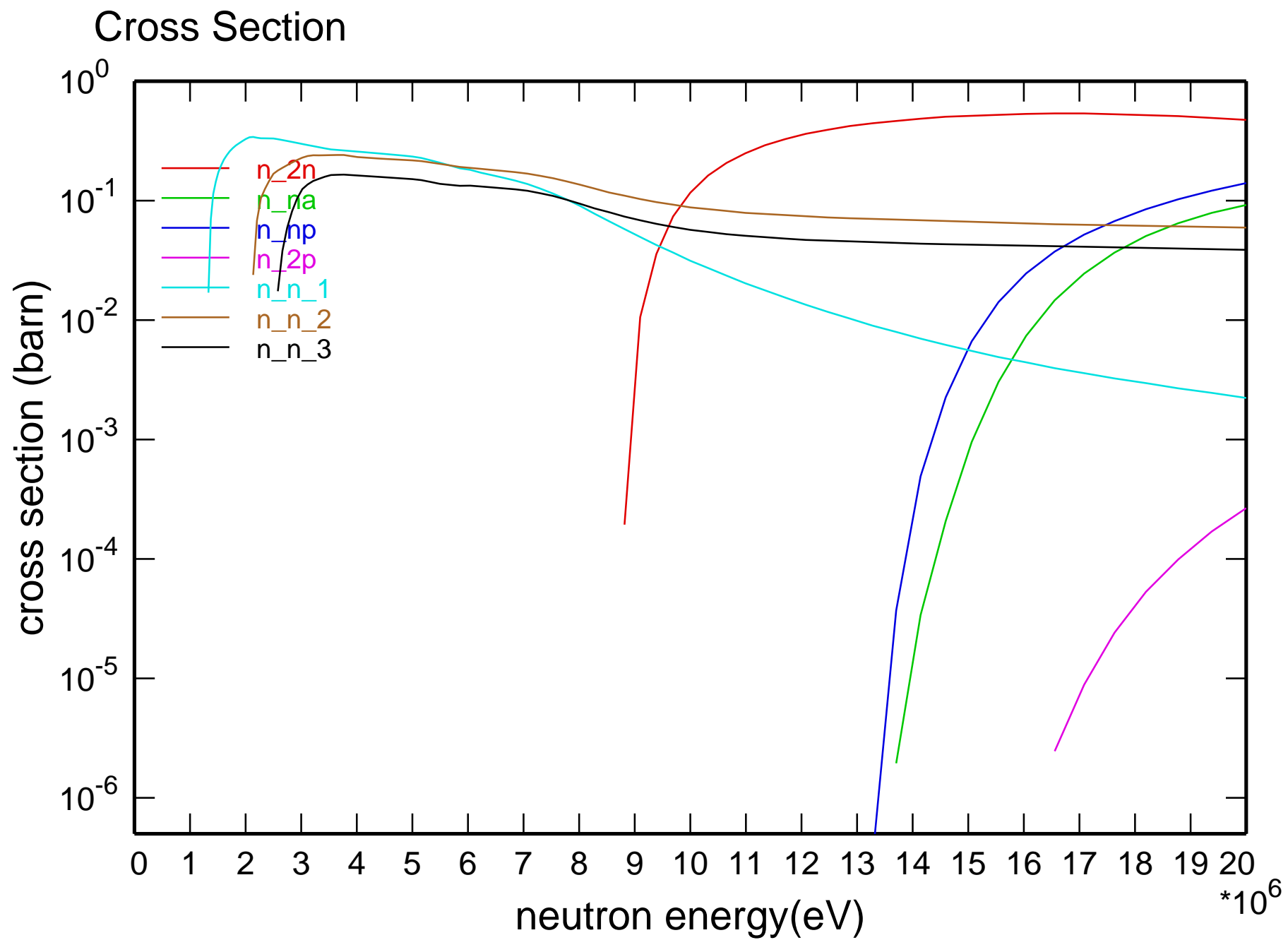Main Cross Sections

cross section (barn) vs neutron energy(eV)

Elastic
Capture
Inelastic

Cross Section
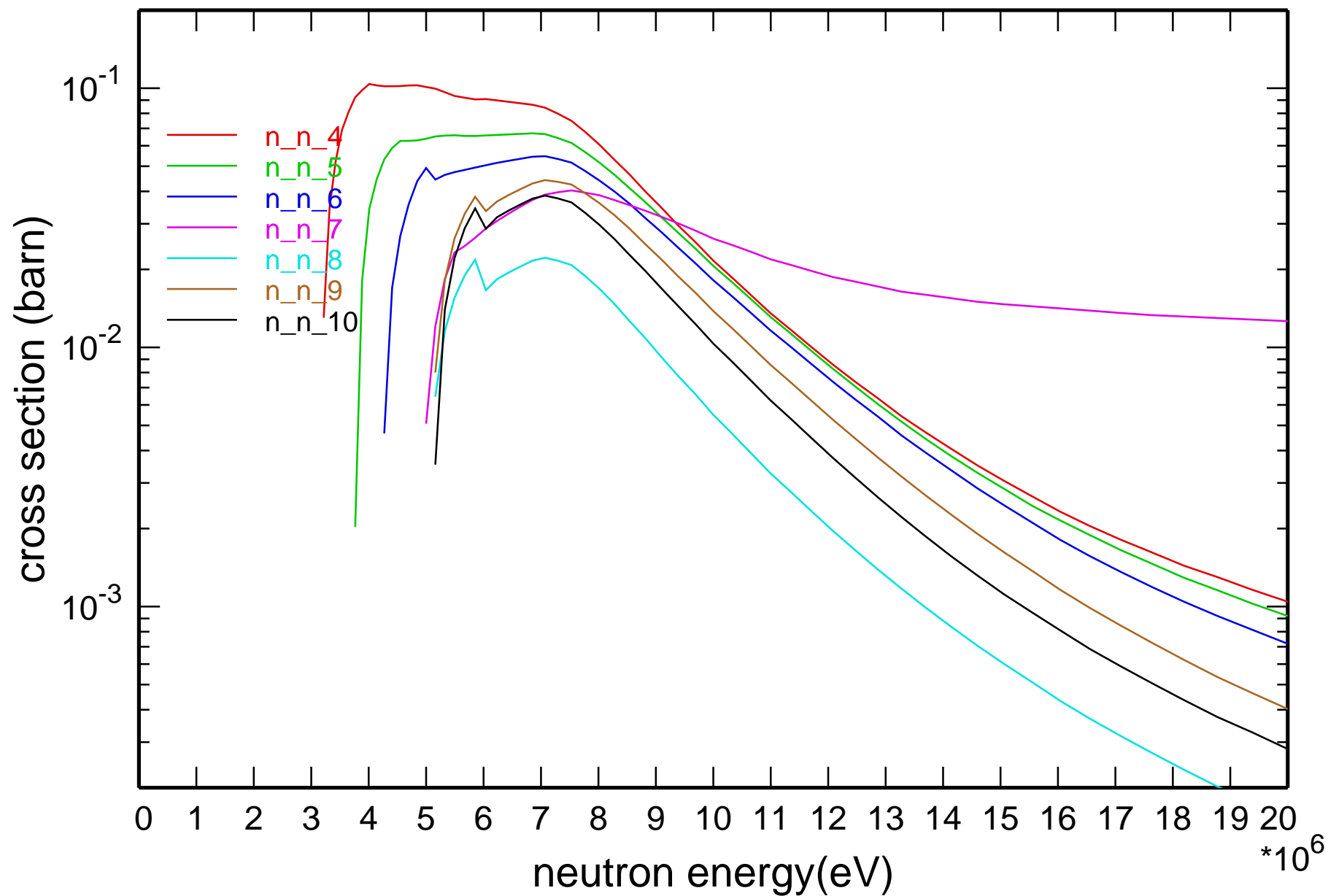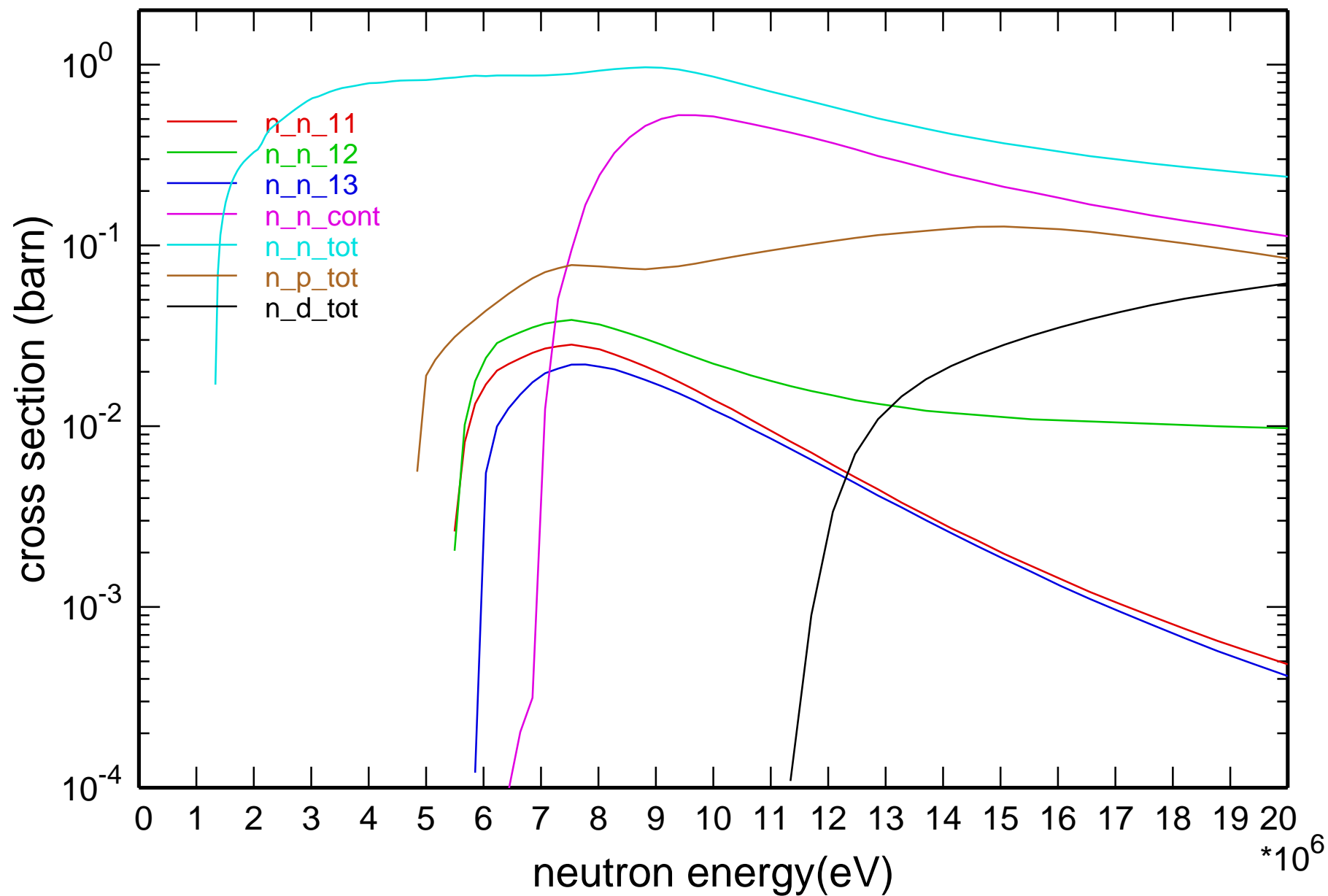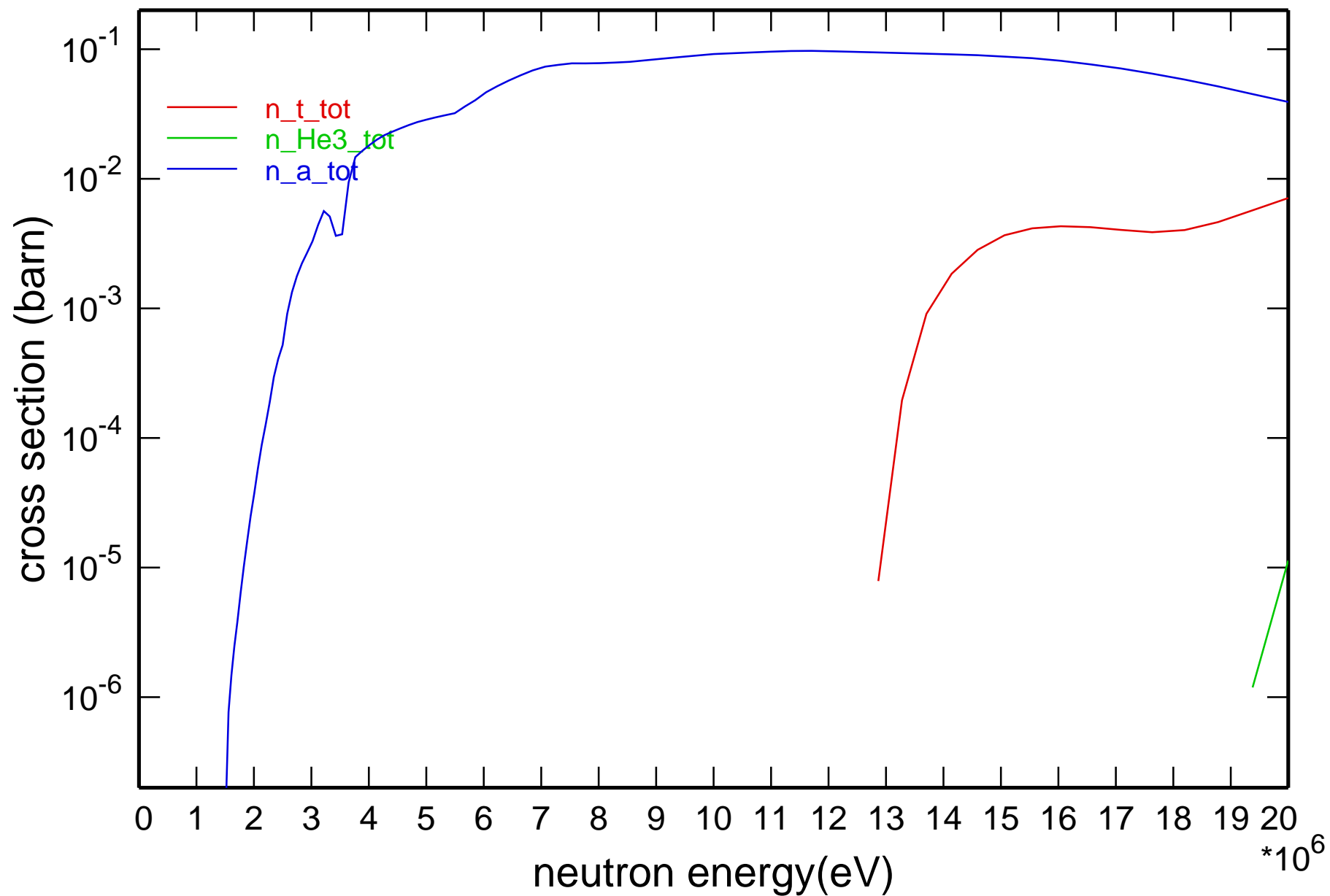
Cross Section

Cross Section

Cross Section

Angular distribution (CMS)
Elastic

probability

neutron energy (eV)

cos(theta)

Angular distribution (CMS)
n_2n part.=neutron

probability

neutron energy (eV)

cos(theta)

$*10^6$

Angular distribution (CMS)
n_2n part.=gamma

probability

neutron energy (eV)

cos(theta)

Angular distribution (CMS)
n_na part.=neutron

probability

neutron energy (eV)

cos(theta)

20
18
16
14

*10⁶

1.0 0.5 0.0 -0.5 -1.0

Angular distribution (CMS)
n_na part.=alpha

probability

neutron energy (eV)

cos(theta)

Angular distribution (CMS)
n_na part.=gamma

cos(theta)

neutron energy (eV)

probability

Angular distribution (CMS)
n_np part.=neutron

probability

20 *10^6

18

16

14

neutron energy (eV)

1.0 0.5 0.0 -0.5 -1.0

cos(theta)

10^0

Angular distribution (CMS)
n_np part.=proton

probability

10^0

neutron energy (eV)

20 *10^6

18

16

14

1.0 0.5 0.0 -0.5 -1.0

cos(theta)

Angular distribution (CMS)
n_np part.=gamma

probability

neutron energy (eV)

cos(theta)

20 *10⁶

18

16

14

1.0 0.5 0.0 -0.5 -1.0

Angular distribution (CMS)
n_n_1

probability

neutron energy (eV)

cos(theta)

Angular distribution (CMS)
n_n_2

neutron energy (eV)

cos(theta)

probability

Angular distribution (CMS)
n_n_3

neutron energy (eV)

cos(theta)

probability

Angular distribution (CMS)

n_n_4

probability

10^0

20 *10^6

15

neutron energy (eV)

10

5

0

1.0 0.5 0.0 -0.5 -1.0

cos(theta)

Angular distribution (CMS)
n_n_5

probability

neutron energy (eV)

cos(theta)

20 *10⁶

15

10

5

0

1.0 0.5 0.0 -0.5 -1.0

Angular distribution (CMS)
n_n_6

probability

neutron energy (eV)

cos(theta)

Angular distribution (CMS)
n_n_7

probability

10⁰

cos(theta)

1.0 0.5 0.0 -0.5 -1.0

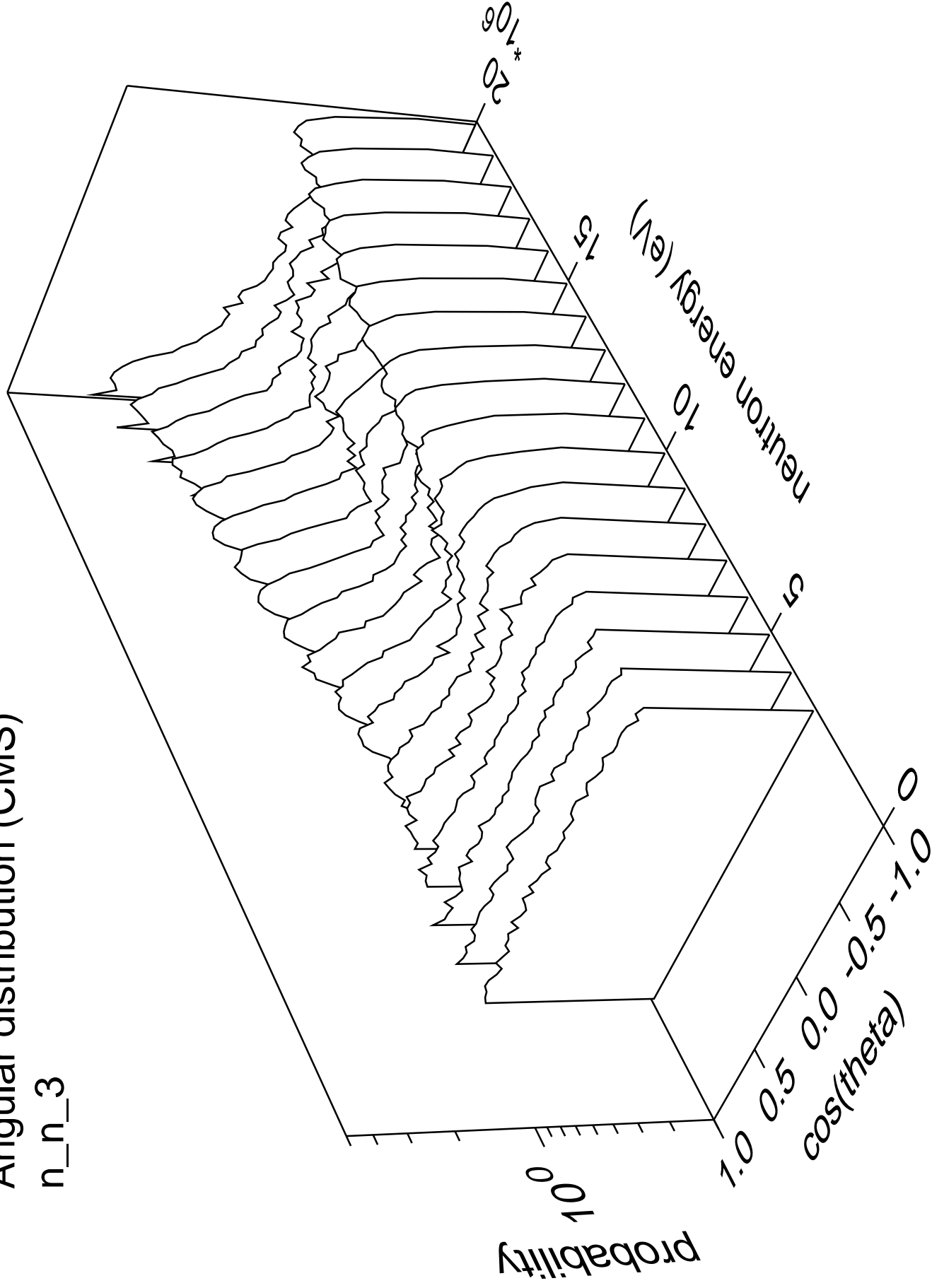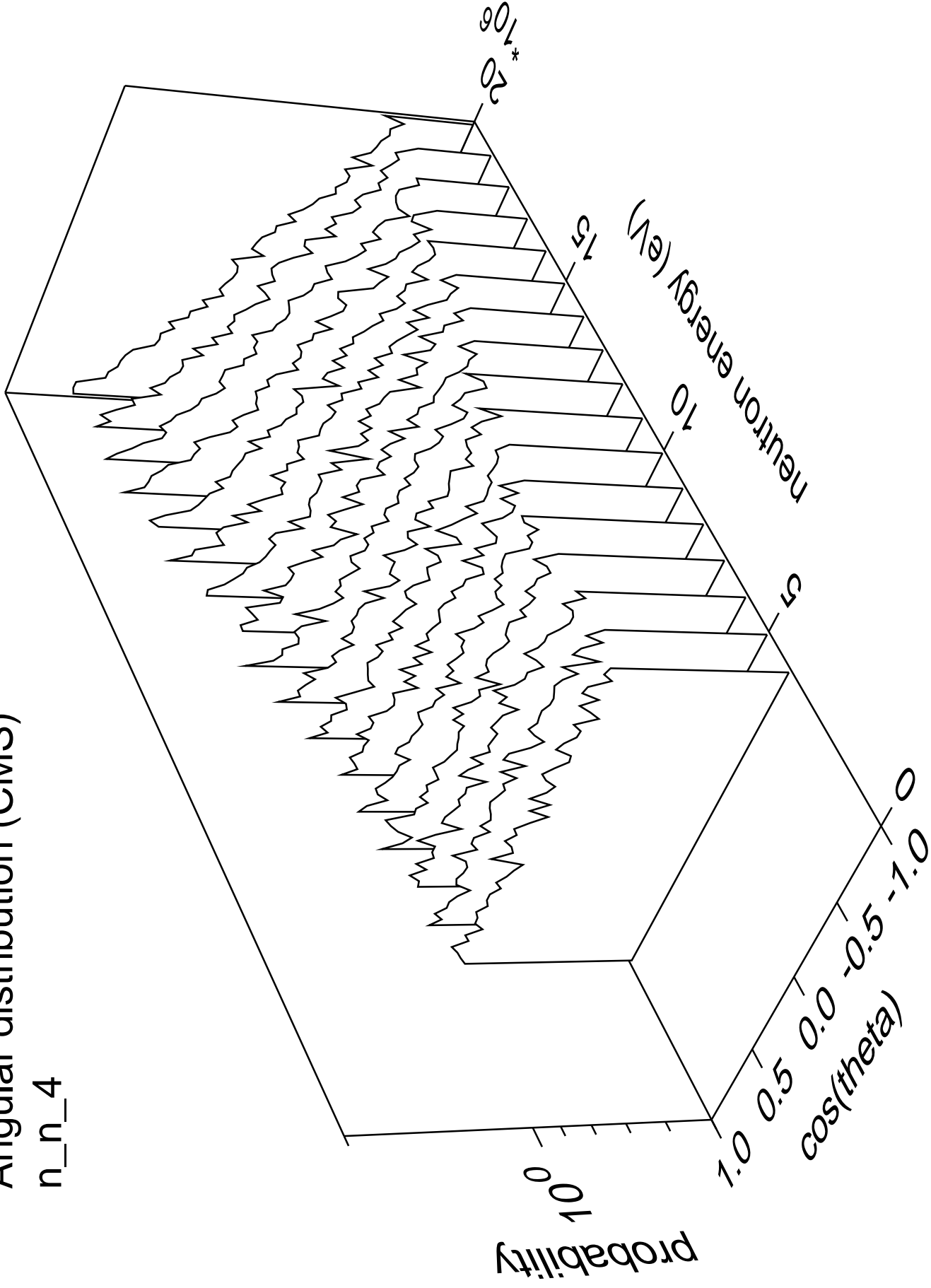neutron energy (eV)

5

10

15

20

*10⁶

Angular distribution (CMS)
n_n_8
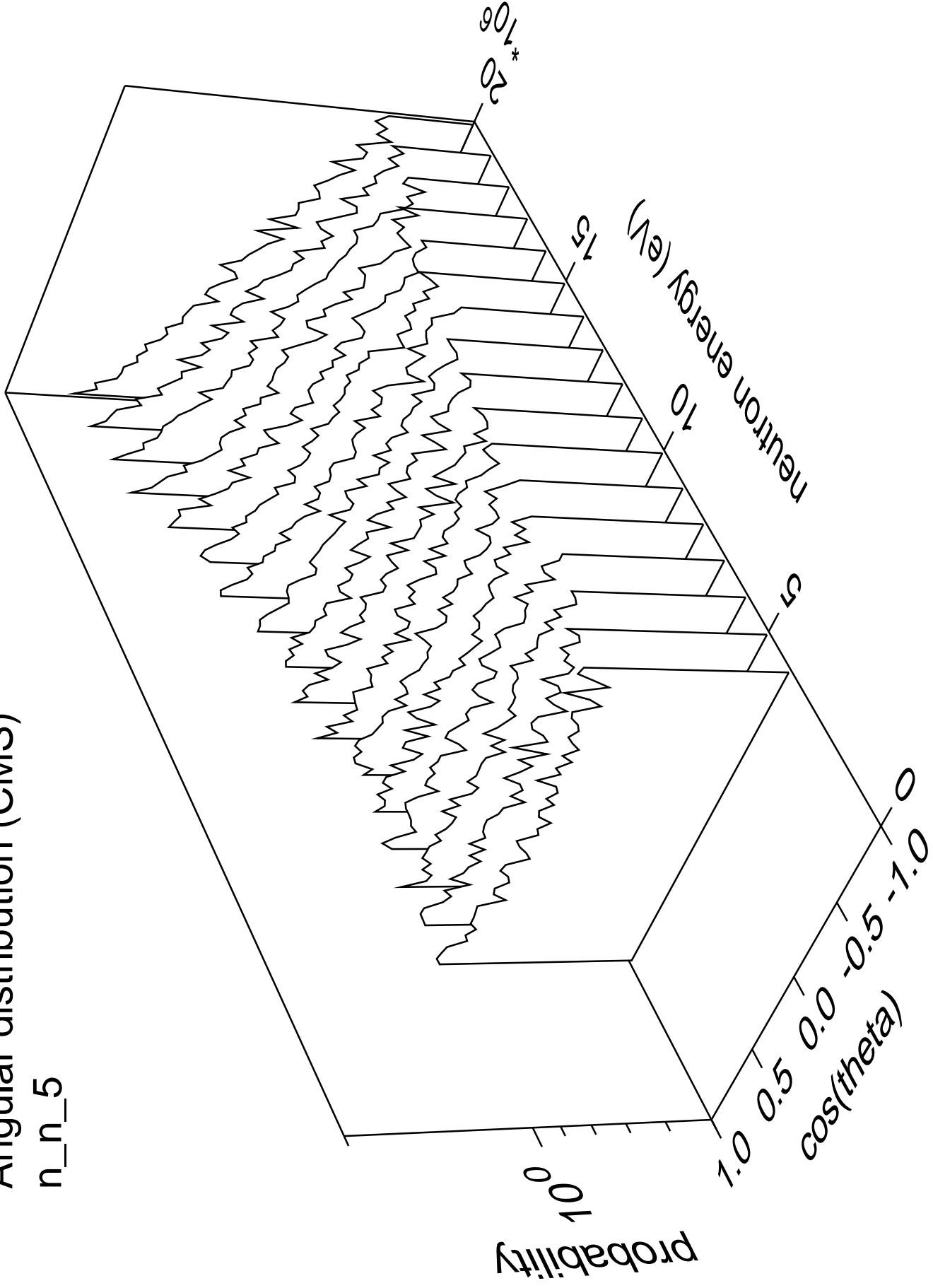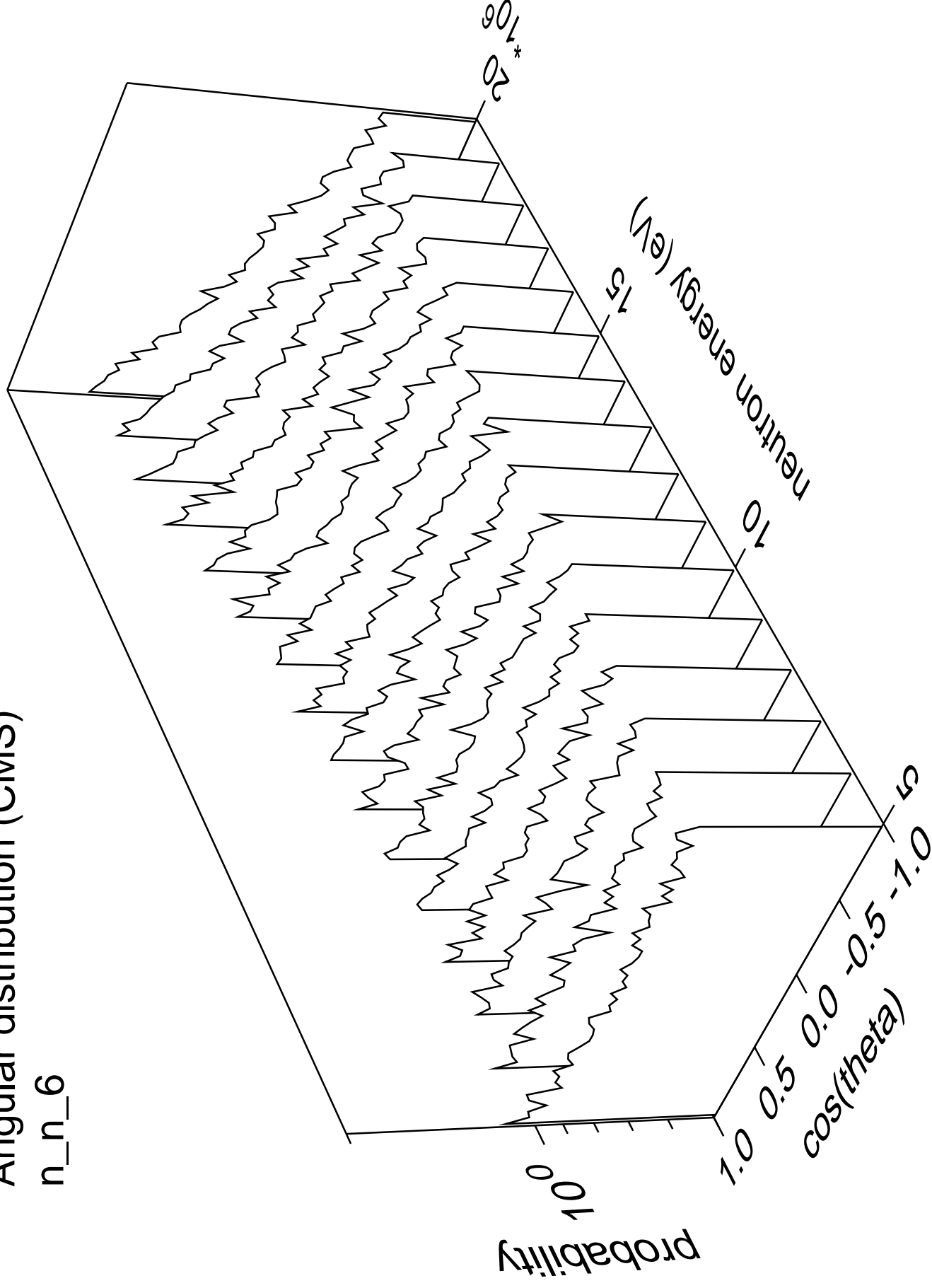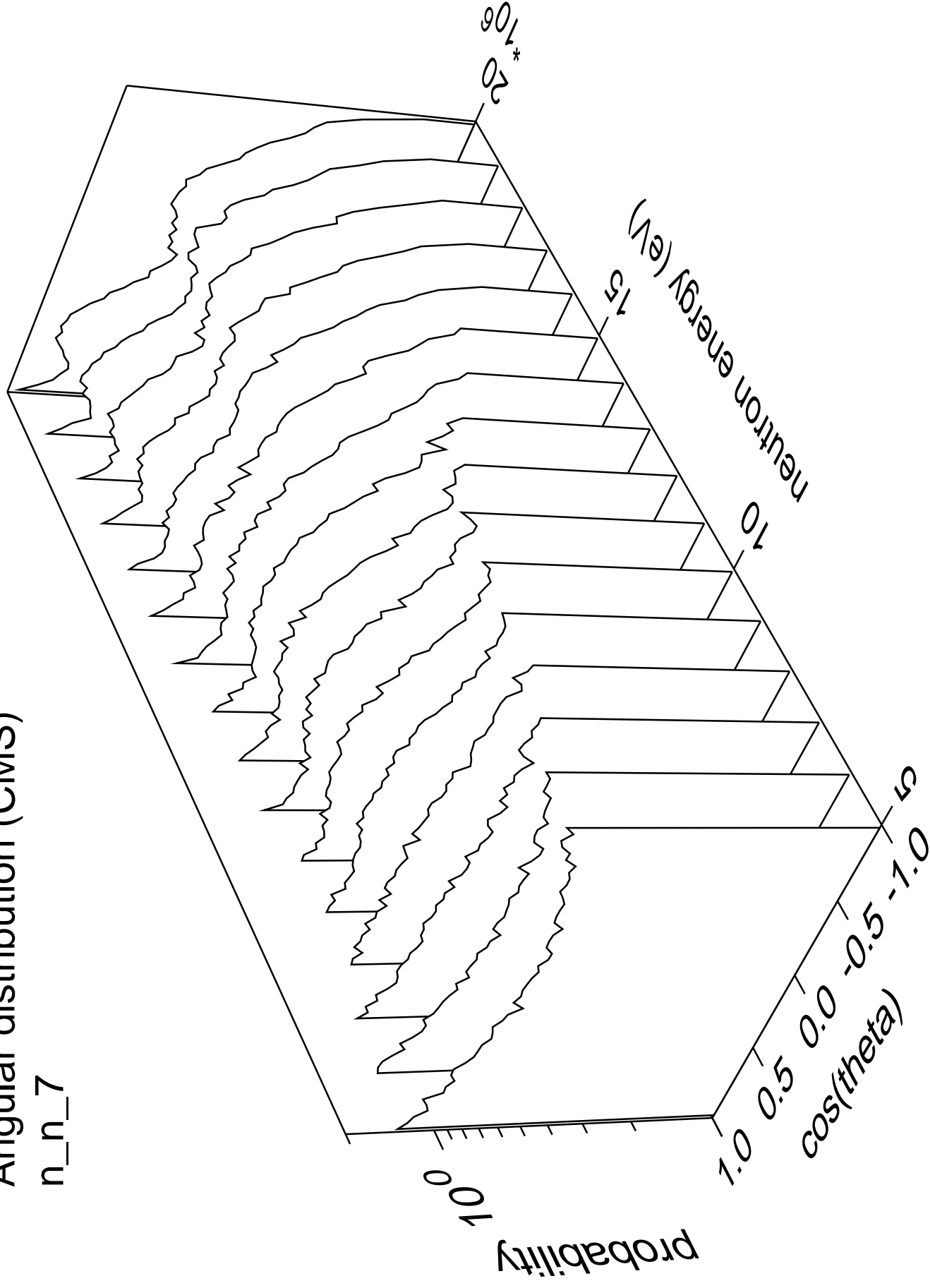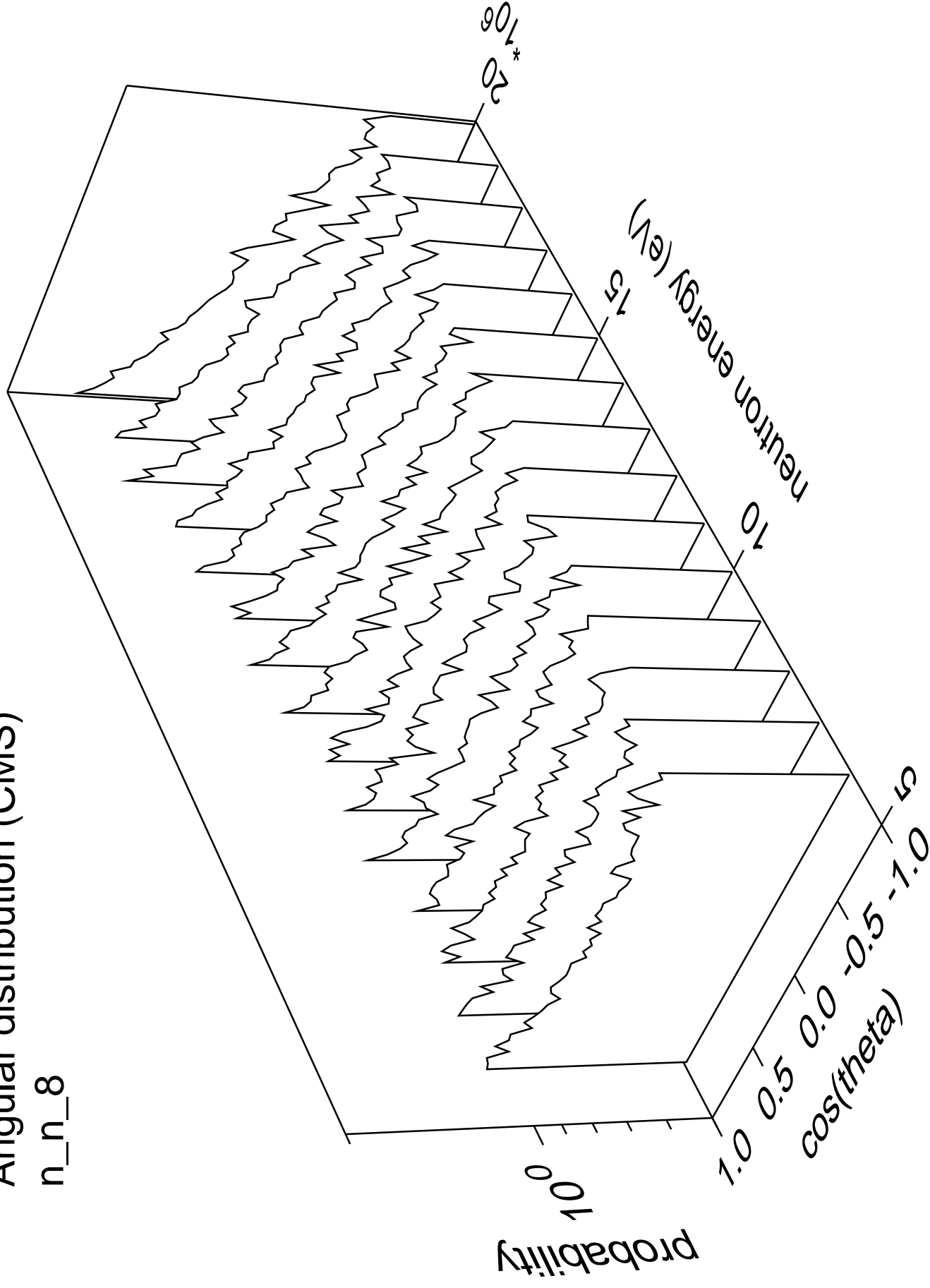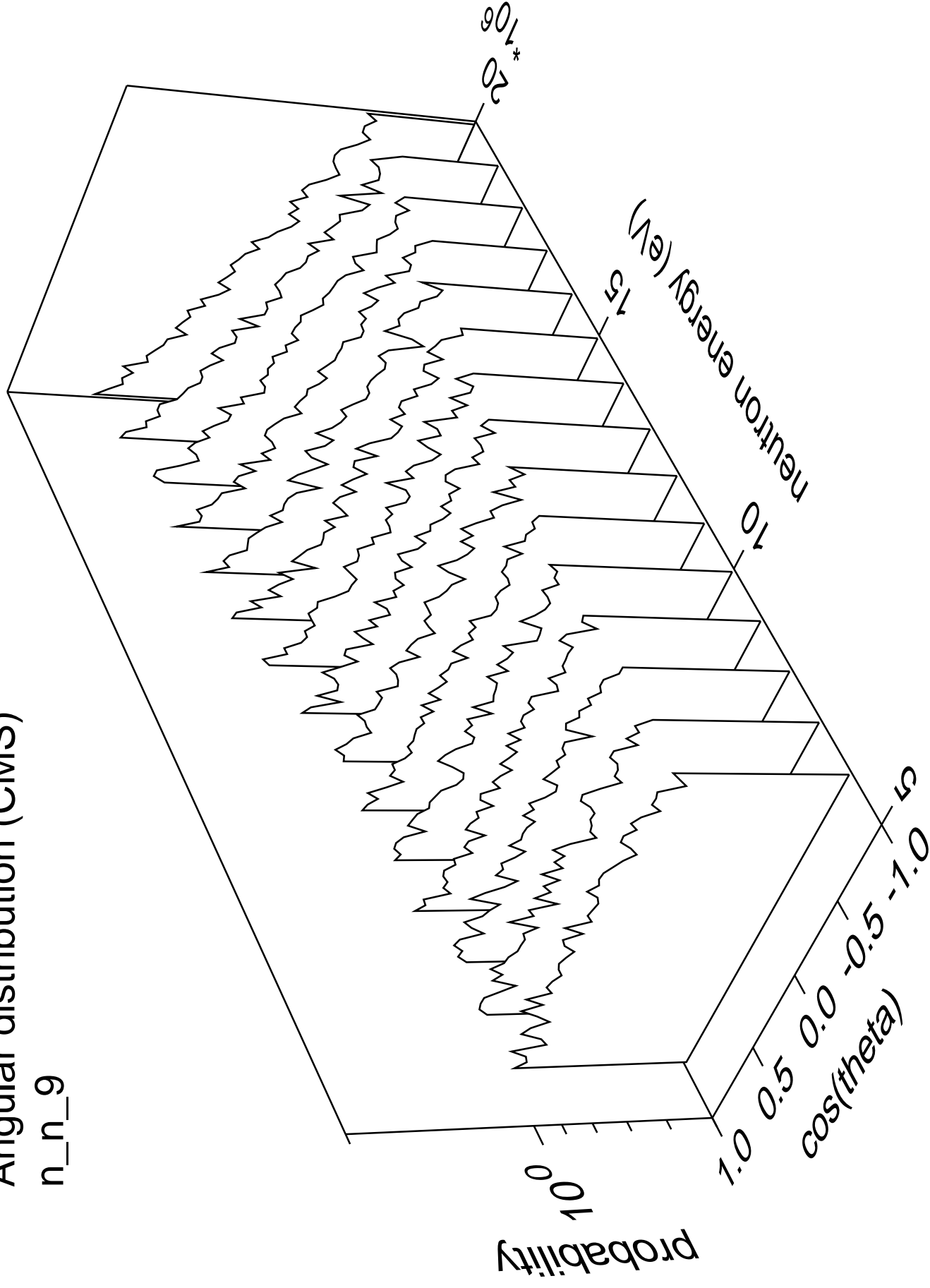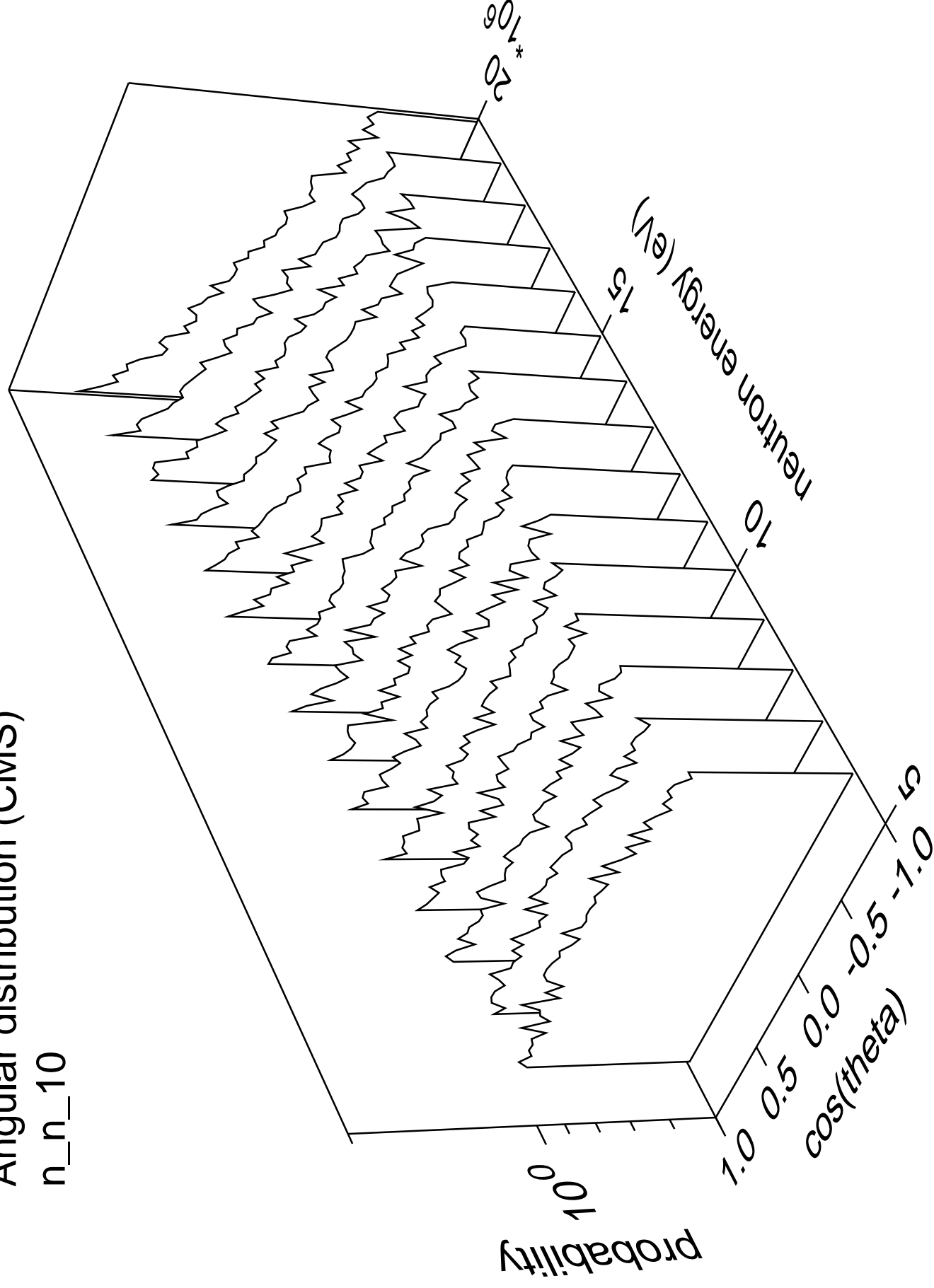
Angular distribution (CMS)
n_n_9

Angular distribution (CMS)
n_n_10

Angular distribution (CMS)
n_n_11

probability
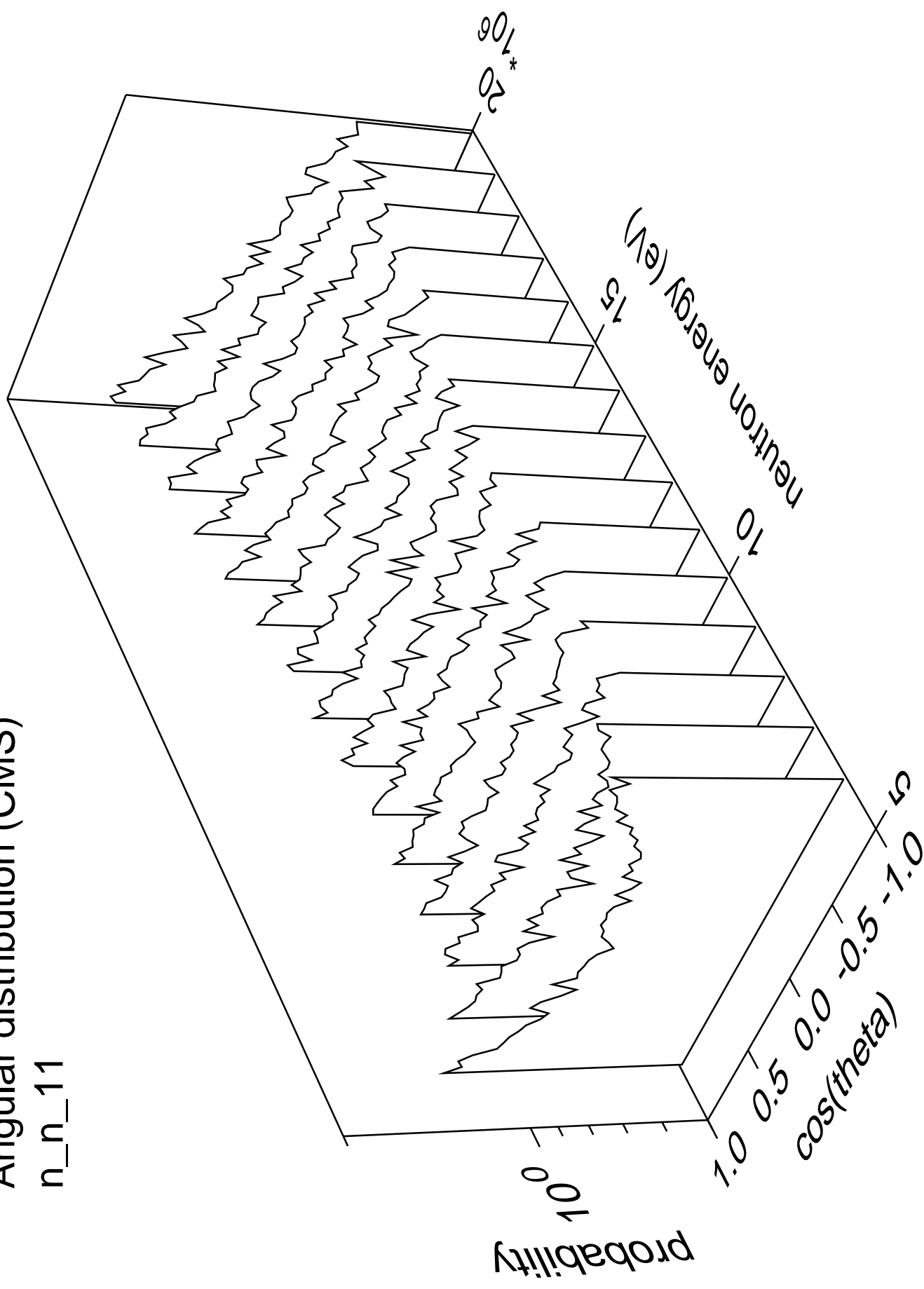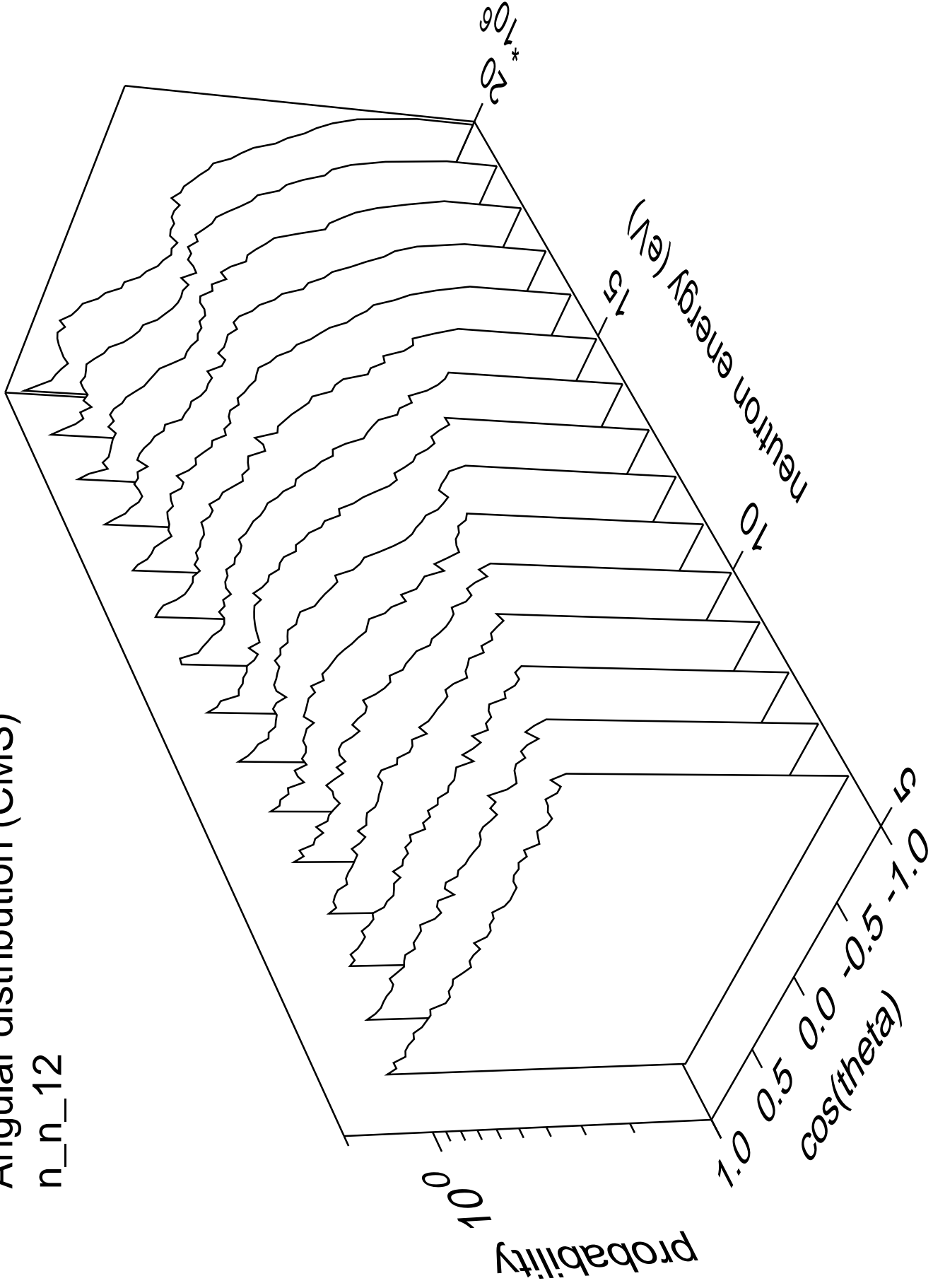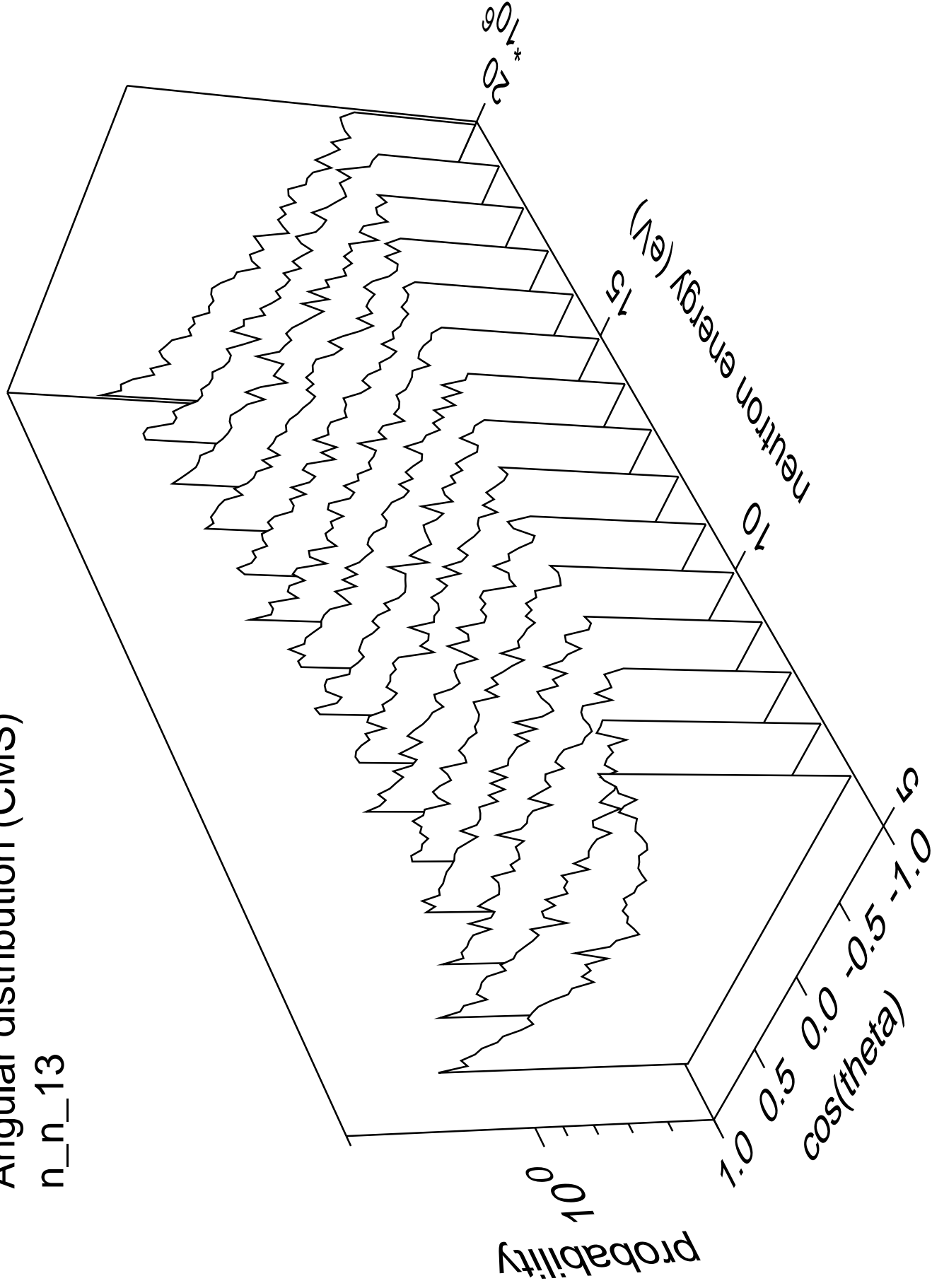
cos(theta)

neutron energy (eV)

Angular distribution (CMS)
n_n_12

probability

$*10^6$

neutron energy (eV)

cos(theta)

Angular distribution (CMS)
n_n_13

probability

10^0

cos(theta)

1.0 0.5 0.0 -0.5 -1.0

neutron energy (eV)

5

10

15

20 *10^6
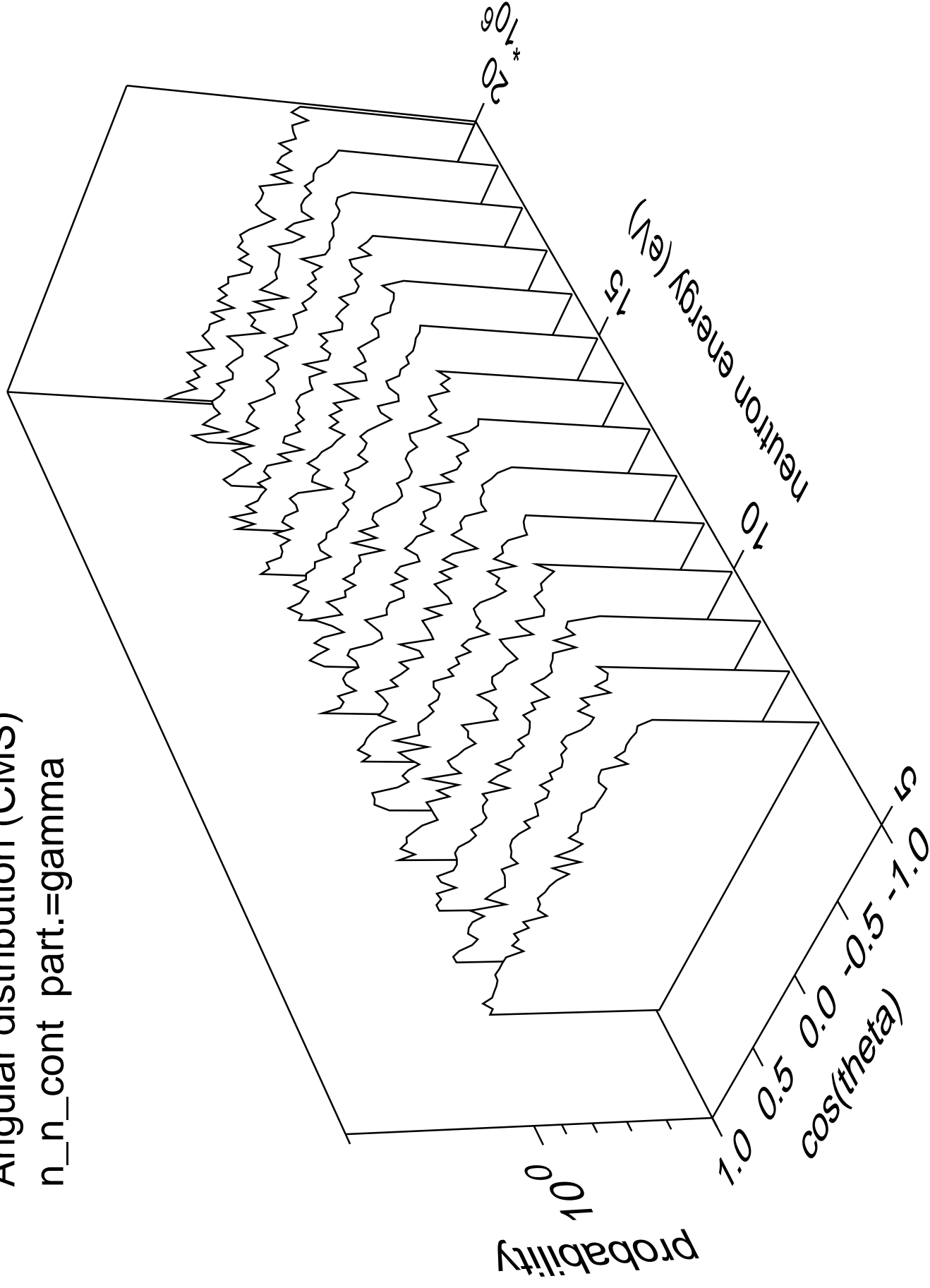
Angular distribution (CMS)
n_n_cont part.=neutron

Angular distribution (CMS)
n_n_cont part.=gamma
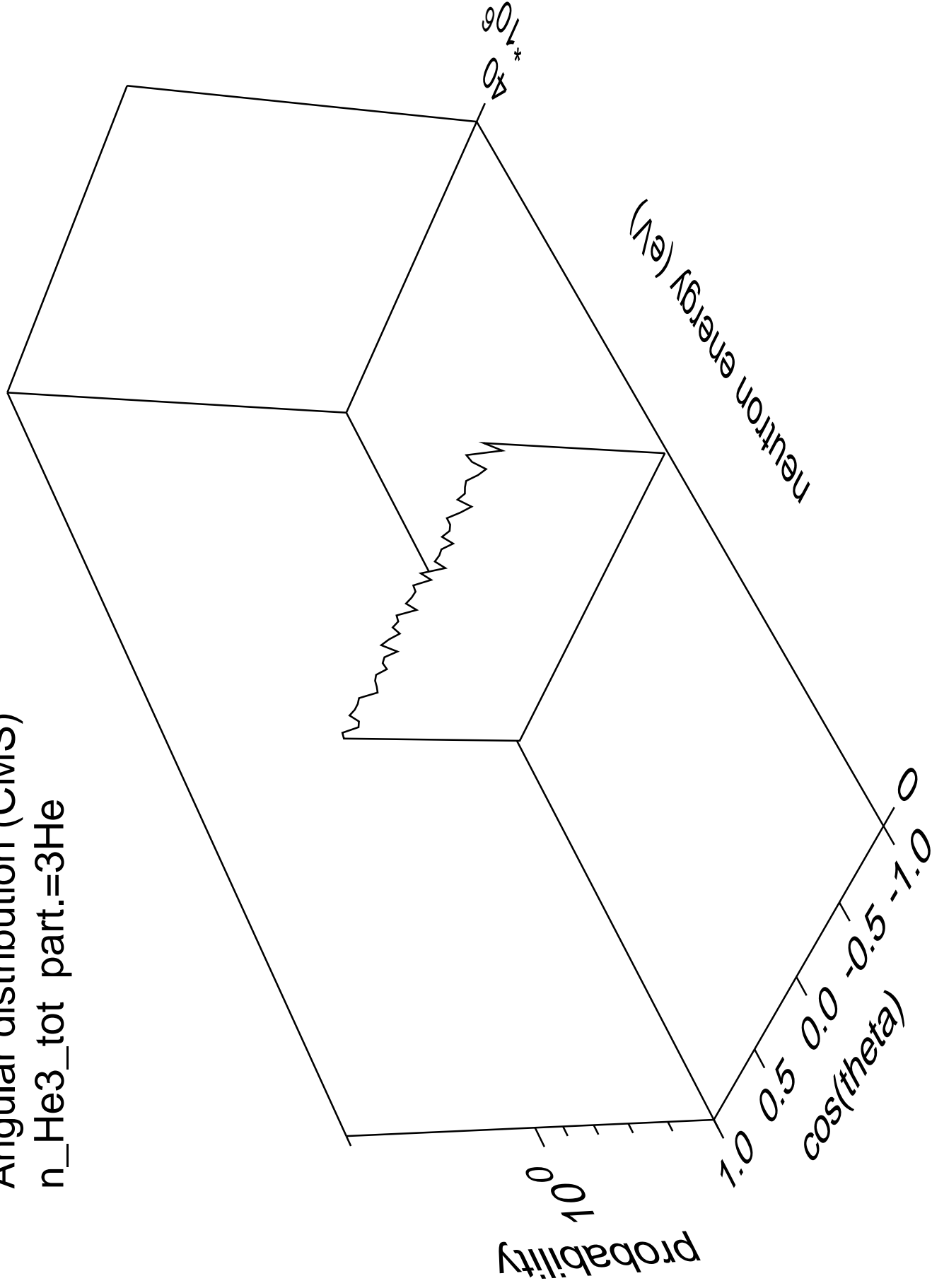
neutron energy (eV)

cos(theta)

probability

20 *10⁶

15

10

5

1.0 0.5 0.0 -0.5 -1.0

Angular distribution (CMS)
n_He3_tot part.=3He

probability

cos(theta)

neutron energy (eV)

*10⁶

Angular distribution (CMS)
n_He3_tot part.=gamma

probability

neutron energy (eV)

cos(theta)

1.0 0.5 0.0 -0.5 -1.0

0

40 *10⁶

Energy distribution (CMS)
n_2n part.=neutron

probability

energy (eV)

neutron energy (eV)

Energy distribution (CMS)
n_2n part.=gamma

probability

10^2

10^0

10^{-2}

energy (eV)

0

5

10

15

*10^6

5

10

15

20

*10^6

neutron energy (eV)

Energy distribution (CMS)
n_na part.=neutron

probability

10¹

10⁻¹

energy (eV)
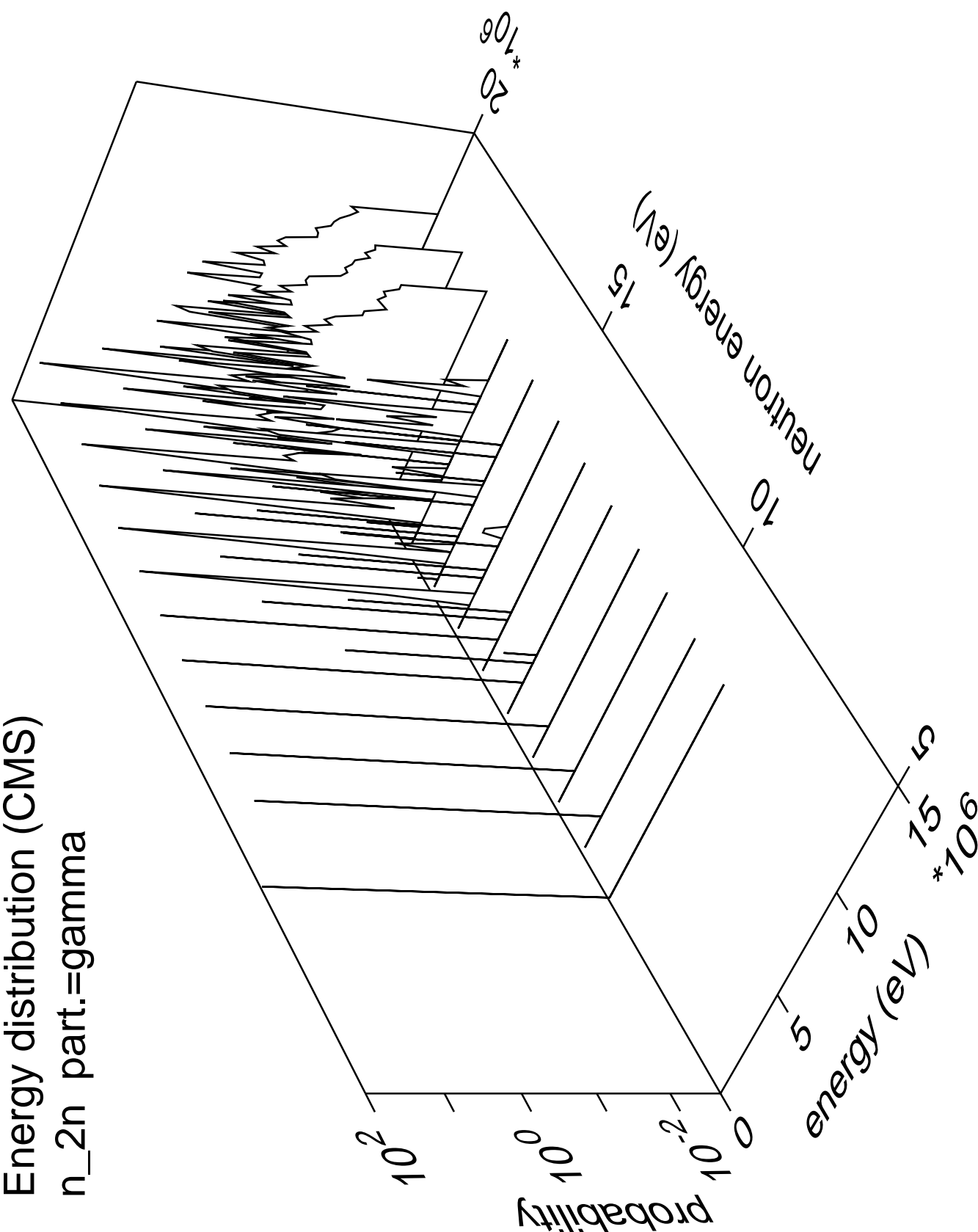
0
2
4
6
8
*10⁶

neutron energy (eV)

14
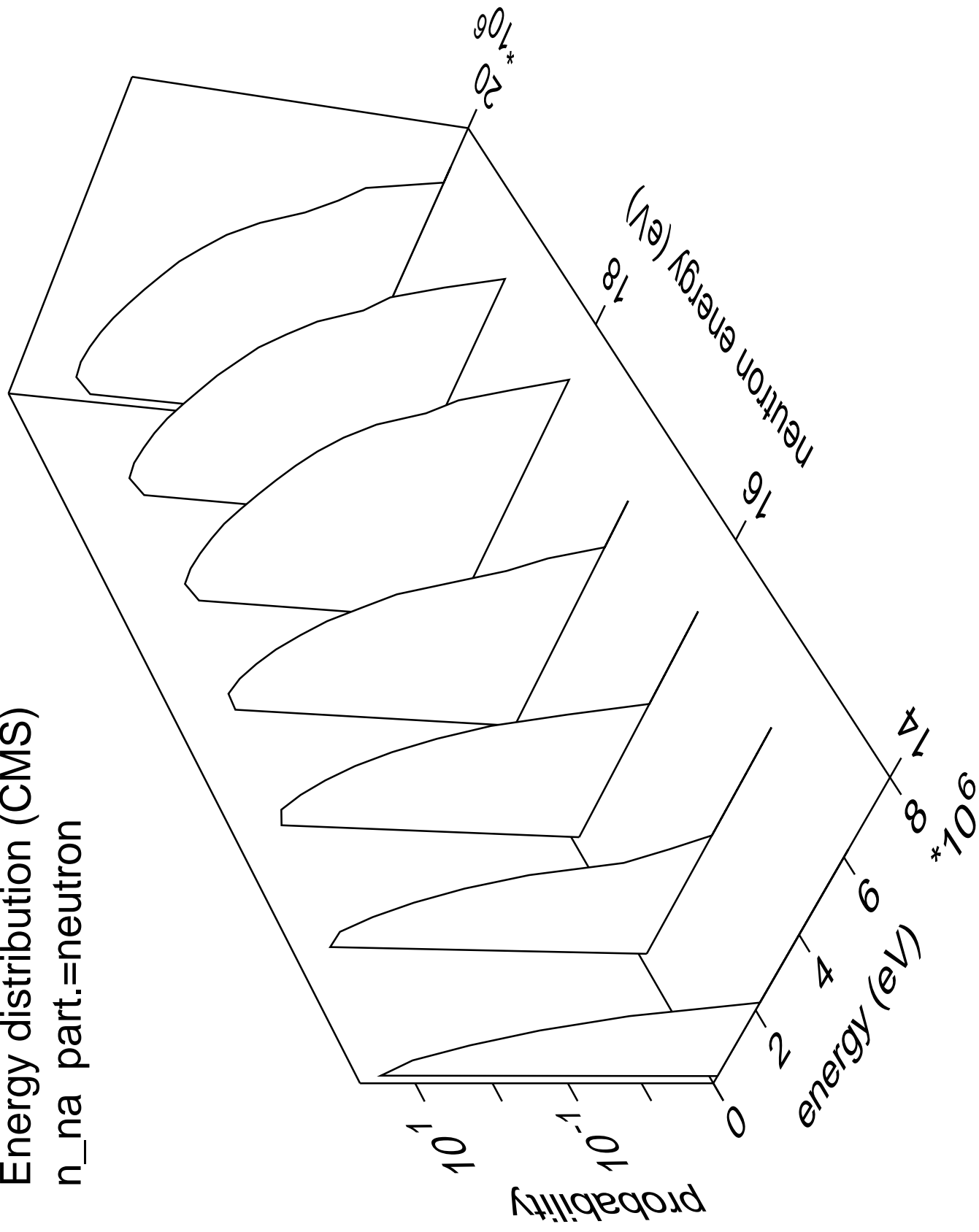16
18
20
*10⁶
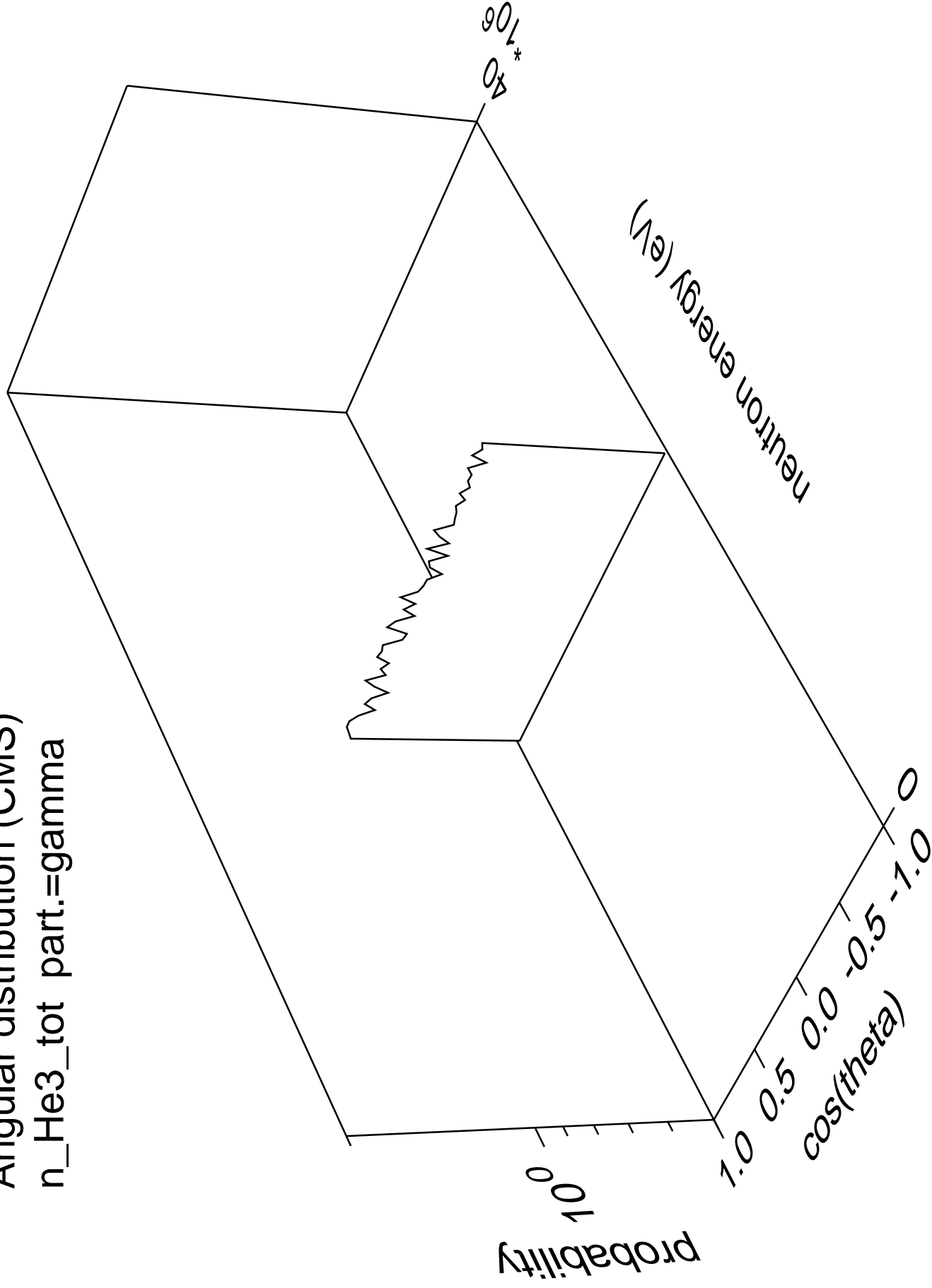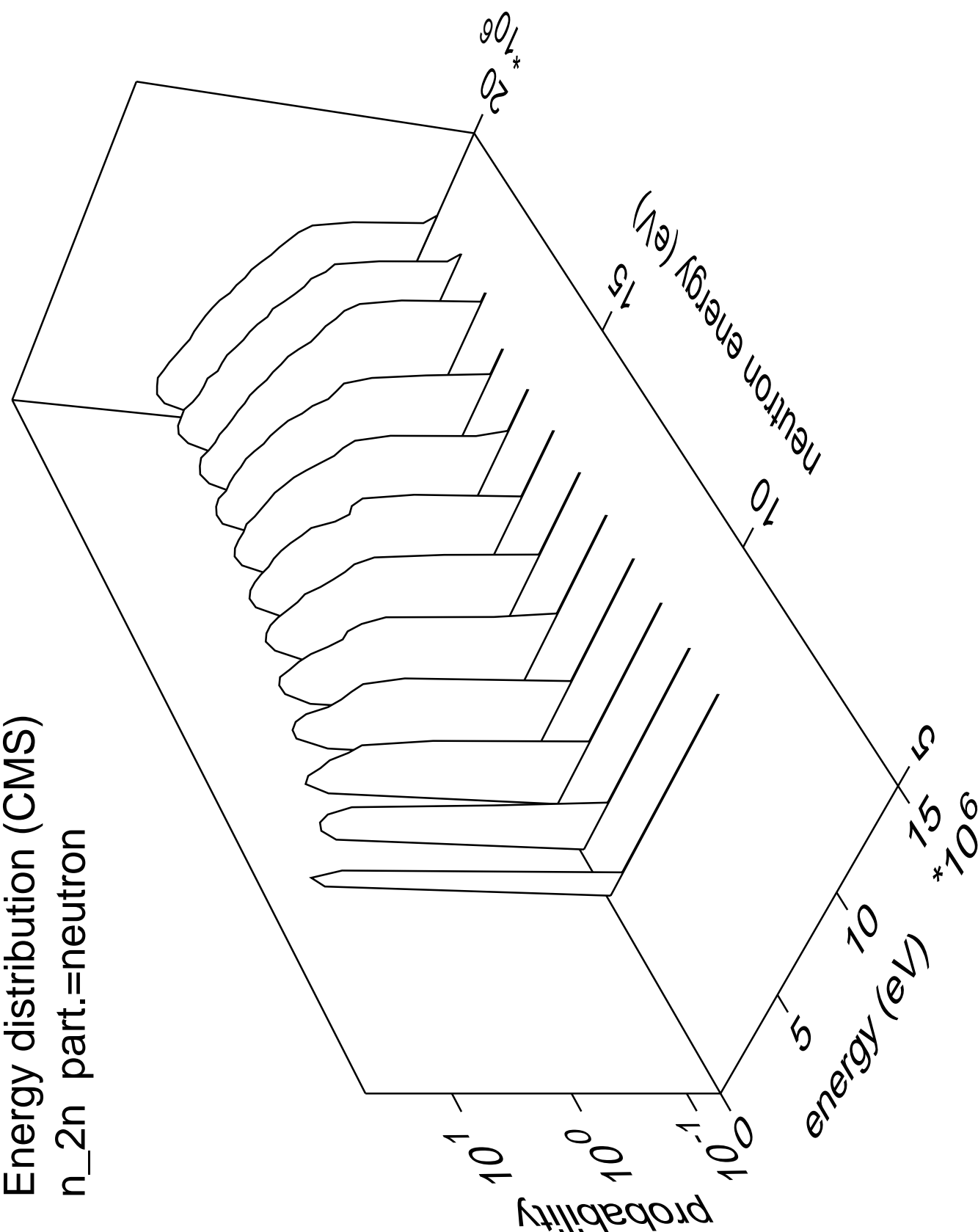
Energy distribution (CMS)
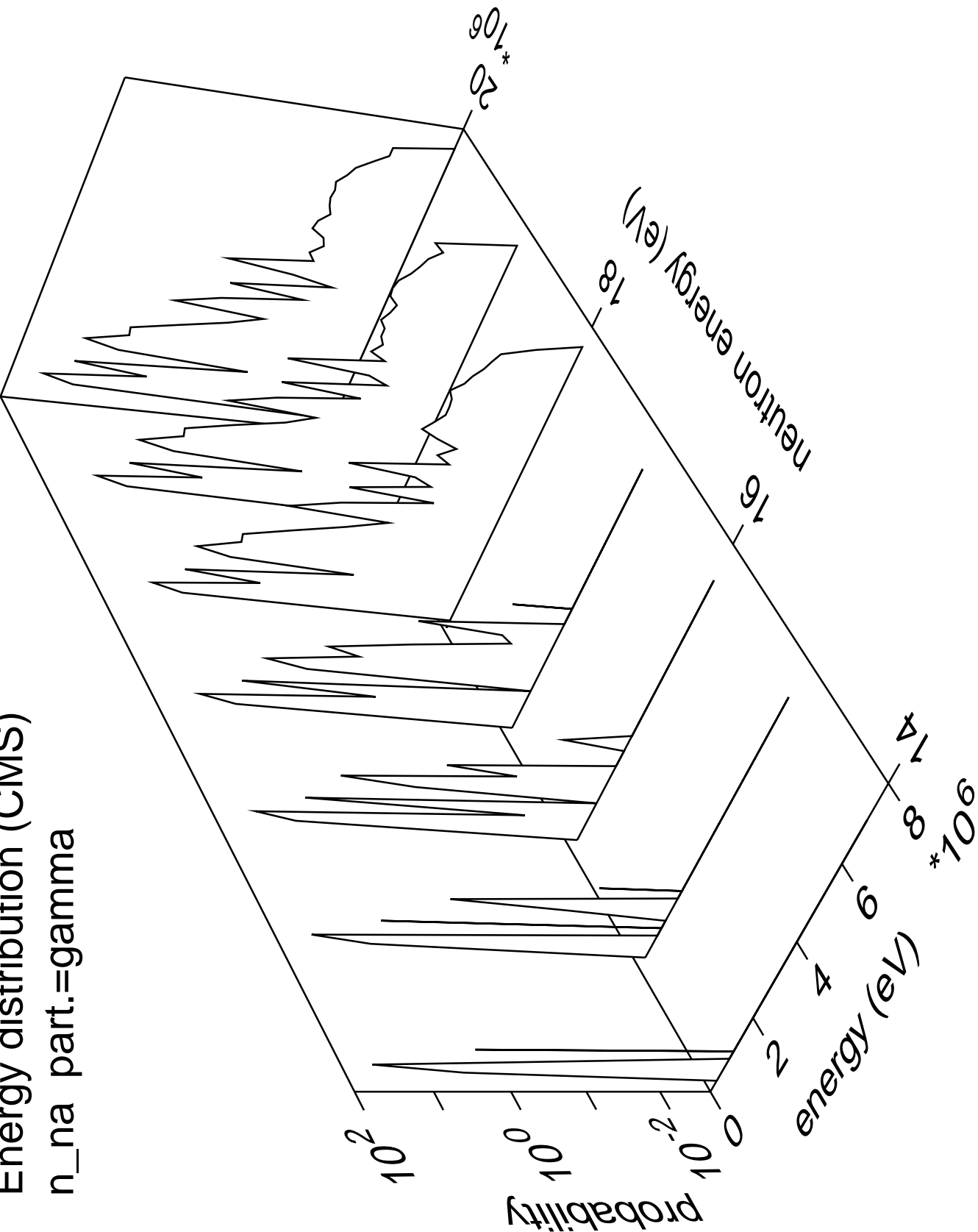n_na part.=alpha
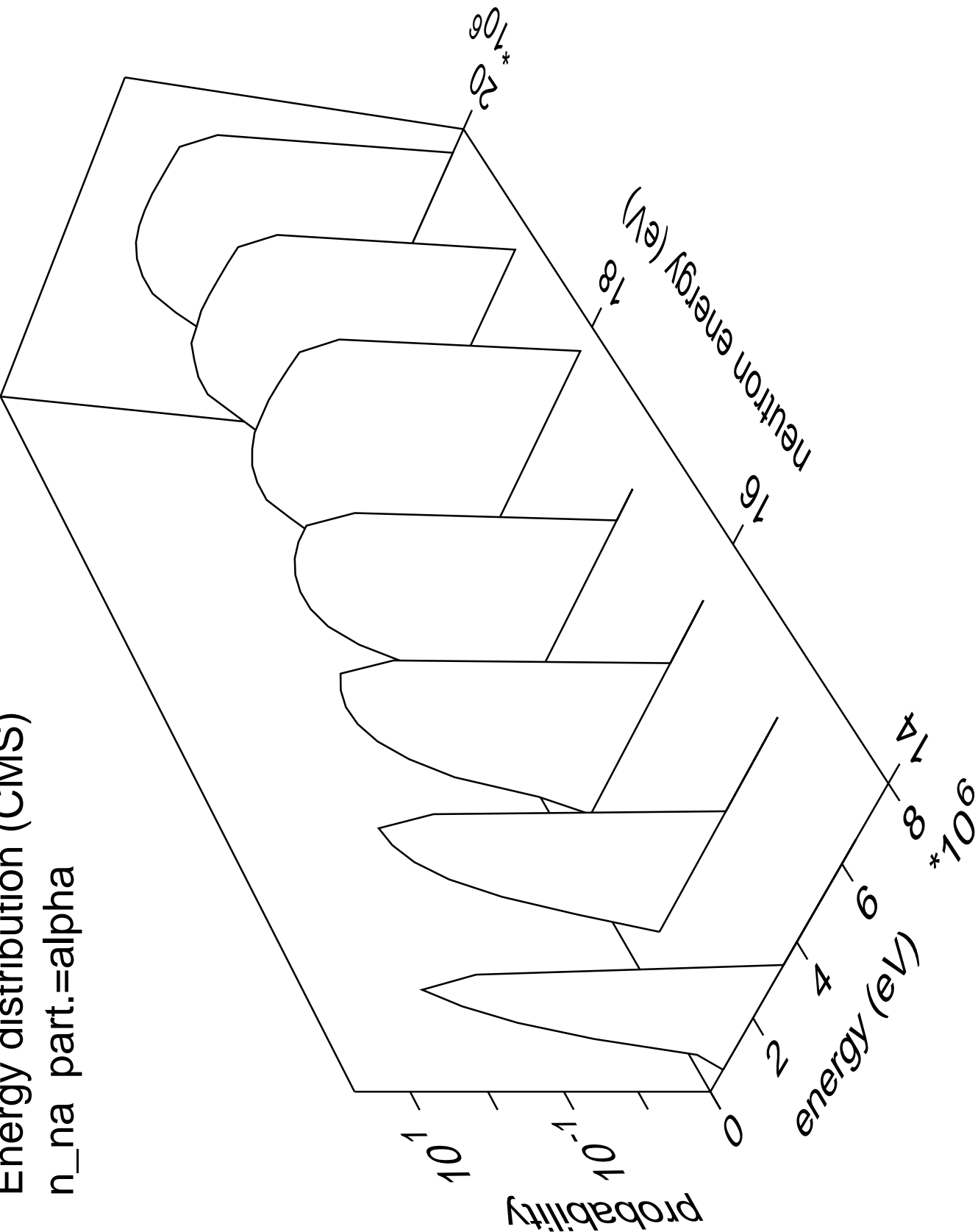
Energy distribution (CMS)
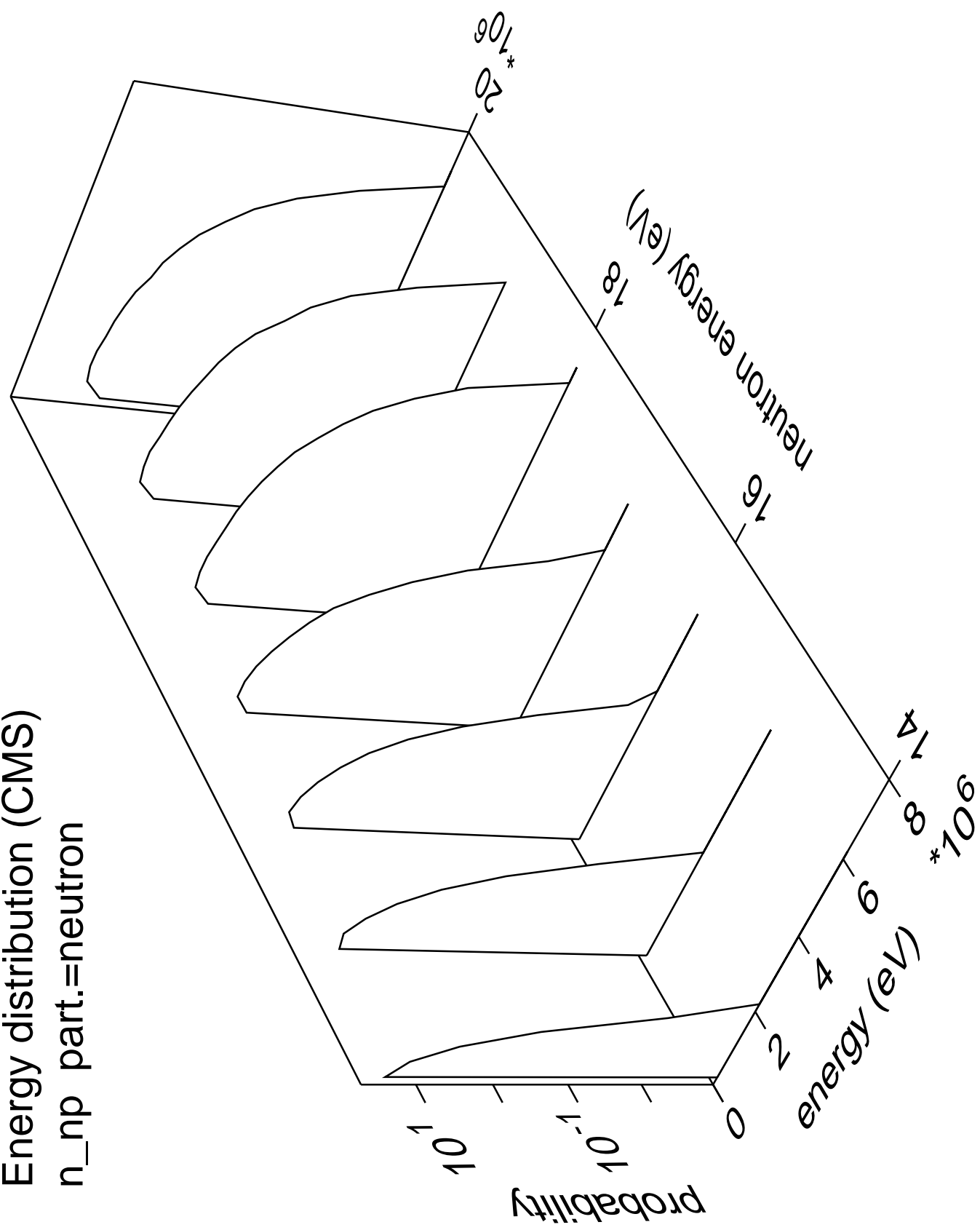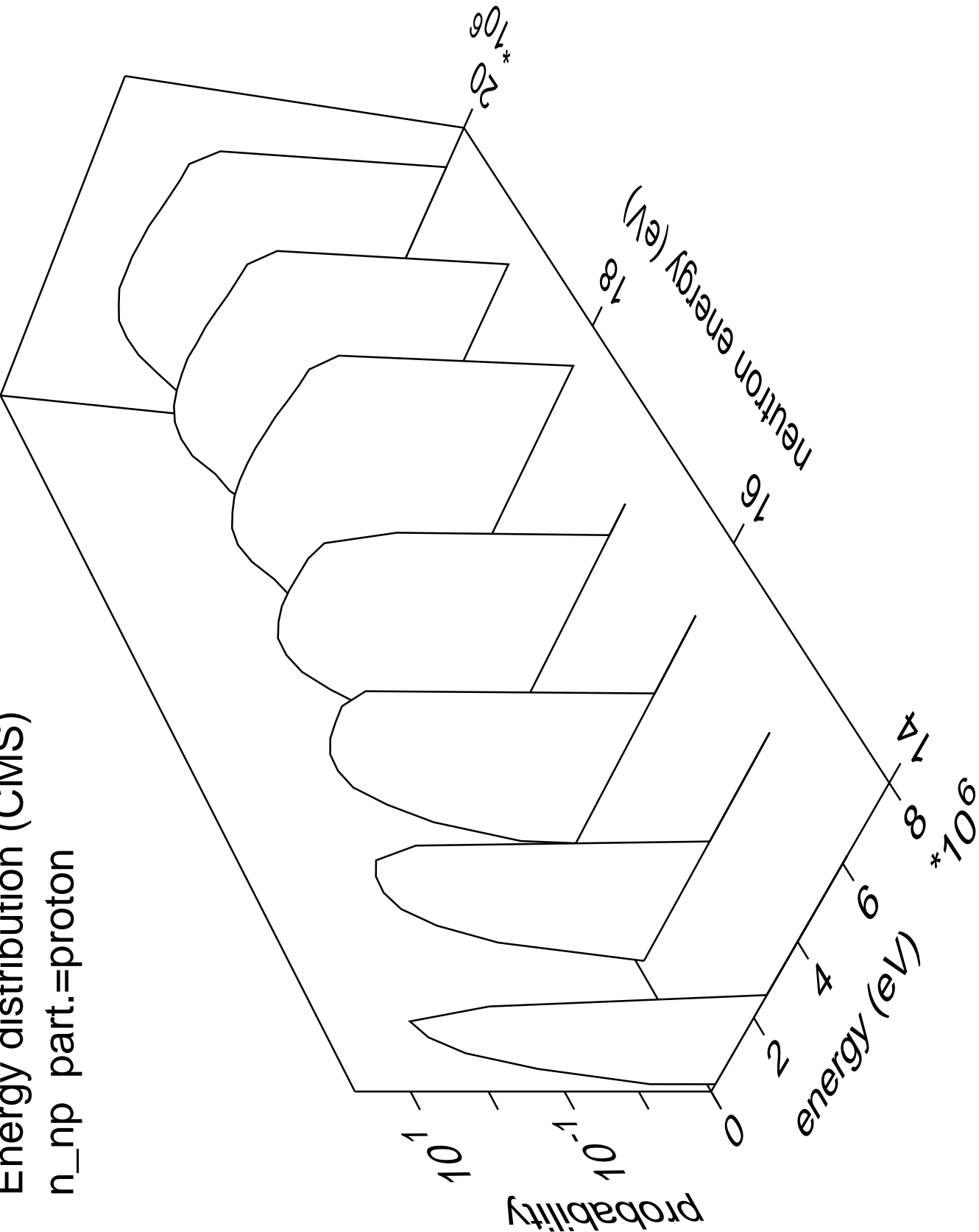n_na part.=gamma

Energy distribution (CMS)
n_np part.=neutron

probability

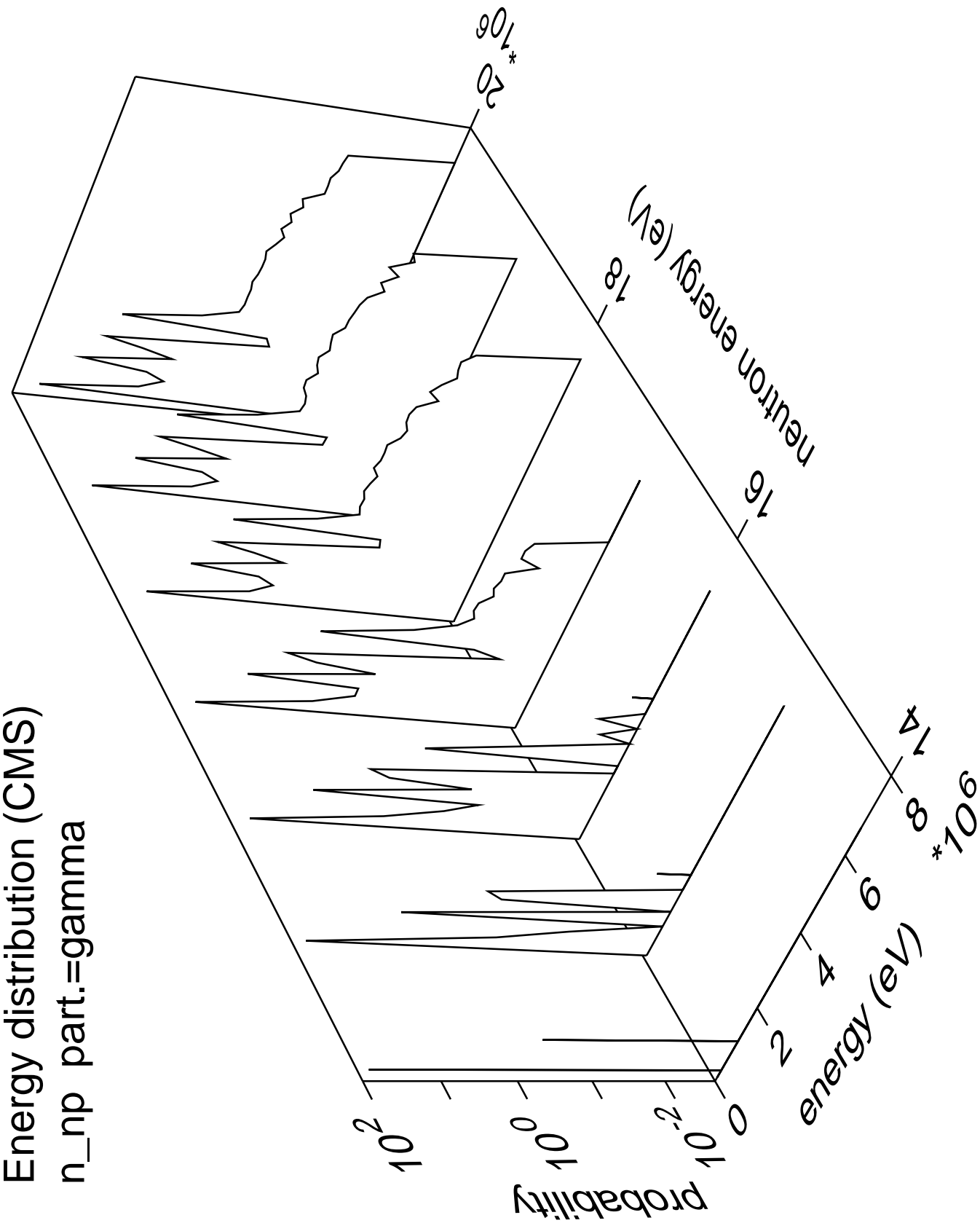10^1

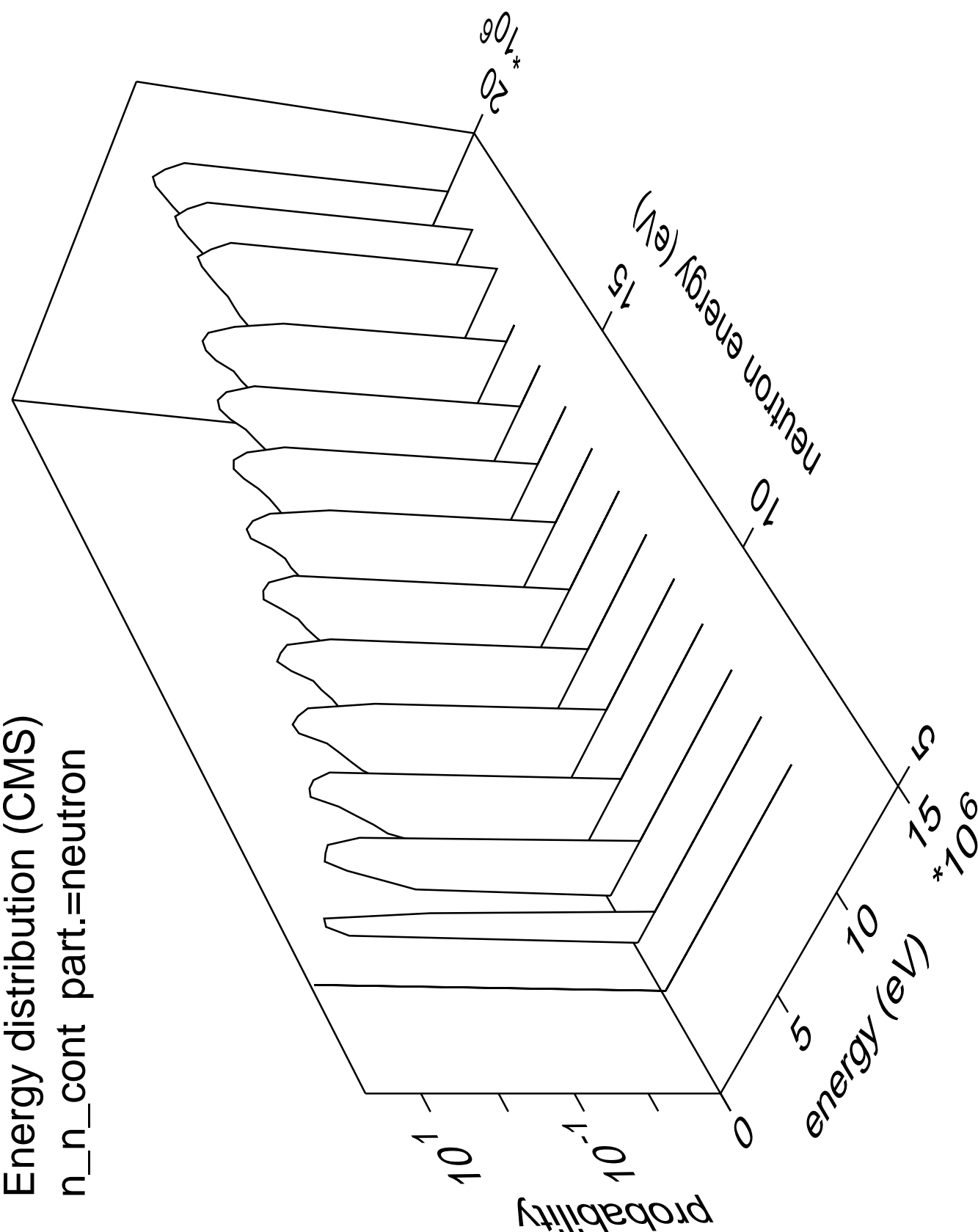10^{-1}

energy (eV)

0

2

4

6

8 $*10^6$

neutron energy (eV)

14

16

18

20 $*10^6$

Energy distribution (CMS)
n_np part.=proton

probability

10¹

10⁻¹

energy (eV)

0   2   4   6   8   *10⁶

neutron energy (eV)

14   16   18   20   *10⁶

Energy distribution (CMS)
n_np part.=gamma

Energy distribution (CMS)
n_n_cont part.=neutron

probability

10^1

10^{-1}

energy (eV)

0

5

10

15

$*10^6$

5

10

15

20

$*10^6$

neutron energy (eV)
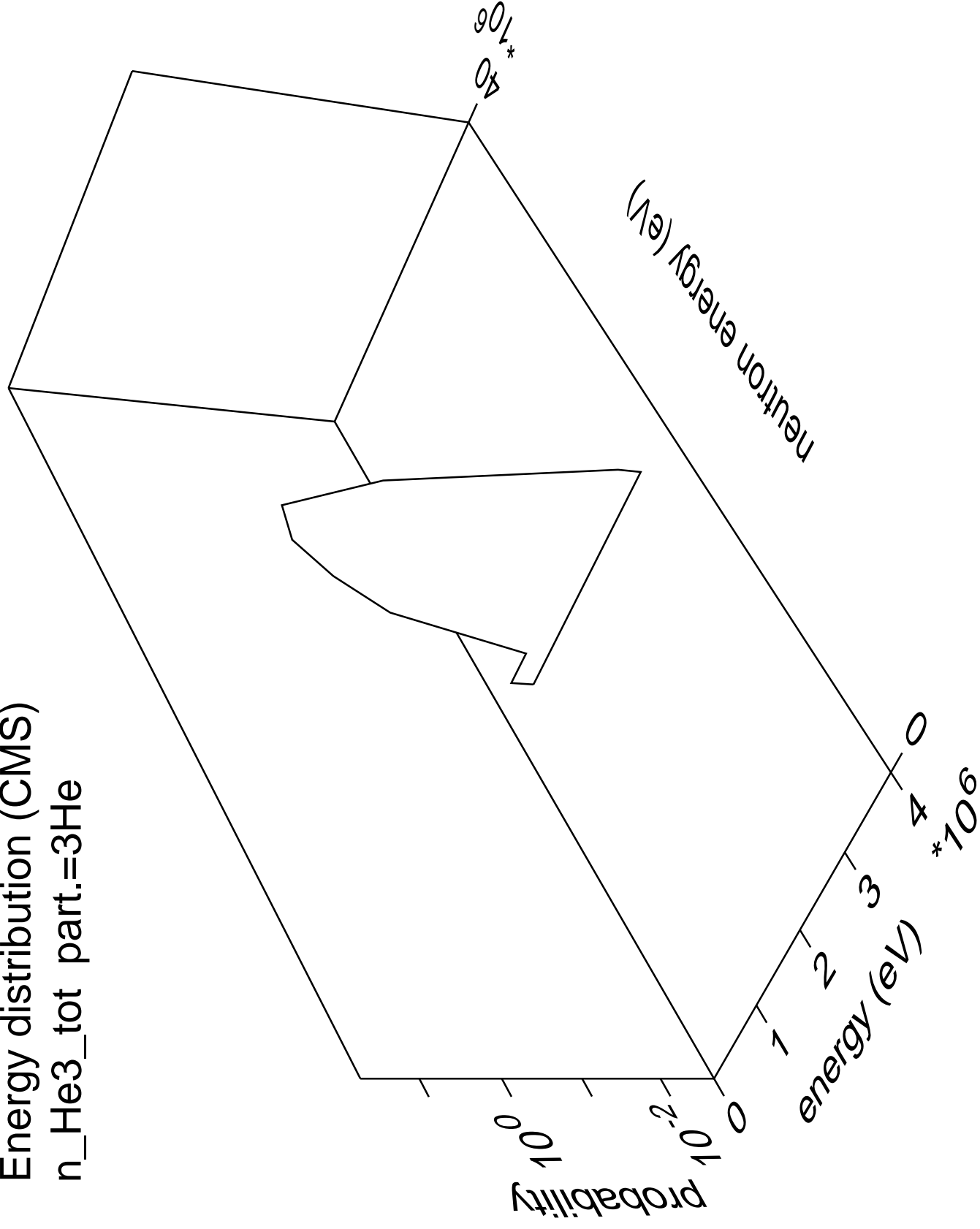
Energy distribution (CMS)
n_n_cont part.=gamma

Energy distribution (CMS)
n_He3_tot part.=3He

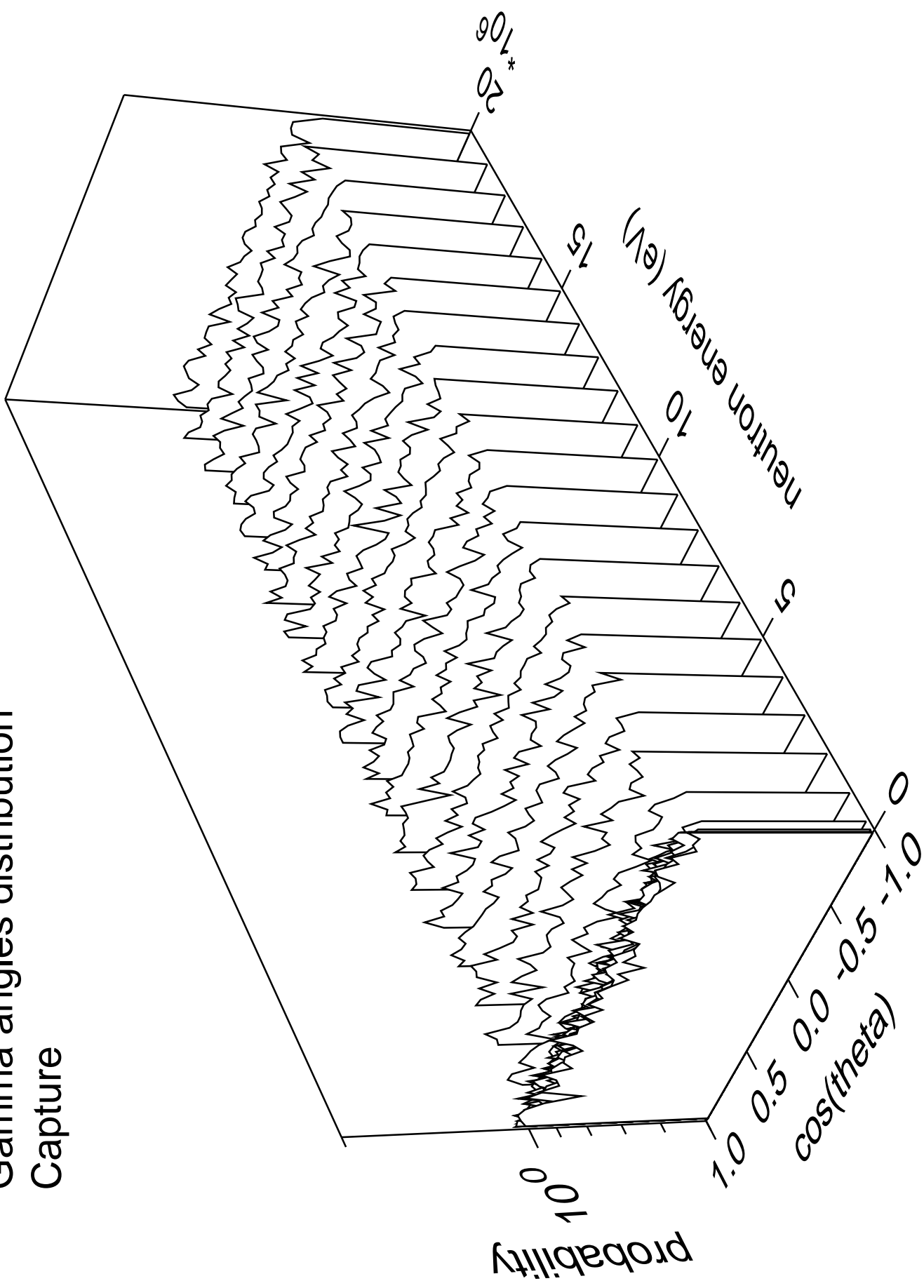probability

10^0

10^{-2}

energy (eV)

0   1   2   3   4
                    $*10^6$

neutron energy (eV)

0
4
                    $*10^6$

Energy distribution (CMS)
n_He3_tot part.=gamma

probability

10^1
10^0
10^{-1}
10^{-2}

energy (eV)

0 1 2 3 4
$*10^6$

neutron energy (eV)

40
$*10^6$

Gamma energy distribution
Capture

probability

neutron energy (eV)

gamma energy (MeV)

$*10^6$

Gamma angles distribution
Capture

probability

neutron energy (ev)

cos(theta)

20 *10⁶

15

10

5

0

1.0   0.5   0.0   -0.5 -1.0

10⁰

Gamma multiplicities distribution
Capture

neutron energy (eV)

multiplicity

probability

Gamma energy distribution
n_n_1

probability

neutron energy (eV)

gamma energy (MeV)

100

50

0

5

10

15

20 *10⁶

0

5

10

15

20

Gamma angles distribution
n_n_1

probability

neutron energy (eV)
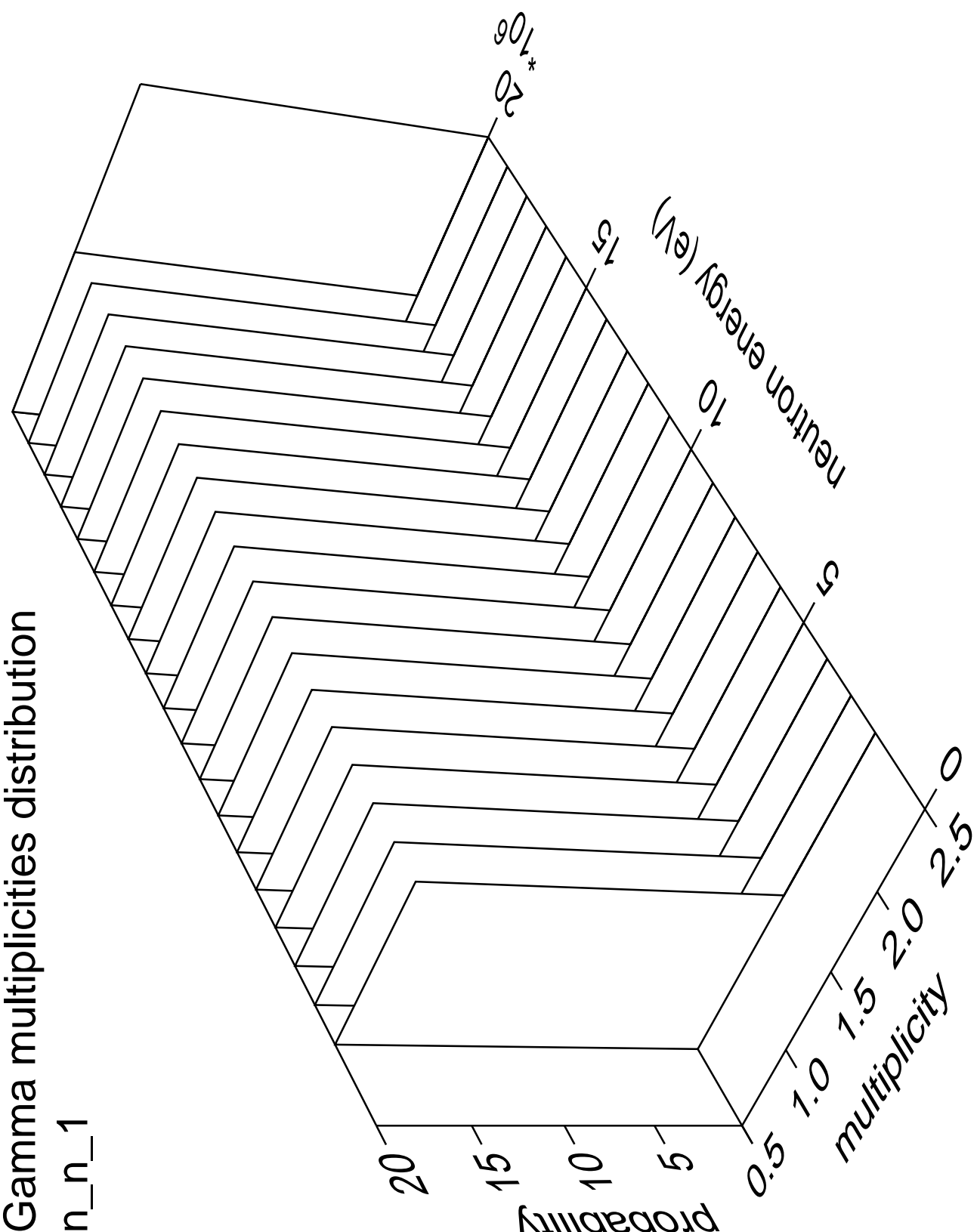
cos(theta)

20 *10⁶

15

10

5

0

1.0 0.5 0.0 -0.5 -1.0

10⁰
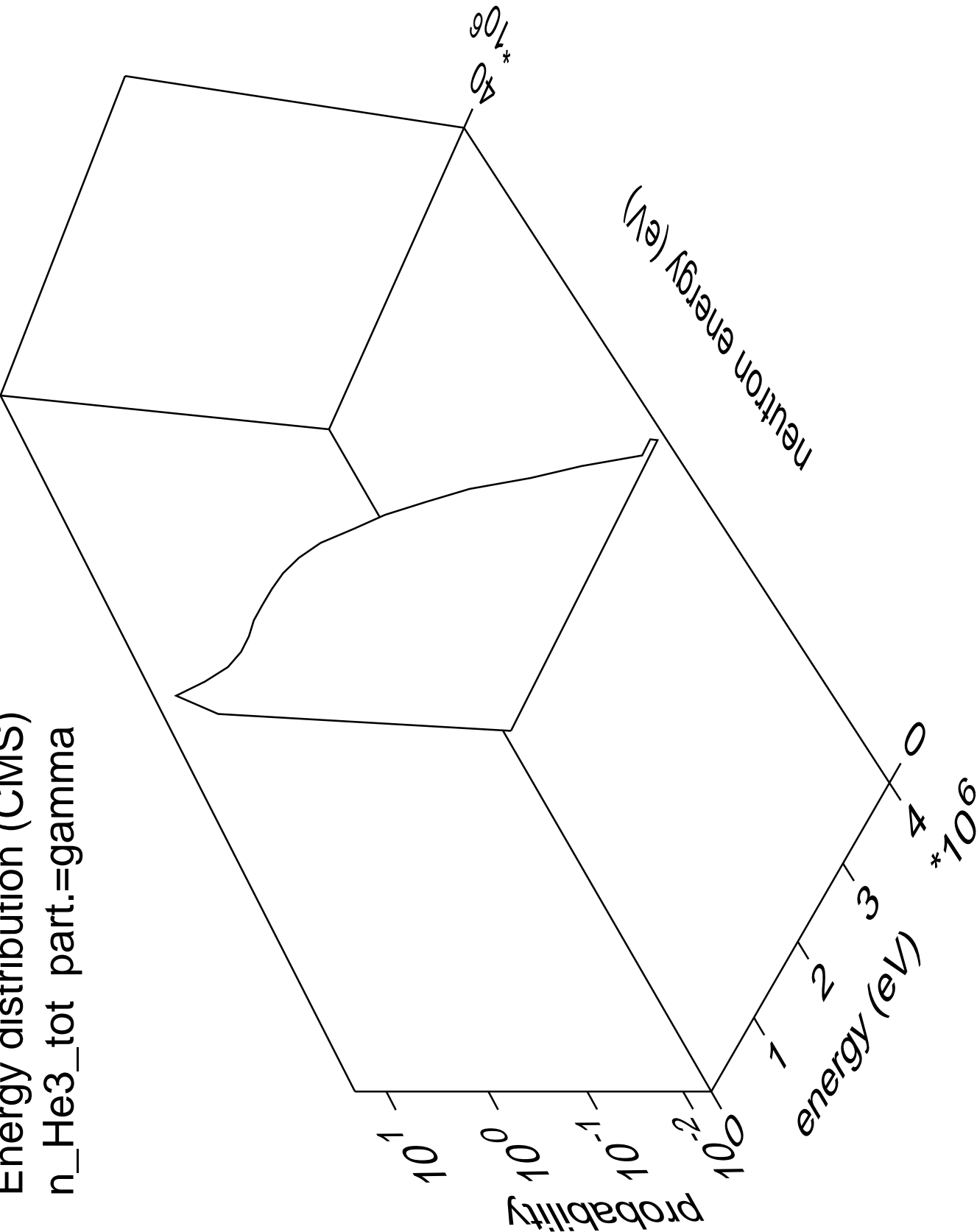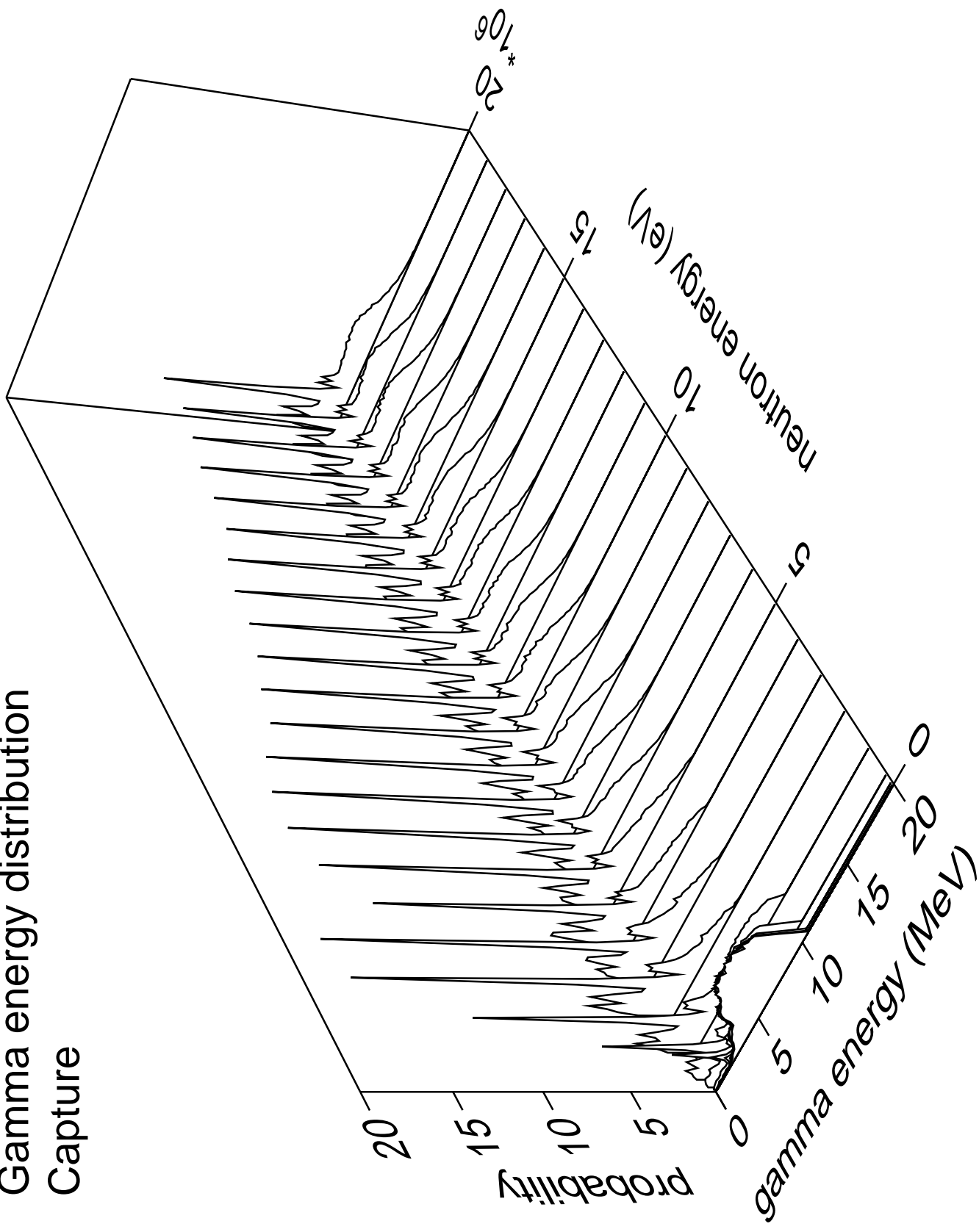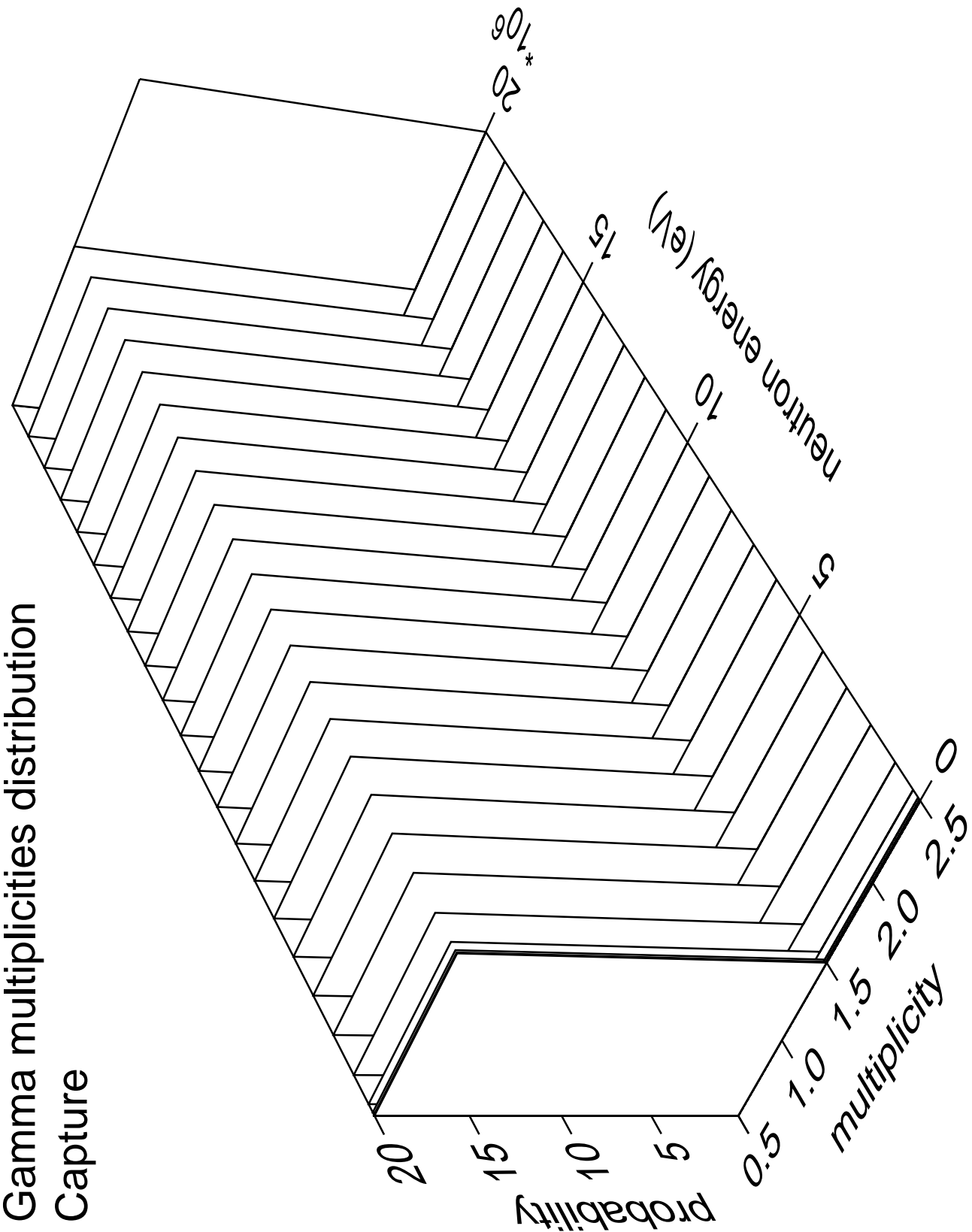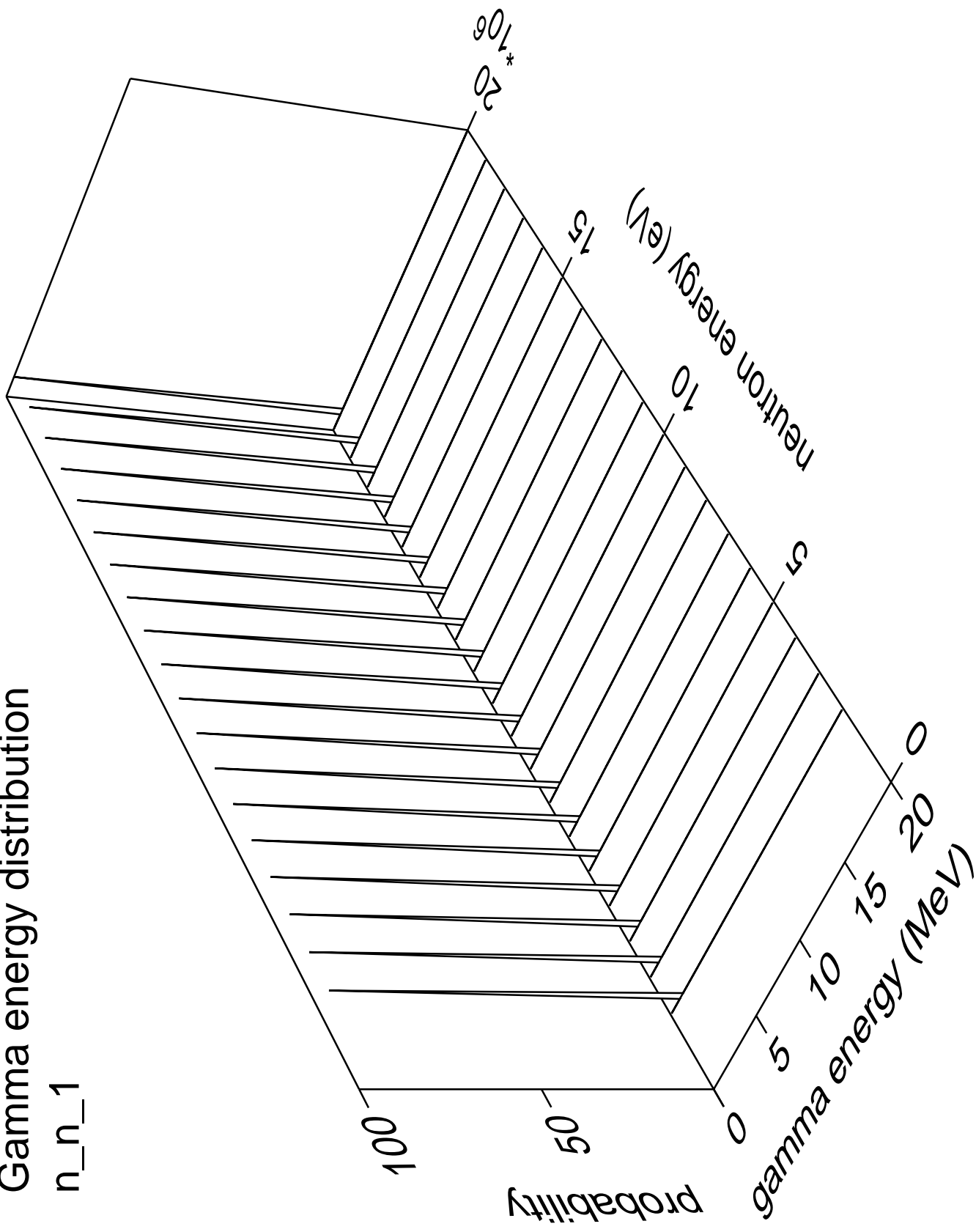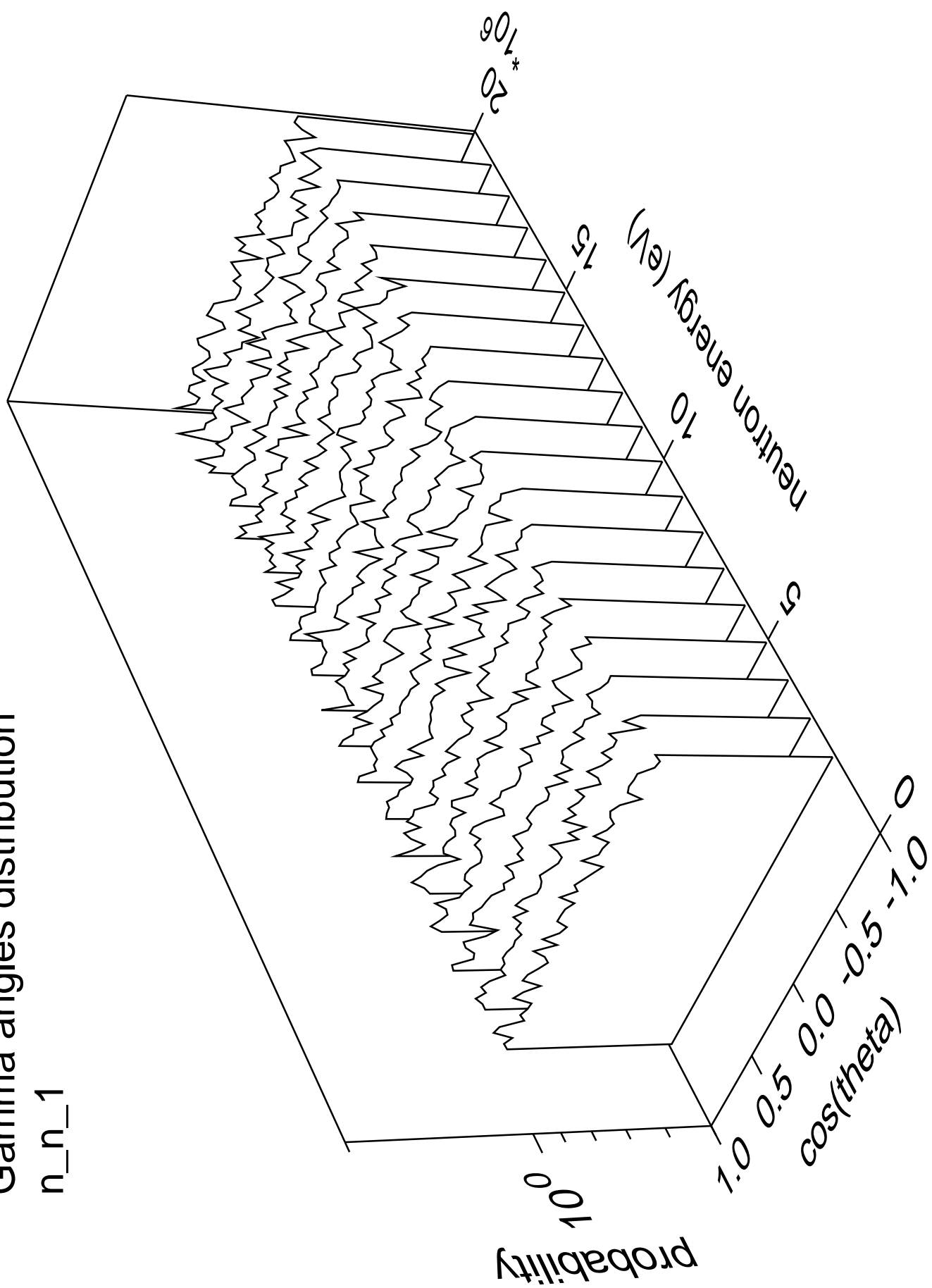
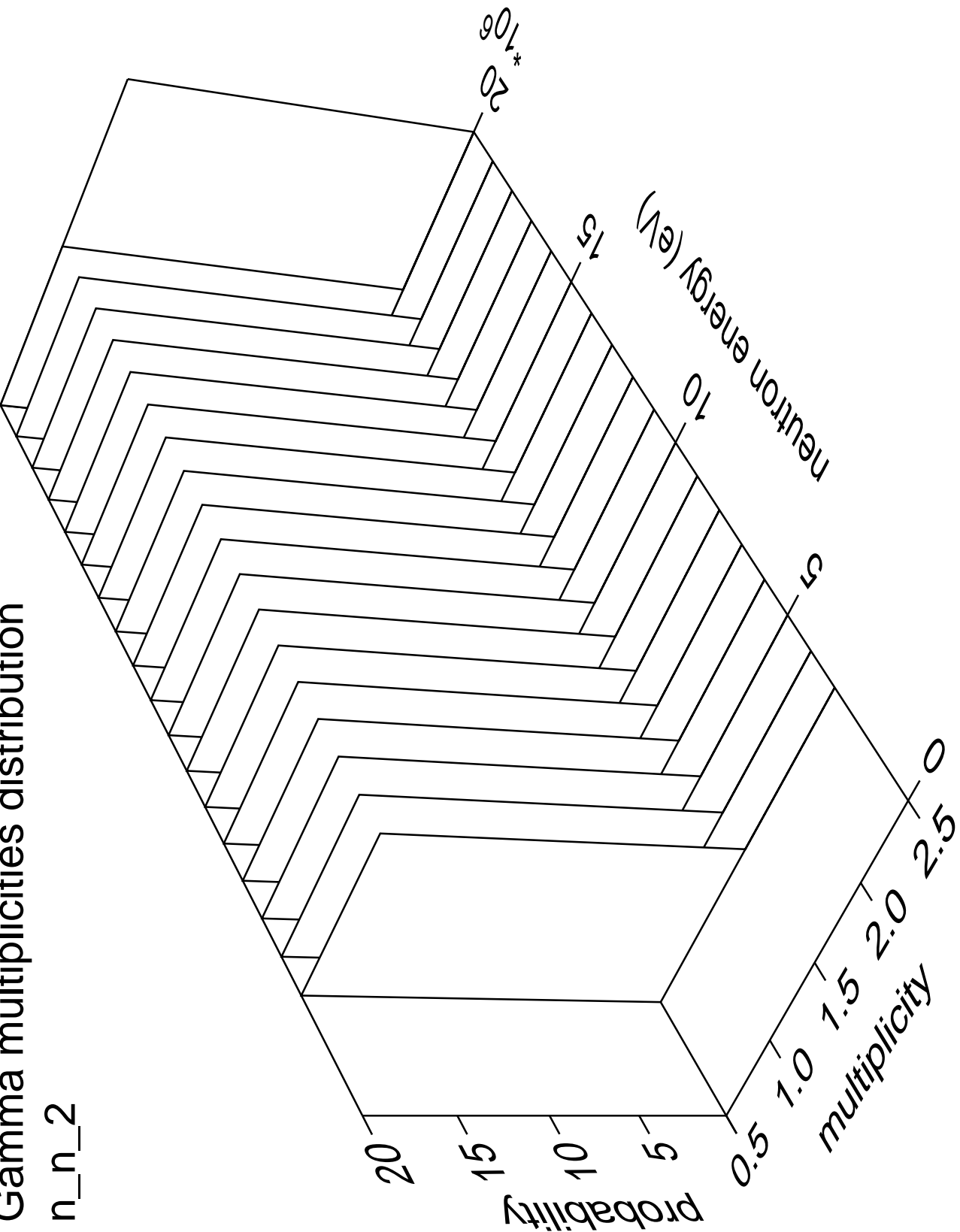Gamma multiplicities distribution
n_n_1

Gamma energy distribution
n_n_2

probability

gamma energy (MeV)

neutron energy (eV)

20 *10⁶

Gamma angles distribution
n_n_2

neutron energy (eV)

cos(theta)

probability
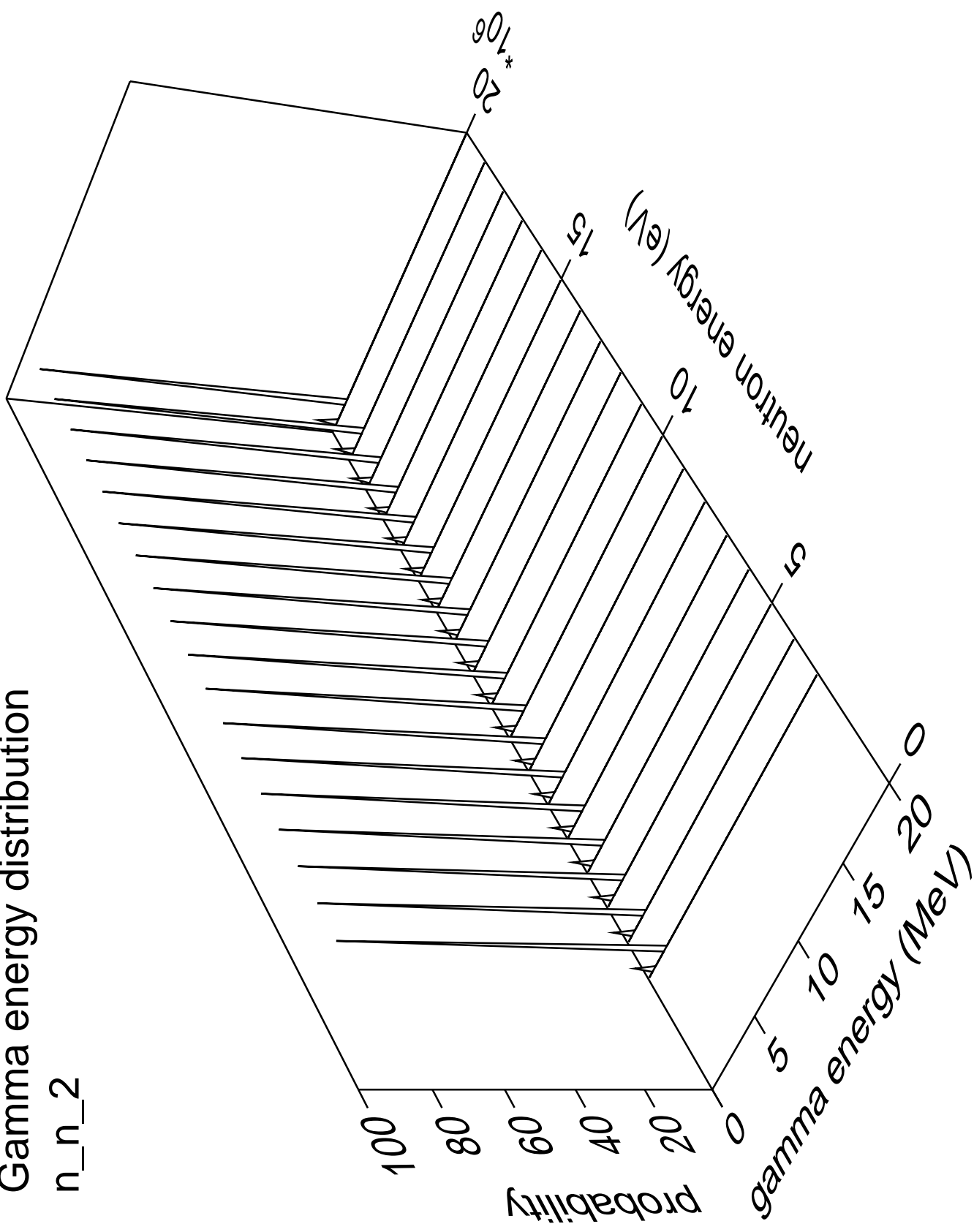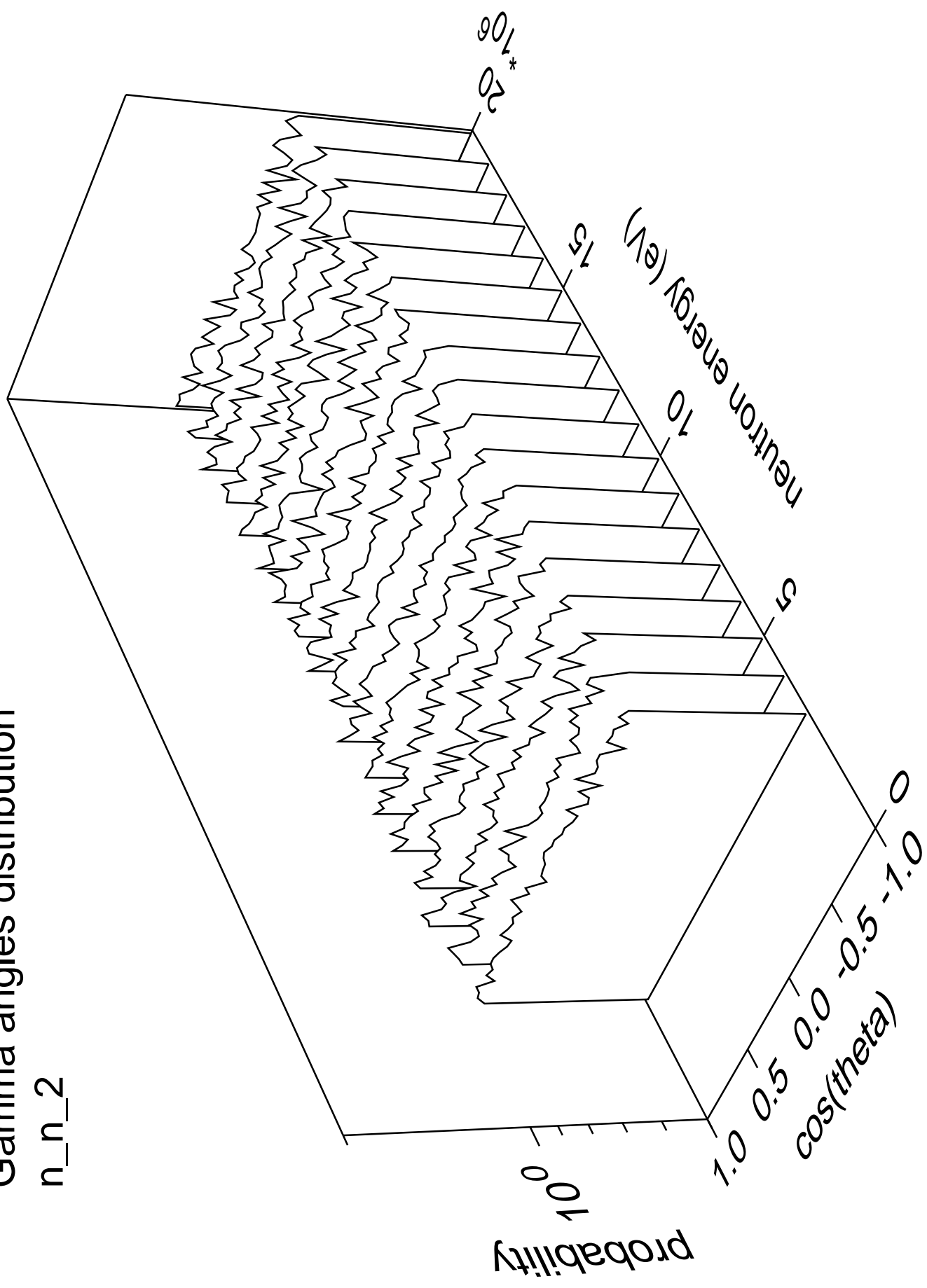
Gamma multiplicities distribution
n_n_2

Gamma energy distribution
n_n_3

neutron energy (eV)

gamma energy (MeV)

probability

20 *10⁶

15

10

5

0

5

10

15

20

0

20

40

60

80

100

Gamma angles distribution
n_n_3

probability

neutron energy (eV)

cos(theta)
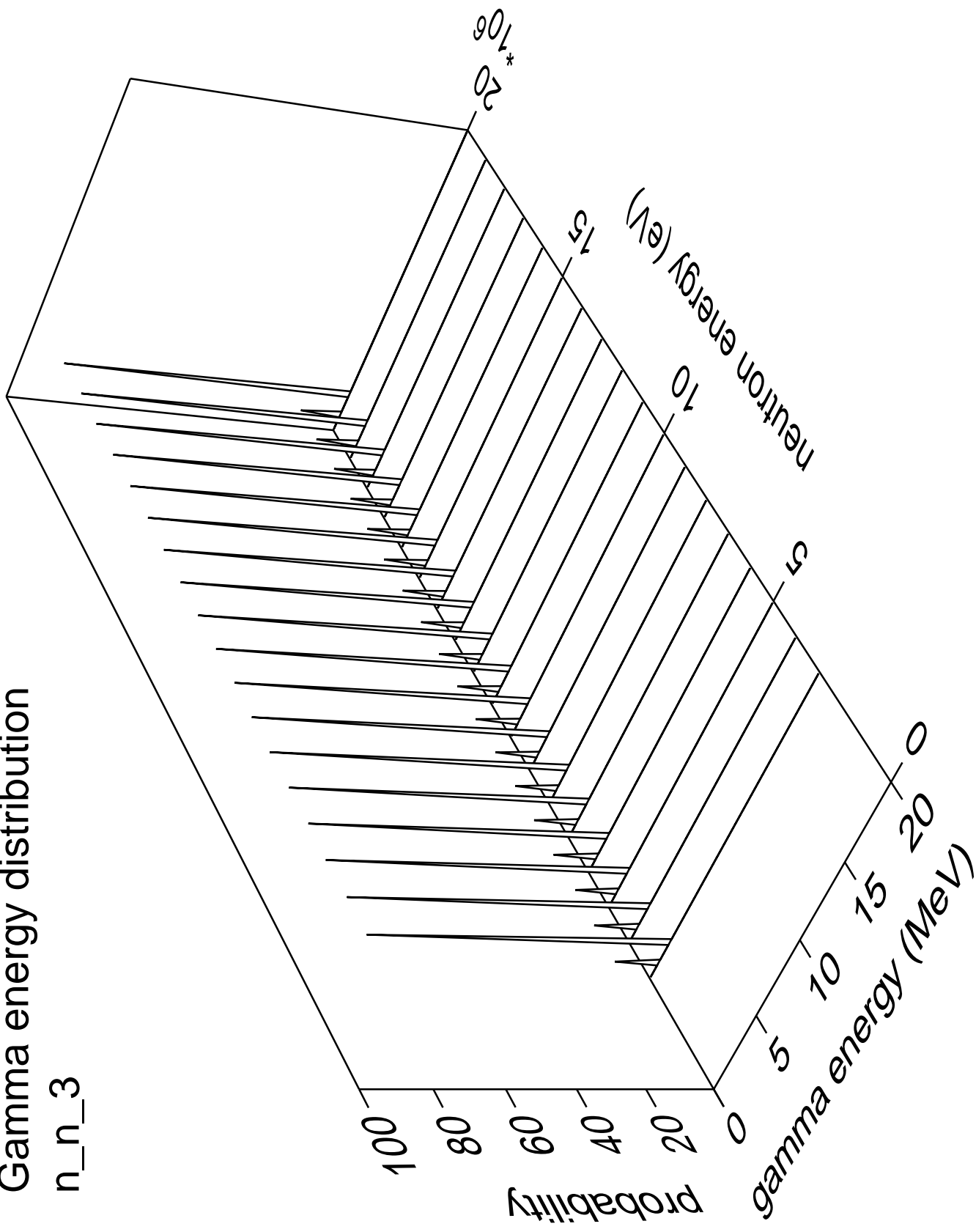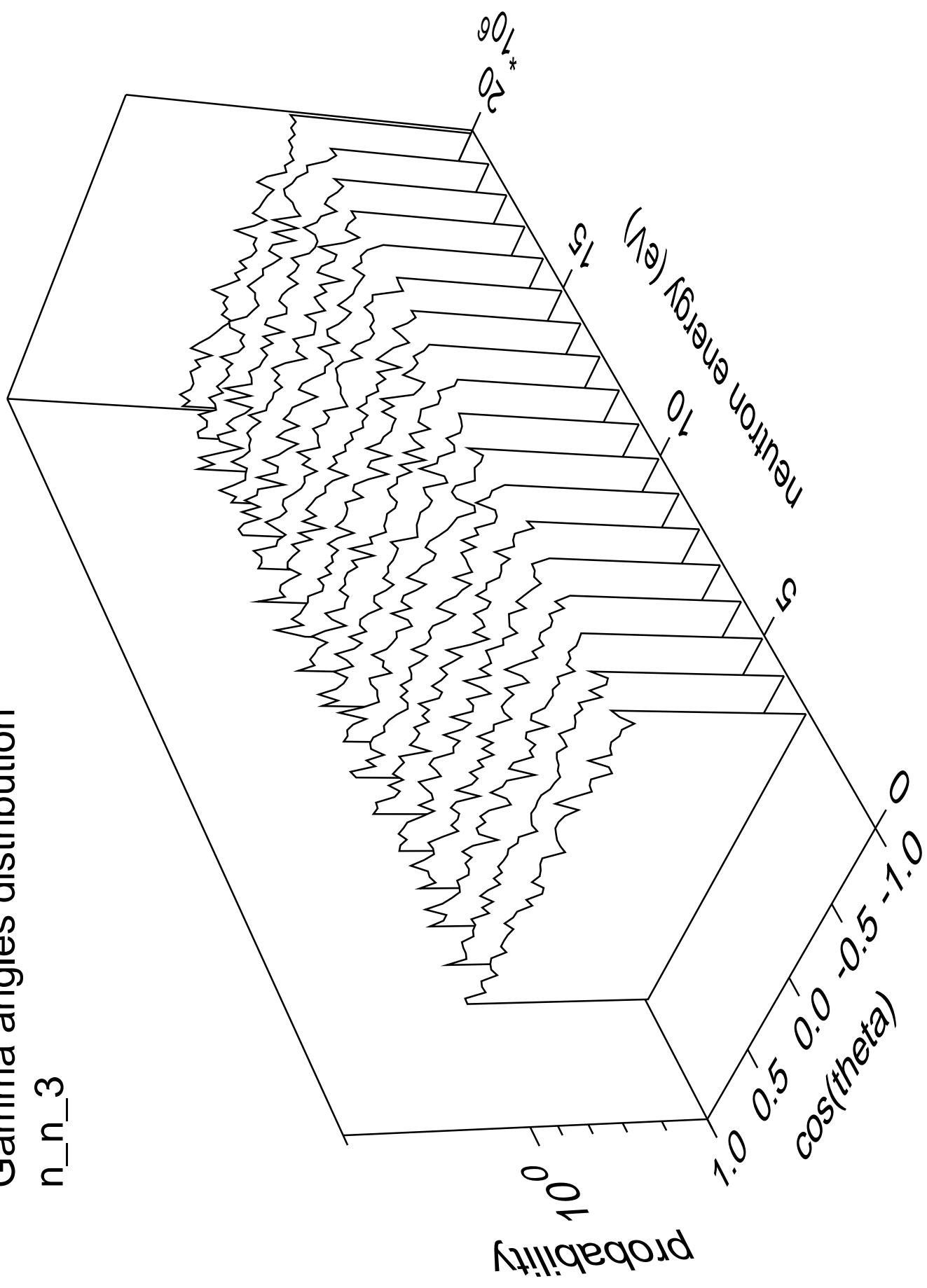
Gamma multiplicities distribution n_n_3

Gamma energy distribution
n_n_4

probability

neutron energy (eV)

gamma energy (MeV)

20 *10^6

15

10

5

0

5

10

15

20

80

60

40

20

0

Gamma angles distribution
n_n_4

probability

neutron energy (eV)

cos(theta)

20 *10^6

15

10

5

0

1.0 0.5 0.0 -0.5 -1.0
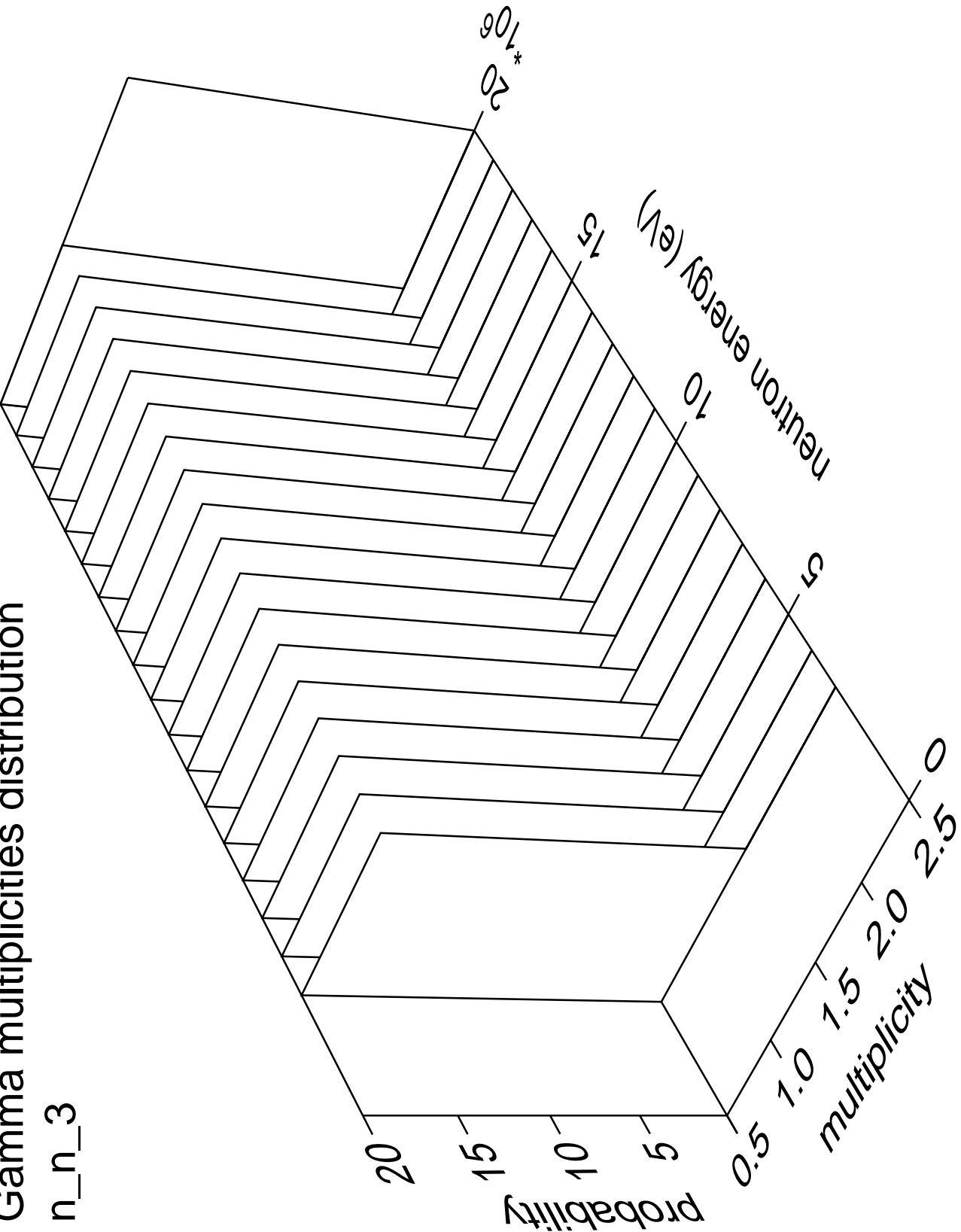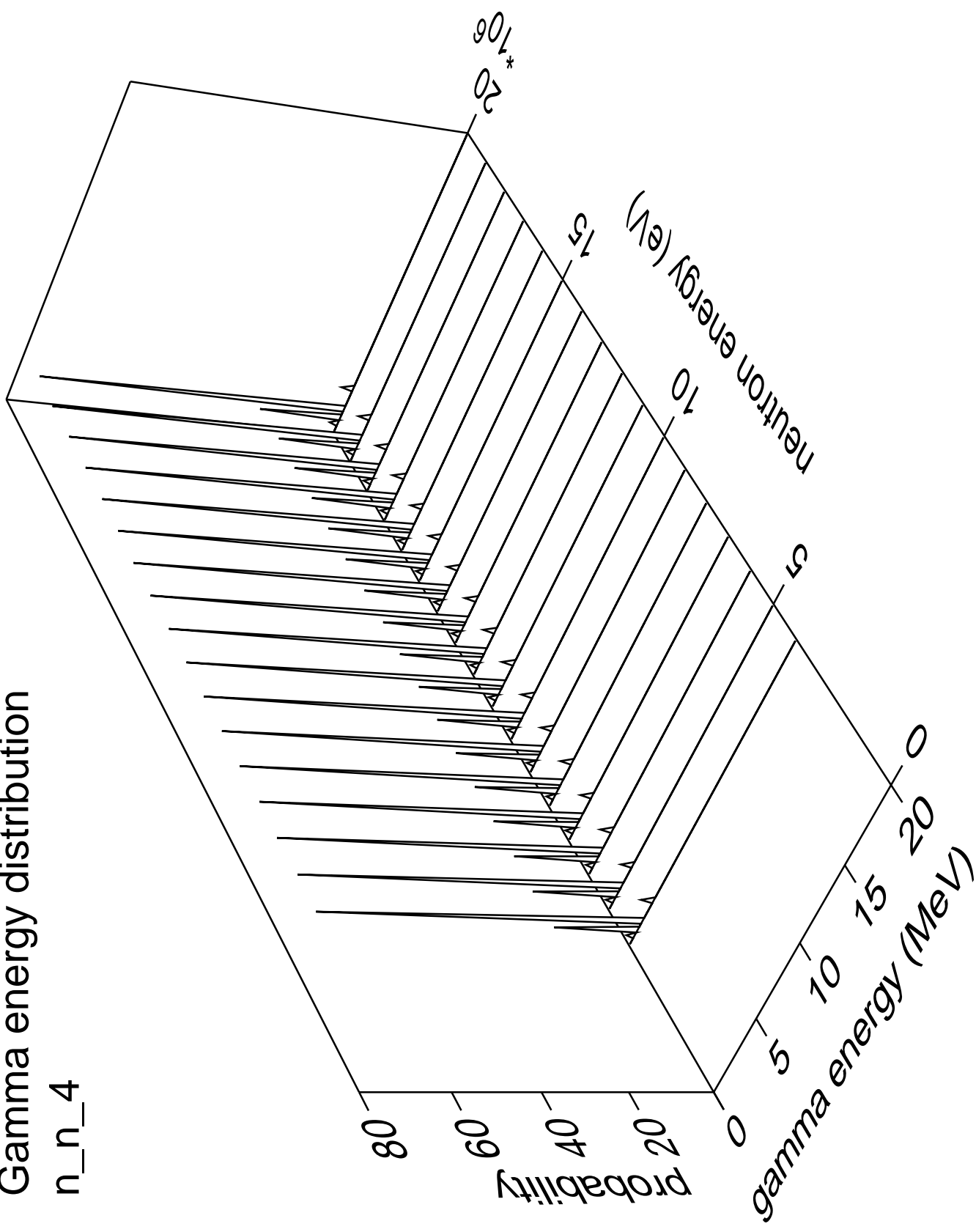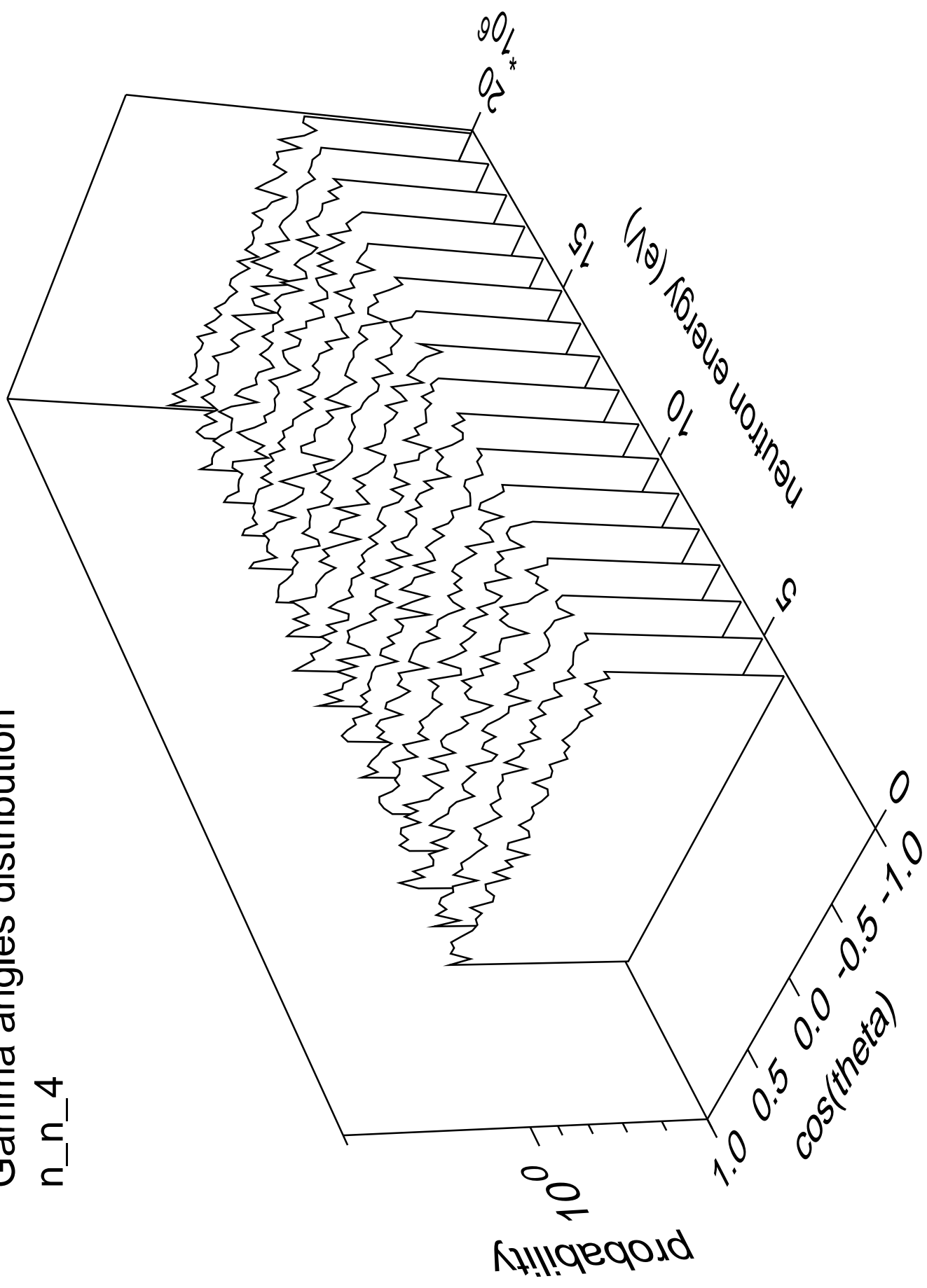
Gamma multiplicities distribution
n_n_4

Gamma energy distribution
n_n_5
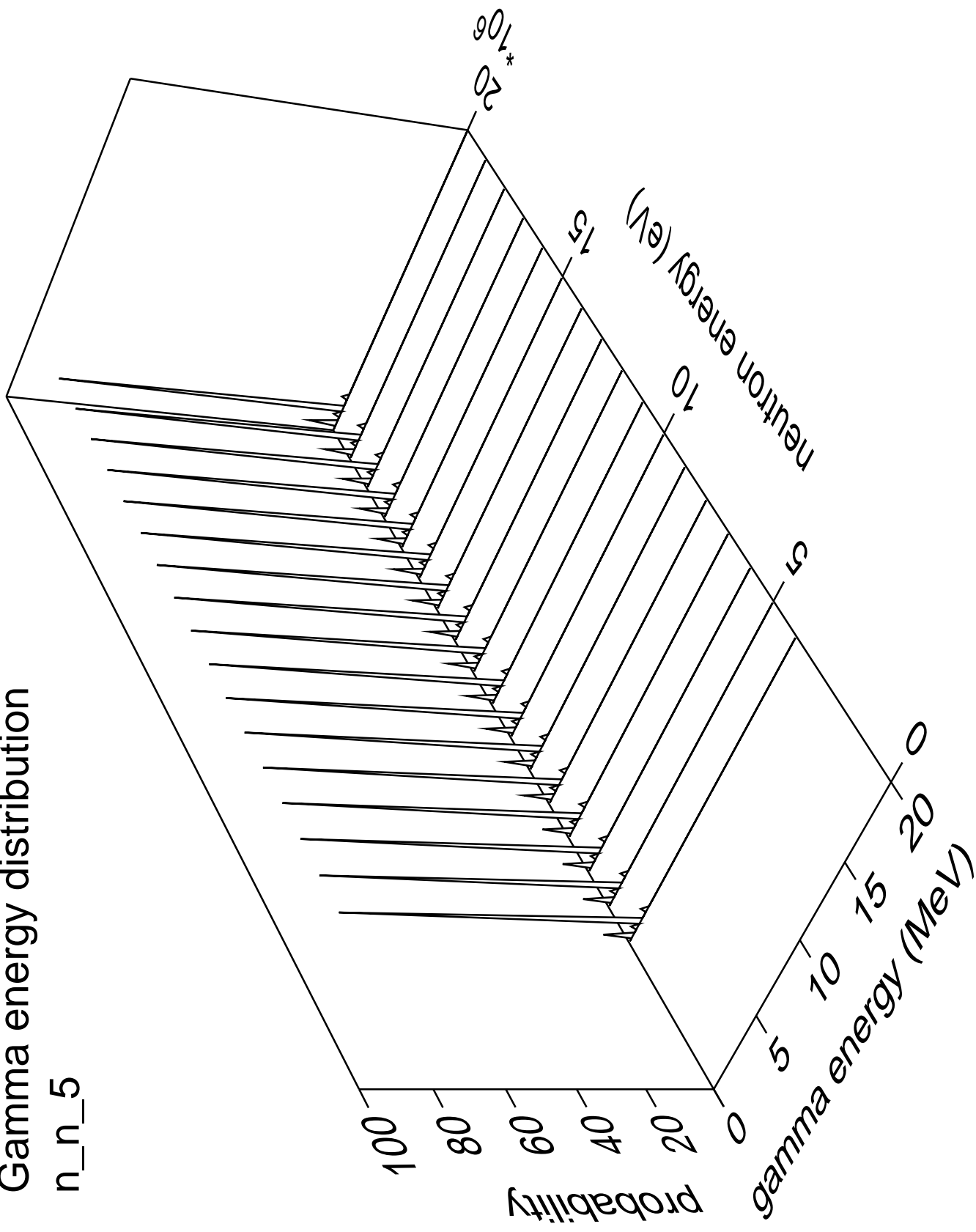
probability

gamma energy (MeV)

neutron energy (eV)

Gamma angles distribution
n_n_5
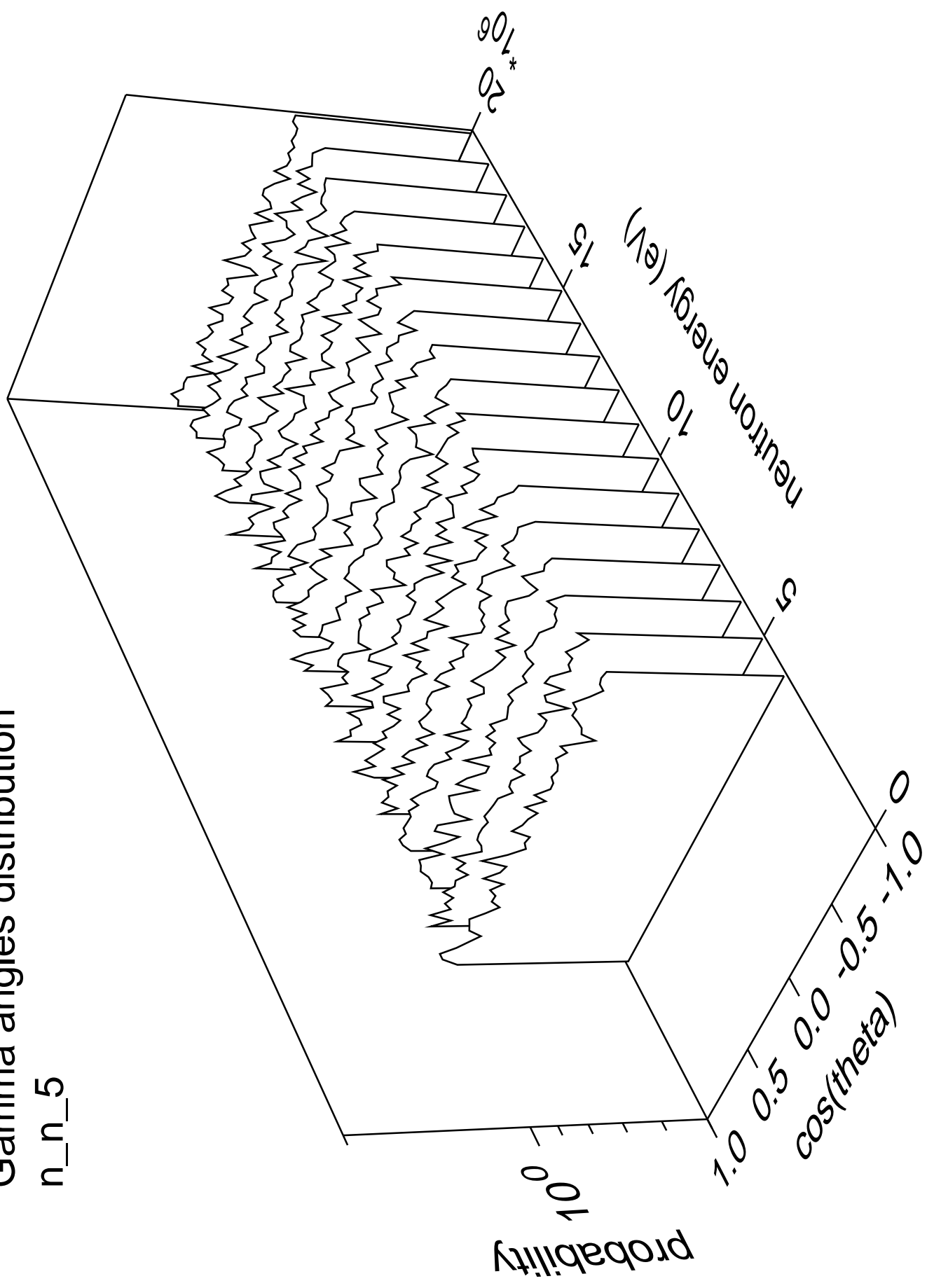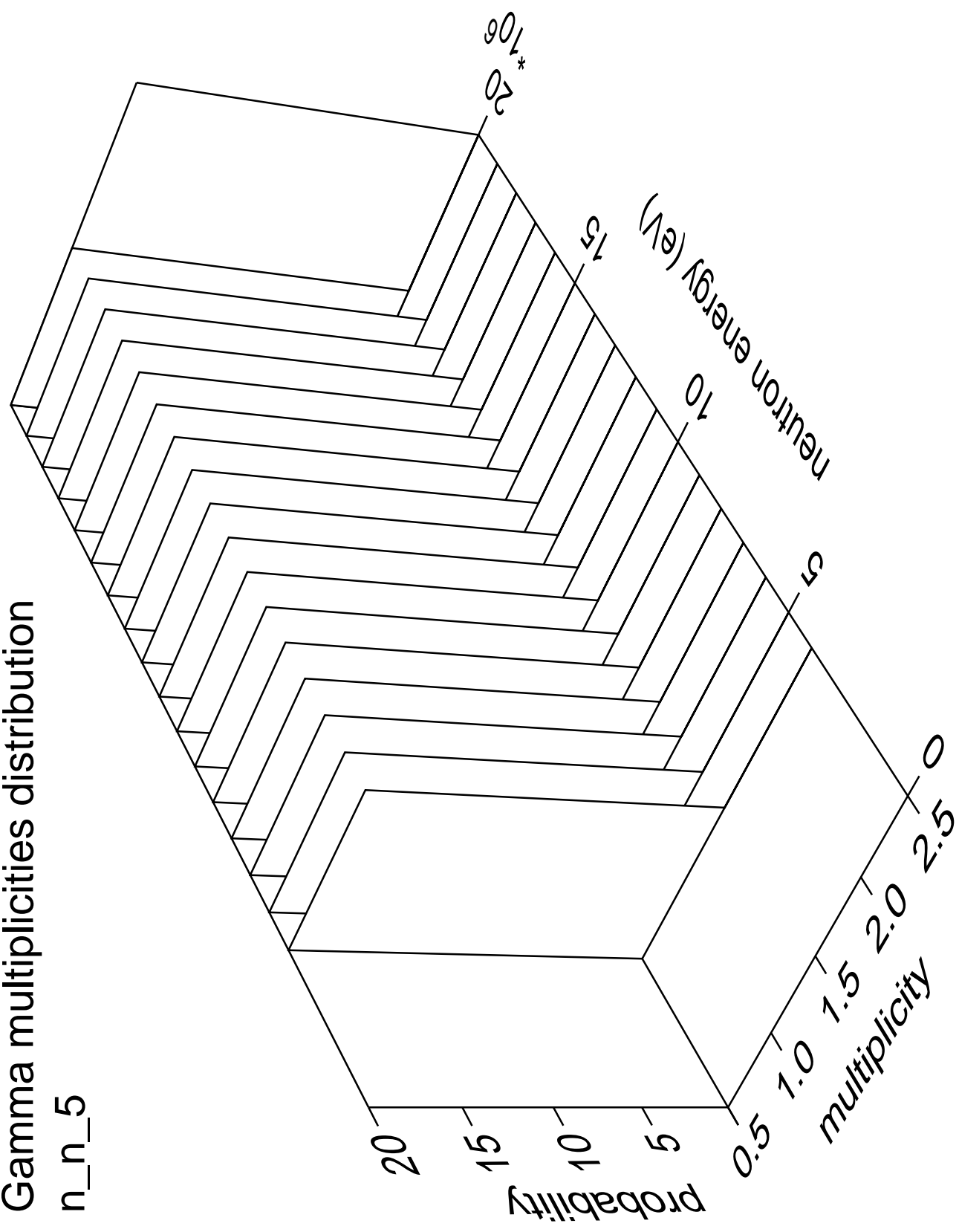
probability

neutron energy (eV)

cos(theta)

20
15
10
5
0

*10⁶

1.0 0.5 0.0 -0.5 -1.0

10⁰

Gamma multiplicities distribution

Gamma energy distribution
n_n_6

probability

neutron energy (eV)

gamma energy (MeV)

20 *10⁶

15

10

5

60

40

20

0   5   10   15   20

Gamma angles distribution
n_n_6

probability

neutron energy (eV)

cos(theta)
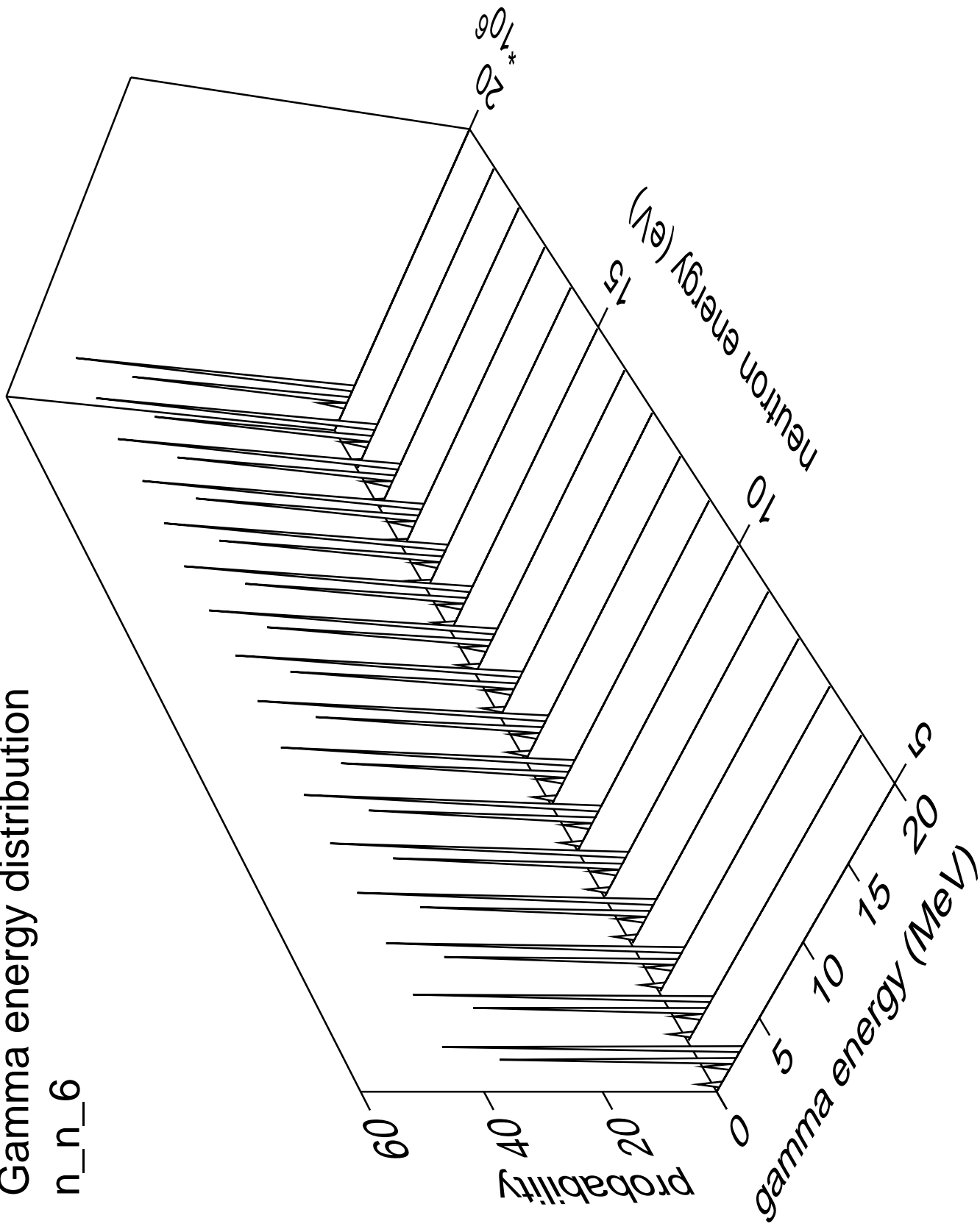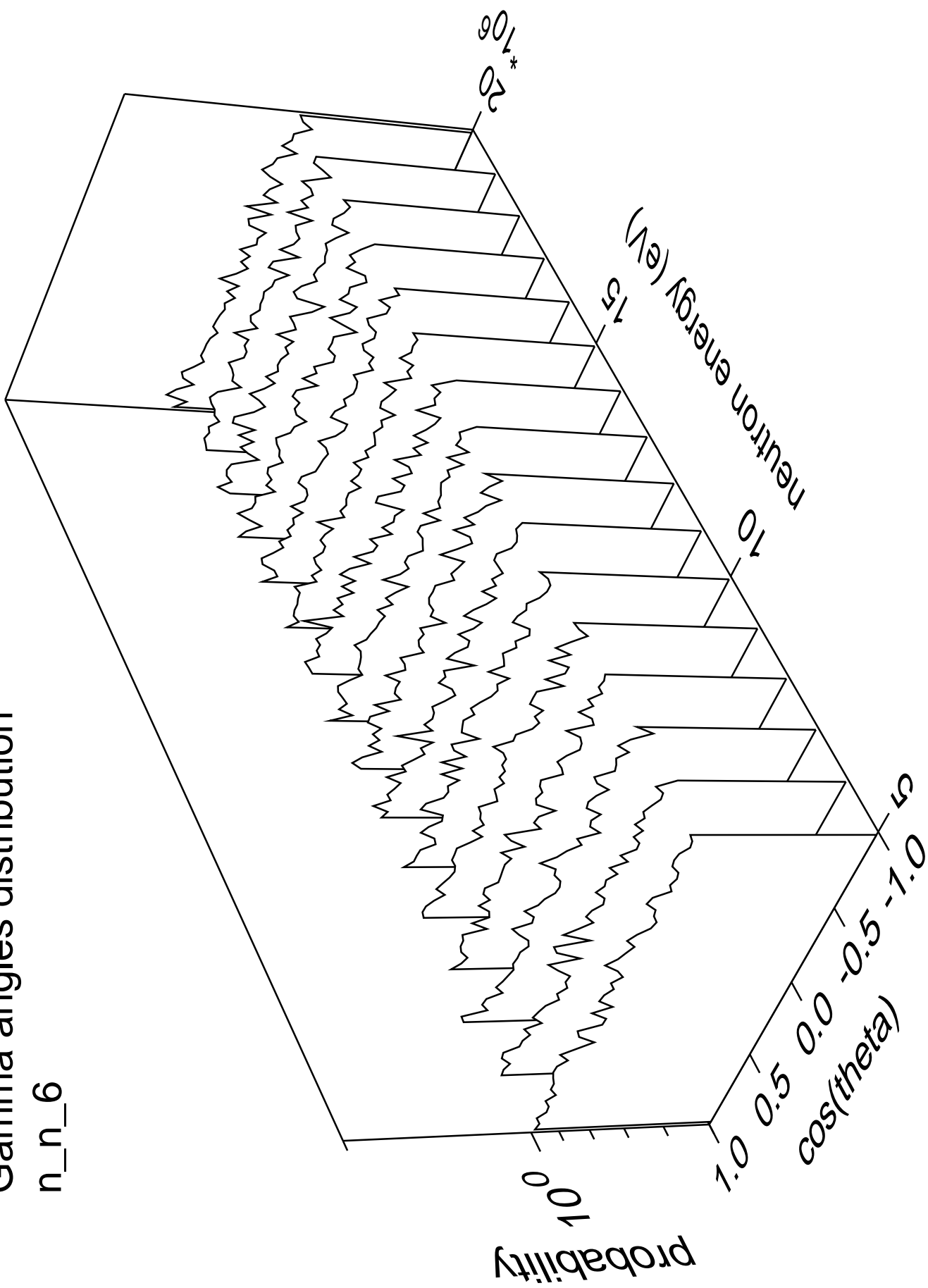
Gamma multiplicities distribution
n_n_6

Gamma energy distribution
n_n_7

probability

neutron energy (eV)

gamma energy (MeV)

20 *10⁶

15

10

5

100 80 60 40 20 0

5 10 15 20

Gamma angles distribution
n_n_7

probability

neutron energy (eV)

cos(theta)

20 *10⁶

15

10

5

1.0 0.5 0.0 -0.5 -1.0
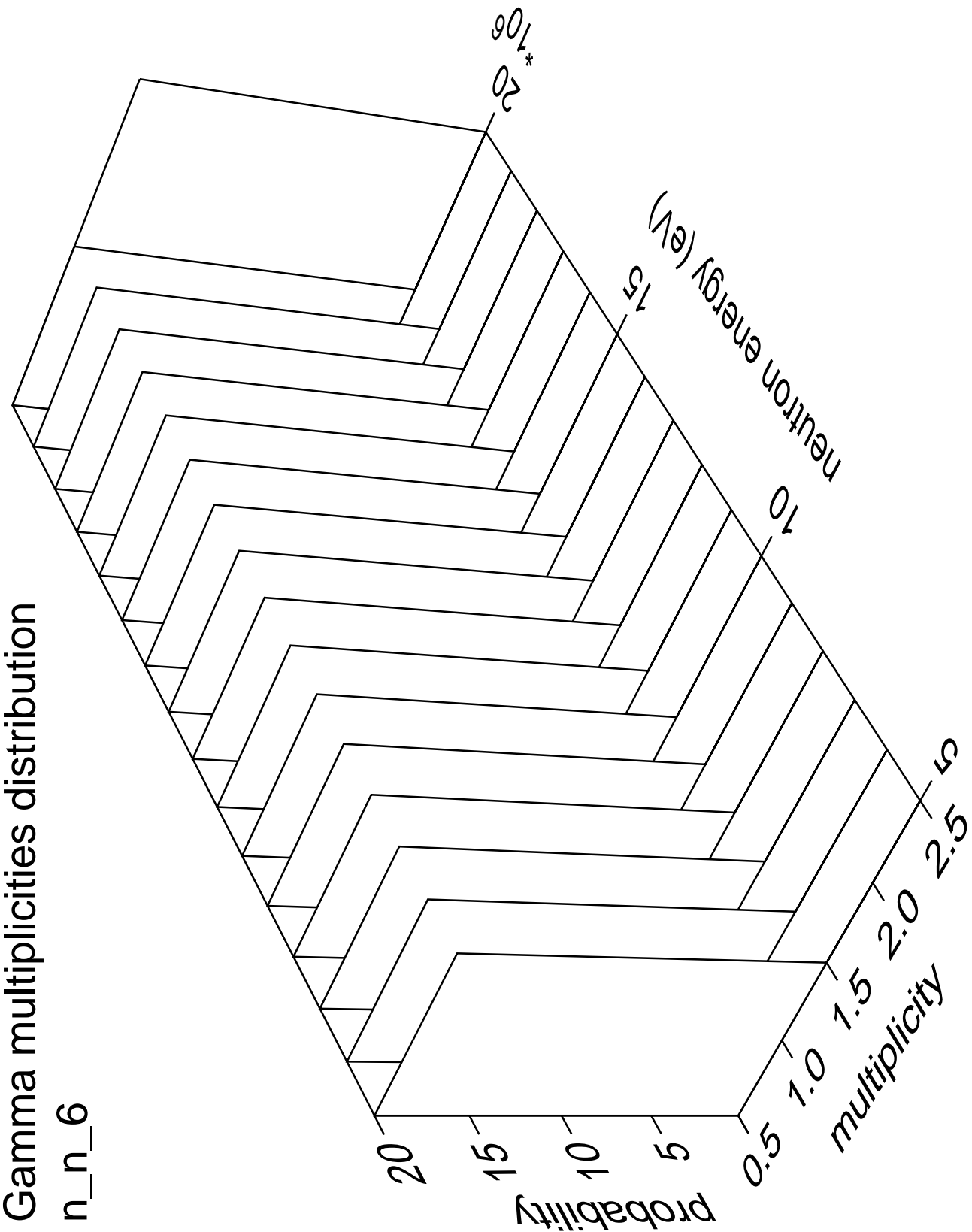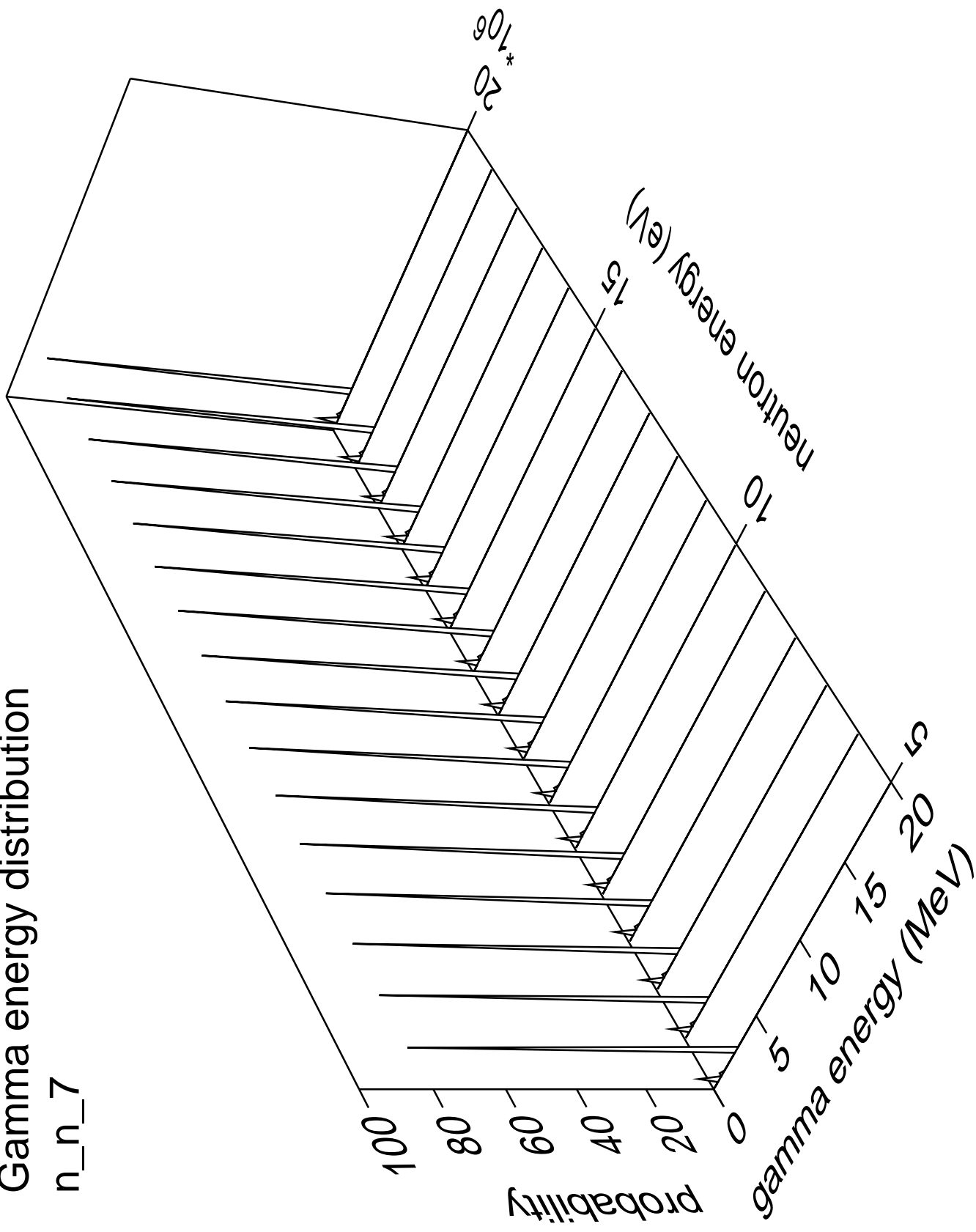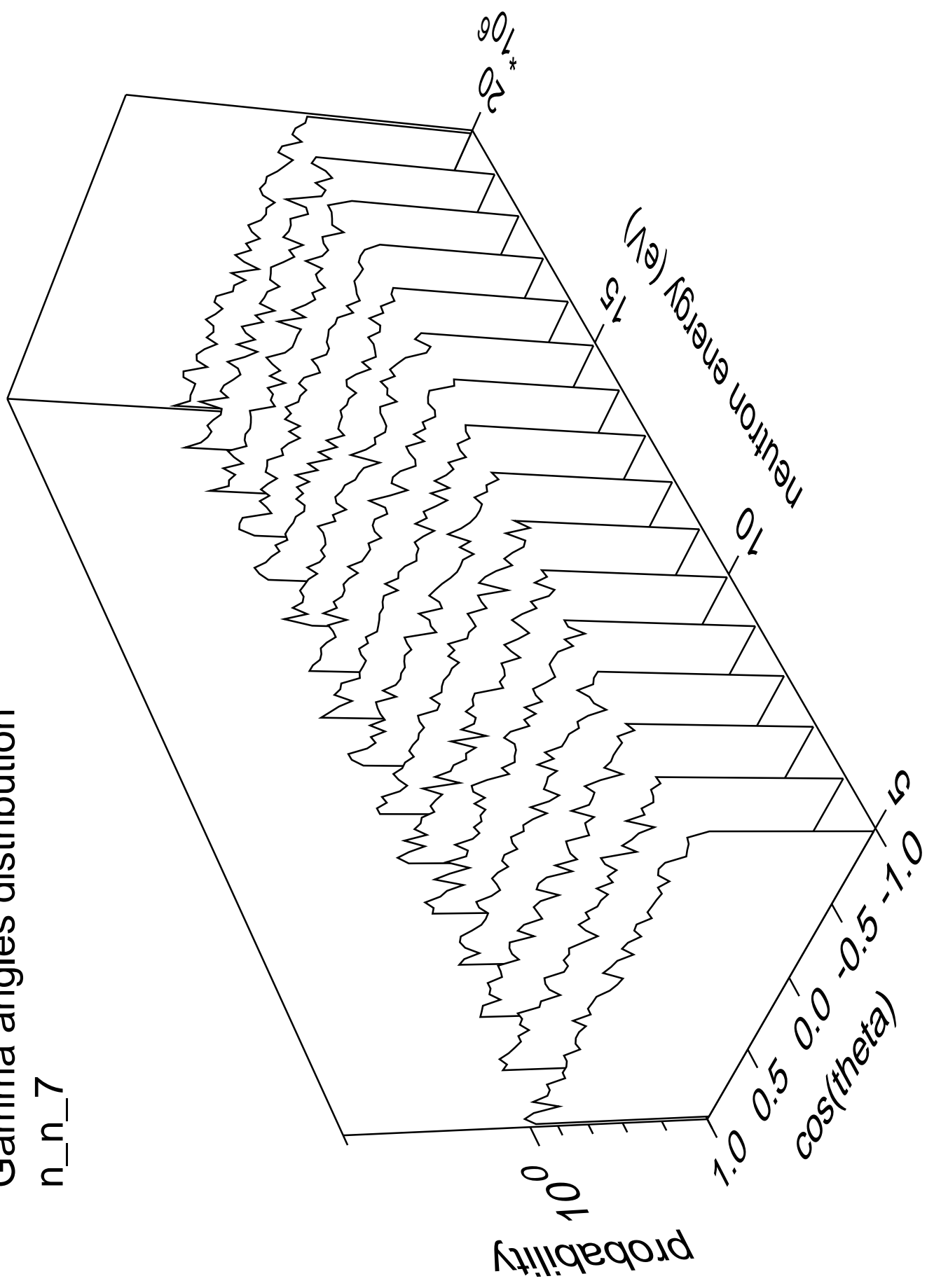
Gamma multiplicities distribution
n_n_7

Gamma energy distribution
n_n_8

probability

neutron energy (eV)

gamma energy (MeV)

20 *10⁶

15

10

5

0

20

40

60

80

100

0

5

10

15

20

Gamma angles distribution
n_n_8

probability

neutron energy (eV)

cos(theta)

20 *10⁶

15

10

5
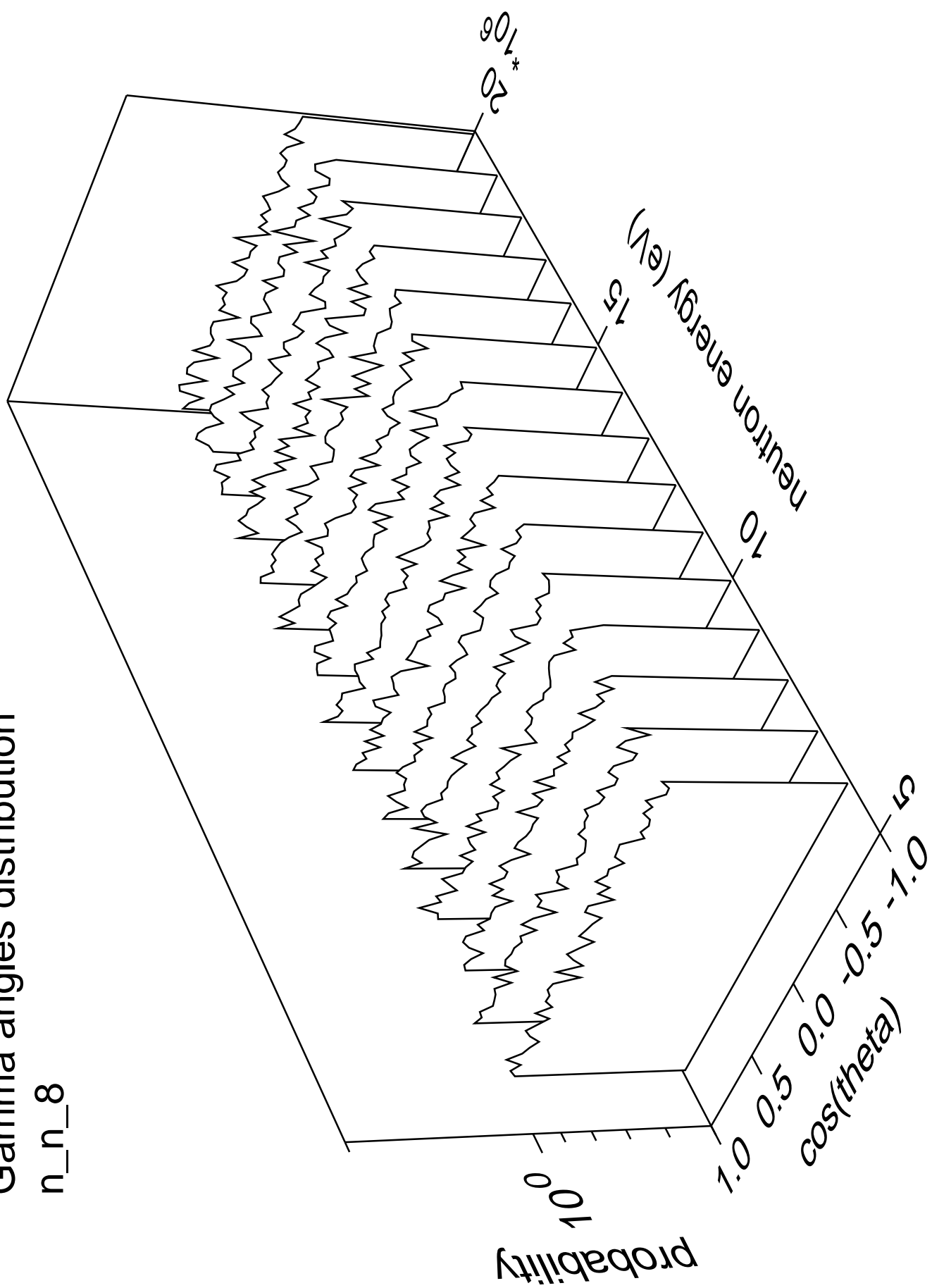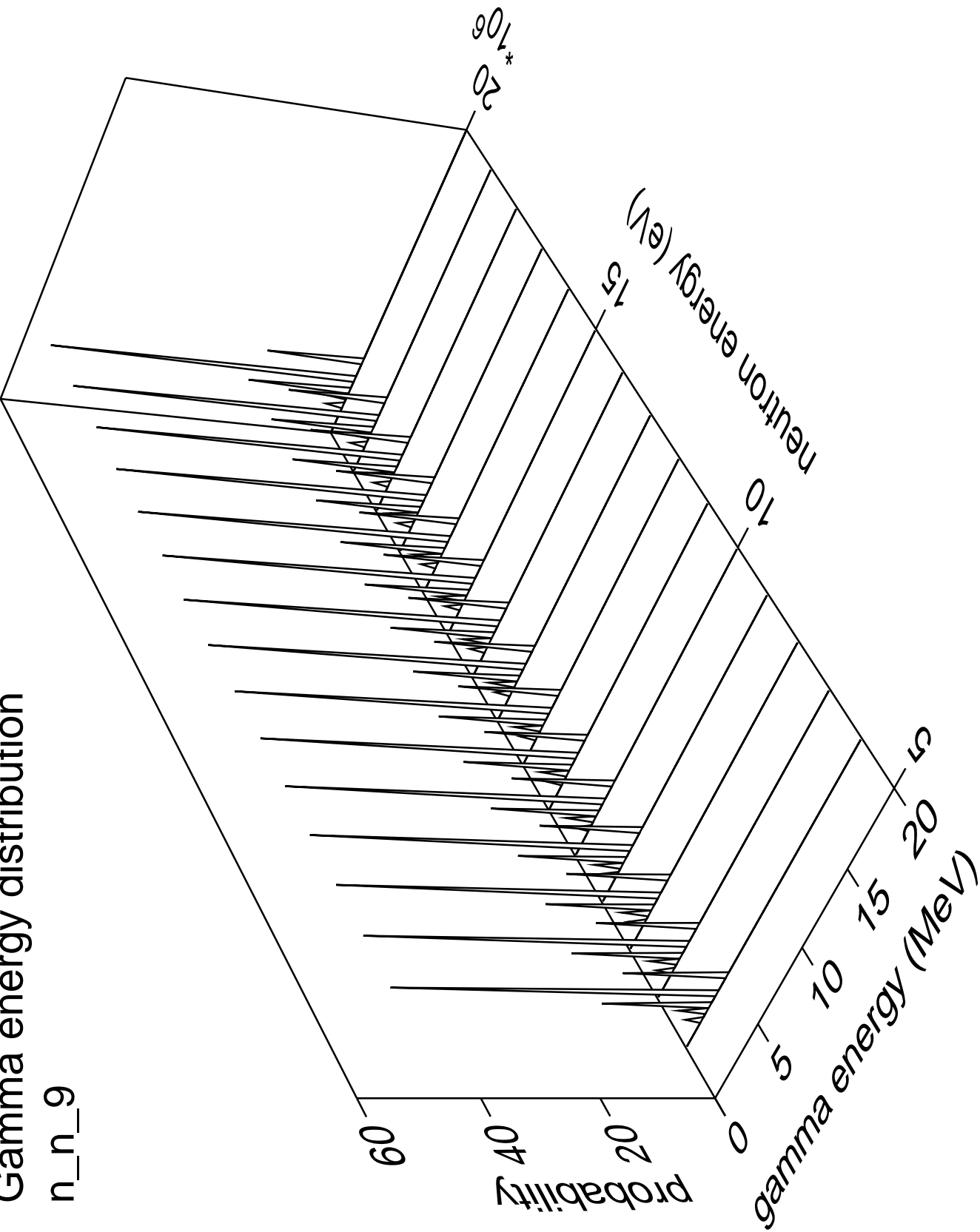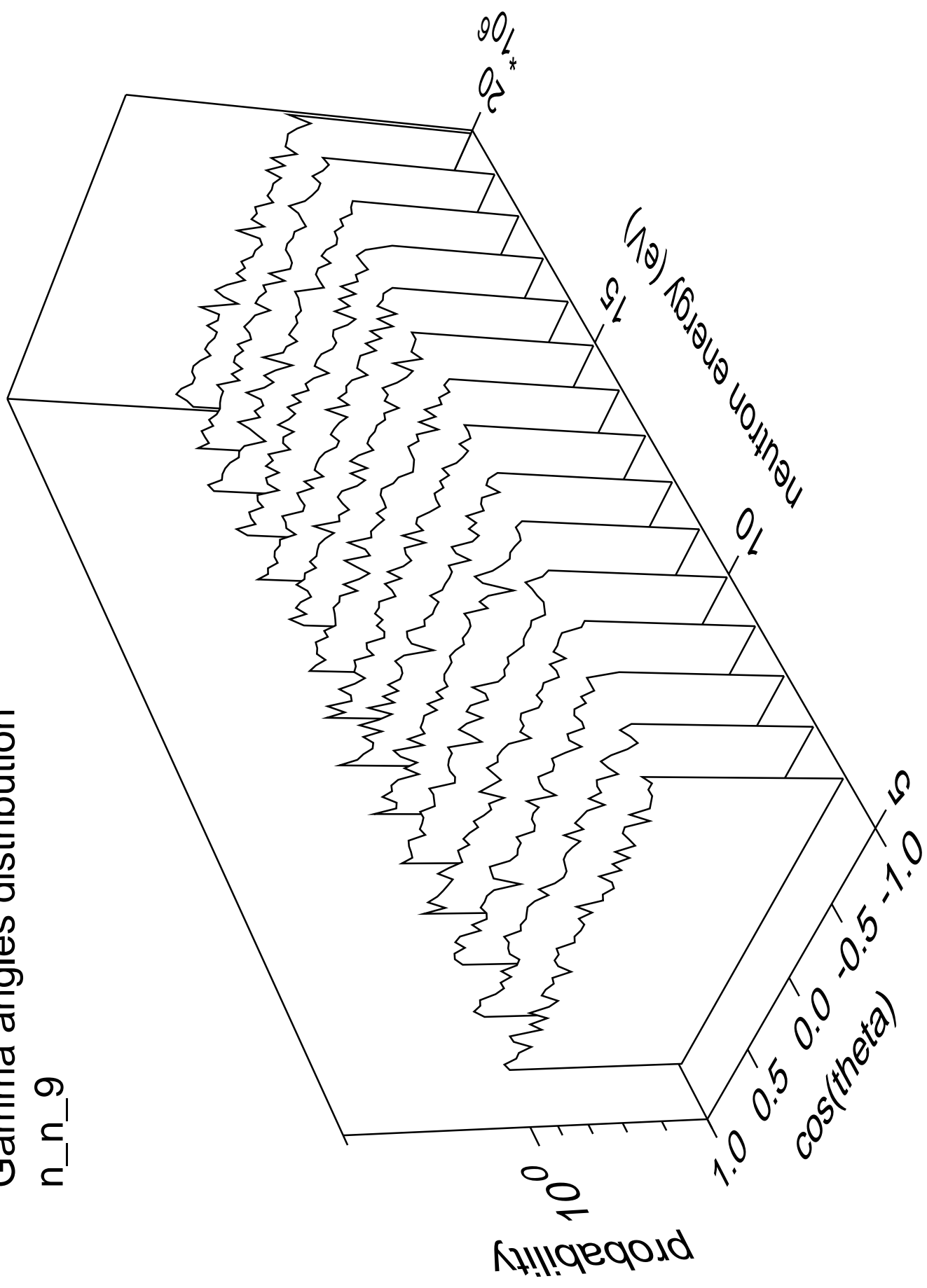
1.0 0.5 0.0 -0.5 -1.0
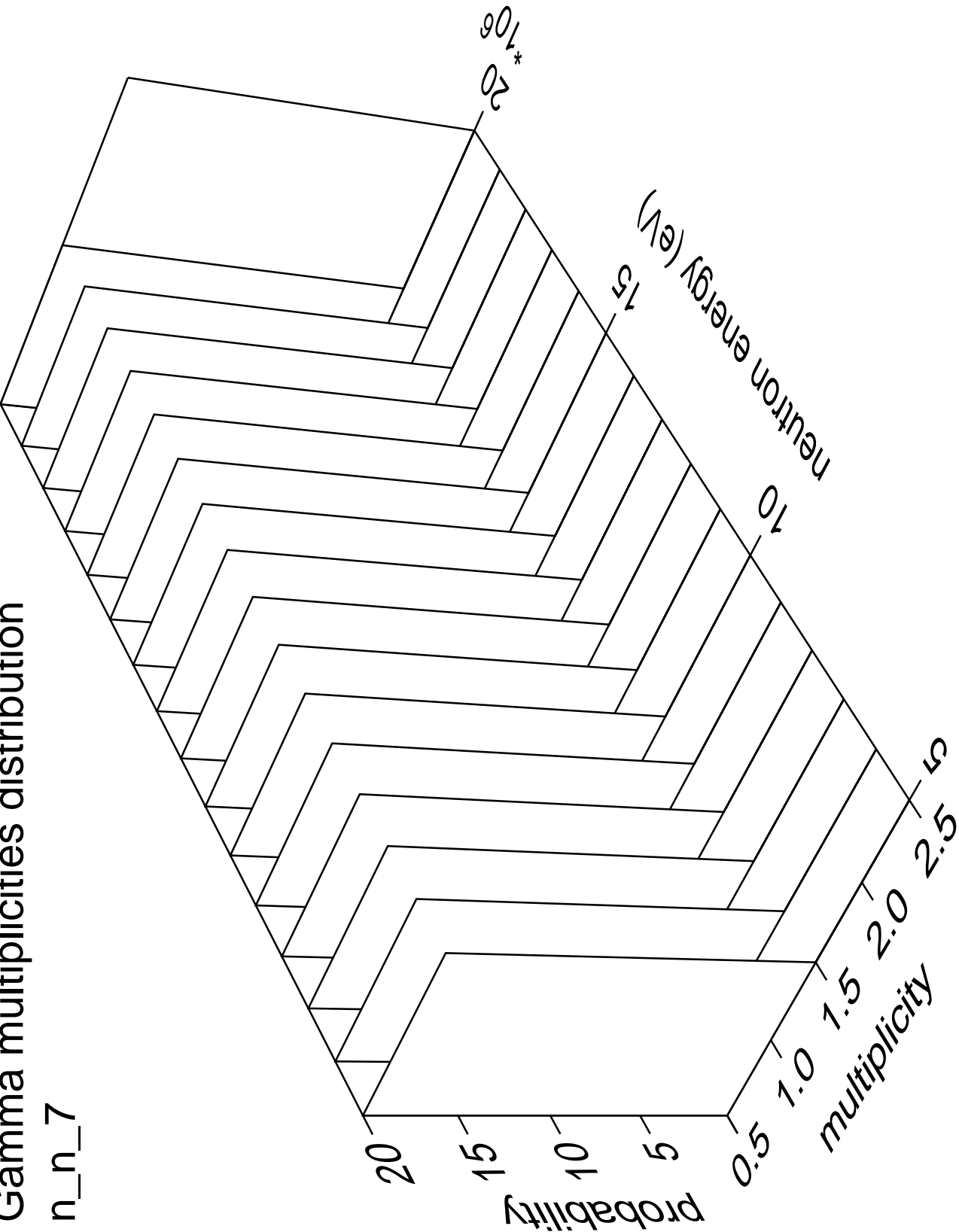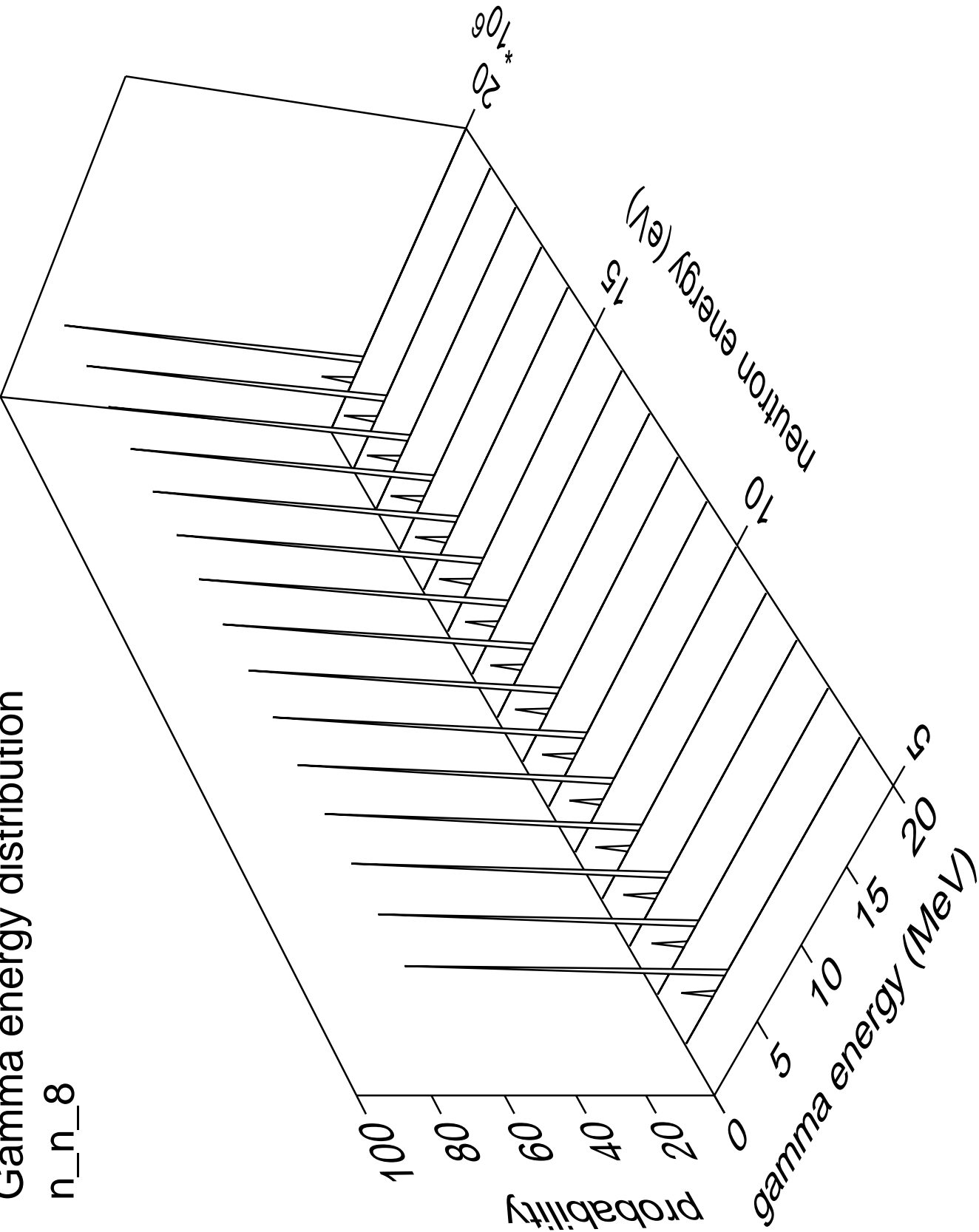
Gamma multiplicities distribution
n_n_8
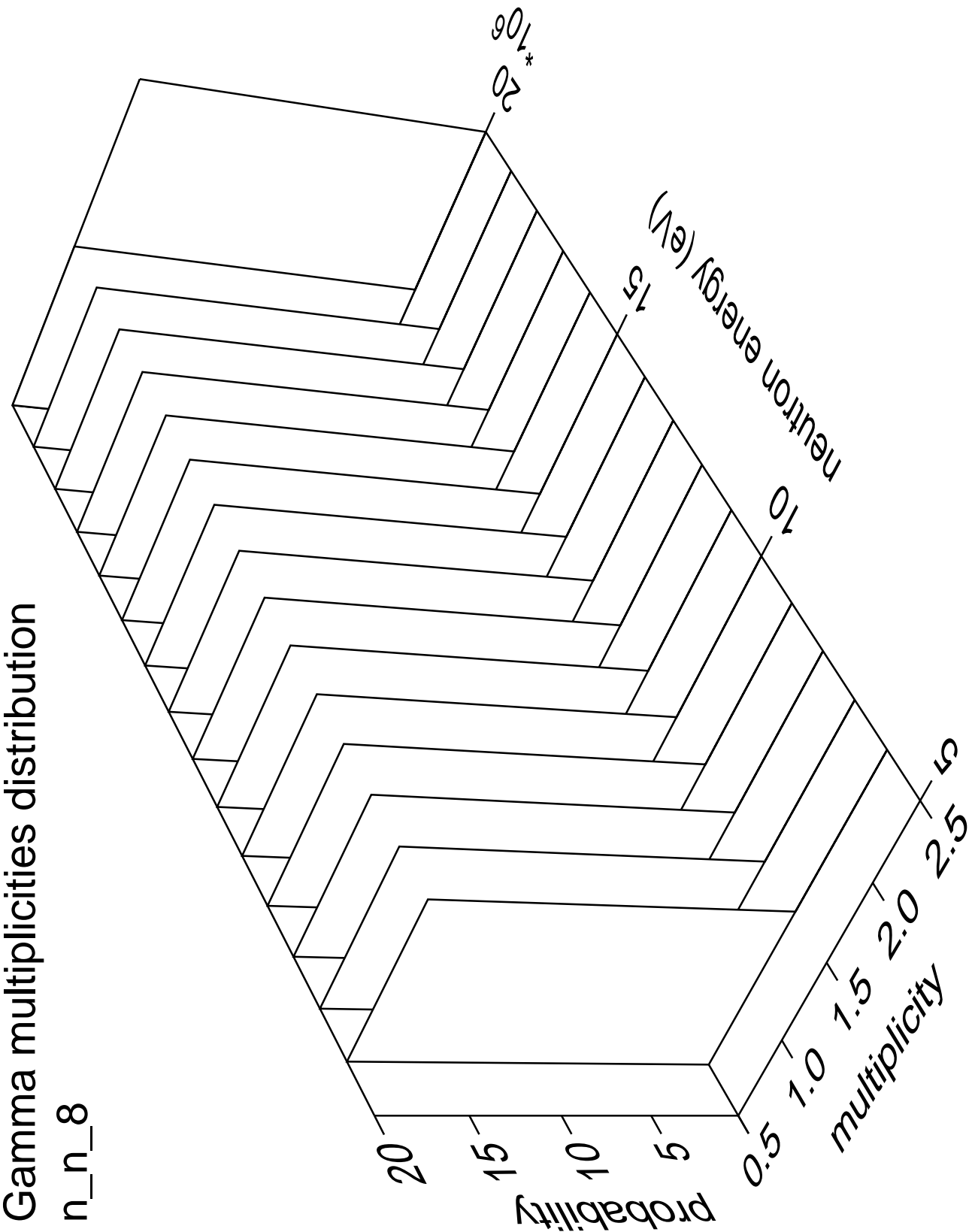
Gamma energy distribution
n_n_9

Gamma angles distribution
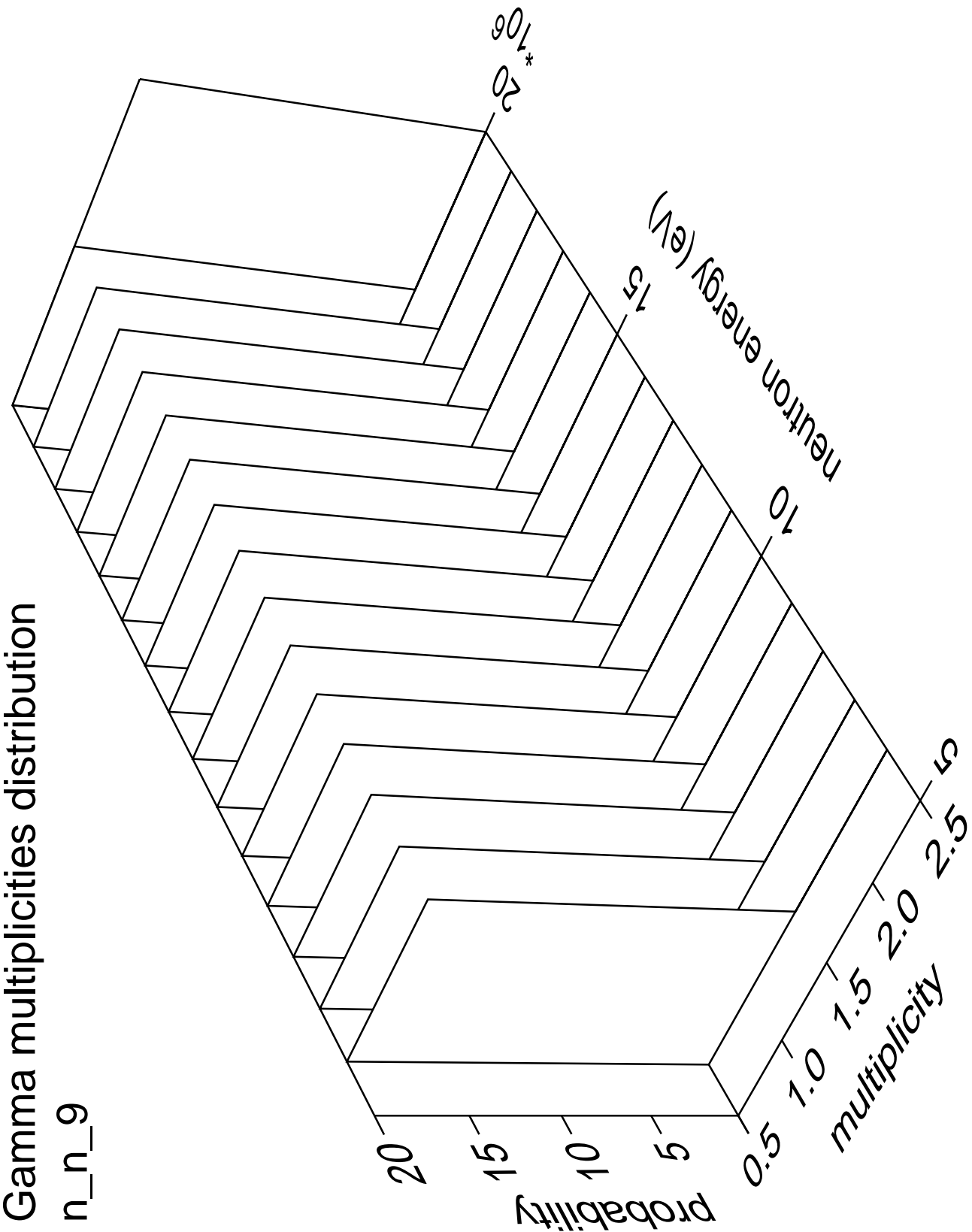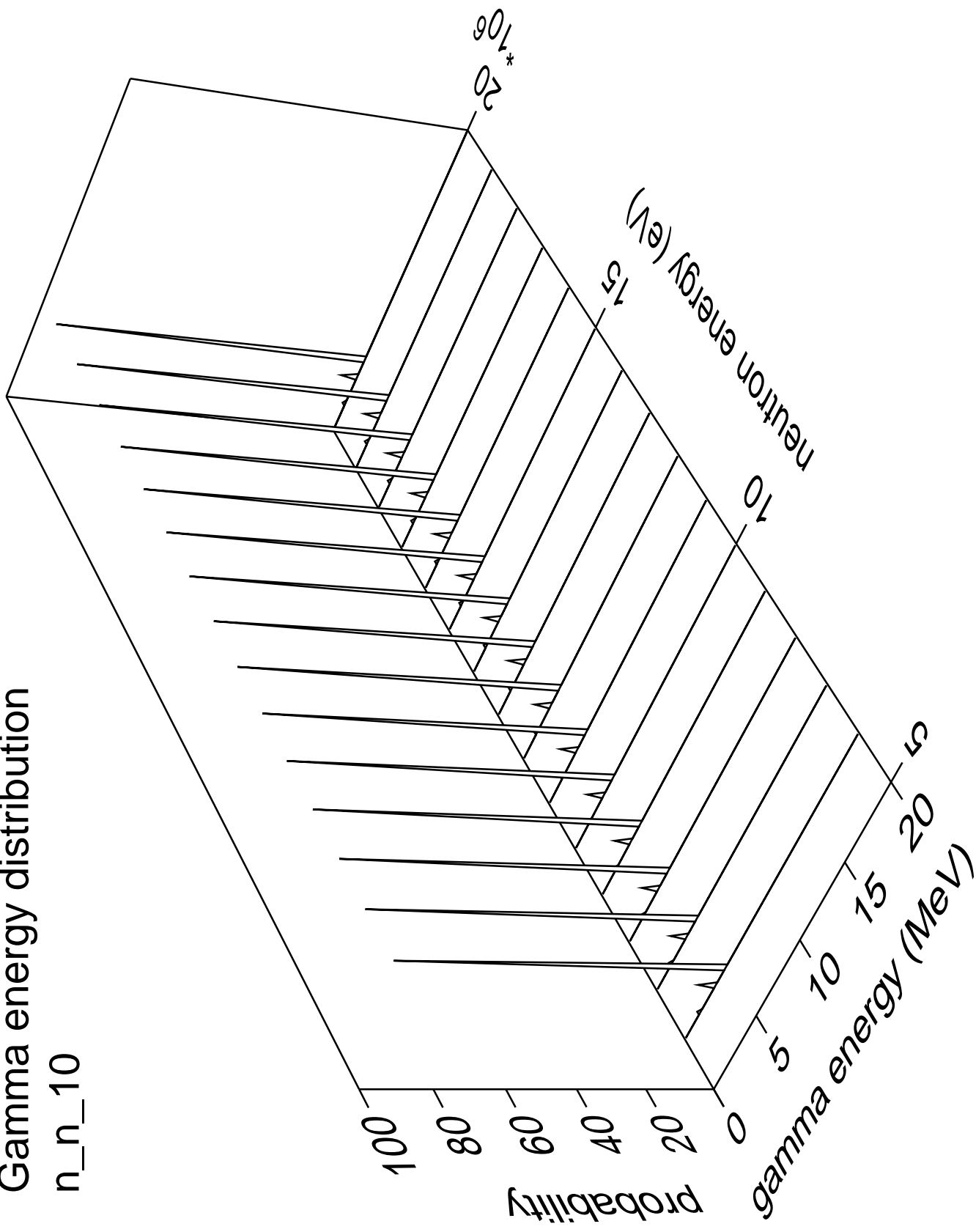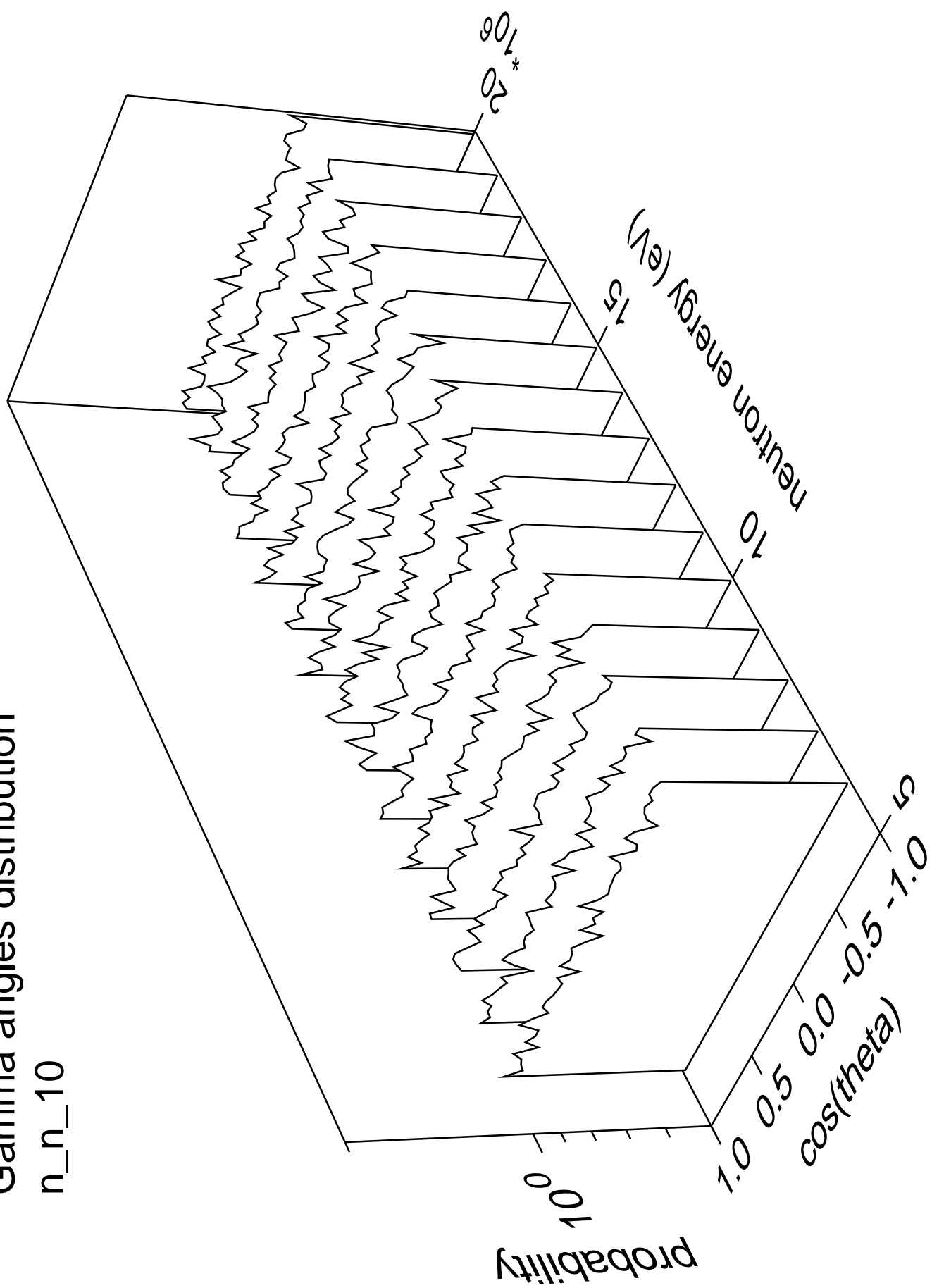n_n_9

Gamma multiplicities distribution
n_n_9

Gamma energy distribution
n_n_10

probability

gamma energy (MeV)

neutron energy (eV)

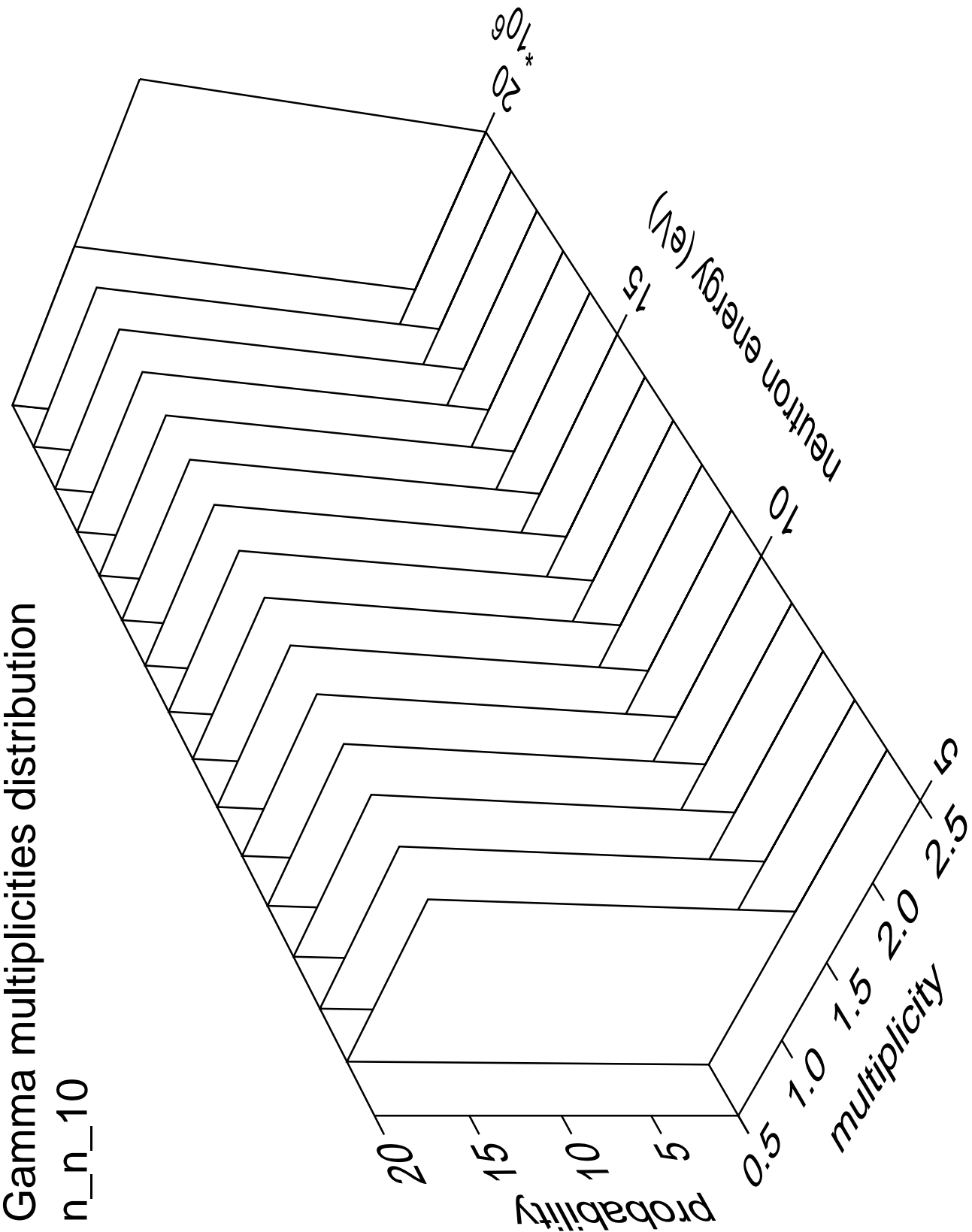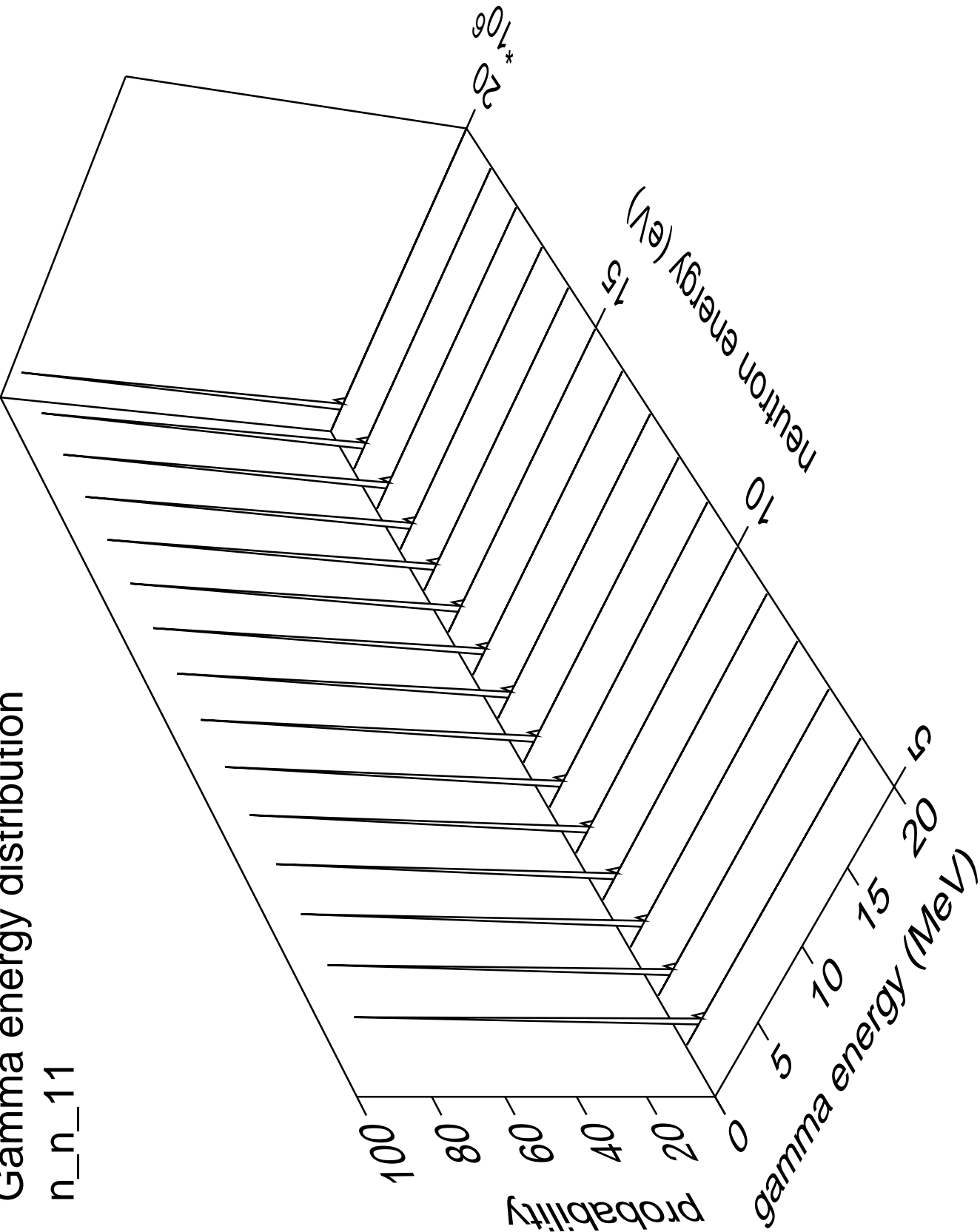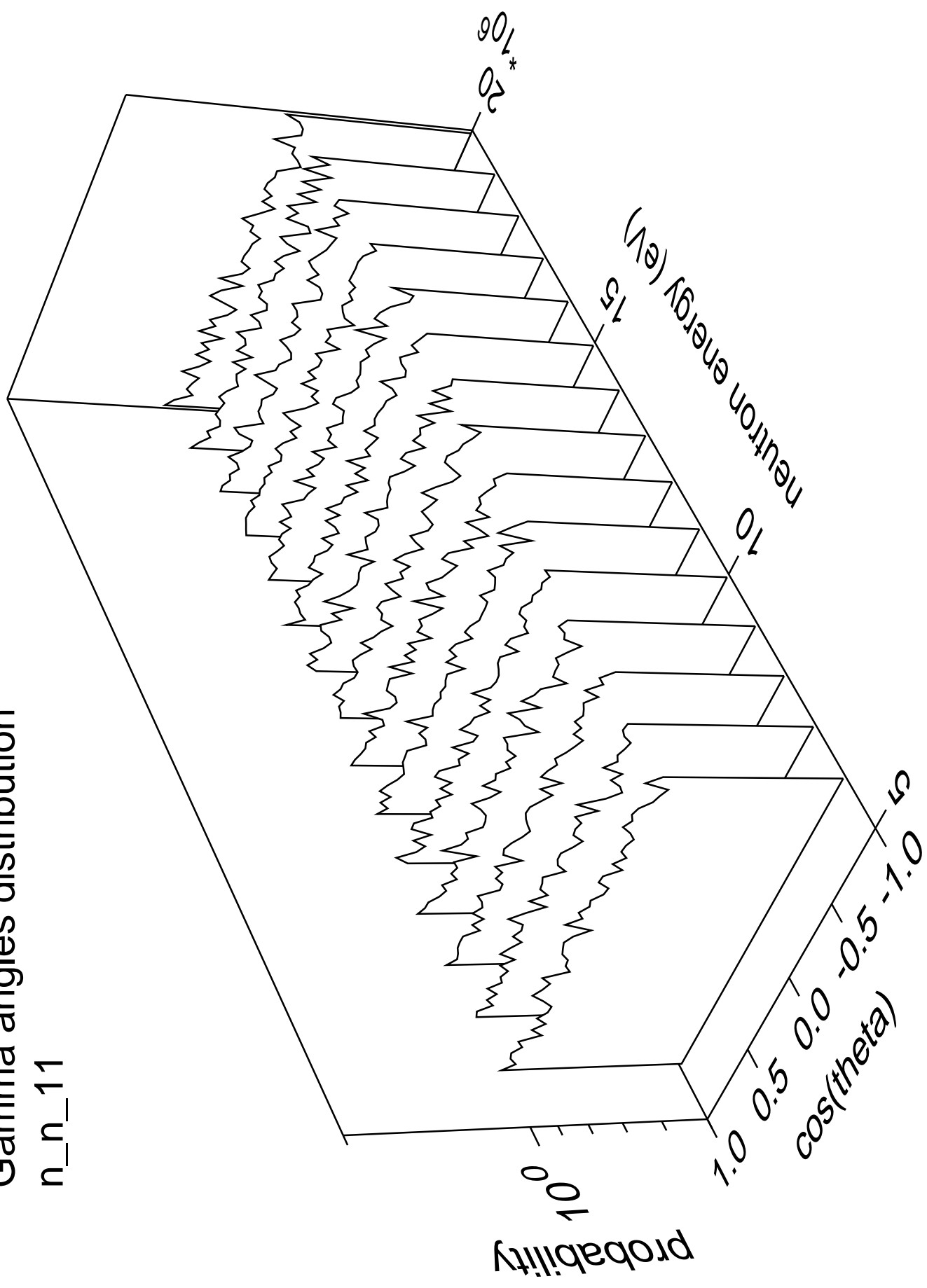20 *10⁶

15

10

5

0   5   10   15   20

100 80 60 40 20

Gamma angles distribution
n_n_10

Gamma multiplicities distribution
n_n_10

Gamma energy distribution
n_n_11

probability

neutron energy (eV)

gamma energy (MeV)

20 *10⁶

15

10

5

100
80
60
40
20
0

5
10
15
20
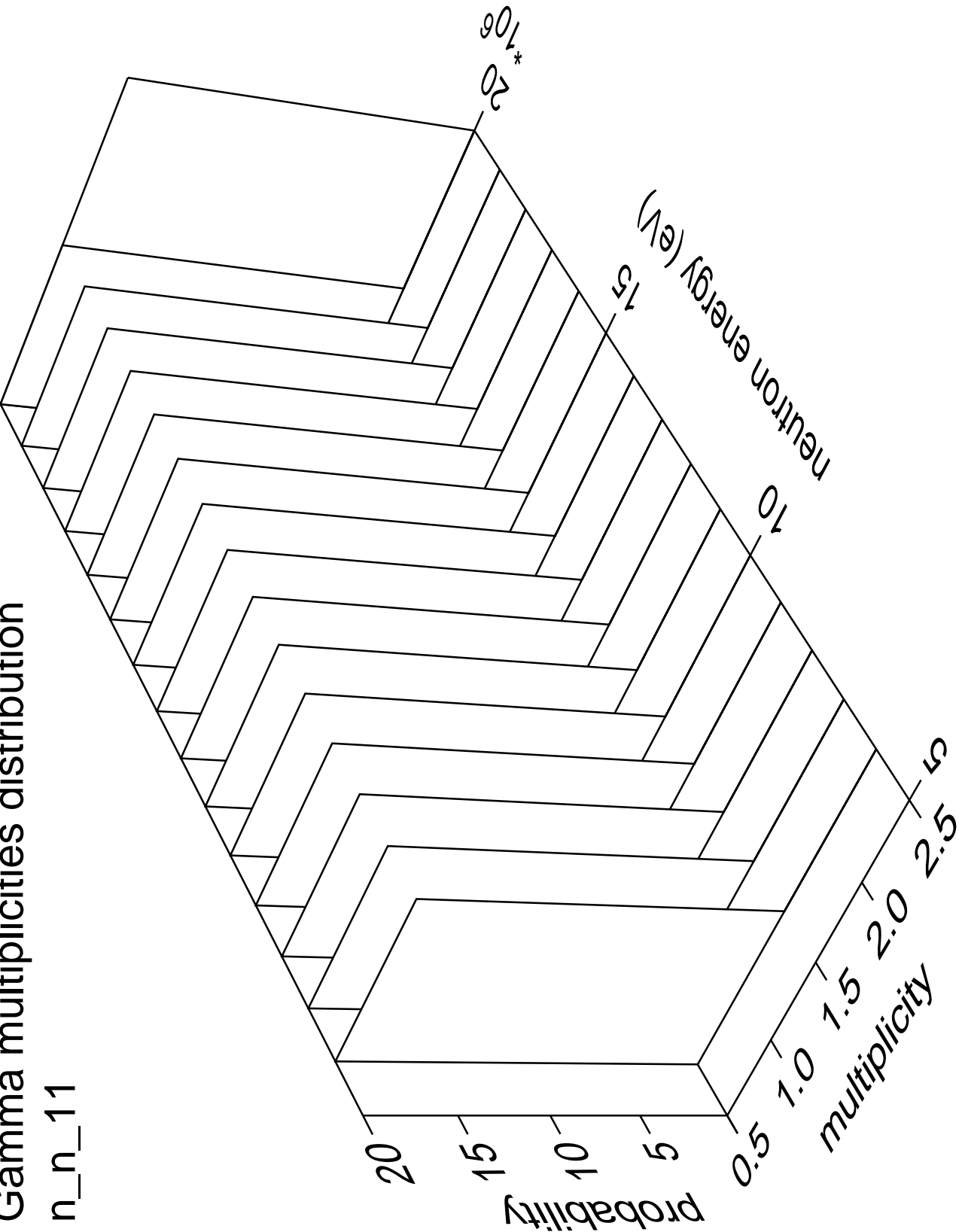
Gamma angles distribution
n_n_11
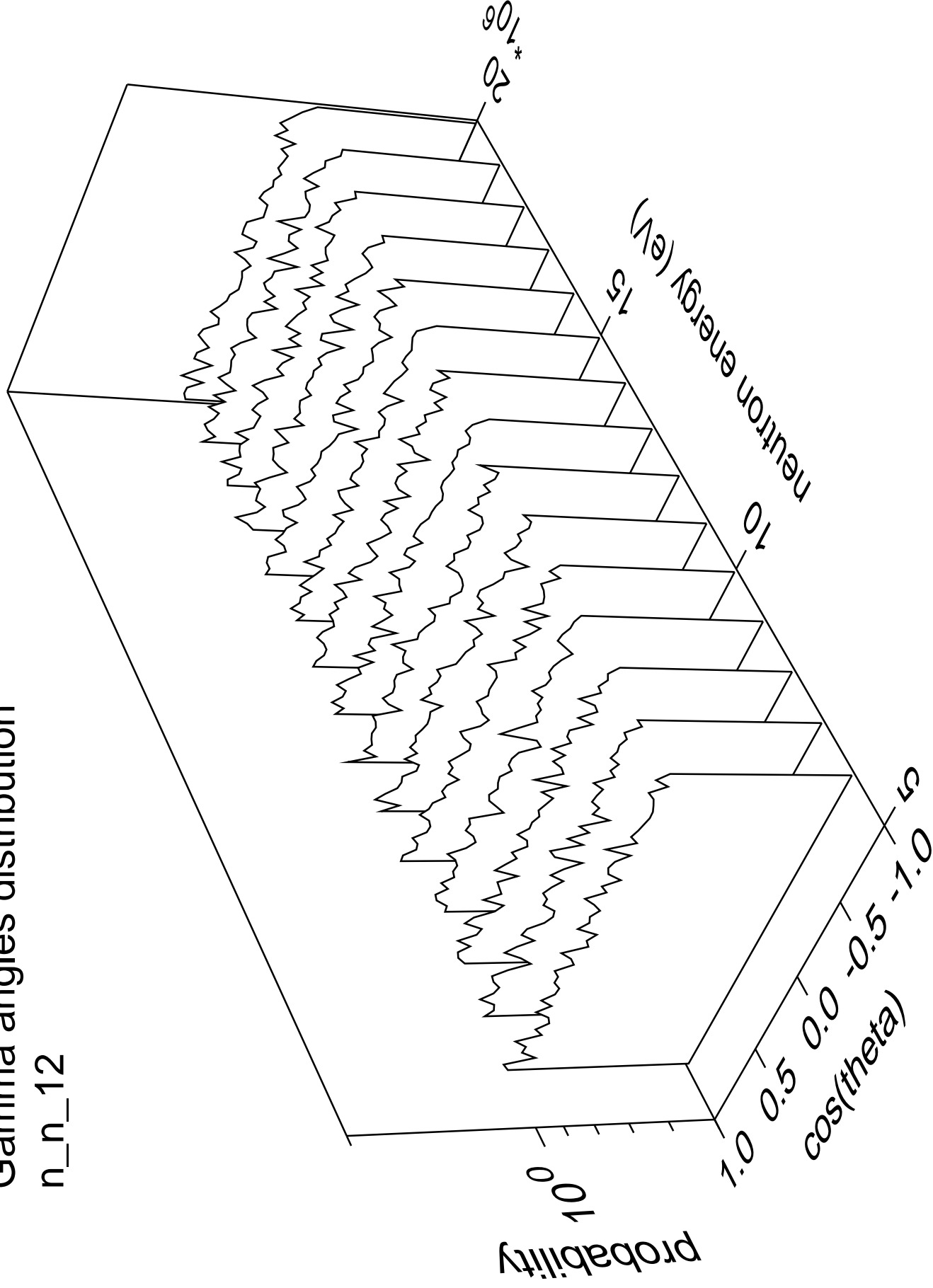
Gamma multiplicities distribution
n_n_11

Gamma energy distribution
n_n_12

neutron energy (eV)

gamma energy (MeV)

probability
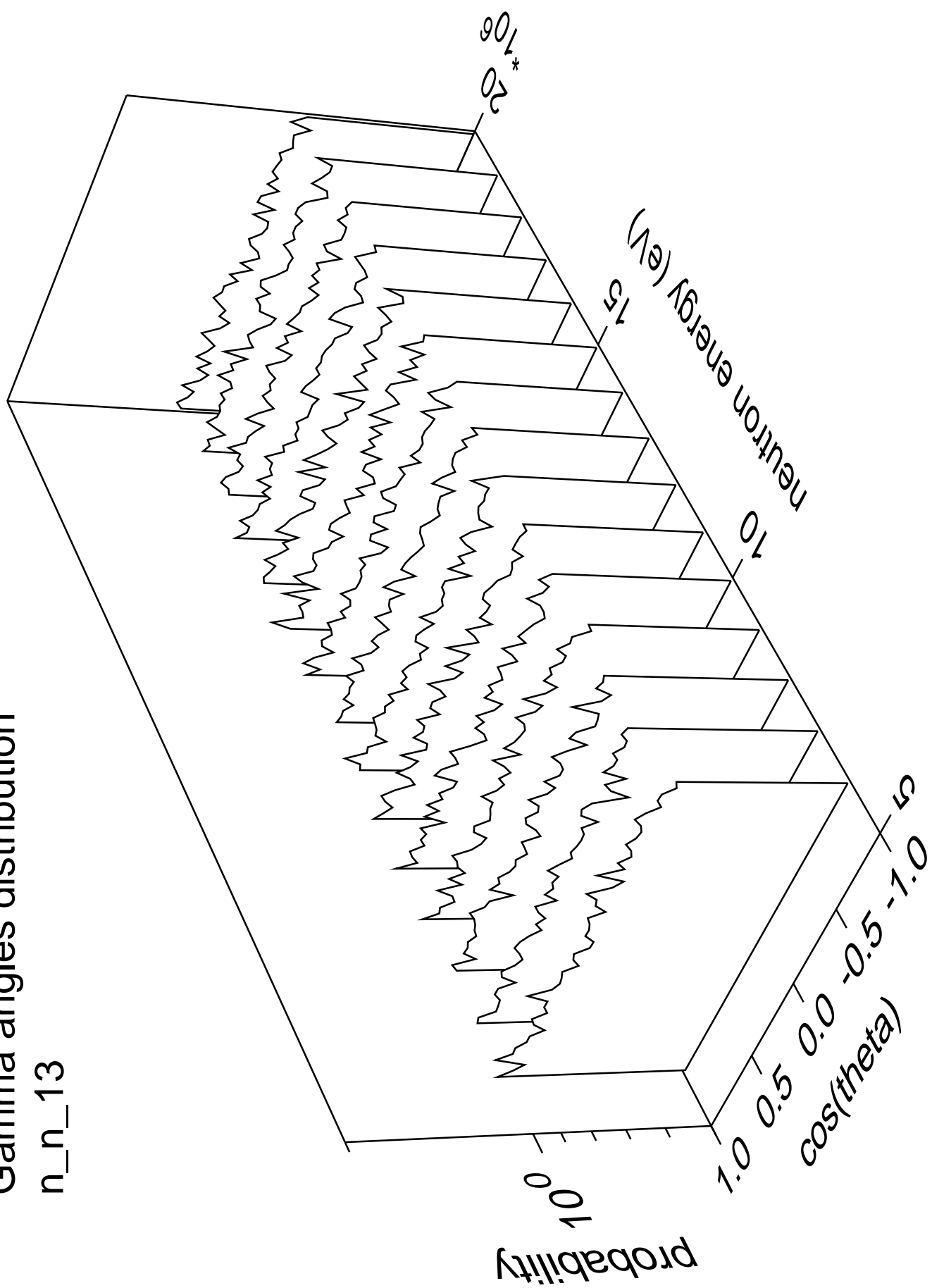
20 *10⁶

Gamma angles distribution
n_n_12

probability

cos(theta)

neutron energy (eV)
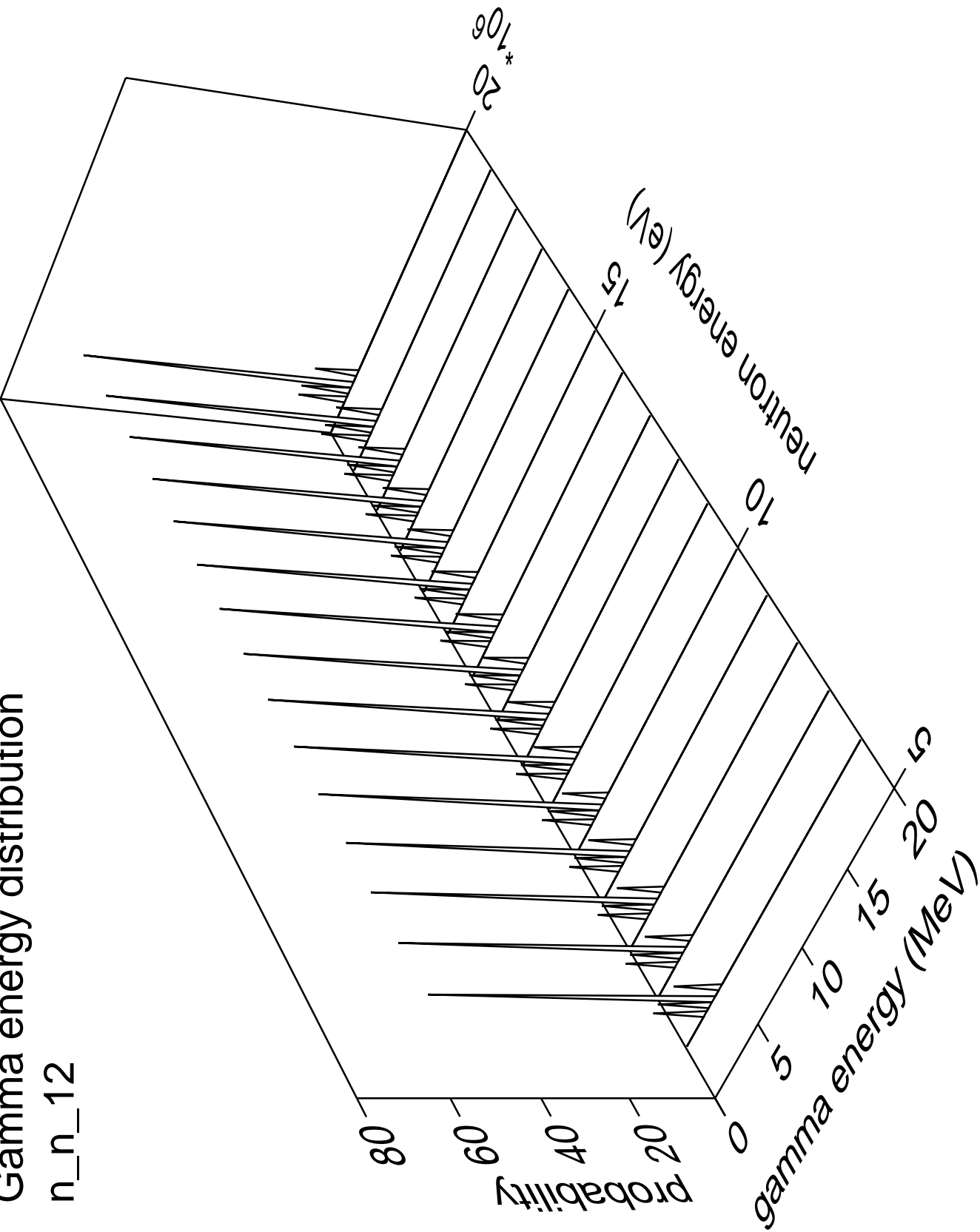
Gamma multiplicities distribution
n_n_12

Gamma energy distribution
n_n_13

probability

gamma energy (MeV)

neutron energy (eV)

20 *10^6

15

10

5

0   5   10   15   20

20

40

60

Gamma angles distribution
n_n_13

probability

cos(theta)

neutron energy (eV)

*10⁶

Gamma multiplicities distribution
n_n_13