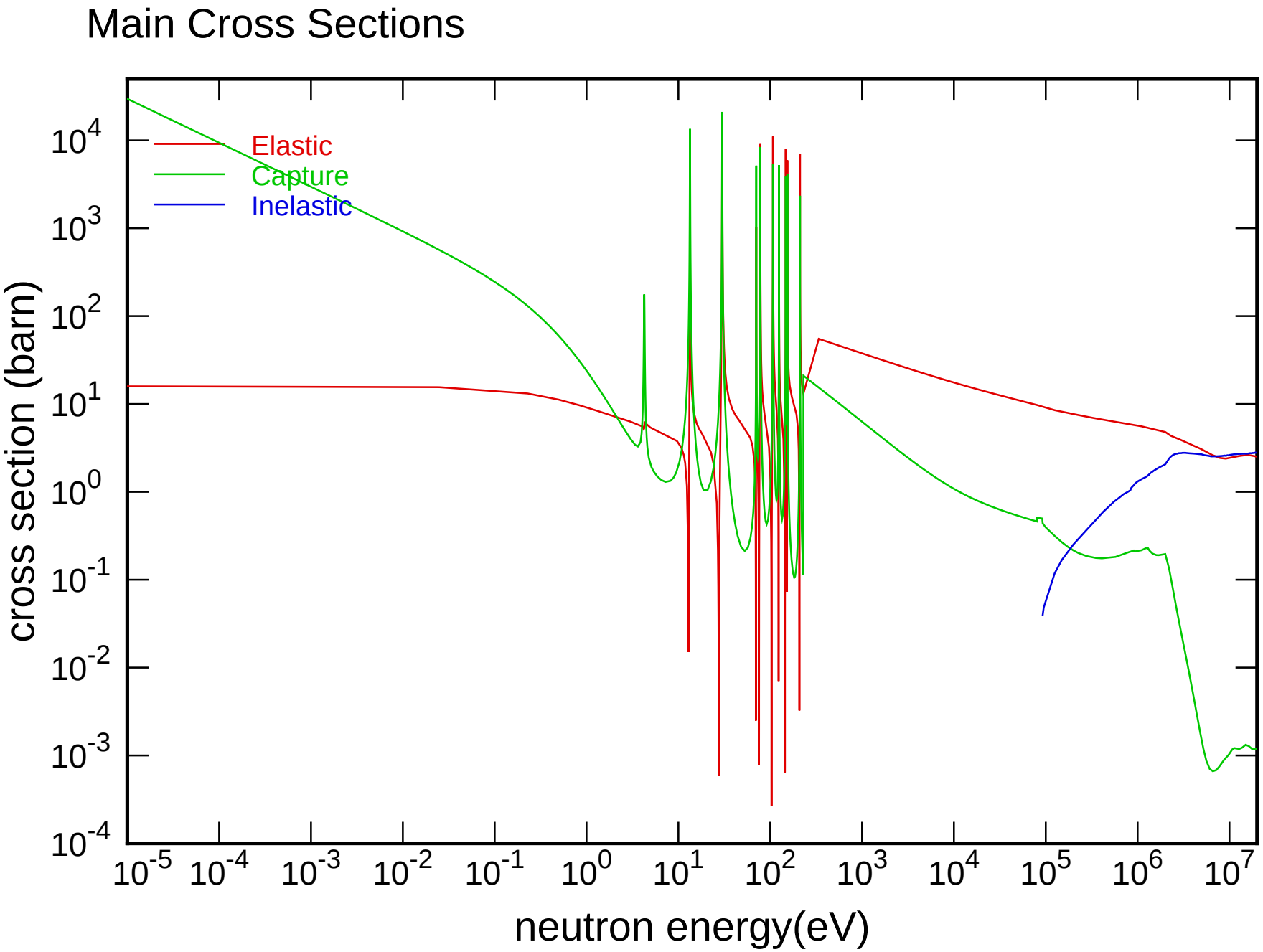
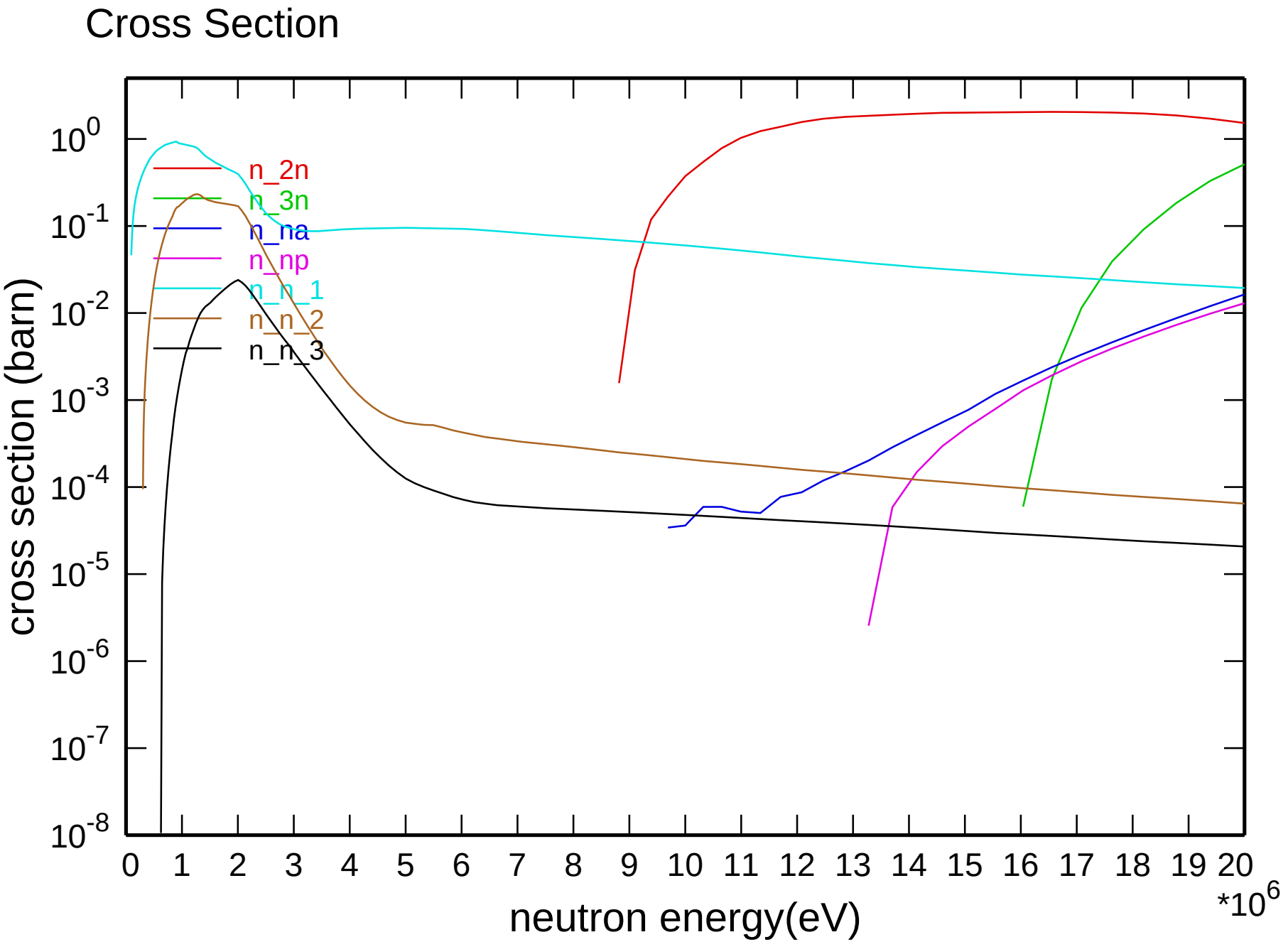
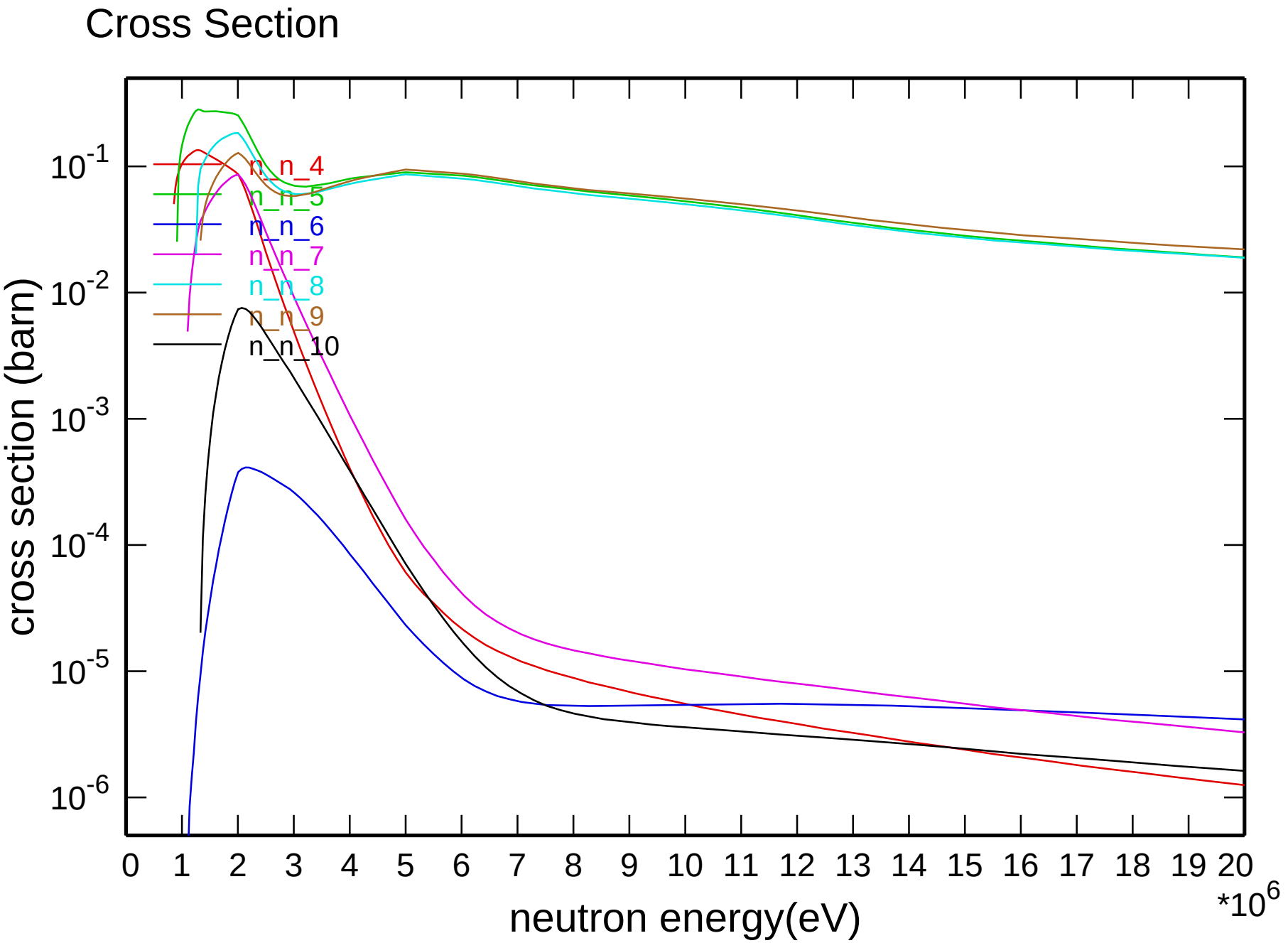
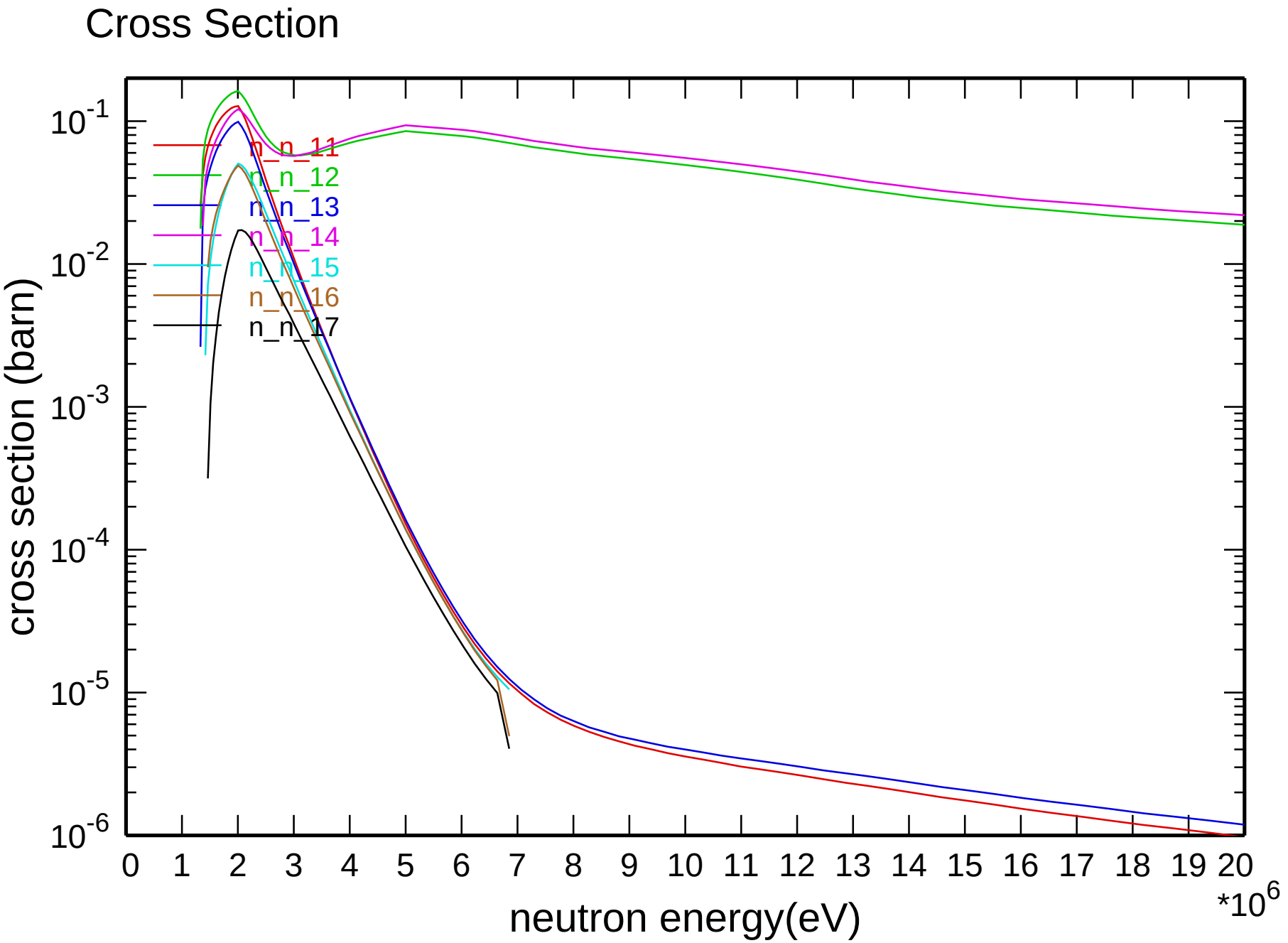
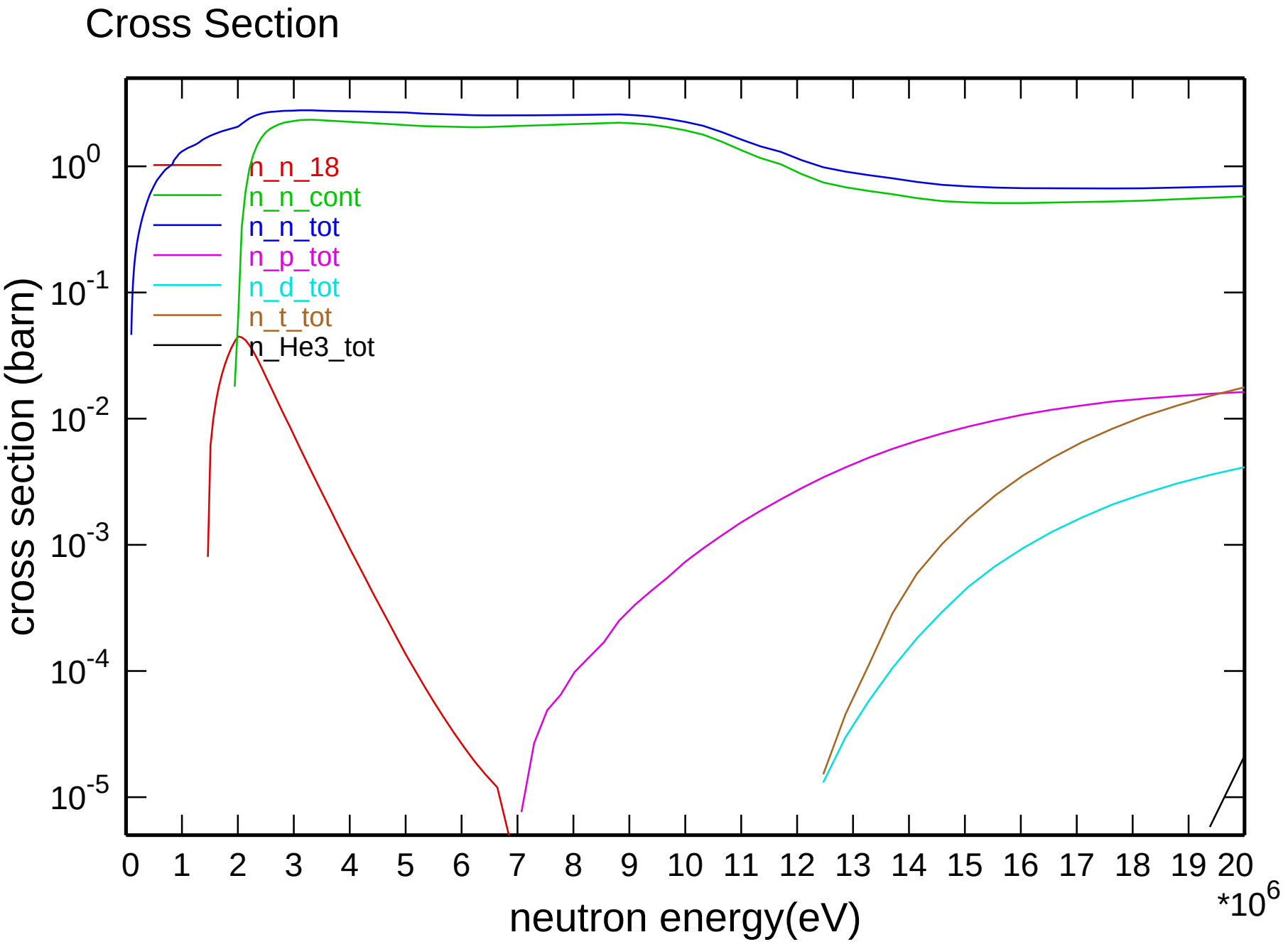
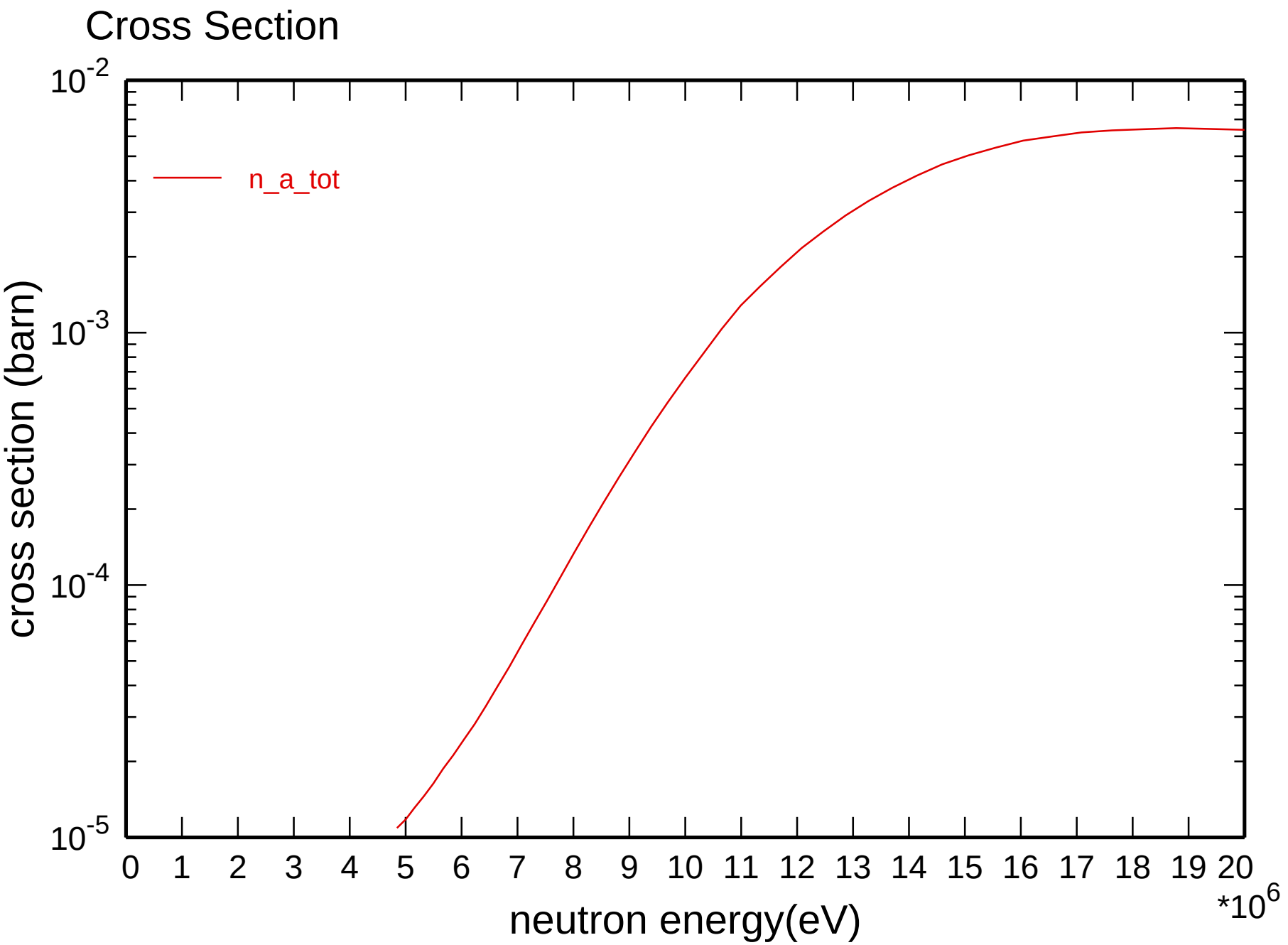

Main Cross Sections
Elastic
Capture
Inelastic
cross section (barn)
neutron energy(eV)
10^4
10^3
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
10^-4
10^-3
10^-2
10^-1
10^0
10^1
10^2
10^3
10^4
10^5
10^6
10^7

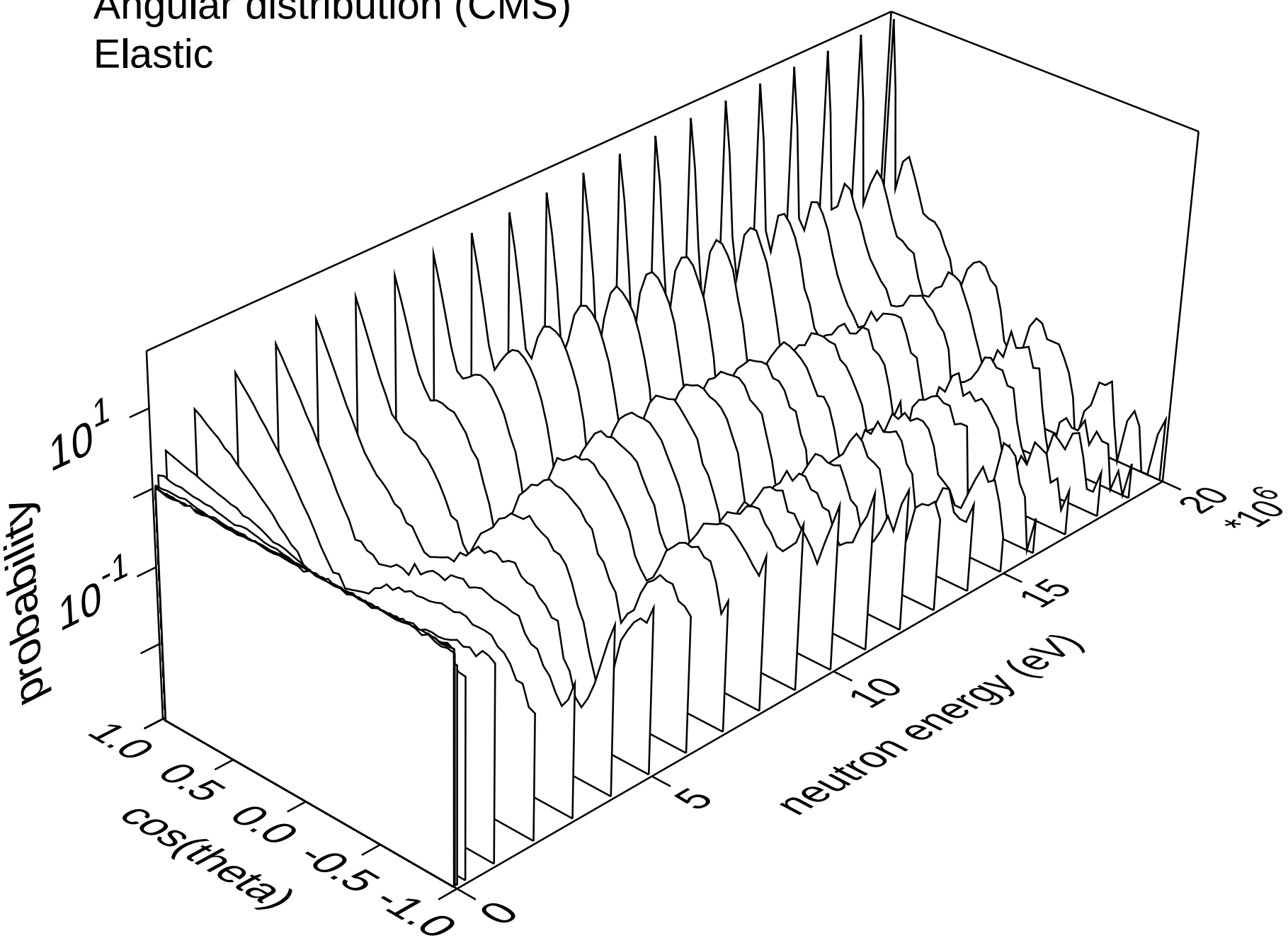

Cross Section
cross section (barn)
neutron energy(eV)
*10^6
n_2n
n_3n
n_na
n_np
n_n_1
n_n_2
n_n_3
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
10^-6
10^-7
10^-8
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

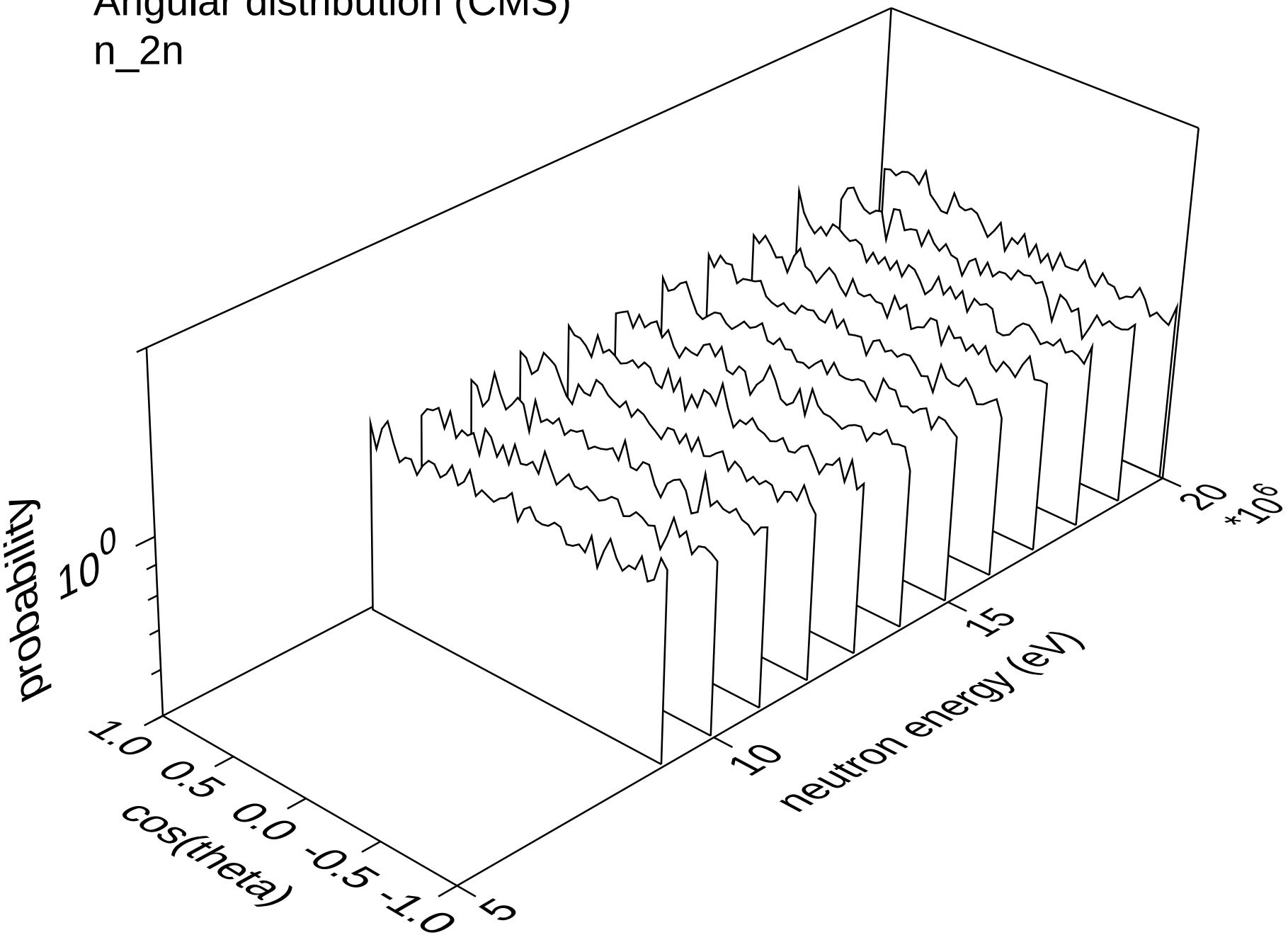

Cross Section
cross section (barn)
neutron energy(eV)
*10^6
n_n_4
n_n_5
n_n_6
n_n_7
n_n_8
n_n_9
n_n_10

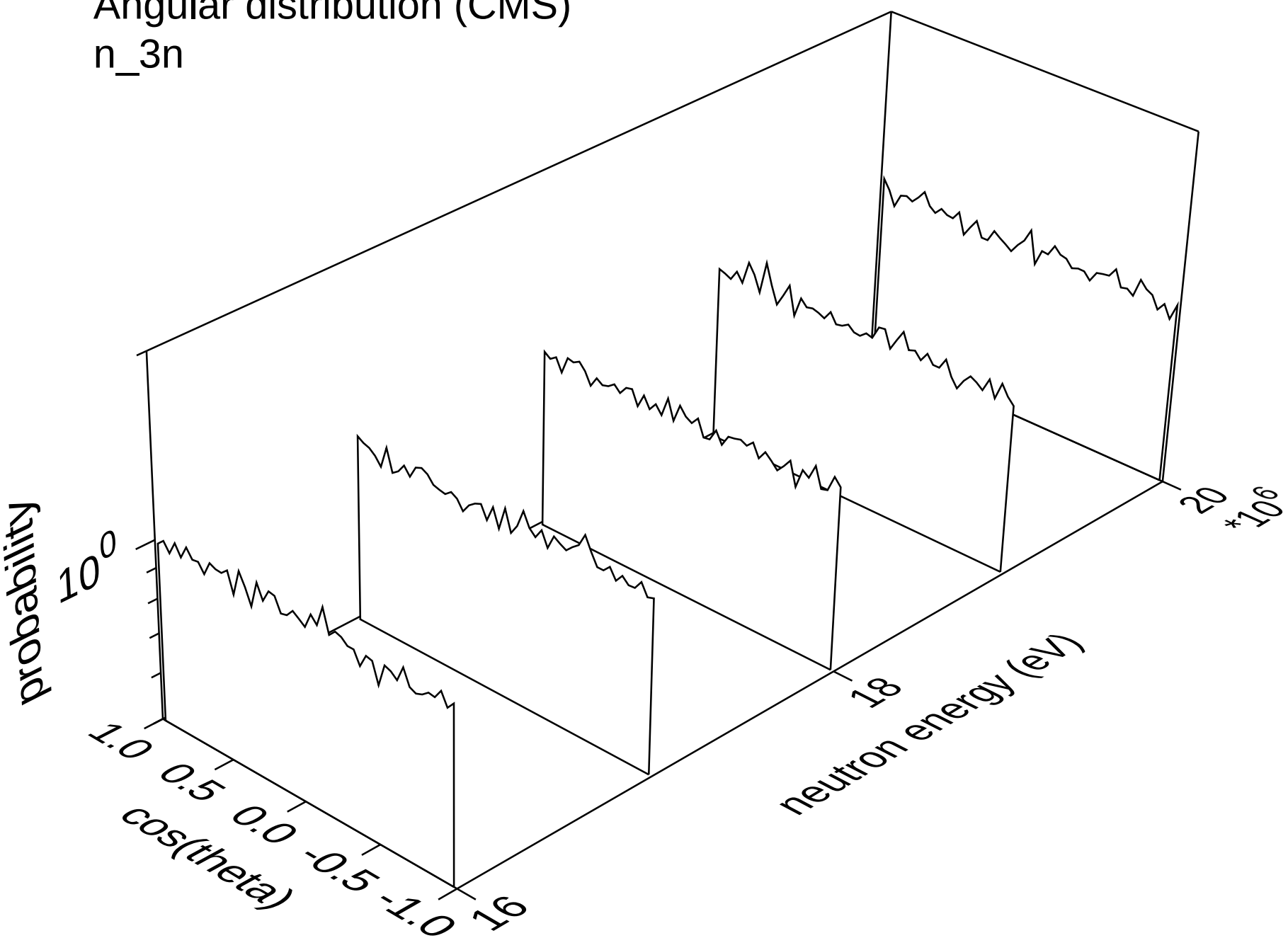

Cross Section
cross section (barn)
neutron energy(eV)
*10^6
n_n_11
n_n_12
n_n_13
n_n_14
n_n_15
n_n_16
n_n_17

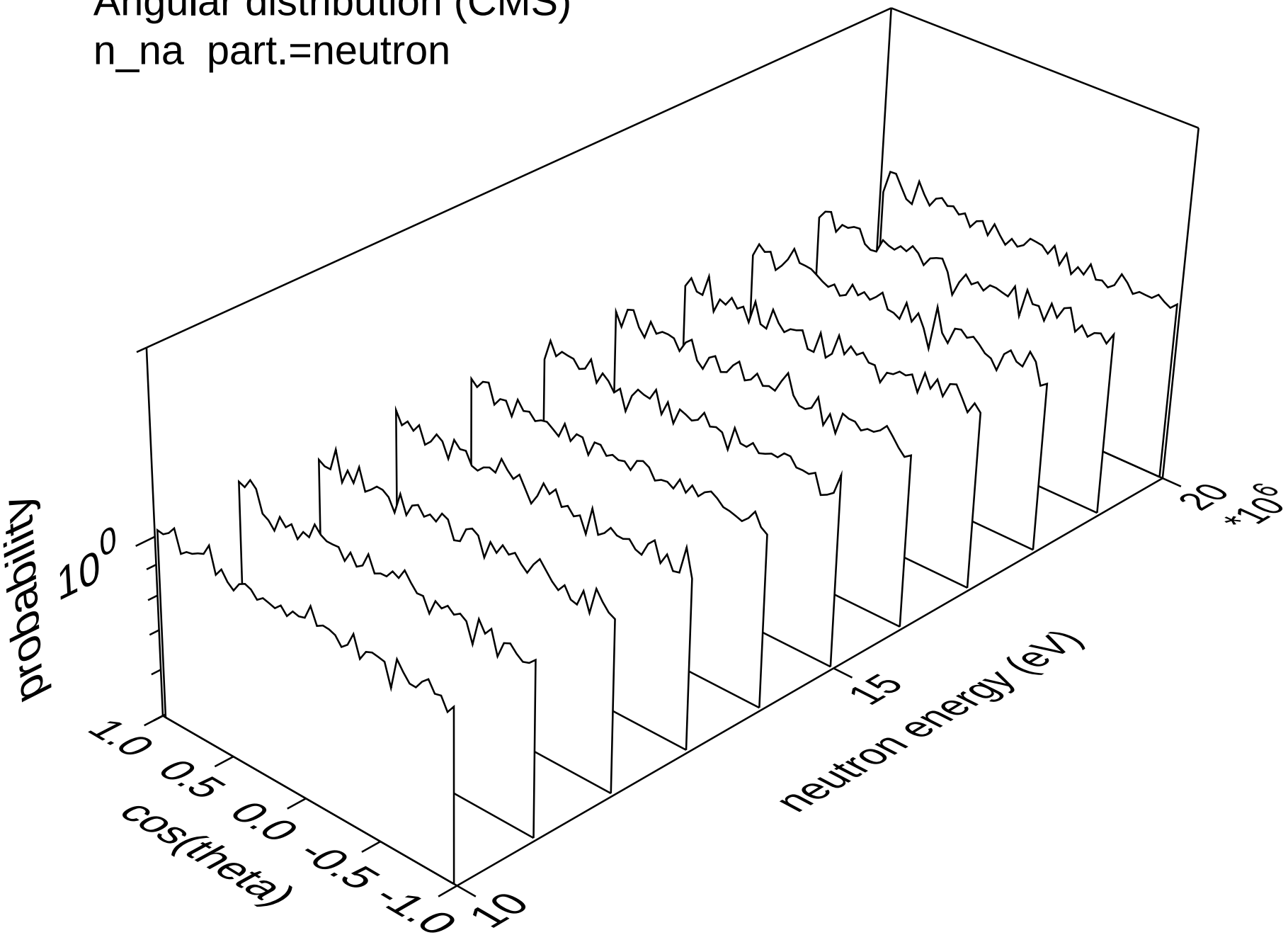

Cross Section
cross section (barn)
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
n_n_18
n_n_cont
n_n_tot
n_p_tot
n_d_tot
n_t_tot
n_He3_tot
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
*10^{6}
neutron energy(eV)

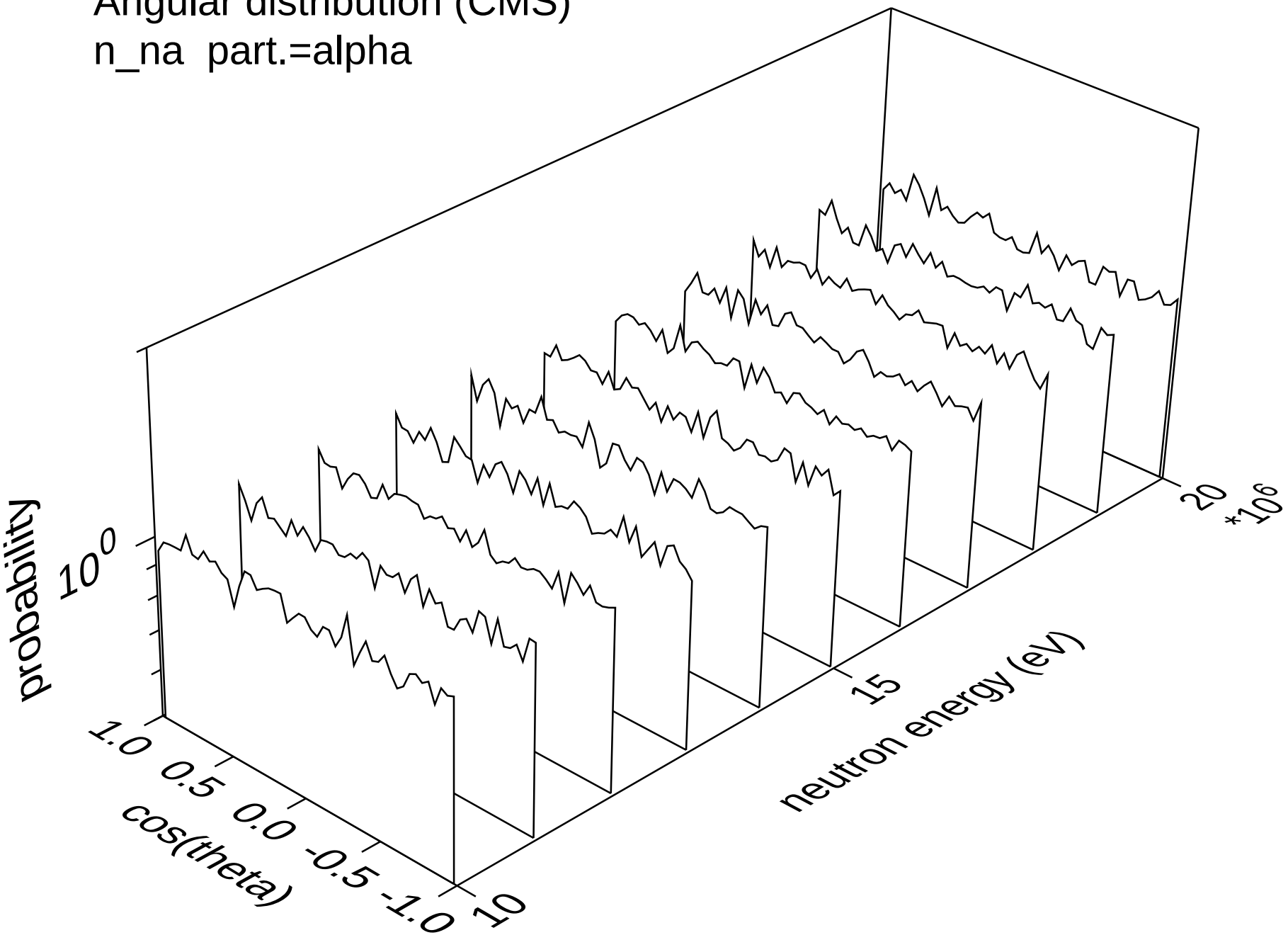

Cross Section
n_a_tot
cross section (barn)
10^{-2}
10^{-3}
10^{-4}
10^{-5}
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
*10^{6}
neutron energy(eV)

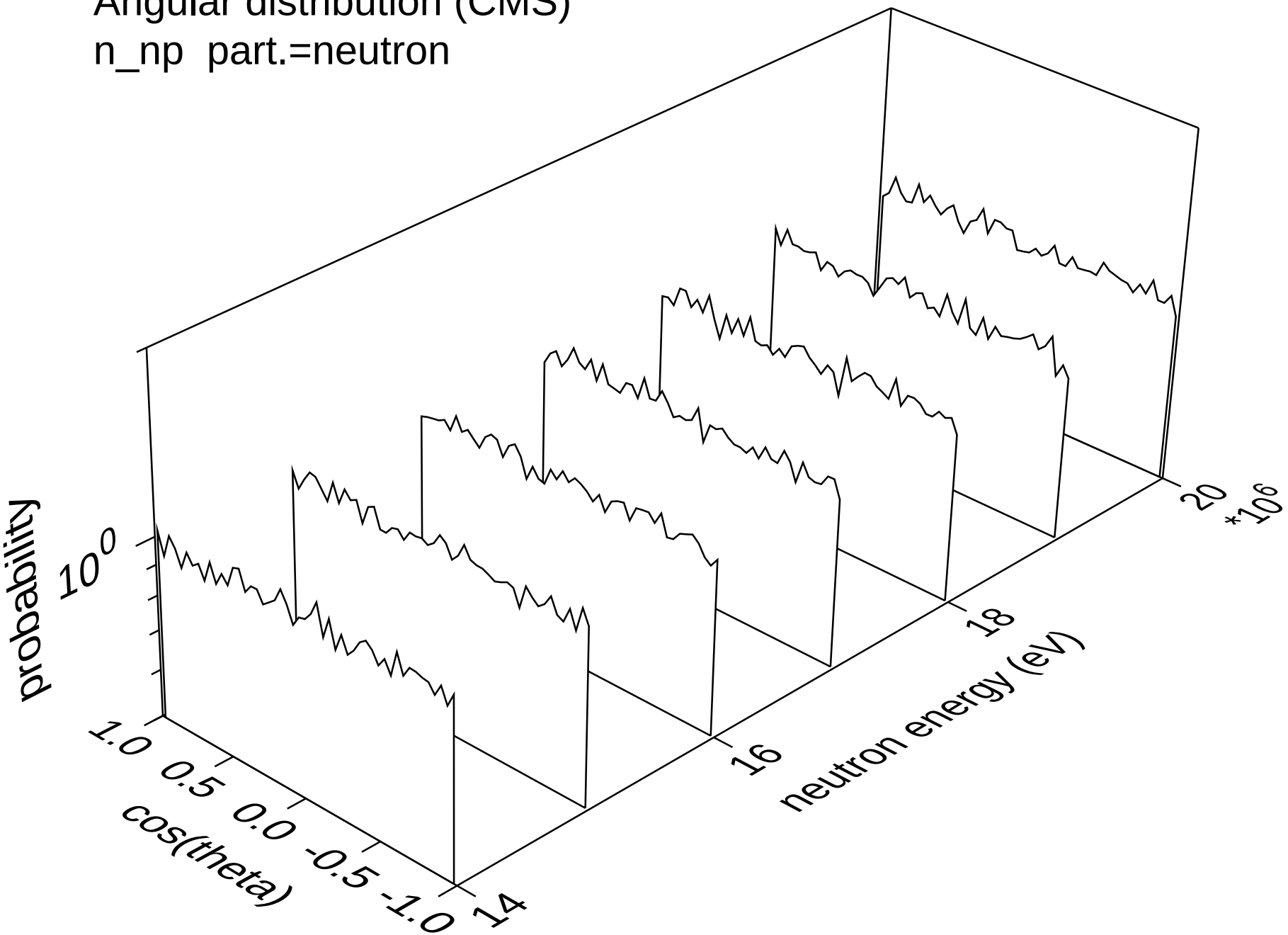

Angular distribution (CMS)
Elastic
probability
10^{1}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

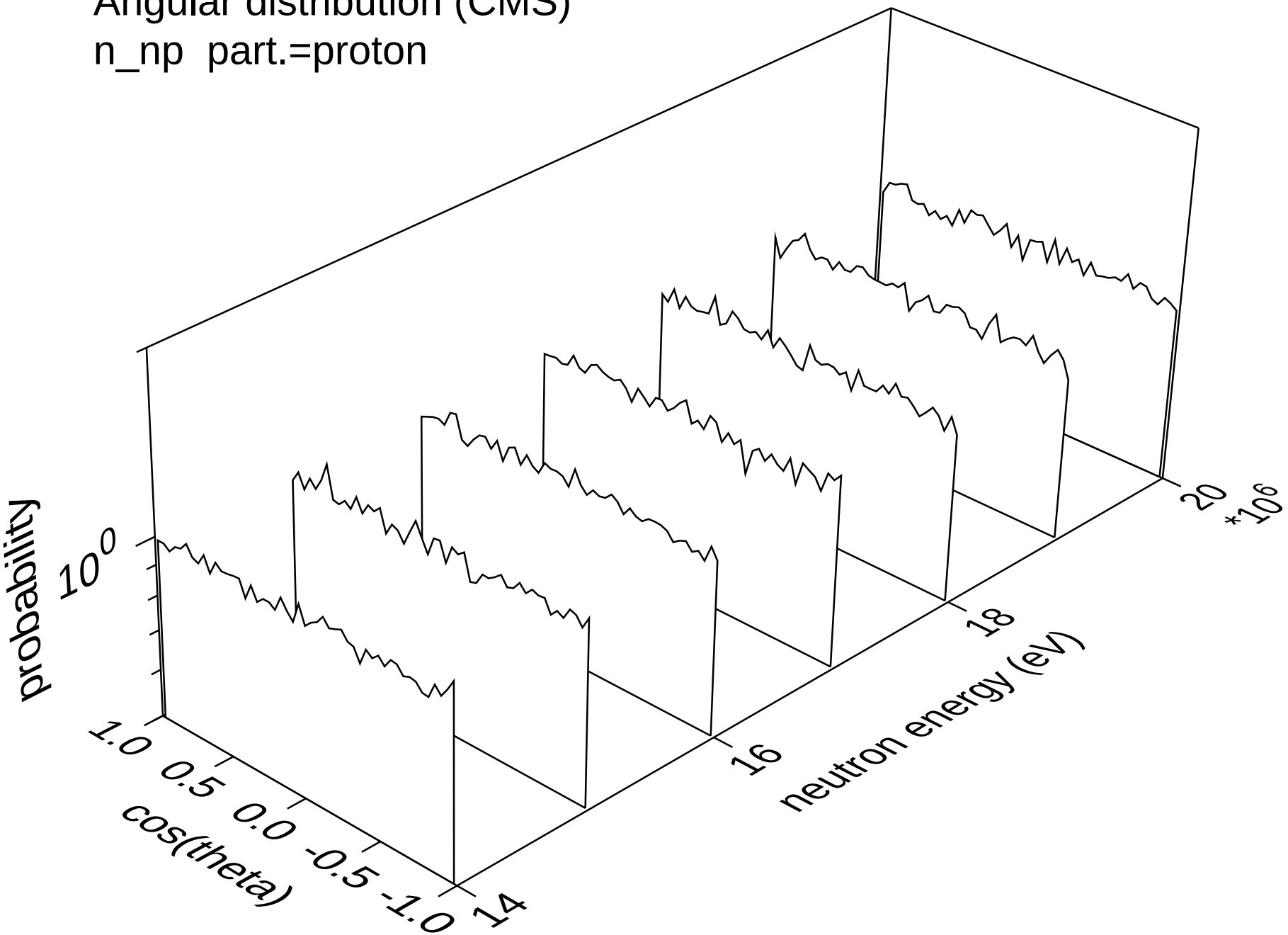

Angular distribution (CMS)
n_2n
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
5
10
15
20
*10^6
neutron energy (eV)

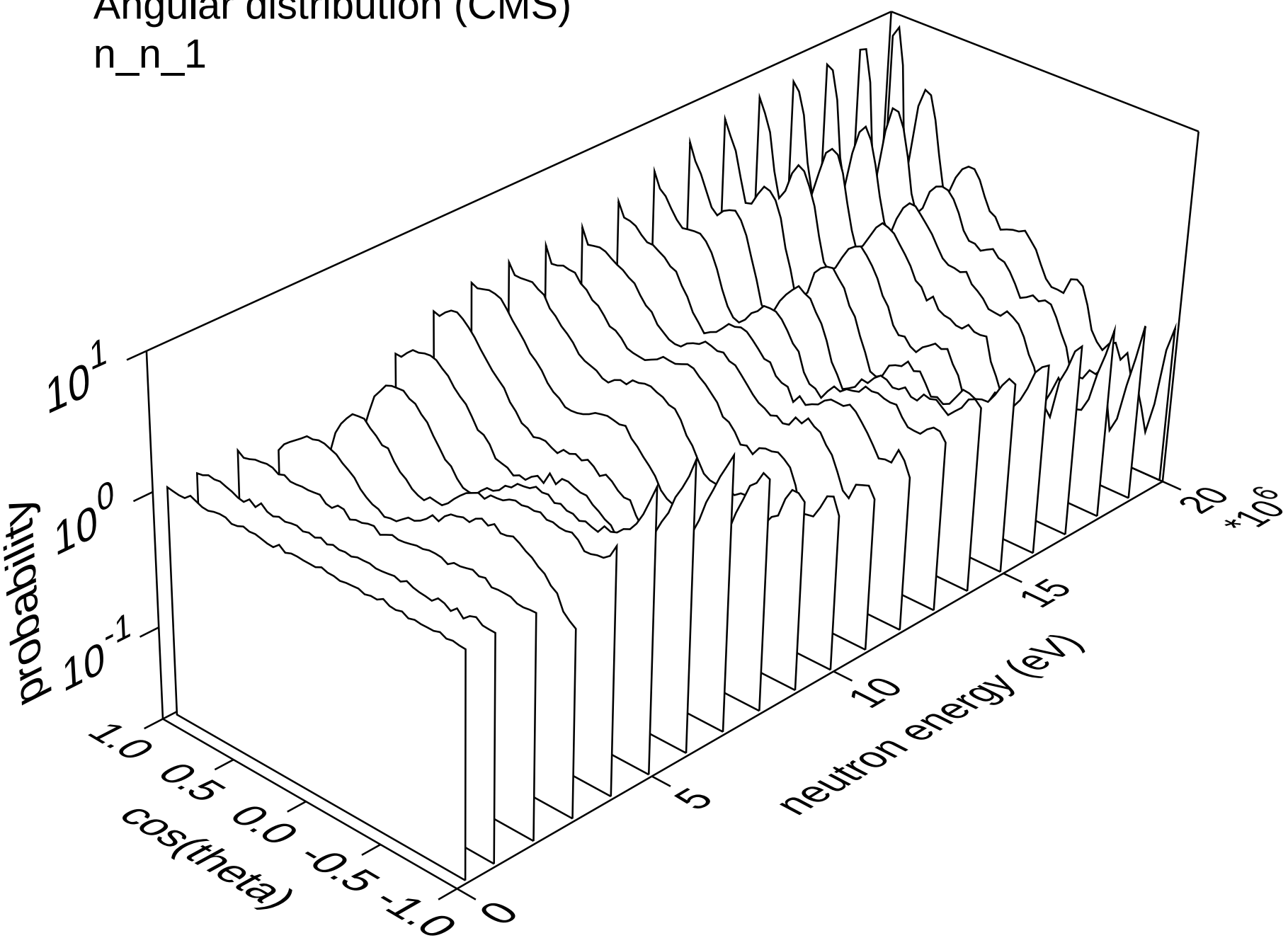

Angular distribution (CMS)
n_3n
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
16
18
20
*10^6
neutron energy (eV)

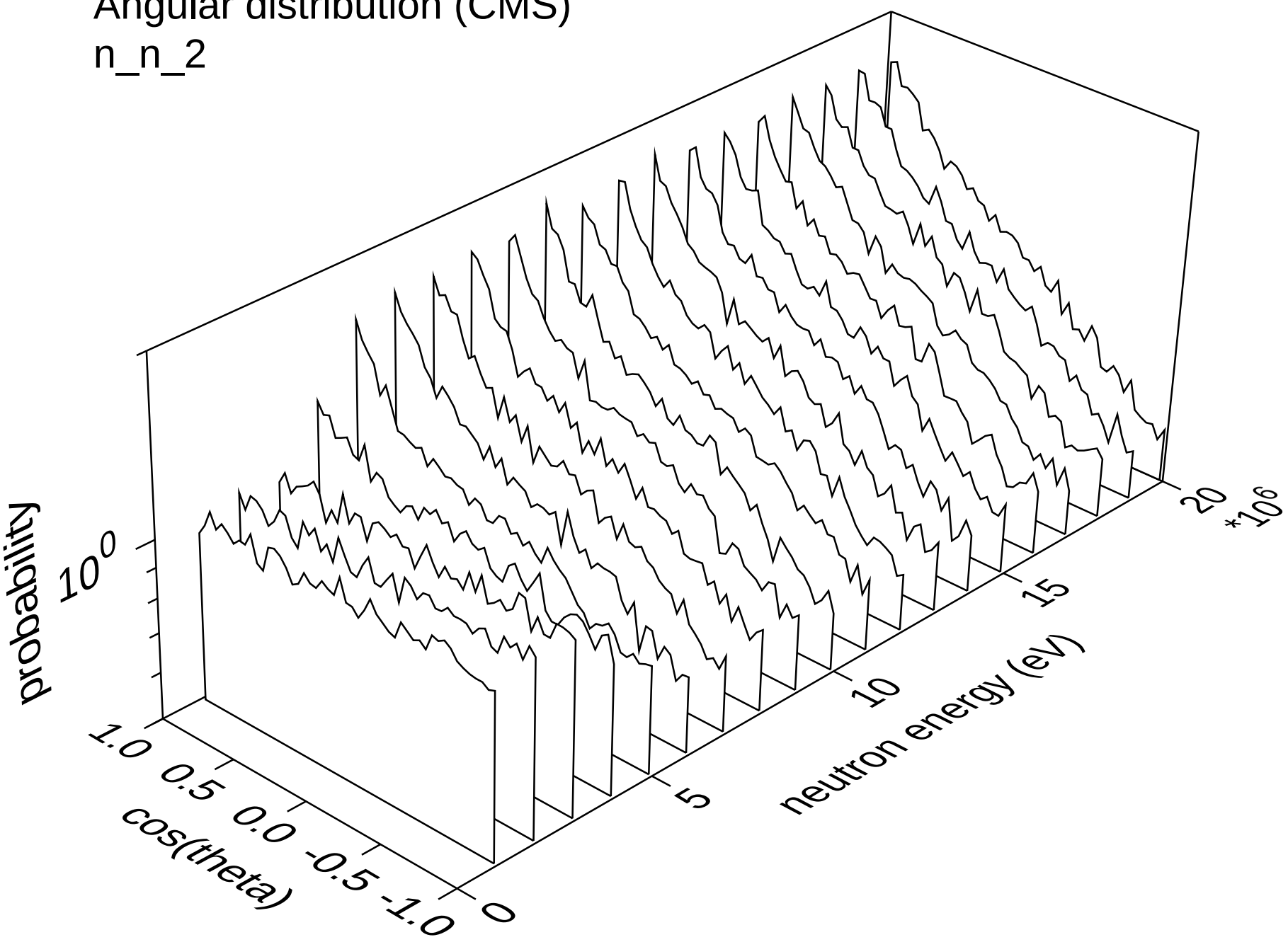

Angular distribution (CMS)
n_na part.=neutron
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
10
15
20
*10^6
neutron energy (eV)

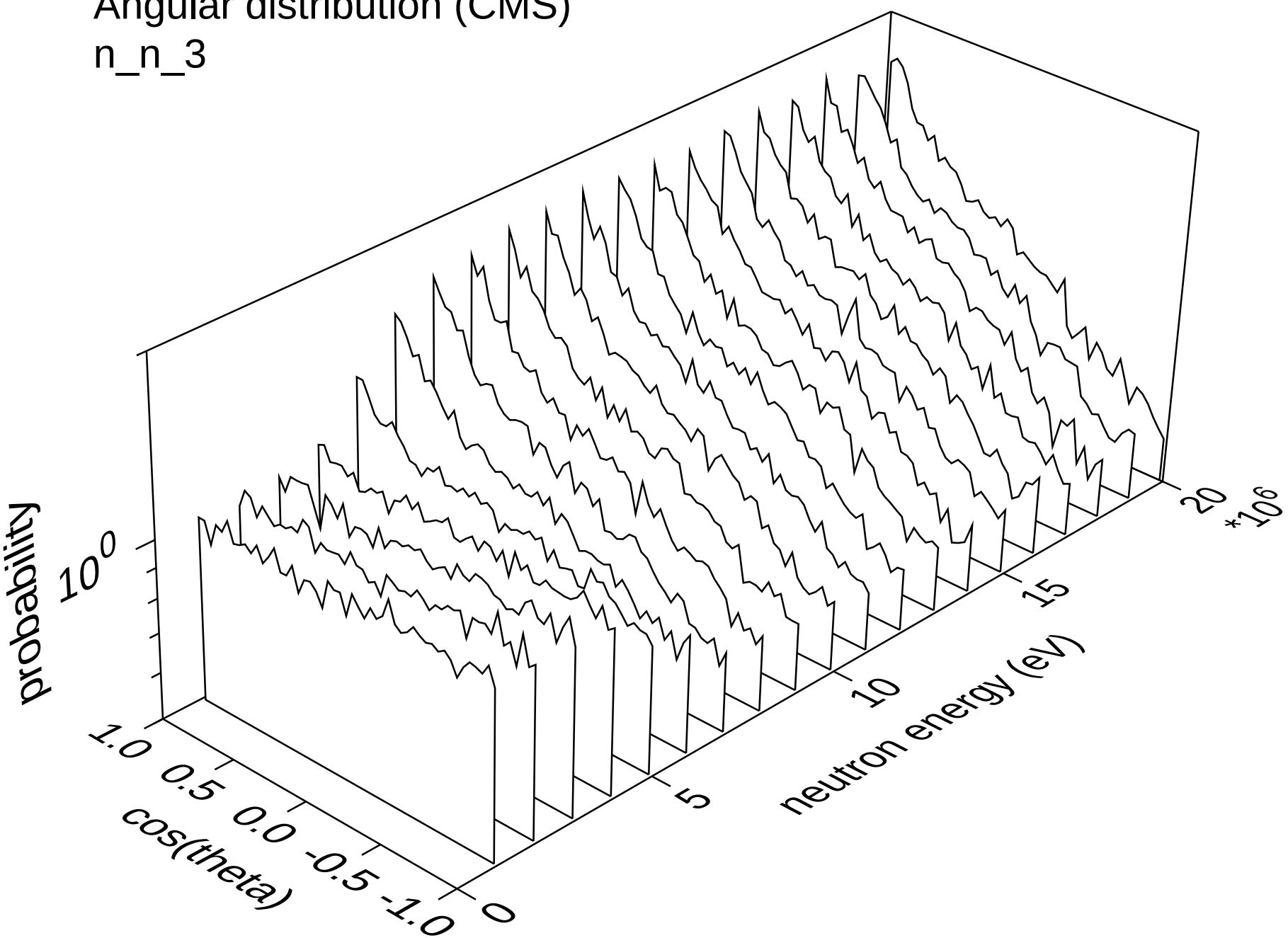

Angular distribution (CMS)
n_na part.=alpha
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
10
15
20
*10^6
neutron energy (eV)

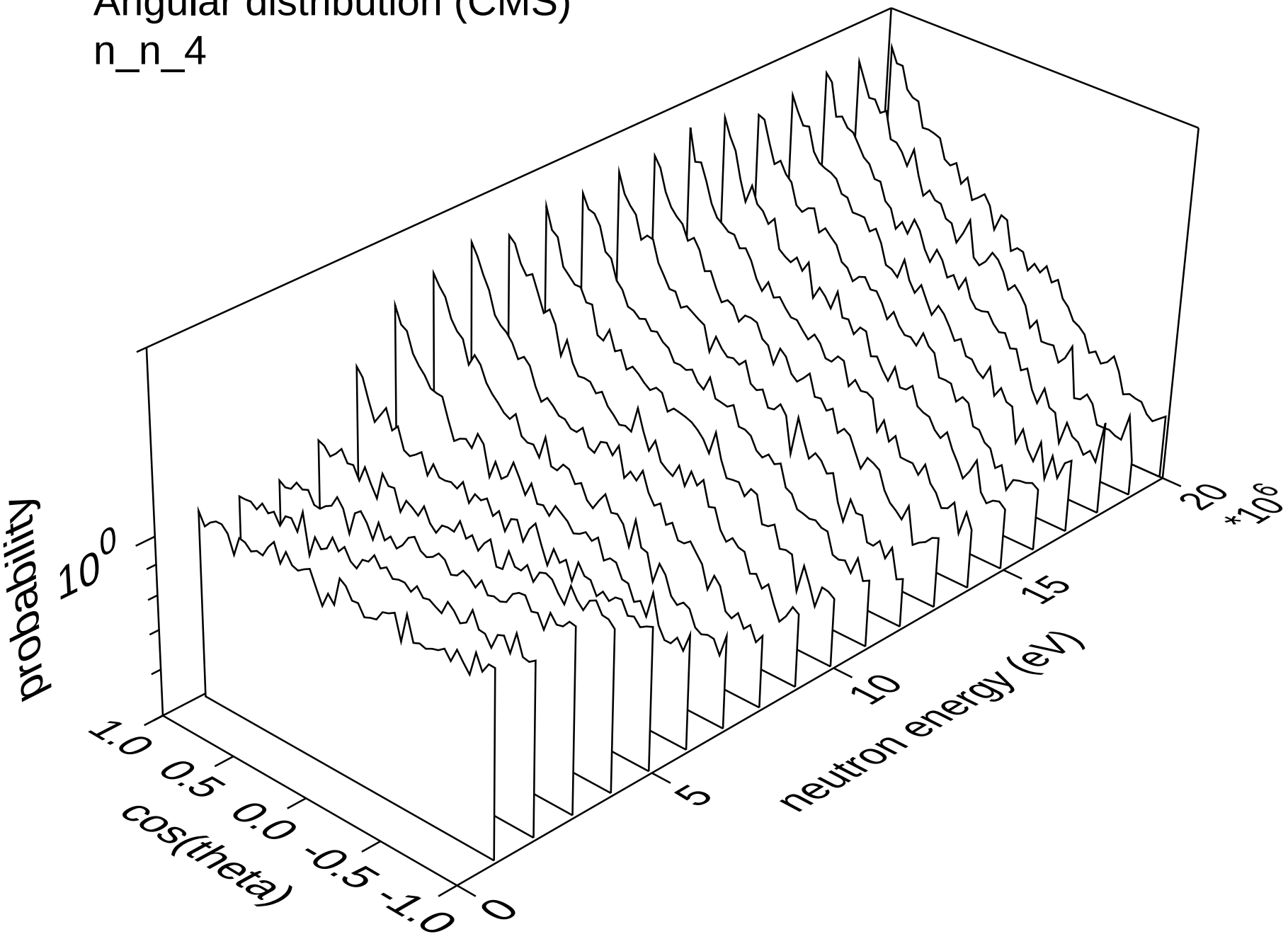

Angular distribution (CMS)
n_np part.=neutron
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
14
16
18
20
*10^6
neutron energy (eV)

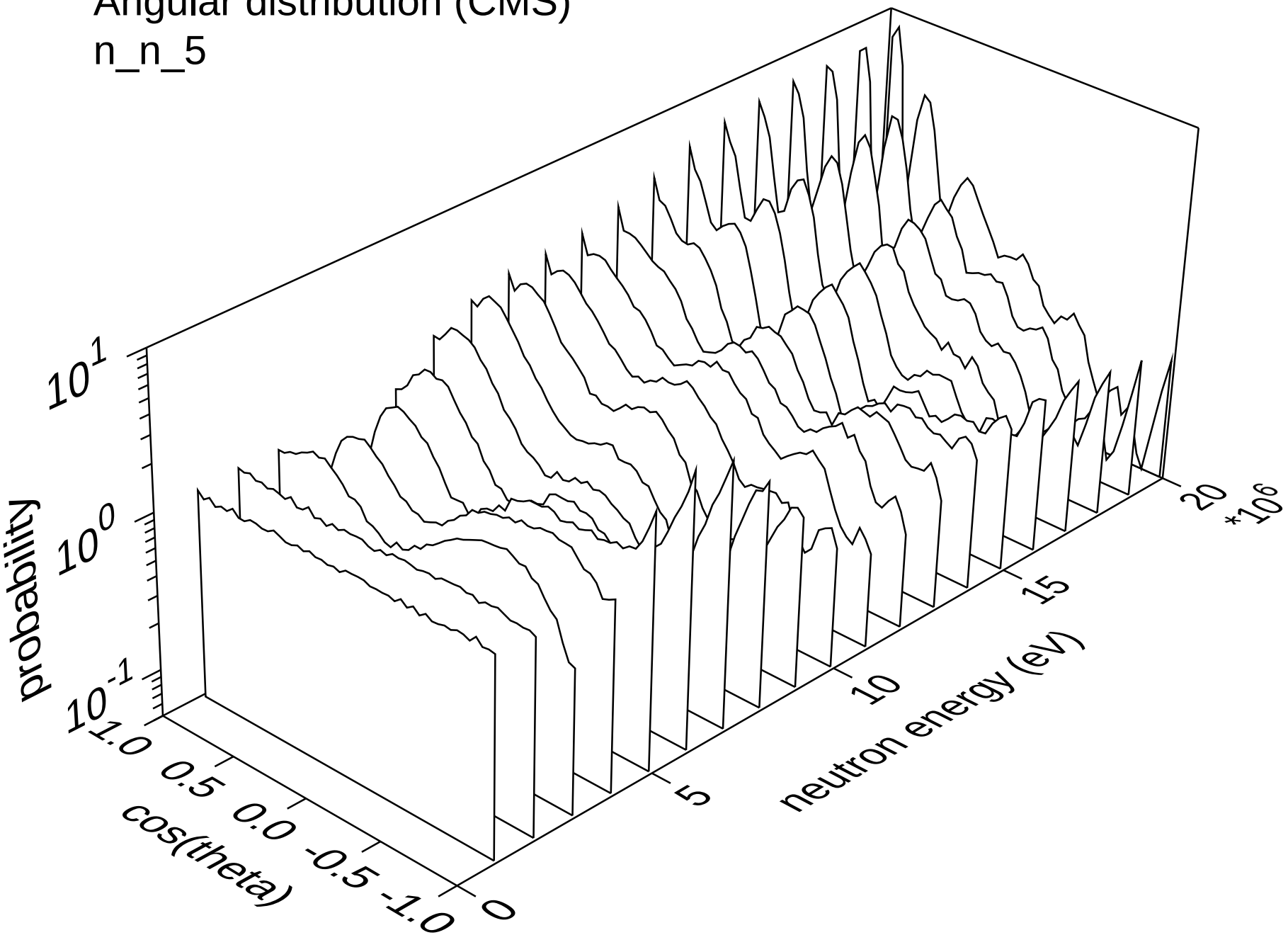

Angular distribution (CMS)
n_np part.=proton
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
14
16
18
20
*10^6
neutron energy (eV)

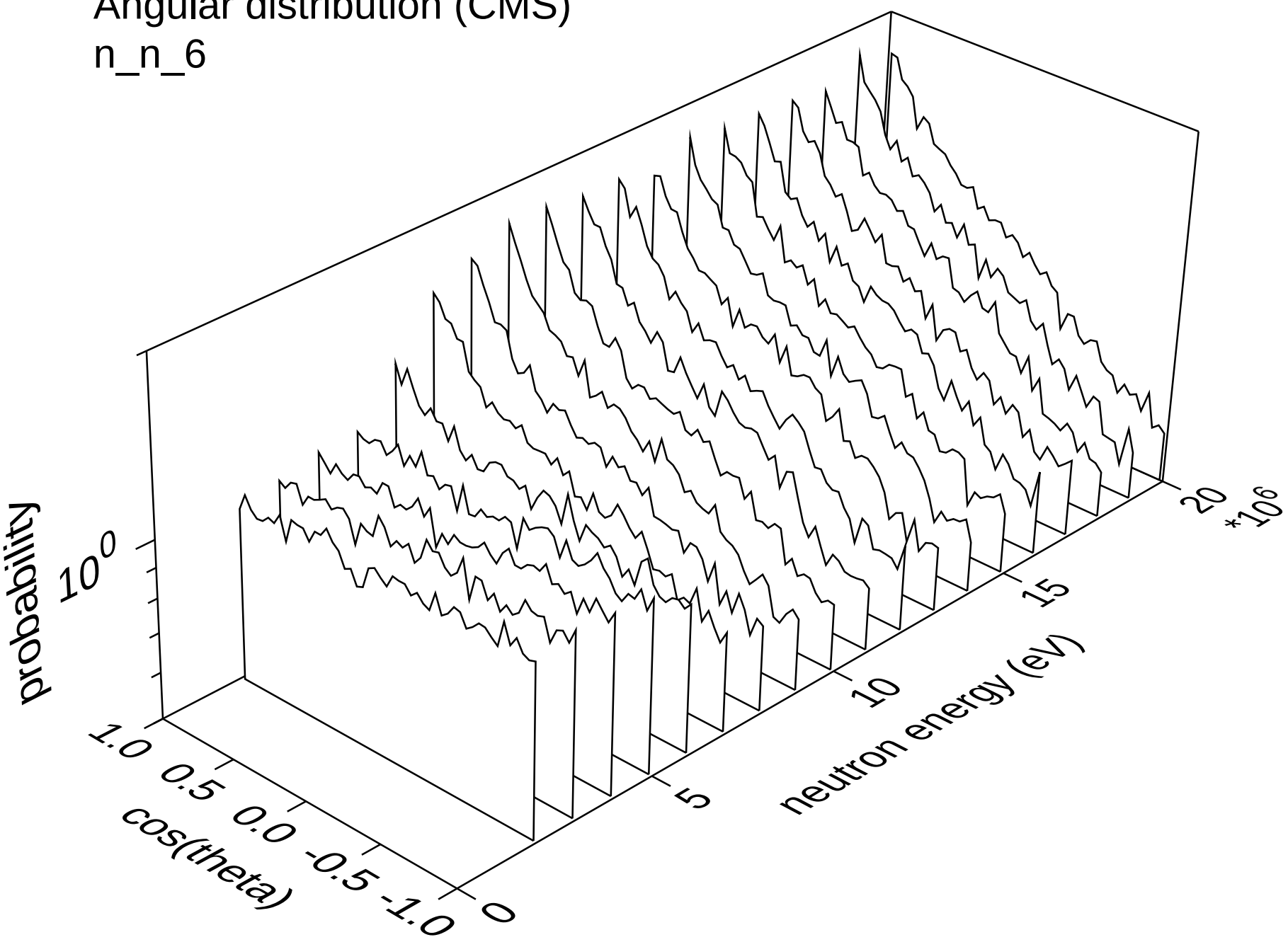

Angular distribution (CMS)
n_n_1
probability
10^{1}
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

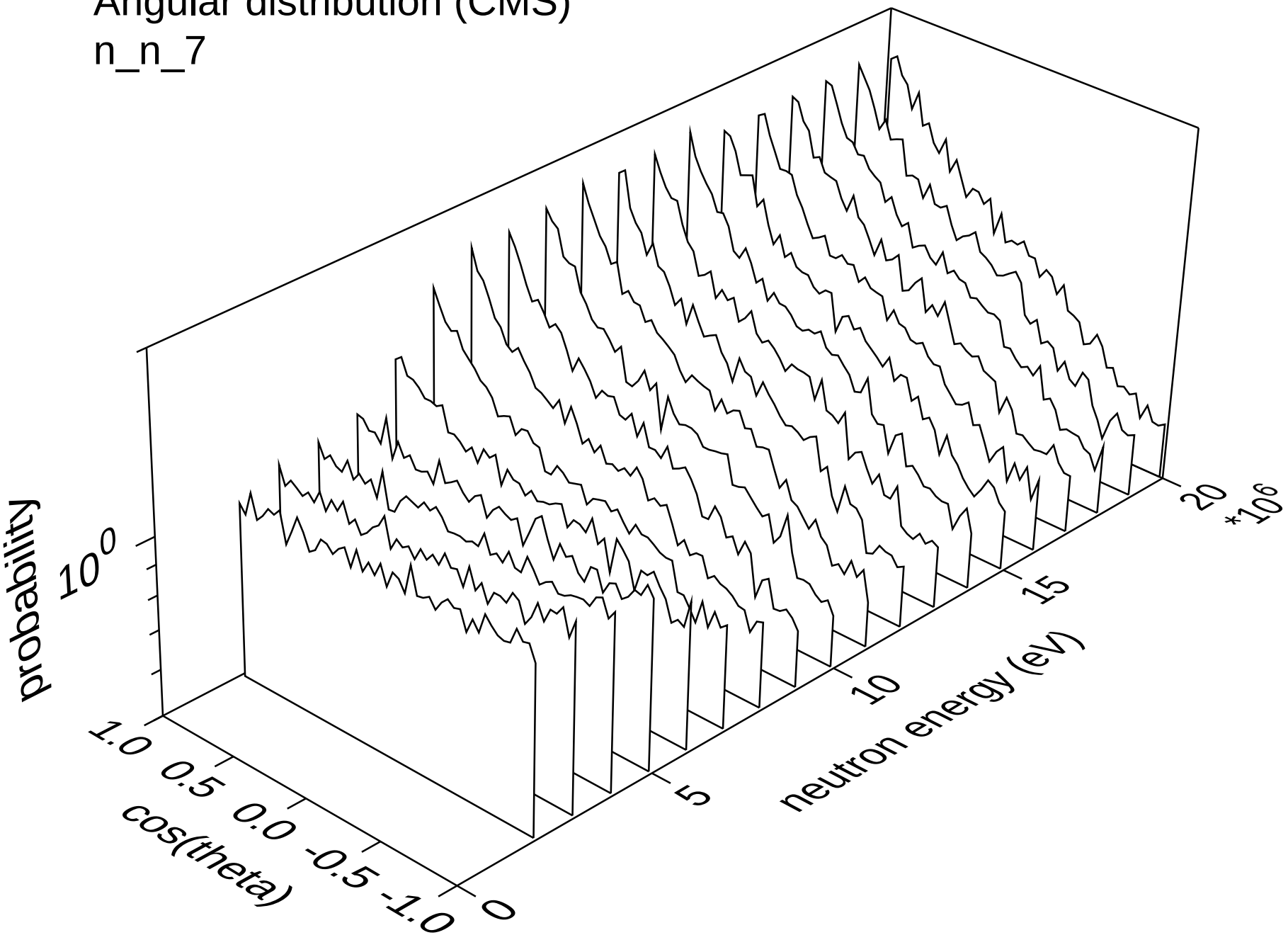

Angular distribution (CMS)
n_n_2
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

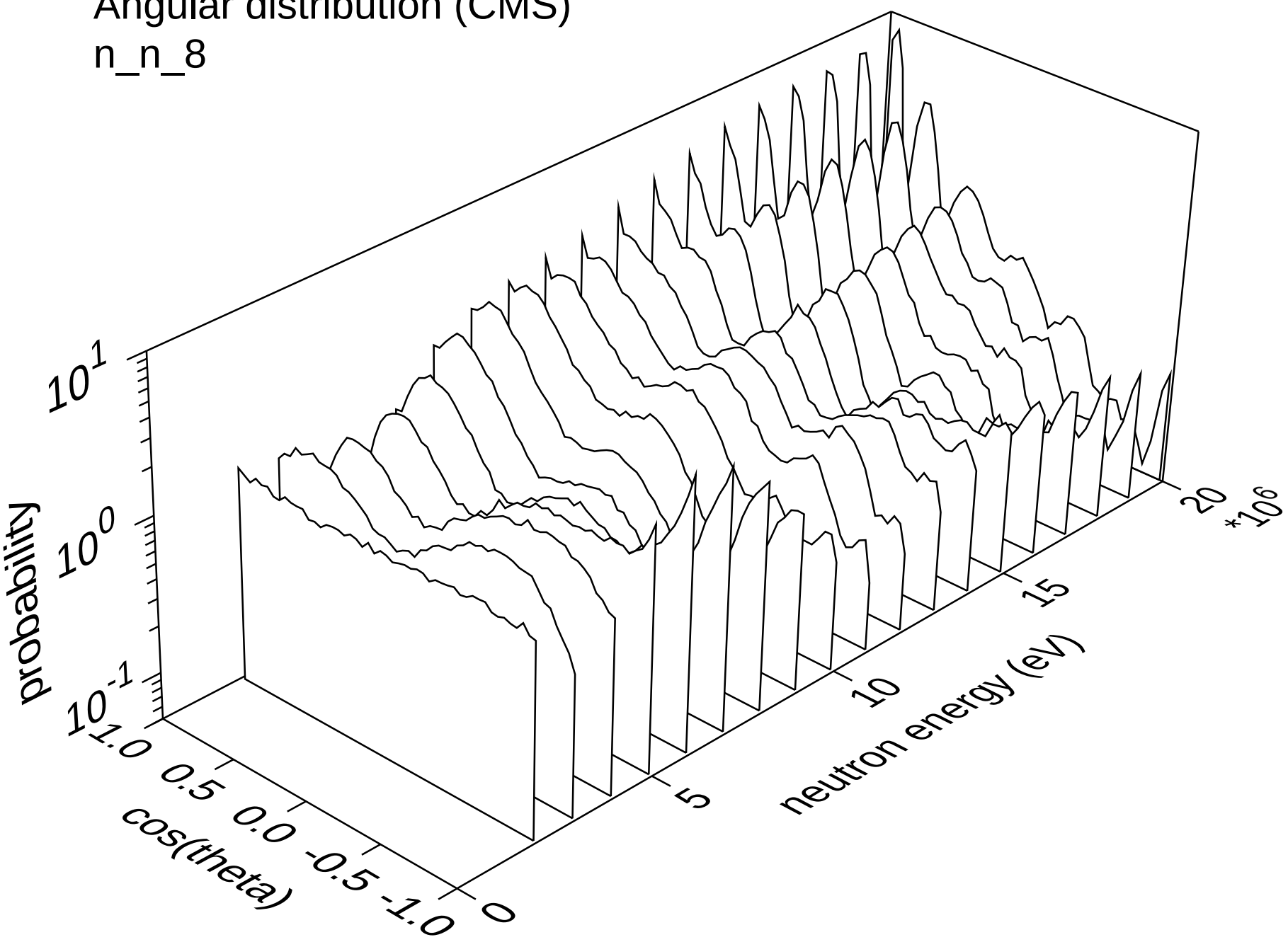

Angular distribution (CMS)
n_n_3
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

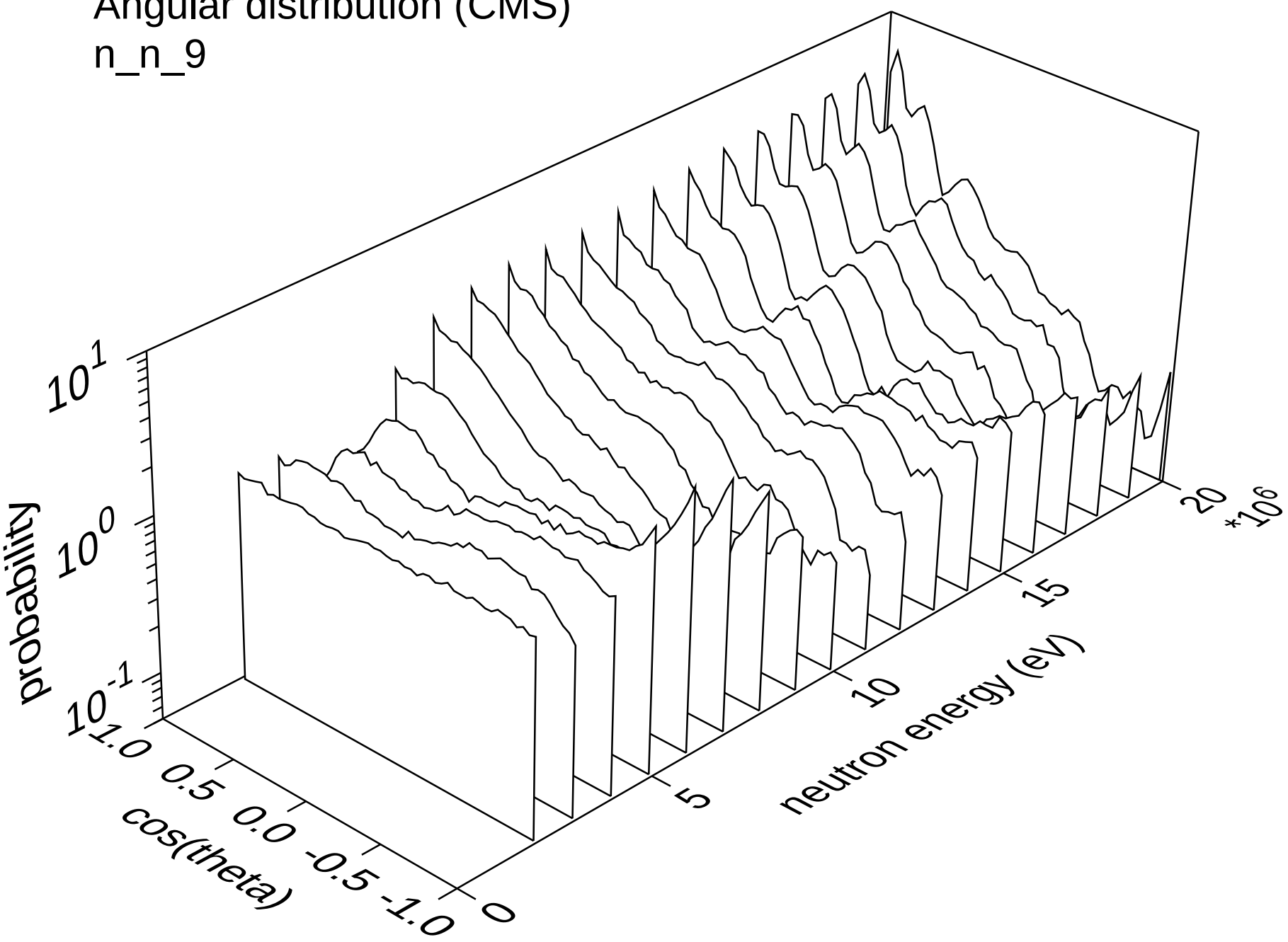

Angular distribution (CMS)
n_n_4
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

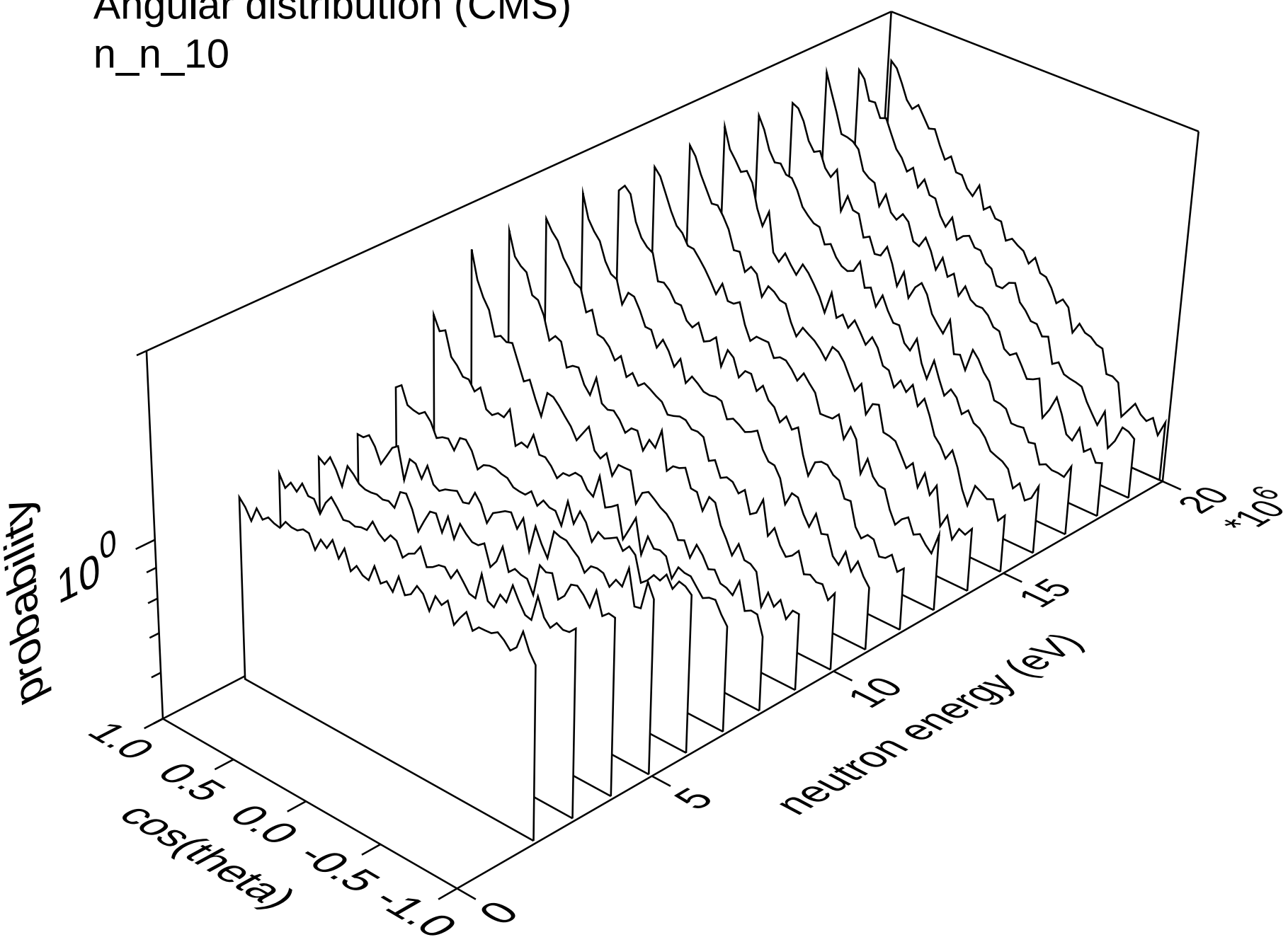

Angular distribution (CMS)
n_n_5
probability
10^{1}
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

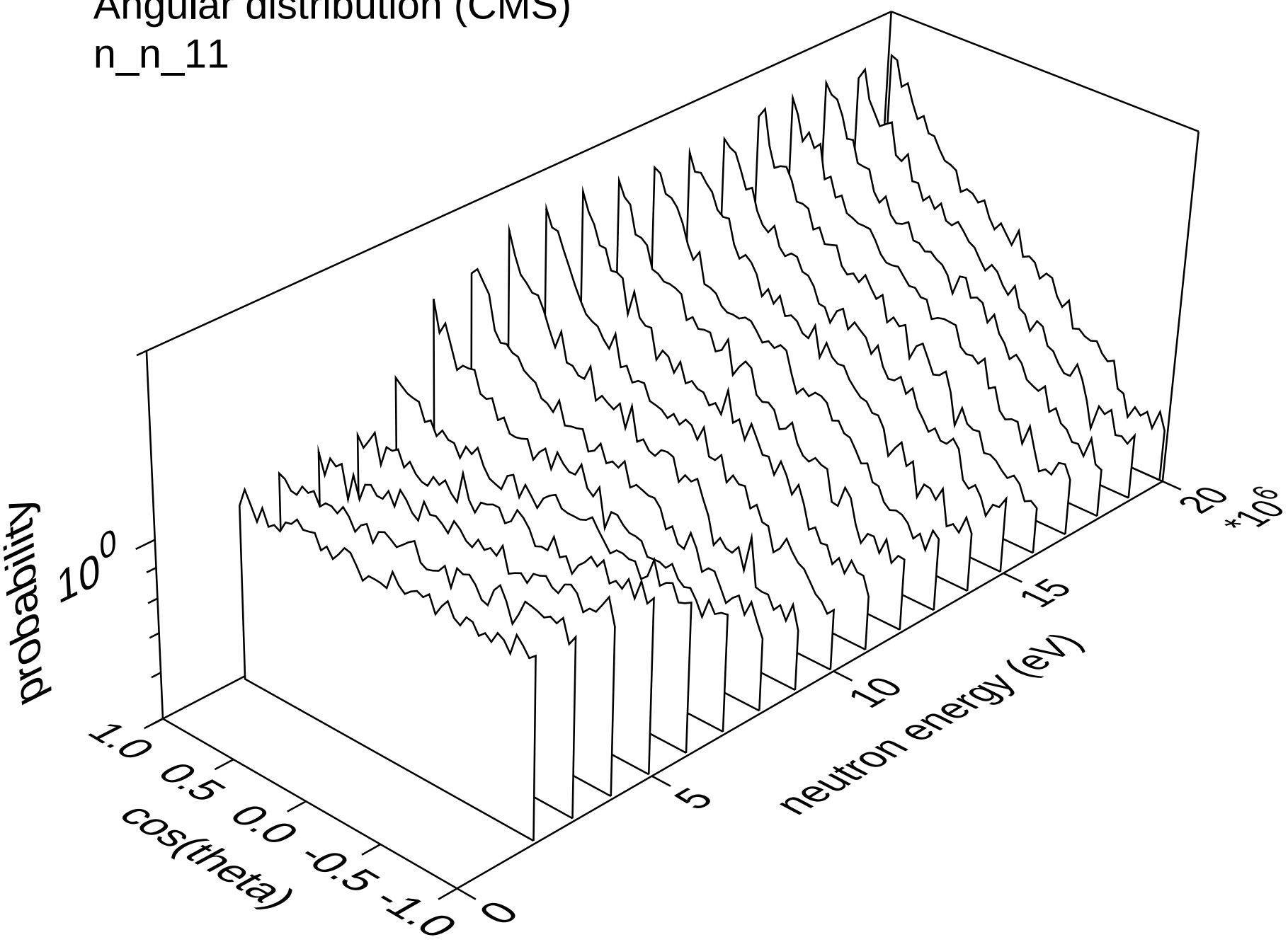

Angular distribution (CMS)
n_n_6
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

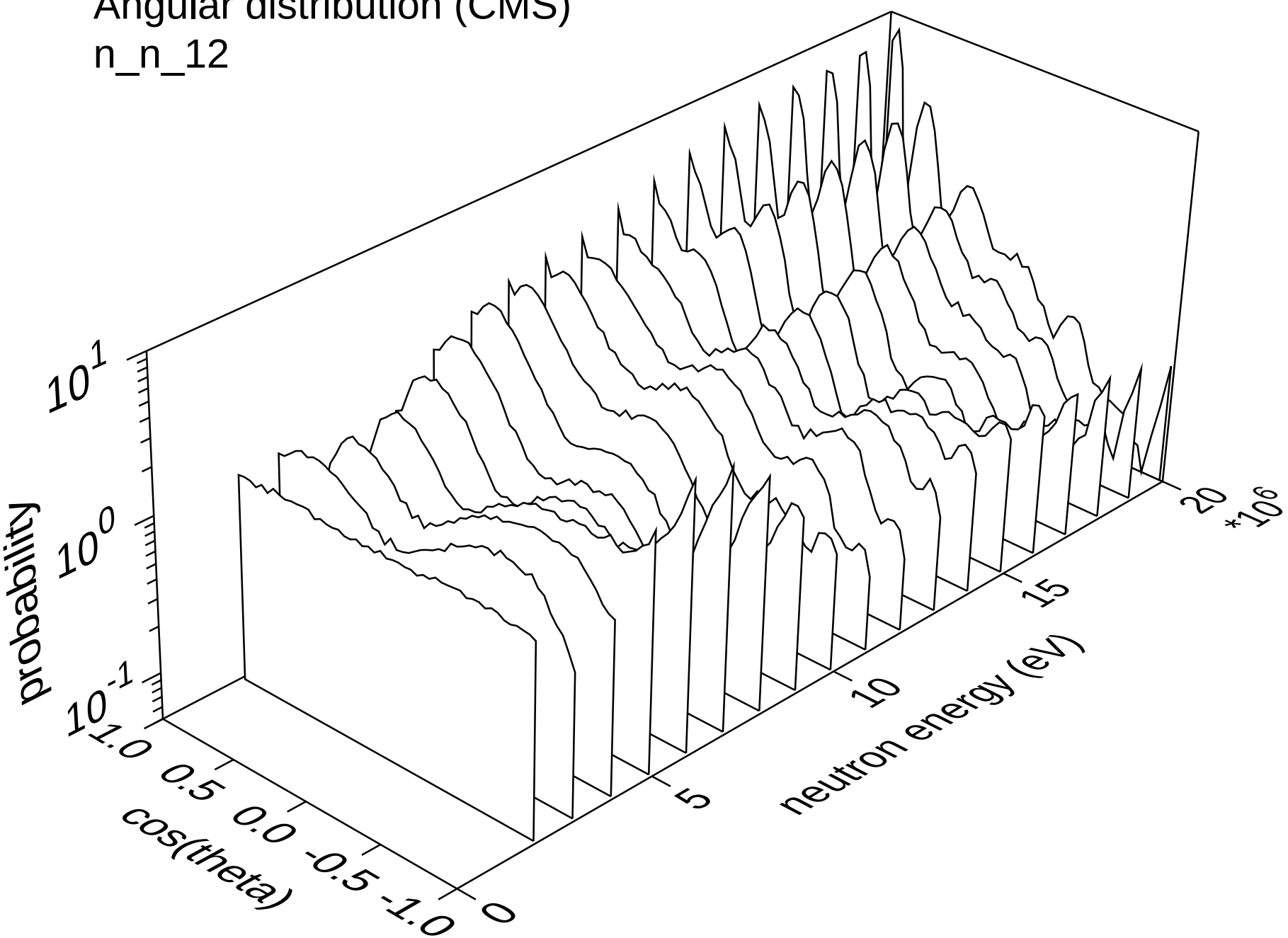

Angular distribution (CMS)
n_n_7
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

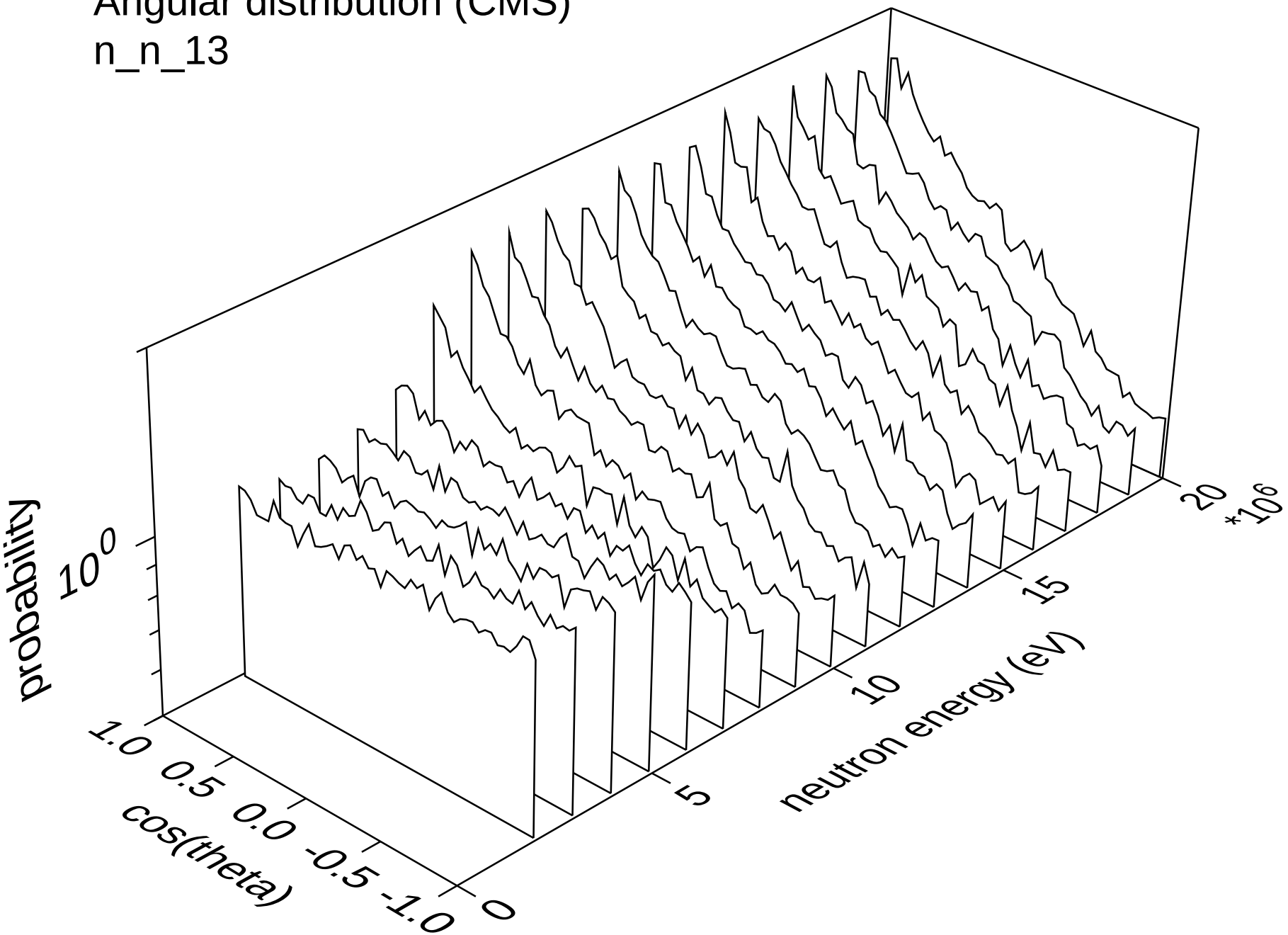

Angular distribution (CMS)
n_n_8
probability
10^{1}
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

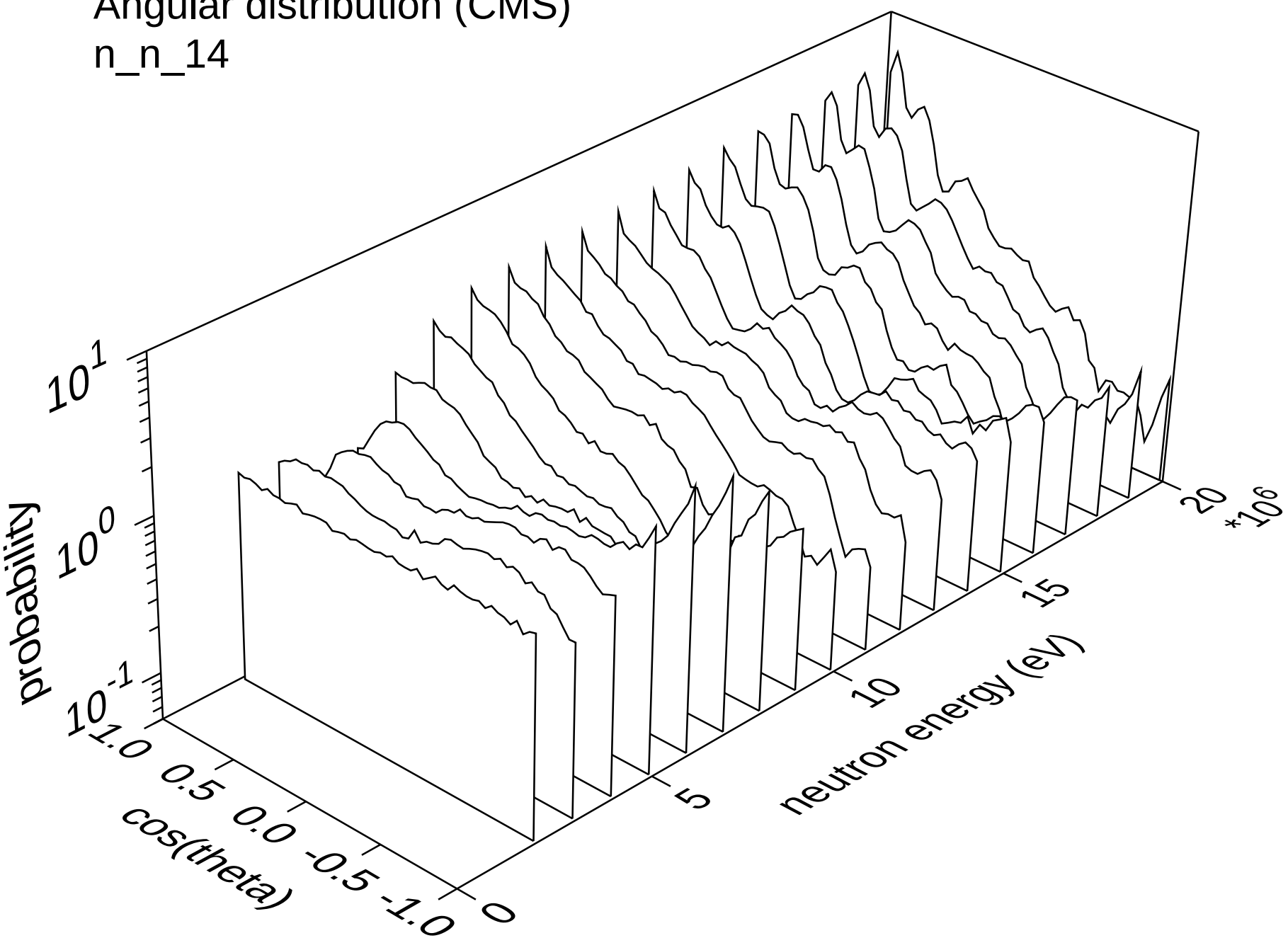

Angular distribution (CMS)
n_n_9
probability
10^{1}
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

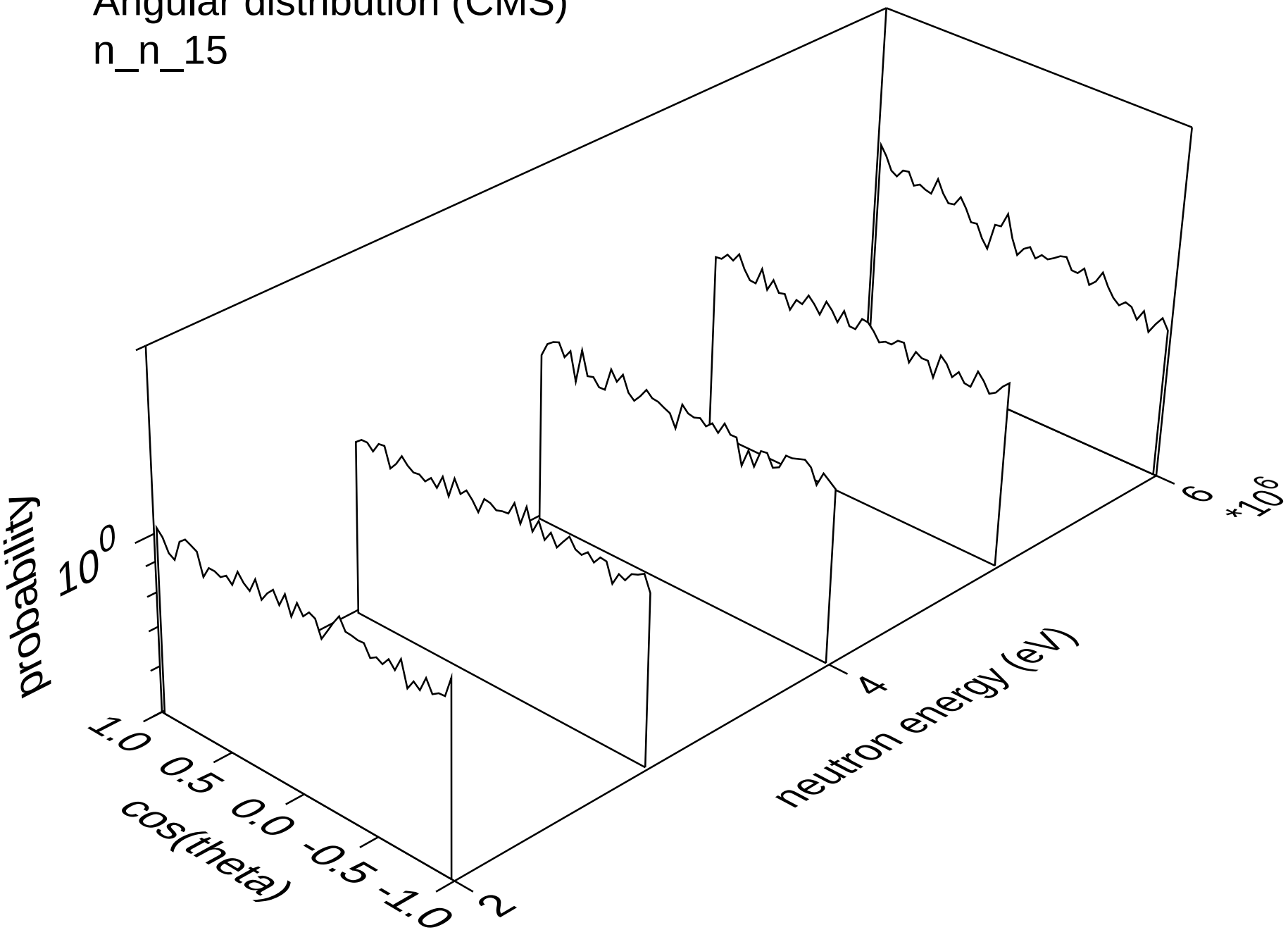

Angular distribution (CMS)
n_n_10
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

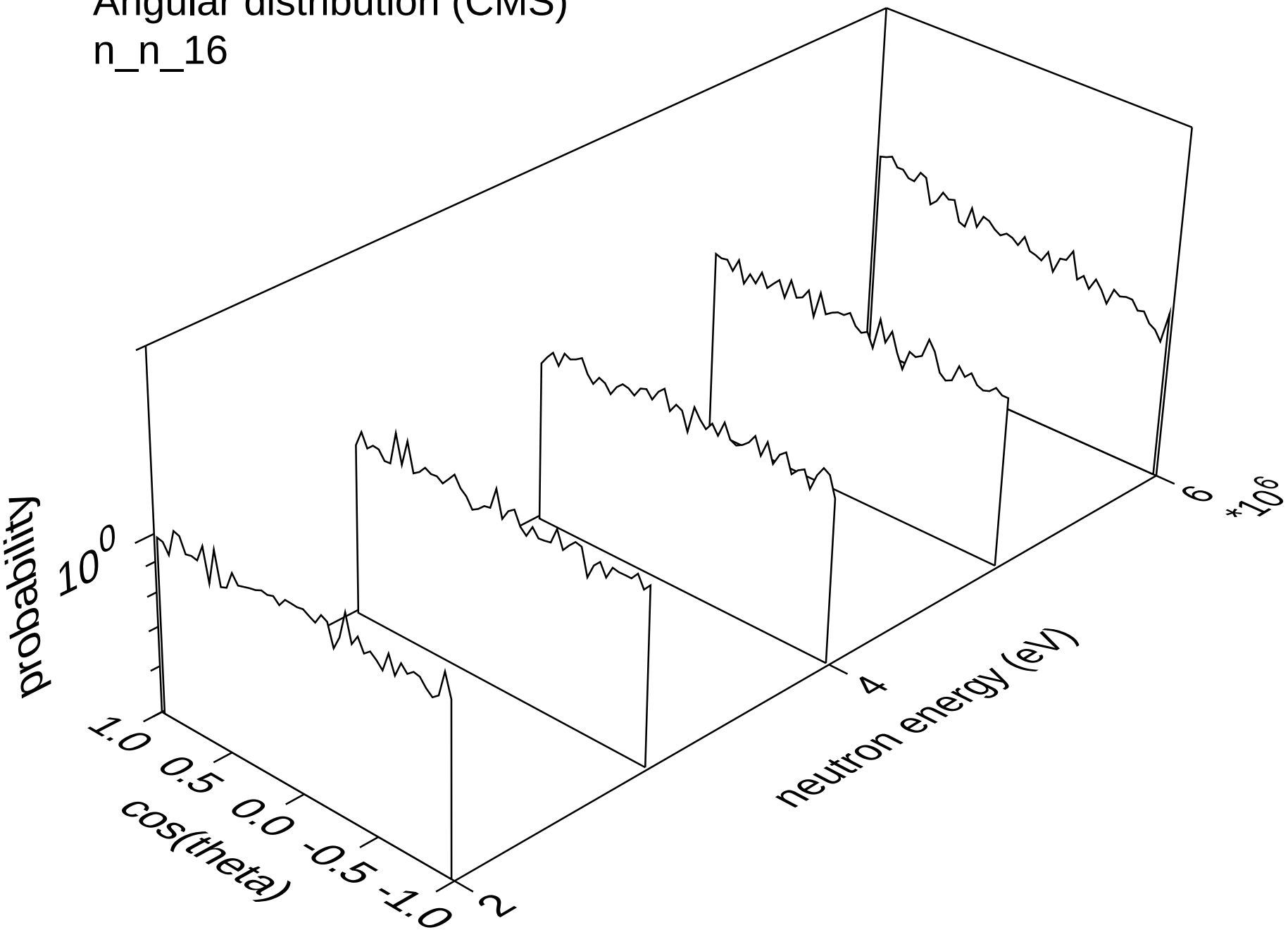

Angular distribution (CMS)
n_n_11
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

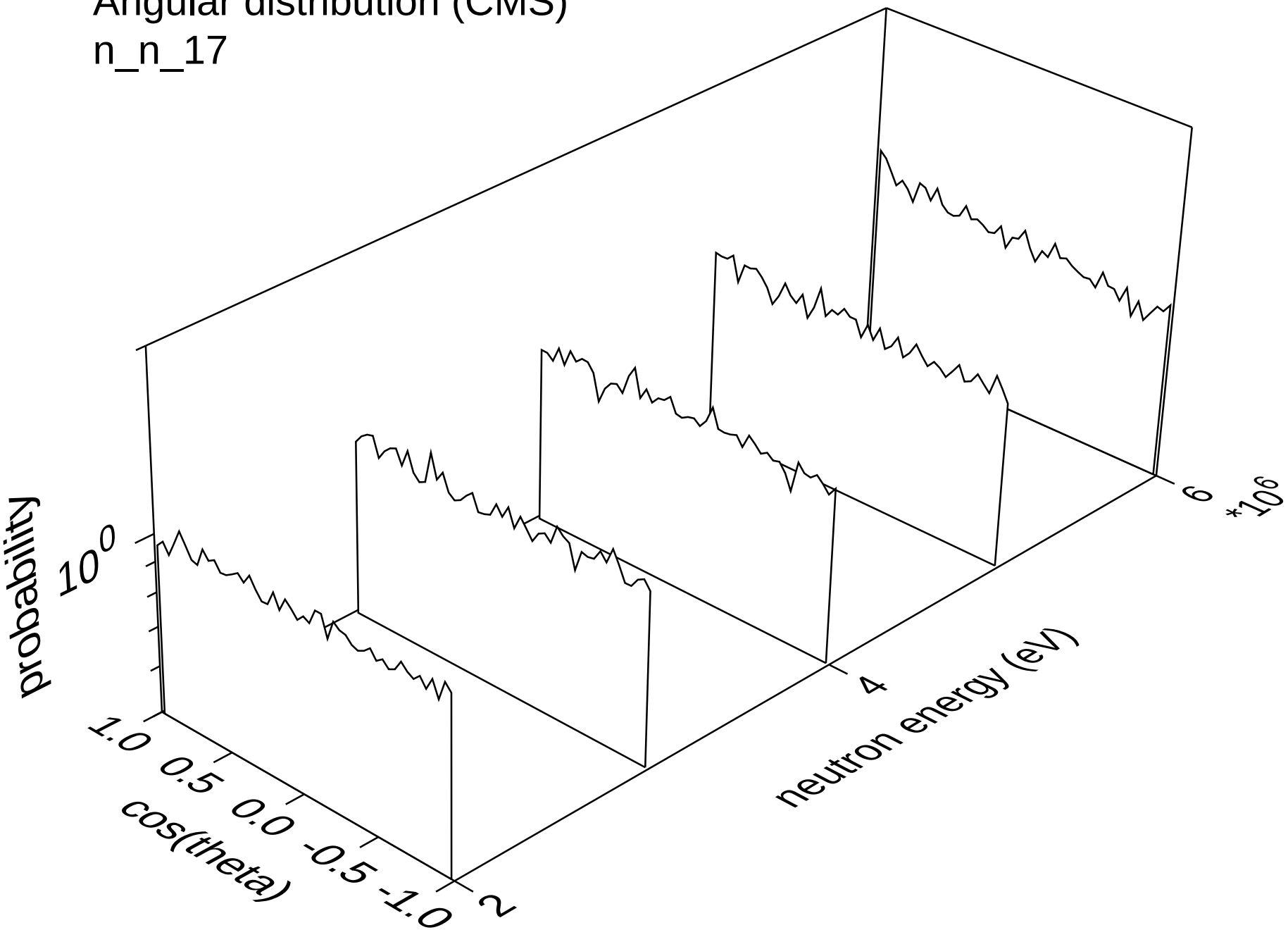

Angular distribution (CMS)
n_n_12
probability
10^{1}
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

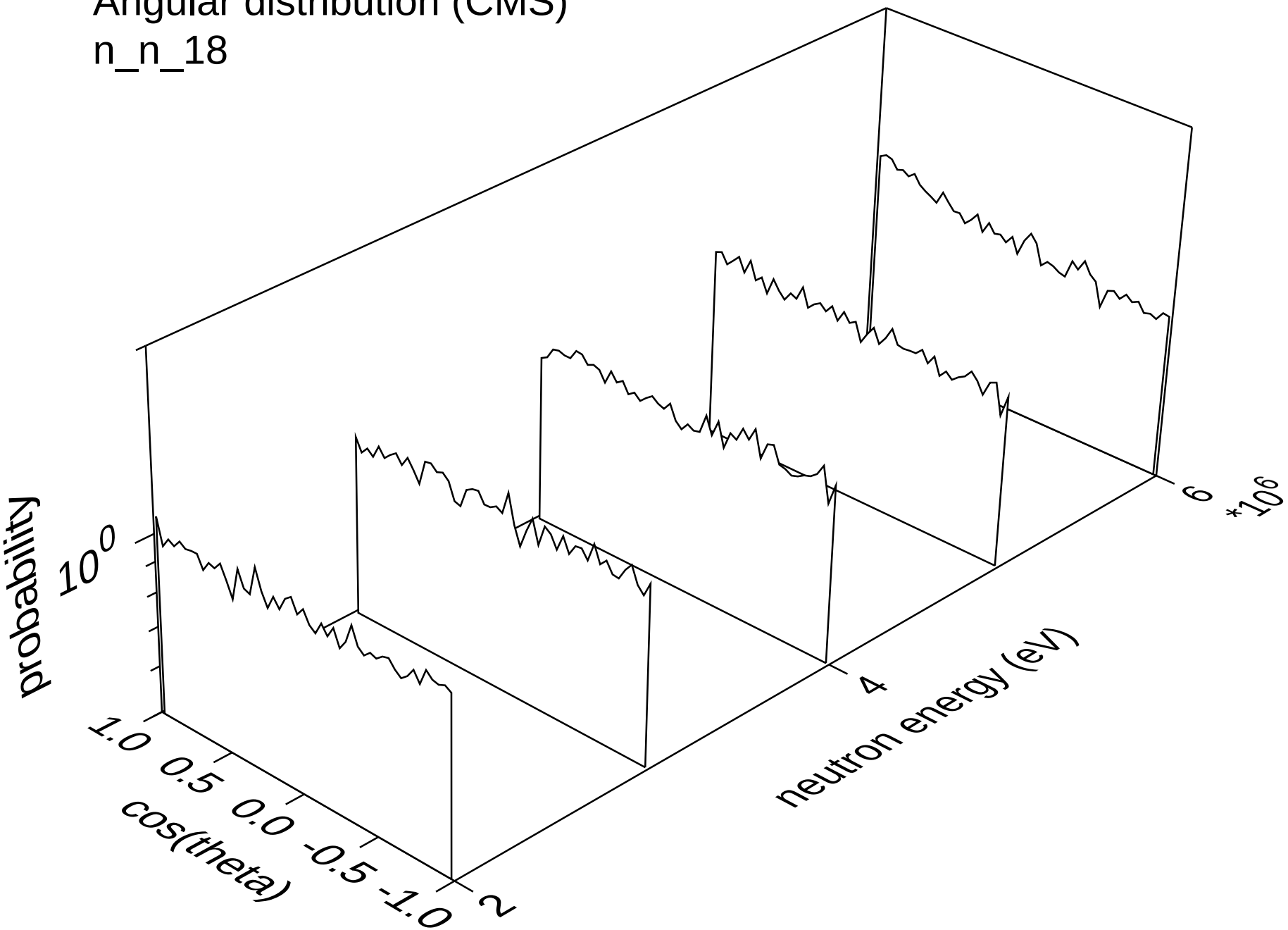

Angular distribution (CMS)
n_n_13
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

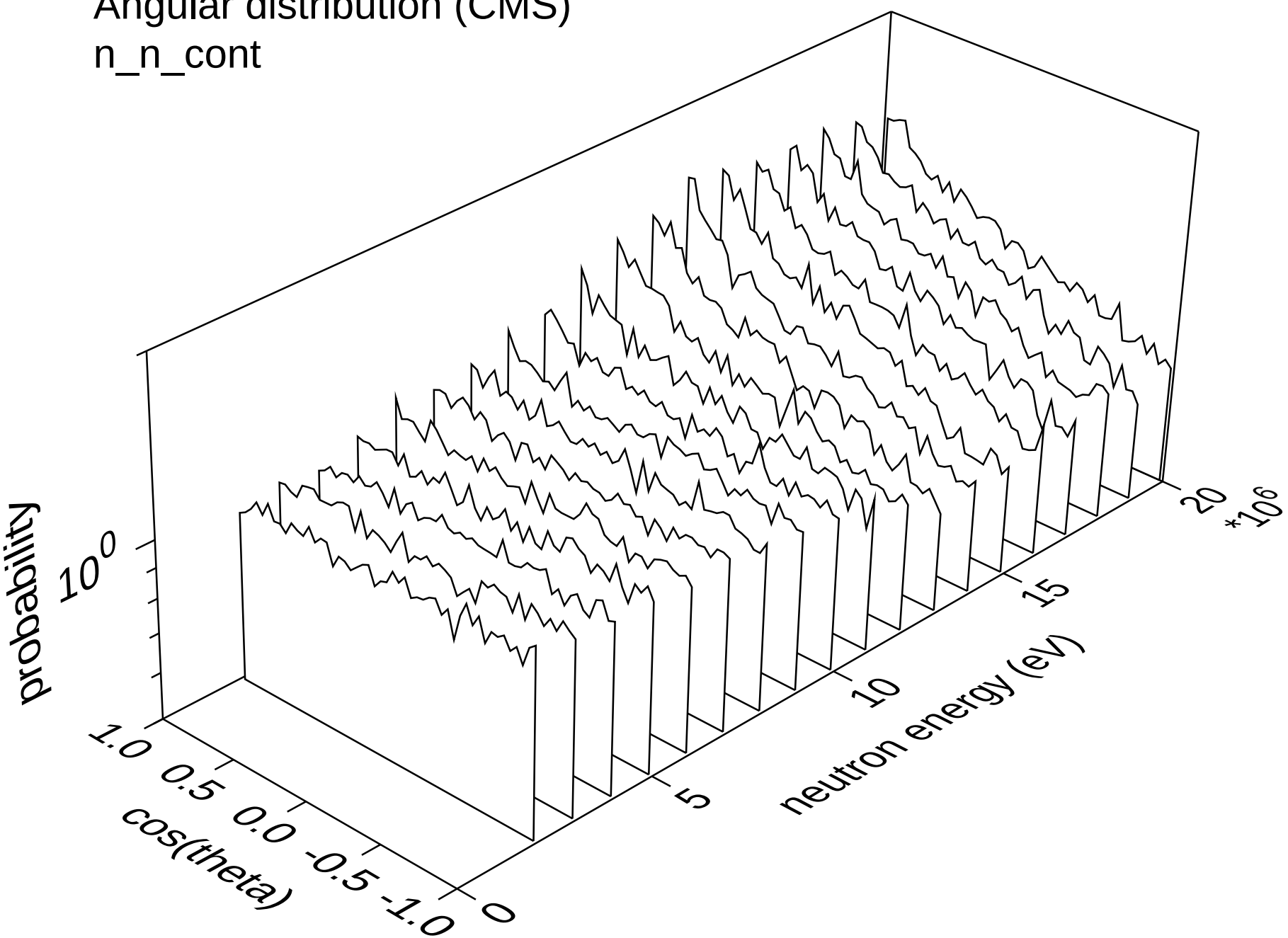

Angular distribution (CMS)
n_n_14
probability
10^{1}
10^{0}
10^{-1}
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

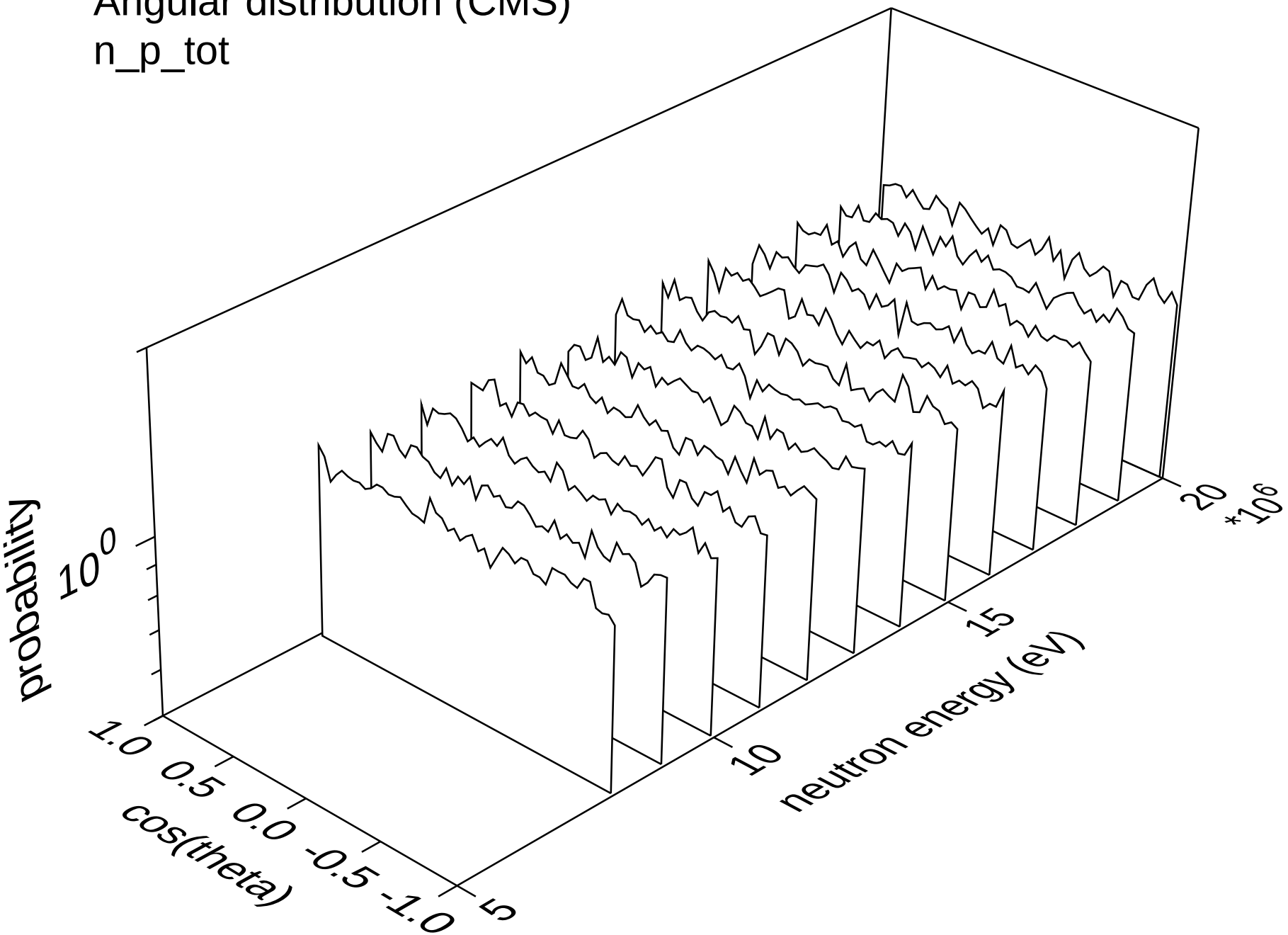

Angular distribution (CMS)
n_n_15
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
2
4
6
*10^6
neutron energy (eV)

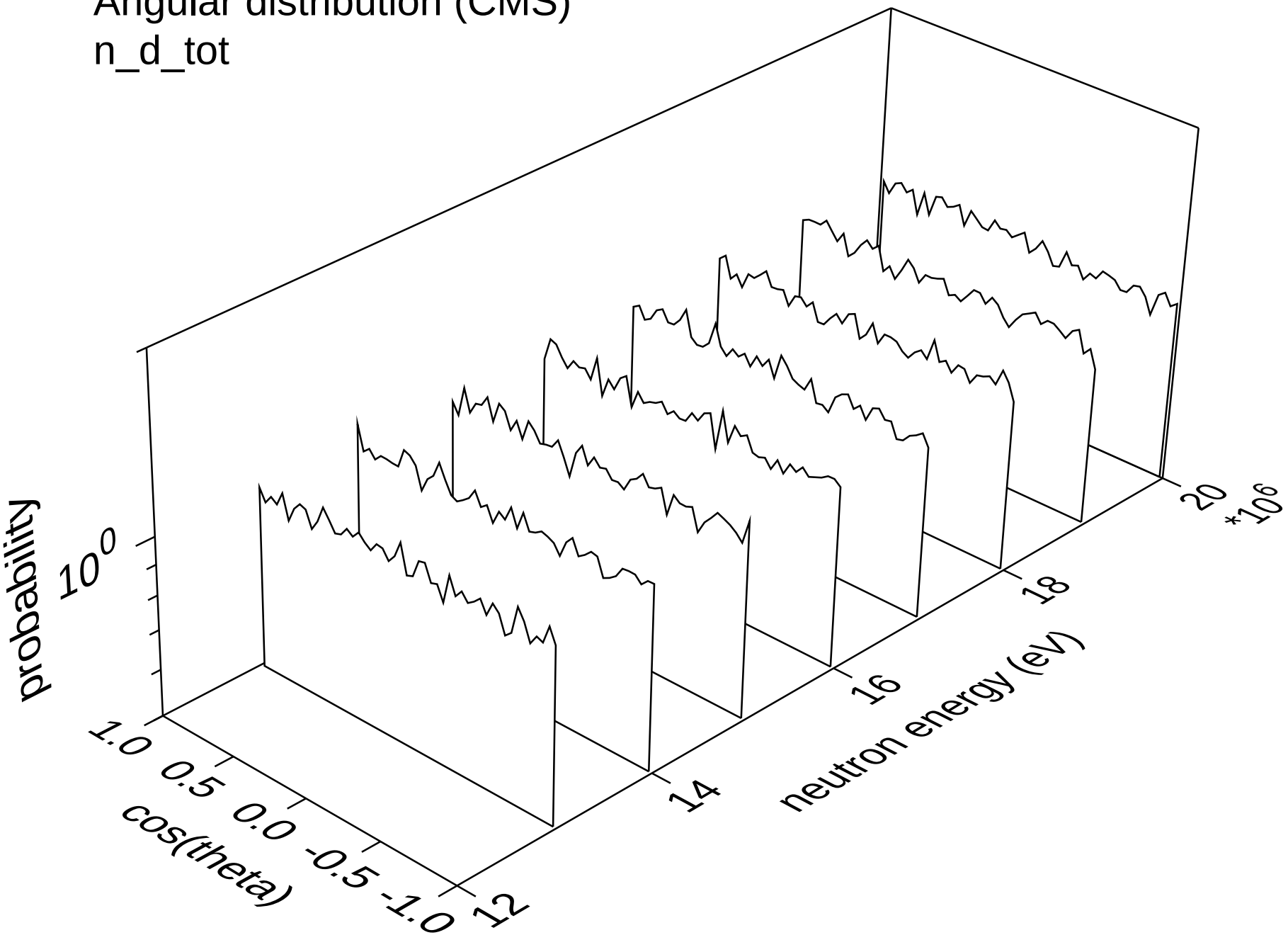

Angular distribution (CMS)
n_n_16
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
2
4
6
*10^6
neutron energy (eV)

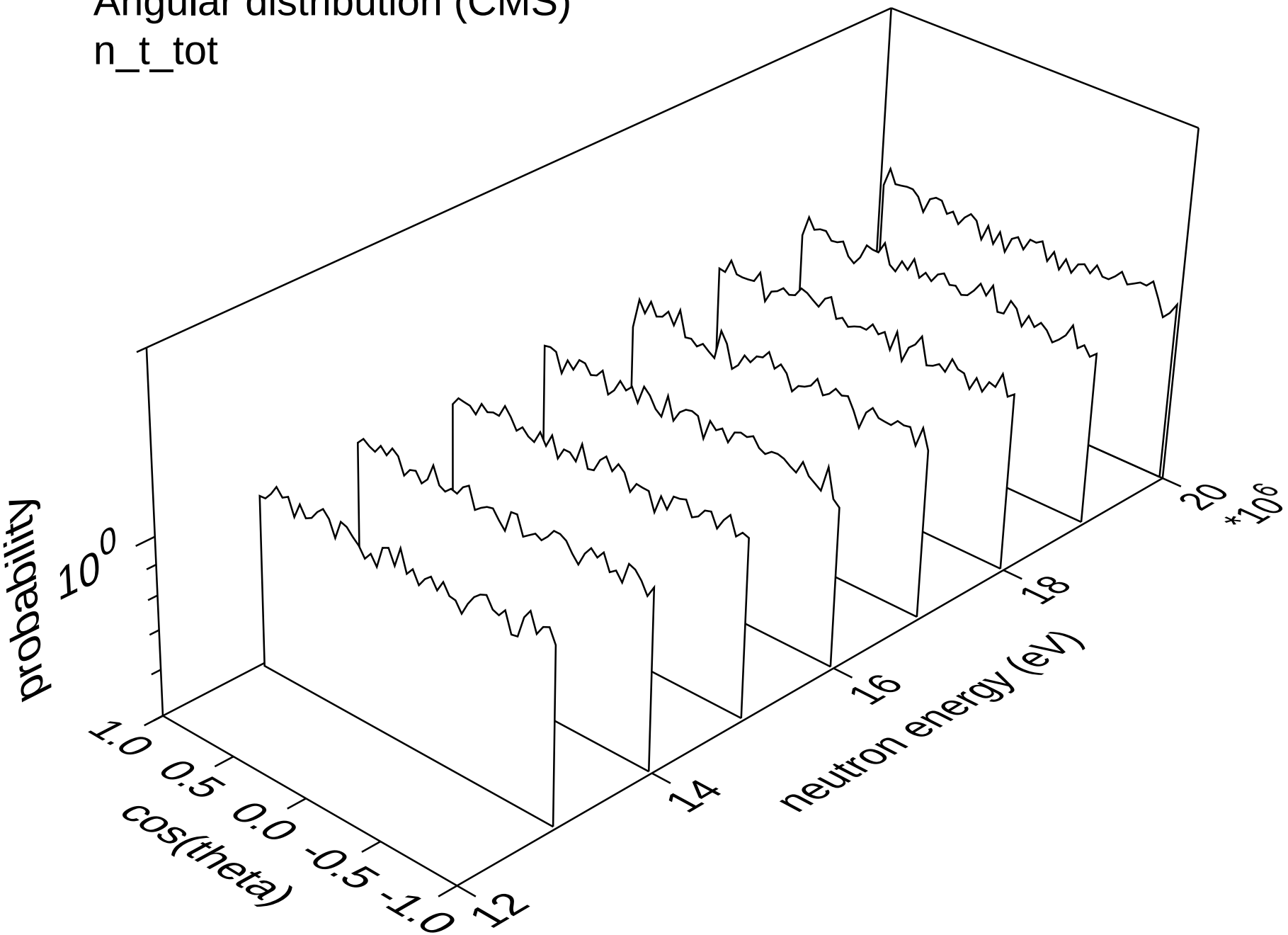

Angular distribution (CMS)
n_n_17
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
2
4
6
*10^6
neutron energy (eV)

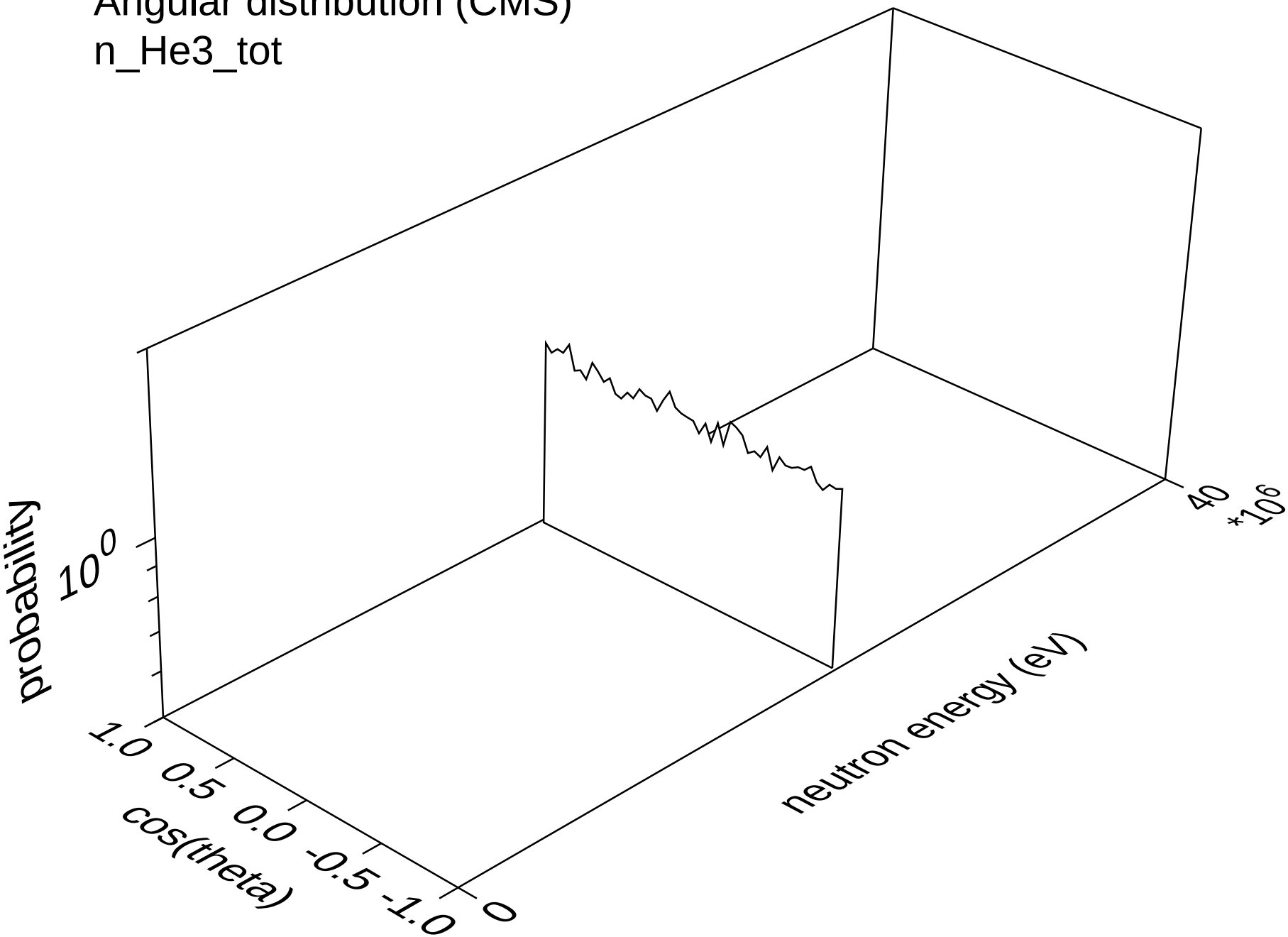

Angular distribution (CMS)
n_n_18
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
2
4
6
*10^6
neutron energy (eV)

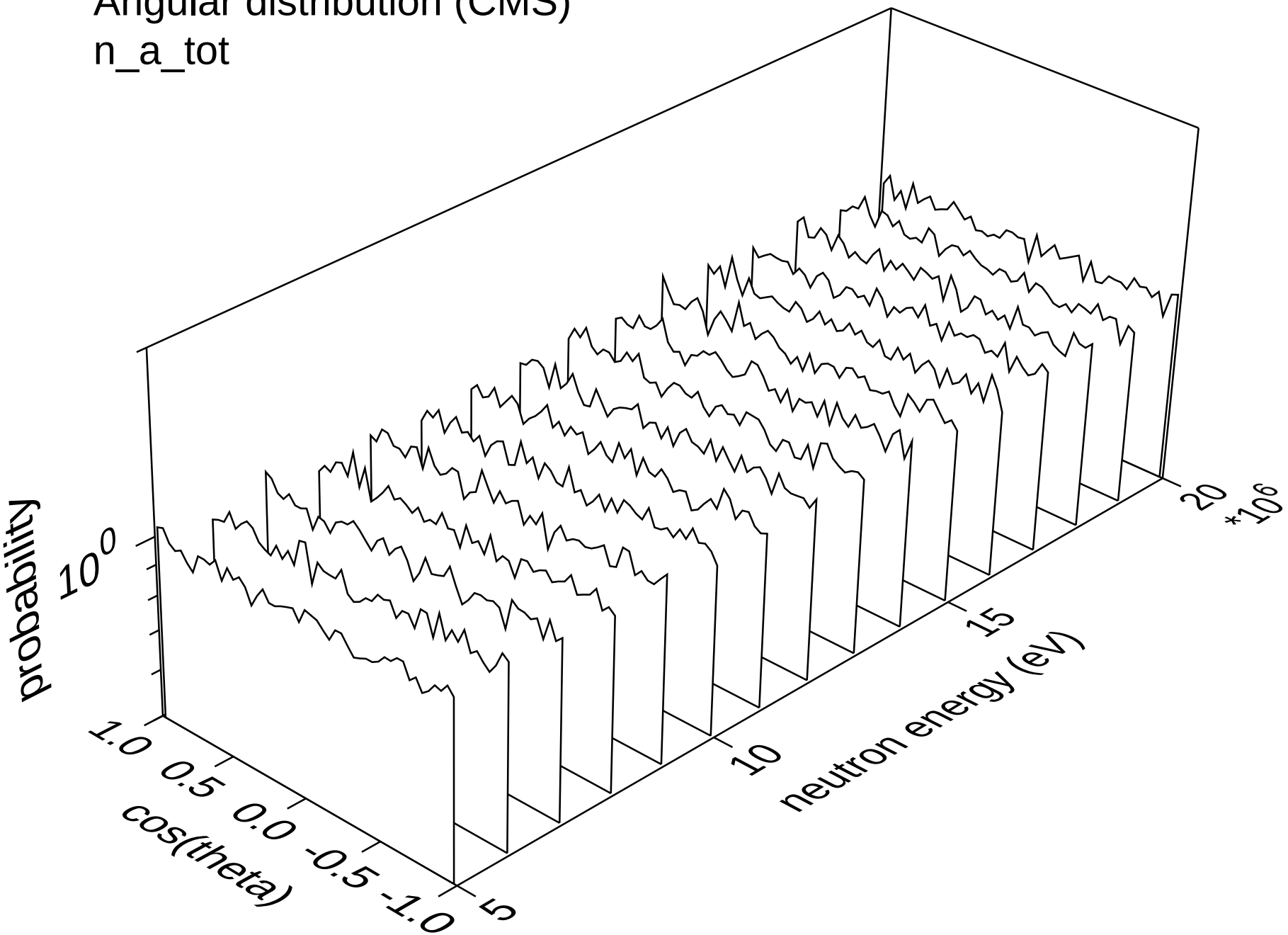

Angular distribution (CMS)
n_n_cont
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

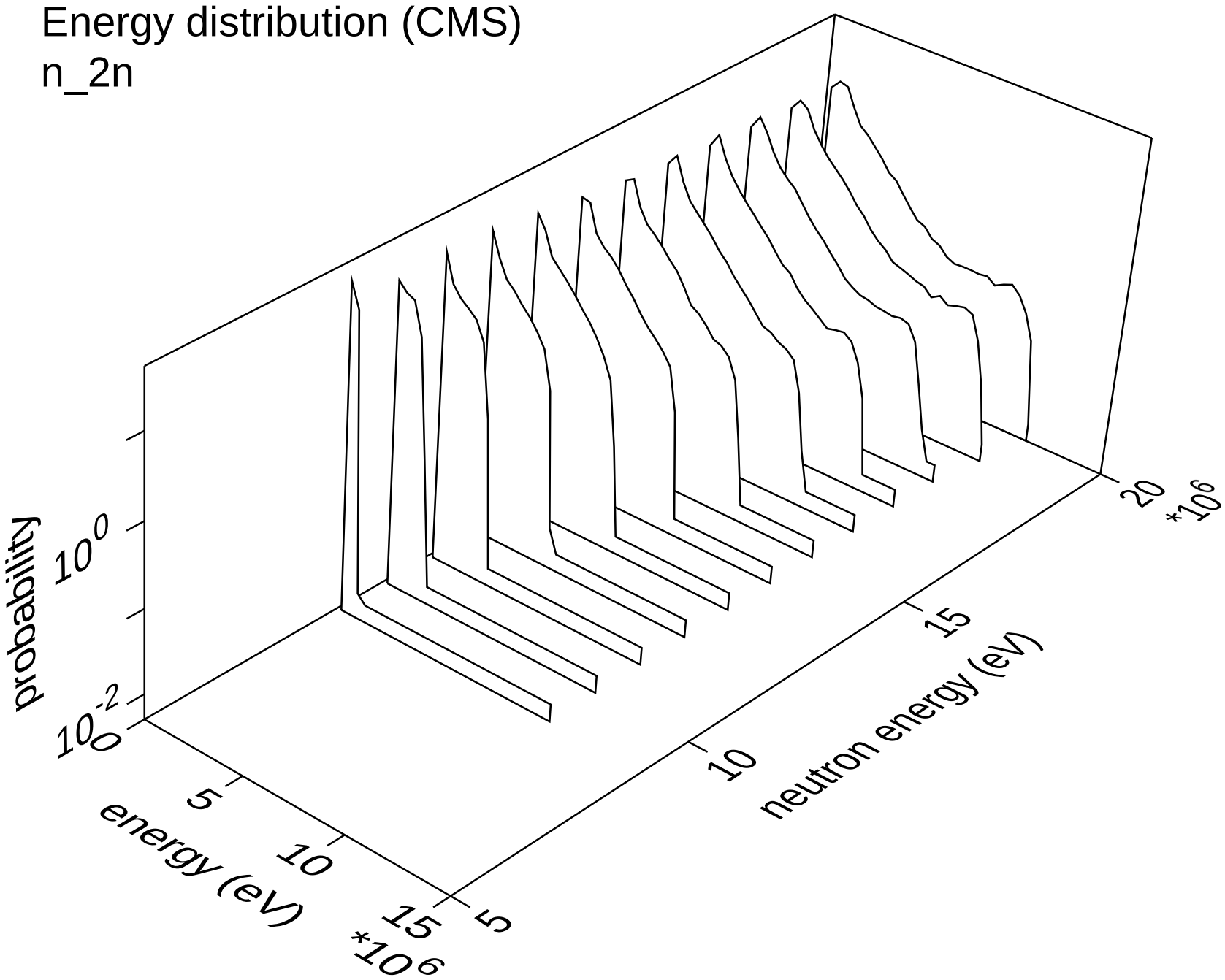

Angular distribution (CMS)
n_p_tot
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
5
10
15
20
*10^6
neutron energy (eV)

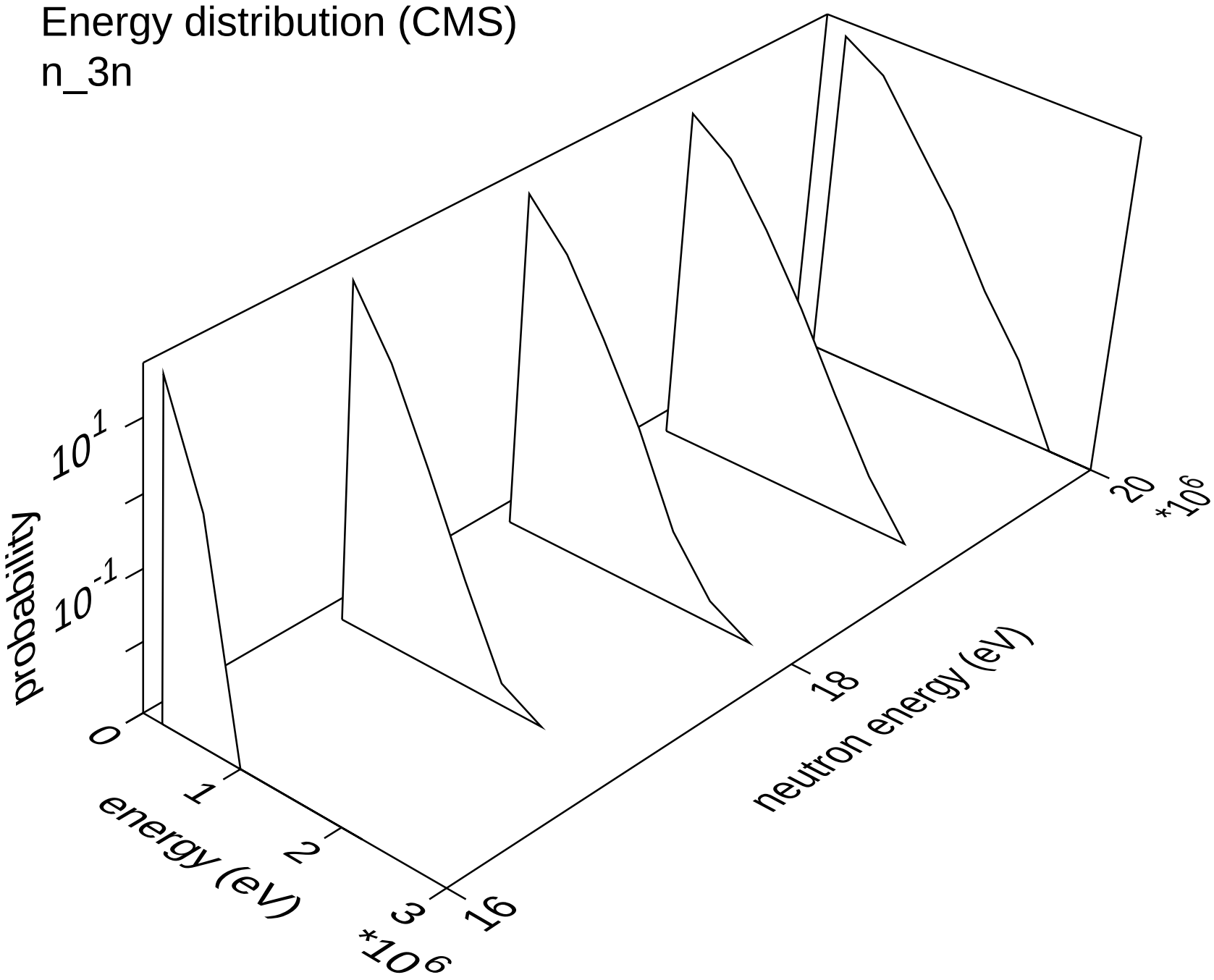

Angular distribution (CMS)
n_d_tot
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
12
14
16
18
20
*10^6
neutron energy (eV)

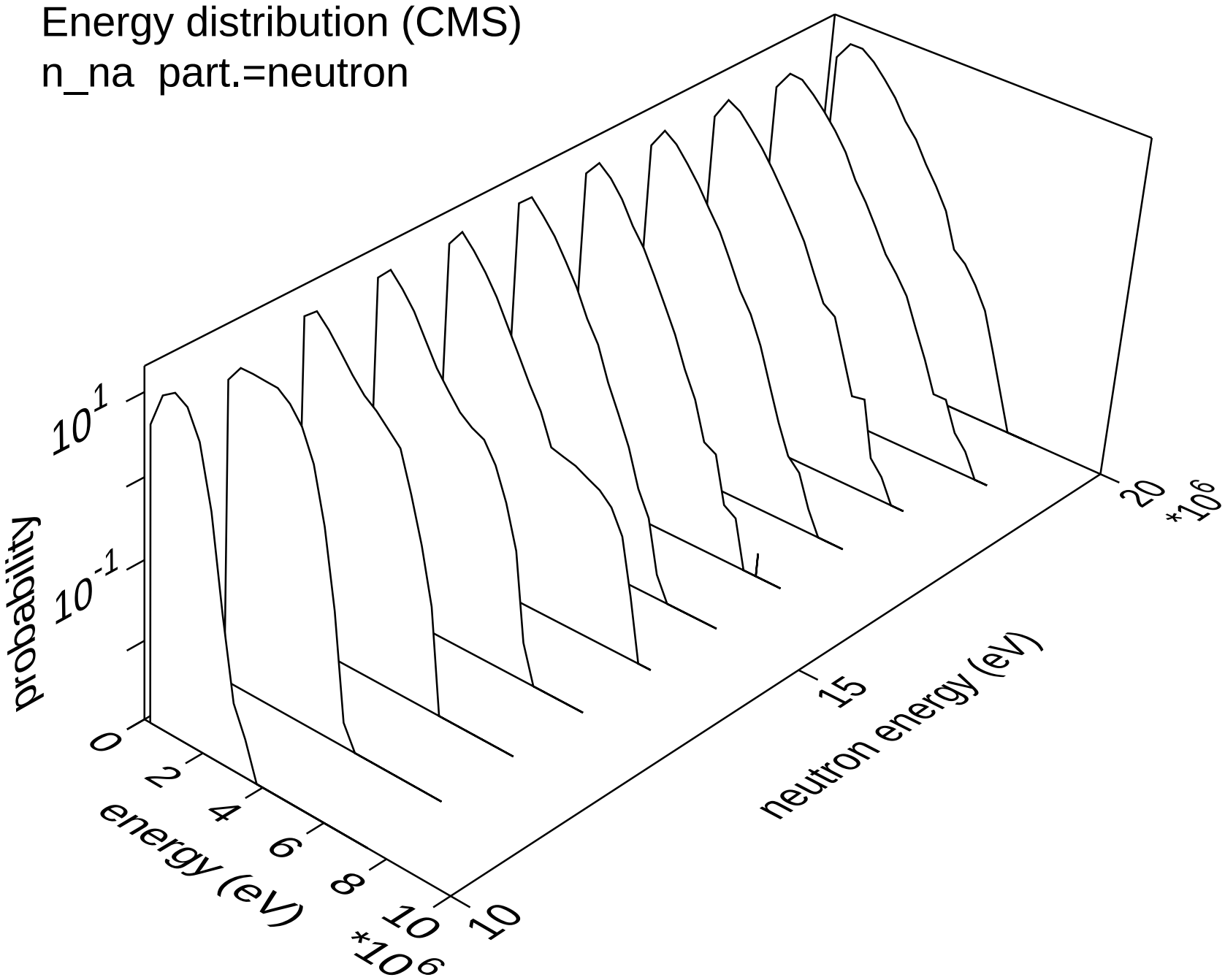

Angular distribution (CMS)
n_t_tot
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
12
14
16
18
20
*10^6
neutron energy (eV)

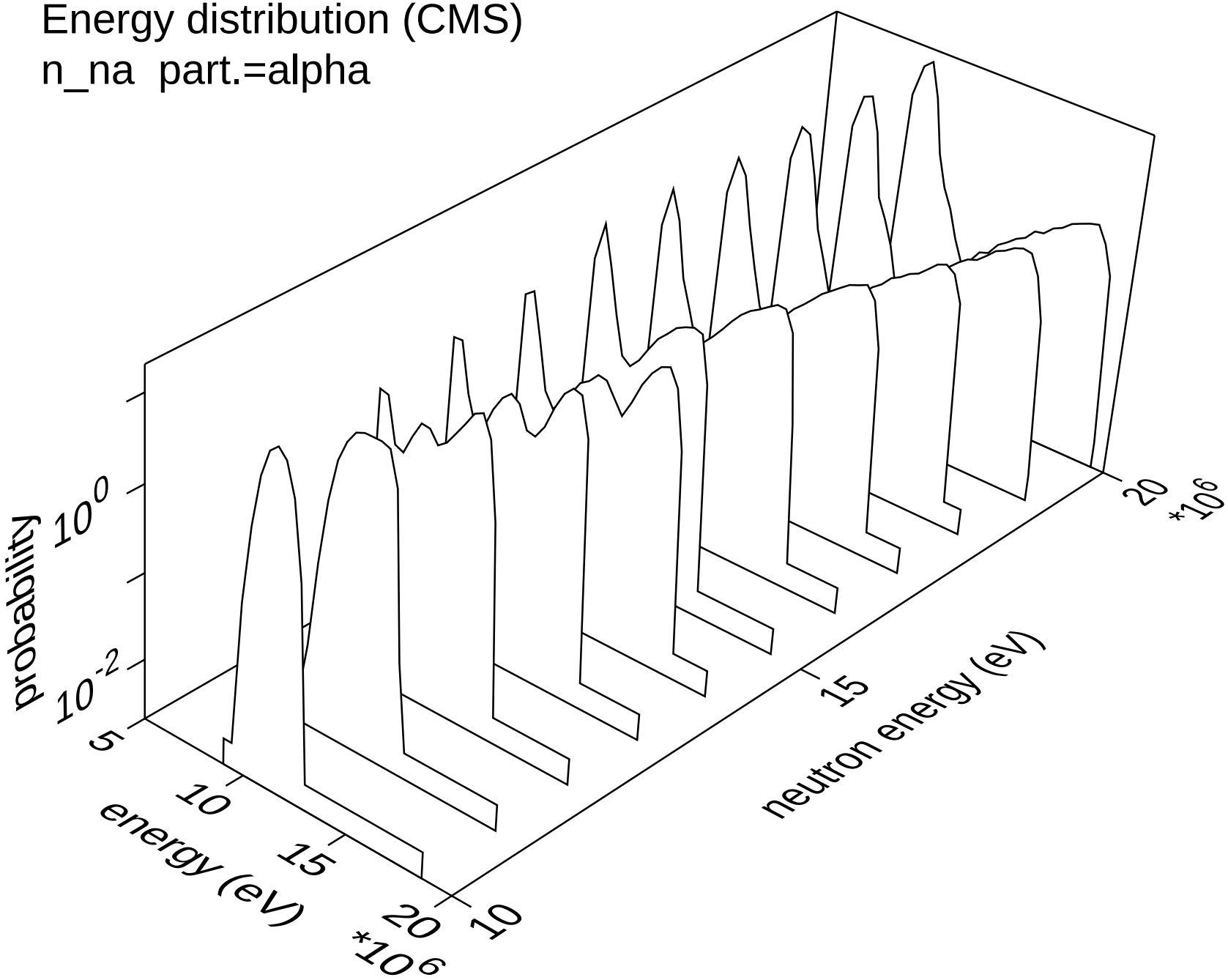

Angular distribution (CMS)
n_He3_tot
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
neutron energy (eV)
40
*10^6

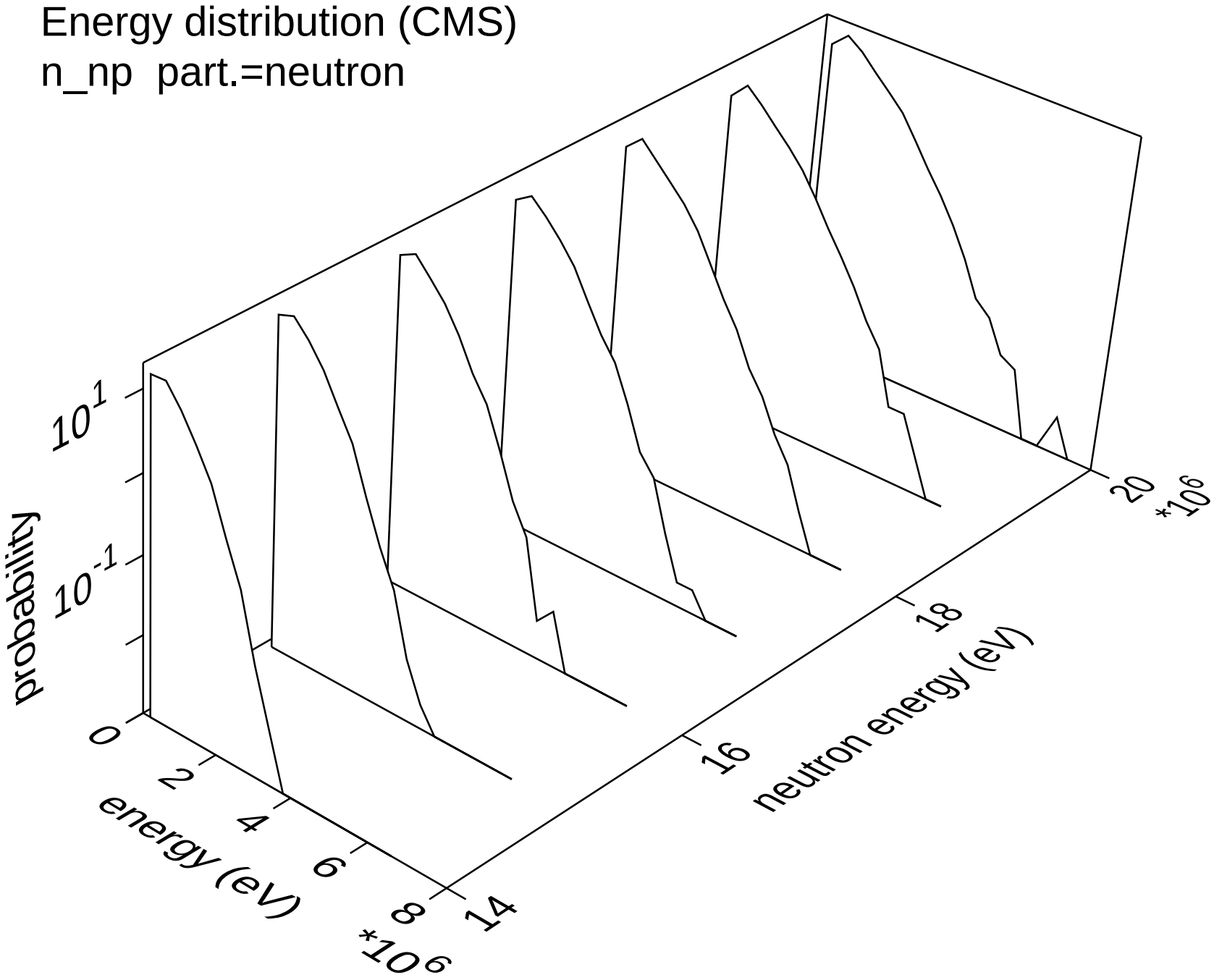

Angular distribution (CMS)
n_a_tot
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
5
10
15
20
*10^6
neutron energy (eV)

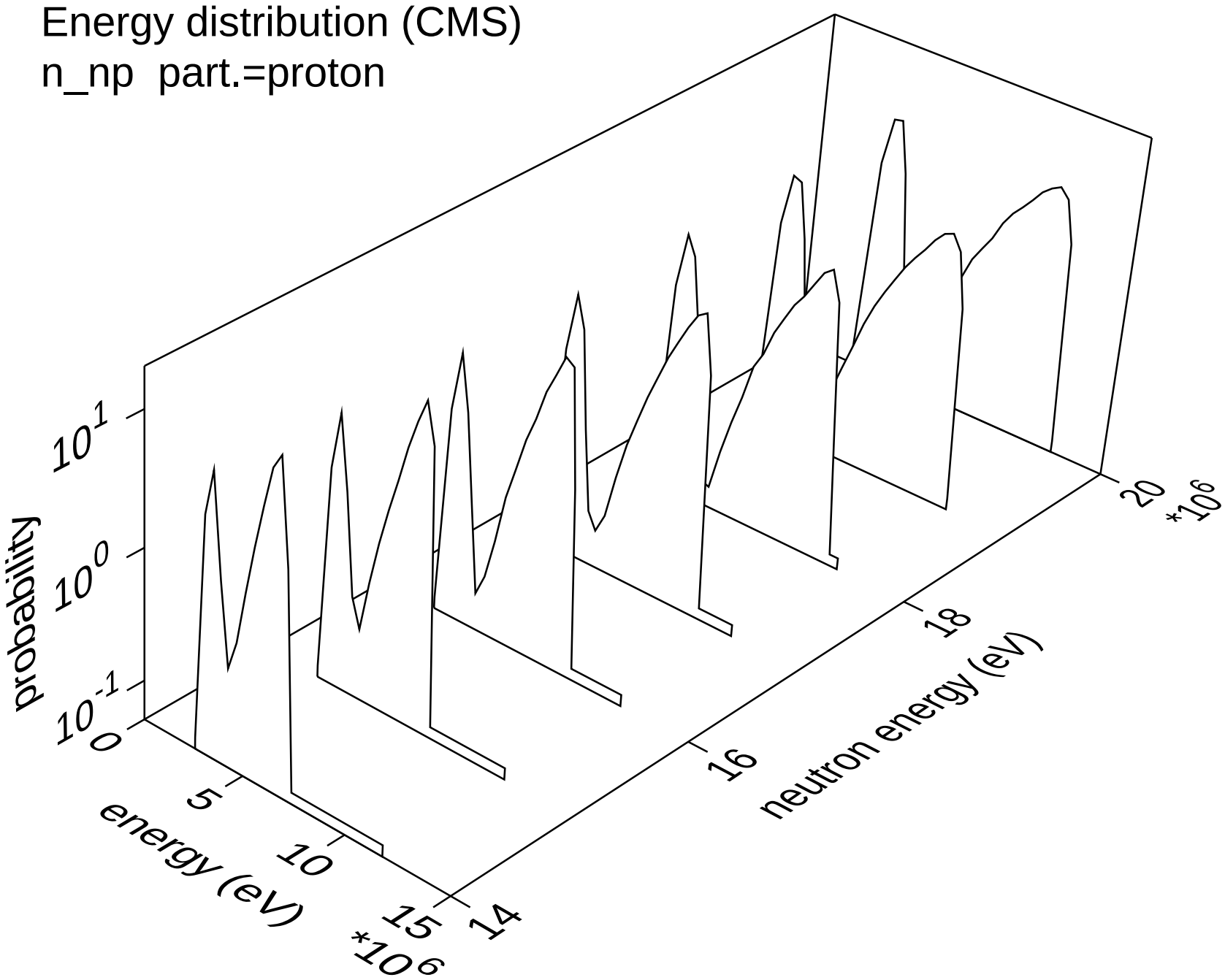

Energy distribution (CMS)
n_2n
probability
10^0
10^{-2}
0
5
10
15
energy (eV)
*10^6
5
10
15
20
neutron energy (eV)
*10^6

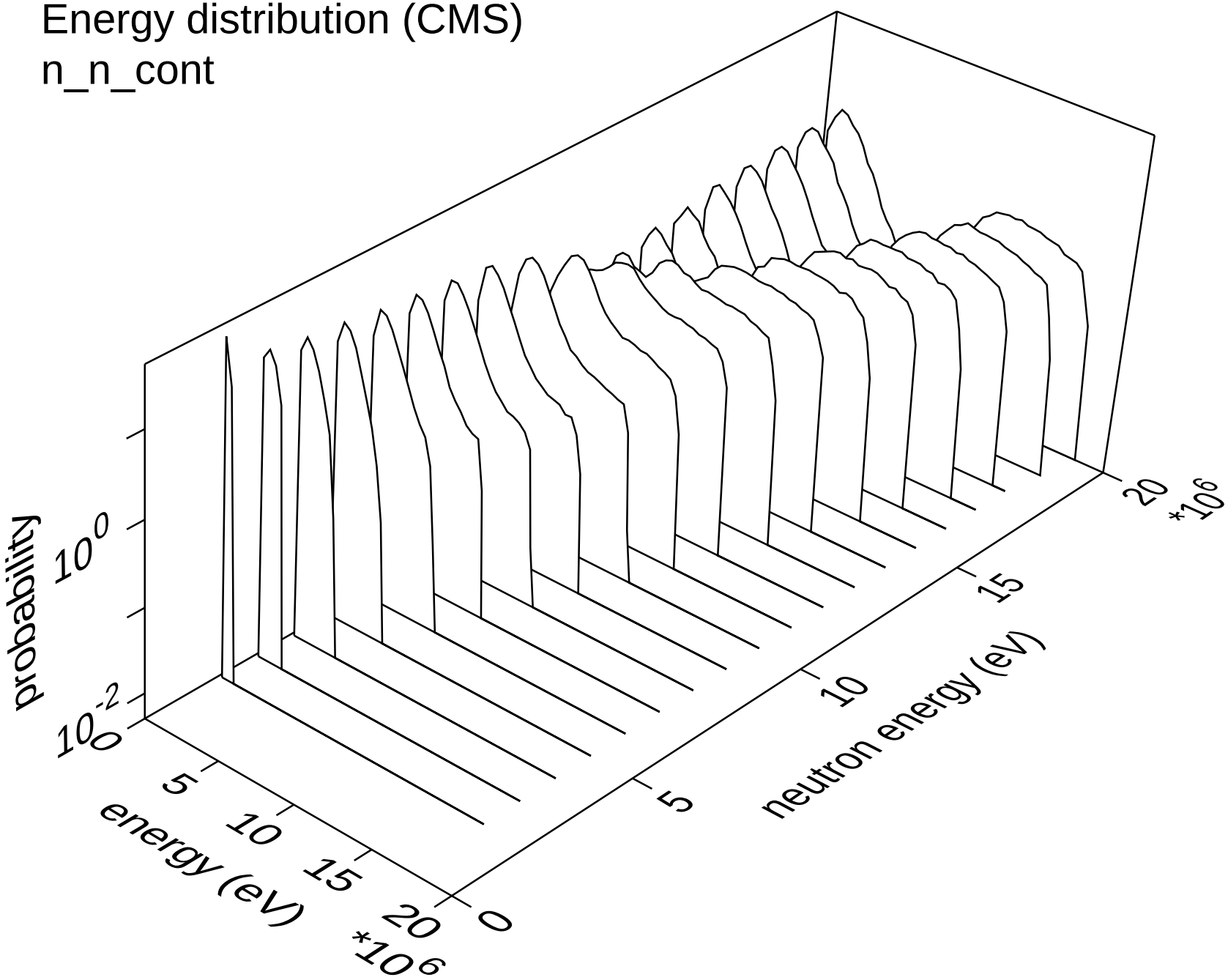

Energy distribution (CMS)
n_3n
probability
10^{1}
10^{-1}
0
energy (eV)
1
2
3
*10 6
16
18
neutron energy (eV)
20
*10^6

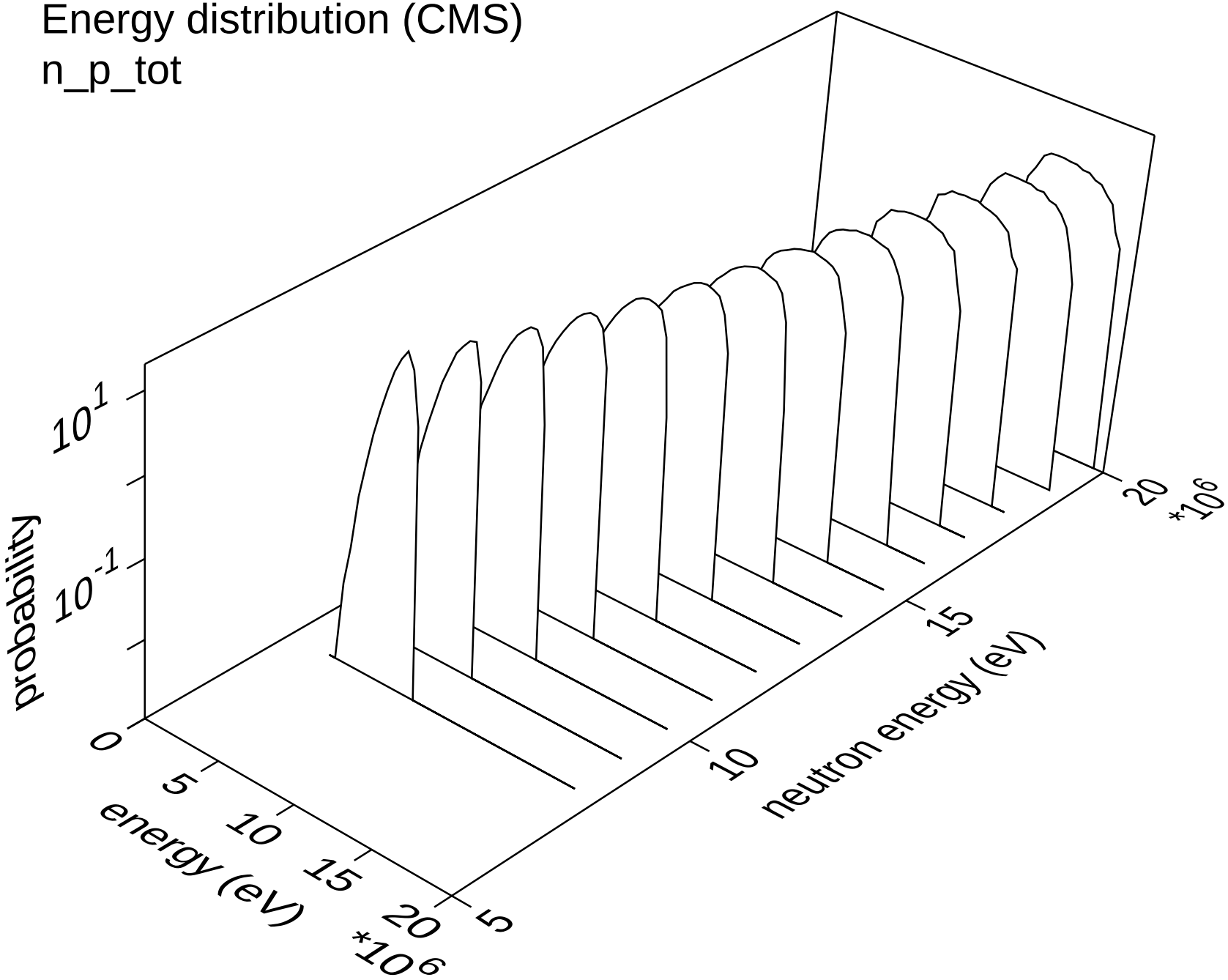

Energy distribution (CMS)
n_na part.=neutron
probability
10^{1}
10^{-1}
0
2
4
6
8
10
energy (eV)
*10^6
10
15
20
neutron energy (eV)
*10^6

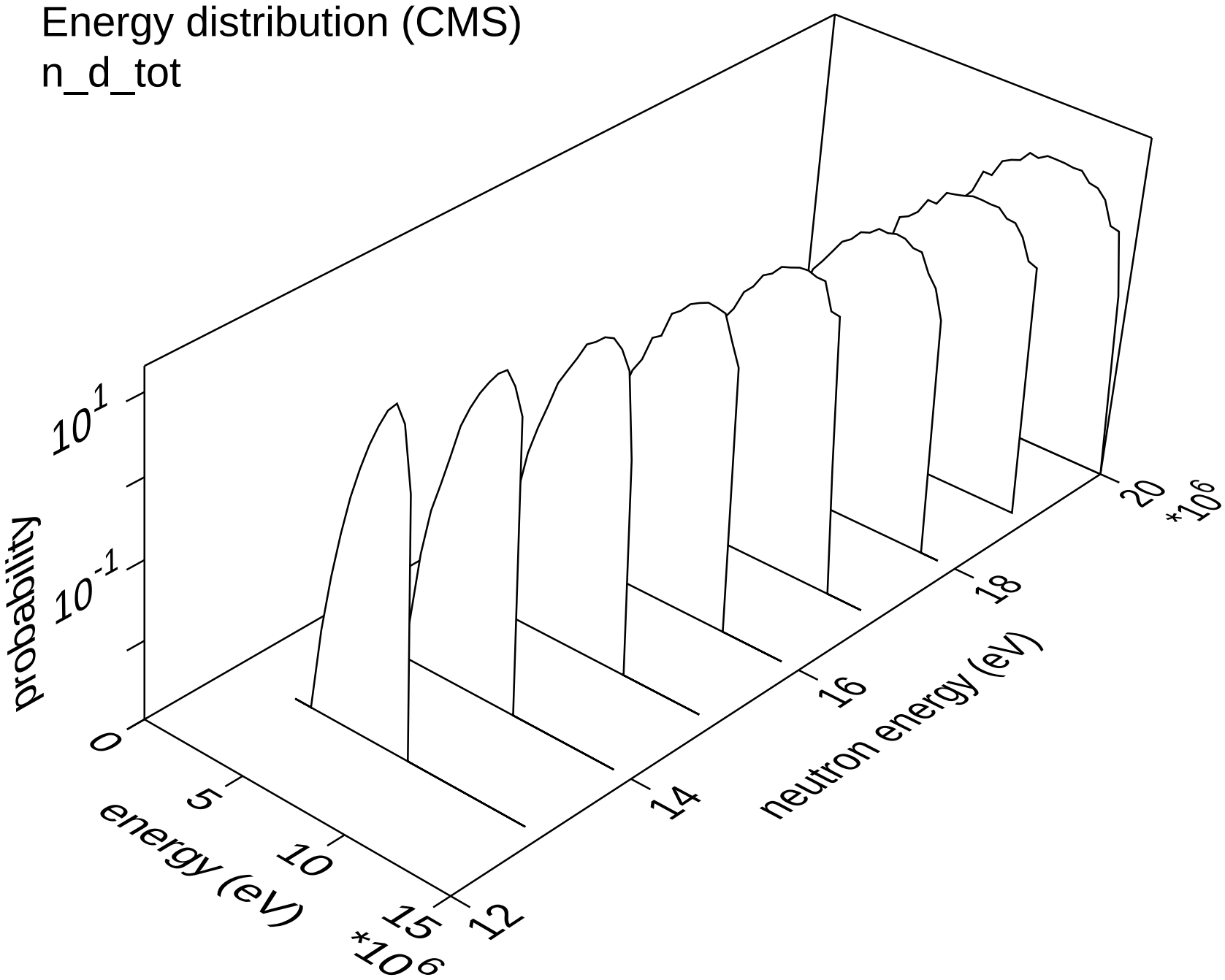

Energy distribution (CMS)
n_na part.=alpha
probability
10^0
10^{-2}
5
10
15
20
*10^6
energy (eV)
10
15
20
*10^6
neutron energy (eV)

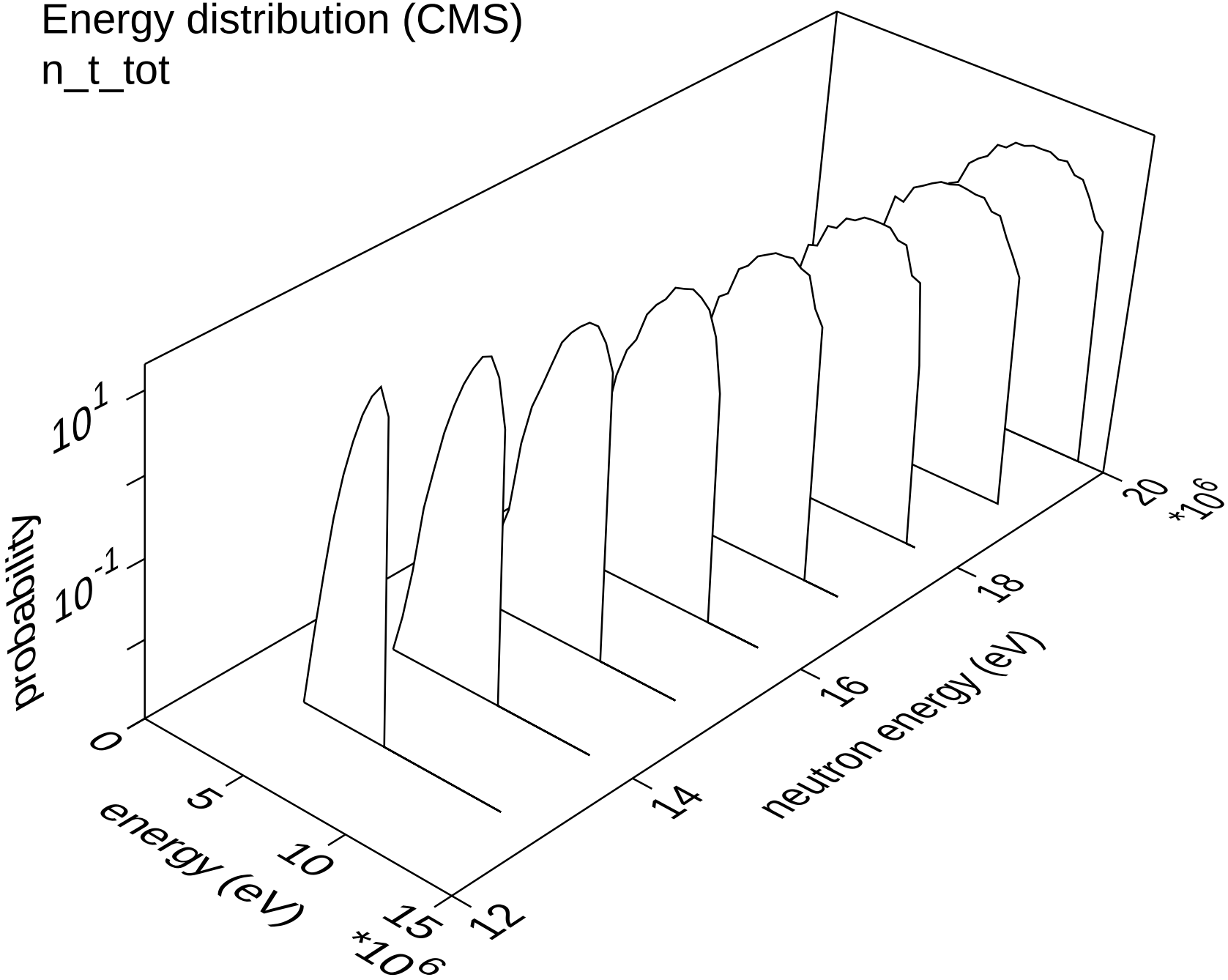

Energy distribution (CMS)
n_np part.=neutron
probability
10^{1}
10^{-1}
0
2
4
6
8
*10 6
energy (eV)
14
16
18
20
*10^6
neutron energy (eV)

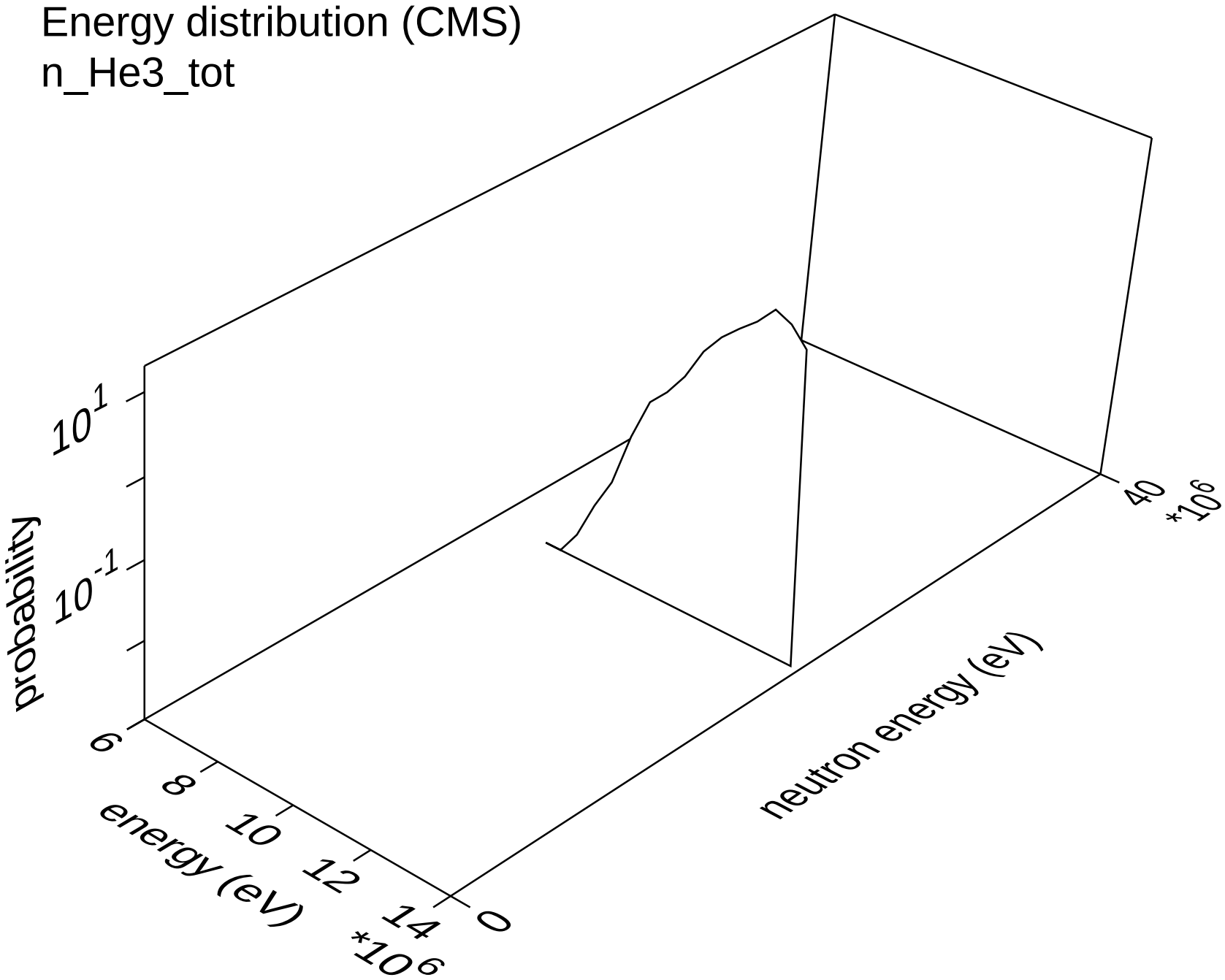

Energy distribution (CMS)
n_np part.=proton
probability
10^{1}
10^{0}
10^{-1}
0
5
10
15
*10^6
energy (eV)
14
16
18
20
*10^6
neutron energy (eV)

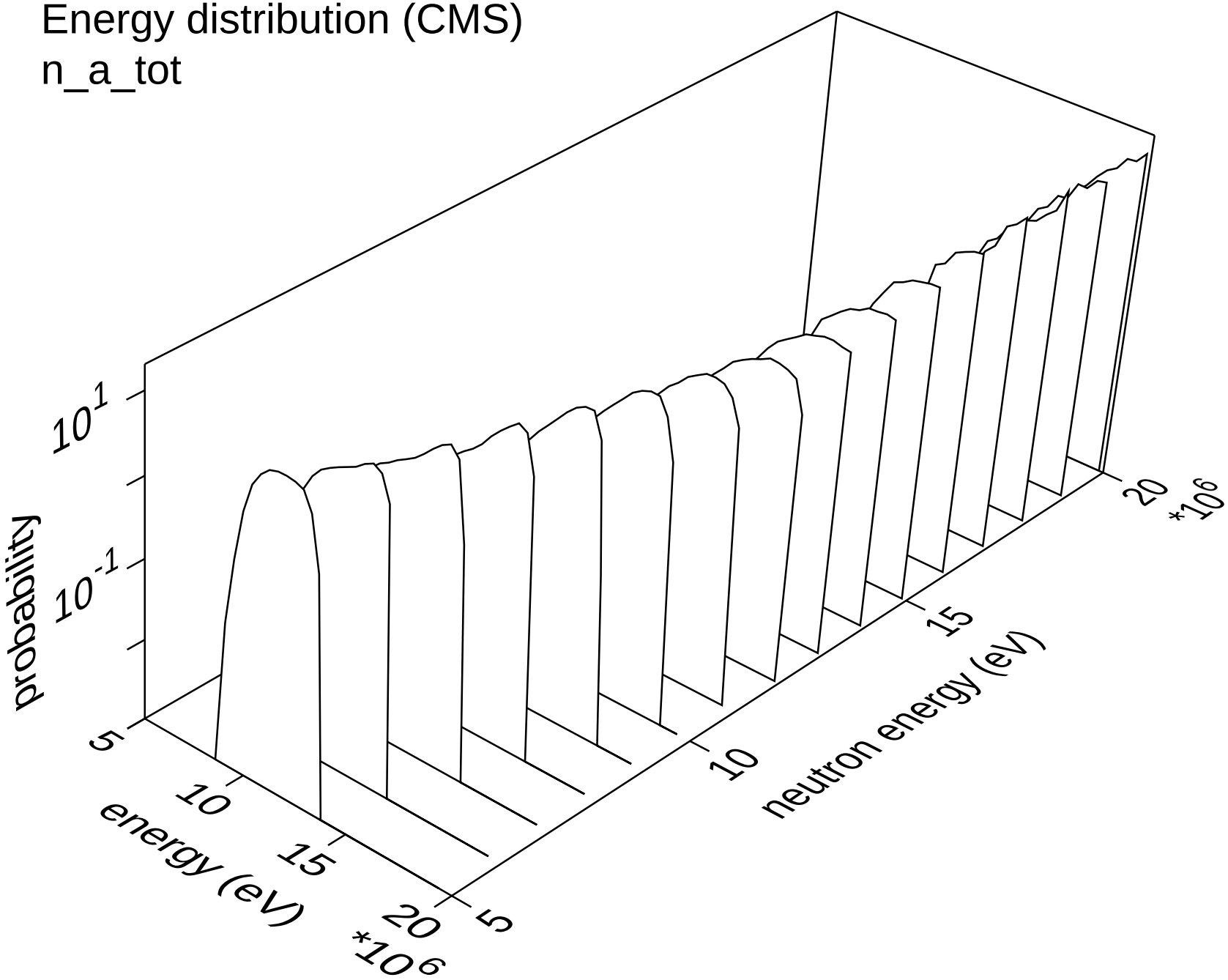

Energy distribution (CMS)
n_n_cont
probability
10^{0}
10^{-2}
0
5
10
15
20
*10^6
energy (eV)
0
5
10
15
20
*10^6
neutron energy (eV)

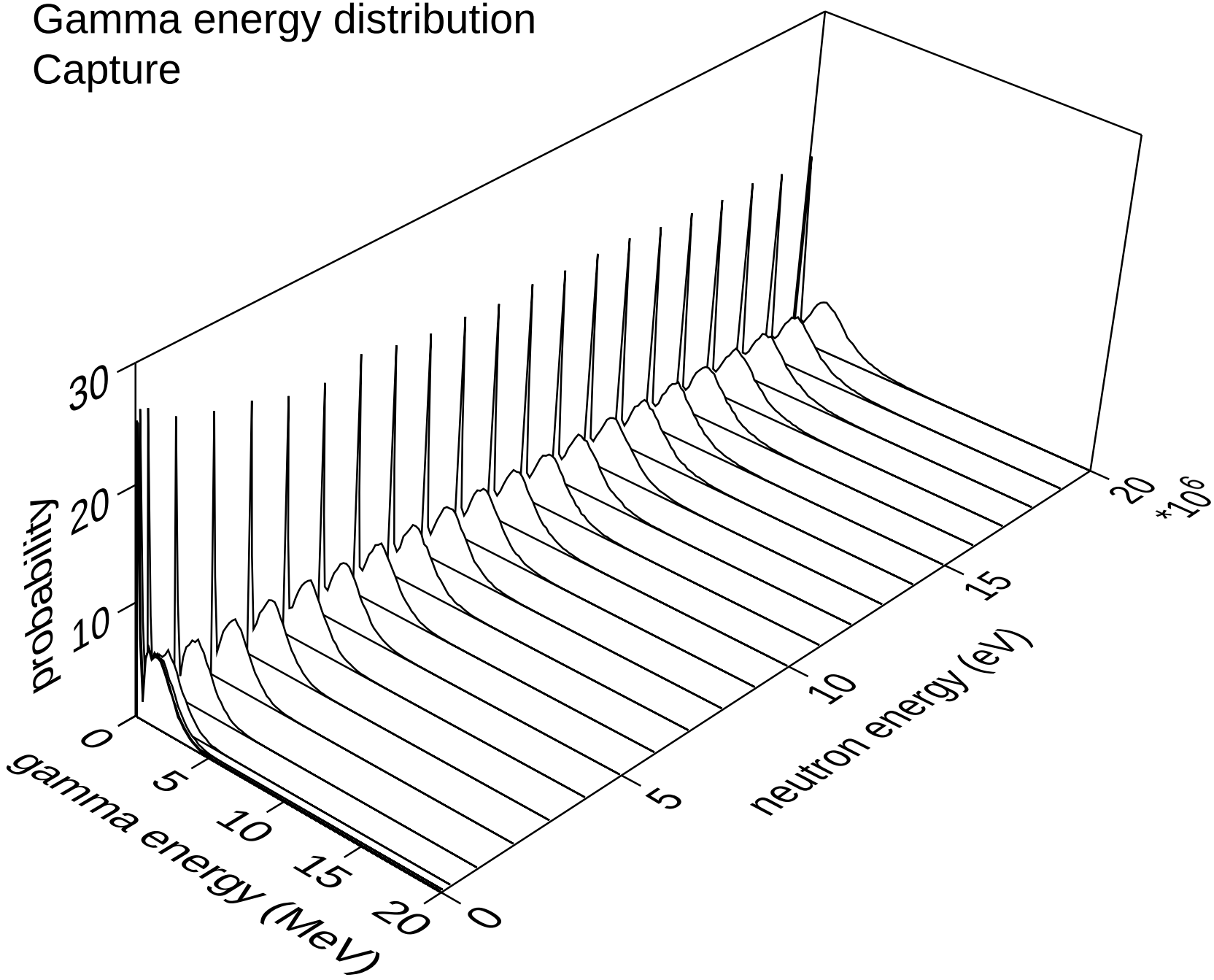

Energy distribution (CMS)
n_p_tot
probability
10^{1}
10^{-1}
0
5
10
15
20
*10^6
energy (eV)
5
10
15
20
*10^6
neutron energy (eV)

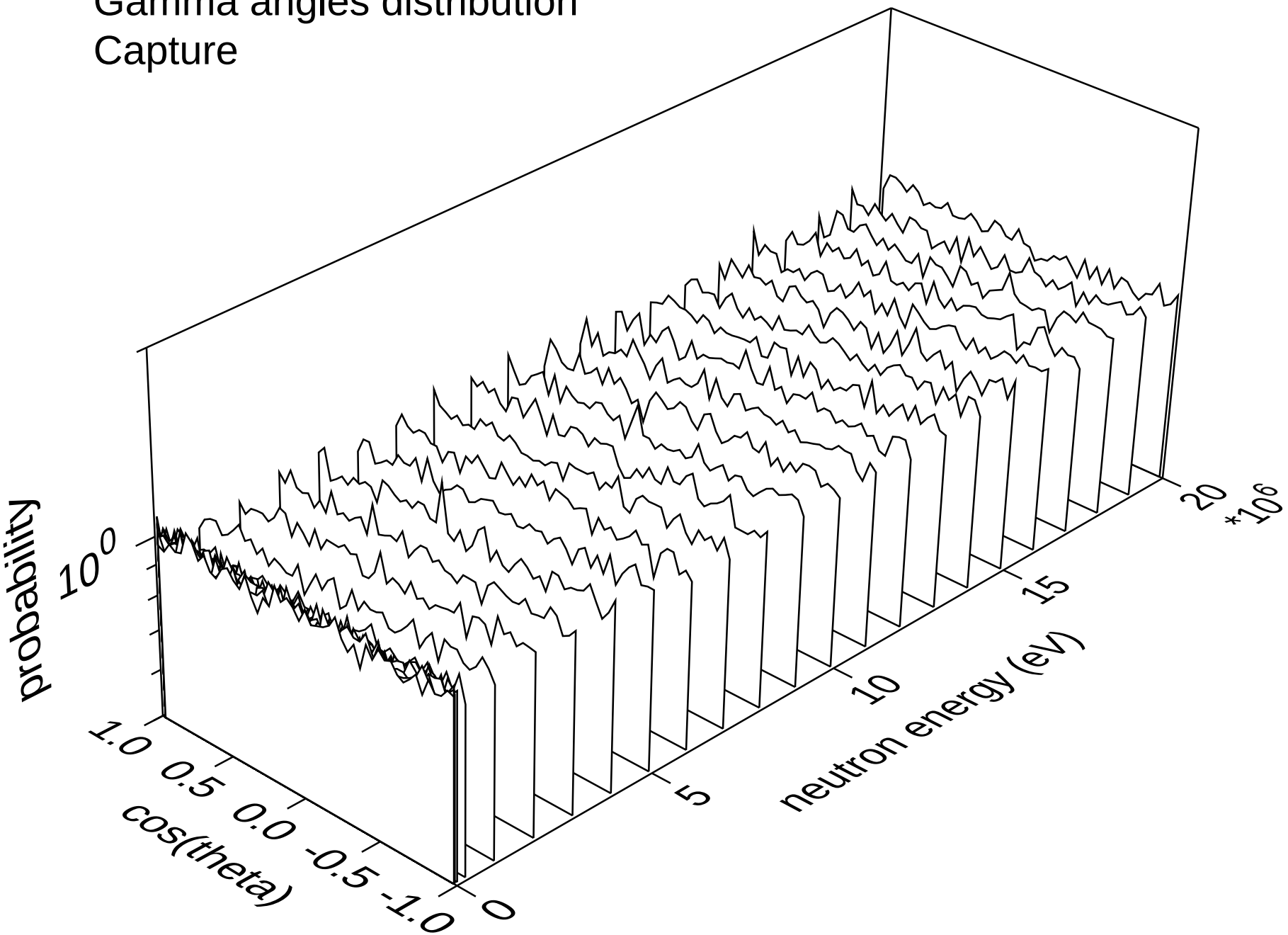

Energy distribution (CMS)
n_d_tot
probability
10^{1}
10^{-1}
0
5
10
15
*10^6
energy (eV)
12
14
16
18
20
*10^6
neutron energy (eV)


Energy distribution (CMS)
n_t_tot
probability
10^{1}
10^{-1}
0
5
10
15
*10^6
energy (eV)
12
14
16
18
20
*10^6
neutron energy (eV)

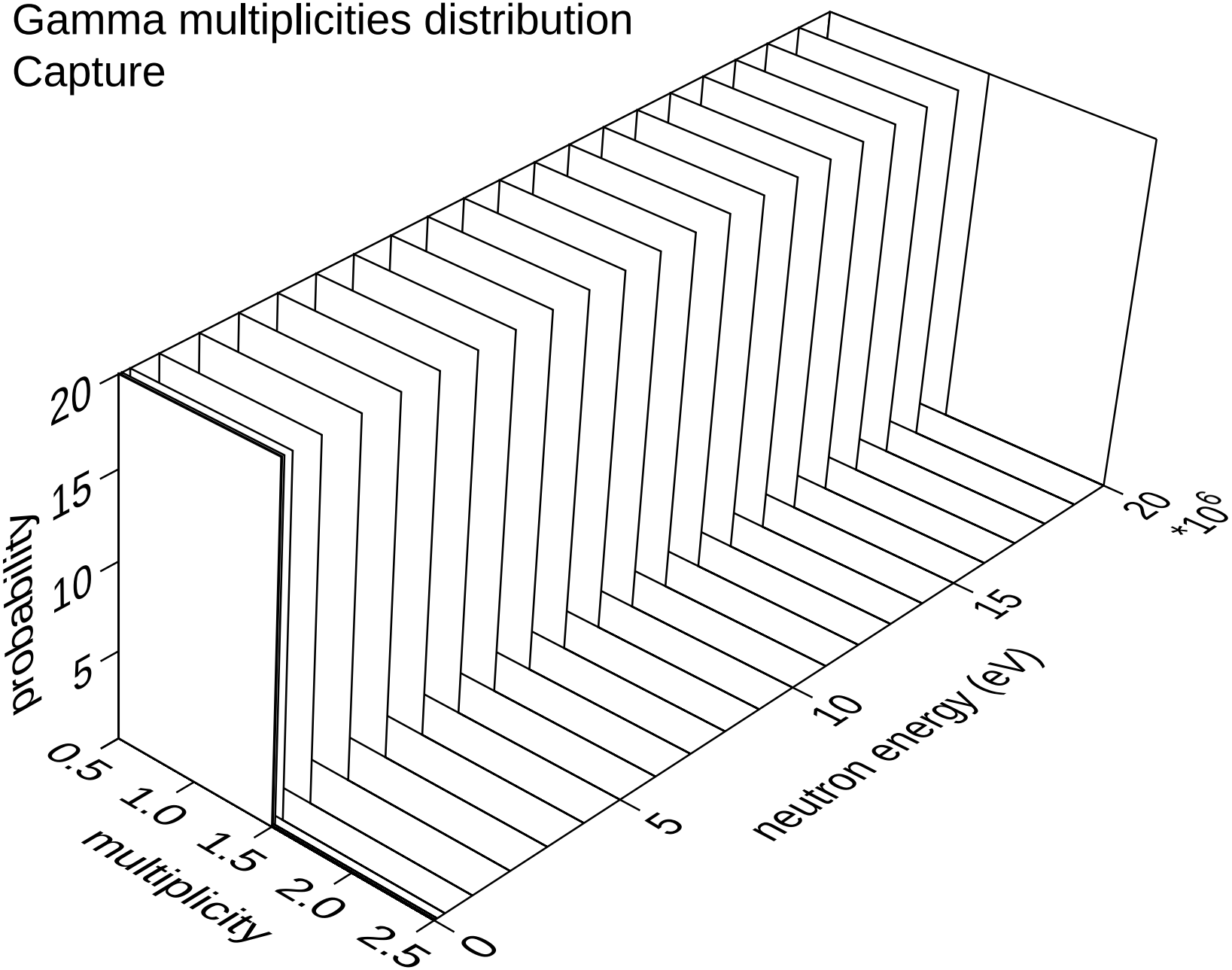

Energy distribution (CMS)
n_He3_tot
probability
10^{1}
10^{-1}
6
8
10
12
14
energy (eV)
*10^6
0
40
*10^6
neutron energy (eV)

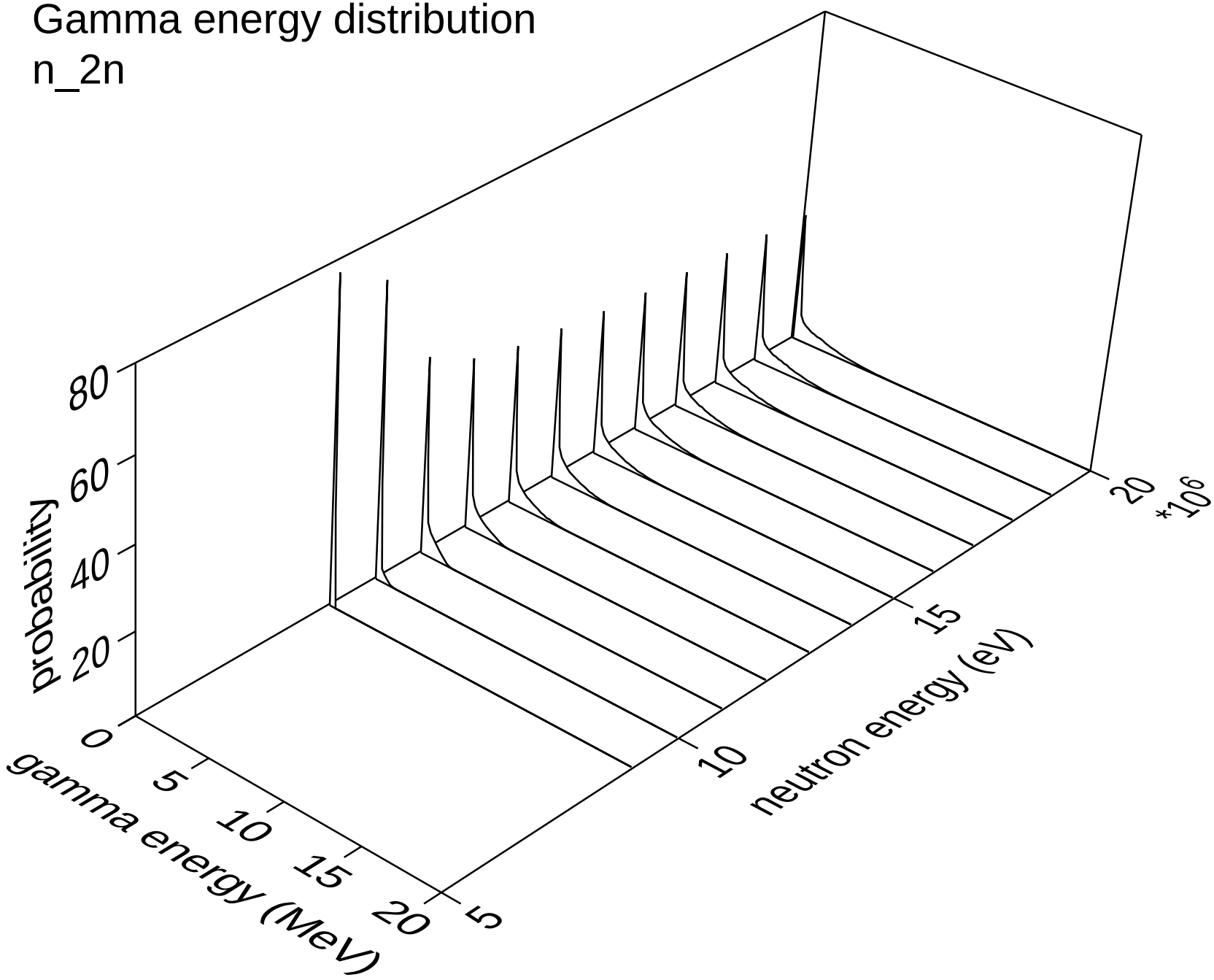

Energy distribution (CMS)
n_a_tot
probability
10^{1}
10^{-1}
5
10
15
20
*10^6
energy (eV)
5
10
15
20
*10^6
neutron energy (eV)

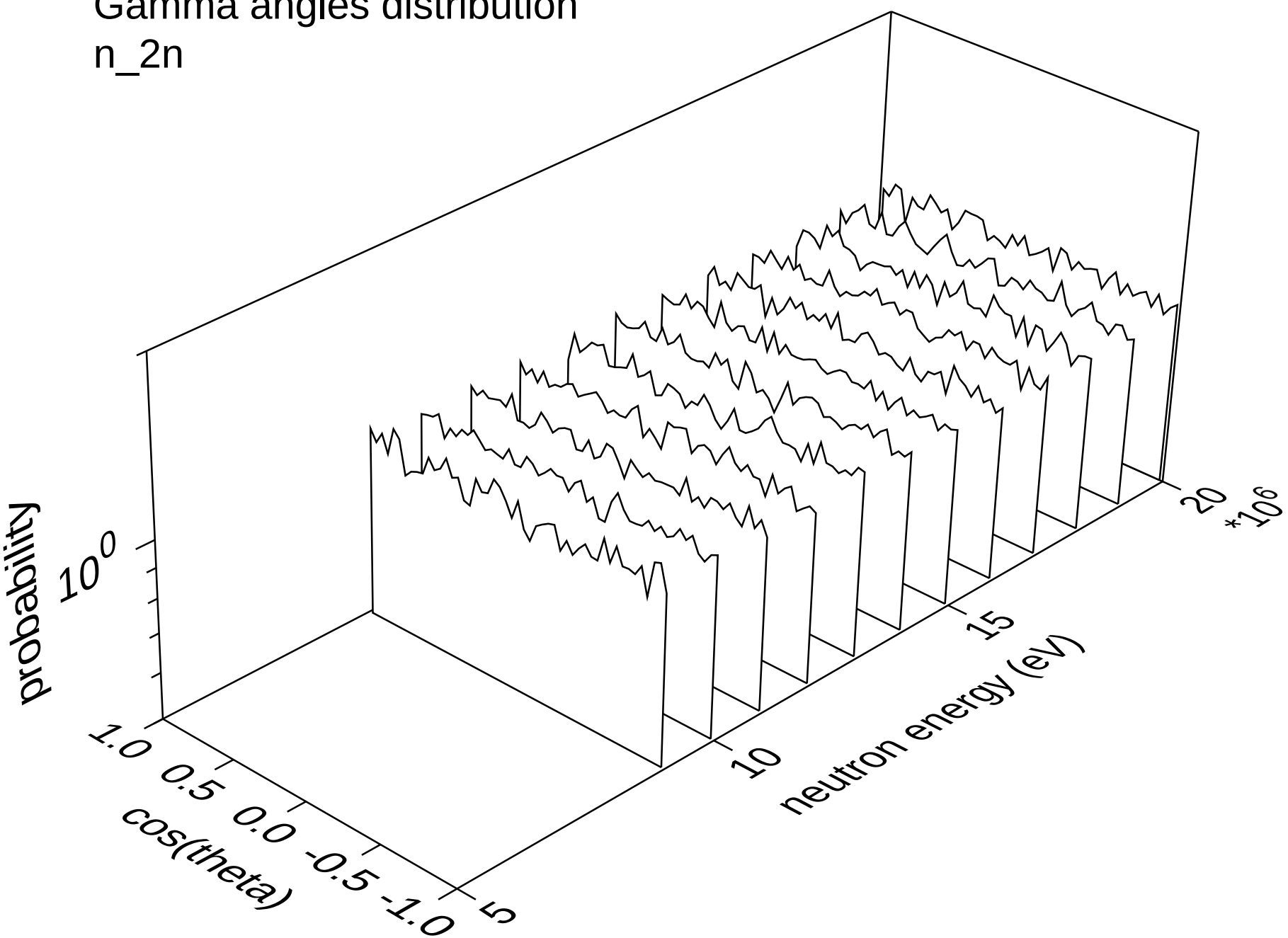

Gamma energy distribution
Capture
probability
30
20
10
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
0
5
10
15
20
*10^6


Gamma angles distribution
Capture
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
neutron energy (eV)
*10^6

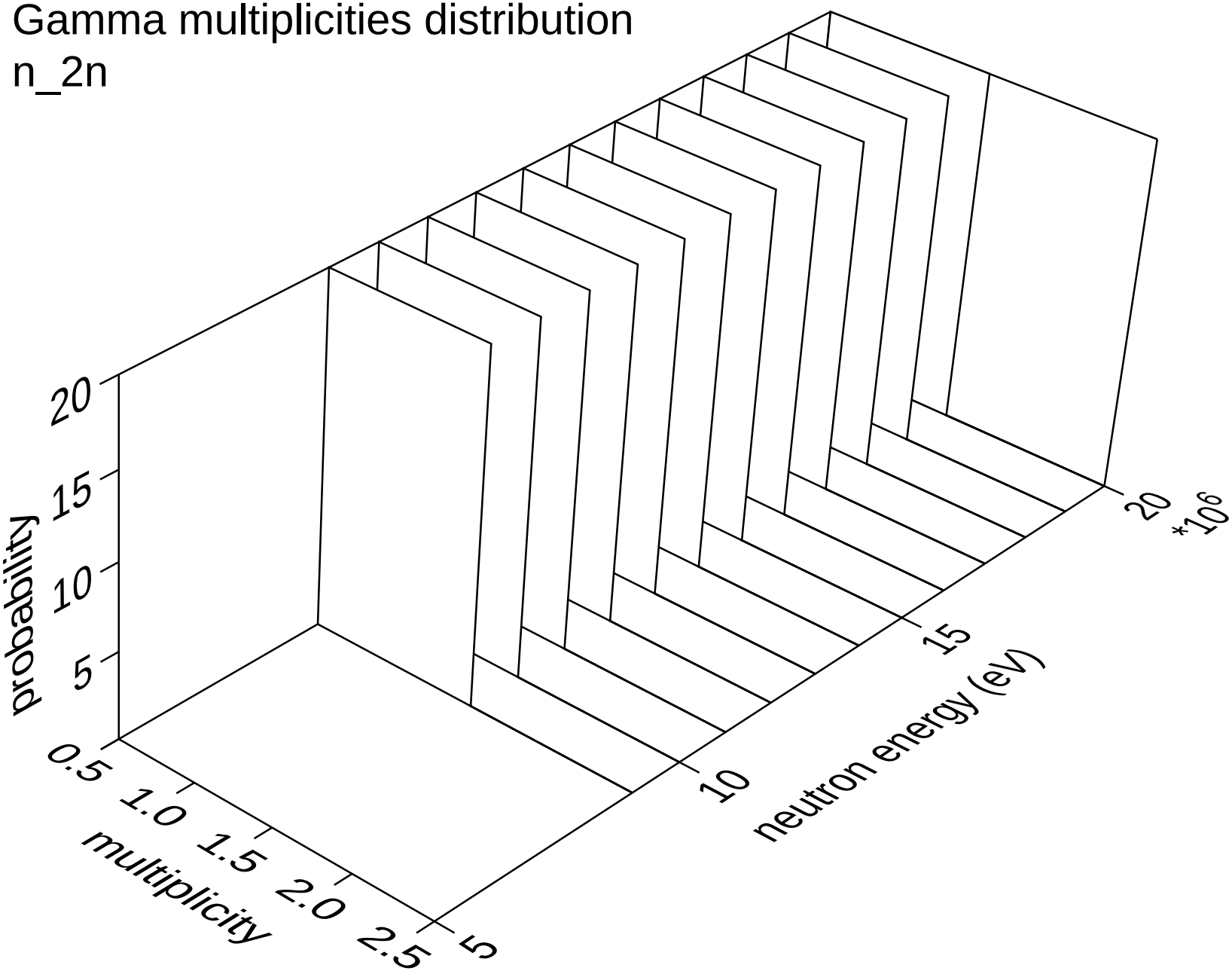
Gamma multiplicities distribution
Capture

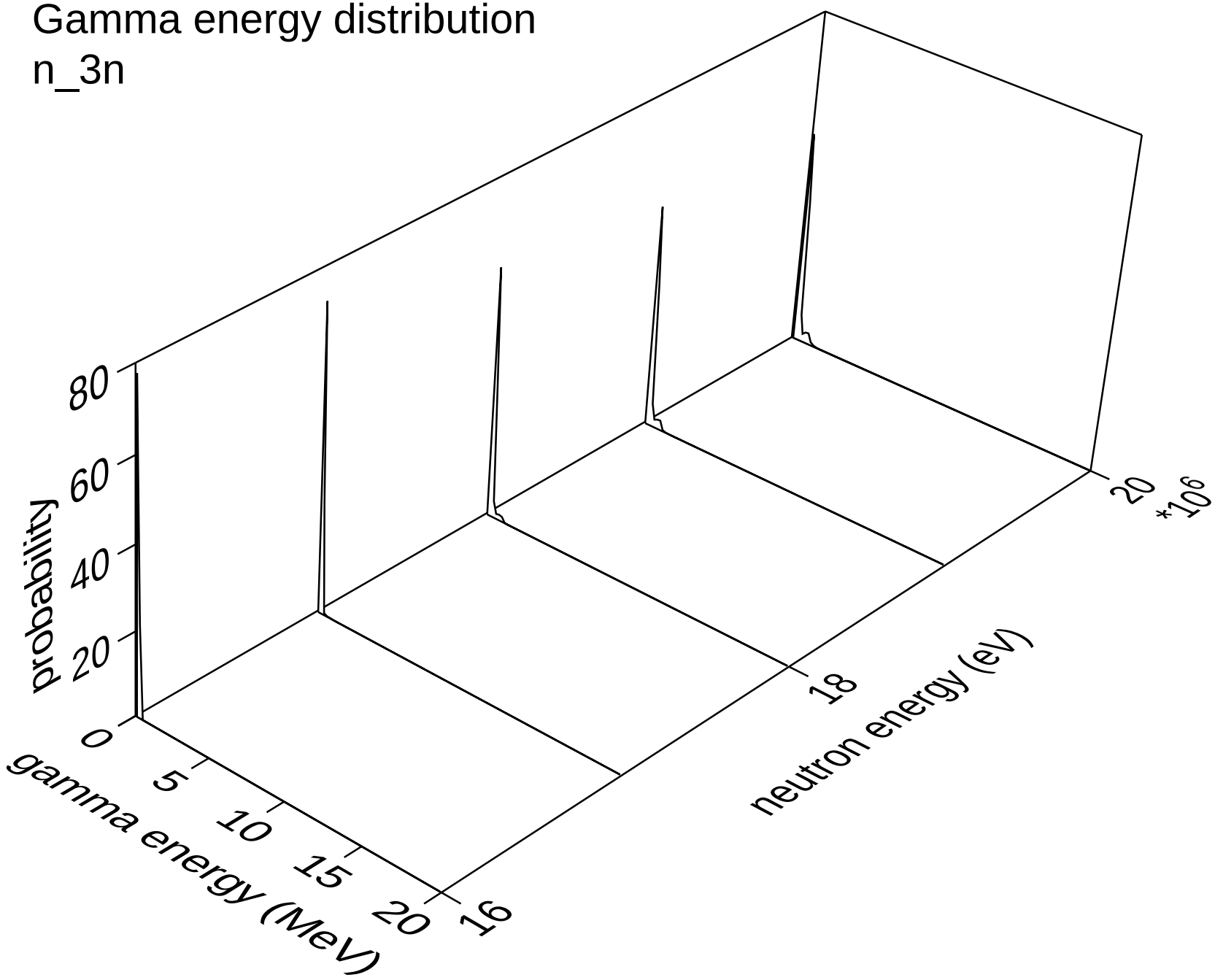


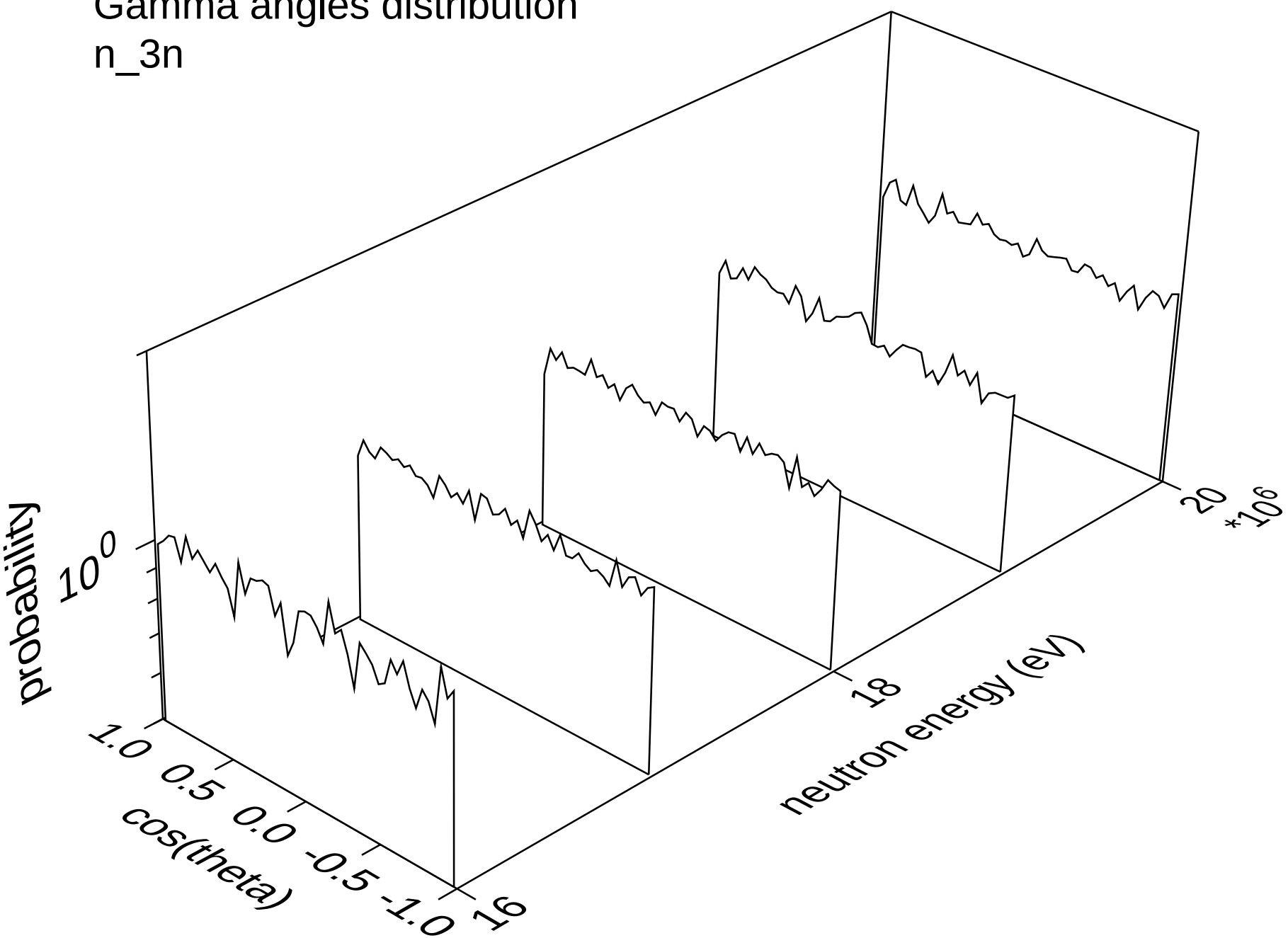

Gamma energy distribution
n_2n
probability
80
60
40
20
0
gamma energy (MeV)
5
10
15
20
neutron energy (eV)
5
10
15
20
*10^6


Gamma angles distribution
n_2n
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
5
10
15
20
*10^6
neutron energy (eV)

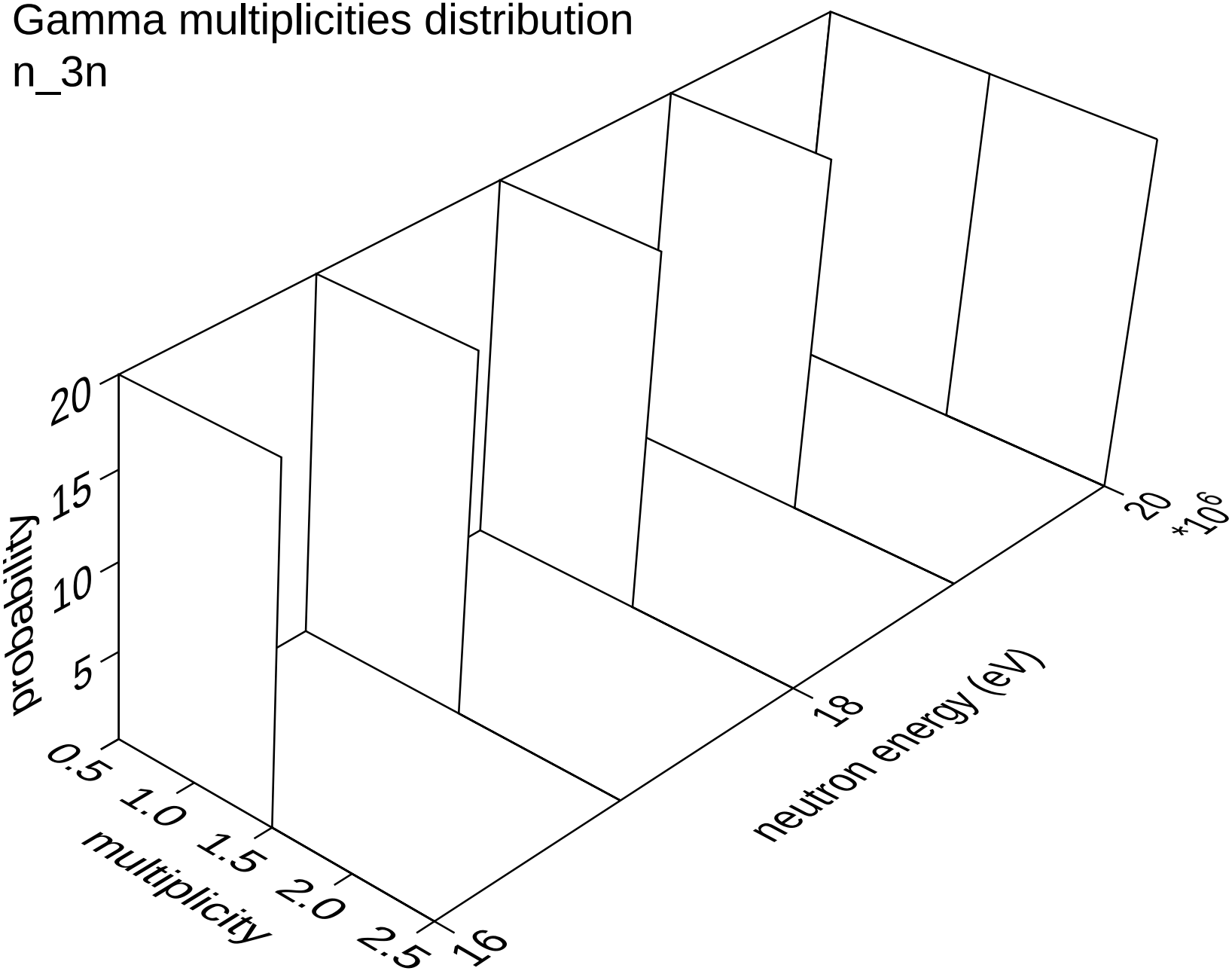
Gamma multiplicities distribution
n_2n

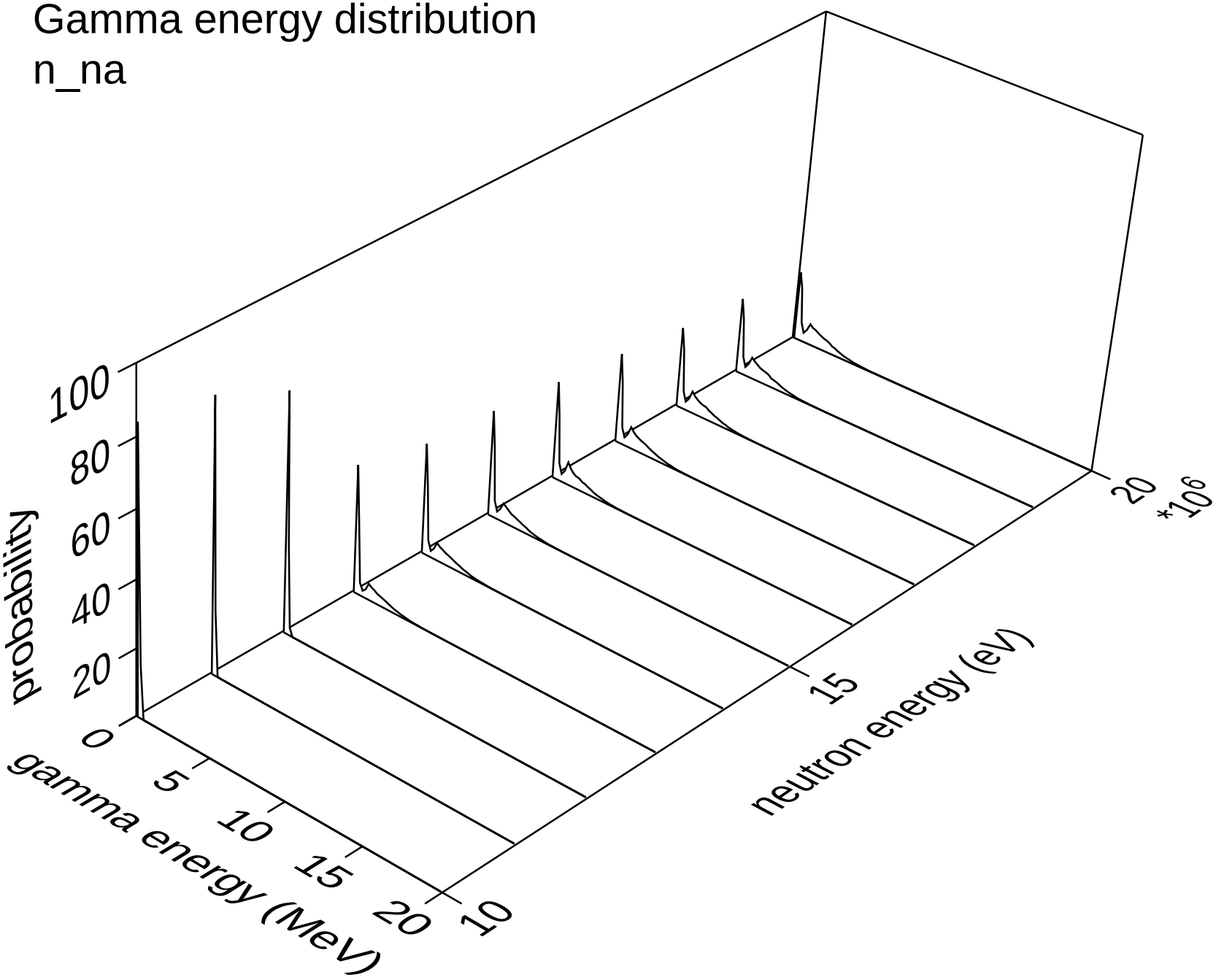


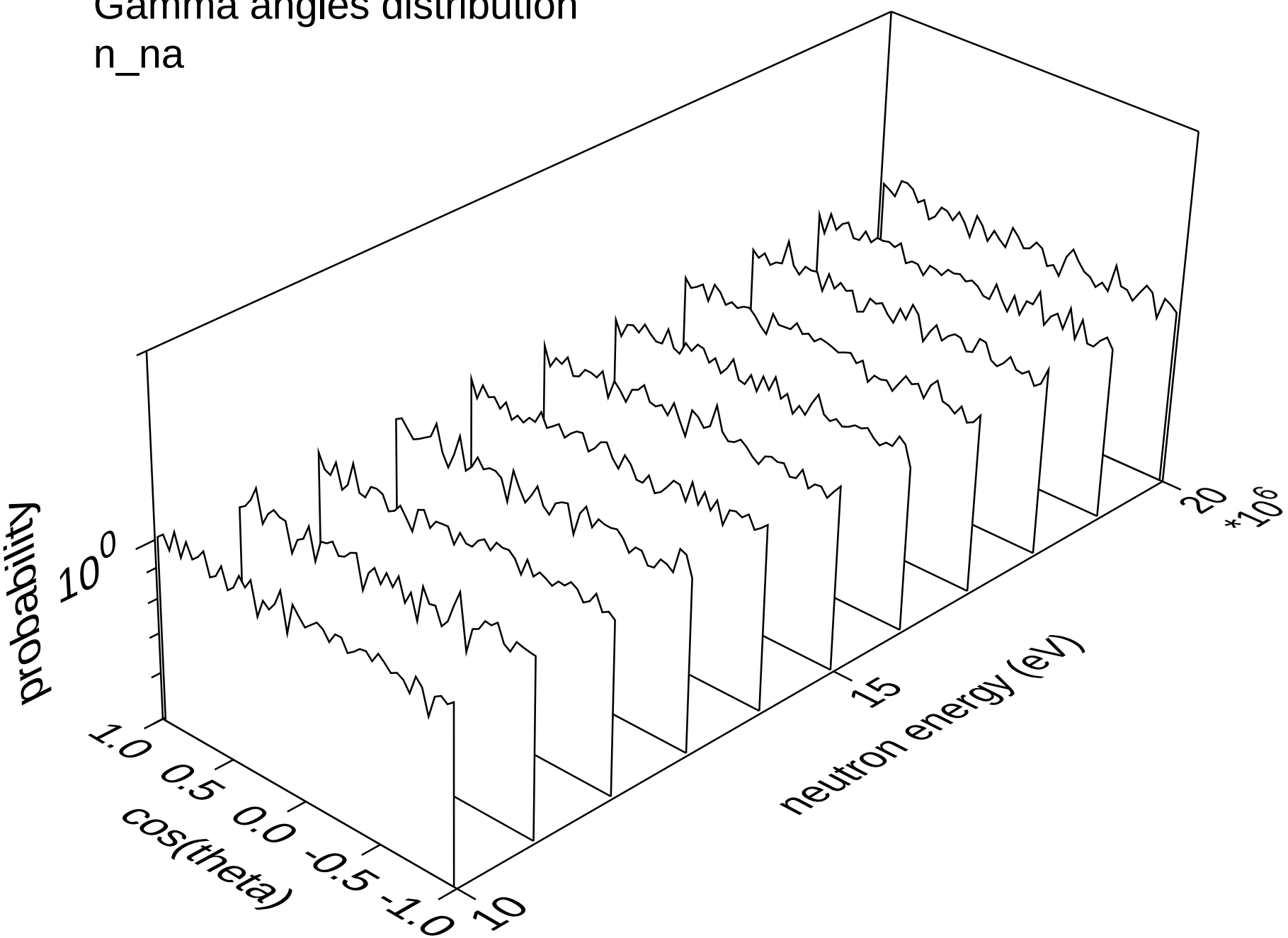

Gamma energy distribution
n_3n
probability
80
60
40
20
0
gamma energy (MeV)
5
10
15
20
16
neutron energy (eV)
18
20
*10^6

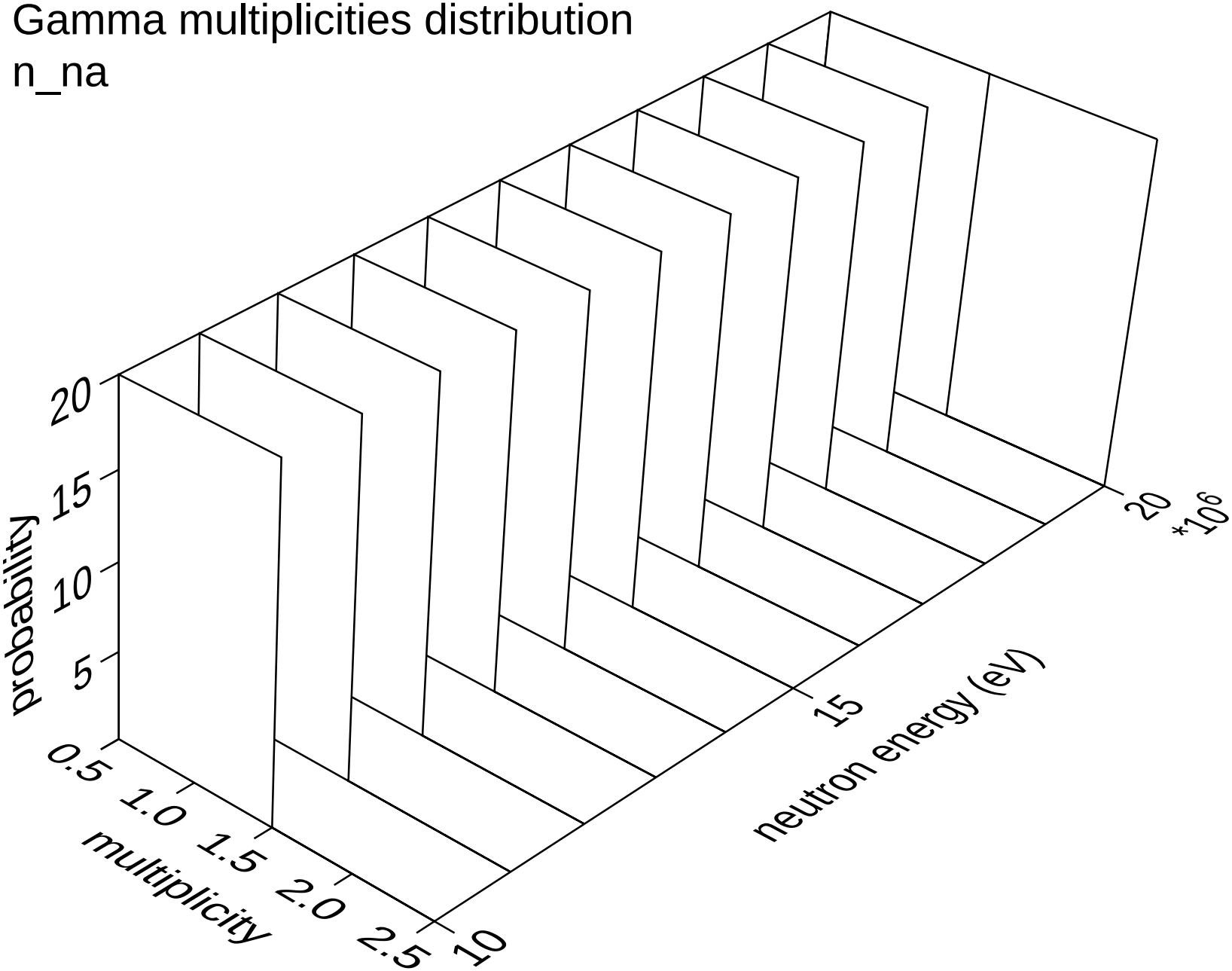

Gamma angles distribution
n_3n
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
16
18
20
*10^6
neutron energy (eV)

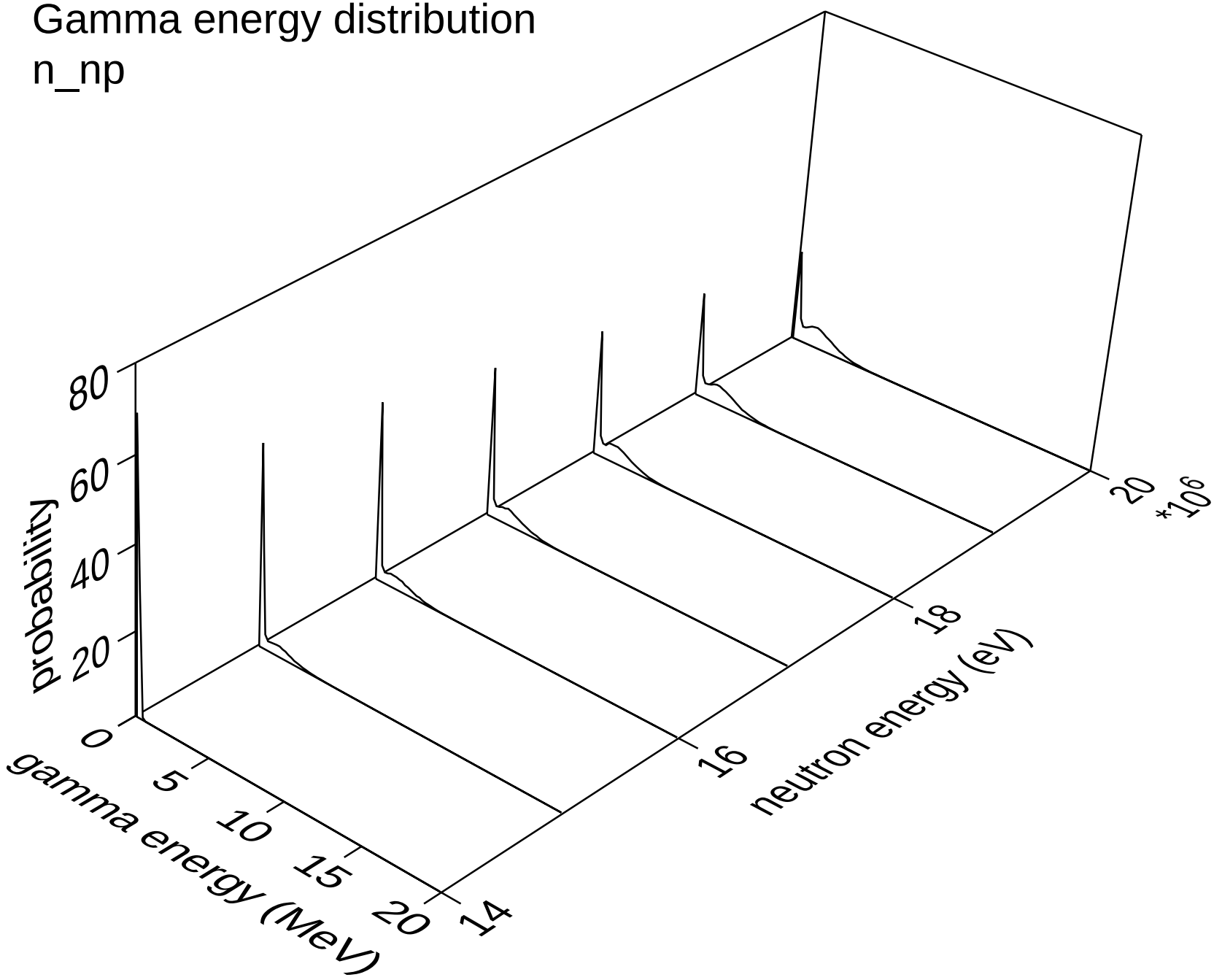
Gamma multiplicities distribution
n_3n

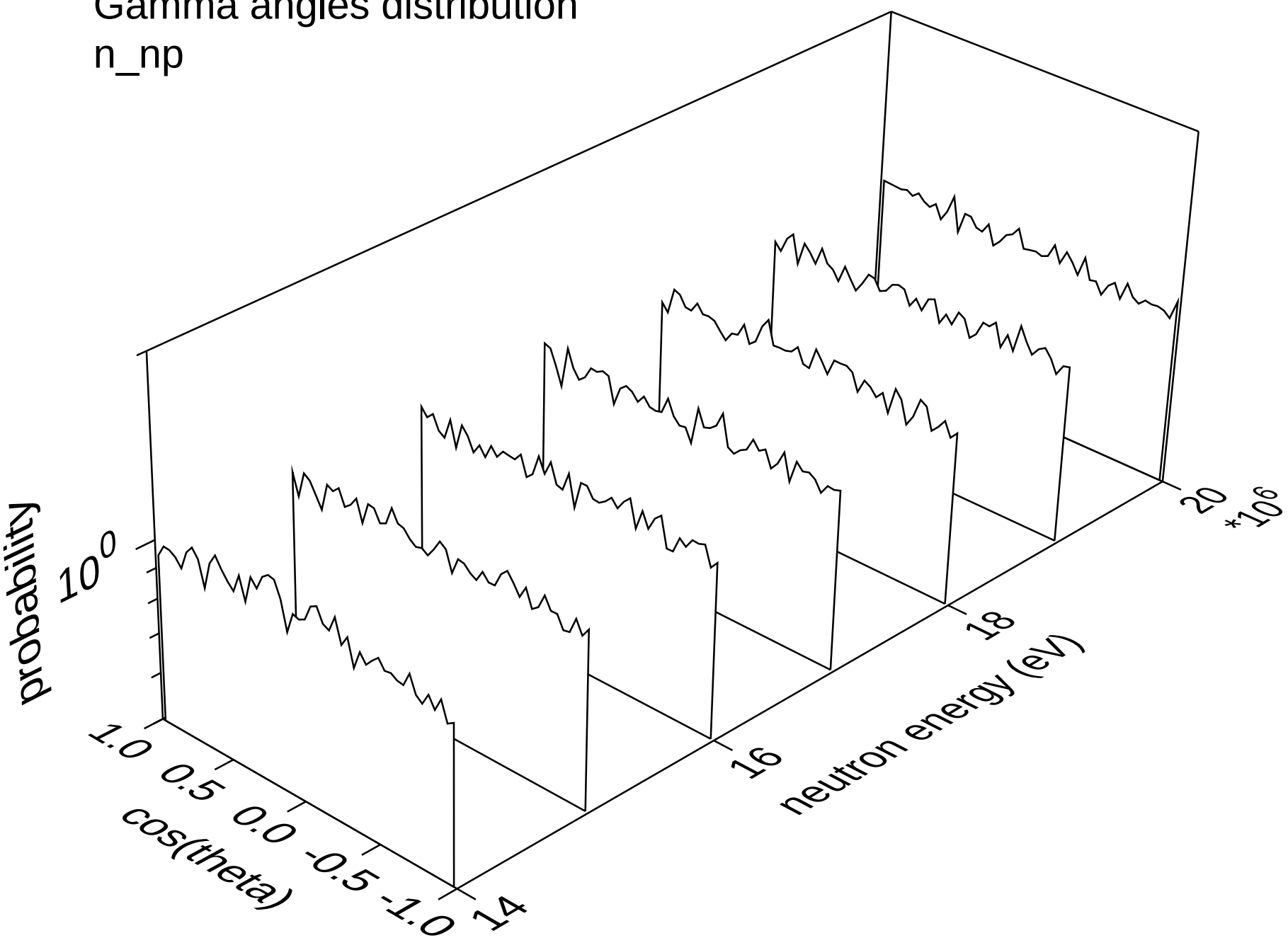


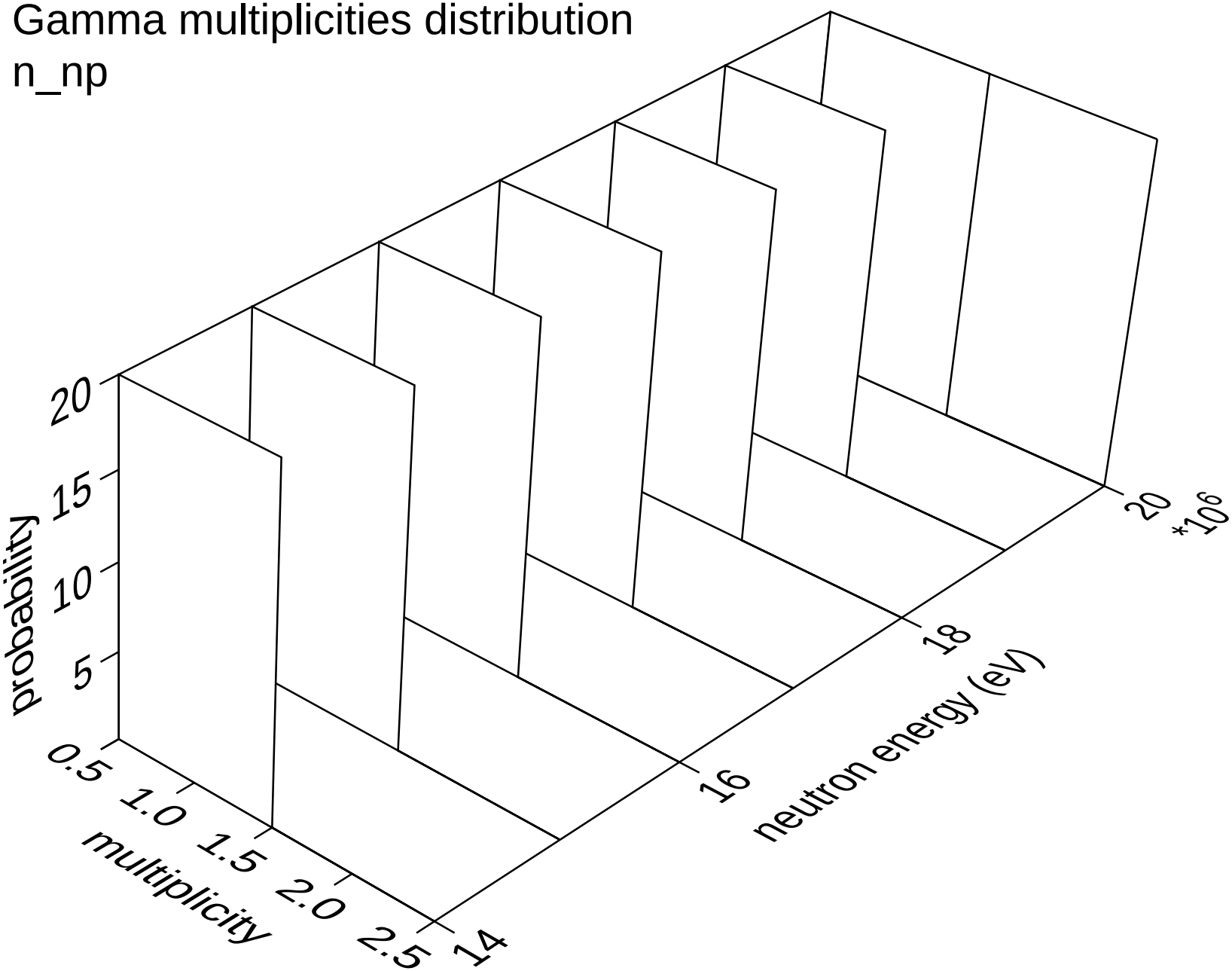

Gamma energy distribution
n_na
probability
100
80
60
40
20
0
gamma energy (MeV)
5
10
15
20
10
neutron energy (eV)
15
20
*10^6

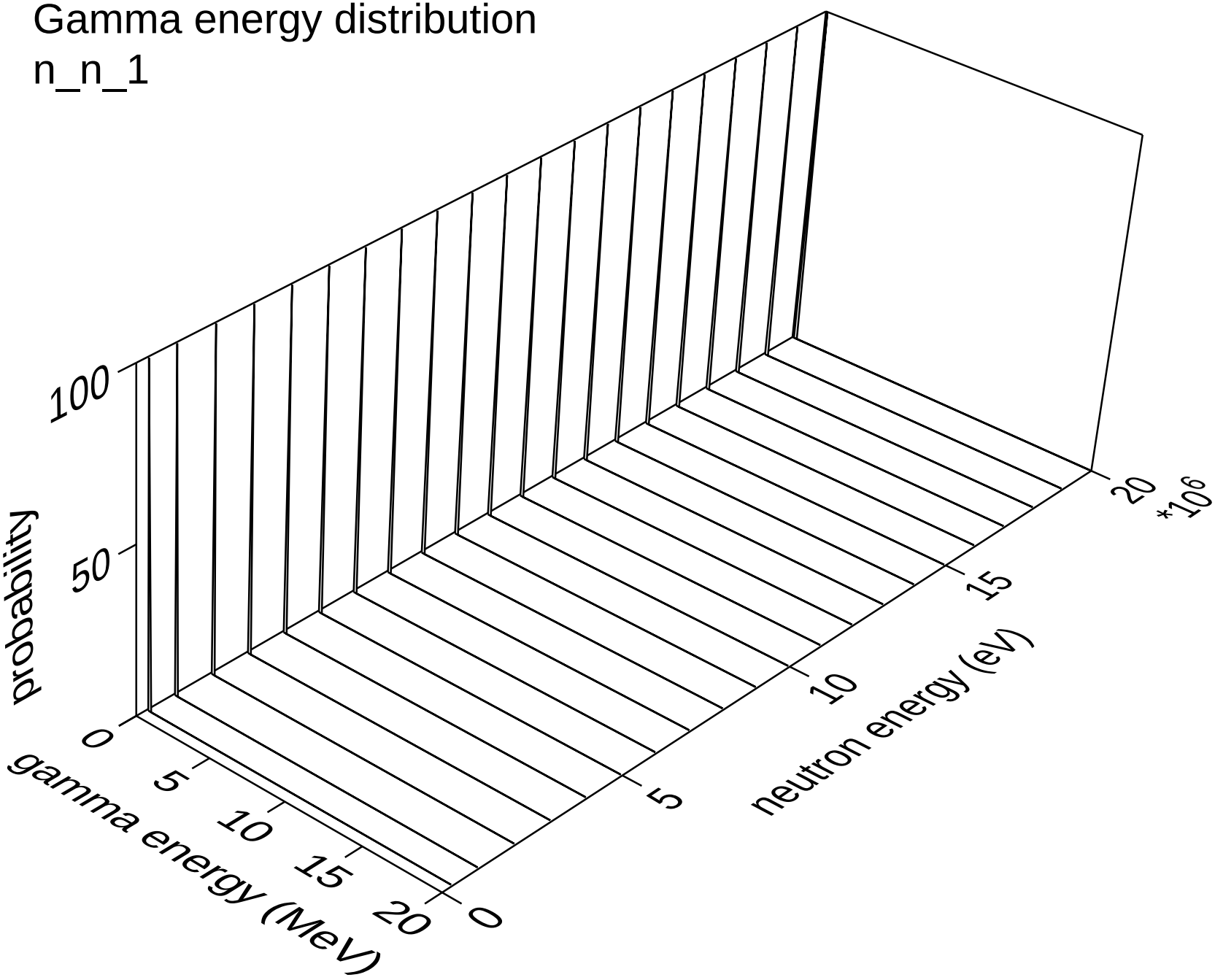

Gamma angles distribution
n_na
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
10
15
20
*10^6
neutron energy (eV)

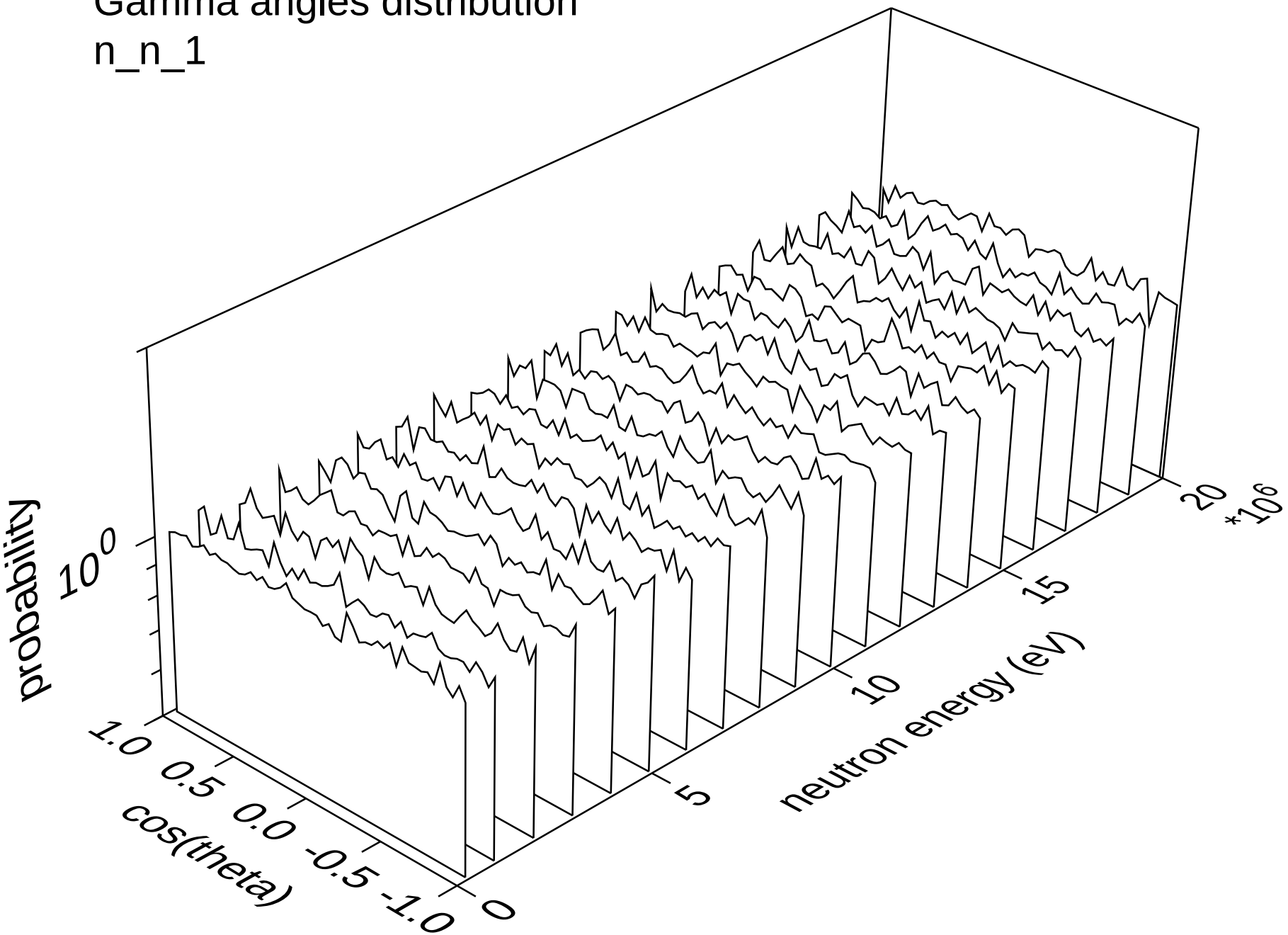

Gamma multiplicities distribution
n_na
probability
20
15
10
5
0.5
1.0
1.5
2.0
2.5
multiplicity
10
15
20
*10^6
neutron energy (eV)


Gamma energy distribution
n_np
probability
0
20
40
60
80
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
14
16
18
20
*10^6

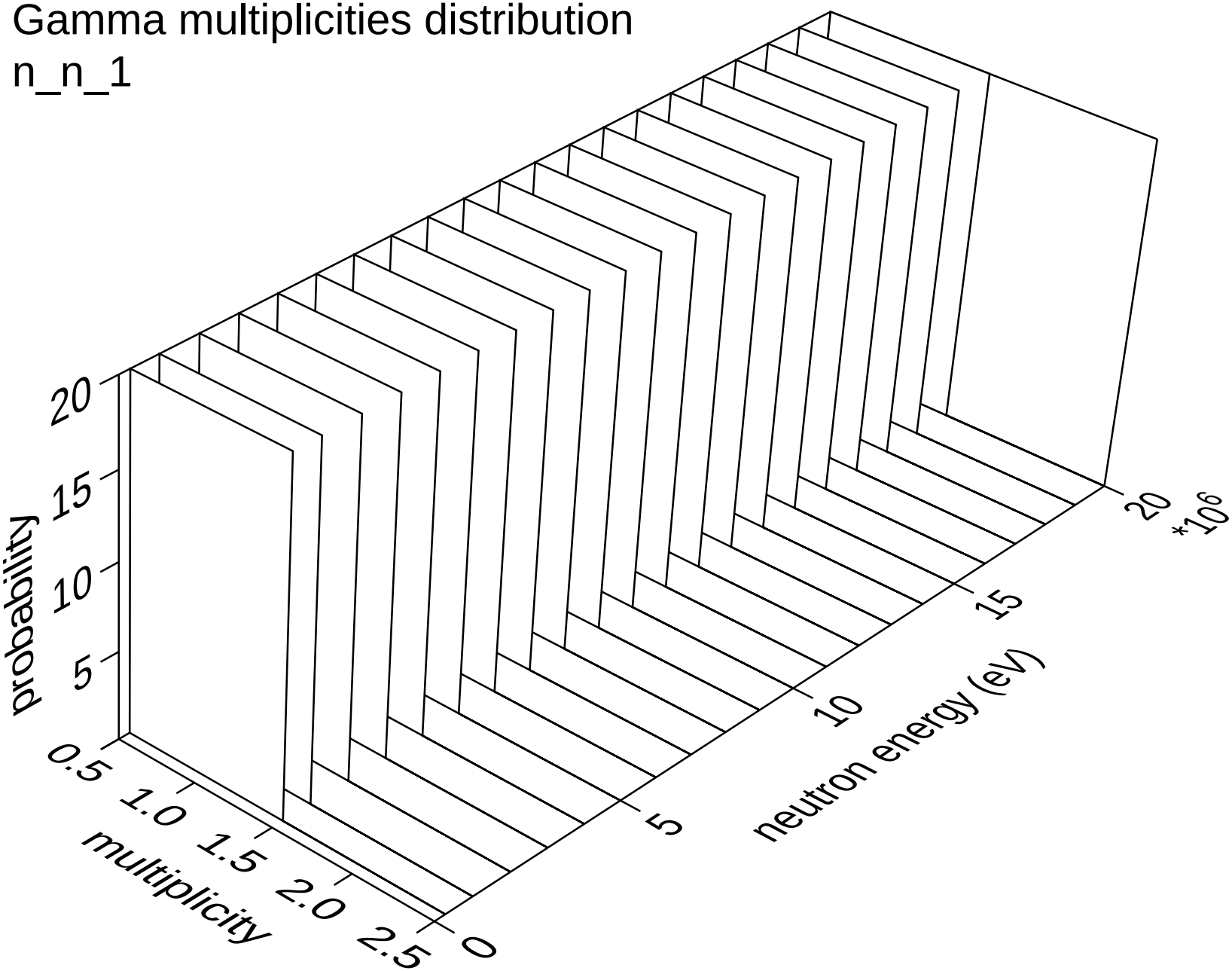

Gamma angles distribution
n_np
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
14
16
18
20
*10^6
neutron energy (eV)

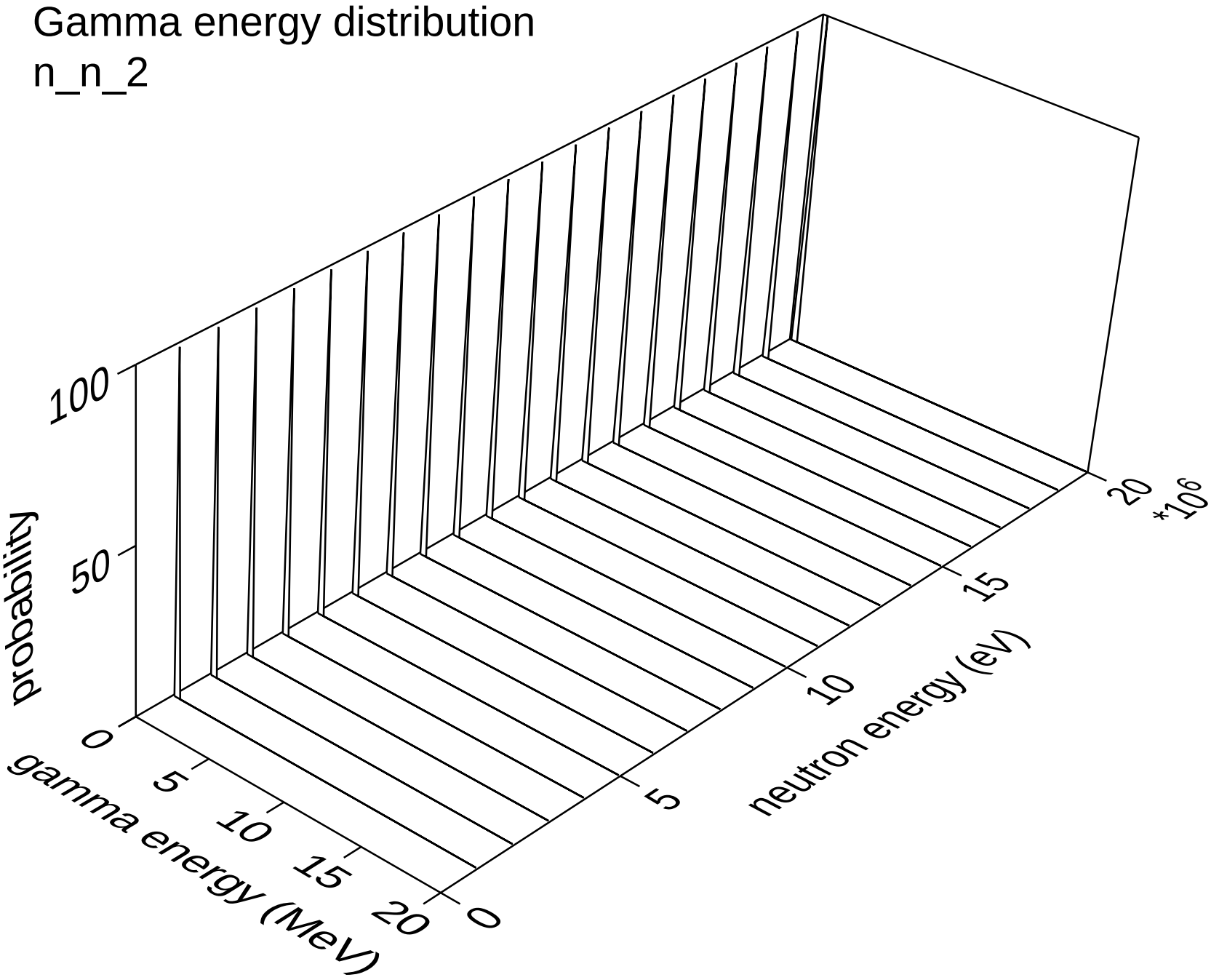

Gamma multiplicities distribution
n_np
probability
20
15
10
5
0.5
1.0
1.5
2.0
2.5
multiplicity
14
16
18
20
*10^6
neutron energy (eV)

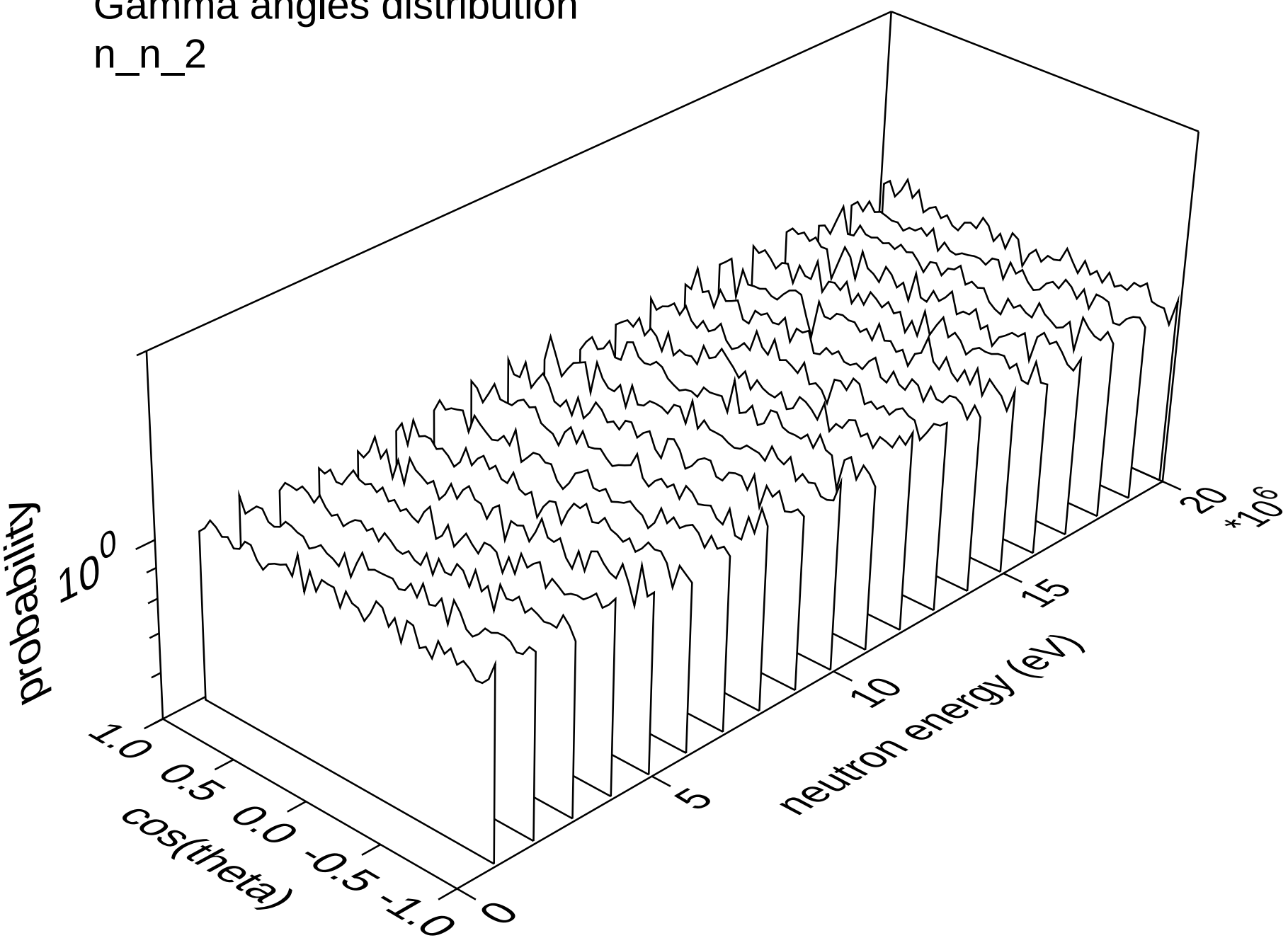

Gamma energy distribution
n_n_1
probability
100
50
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
5
10
15
20
*10^6


Gamma angles distribution
n_n_1
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

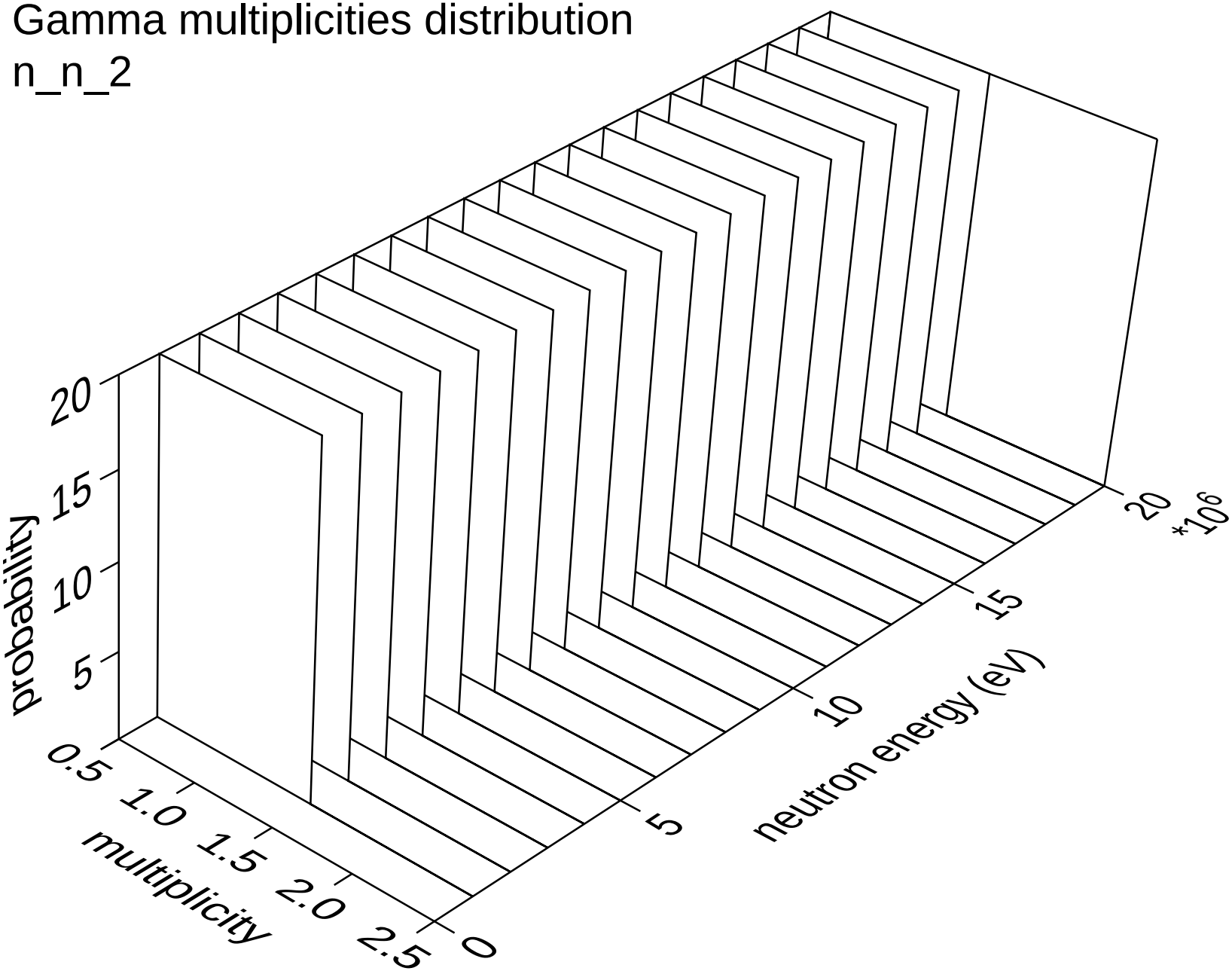
Gamma multiplicities distribution
n_n_1

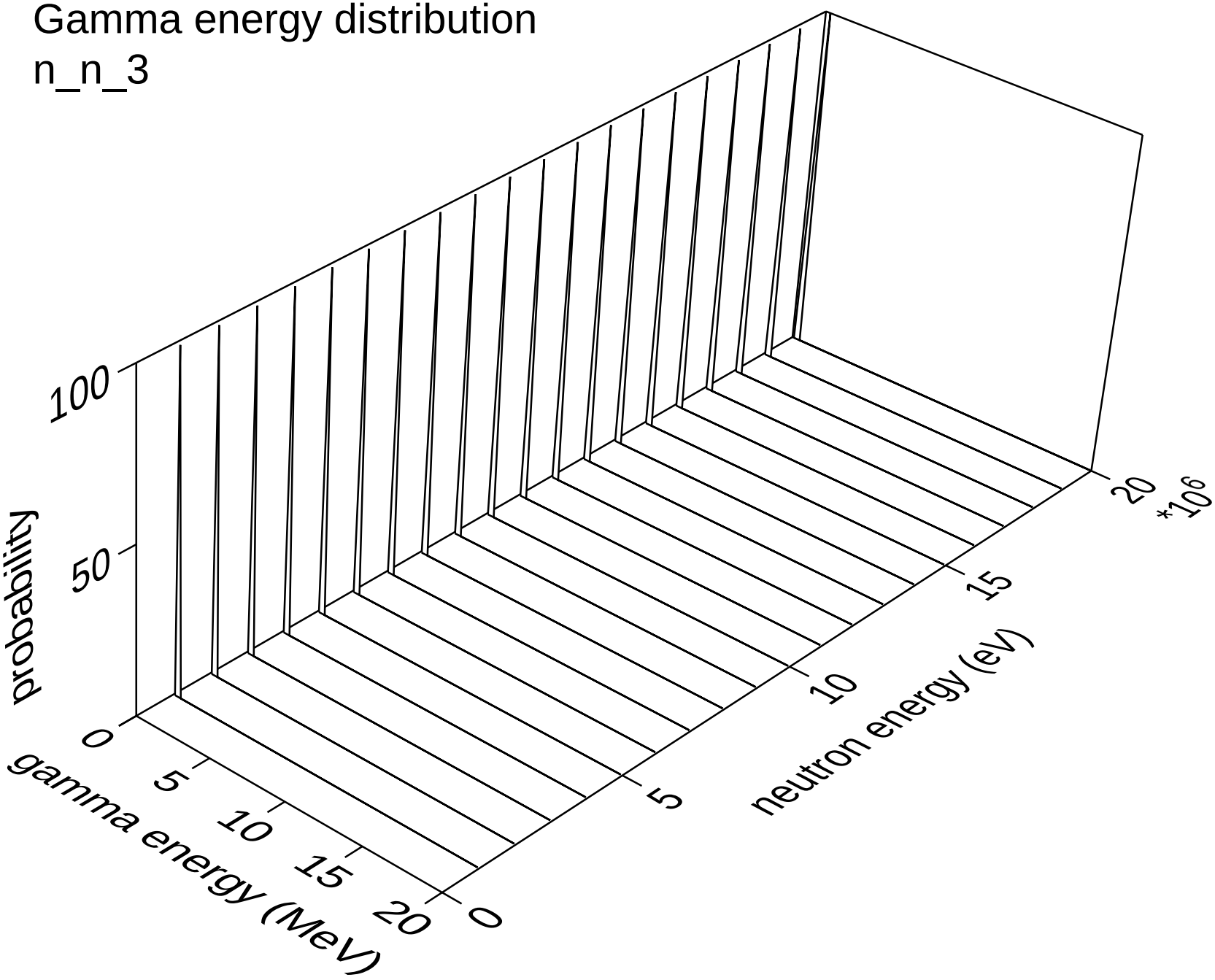


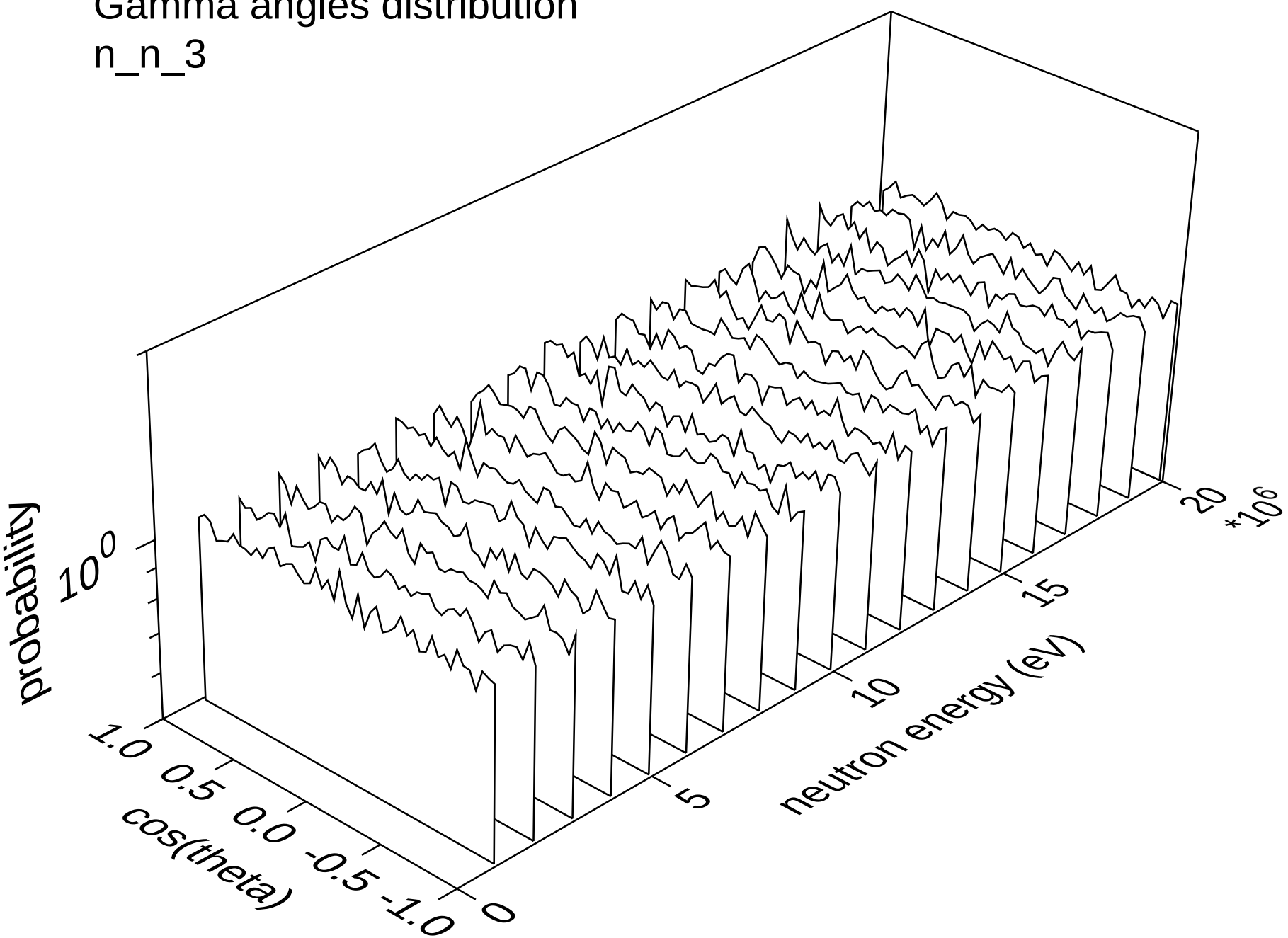

Gamma energy distribution
n_n_2
probability
100
50
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
0
5
10
15
20
*10^6


Gamma angles distribution
n_n_2
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

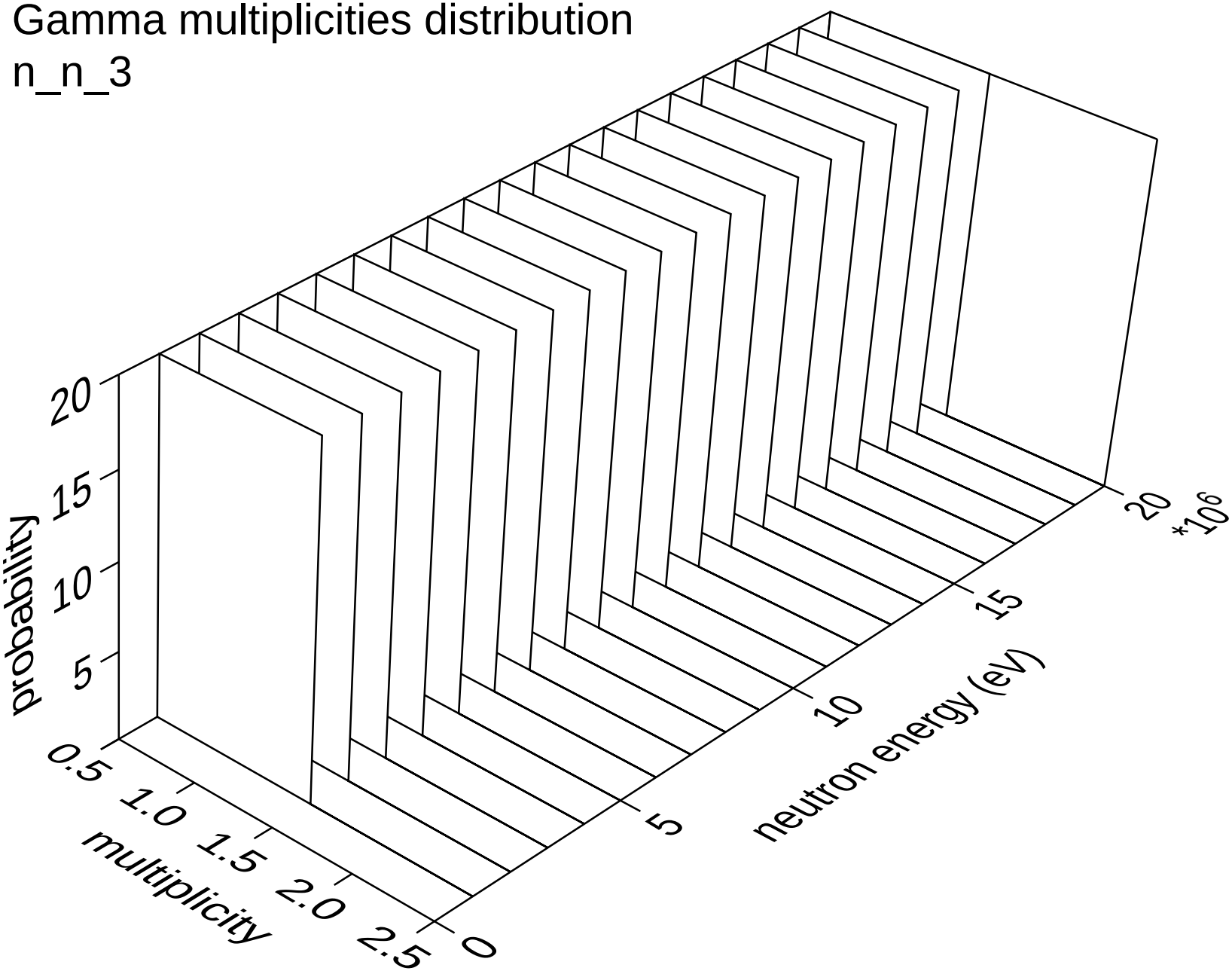
Gamma multiplicities distribution
n_n_2

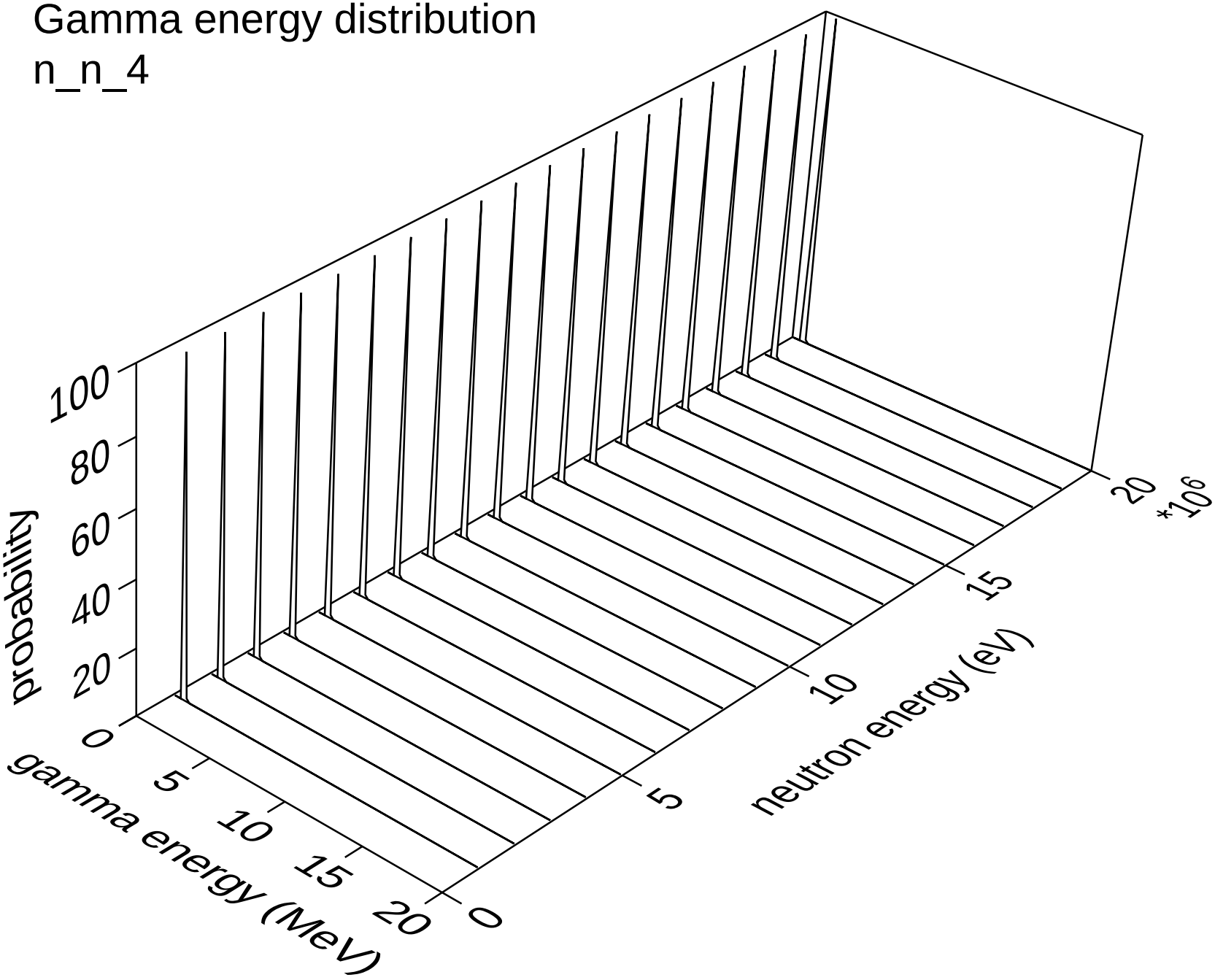


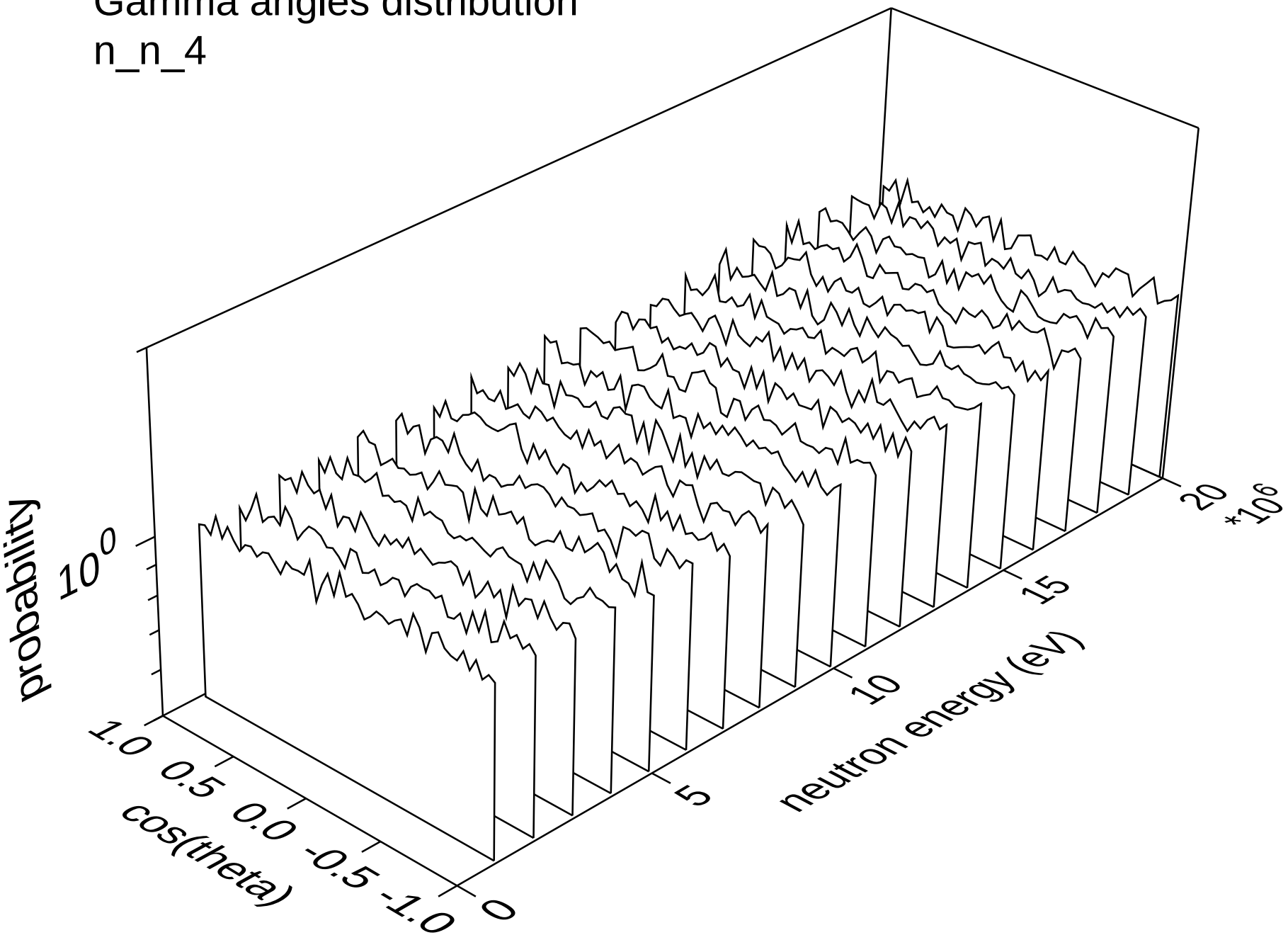

Gamma energy distribution
n_n_3
probability
100
50
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
0
5
10
15
20
*10^6


Gamma angles distribution
n_n_3
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

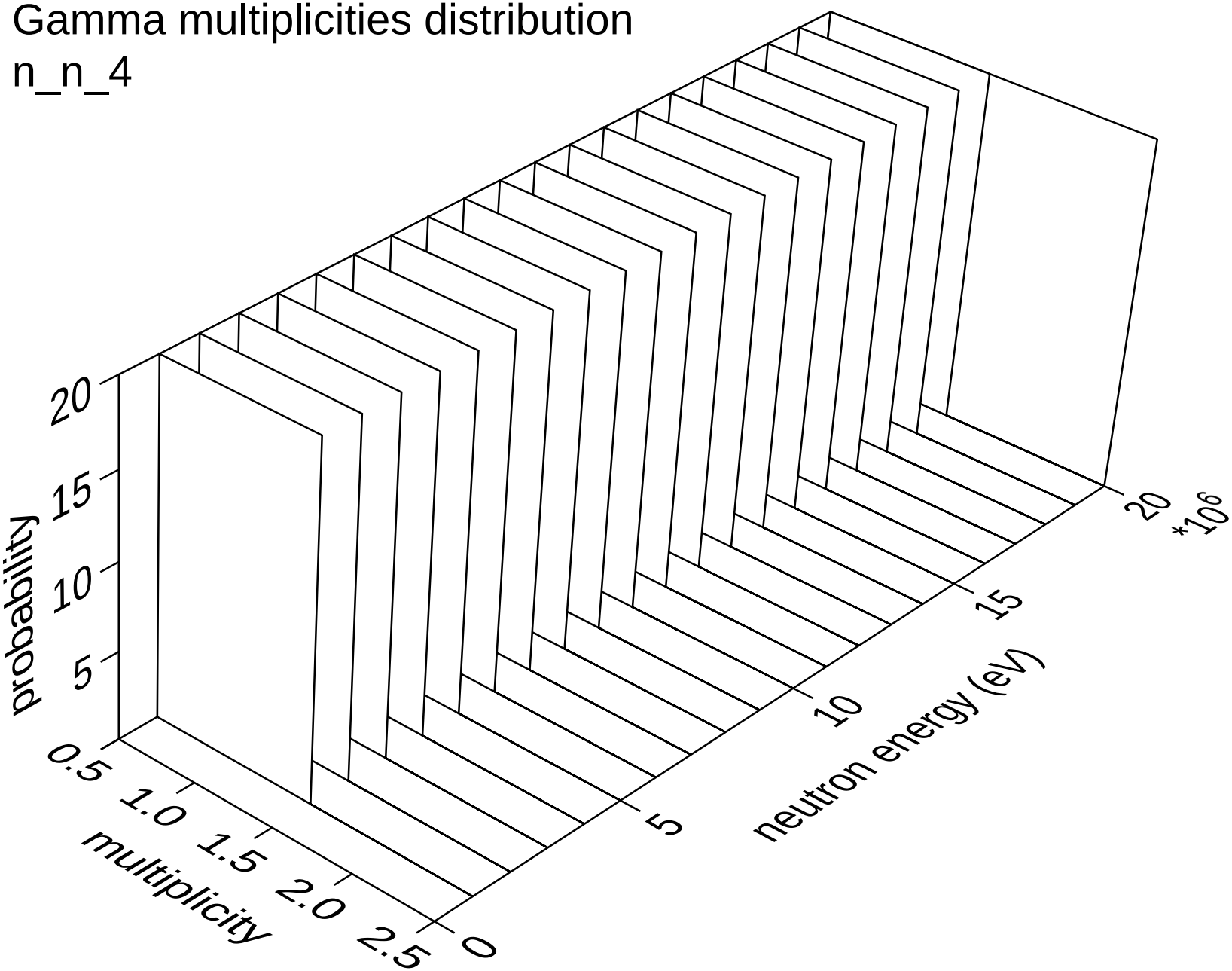
Gamma multiplicities distribution
n_n_3

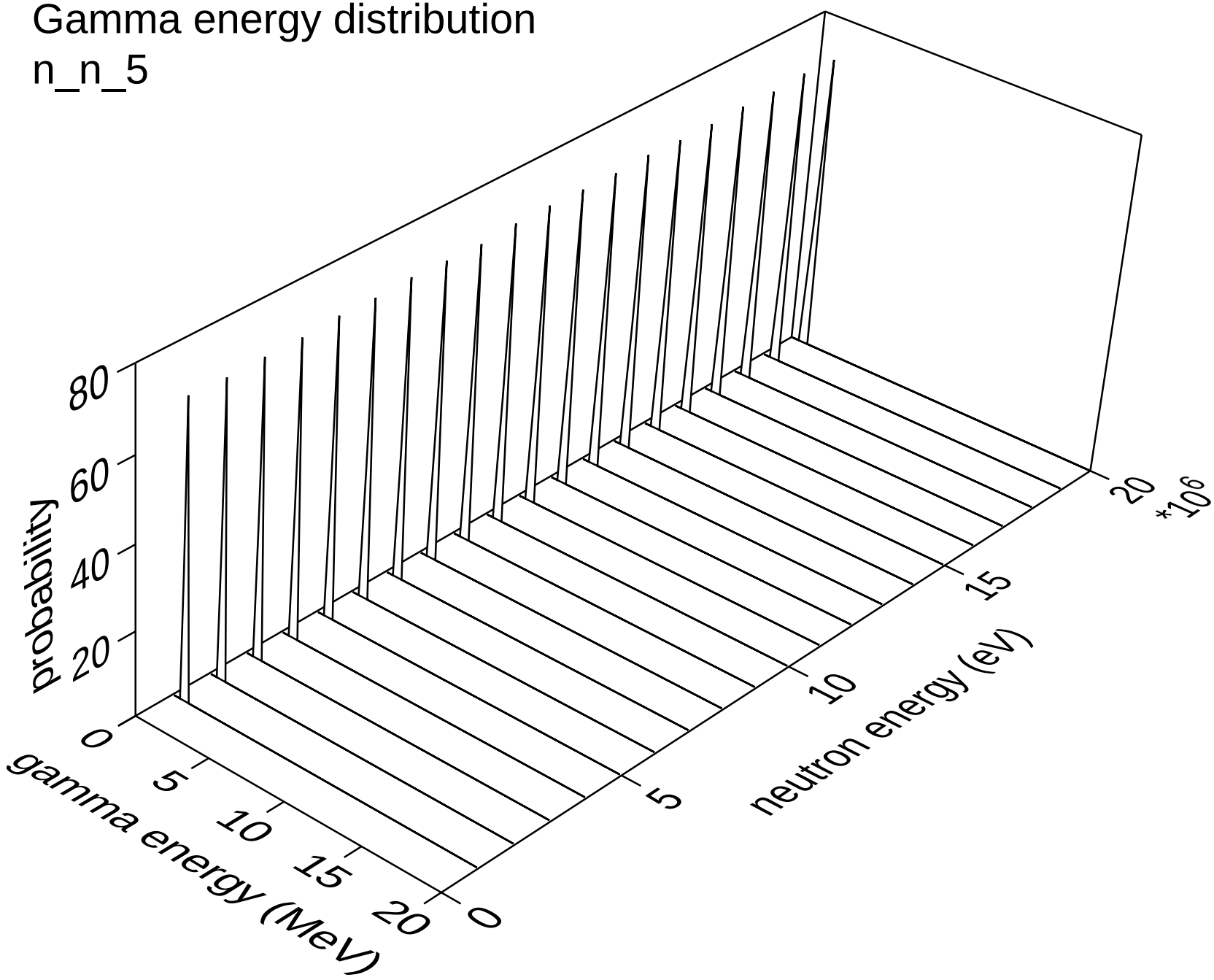


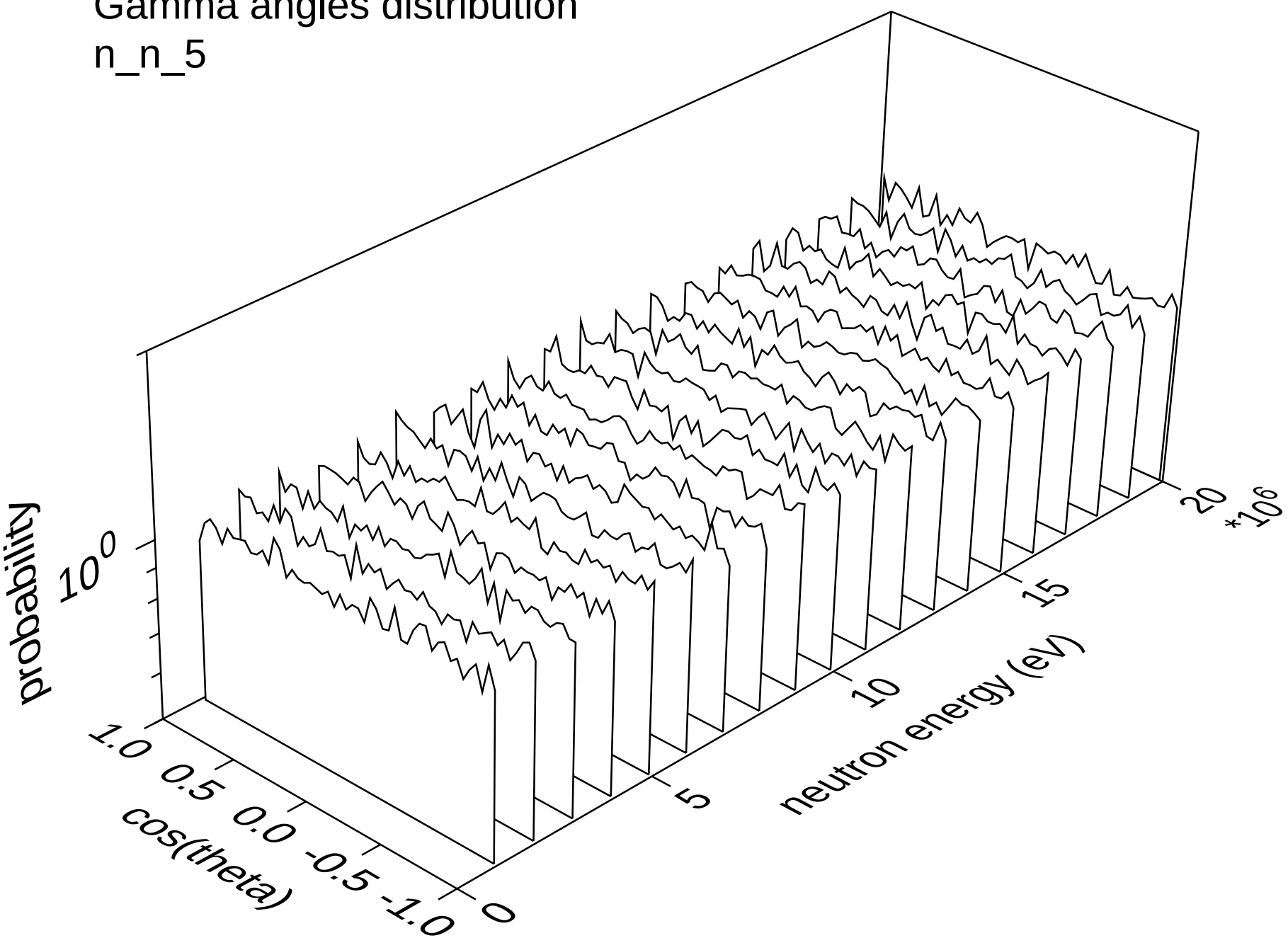

Gamma energy distribution
n_n_4
probability
100
80
60
40
20
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
5
10
15
20
*10^6


Gamma angles distribution
n_n_4
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

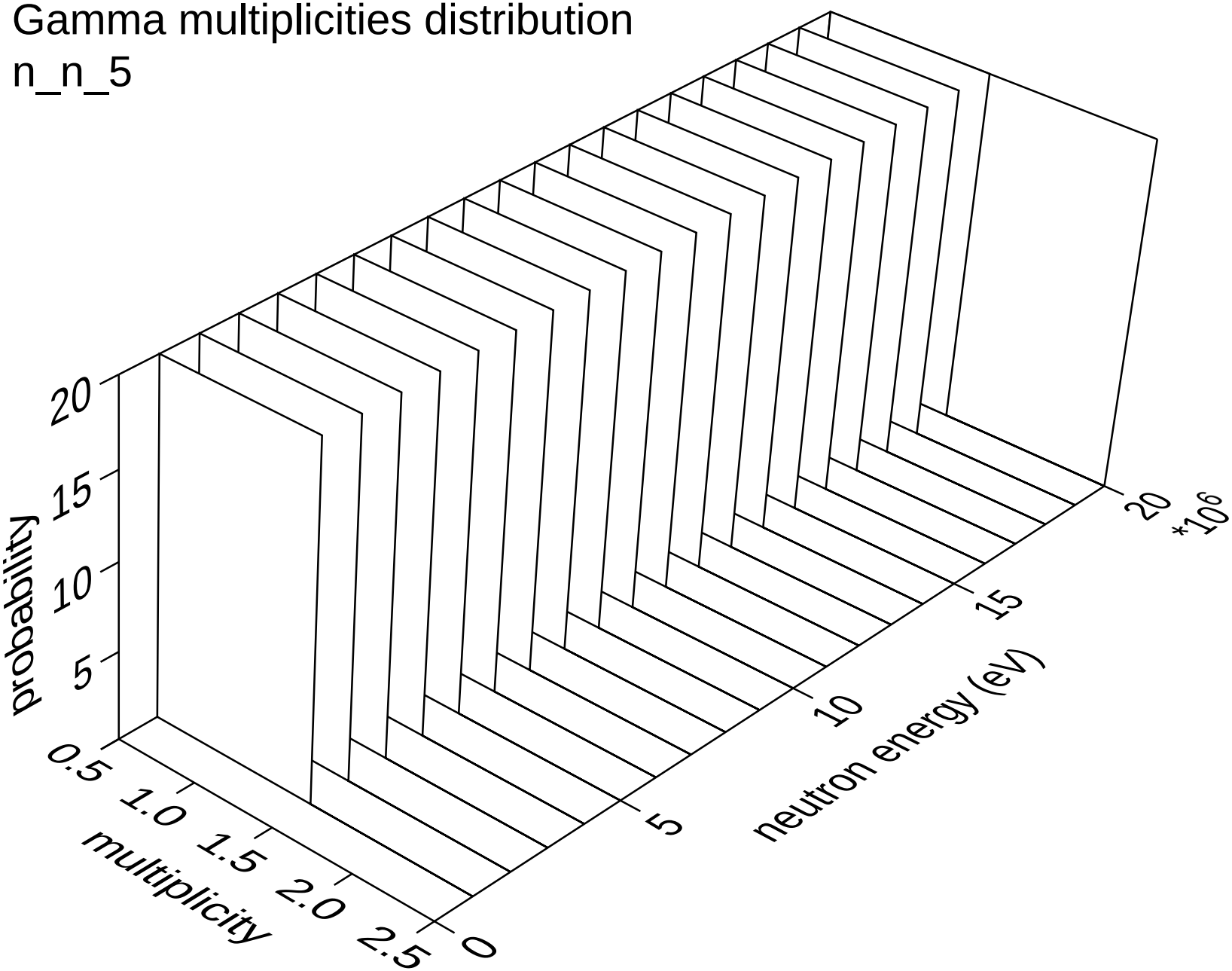
Gamma multiplicities distribution
n_n_4

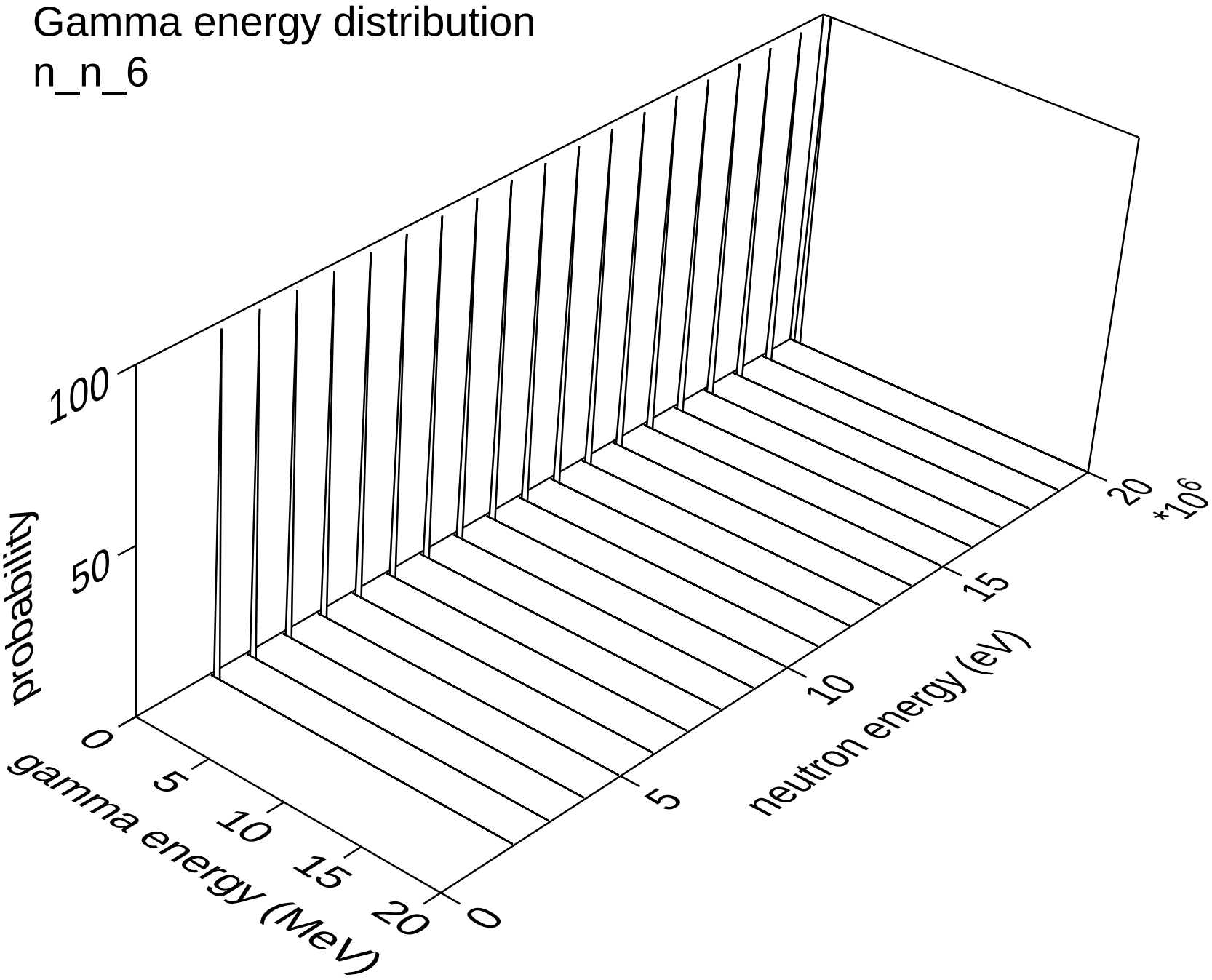


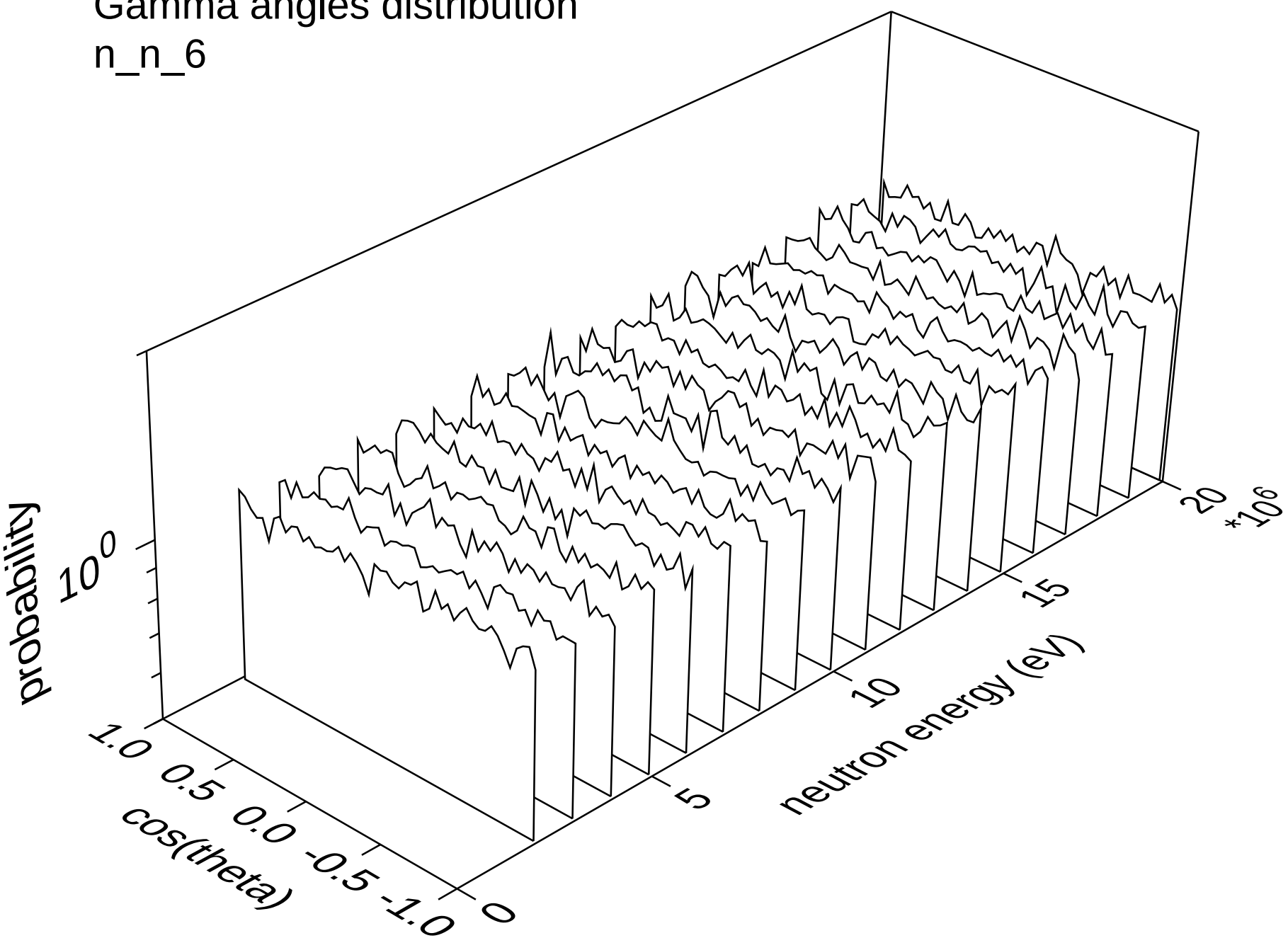

Gamma energy distribution
n_n_5
probability
80
60
40
20
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
0
5
10
15
20
*10^6


Gamma angles distribution
n_n_5
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

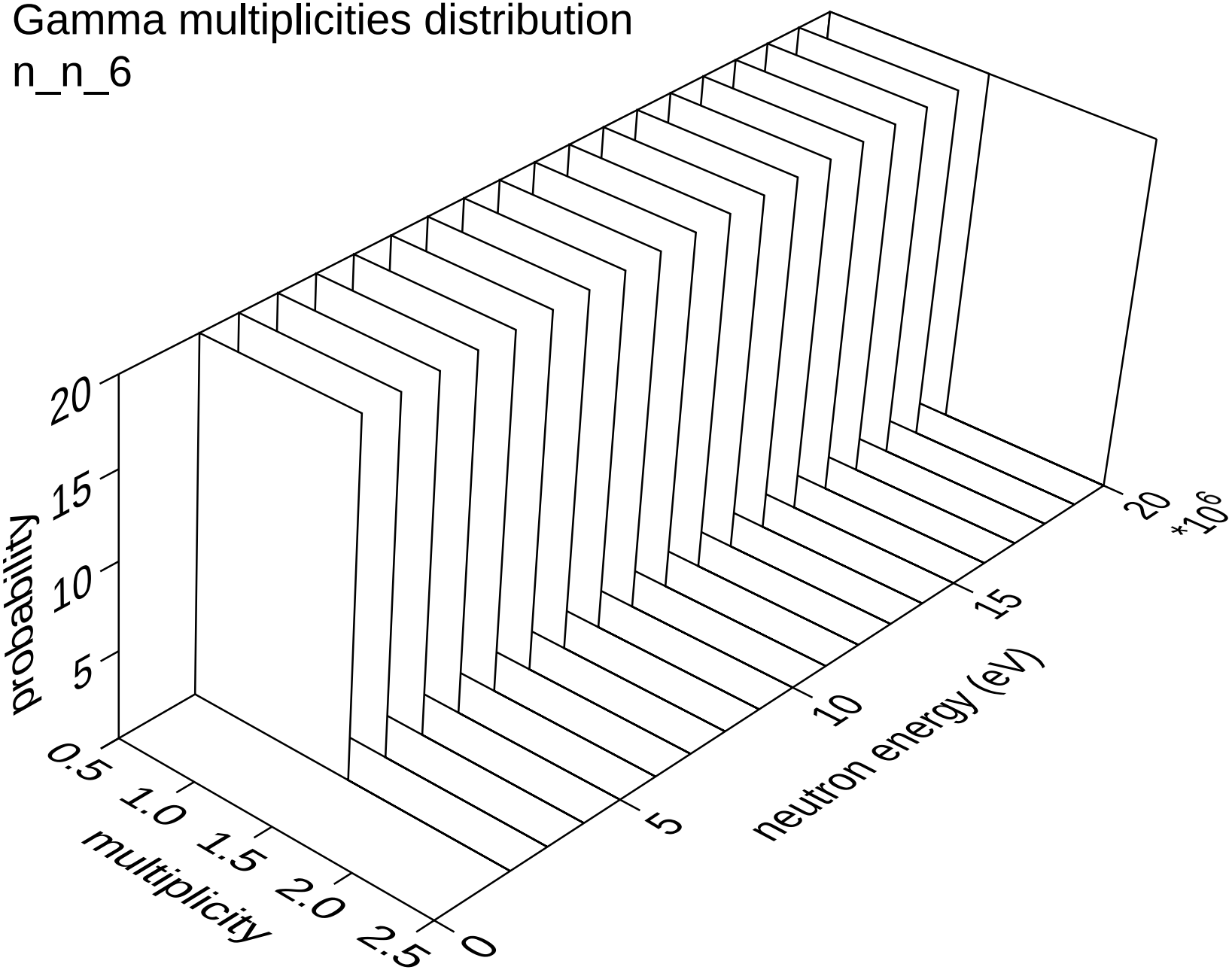
Gamma multiplicities distribution
n_n_5

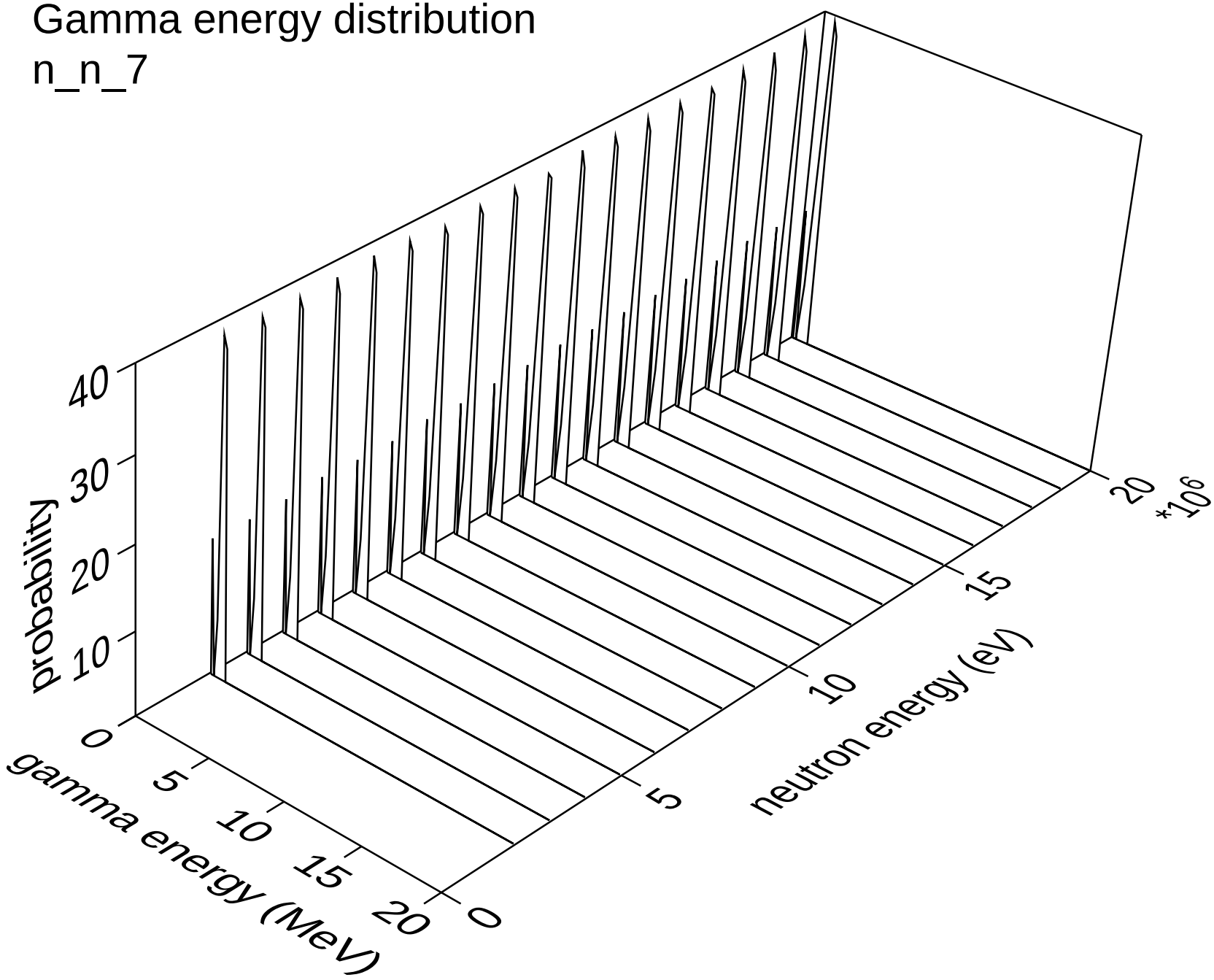


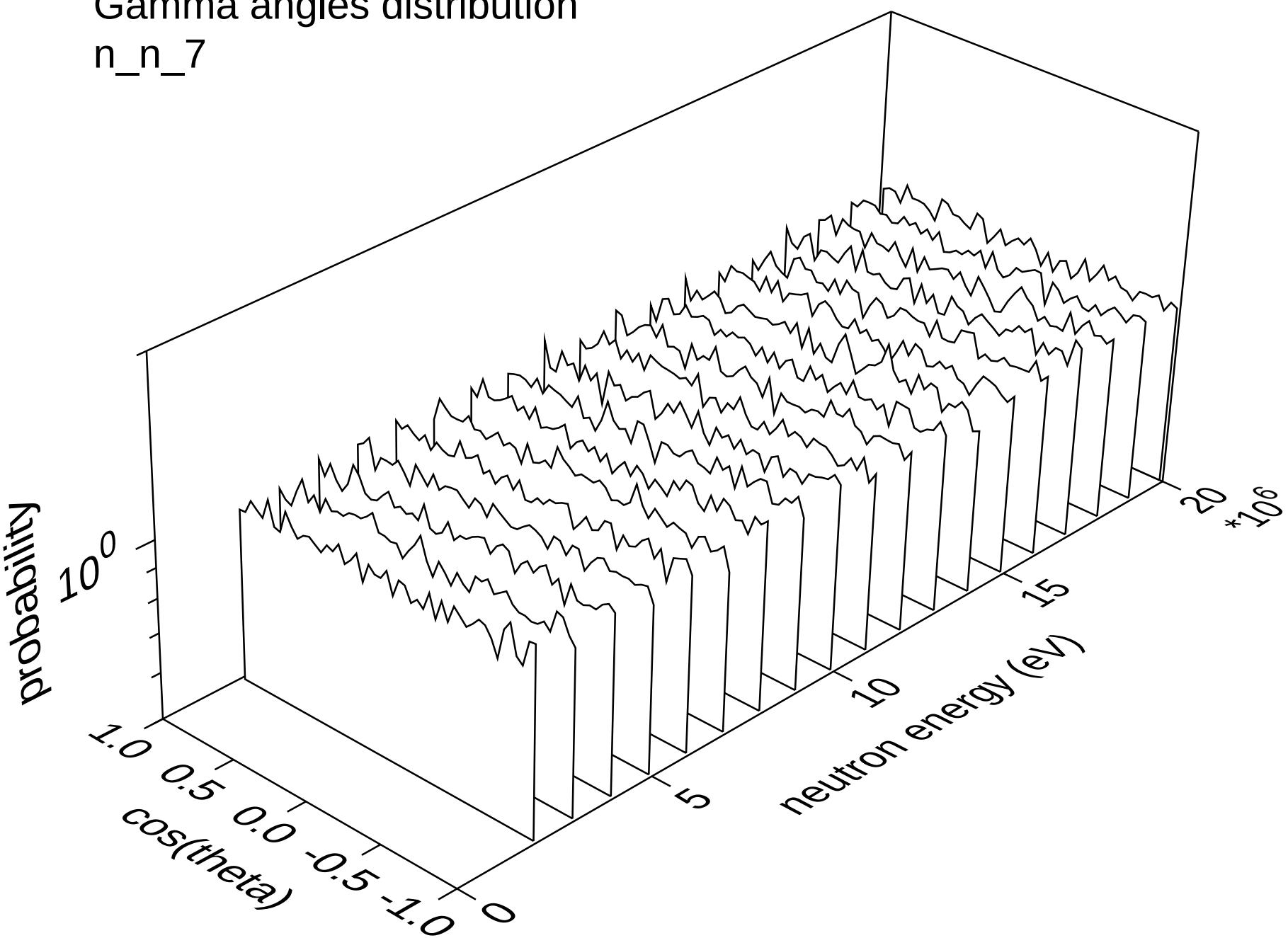

Gamma energy distribution
n_n_6
probability
100
50
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
0
5
10
15
20
*10^6


Gamma angles distribution
n_n_6
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

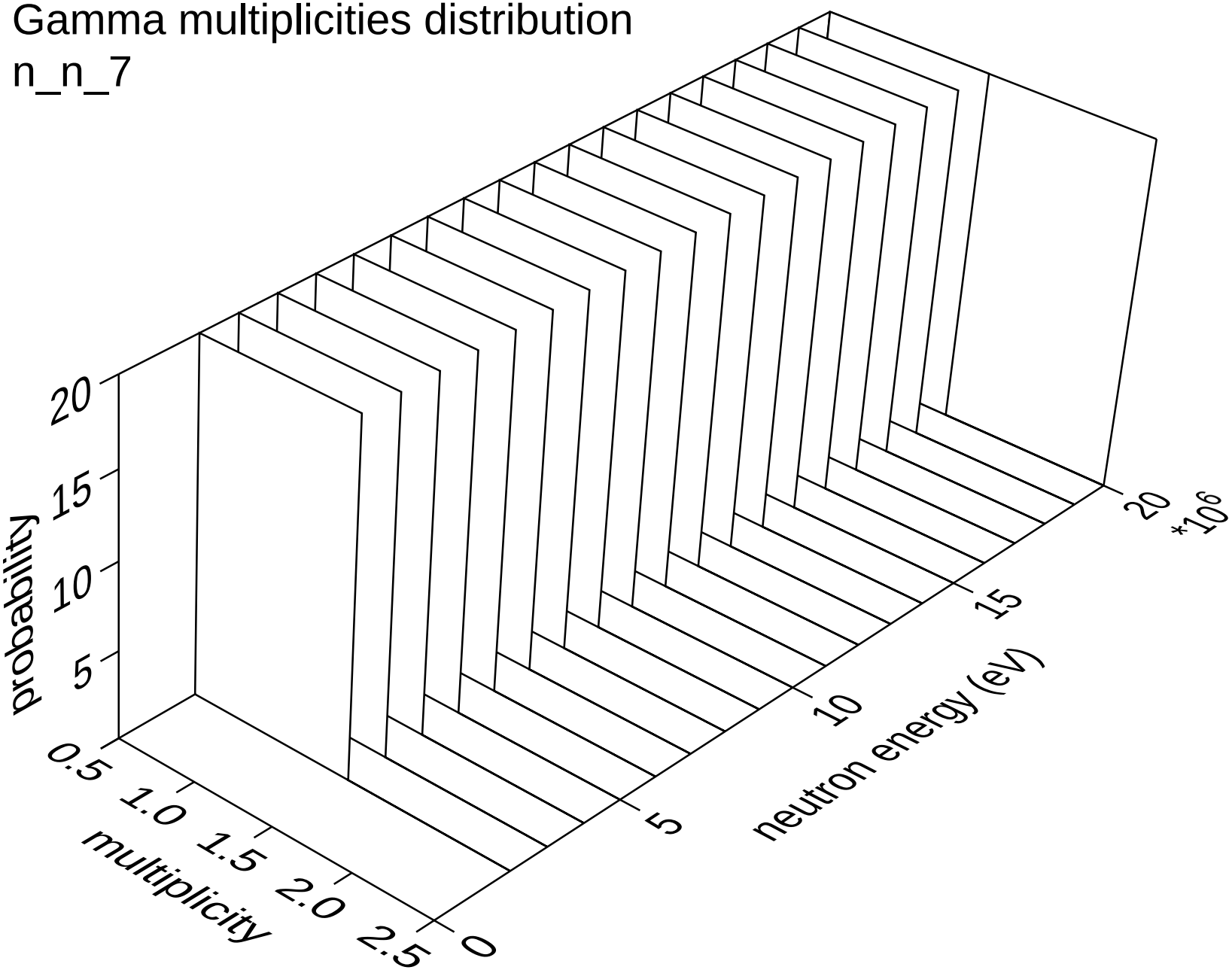
Gamma multiplicities distribution
n_n_6

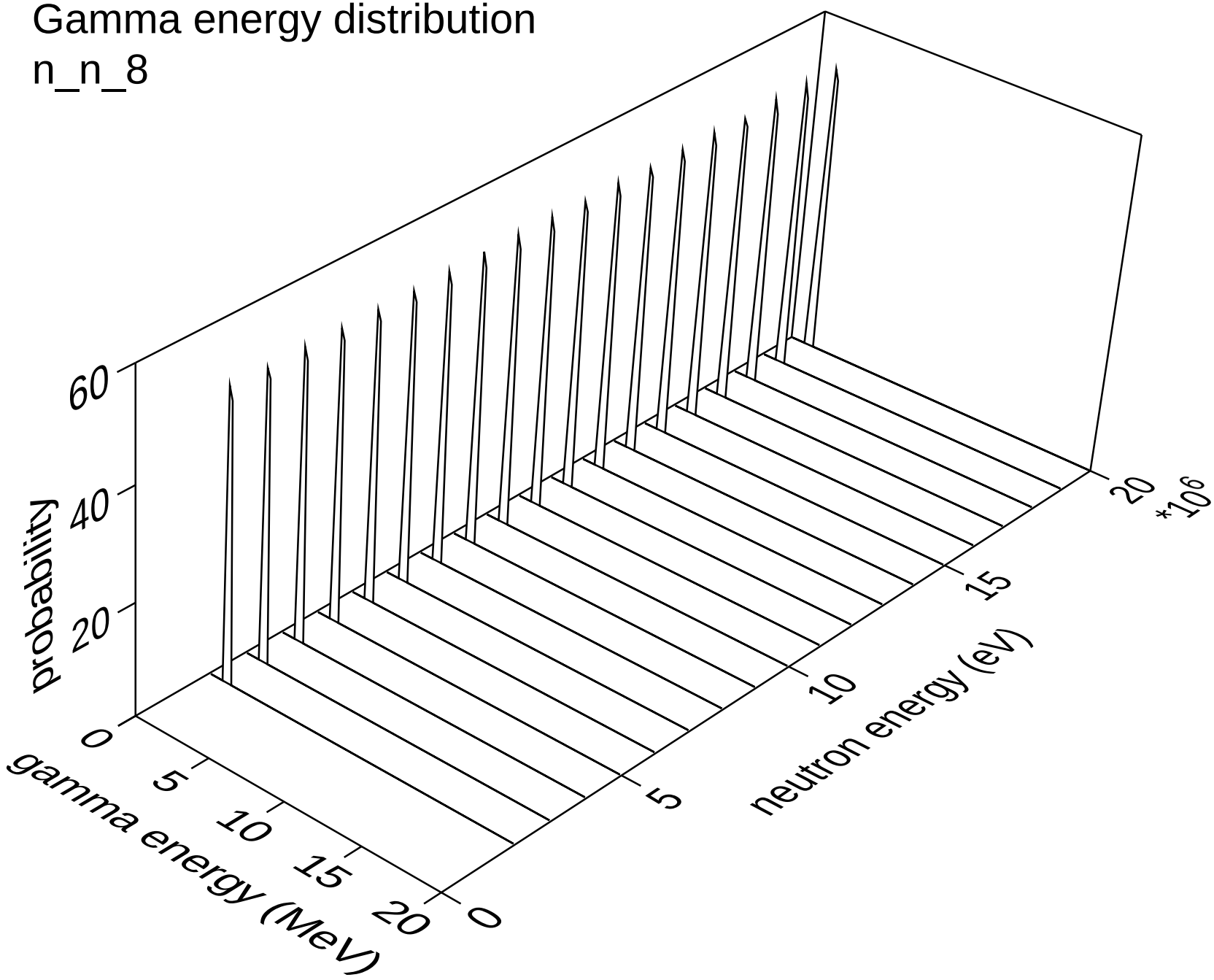


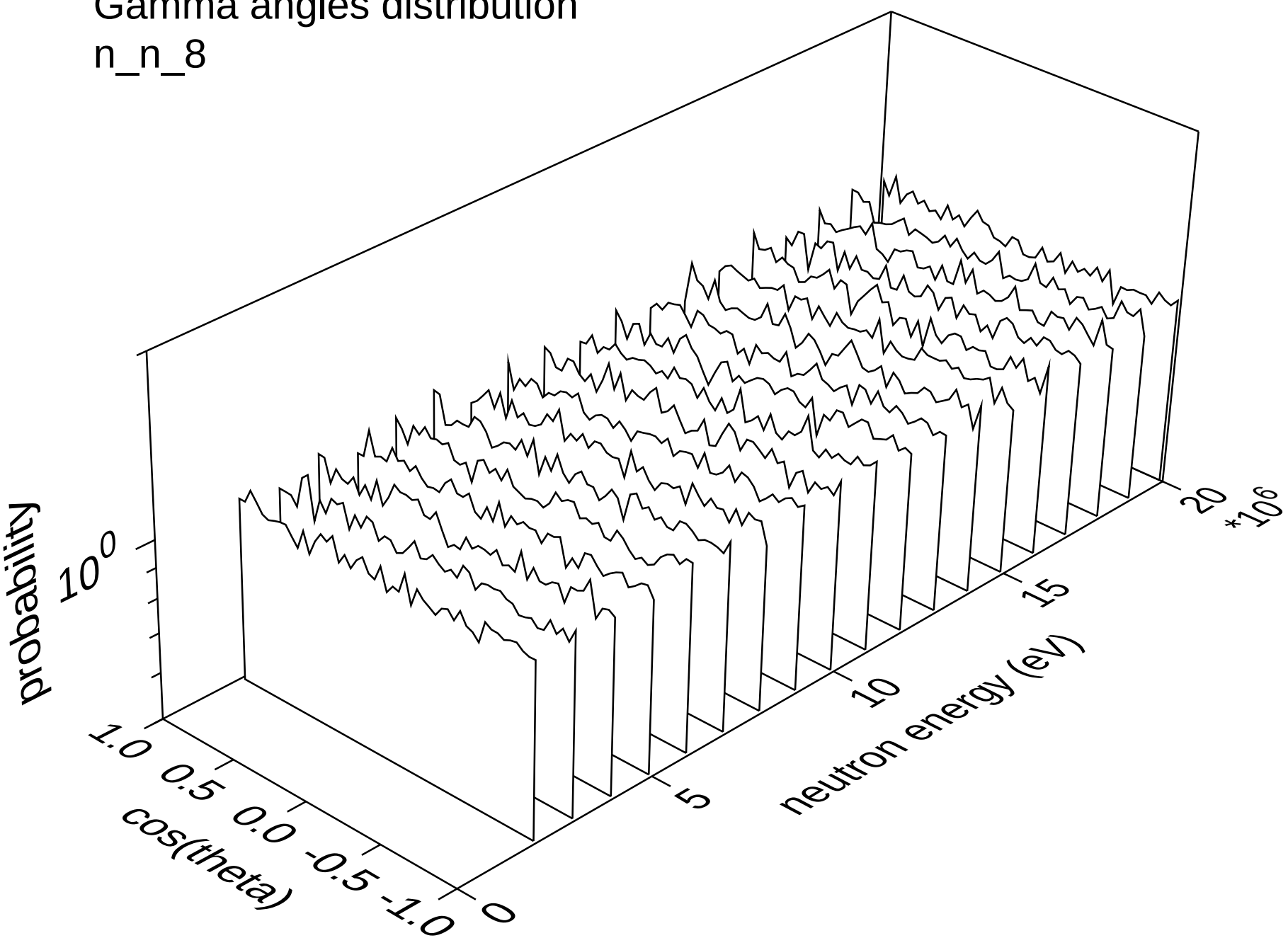

Gamma energy distribution
n_n_7
probability
40
30
20
10
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
0
5
10
15
20
*10^6


Gamma angles distribution
n_n_7
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

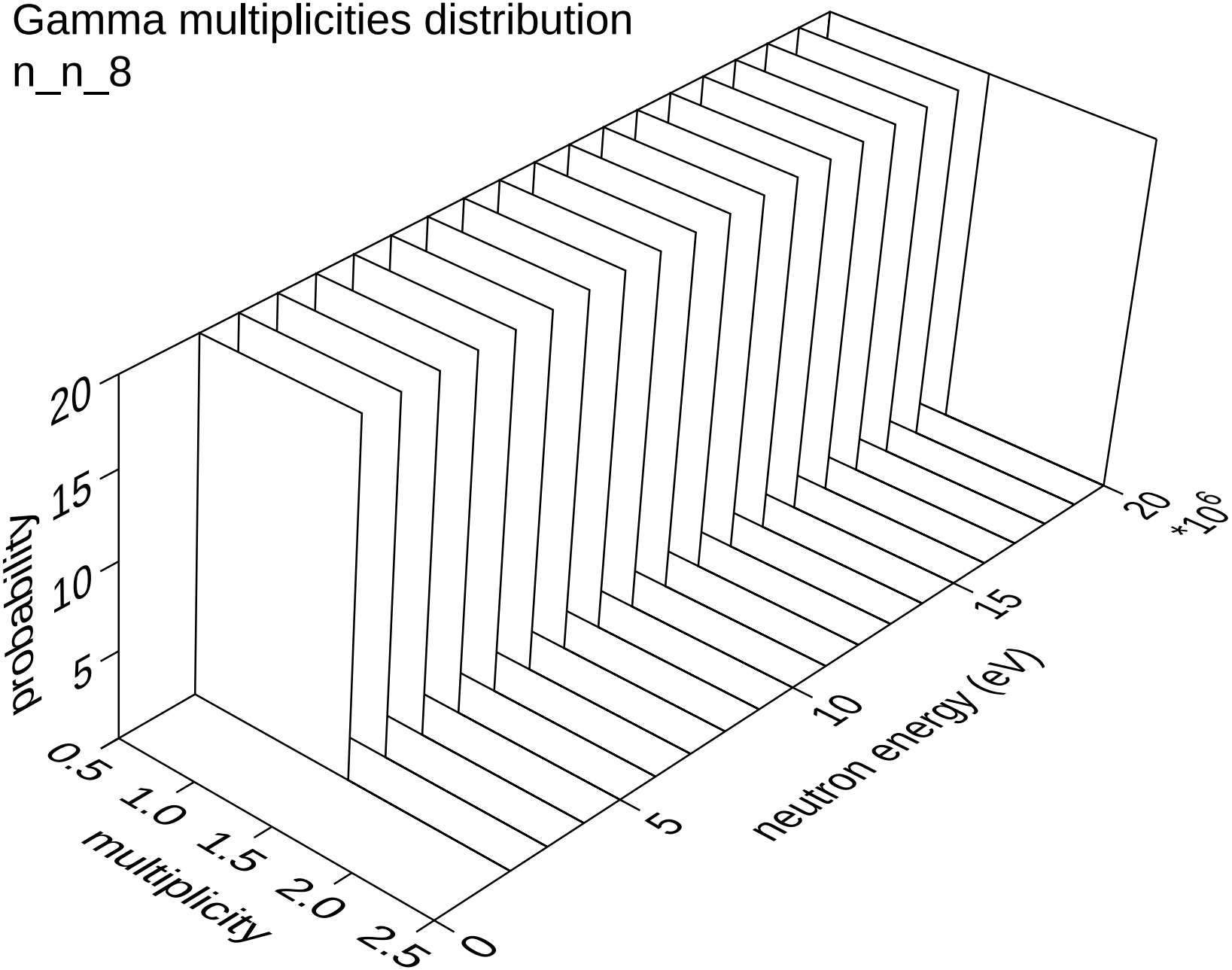
Gamma multiplicities distribution
n_n_7

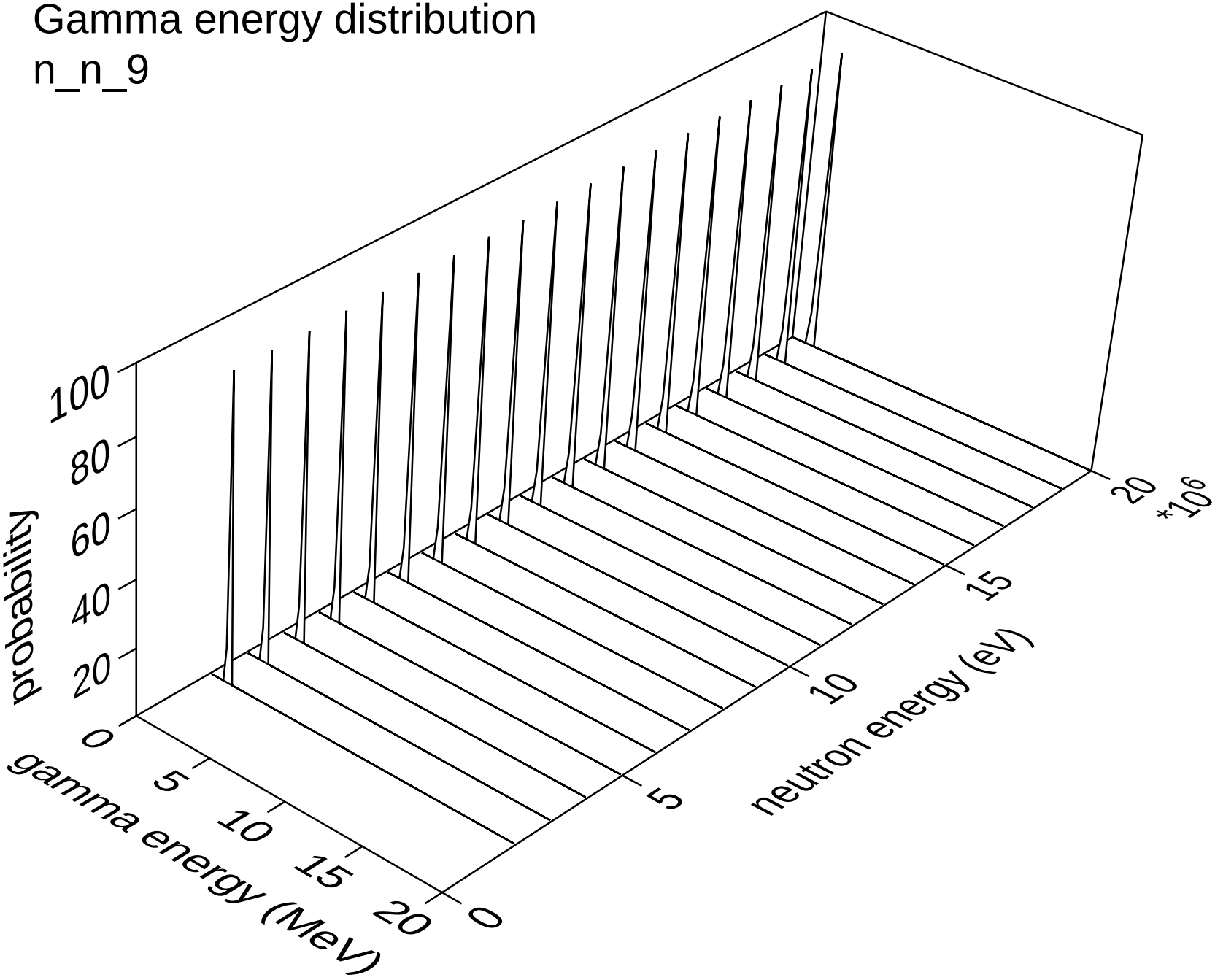


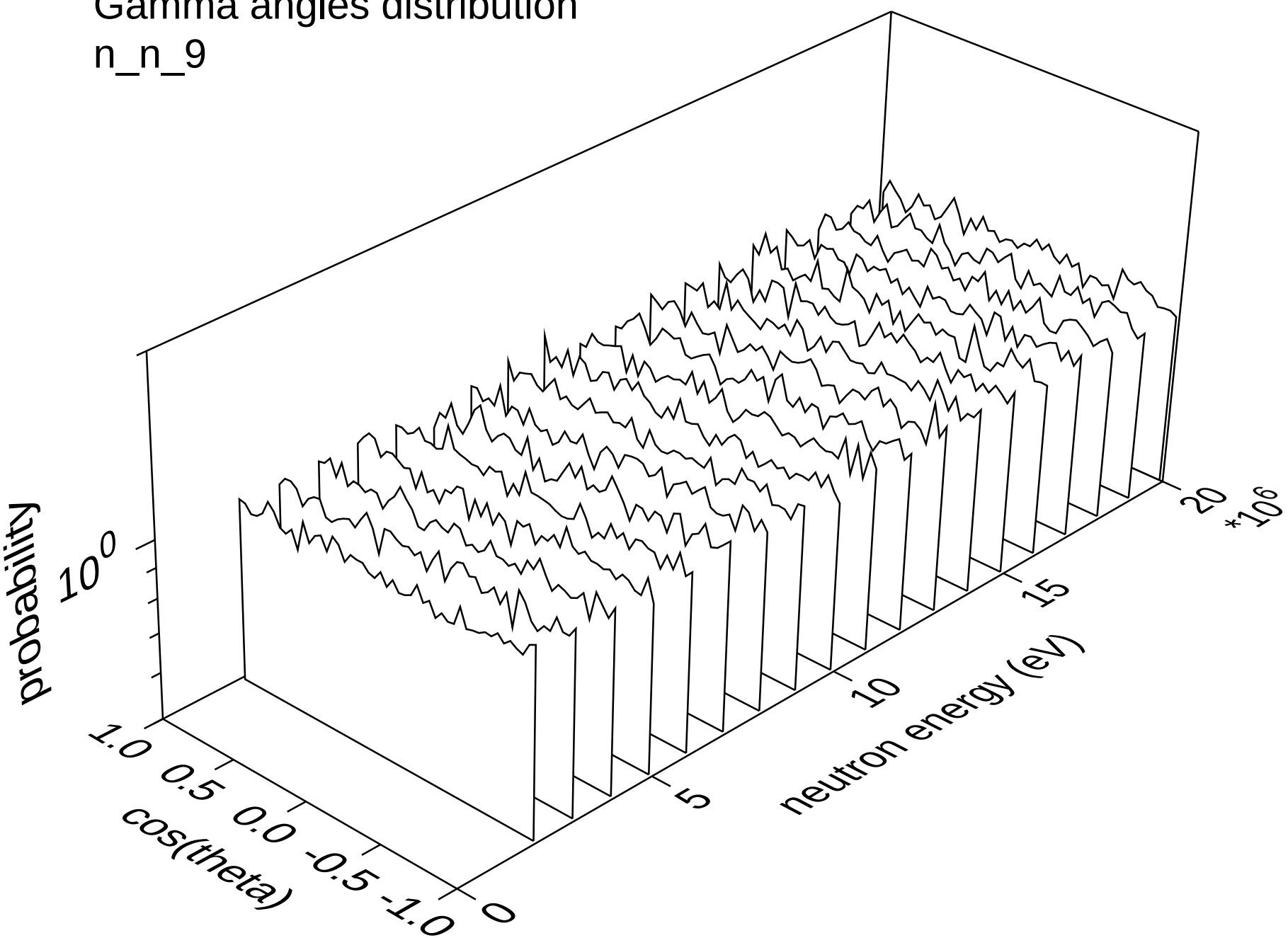

Gamma energy distribution
n_n_8
probability
60
40
20
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
0
5
10
15
20
*10^6


Gamma angles distribution
n_n_8
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

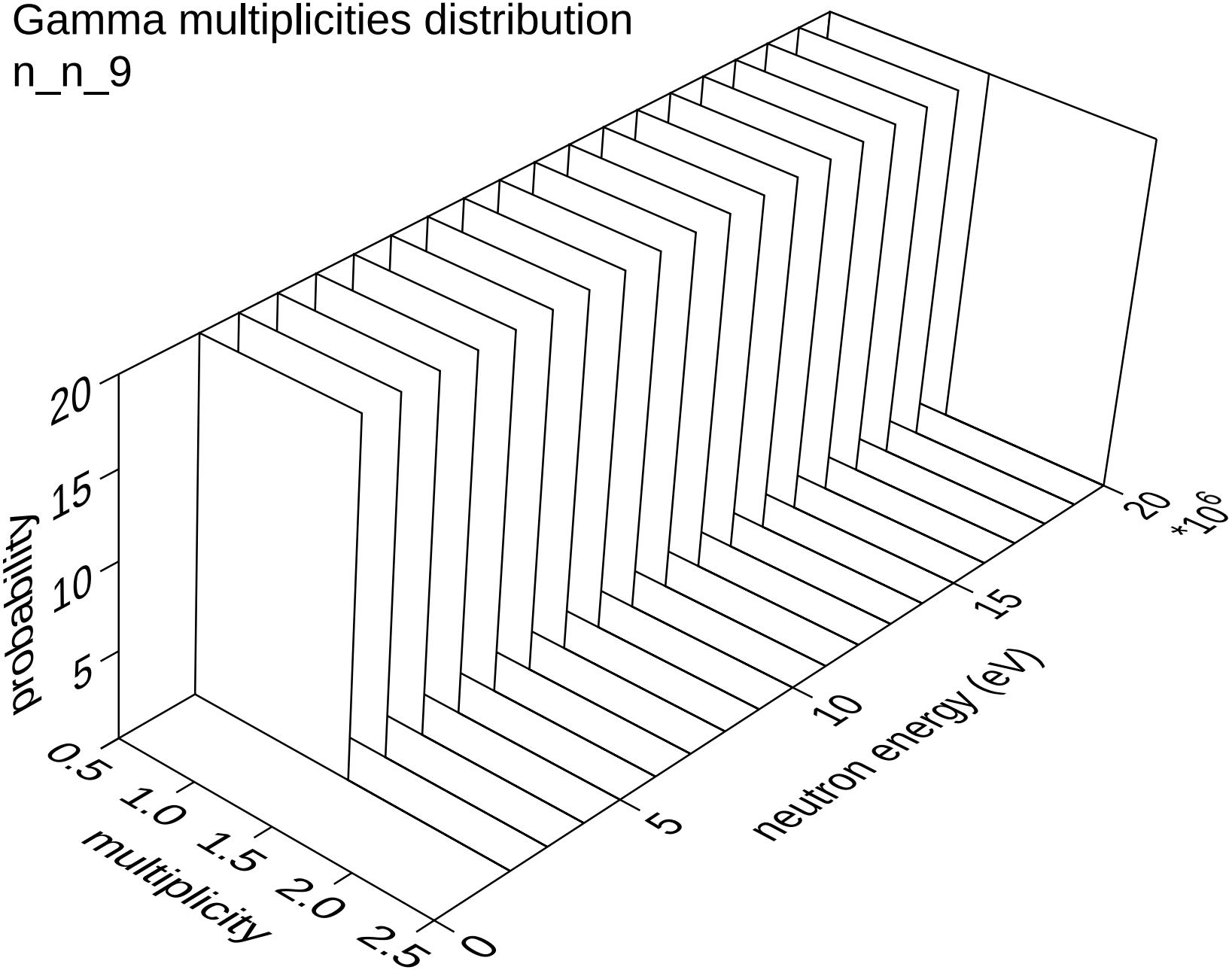
Gamma multiplicities distribution
n_n_8

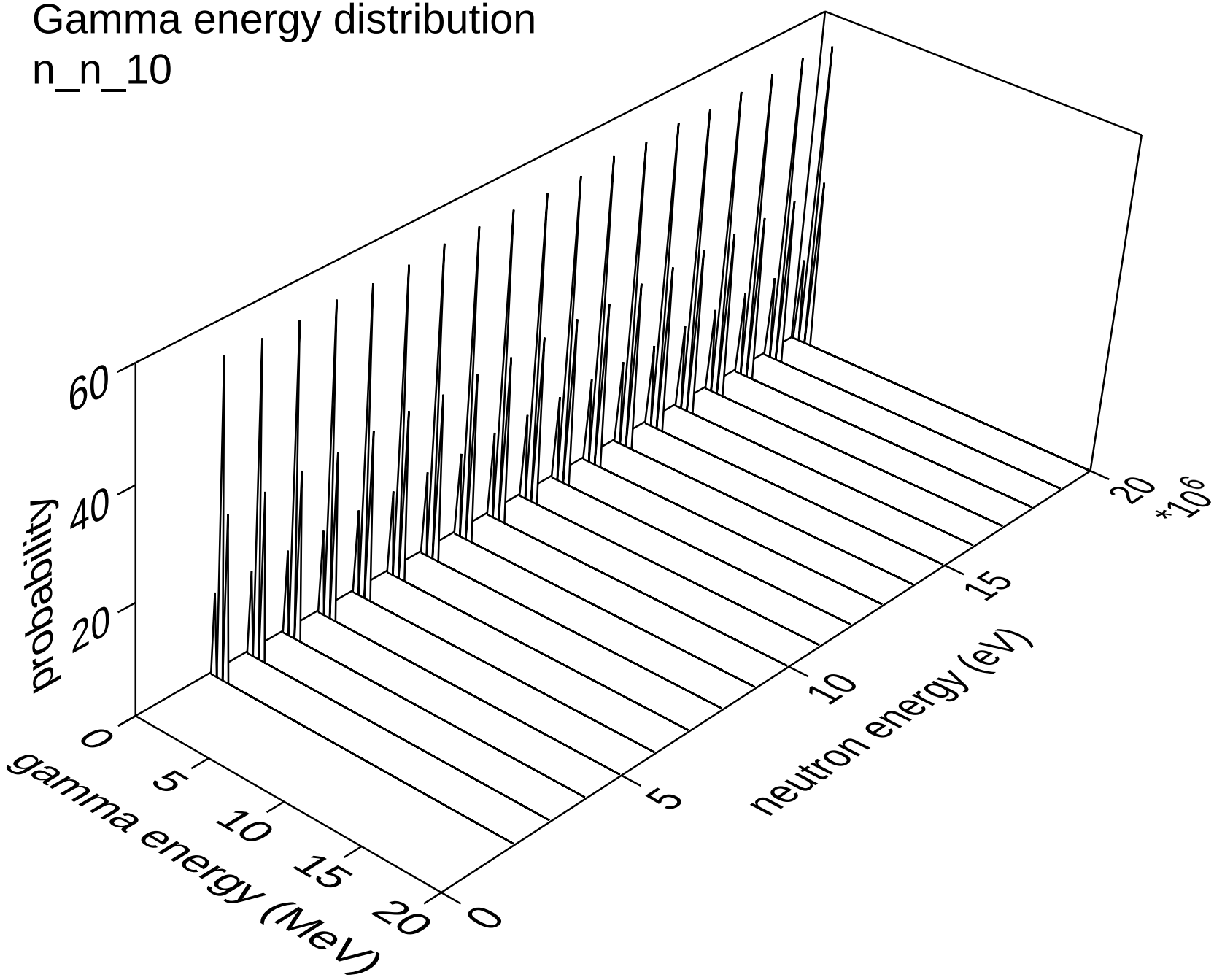


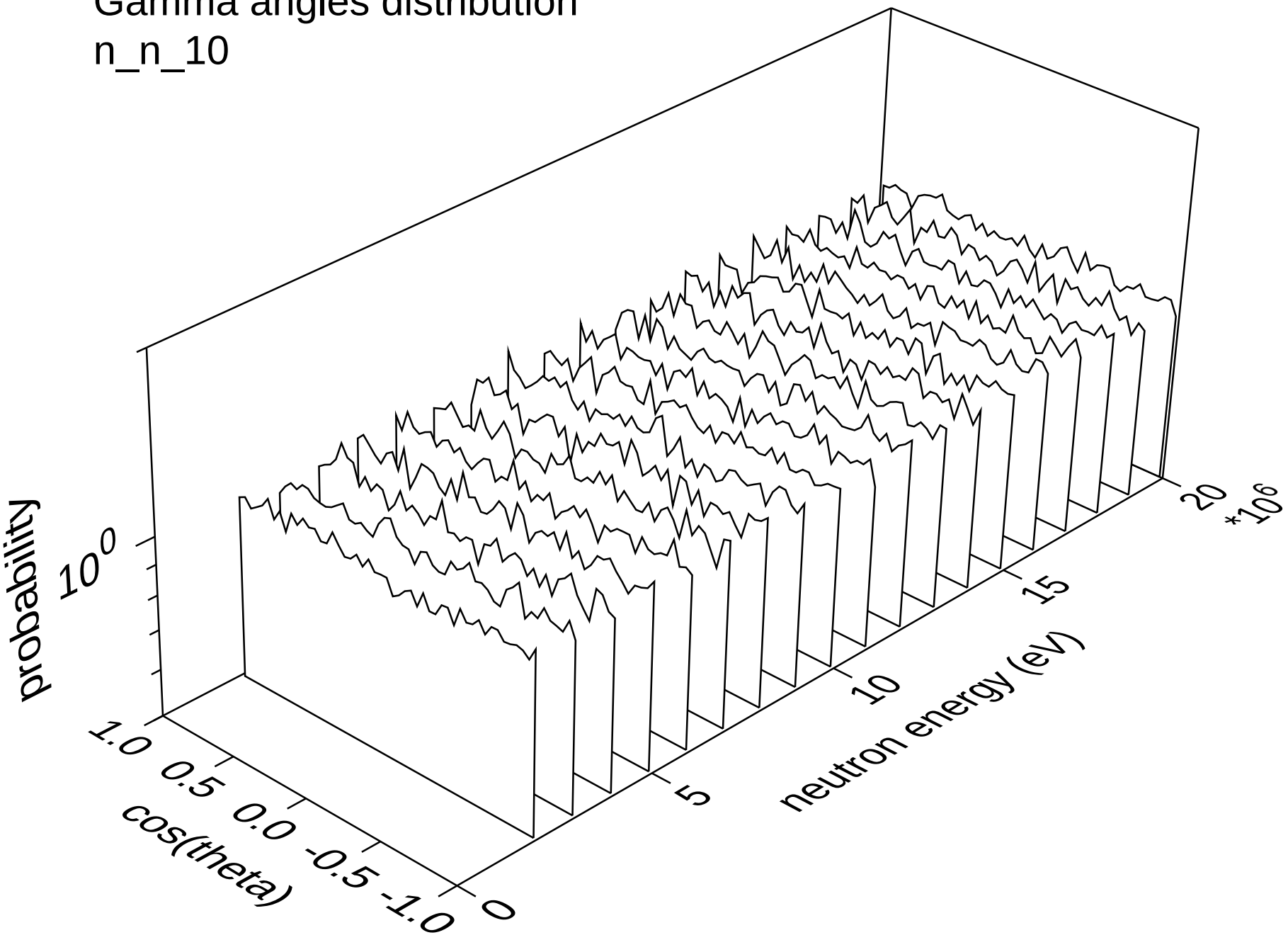

Gamma energy distribution
n_n_9
probability
100
80
60
40
20
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
5
10
15
20
*10^6


Gamma angles distribution
n_n_9
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

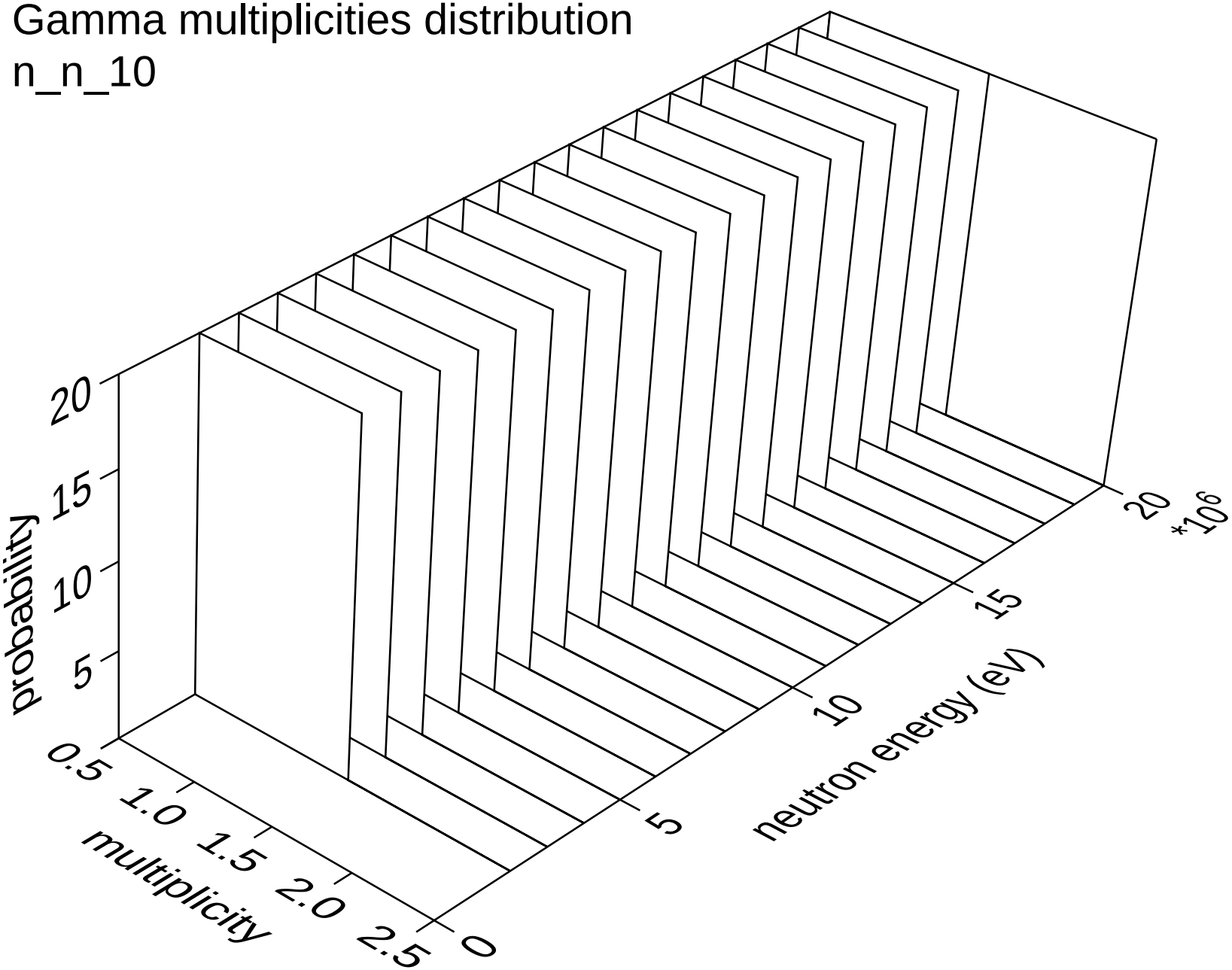
Gamma multiplicities distribution
n_n_9

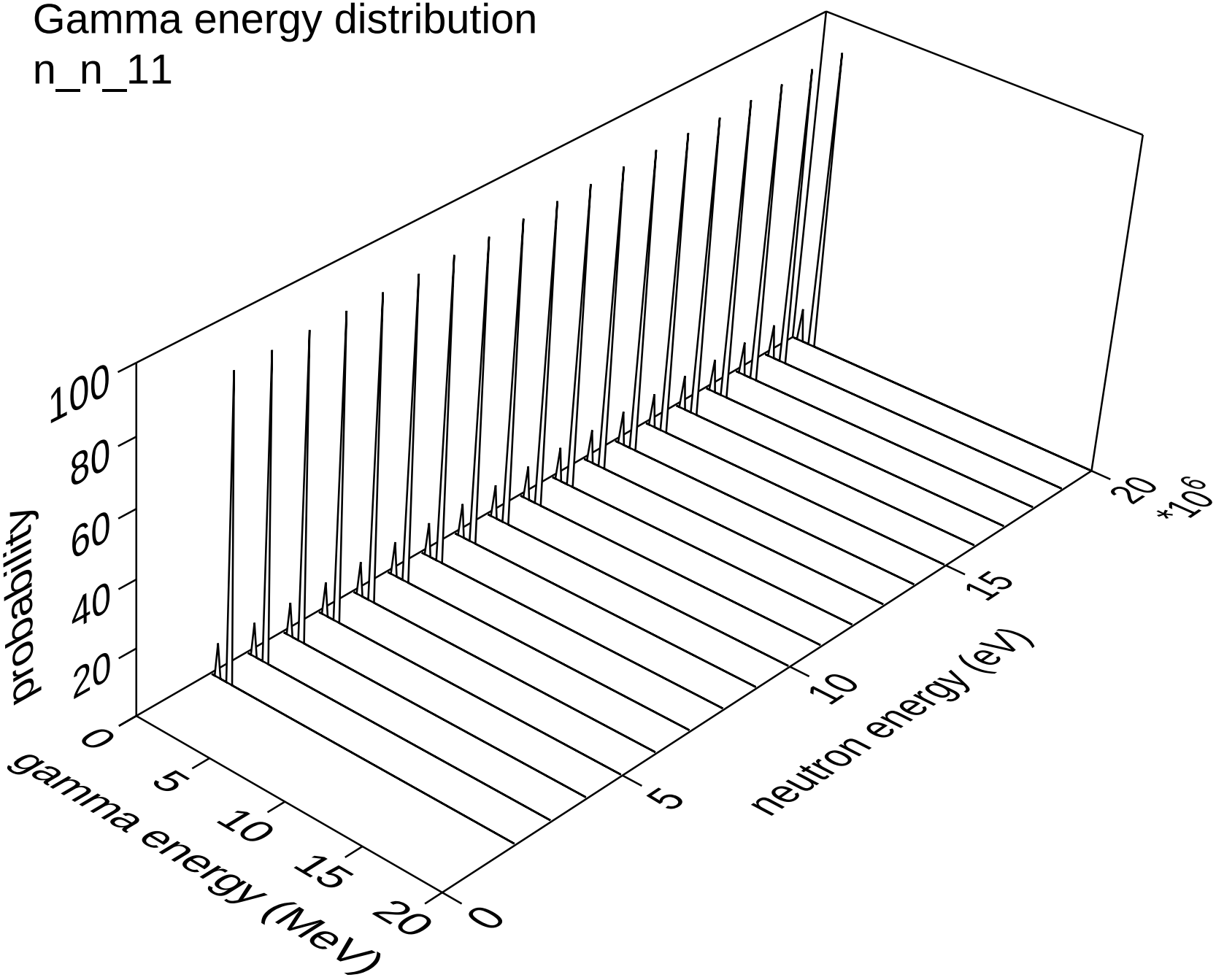


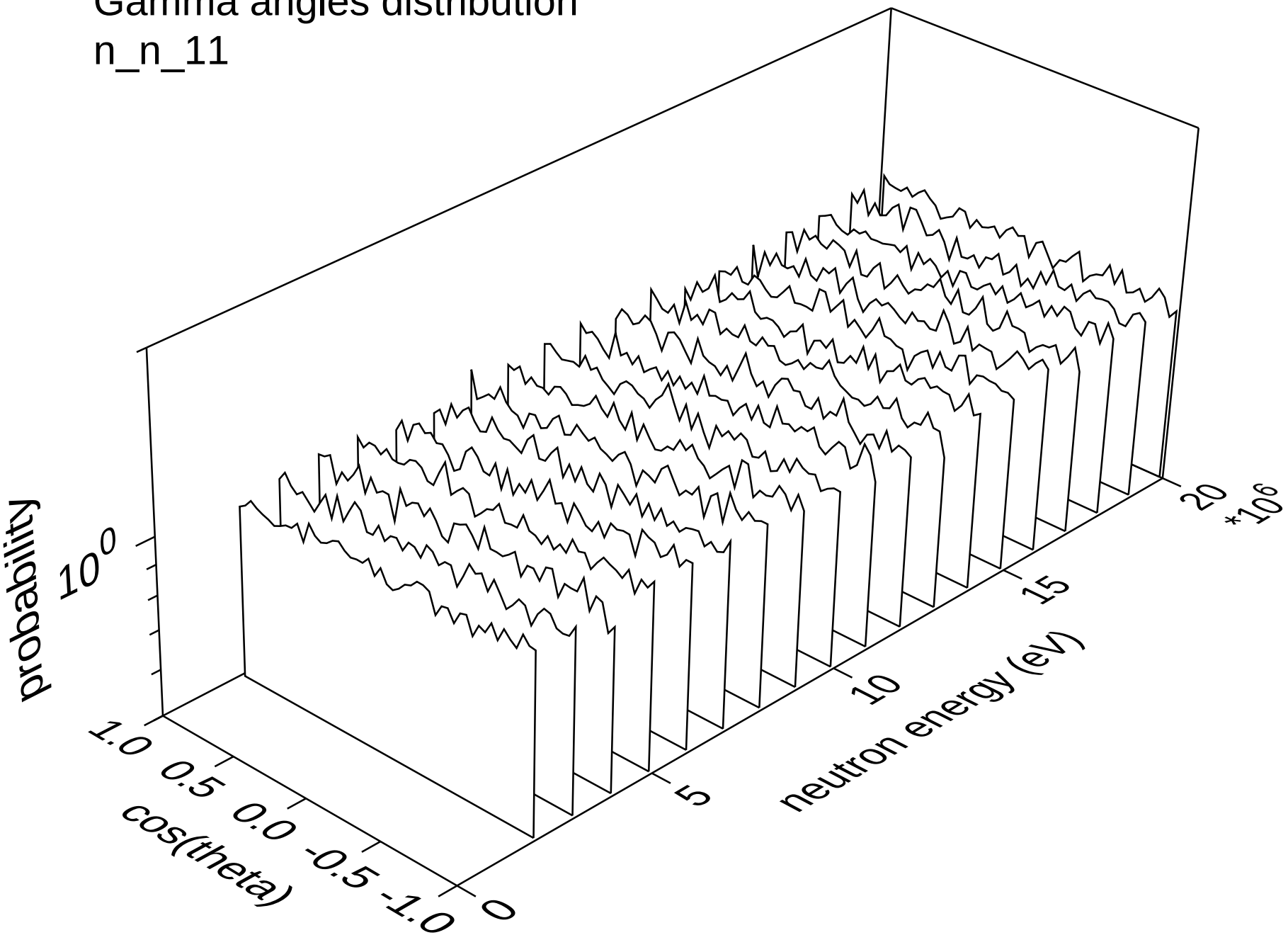

Gamma energy distribution
n_n_10
probability
60
40
20
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
0
5
10
15
20
*10^6


Gamma angles distribution
n_n_10
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

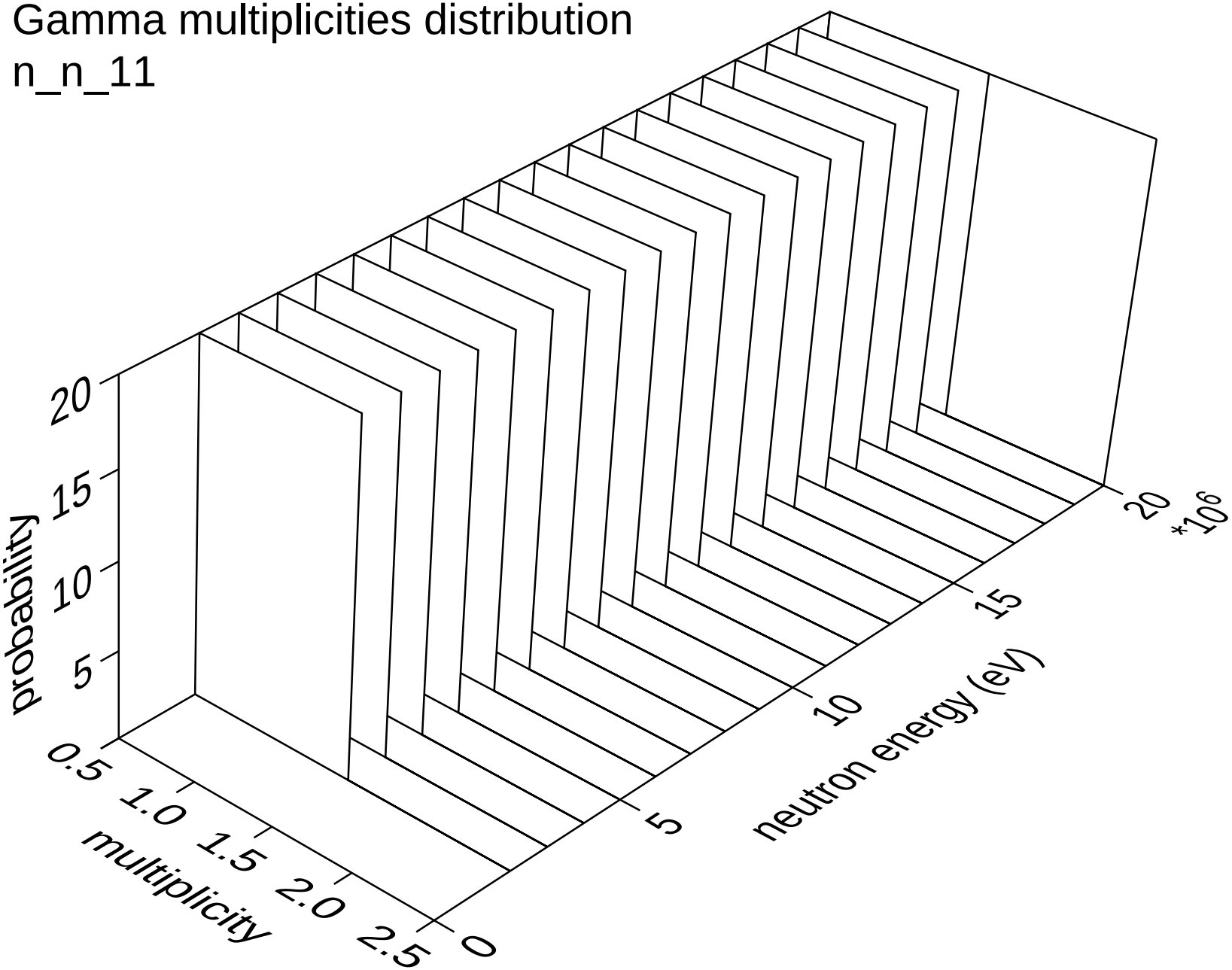
Gamma multiplicities distribution
n_n_10

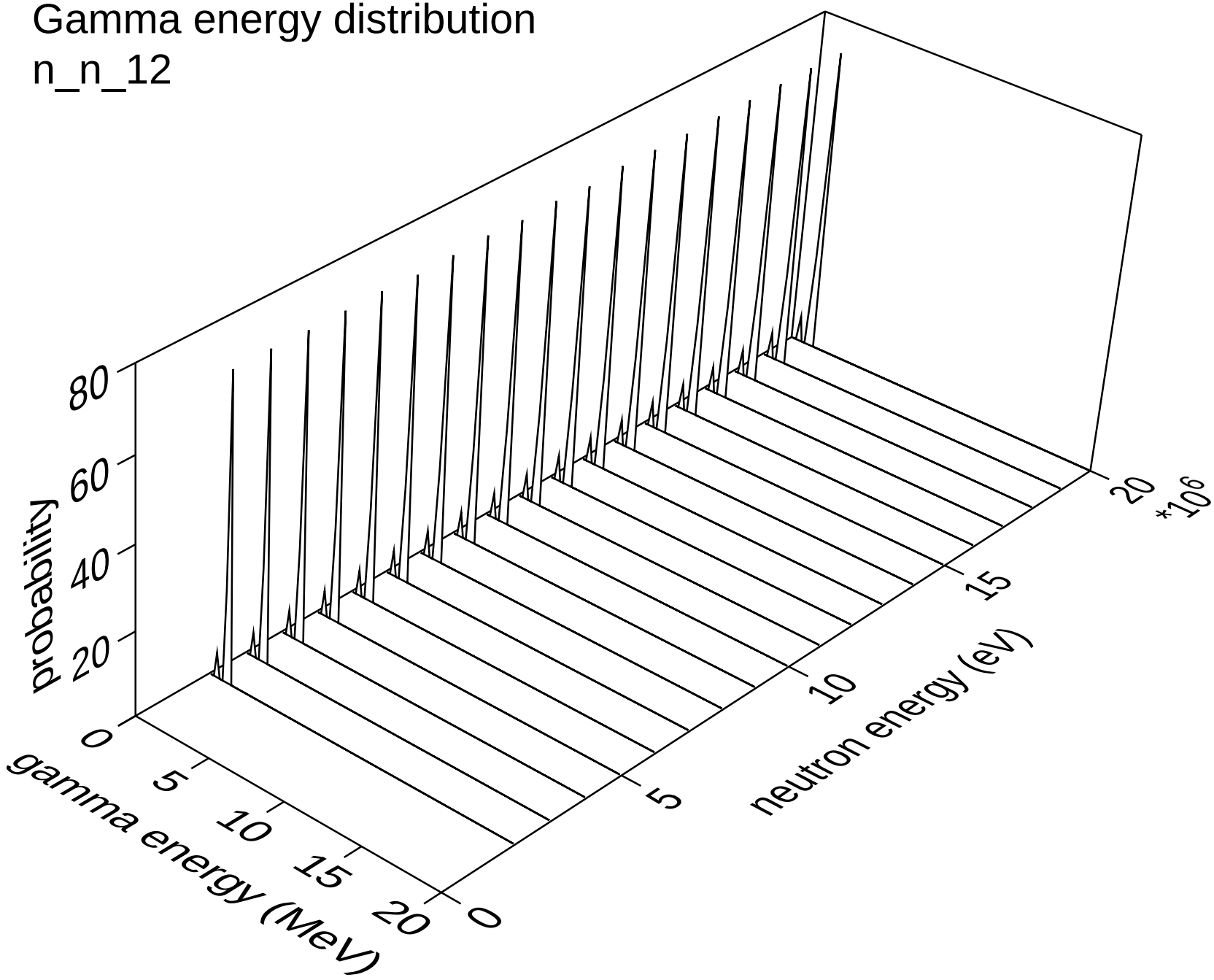


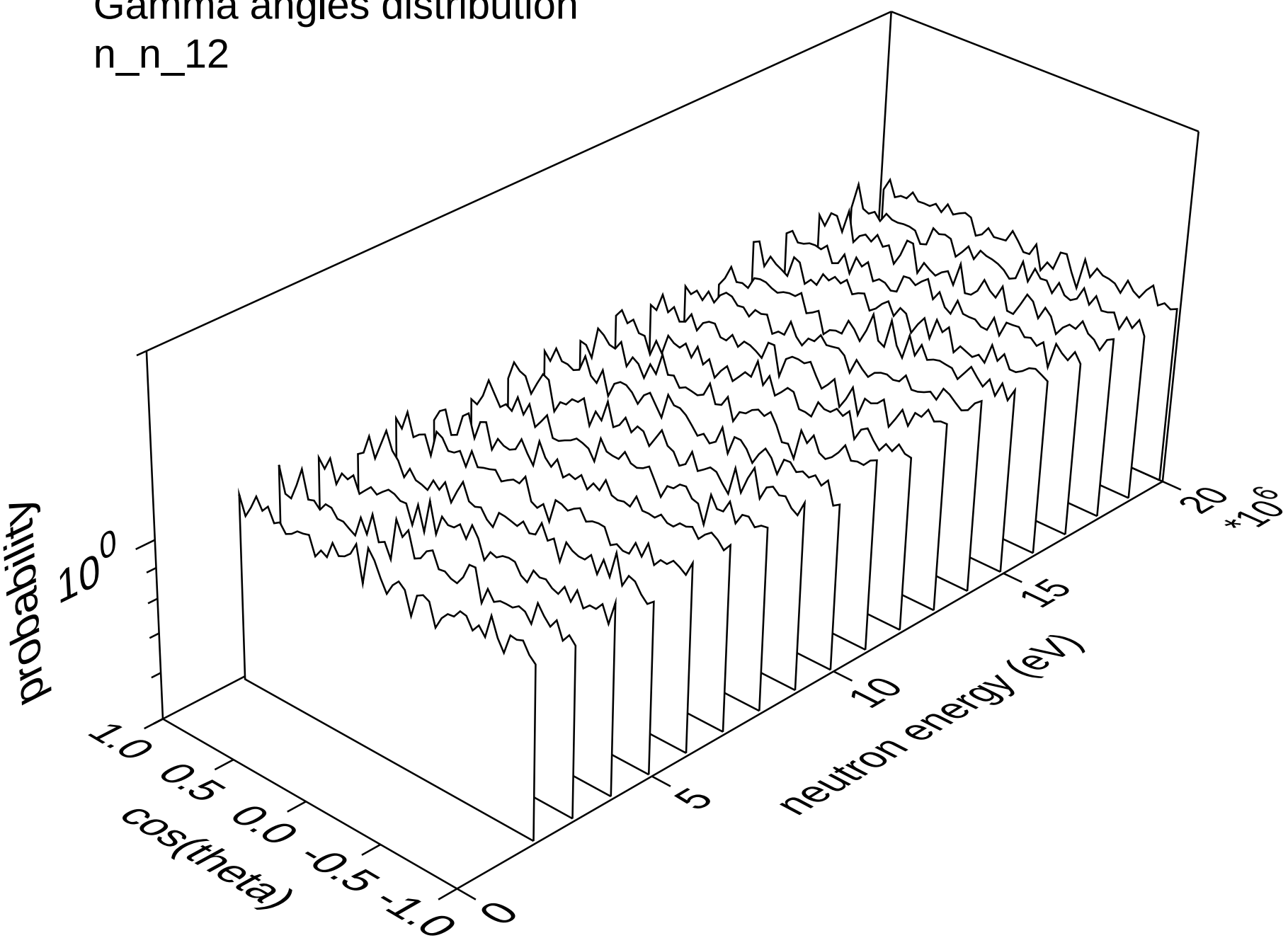

Gamma energy distribution
n_n_11
probability
100
80
60
40
20
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
0
5
10
15
20
*10^6


Gamma angles distribution
n_n_11
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

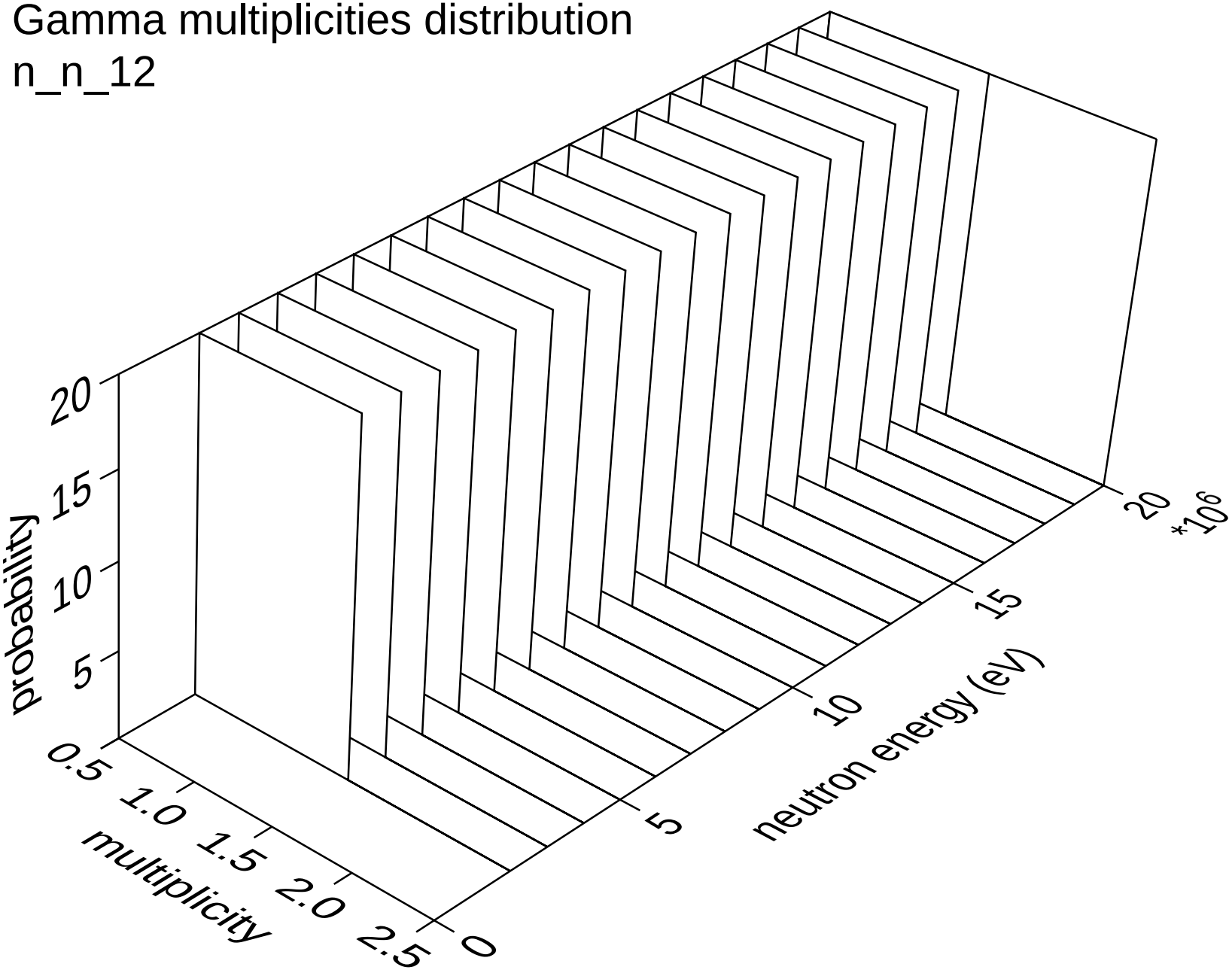
Gamma multiplicities distribution
n_n_11

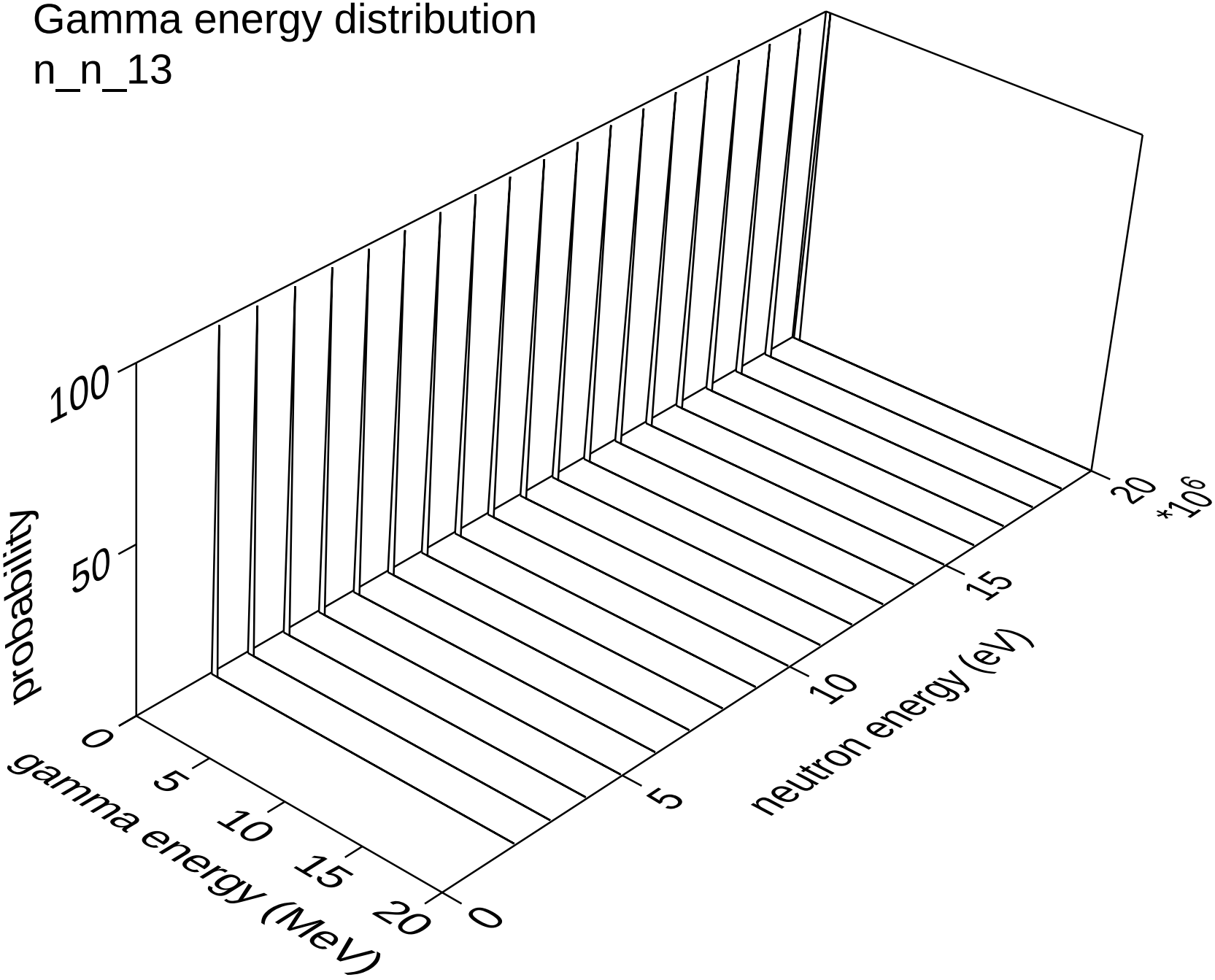


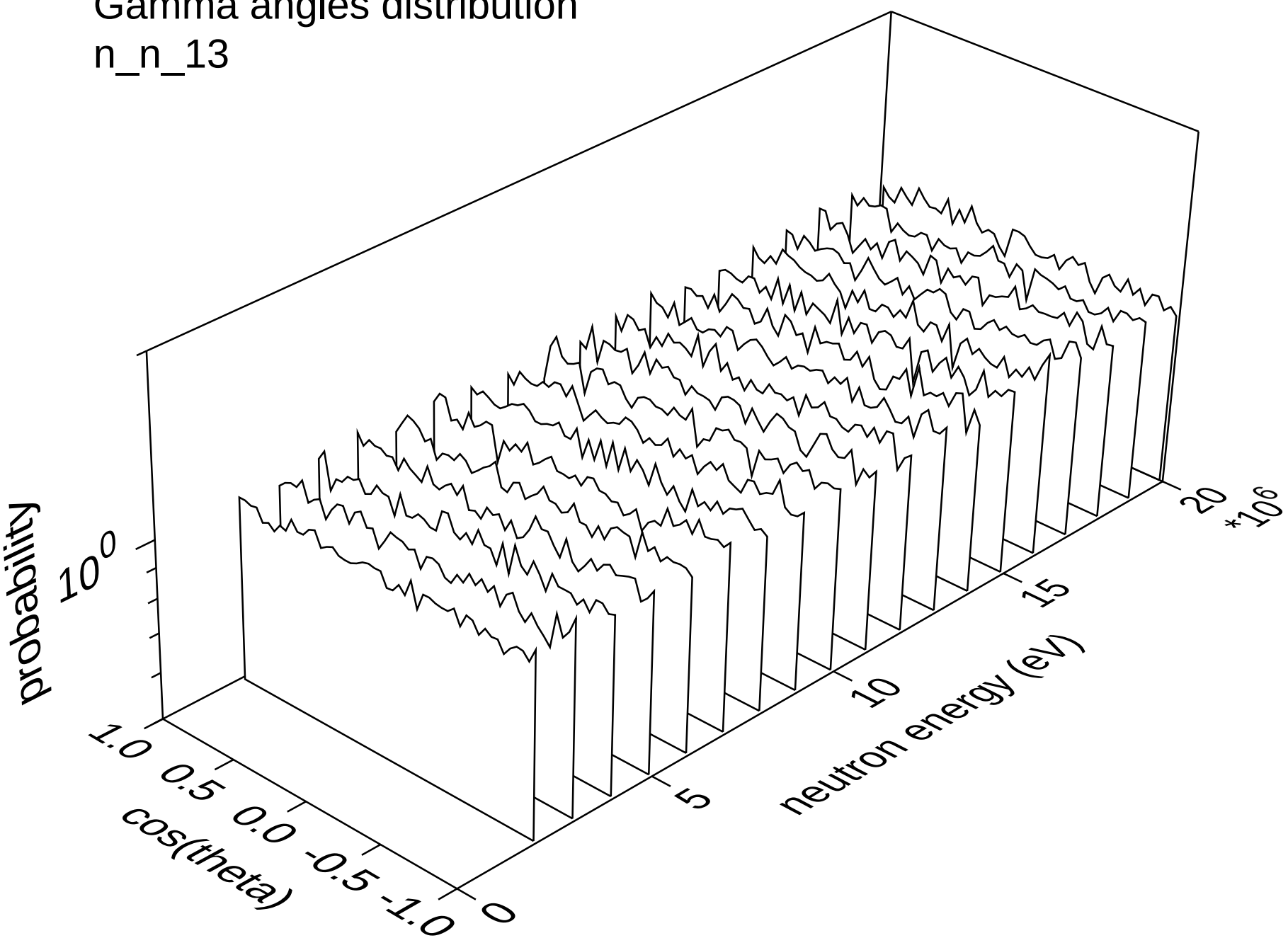

Gamma energy distribution
n_n_12
probability
0
20
40
60
80
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
0
5
10
15
20
*10^6


Gamma angles distribution
n_n_12
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

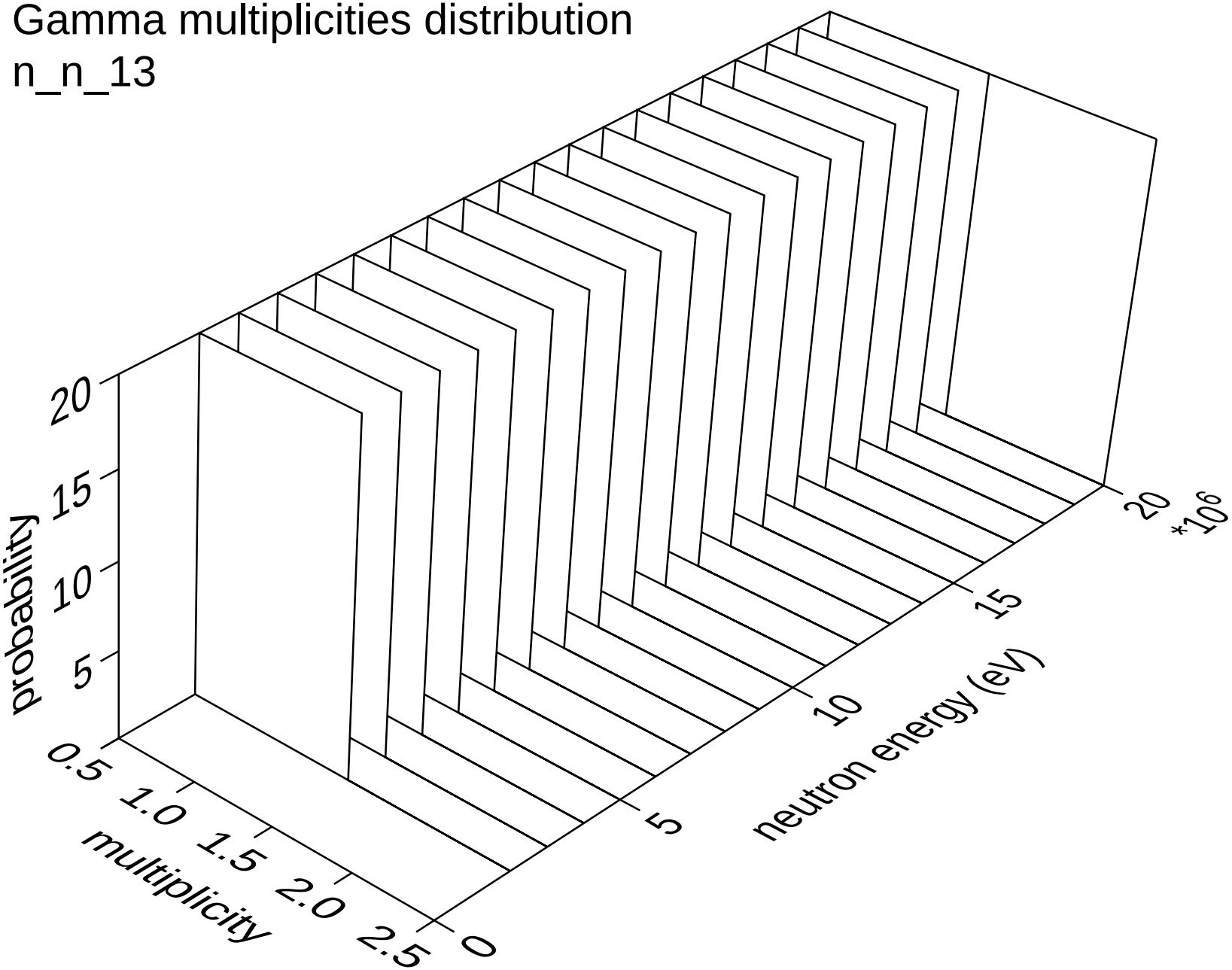
Gamma multiplicities distribution
n_n_12

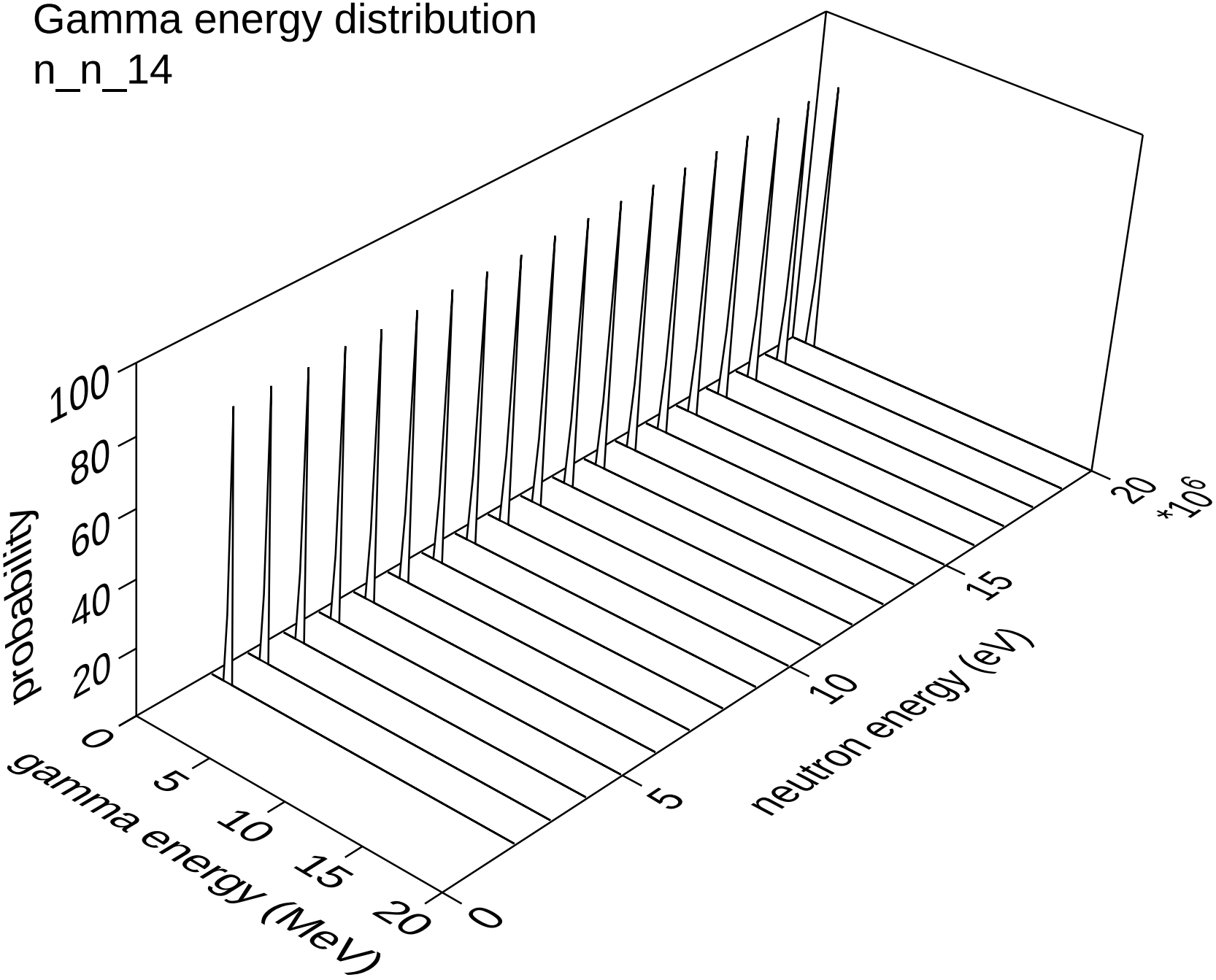


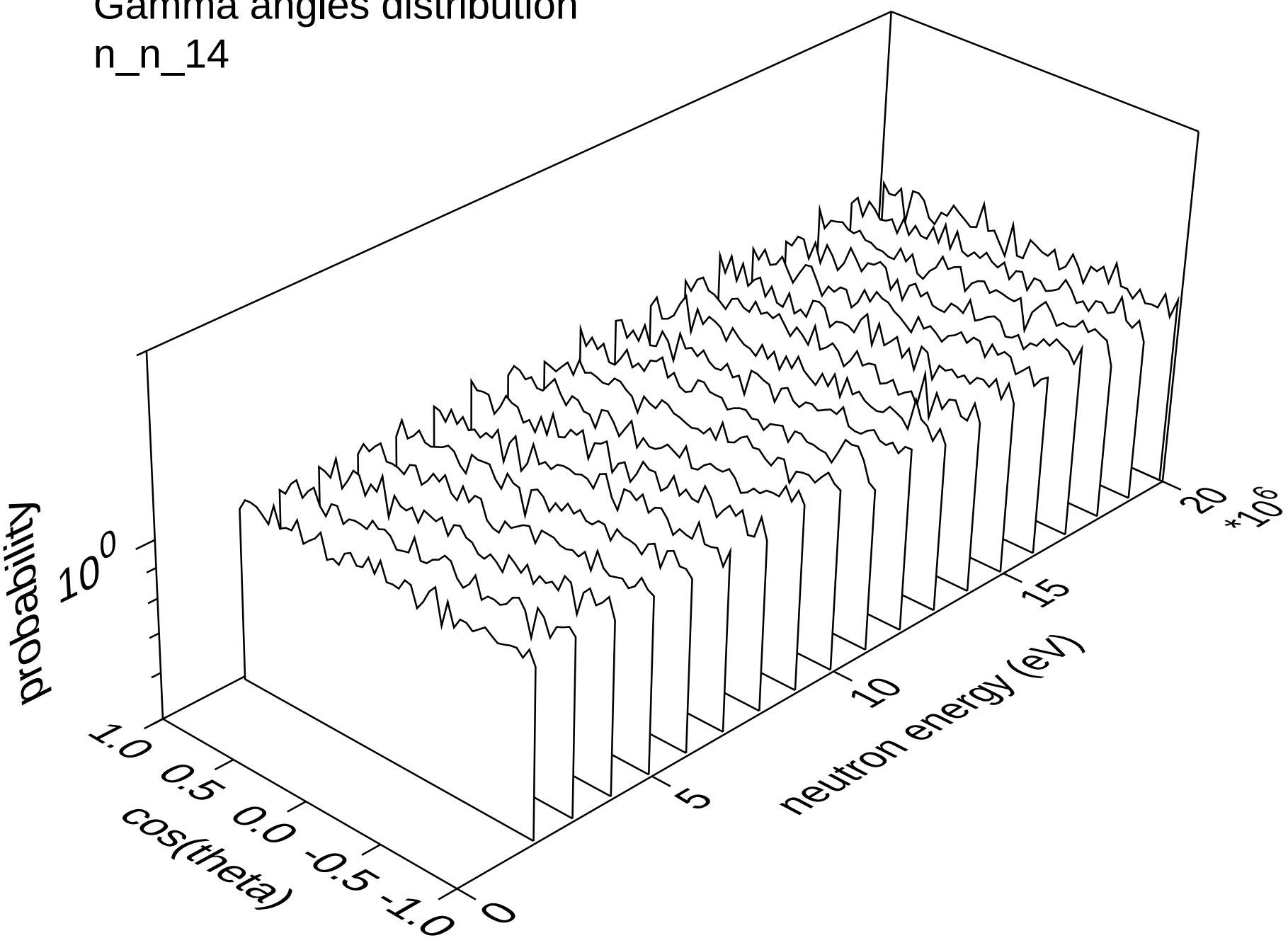

Gamma energy distribution
n_n_13
probability
100
50
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
0
5
10
15
20
*10^6


Gamma angles distribution
n_n_13
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

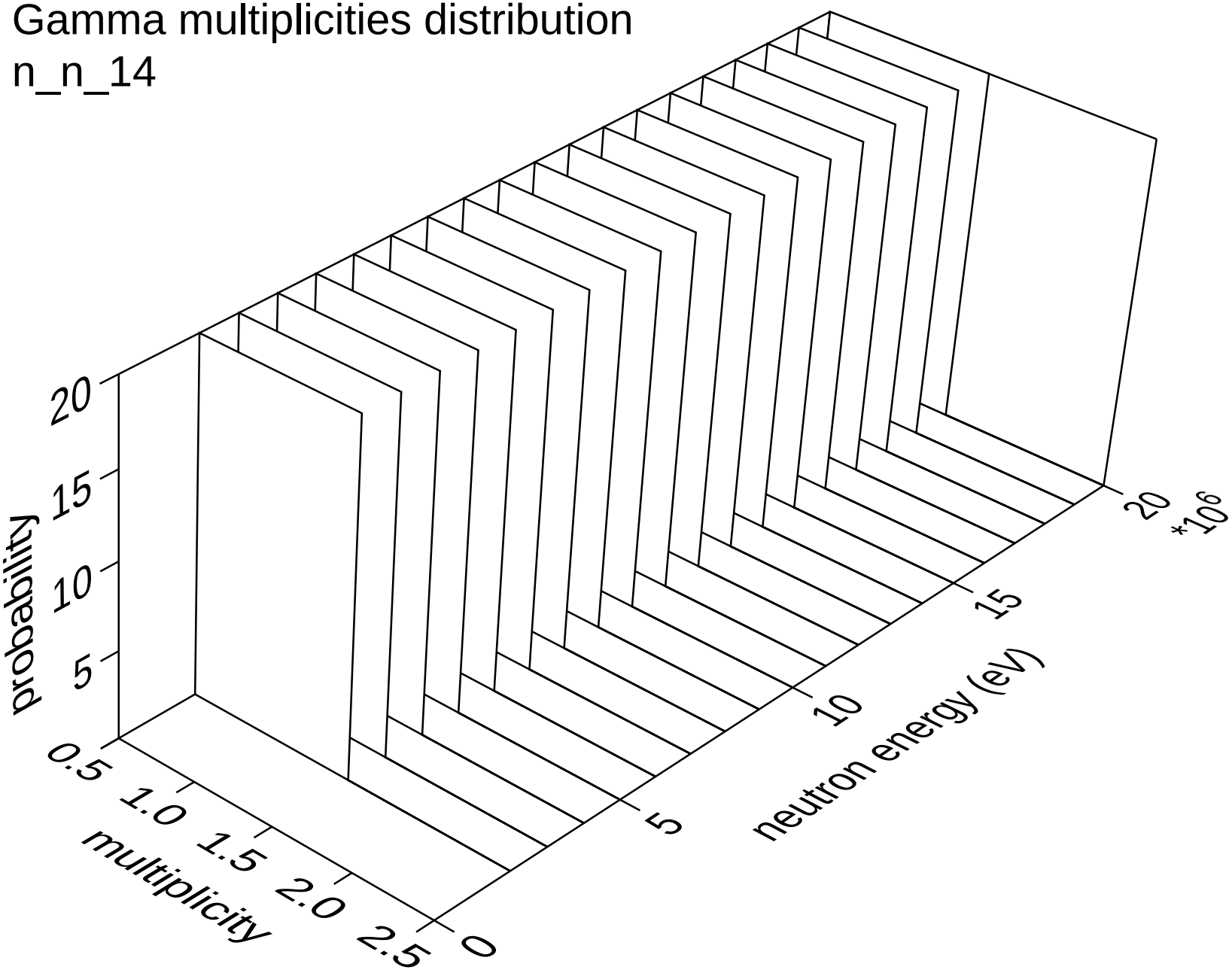
Gamma multiplicities distribution
n_n_13

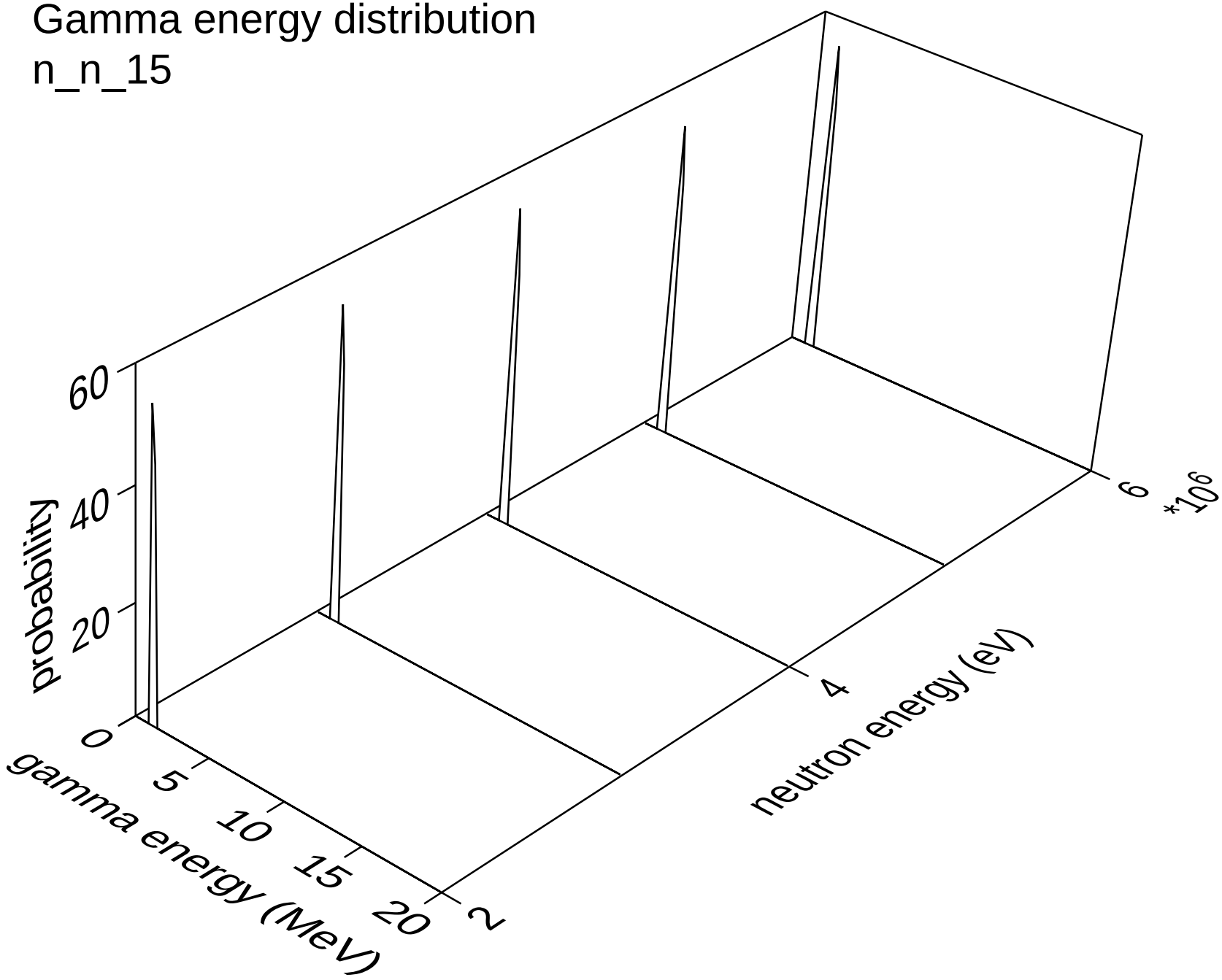


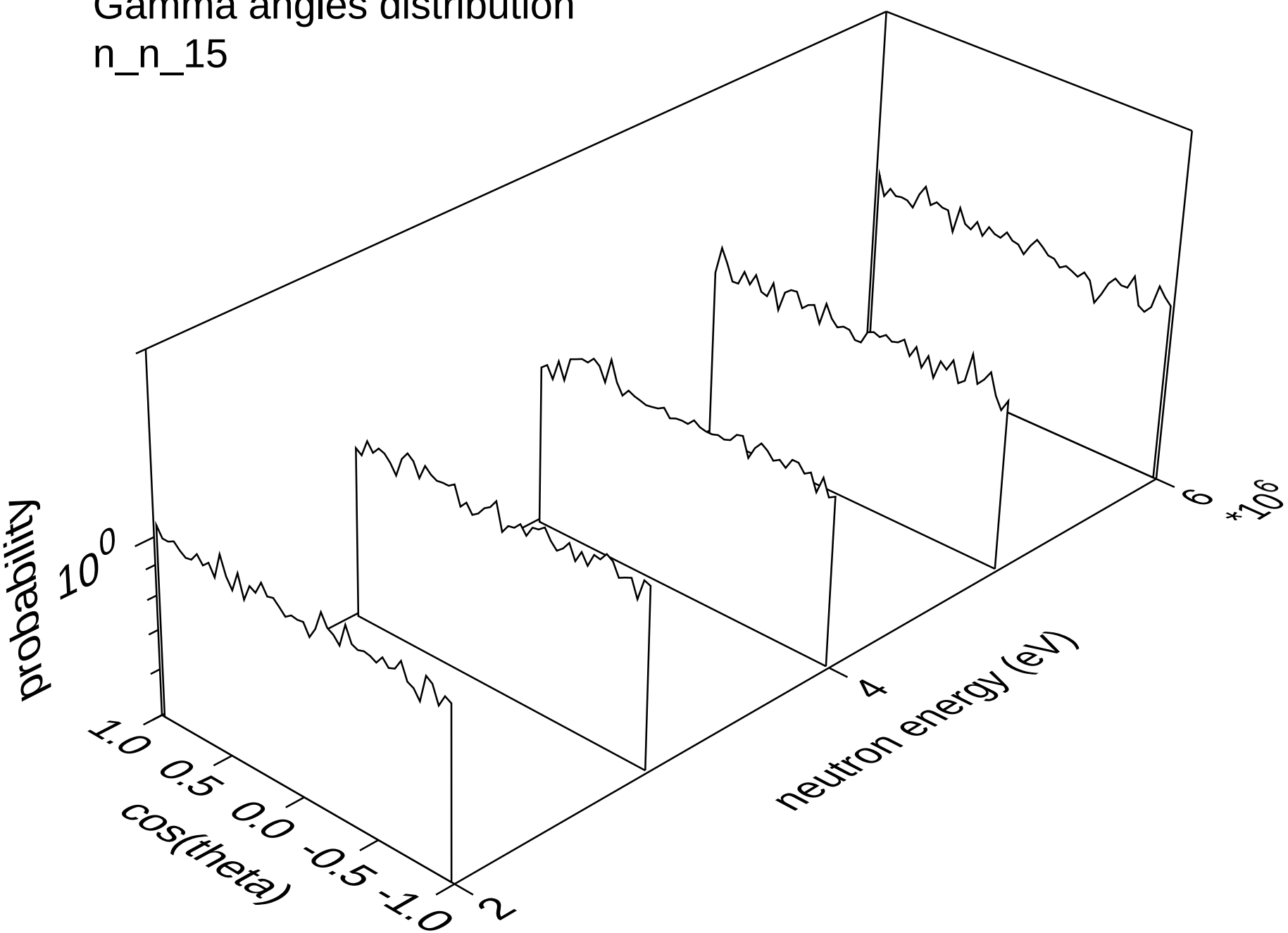

Gamma energy distribution
n_n_14
probability
100
80
60
40
20
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
0
5
10
15
20
*10^6


Gamma angles distribution
n_n_14
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
neutron energy (eV)
*10^6

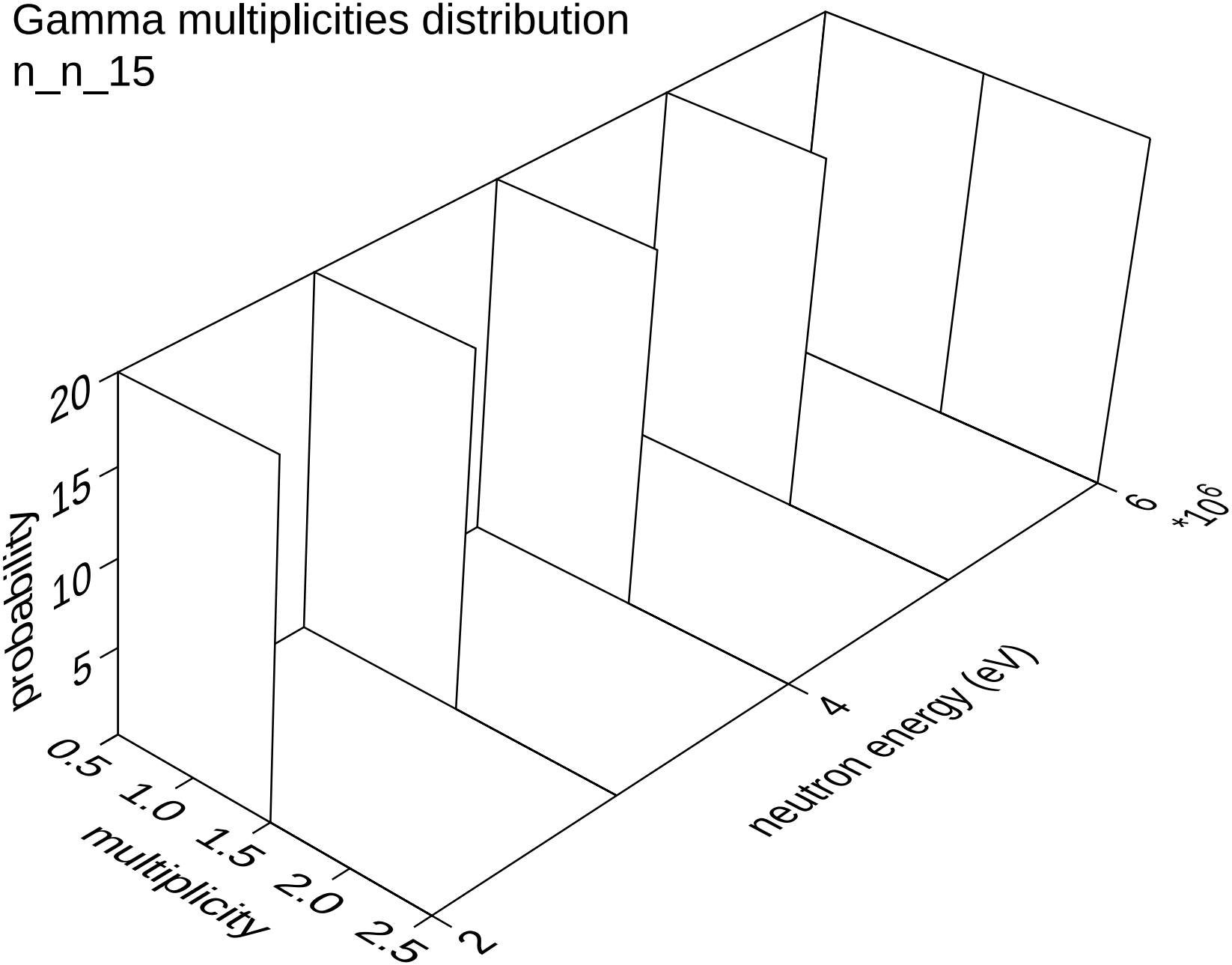
Gamma multiplicities distribution
n_n_14

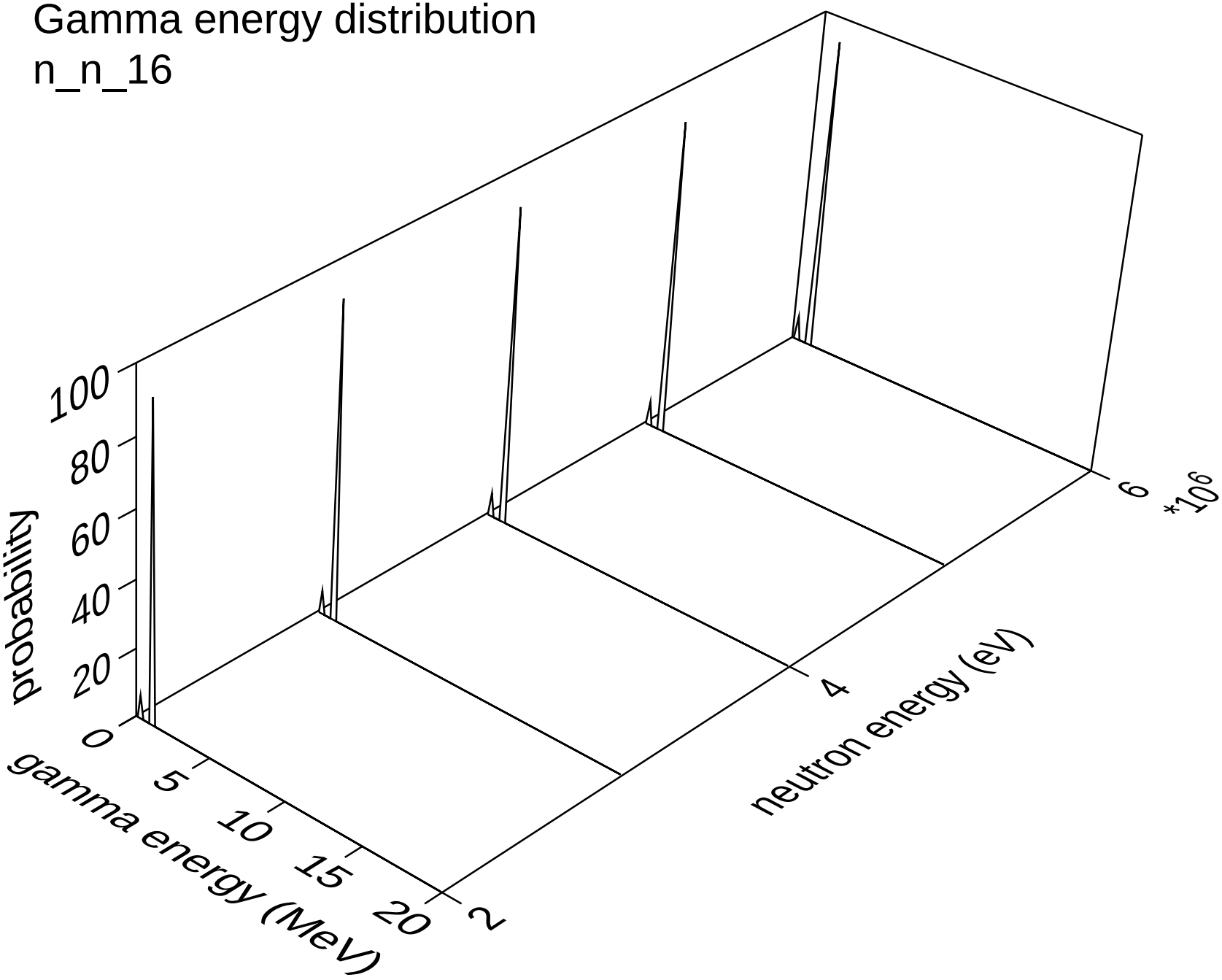


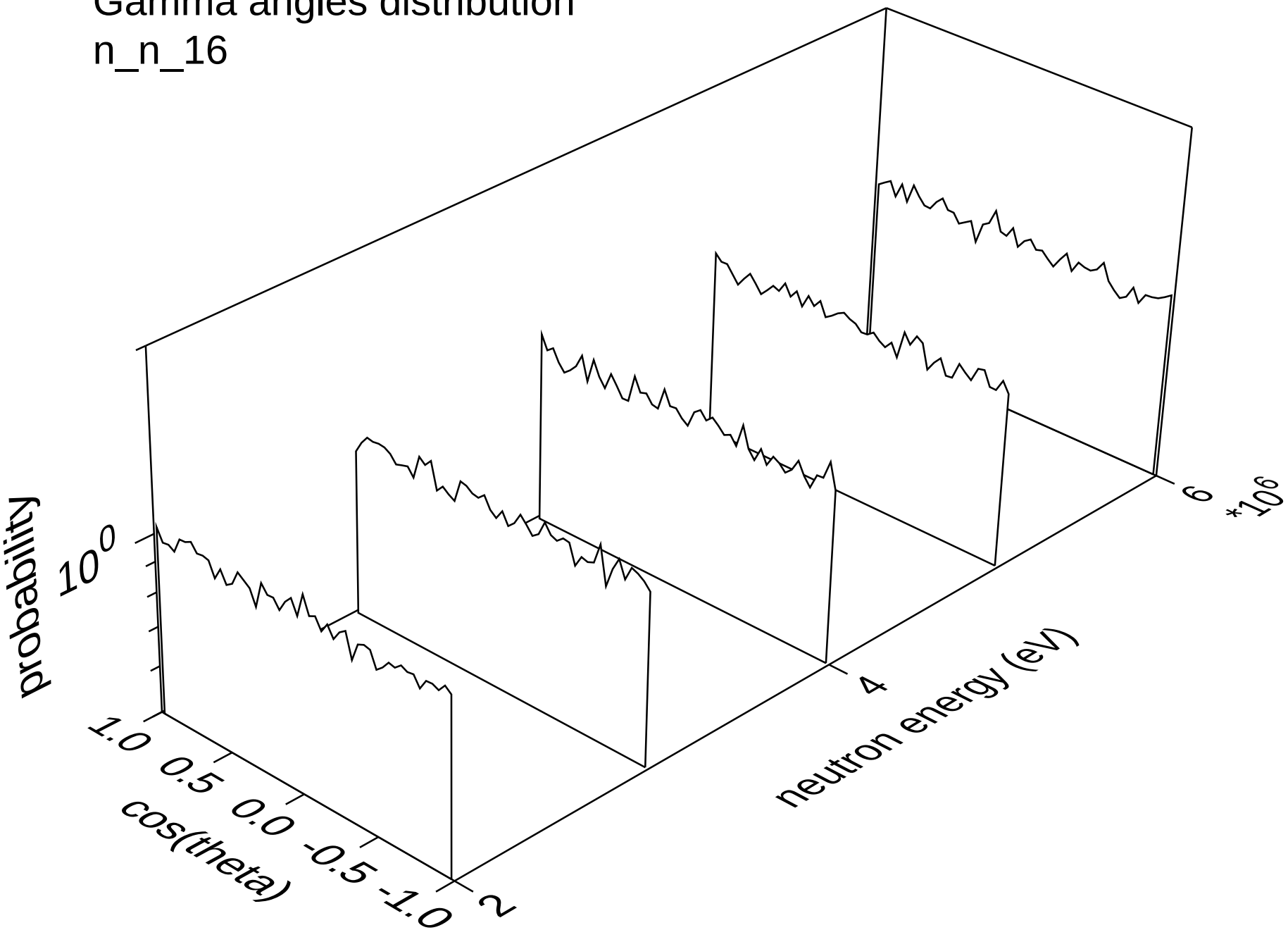

Gamma energy distribution
n_n_15
probability
60
40
20
0
gamma energy (MeV)
5
10
15
20
2
neutron energy (eV)
4
6
*10^6


Gamma angles distribution
n_n_15
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
2
4
6
*10^6
neutron energy (eV)

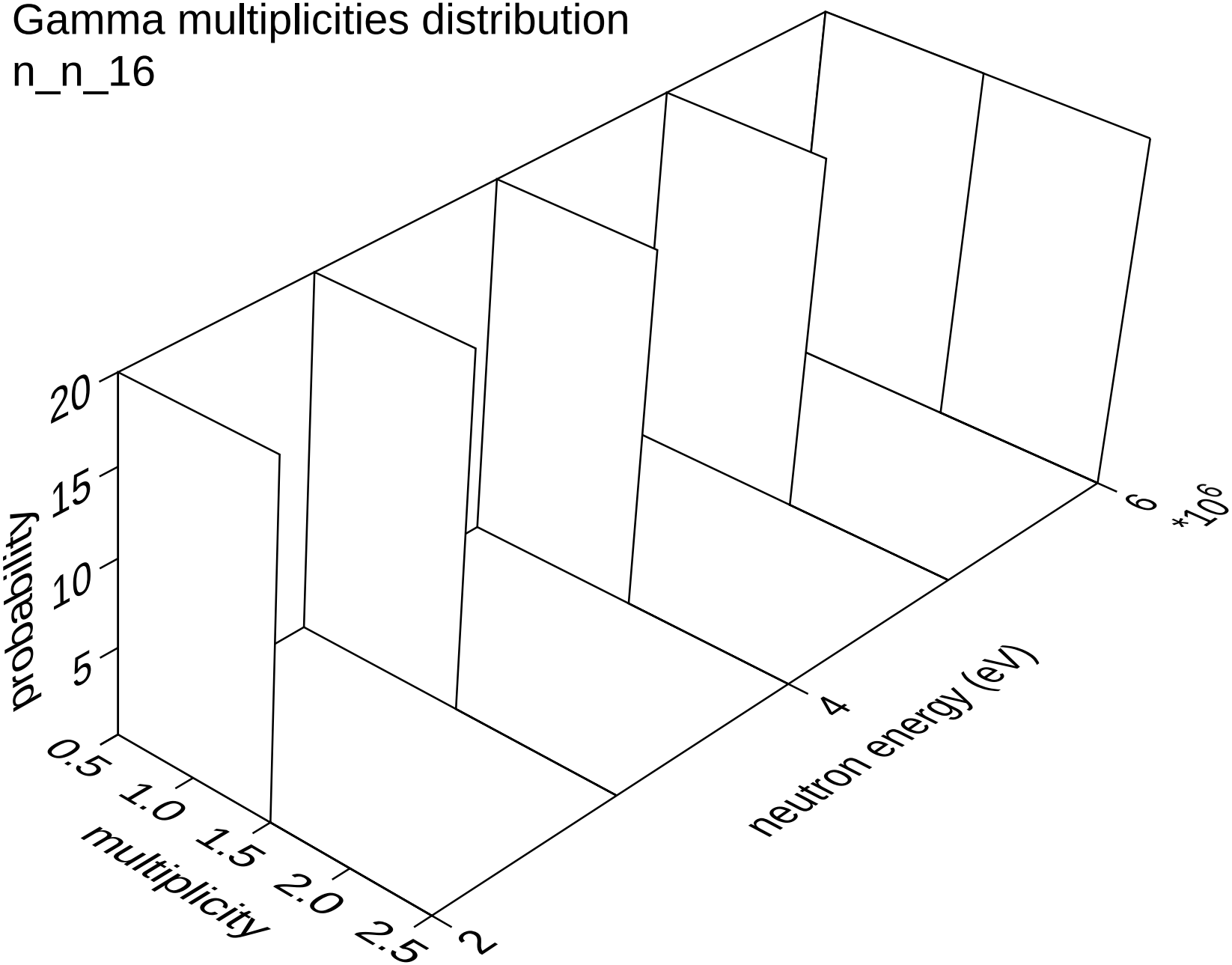
Gamma multiplicities distribution
n_n_15

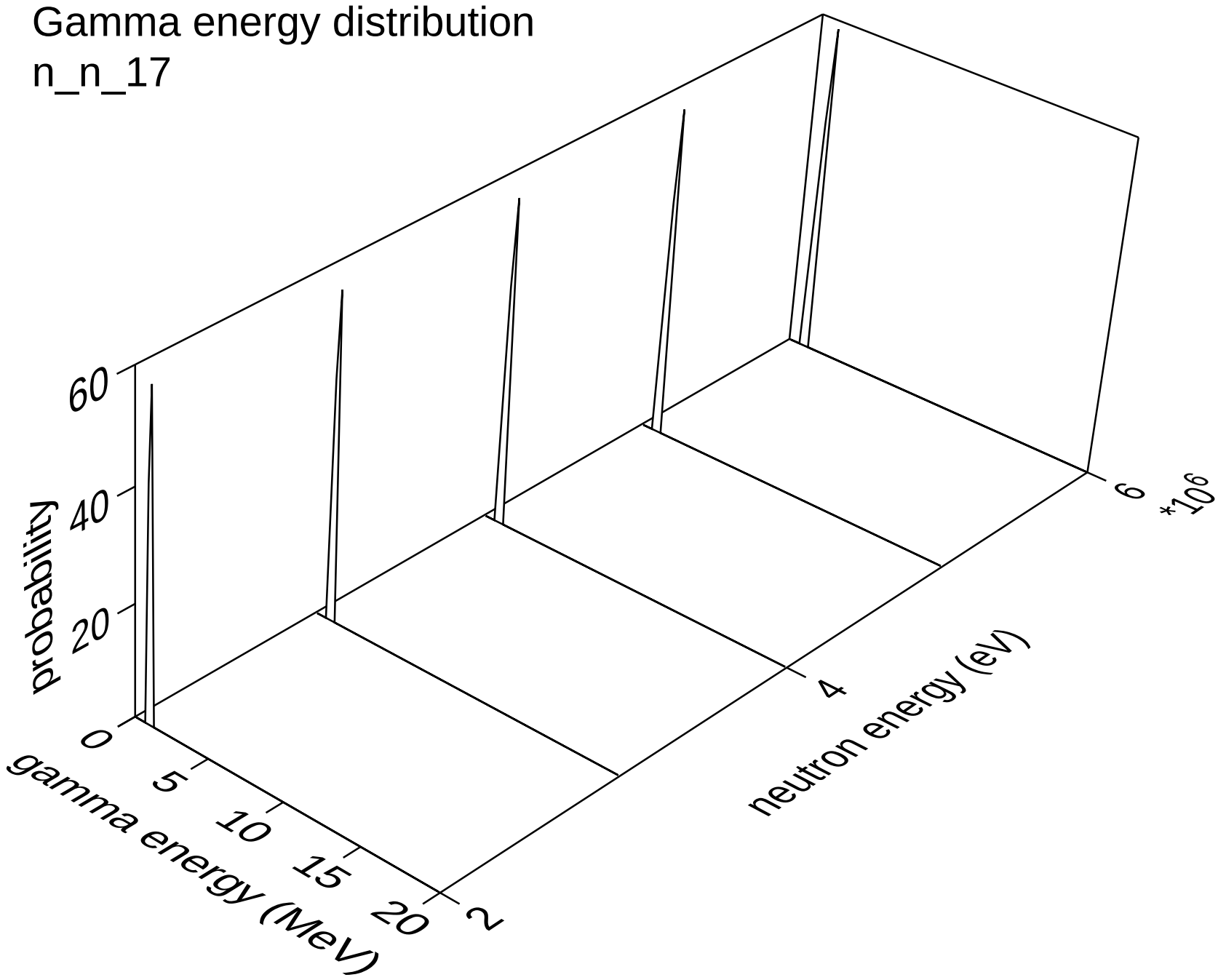


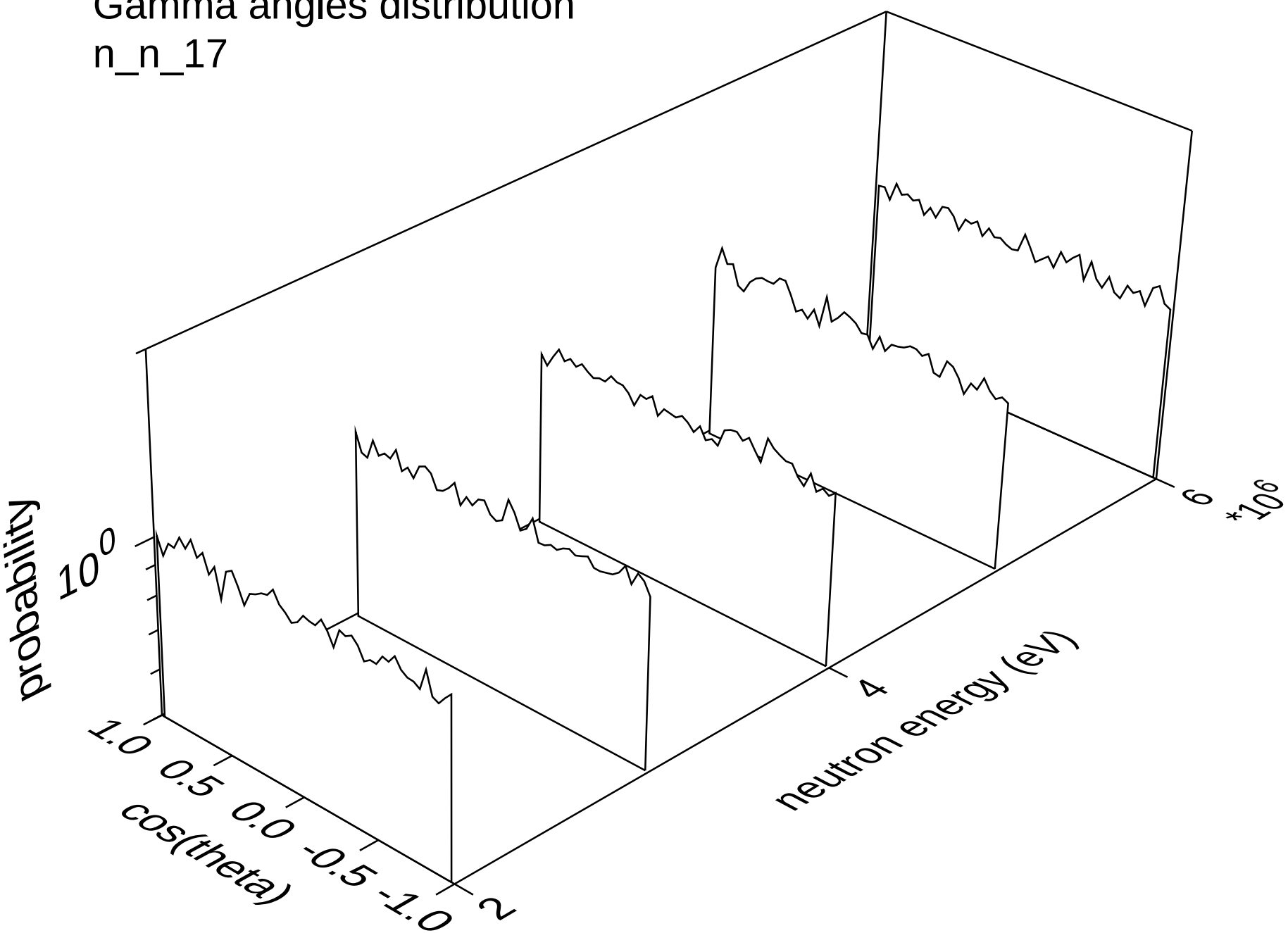

Gamma energy distribution
n_n_16
probability
100
80
60
40
20
0
gamma energy (MeV)
5
10
15
20
2
neutron energy (eV)
4
6
*10^6


Gamma angles distribution
n_n_16
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
2
4
6
*10^6
neutron energy (eV)

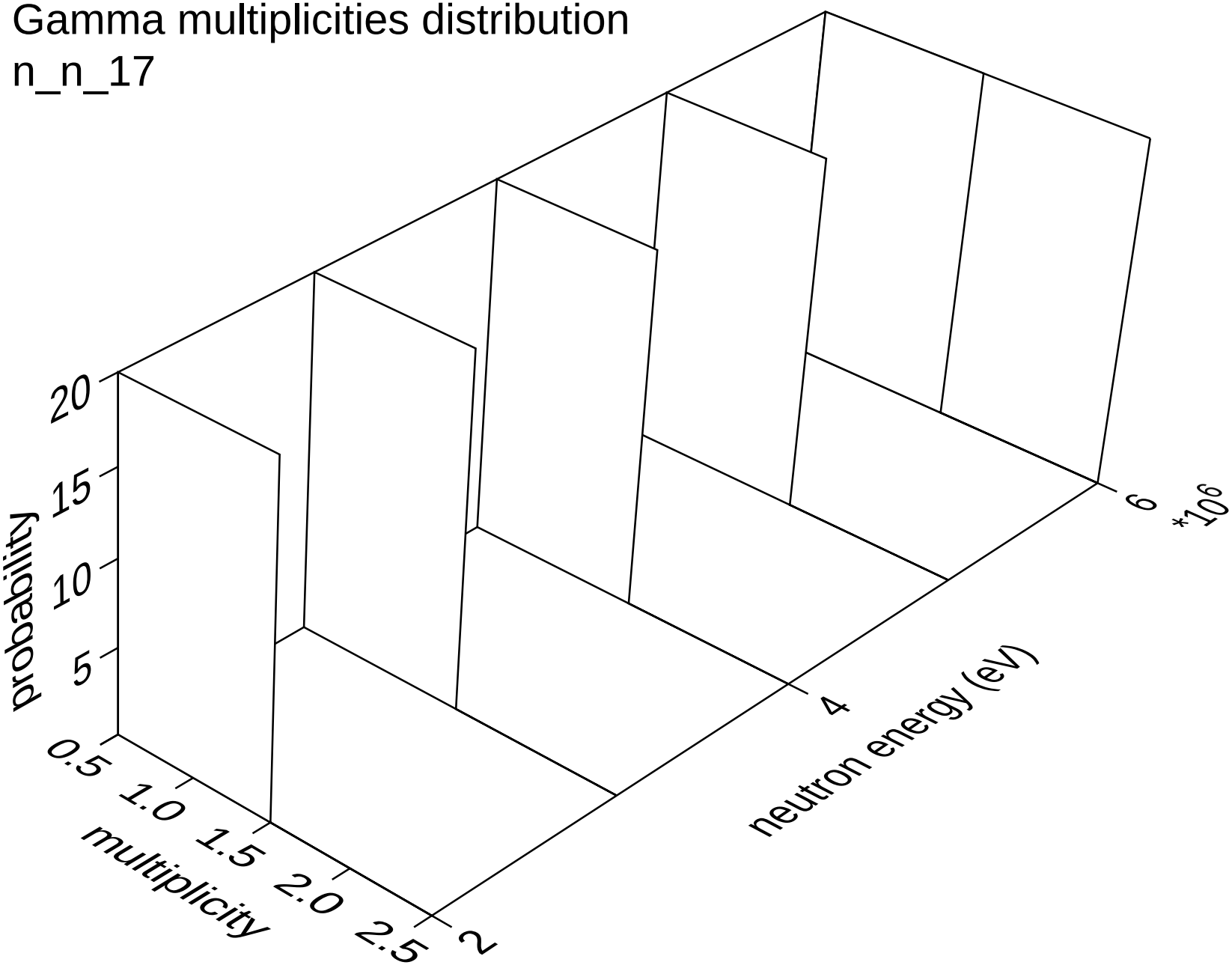
Gamma multiplicities distribution
n_n_16

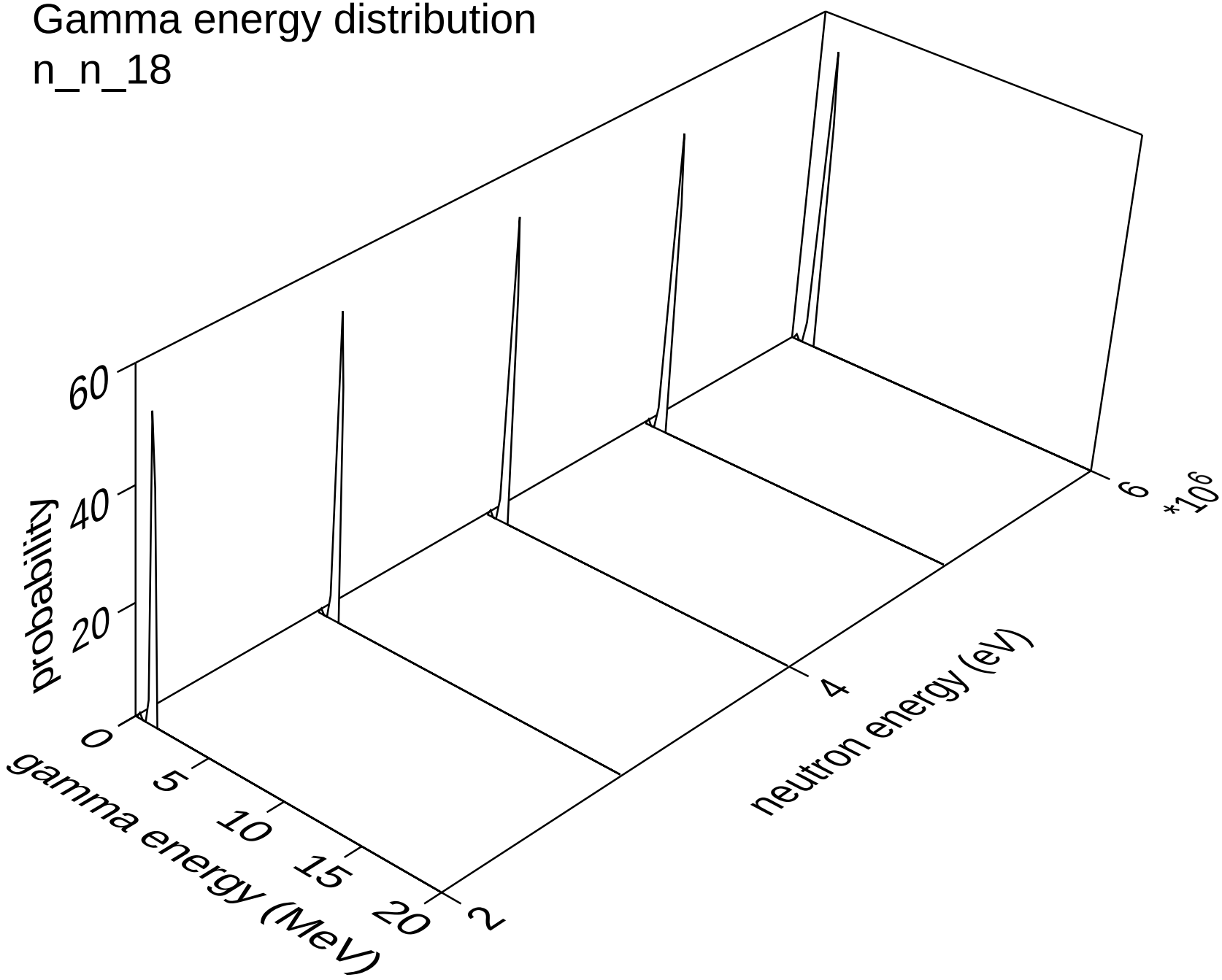


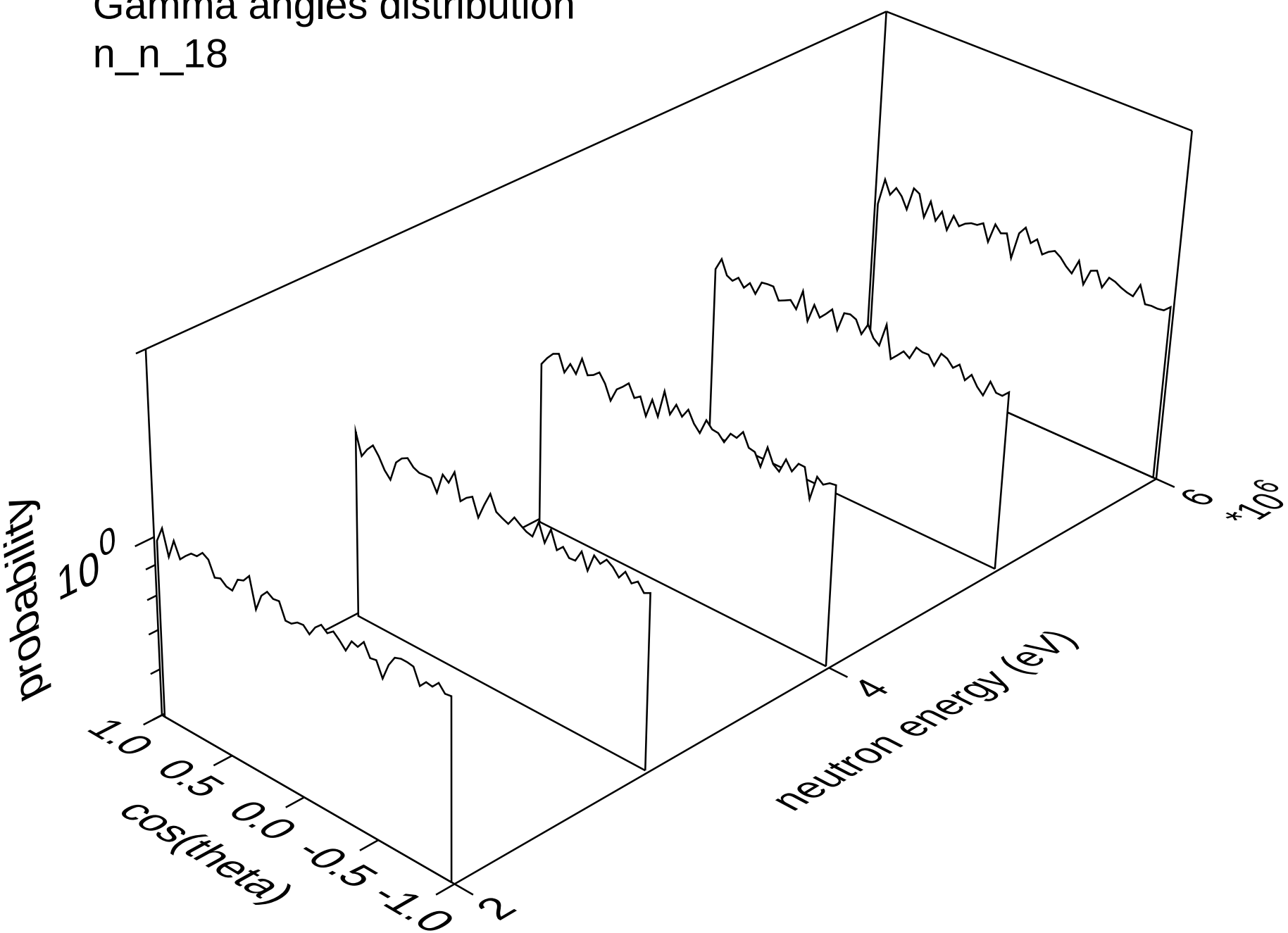

Gamma energy distribution
n_n_17
probability
60
40
20
0
gamma energy (MeV)
5
10
15
20
2
neutron energy (eV)
4
6
*10^6


Gamma angles distribution
n_n_17
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
2
4
6
*10^6
neutron energy (eV)

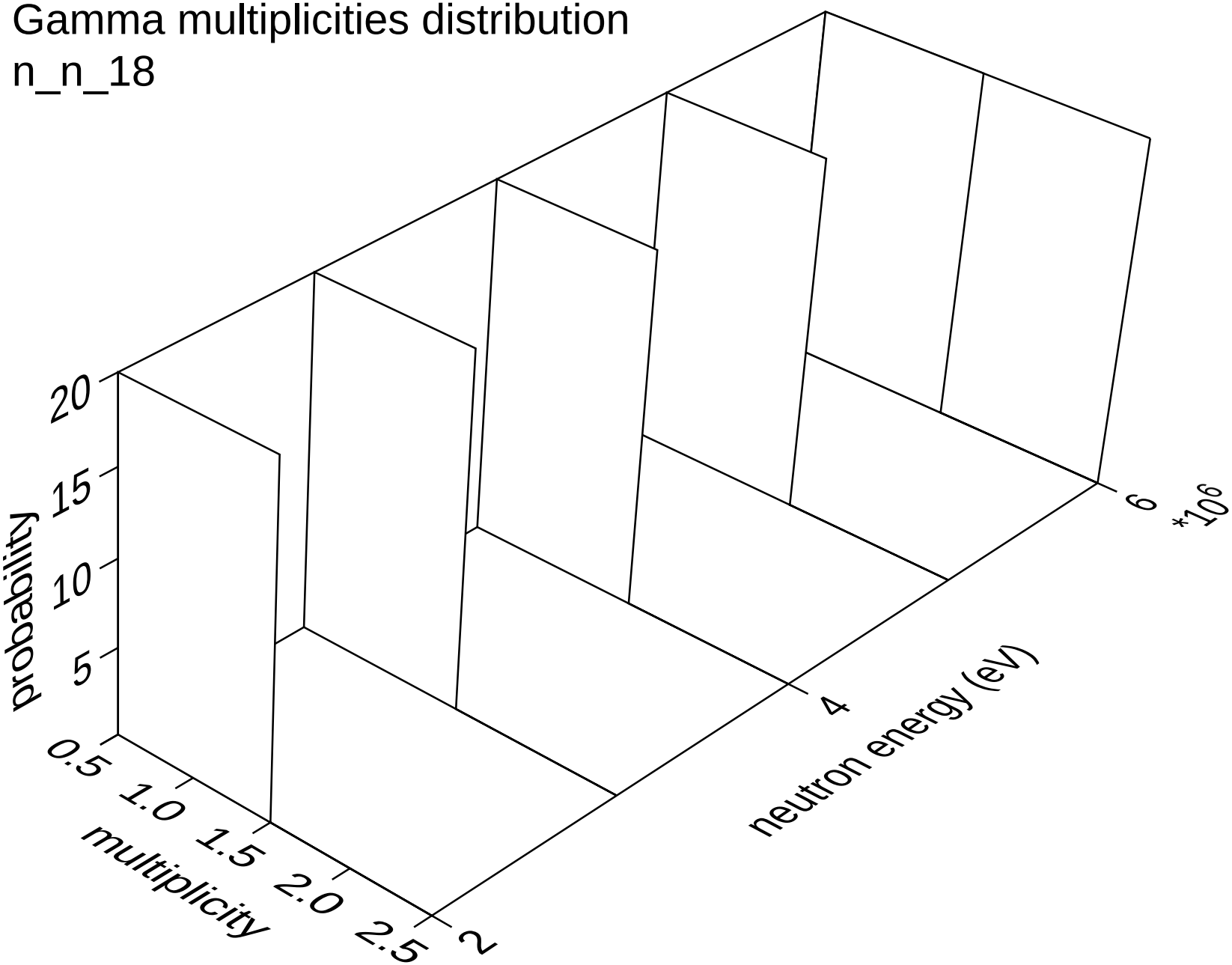
Gamma multiplicities distribution
n_n_17

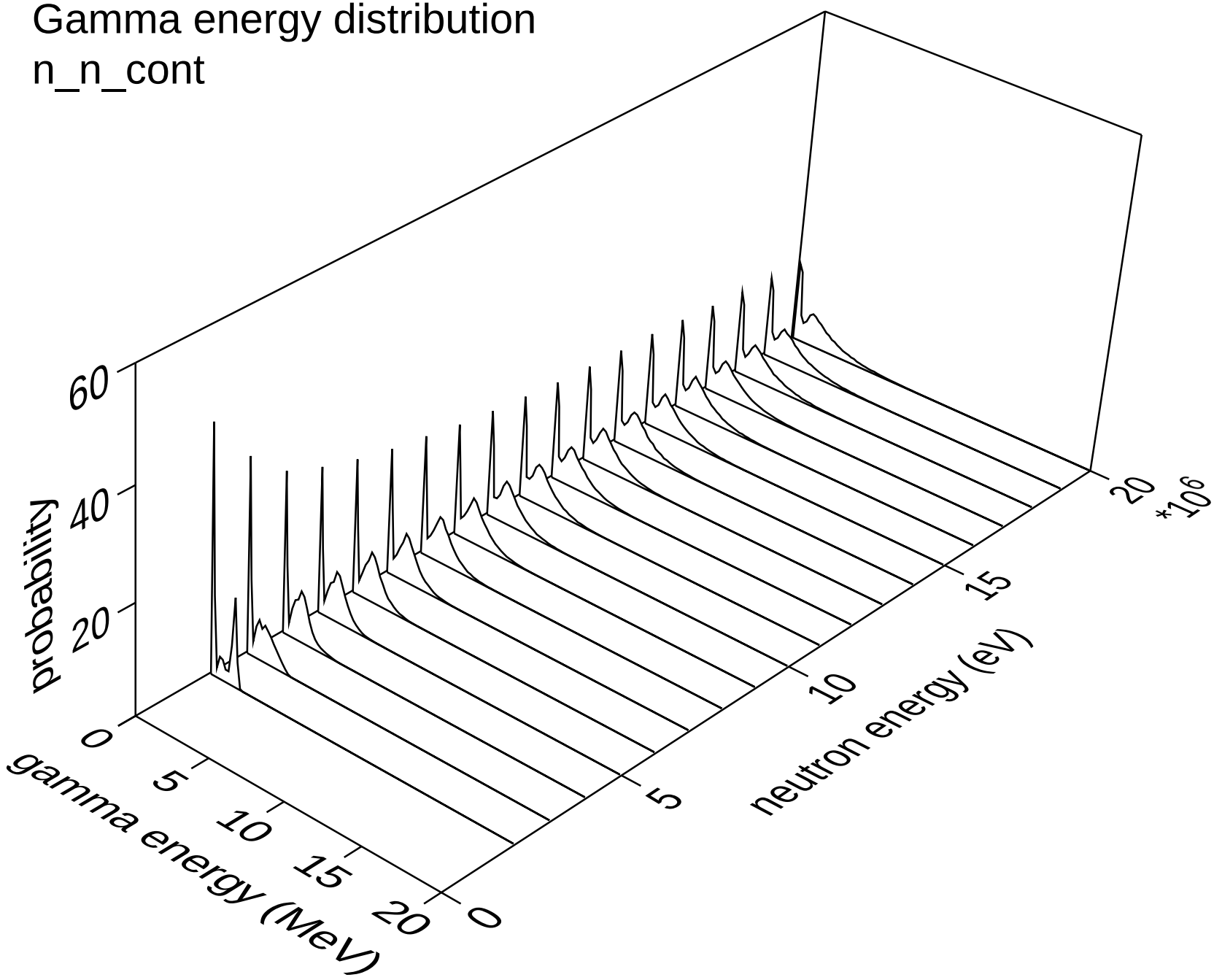


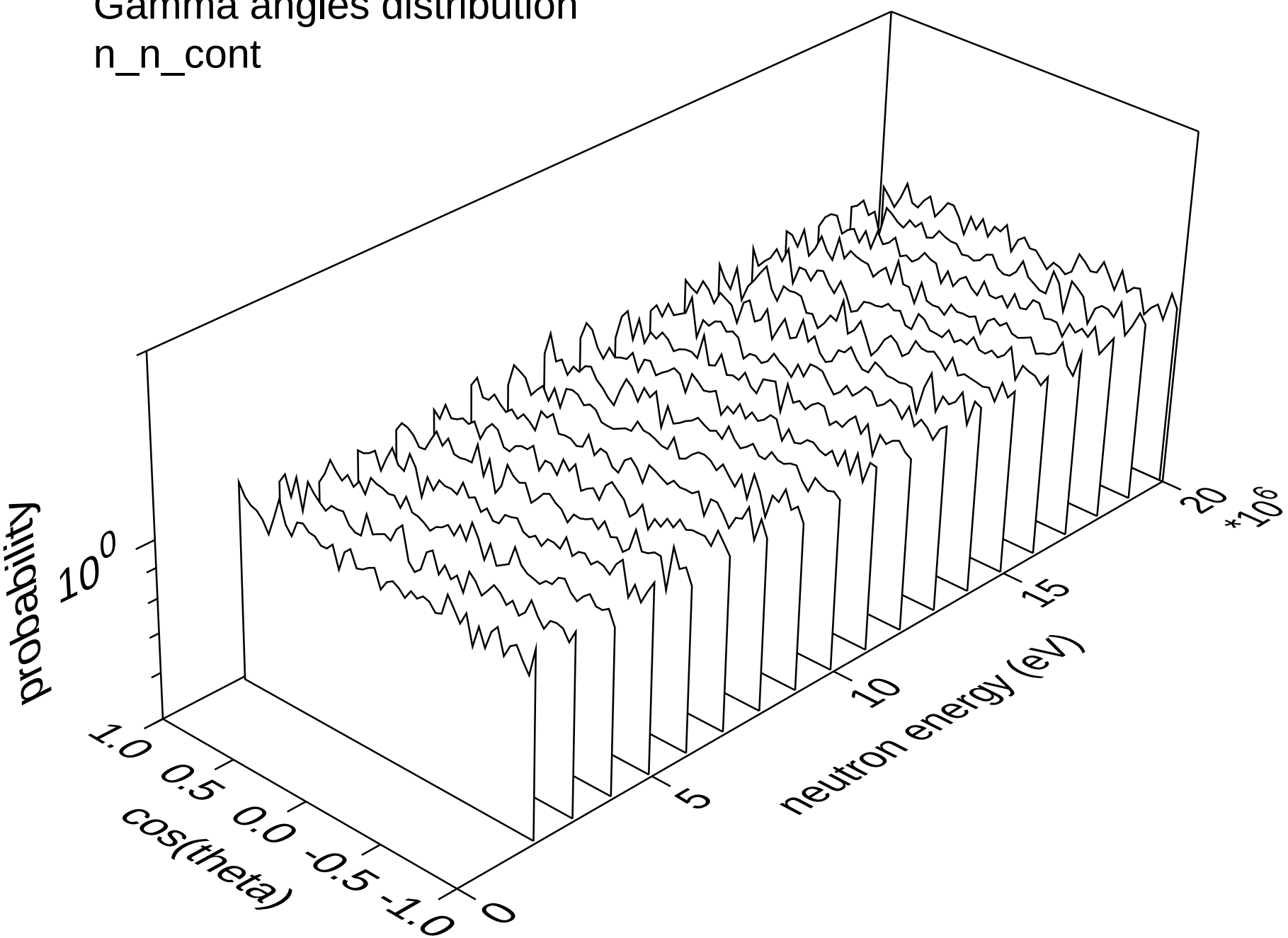

Gamma energy distribution
n_n_18
probability
60
40
20
0
gamma energy (MeV)
5
10
15
20
2
neutron energy (eV)
4
6
*10^6


Gamma angles distribution
n_n_18
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
2
4
6
*10^6
neutron energy (eV)

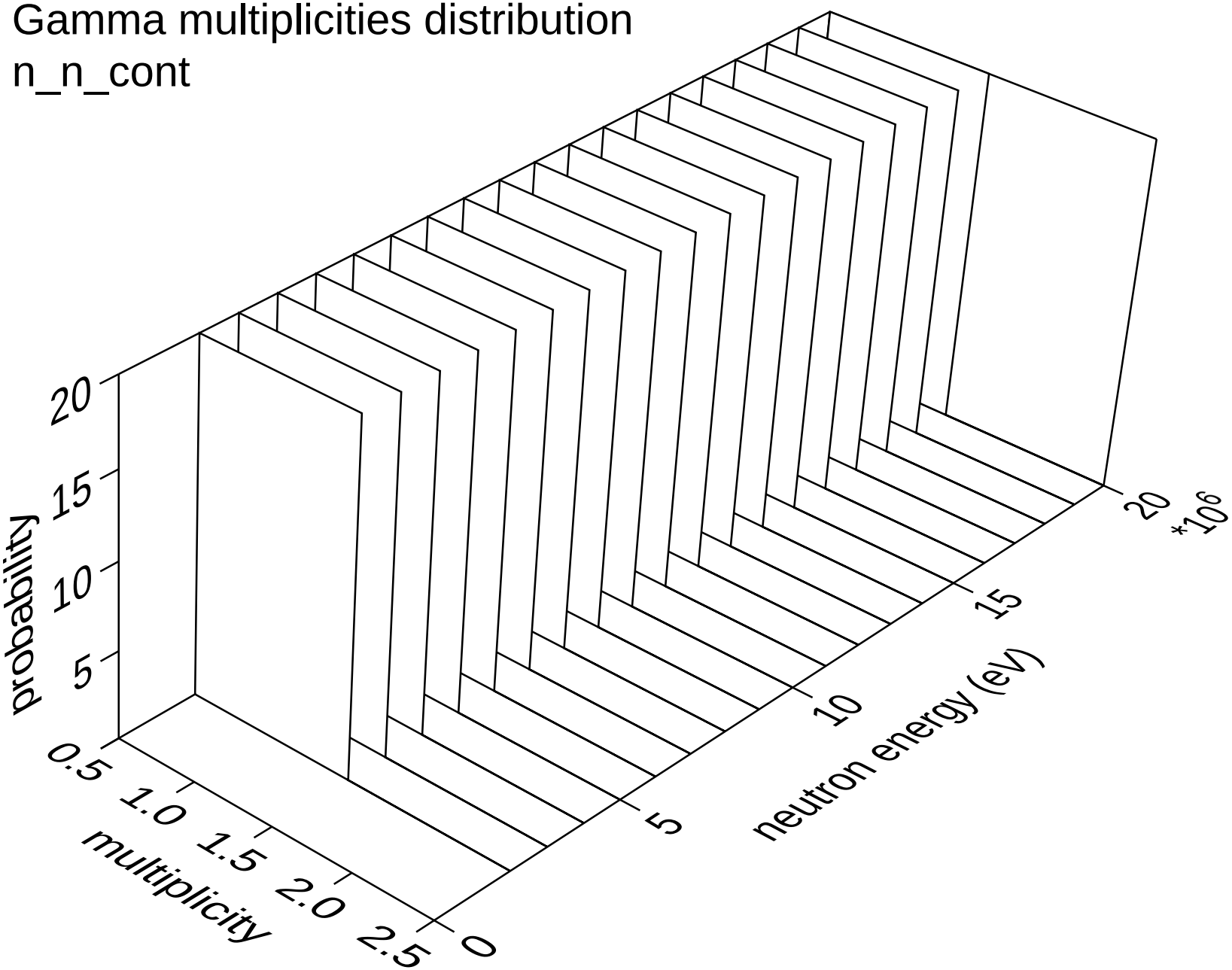
Gamma multiplicities distribution
n_n_18

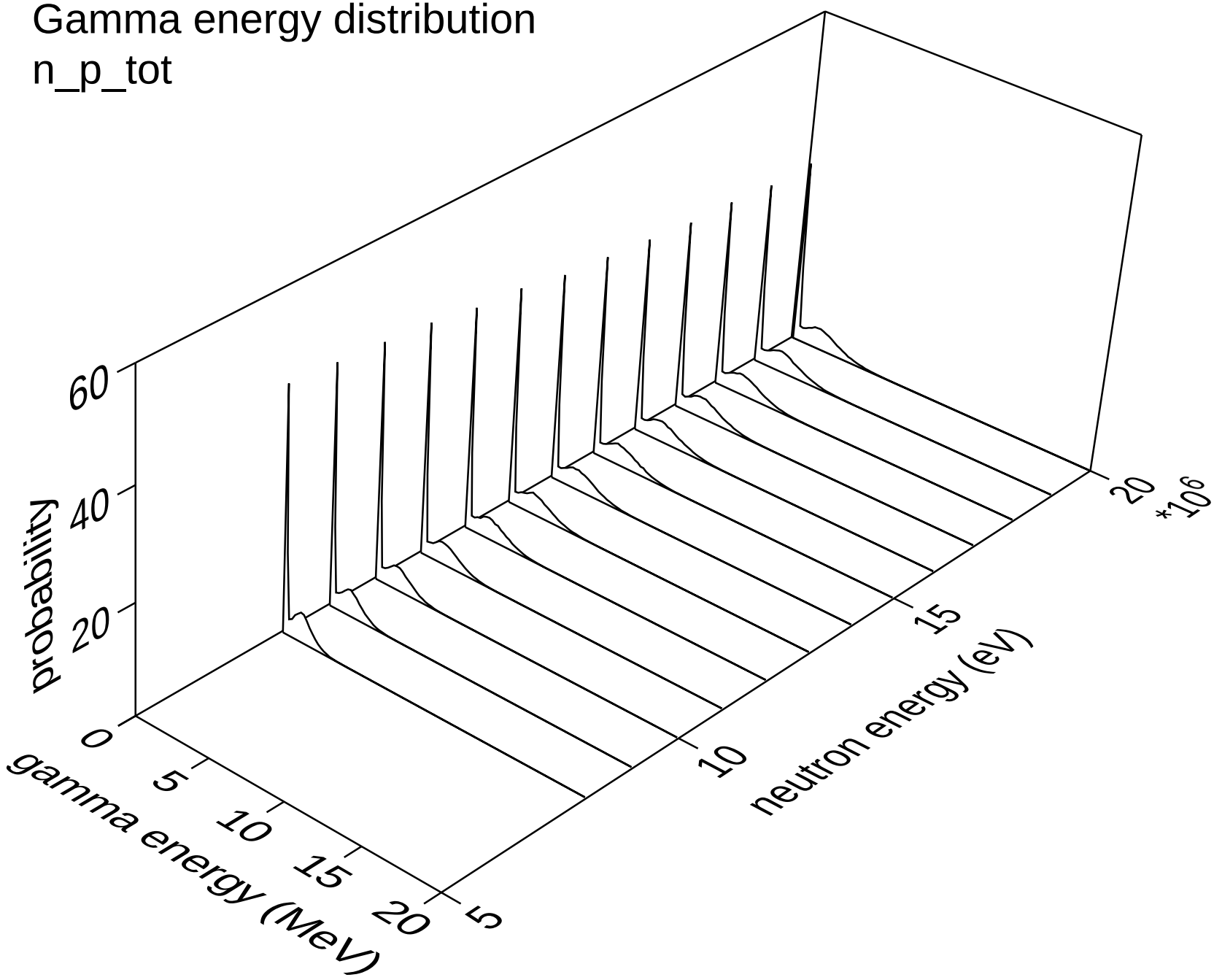


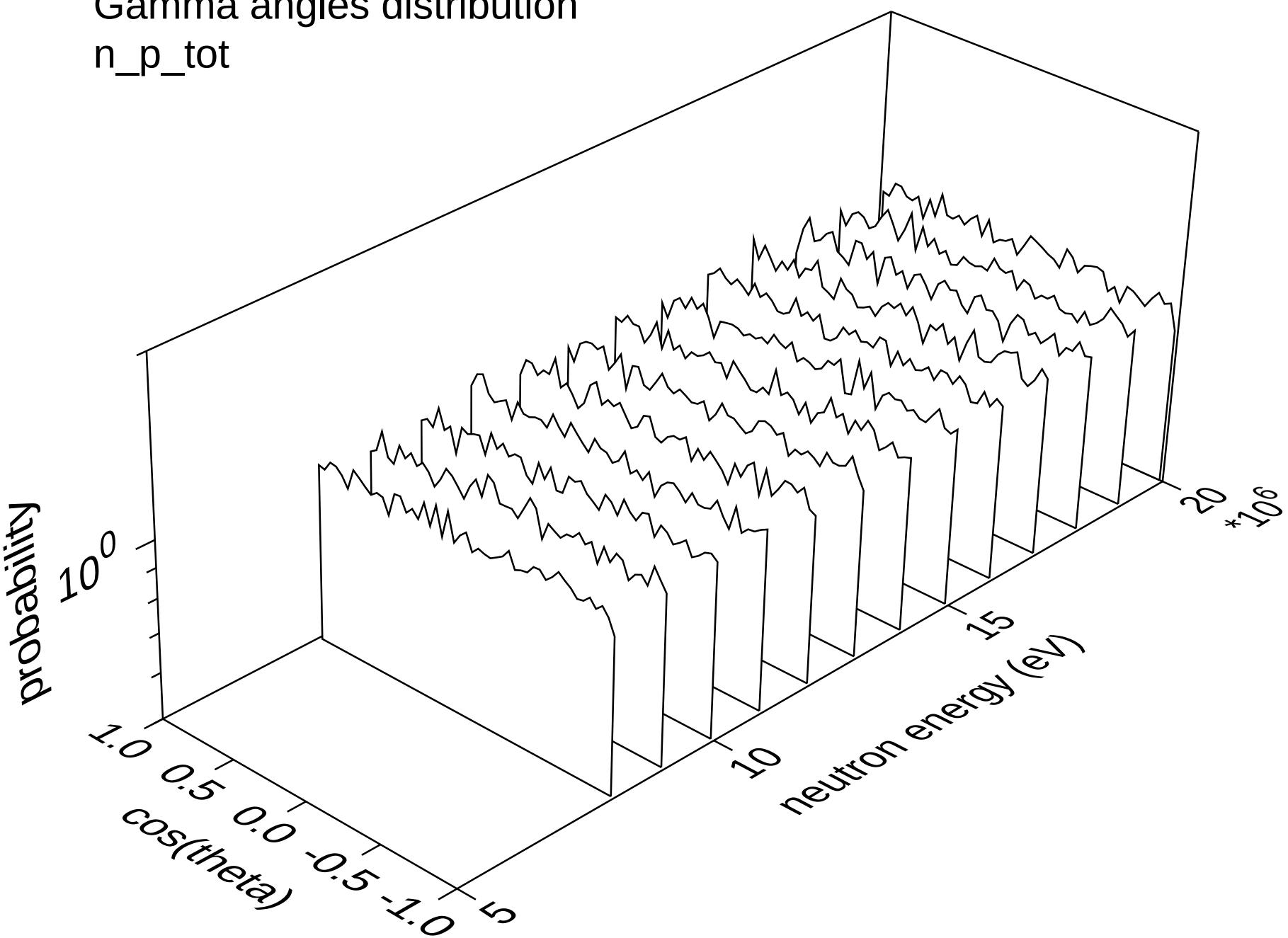

Gamma energy distribution
n_n_cont
probability
60
40
20
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
0
5
10
15
20
*10^6


Gamma angles distribution
n_n_cont
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
5
10
15
20
*10^6
neutron energy (eV)

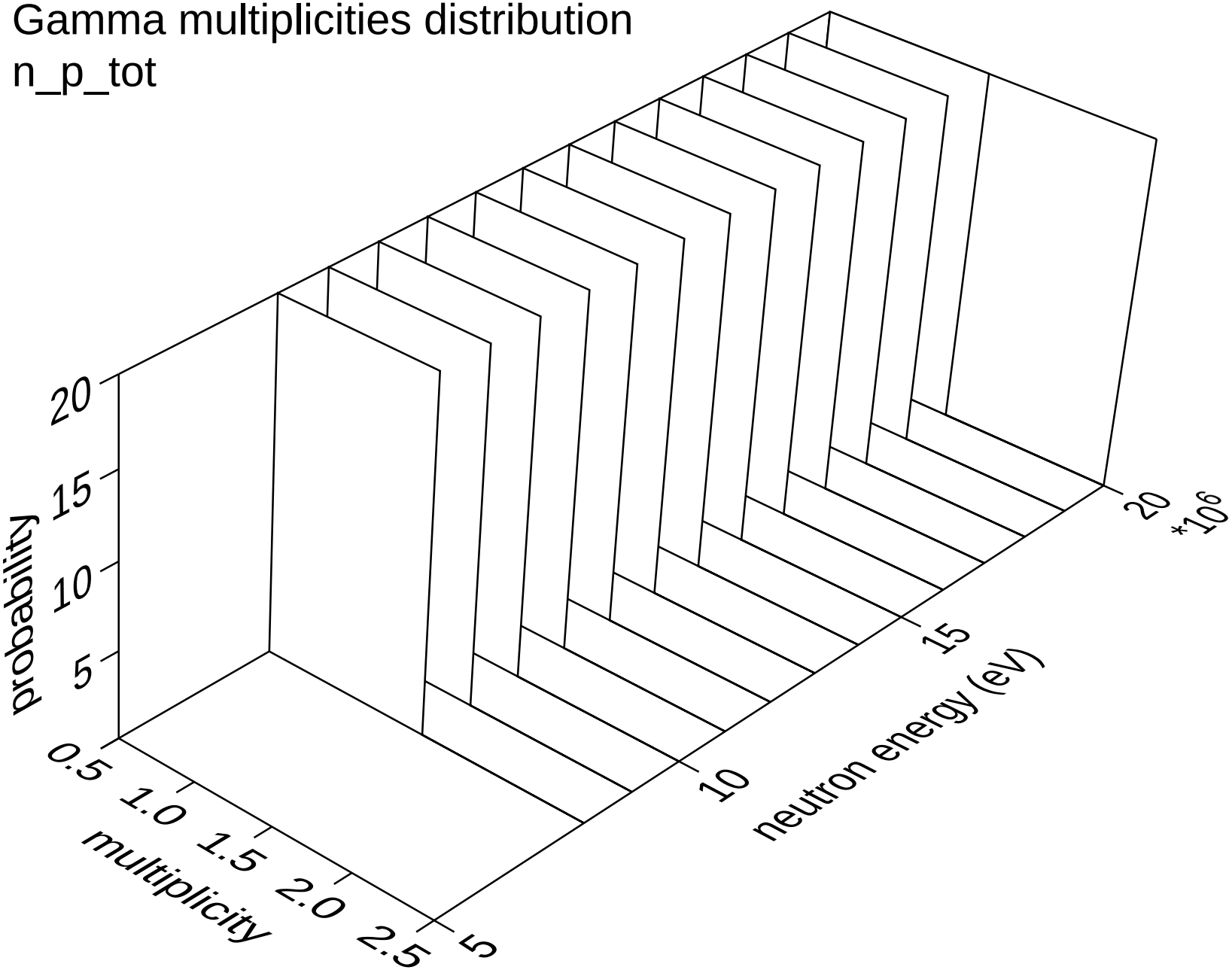
Gamma multiplicities distribution
n_n_cont

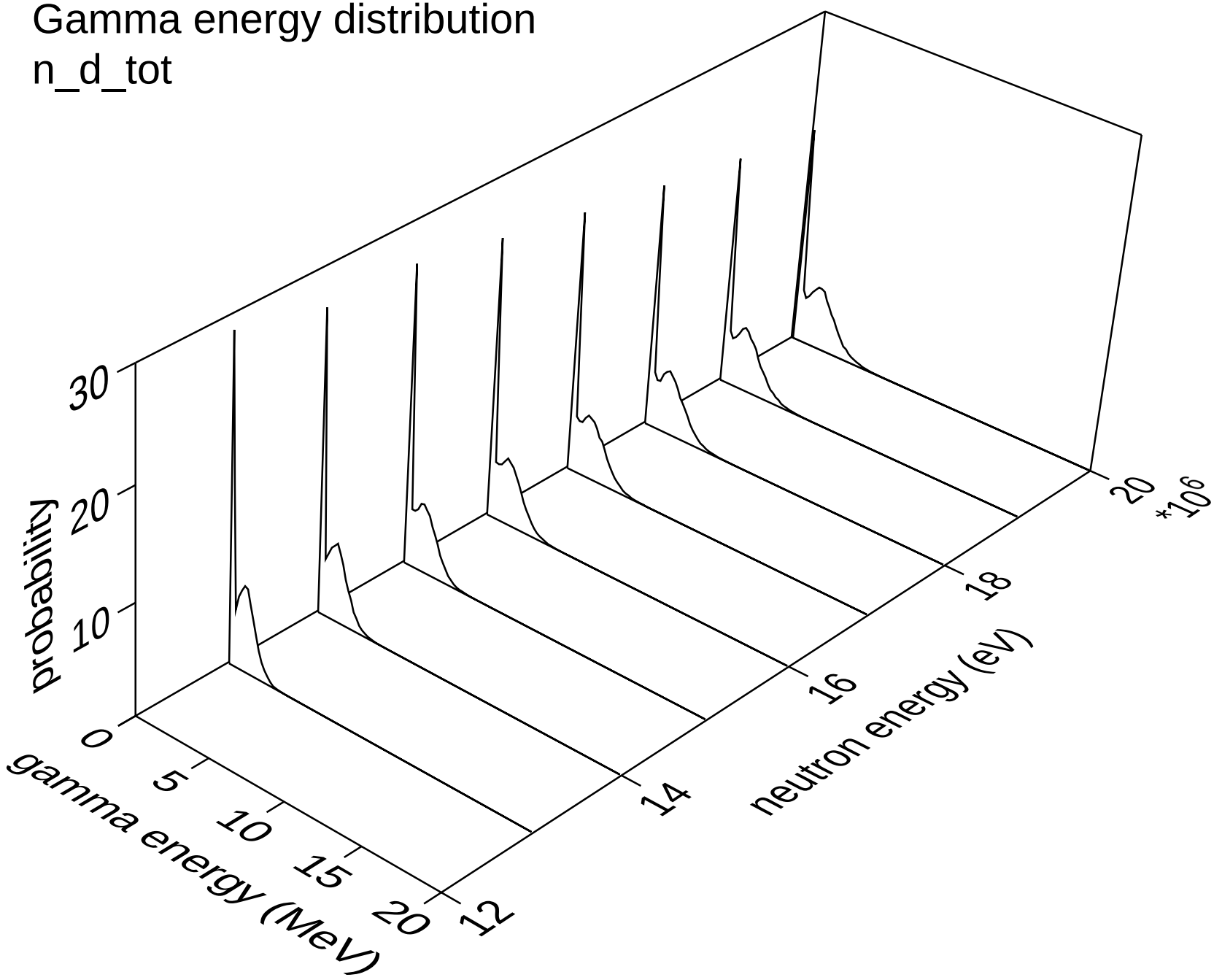


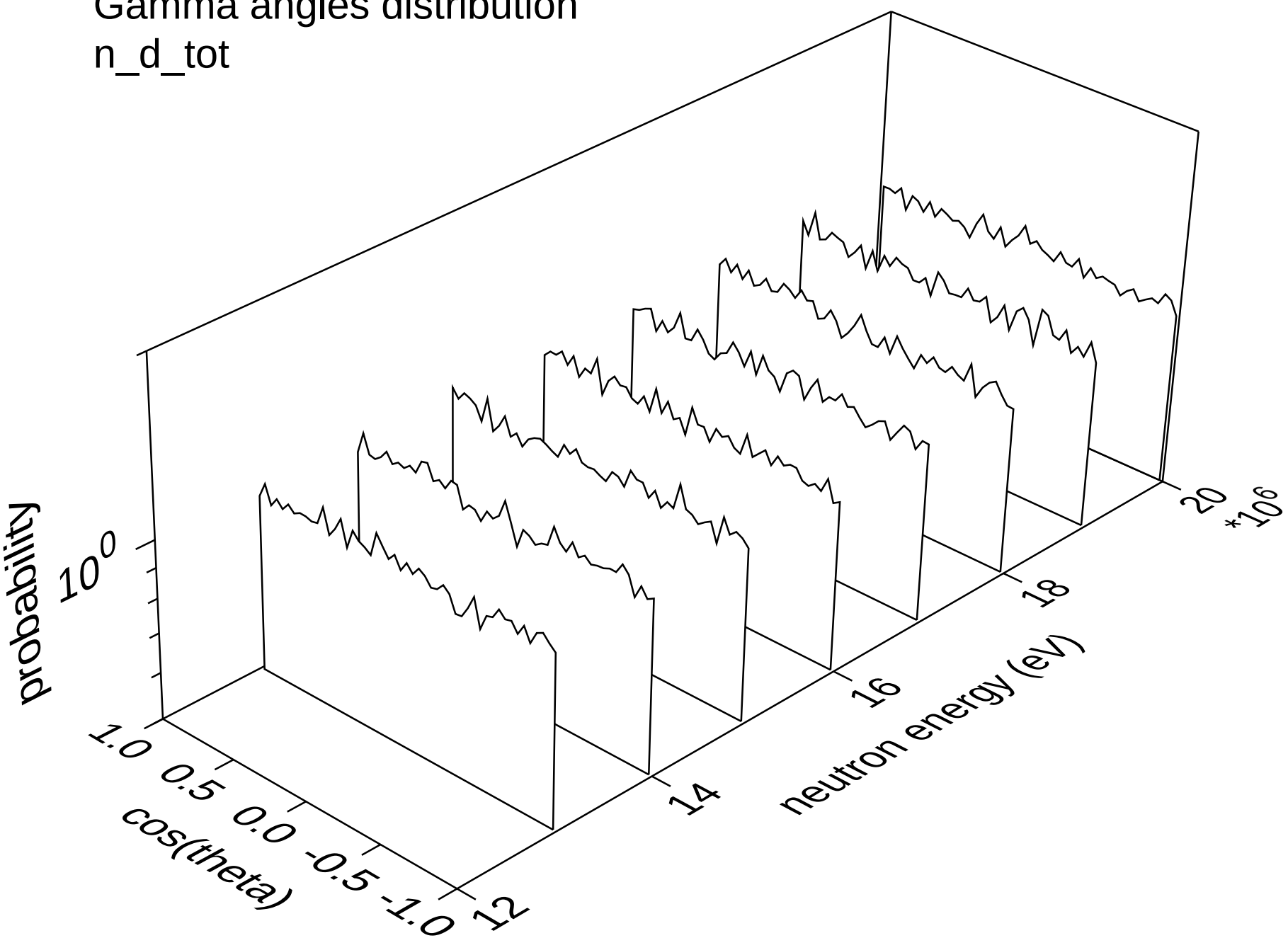

Gamma energy distribution
n_p_tot
probability
60
40
20
0
gamma energy (MeV)
5
10
15
20
neutron energy (eV)
5
10
15
20
*10^6

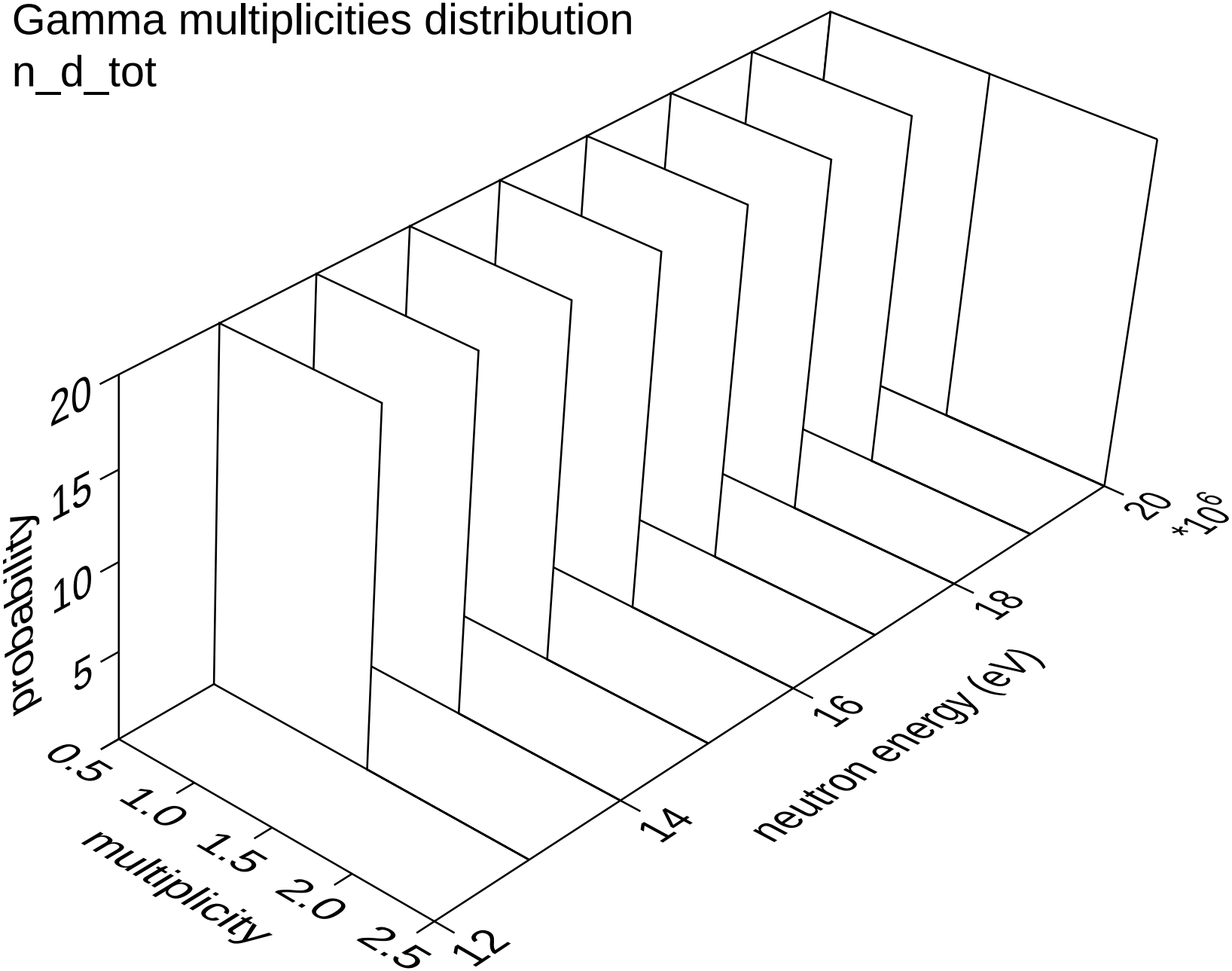

Gamma angles distribution
n_p_tot
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
5
10
15
20
*10^6
neutron energy (eV)

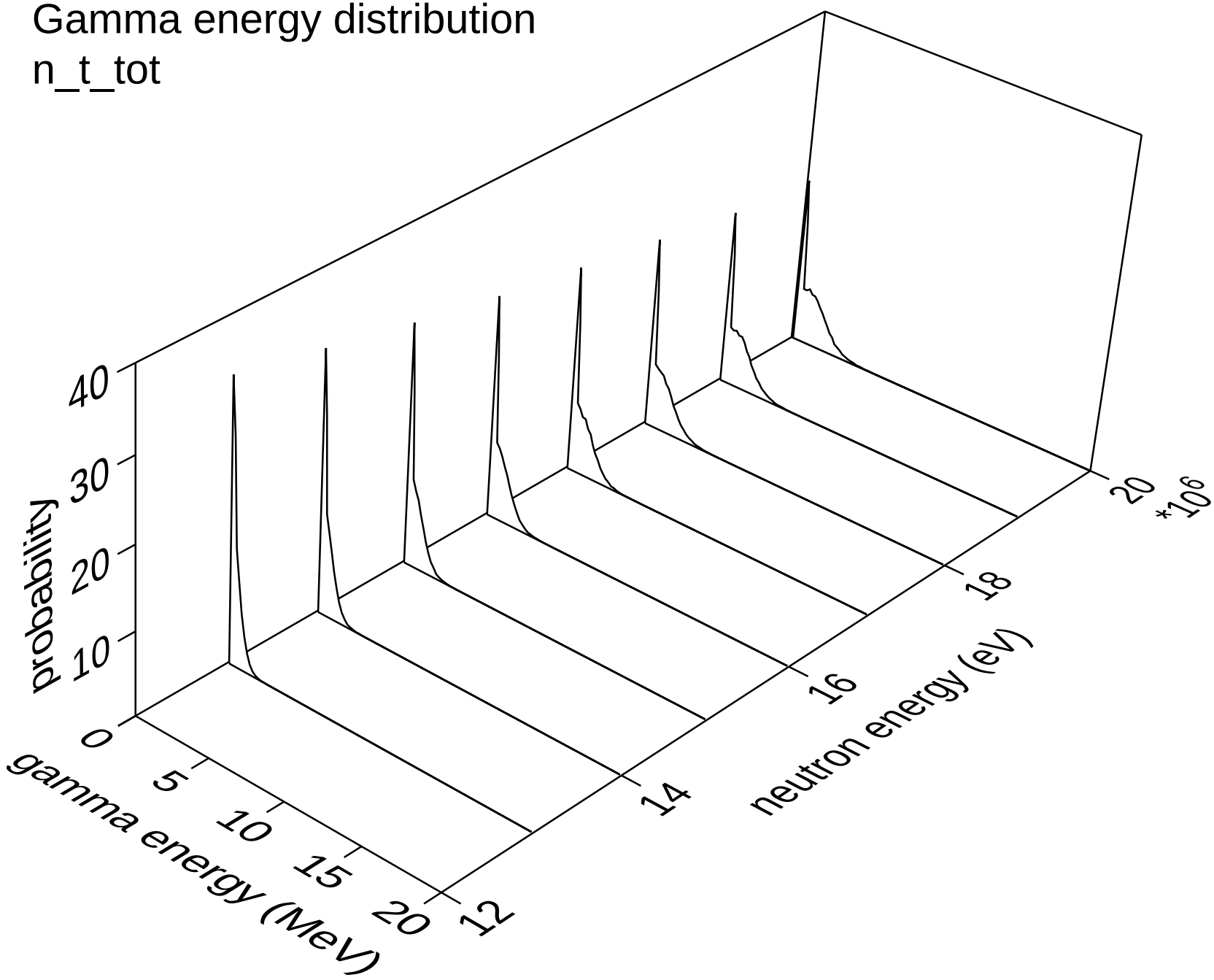
Gamma multiplicities distribution
n_p_tot

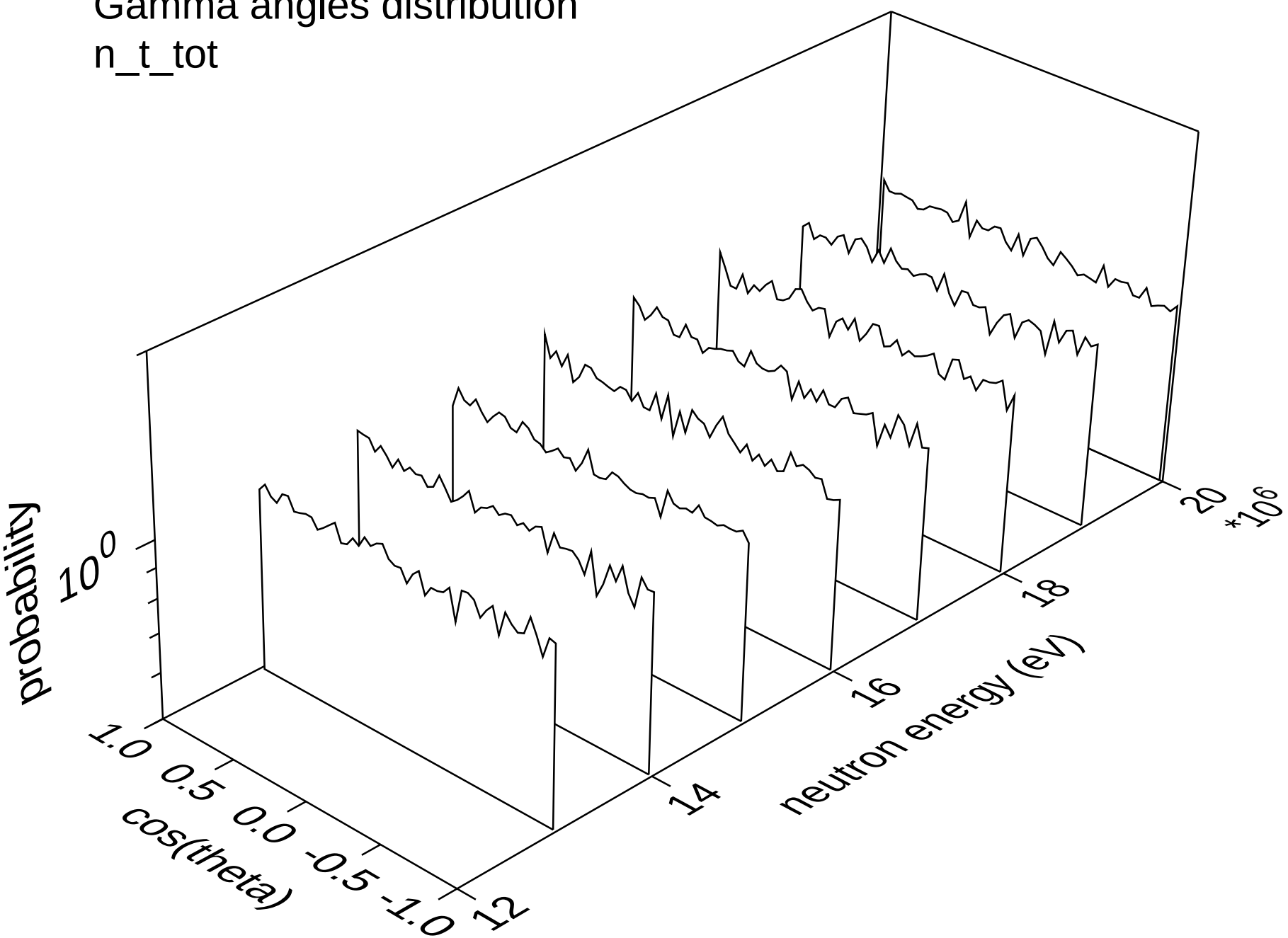



Gamma energy distribution
n_d_tot
probability
30
20
10
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
12
14
16
18
20
*10^6

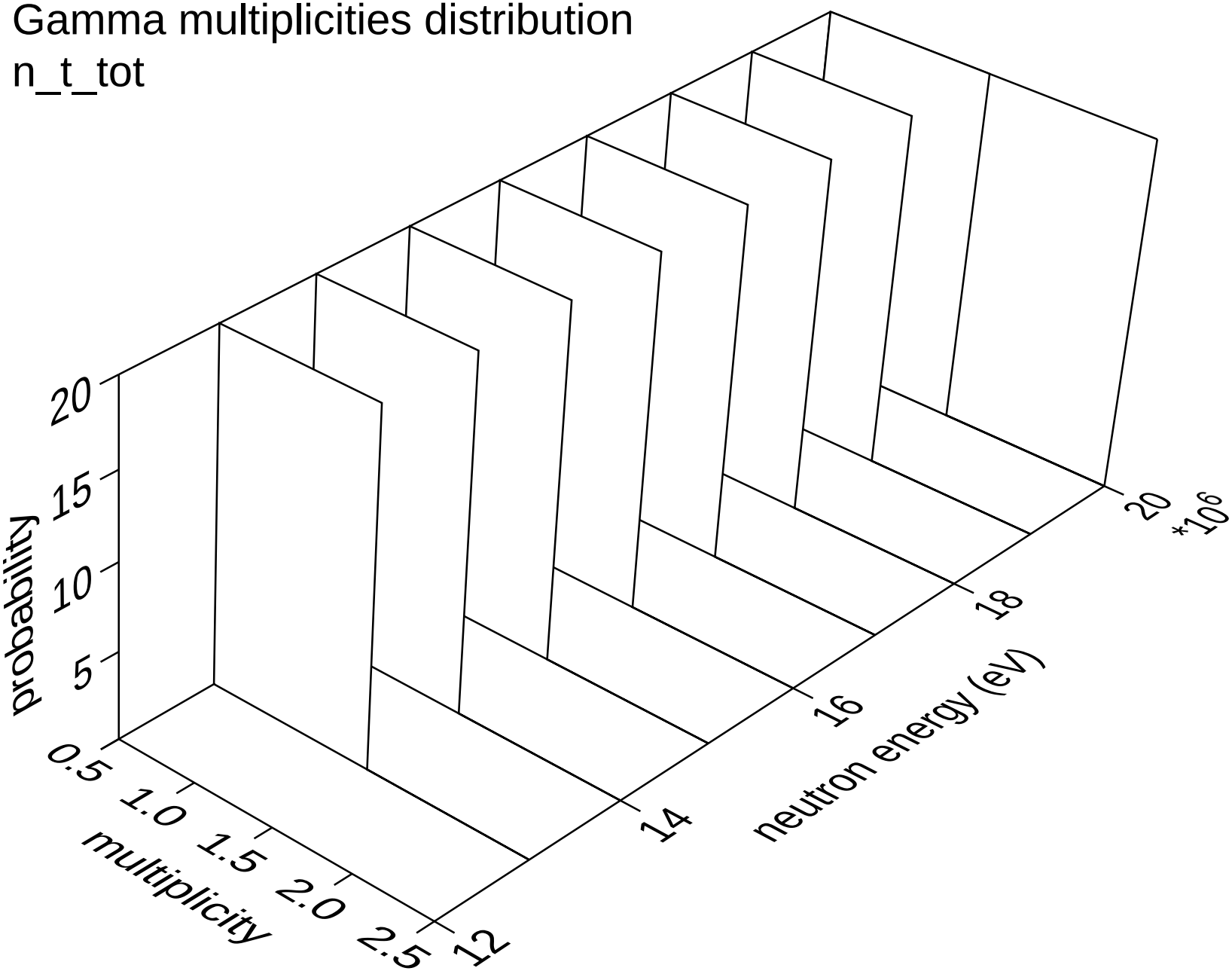

Gamma angles distribution
n_d_tot
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
12
14
16
18
20
*10^6
neutron energy (eV)

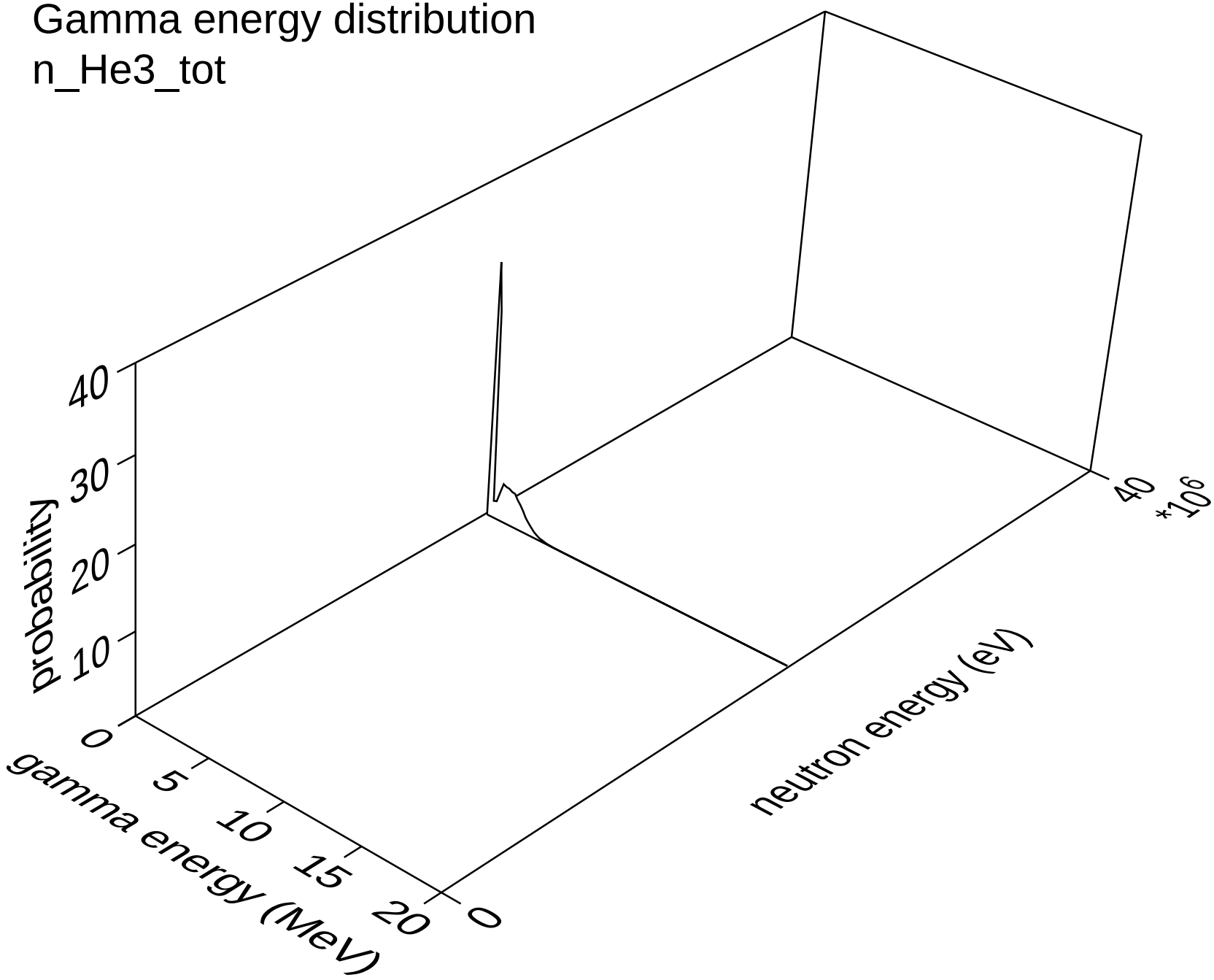

Gamma multiplicities distribution
n_d_tot
probability
20
15
10
5
0.5
1.0
1.5
2.0
2.5
multiplicity
12
14
16
18
20
*10^6
neutron energy (eV)

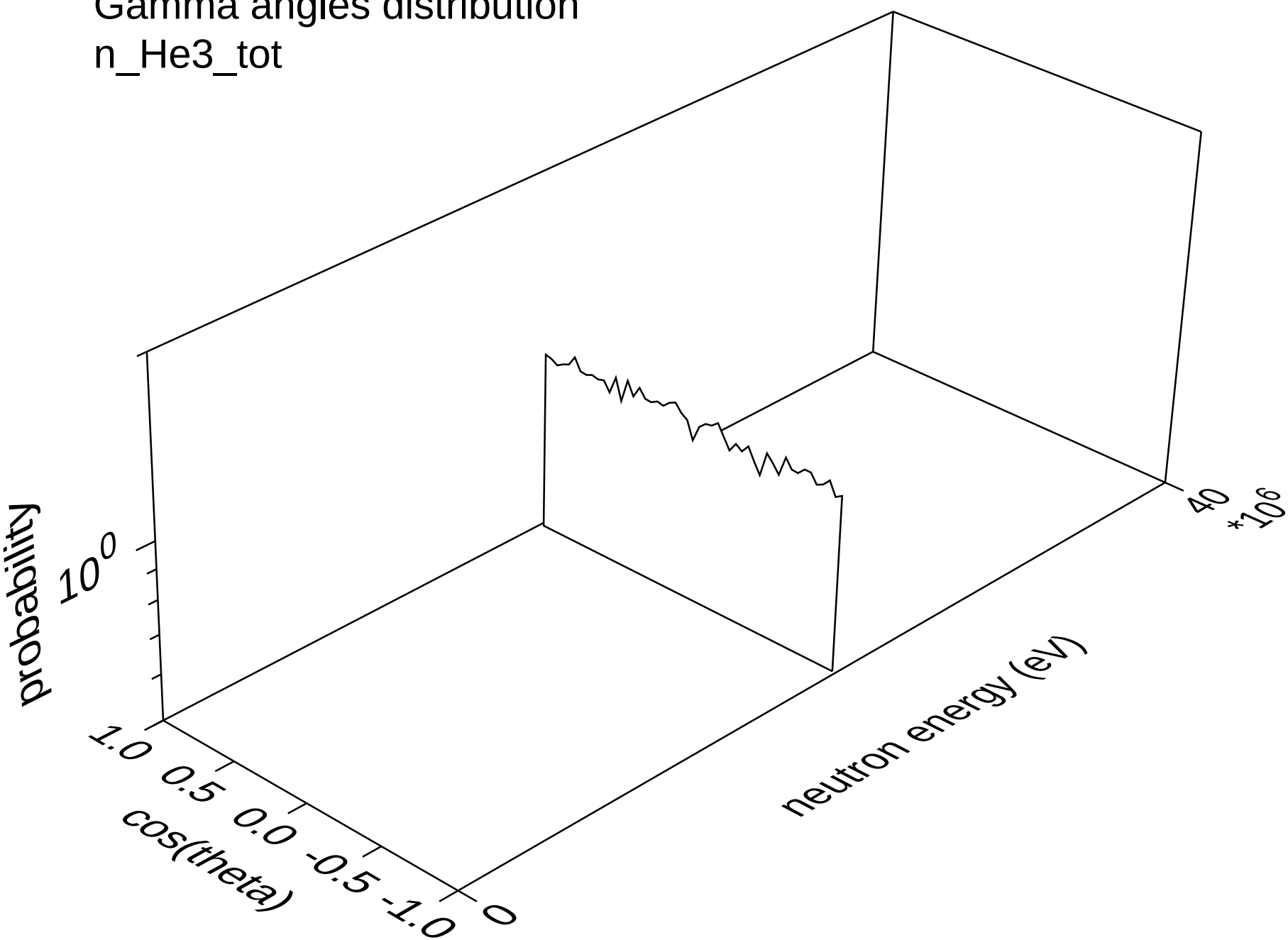

Gamma energy distribution
n_t_tot
probability
40
30
20
10
0
gamma energy (MeV)
5
10
15
20
12
14
16
18
20
*10^6
neutron energy (eV)


Gamma angles distribution
n_t_tot
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
12
14
16
18
20
*10^6
neutron energy (eV)

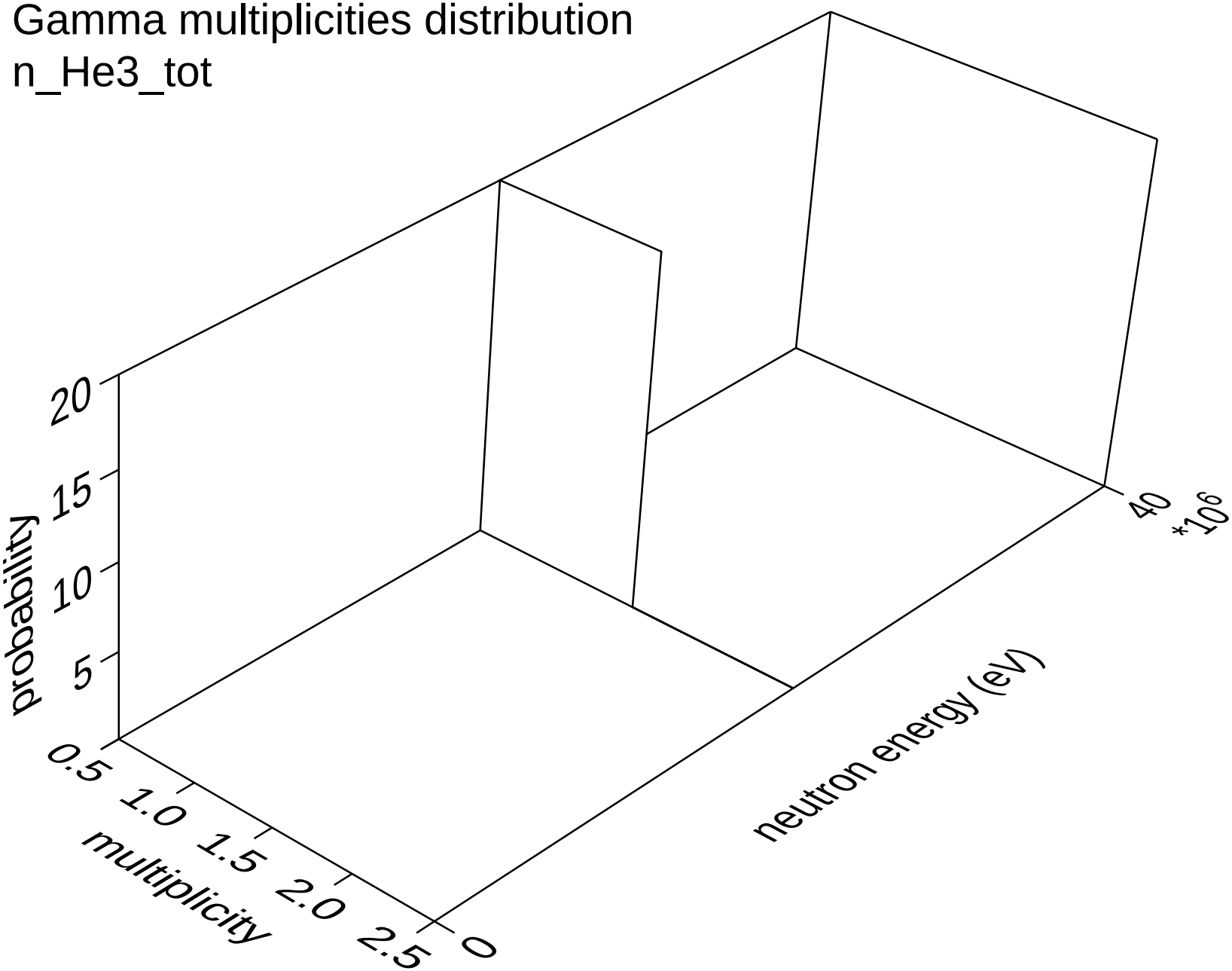
Gamma multiplicities distribution
n_t_tot

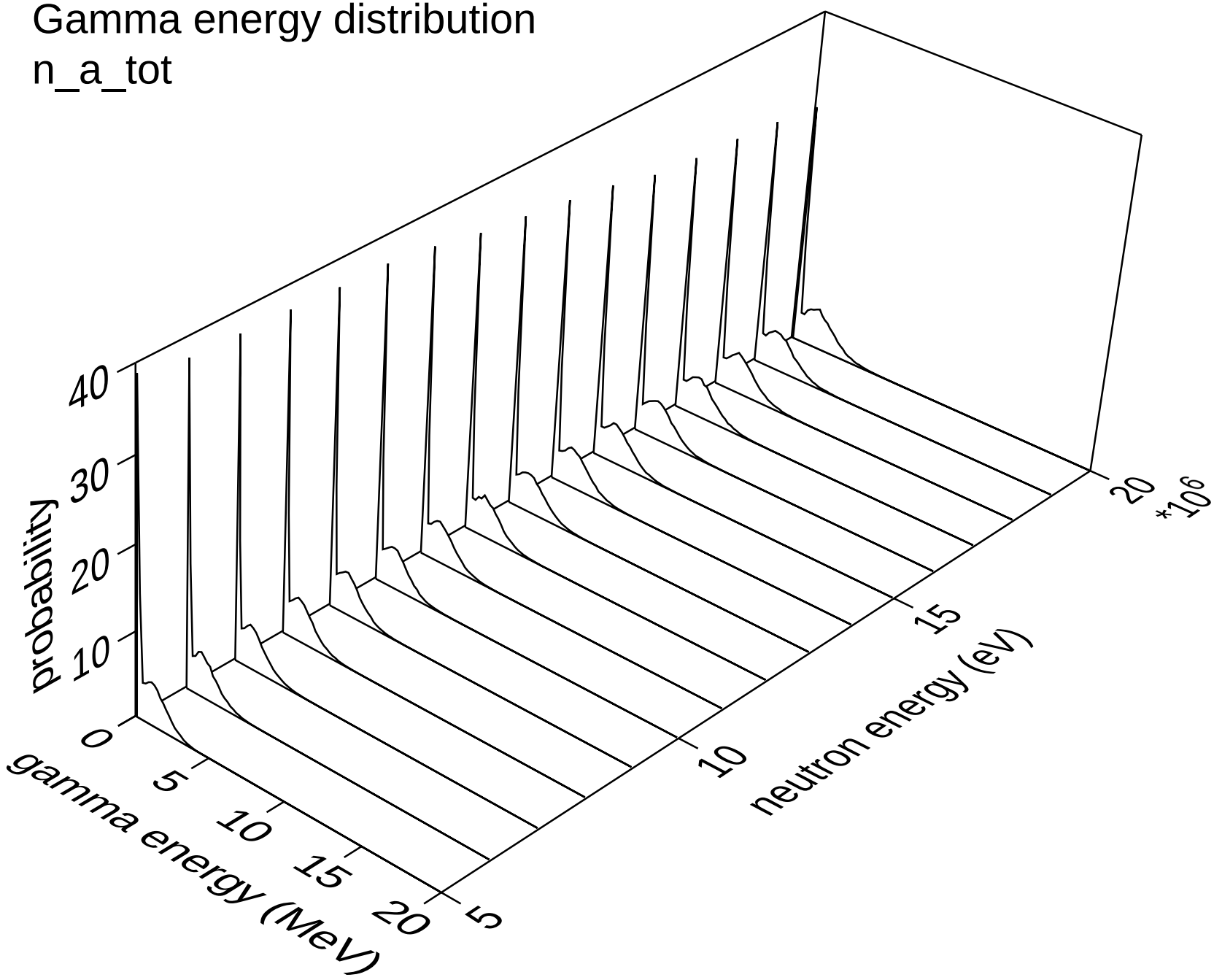


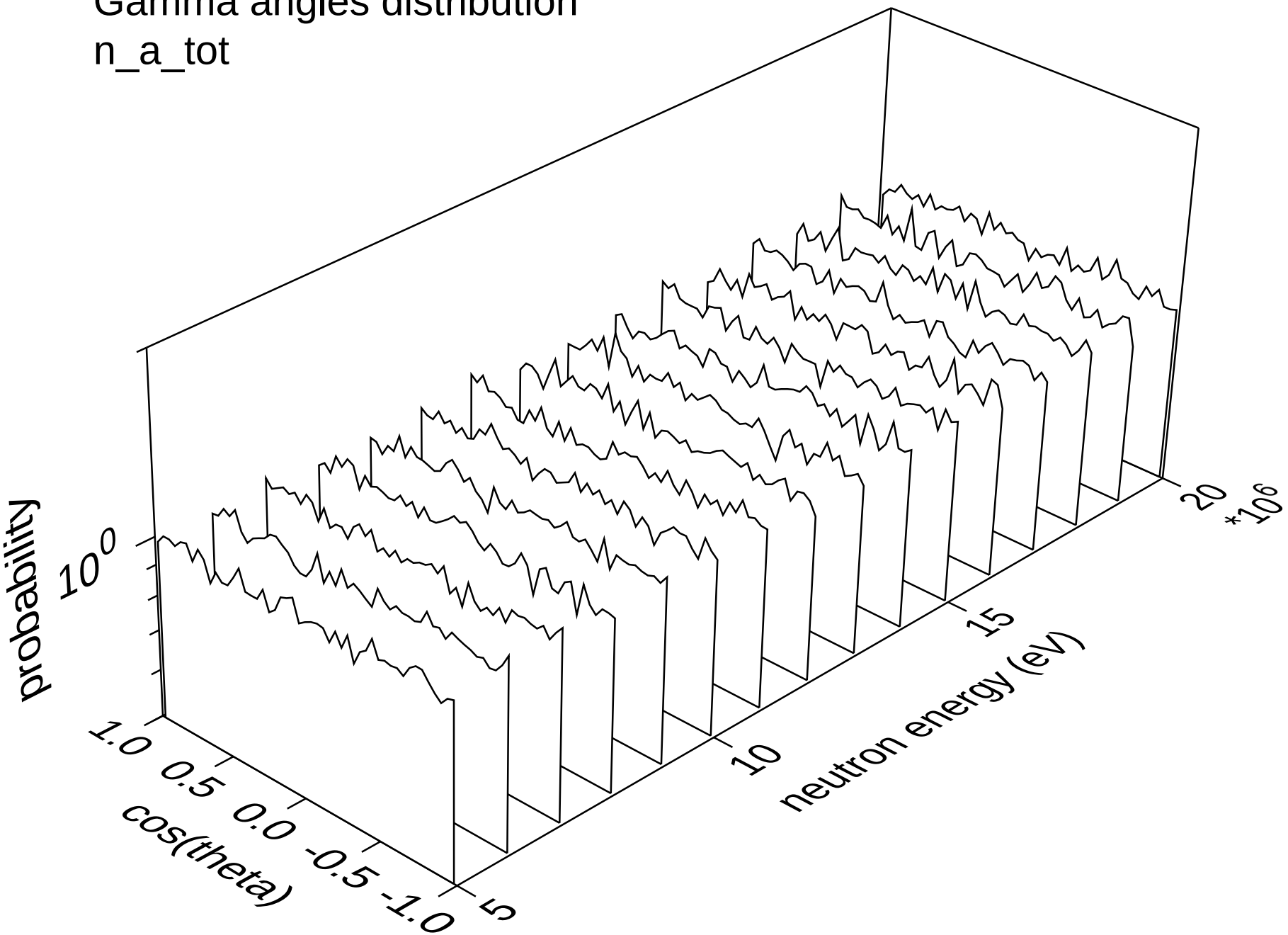
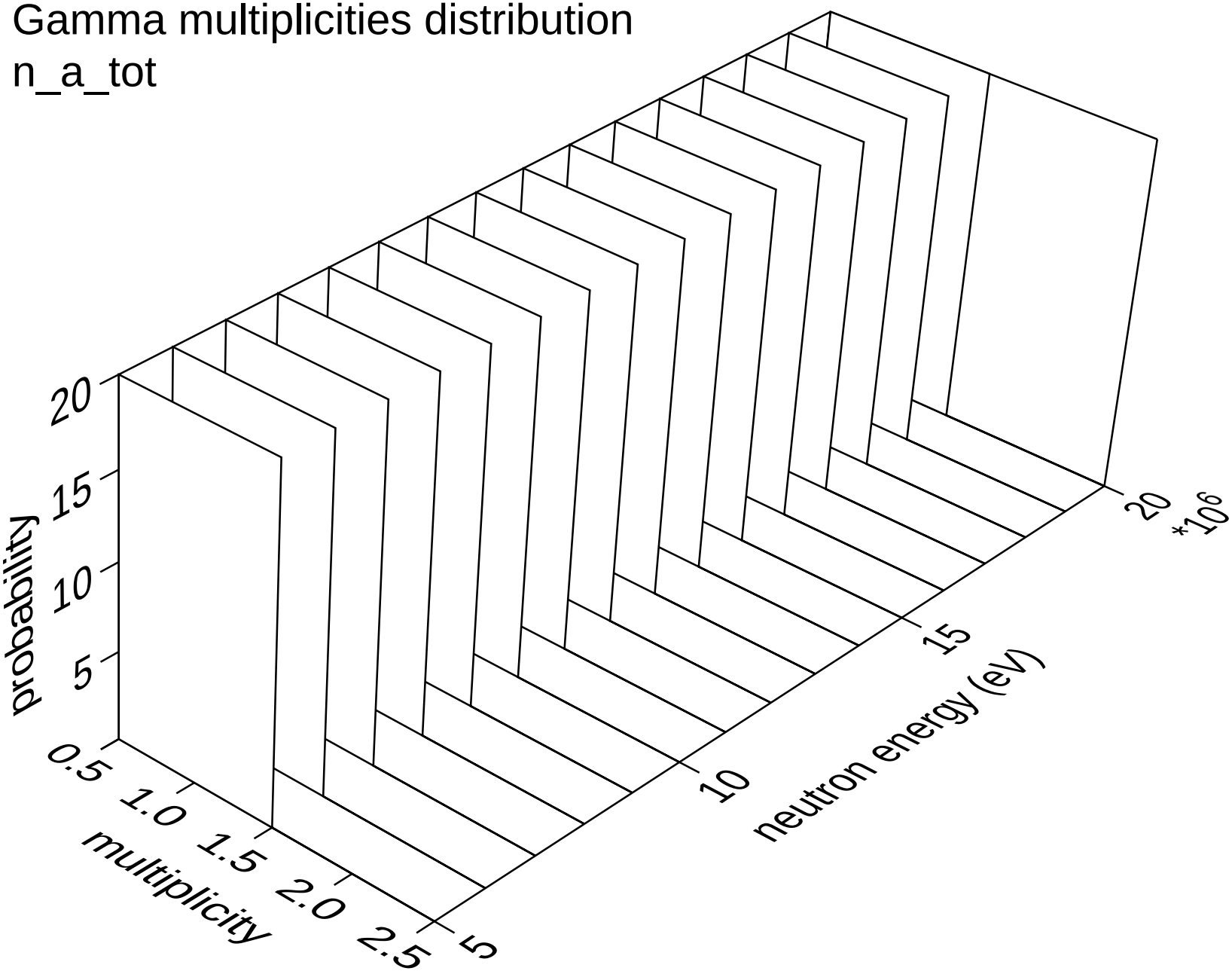

Gamma energy distribution
n_He3_tot
probability
40
30
20
10
0
gamma energy (MeV)
0
5
10
15
20
neutron energy (eV)
40
*10^6


Gamma angles distribution
n_He3_tot
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
0
40
$*10^6$
neutron energy (eV)

Gamma multiplicities distribution
n_He3_tot




Gamma energy distribution
n_a_tot
probability
0
10
20
30
40
gamma energy (MeV)
5
10
15
20
neutron energy (eV)
10
15
20
*10^6


Gamma angles distribution
n_a_tot
probability
10^0
1.0
0.5
0.0
-0.5
-1.0
cos(theta)
5
10
15
20
*10^6
neutron energy (eV)

Gamma multiplicities distribution
n_a_tot