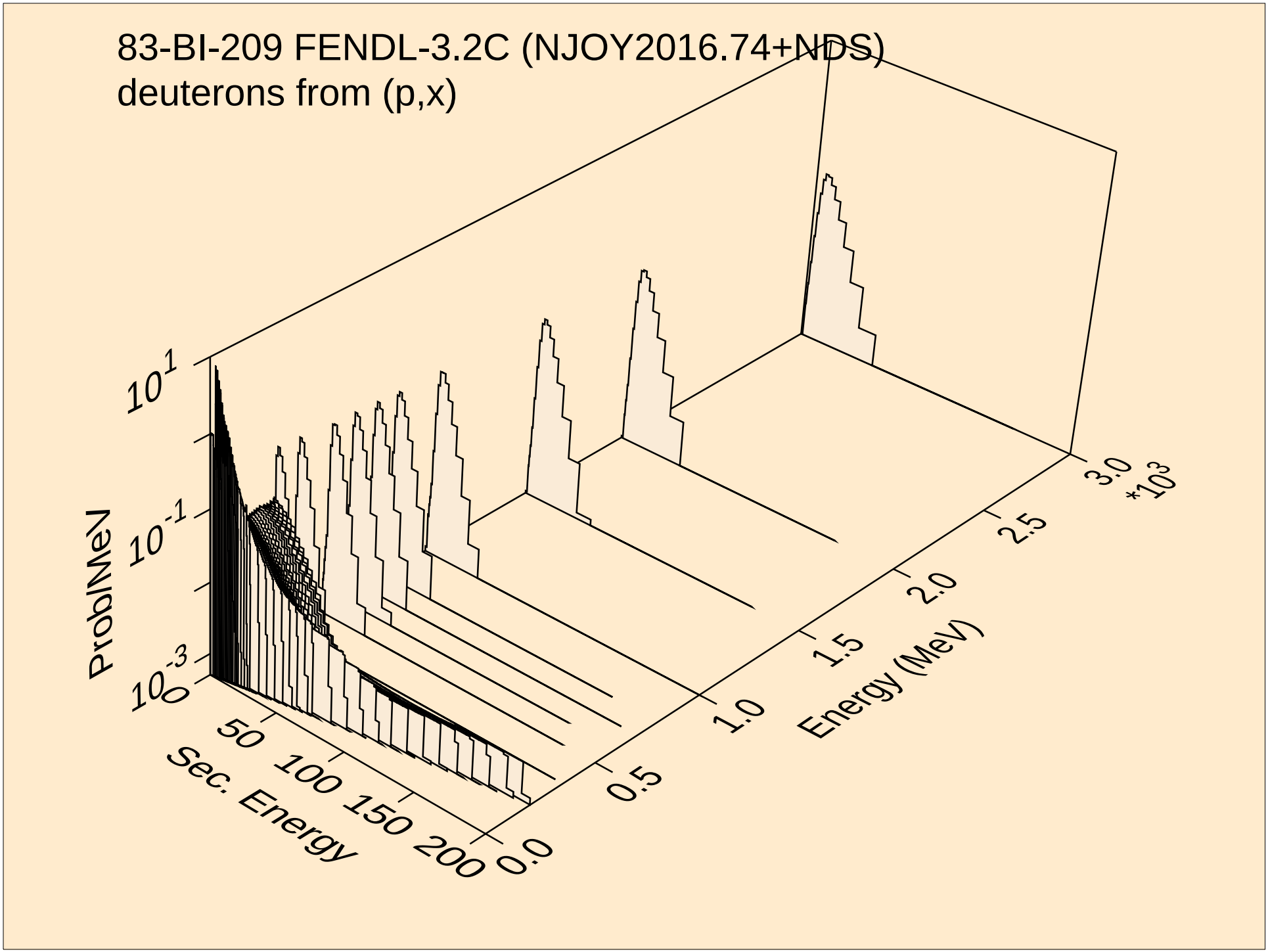

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
neutrons from (p,x)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
50
100
150
200
Sec. Energy
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³
Energy (MeV)

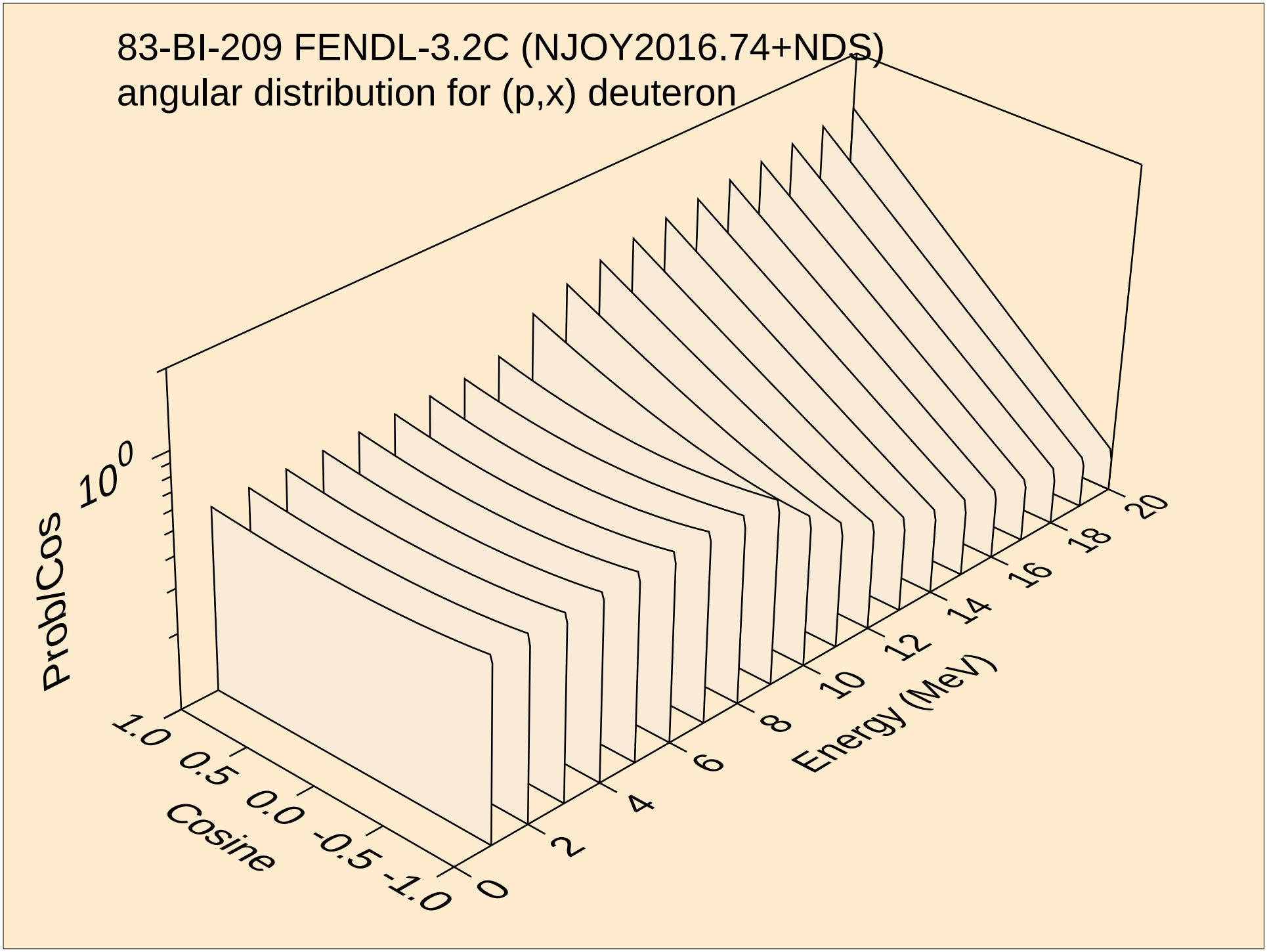

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for (p,x) neutron
10^0
ProbICos
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

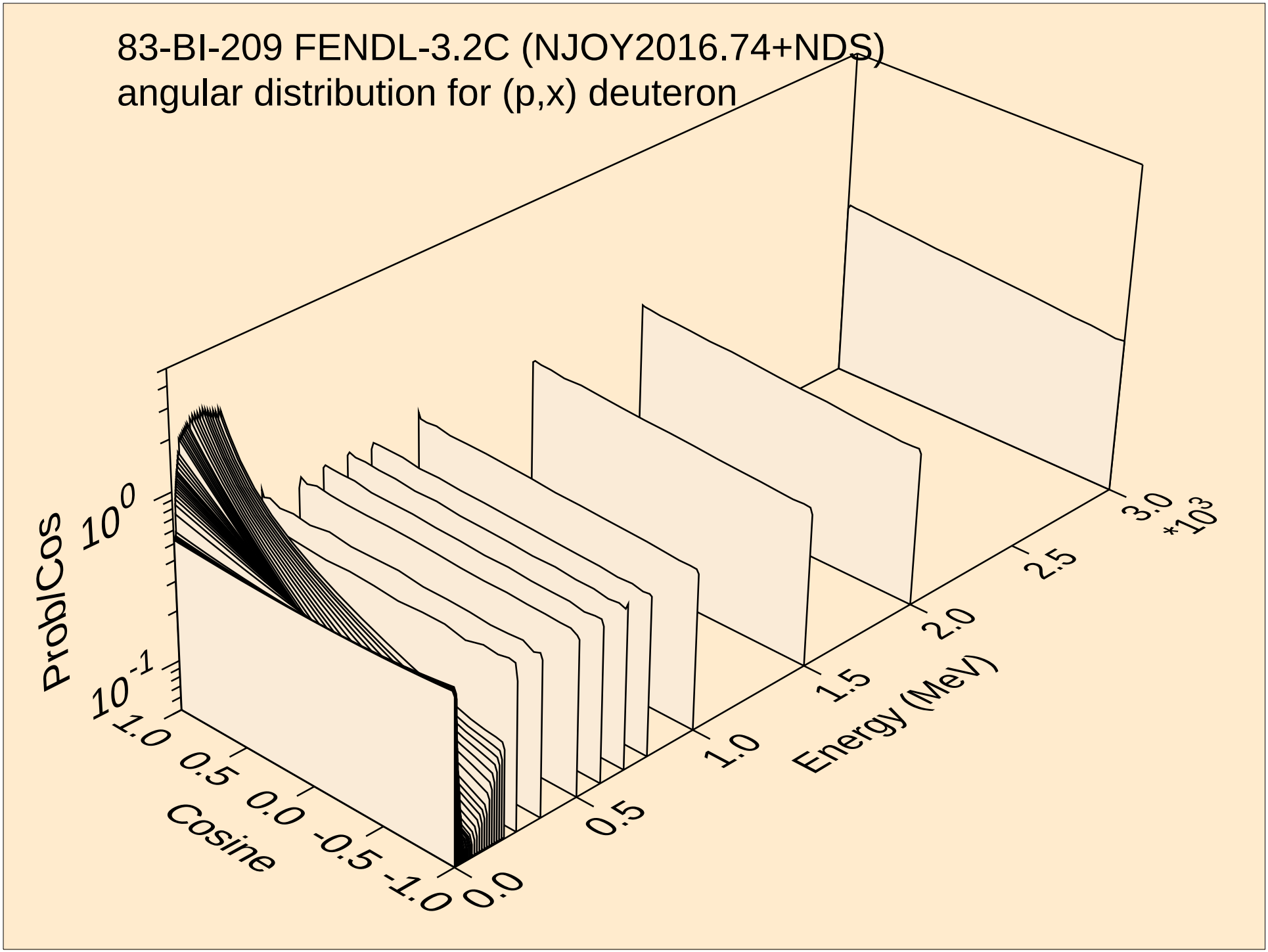

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for (p,x) neutron
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³
Energy (MeV)

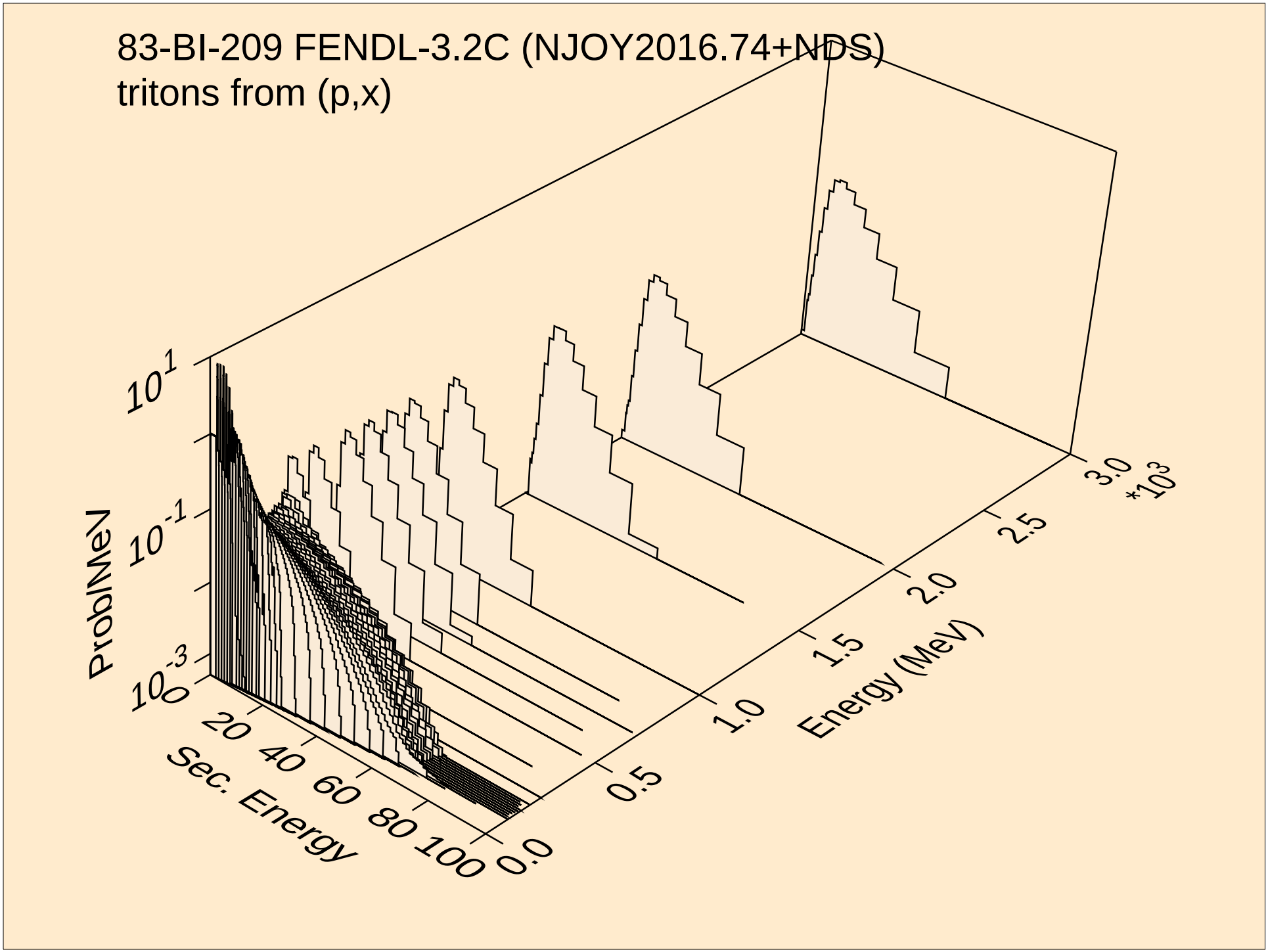

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
neutrons from (pssion
Prob/MeV
10-2
10-4
0
200
400
600
800
Sec. Energy
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³
Energy (MeV)

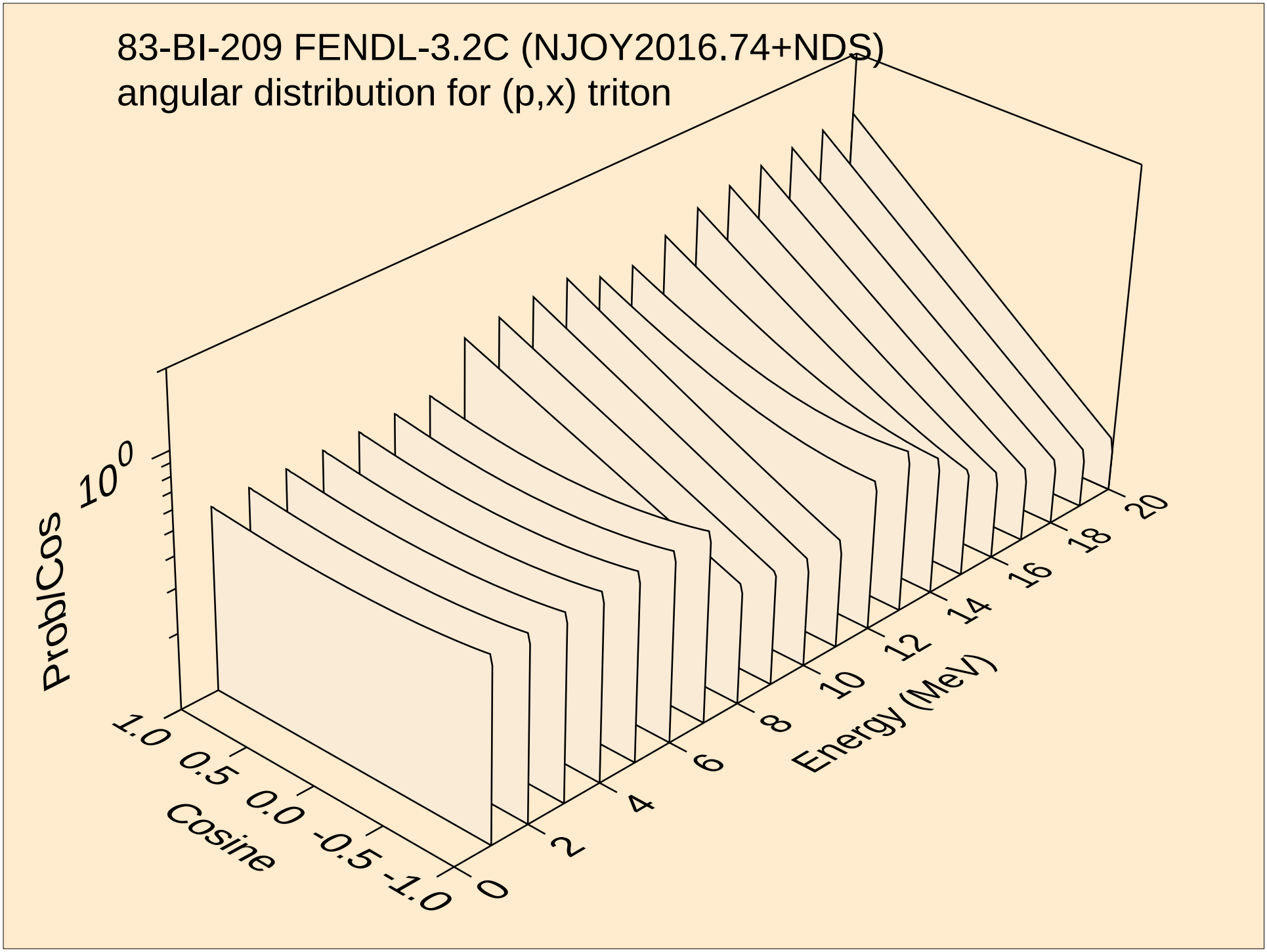

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for (pssion neutron
ProblCos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³

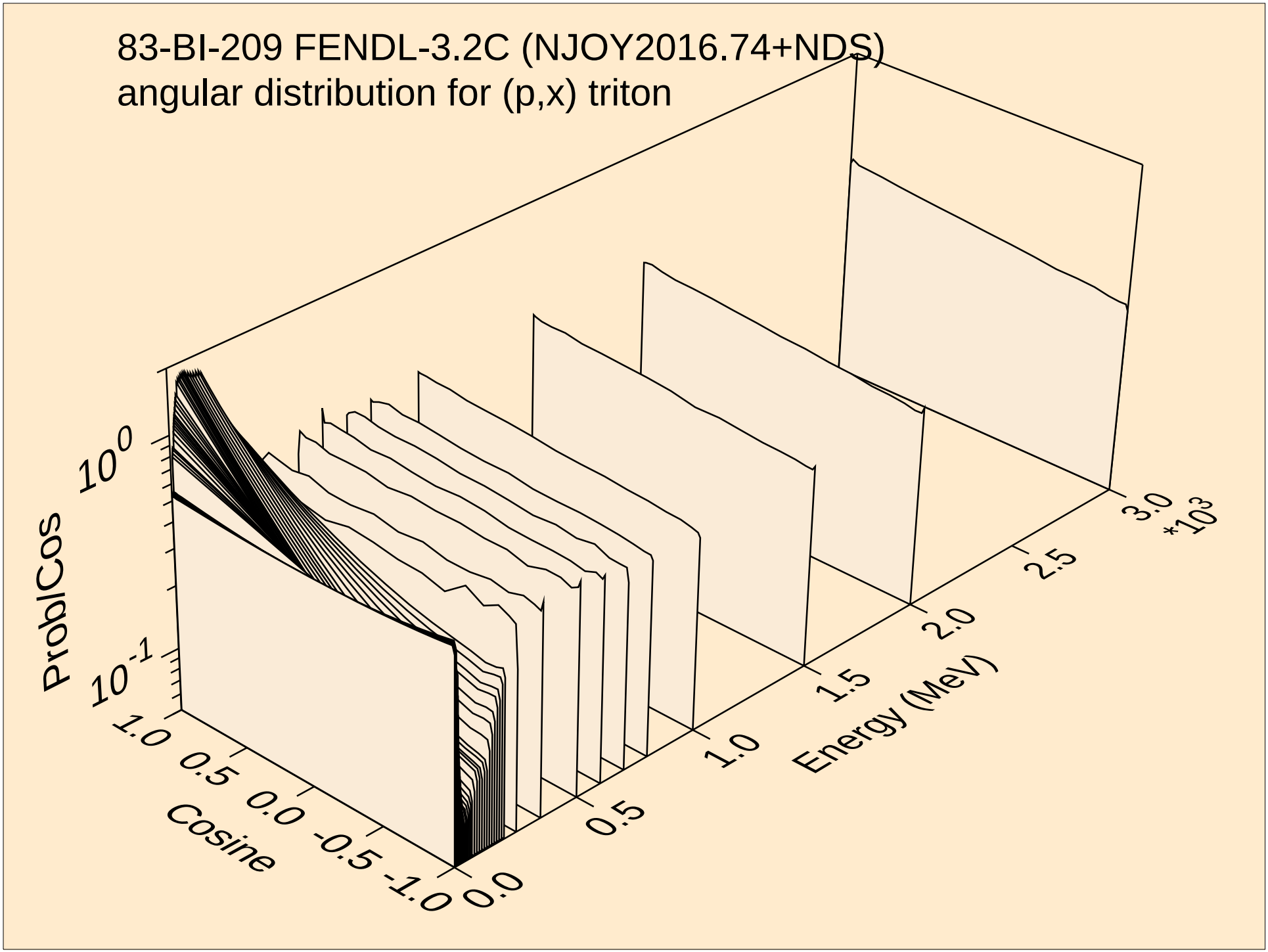

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
deuterons from (p,x)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
50
100
150
200
Sec. Energy
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³
Energy (MeV)

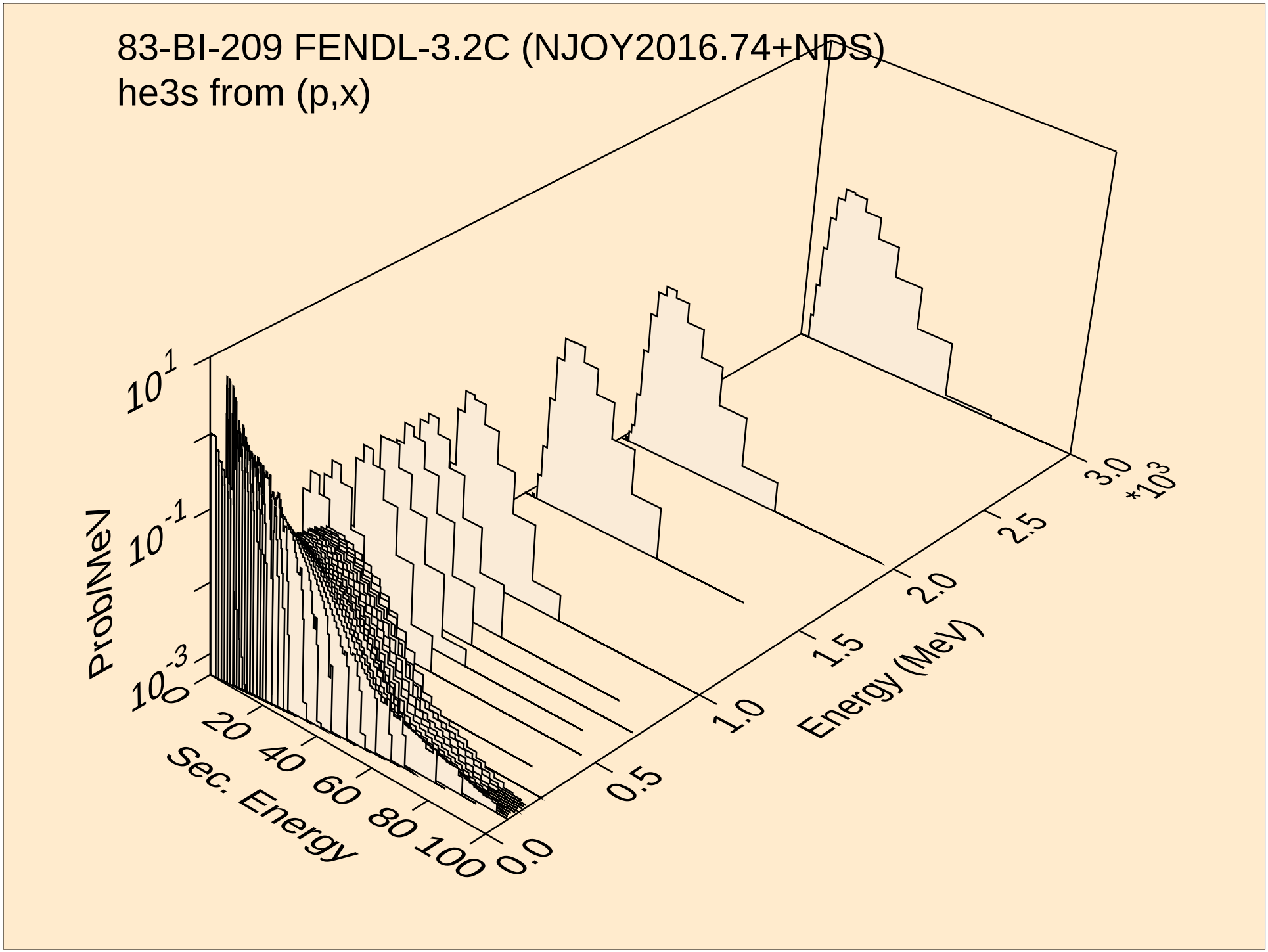

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for (p,x) deuteron
ProblCos
10^0
Cosine
1.0
0.5
0.0
-0.5
-1.0
Energy (MeV)
0
2
4
6
8
10
12
14
16
18
20

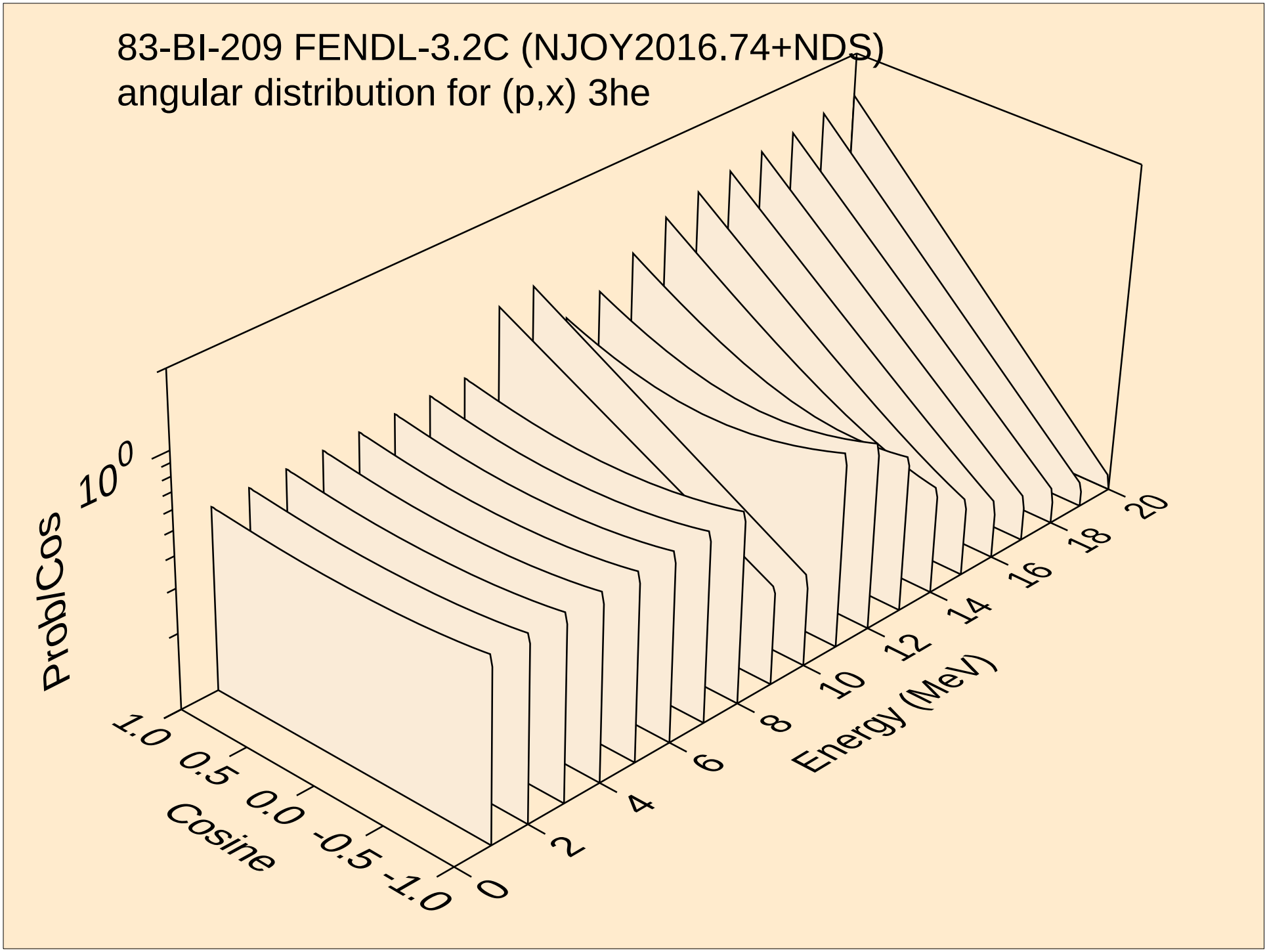

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for (p,x) deuteron
ProbICos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³
Energy (MeV)

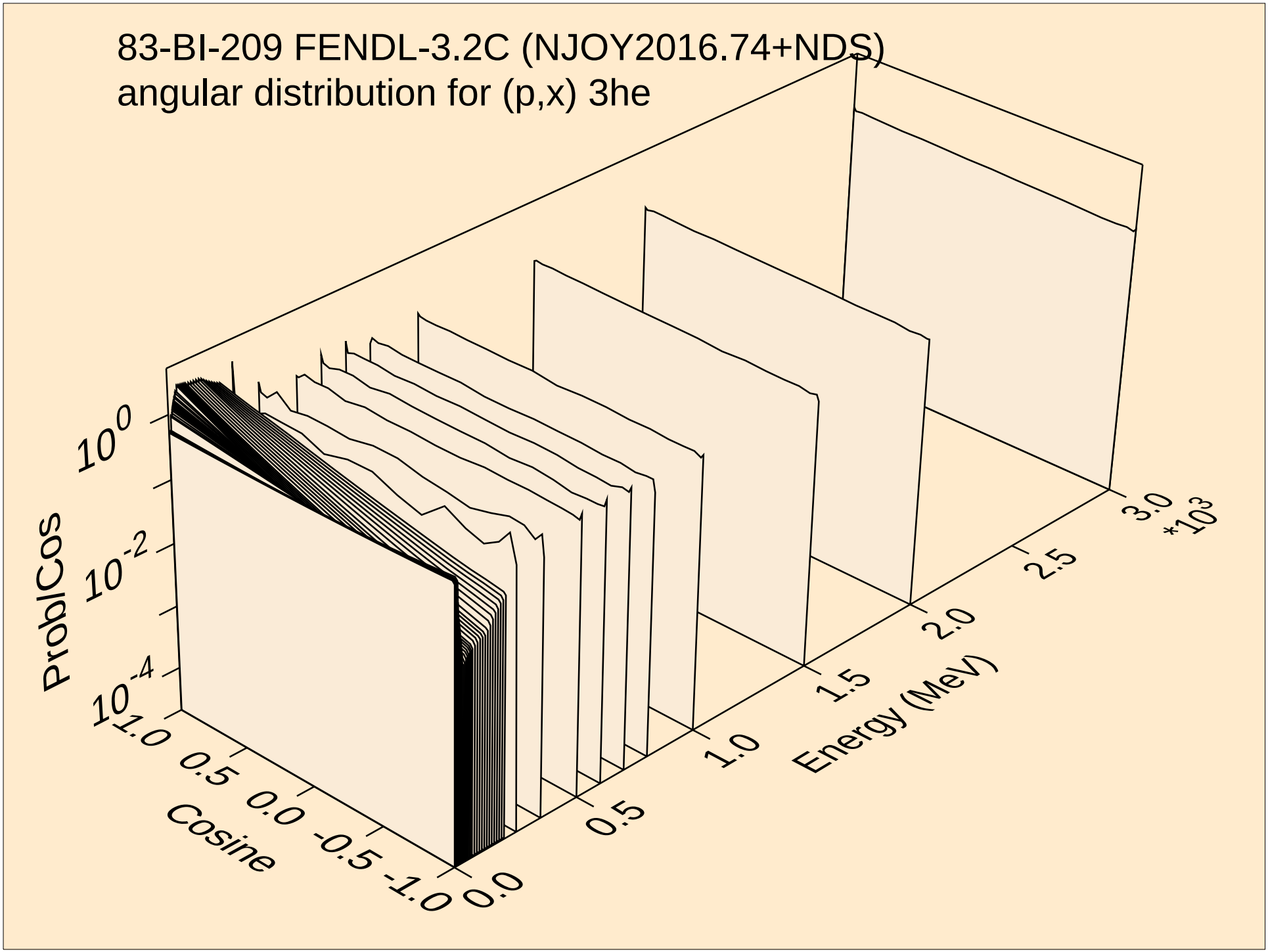

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
tritons from (p,x)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
20
40
60
80
100
Sec. Energy
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³
Energy (MeV)

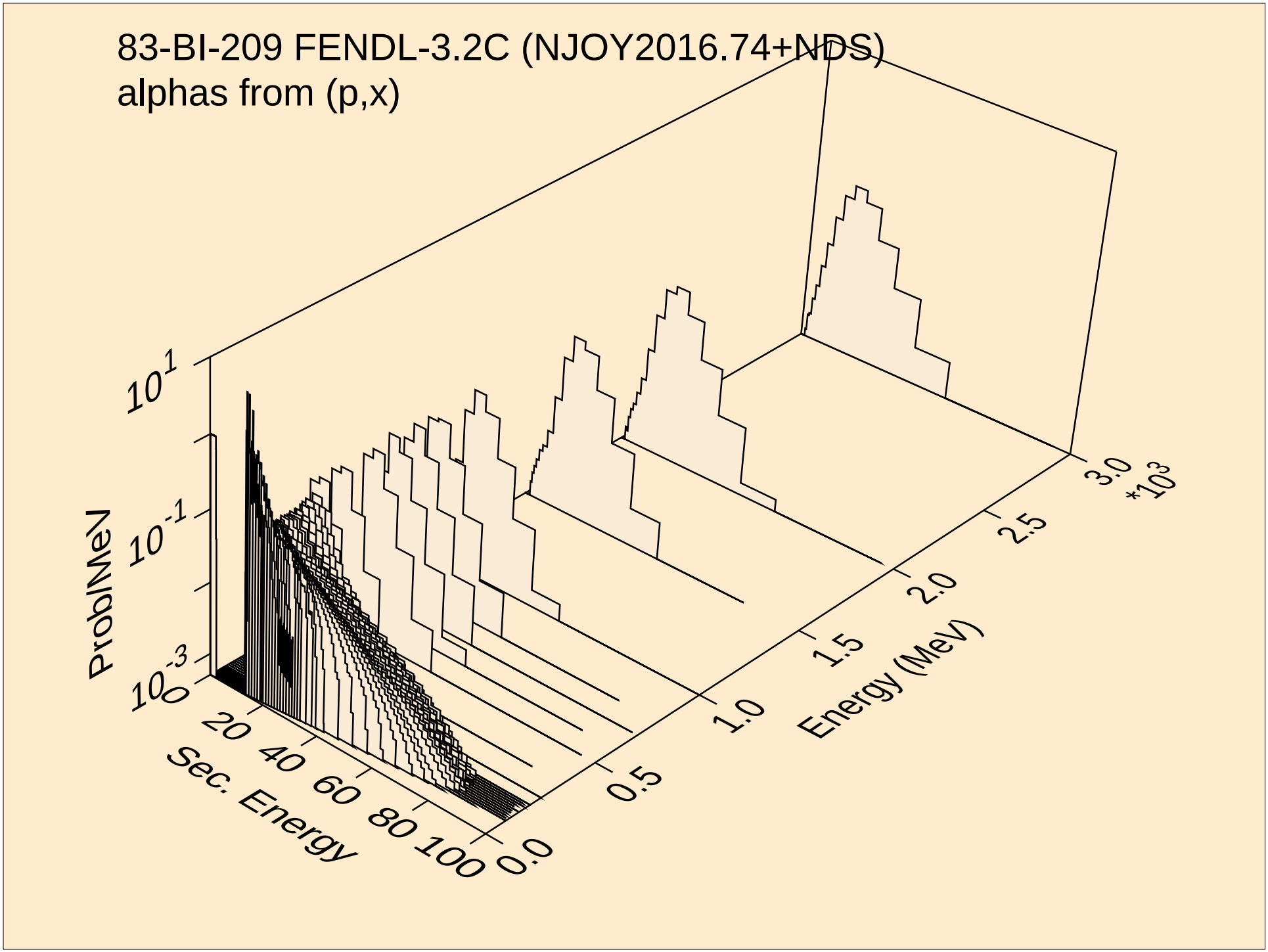

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for (p,x) triton
ProbICos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)

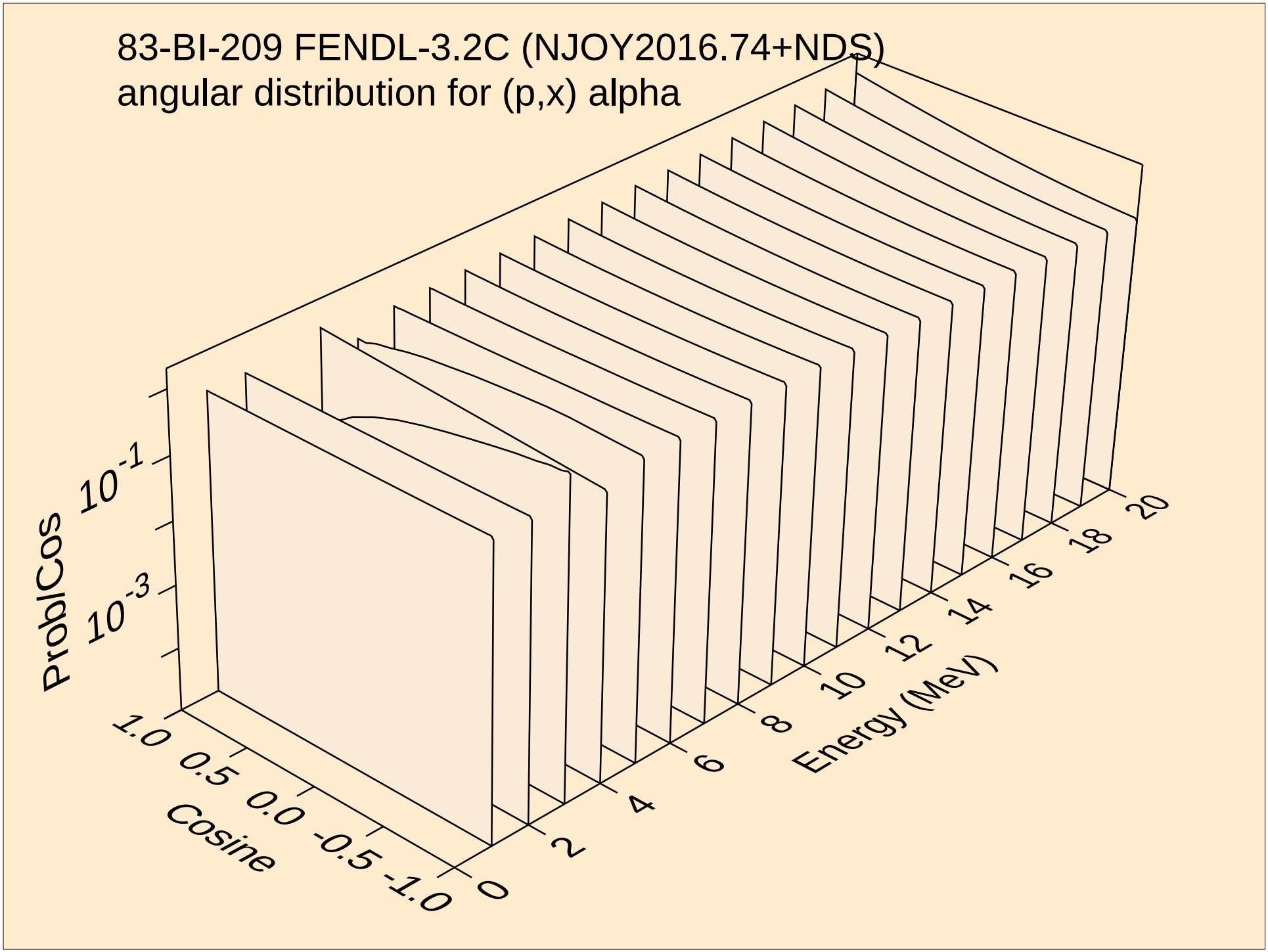

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for (p,x) triton
ProblCos
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³
Energy (MeV)

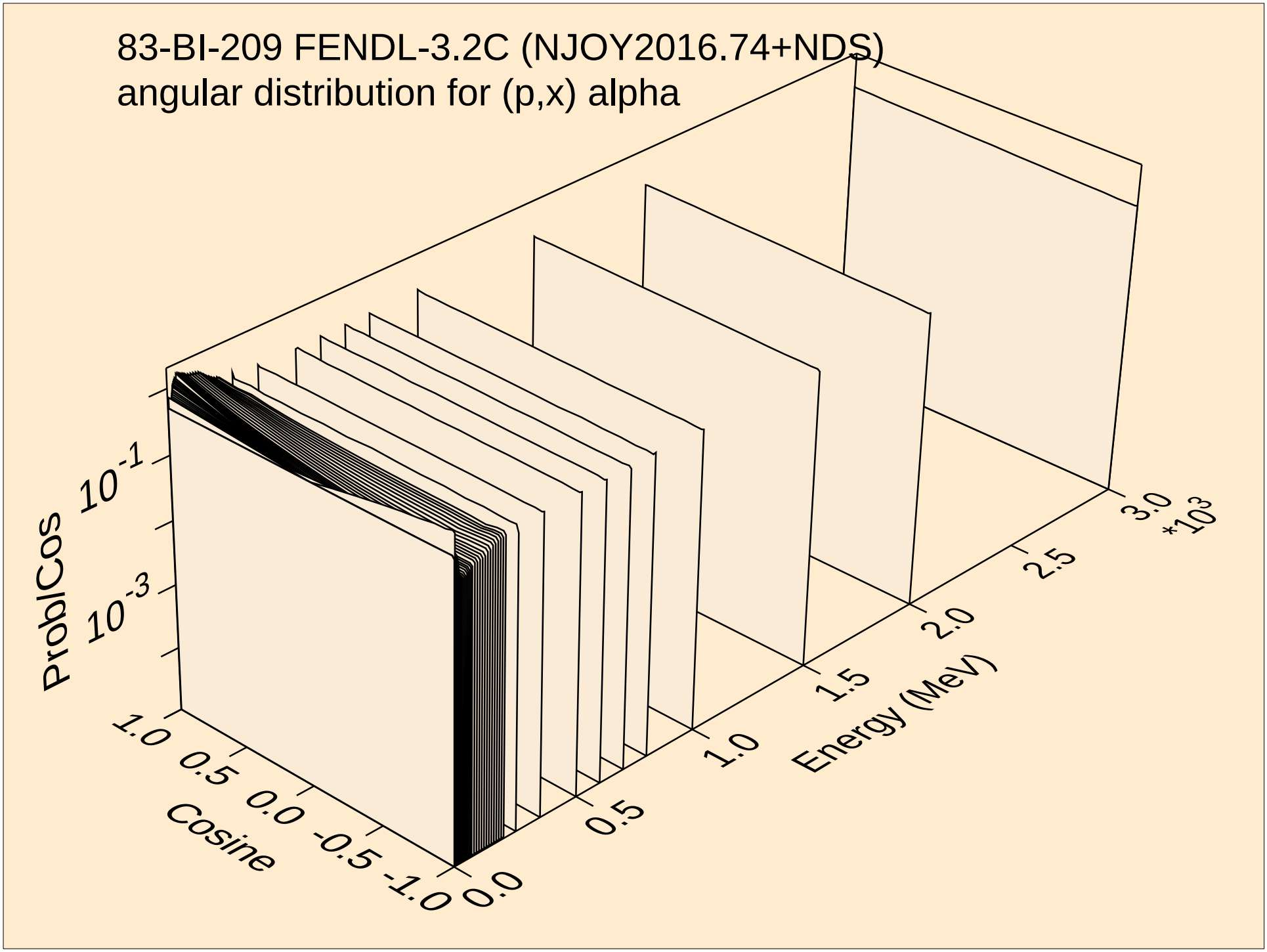

83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
he3s from (p,x)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
20
40
60
80
100
Sec. Energy
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³
Energy (MeV)


83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for (p,x) 3he
ProblCos
10^0
1.0
0.5
0.0
-0.5
-1.0
Cosine
0
2
4
6
8
10
12
14
16
18
20
Energy (MeV)


83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for (p,x) 3he
ProblCos
10^{0}
10^{-2}
10^{-4}
1.0
0.5
0.0
-0.5
-1.0
Cosine
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³
Energy (MeV)


83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
alphas from (p,x)
Prob/MeV
10^{1}
10^{-1}
10^{-3}
0
20
40
60
80
100
Sec. Energy
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³
Energy (MeV)


83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for (p,x) alpha
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)


83-BI-209 FENDL-3.2C (NJOY2016.74+NDS)
angular distribution for (p,x) alpha
ProbICos
10-1
10-3
1.0
0.5
0.0
-0.5
-1.0
Cosine
0.0
0.5
1.0
1.5
2.0
2.5
3.0
*10³
Energy (MeV)