Systematic investigation of the isotopic distributions measured in the fragmentation of ^{124}Xe and ^{136}Xe projectiles

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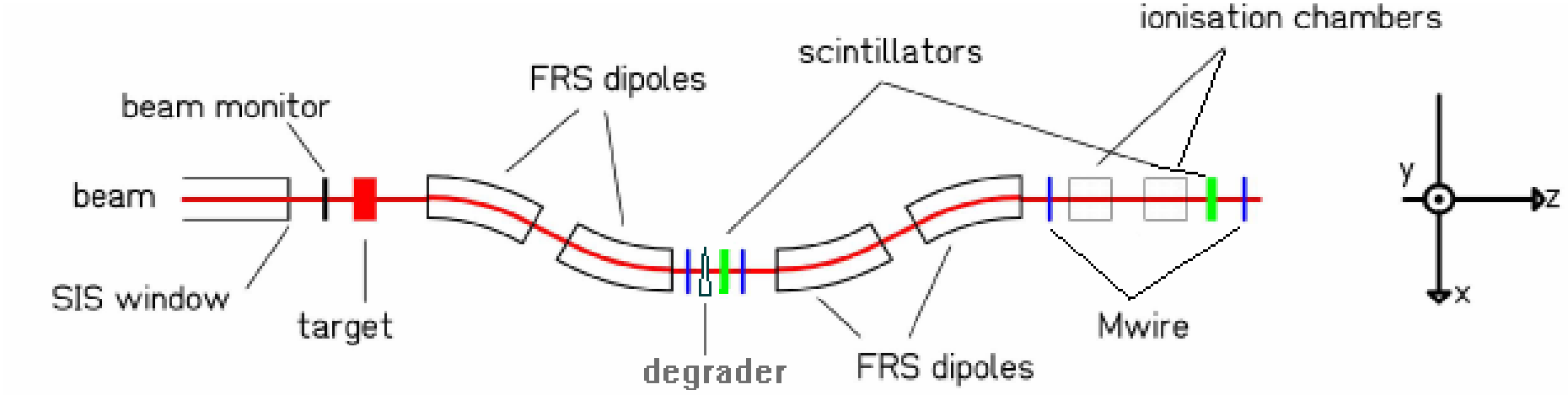
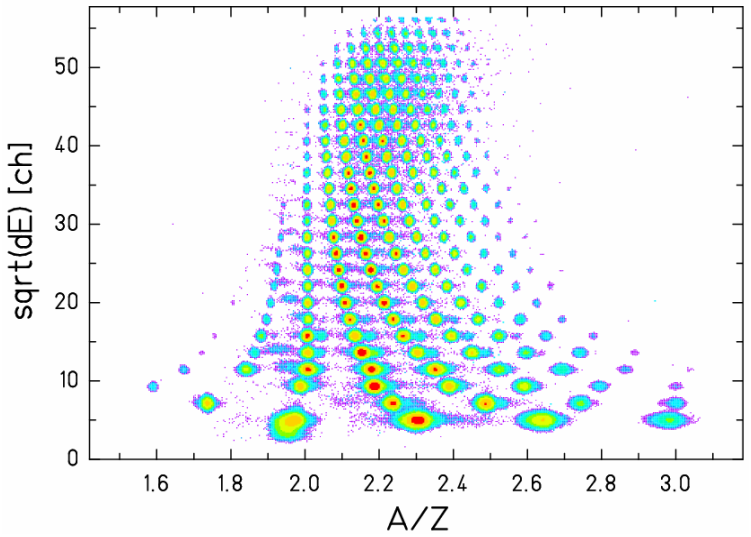
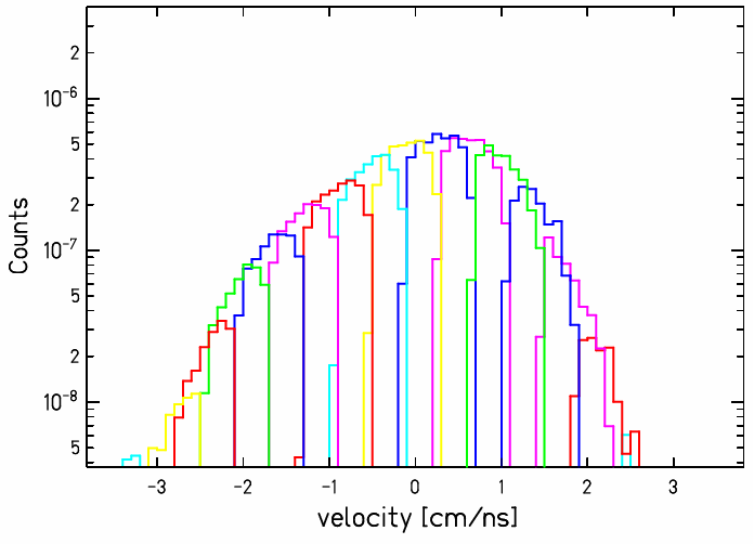
Experiment

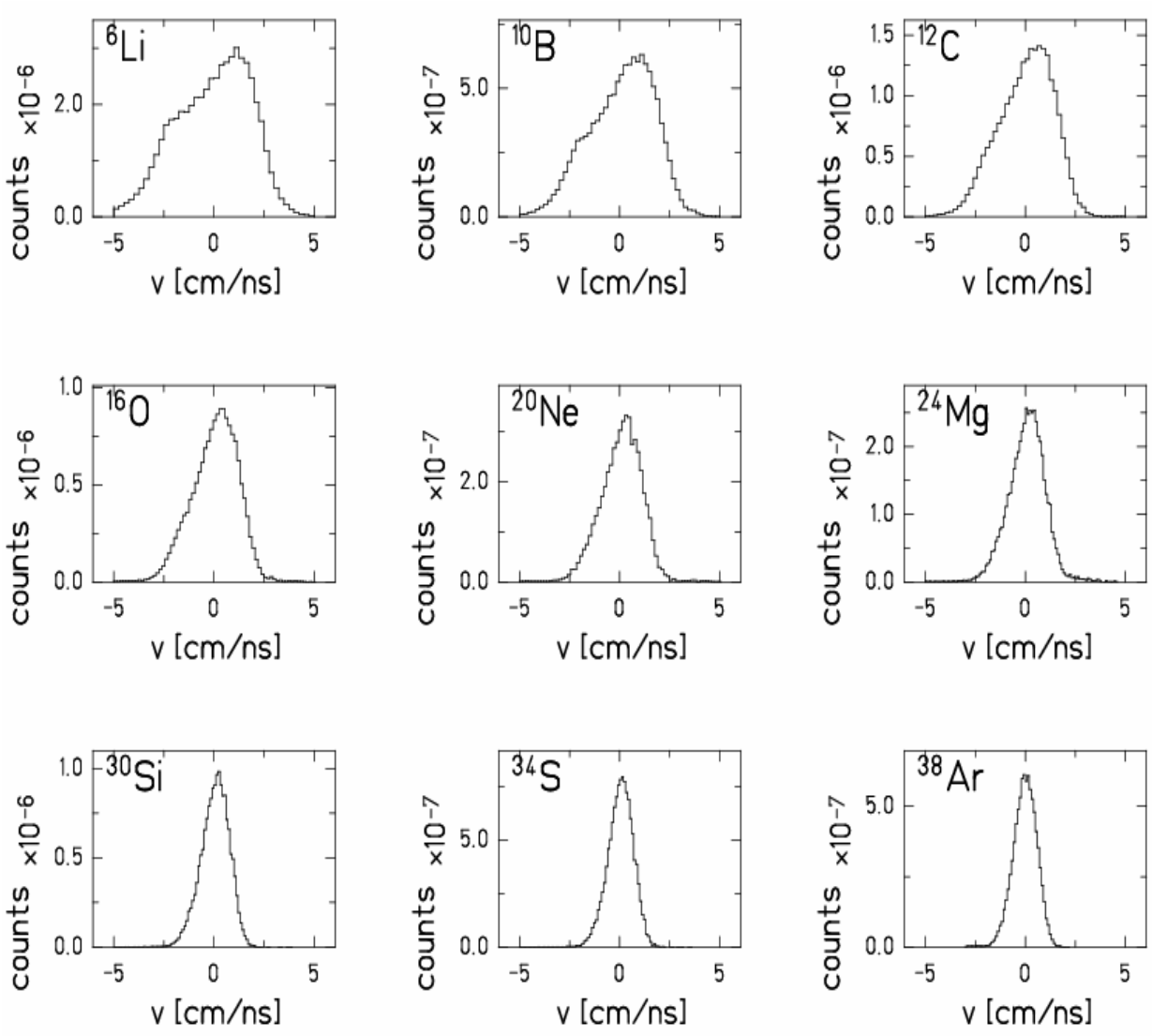

ionisation chambers
scintillators
FRS dipoles
beam monitor
beam
SIS window
target
degrader
FRS dipoles
Mwire
y
z
x


sqrt(dE) [ch]
A/Z

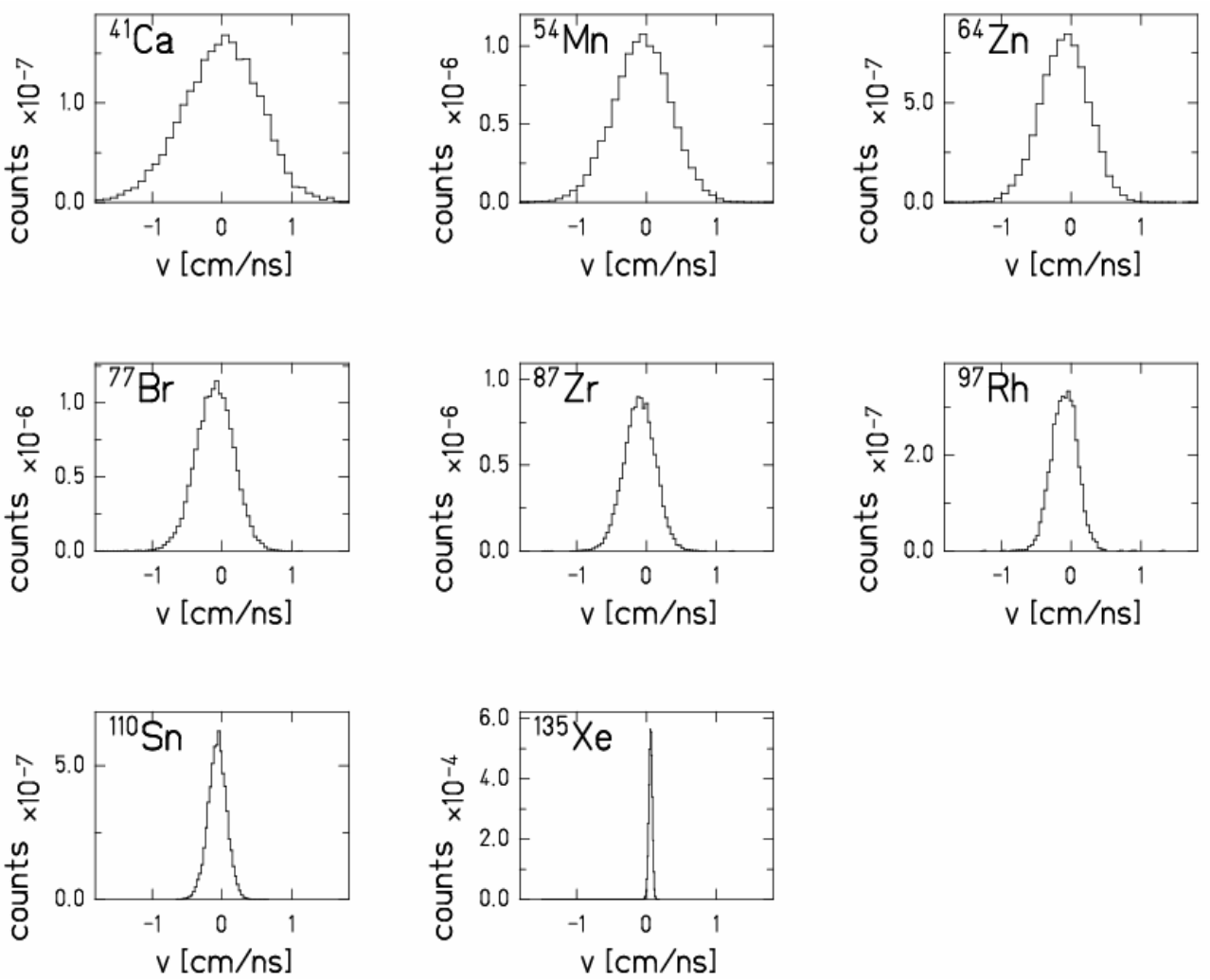

Counts
velocity [cm/ns]

11Li

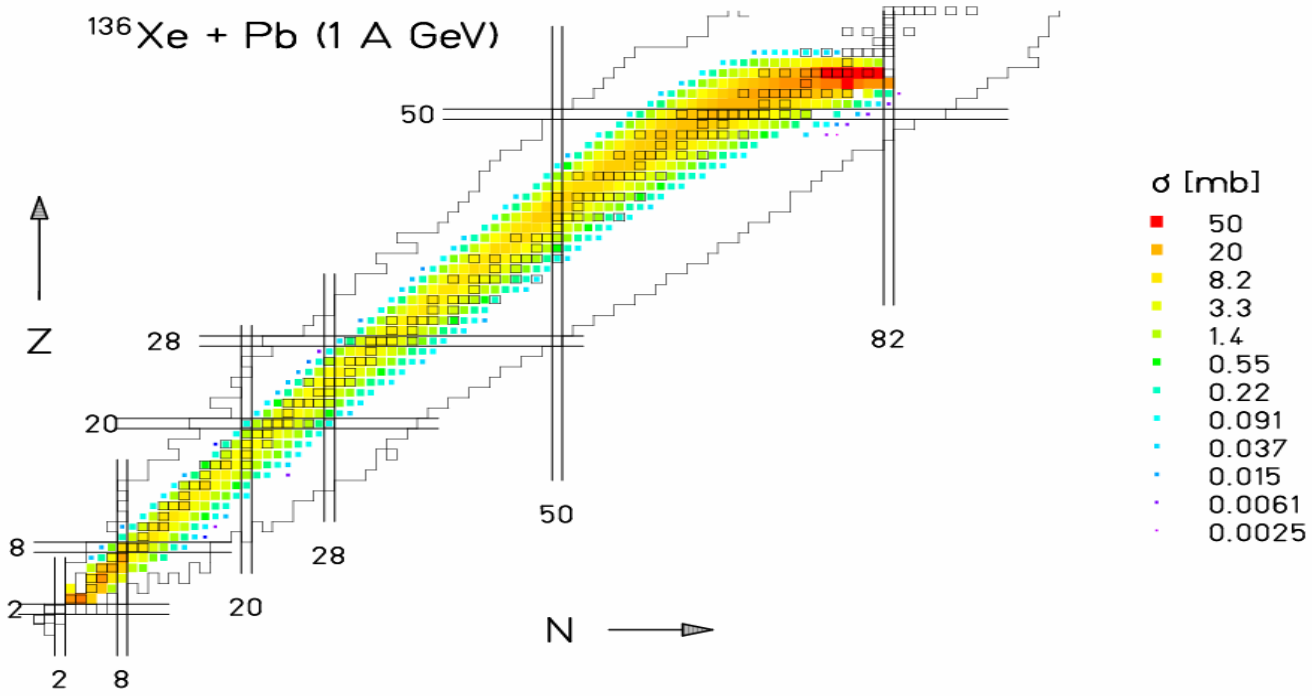
Results

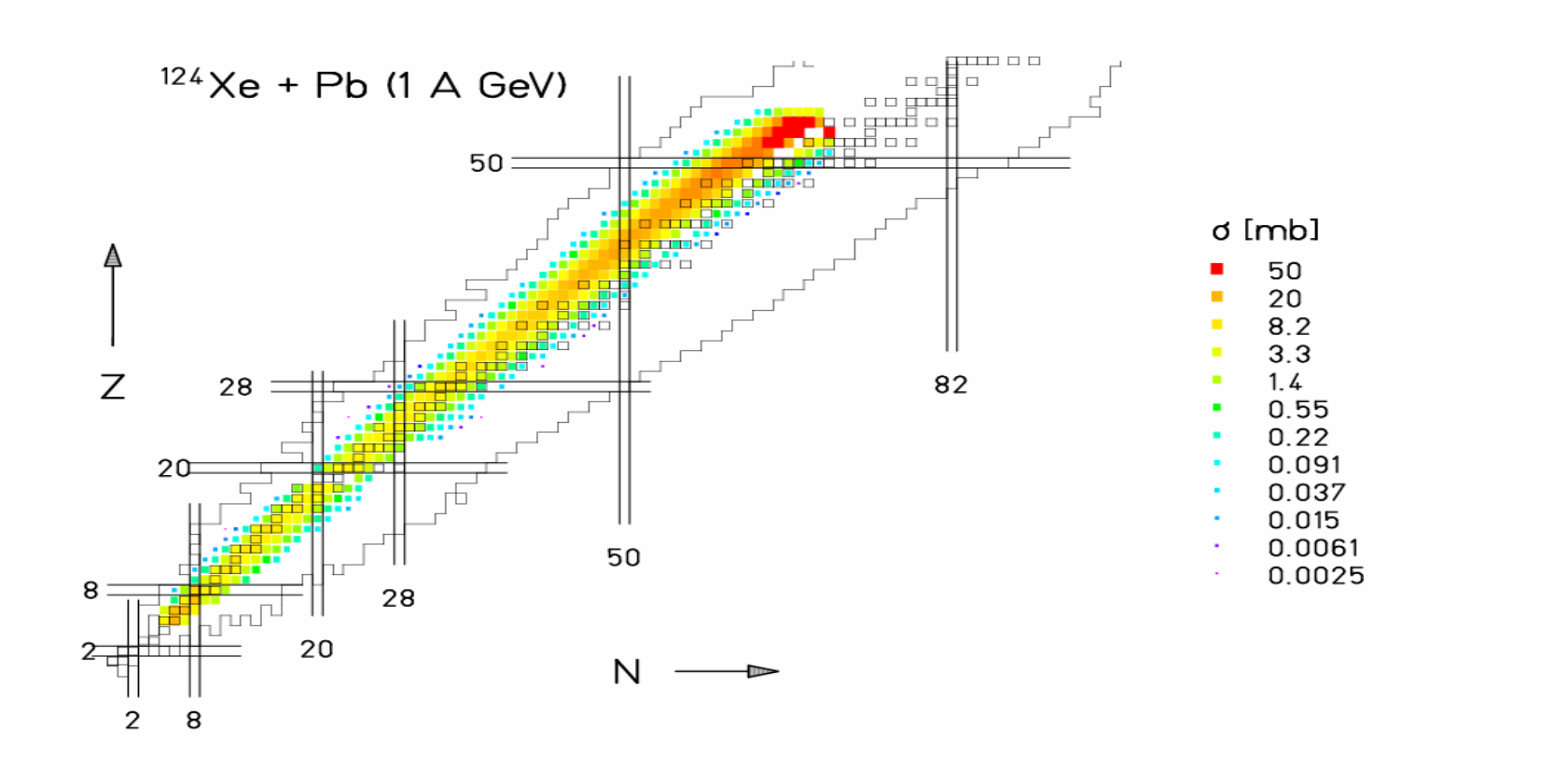


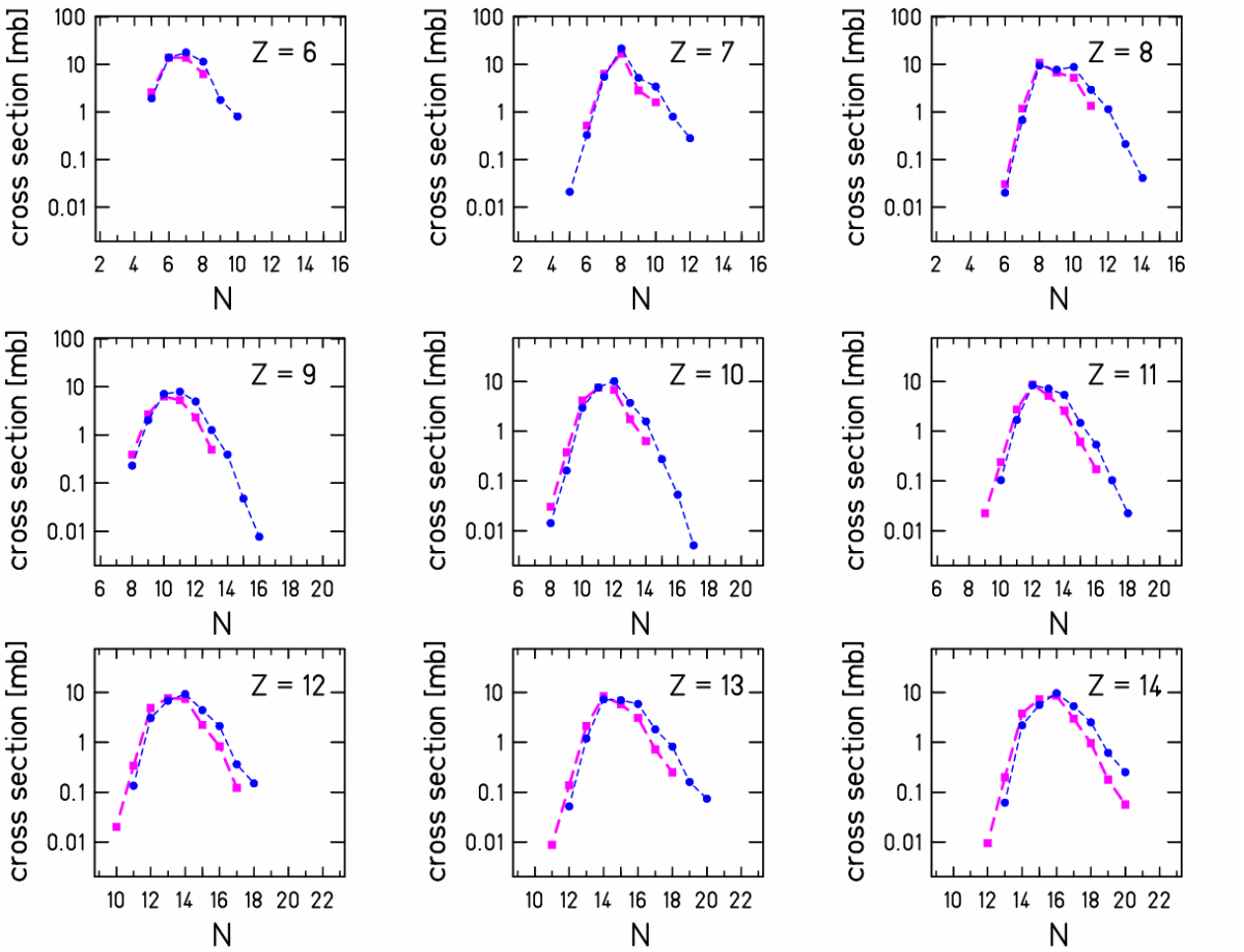
Velocity distributions (136Xe, 1 A GeV + Pb)



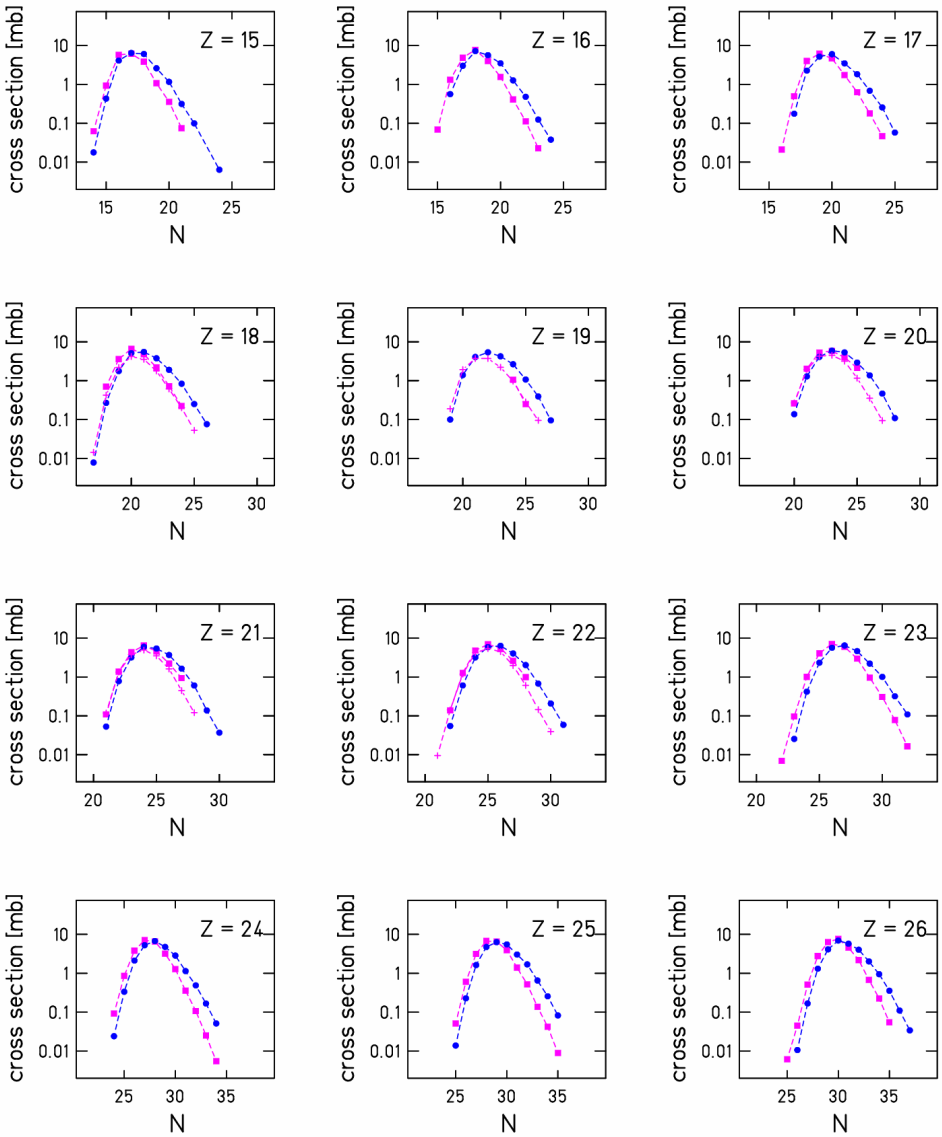
Velocity distributions (136Xe, 1 A GeV + Pb)

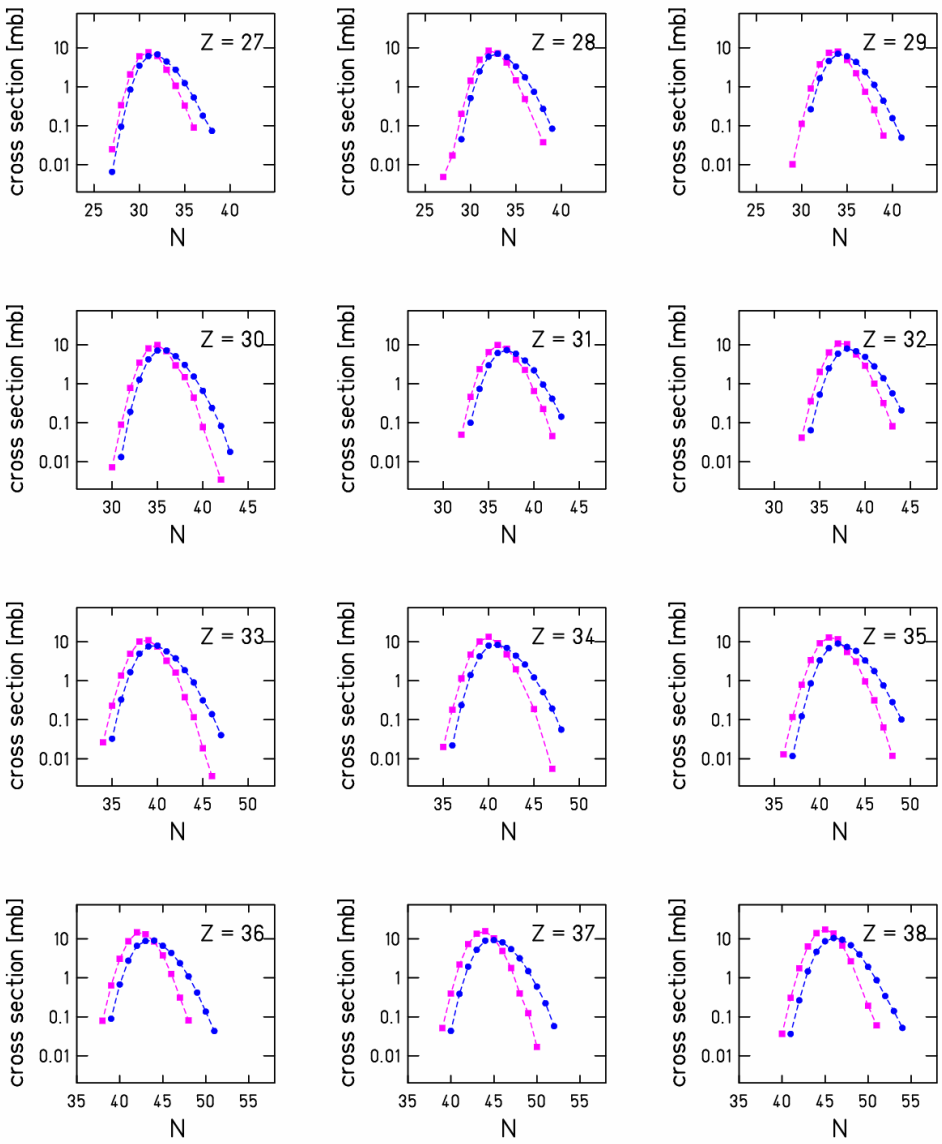

^{136}Xe + Pb (1 A GeV)
50
28
20
8
2
Z
N
2
8
20
28
50
82
σ [mb]
50
20
8.2
3.3
1.4
0.55
0.22
0.091
0.037
0.015
0.0061
0.0025

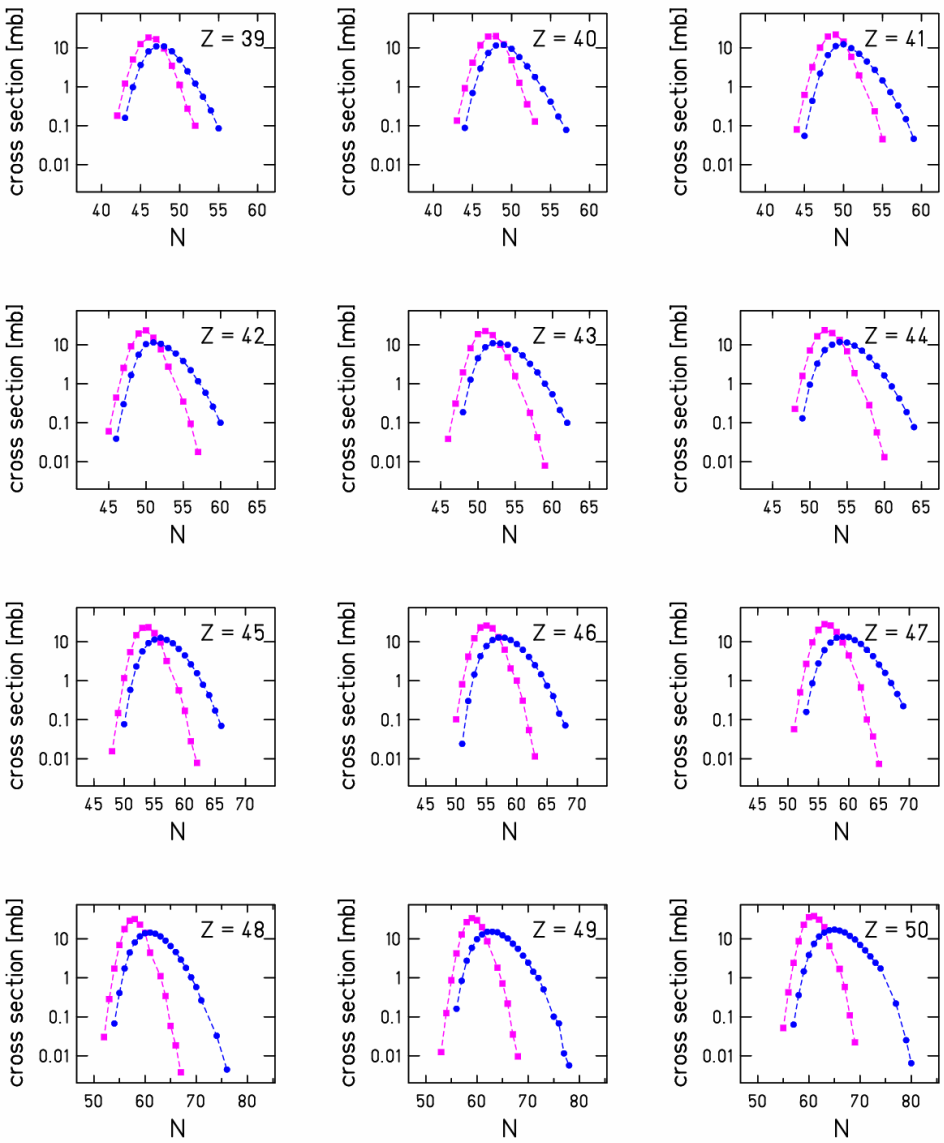

124Xe + Pb (1 A GeV)
50
28
20
8
2
82
50
28
20
2
8
Z
N
σ [mb]
50
20
8.2
3.3
1.4
0.55
0.22
0.091
0.037
0.015
0.0061
0.0025

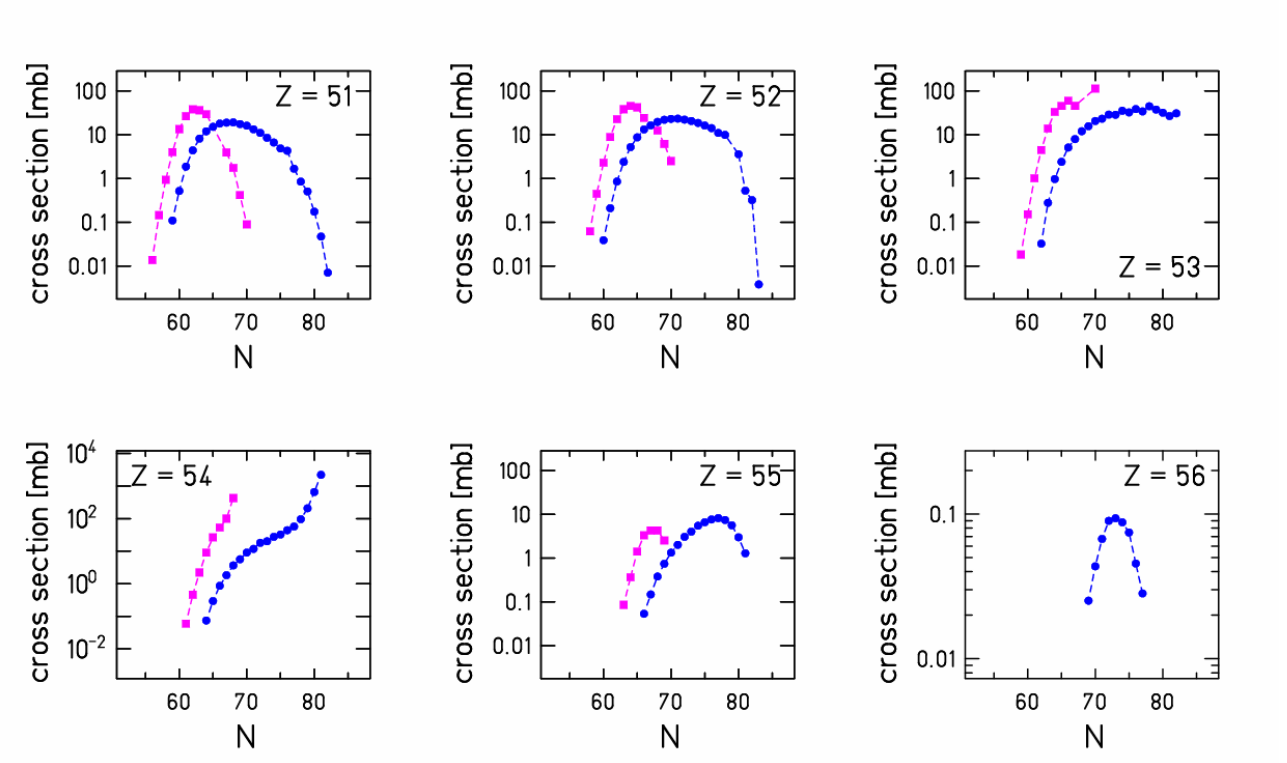


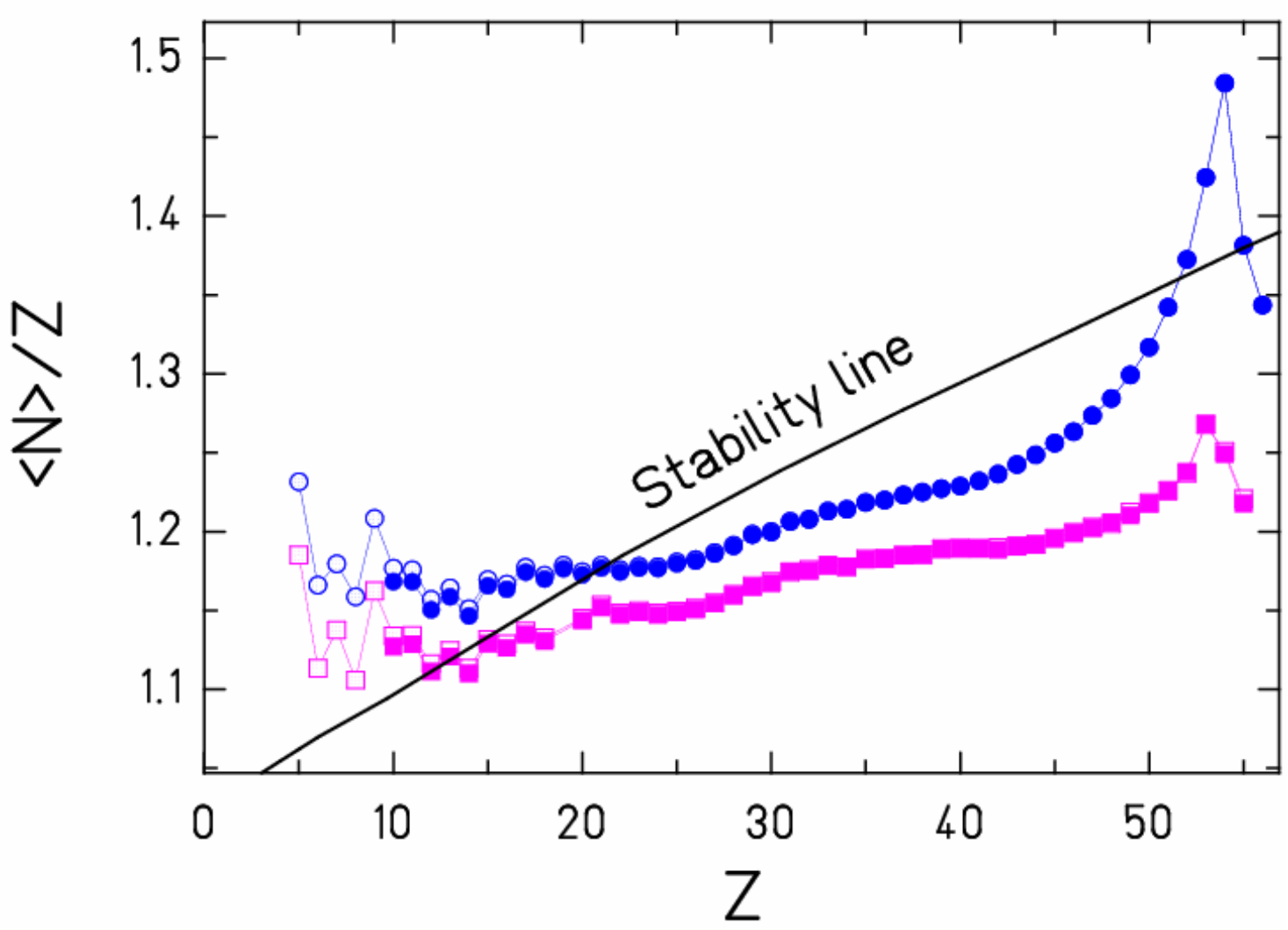
Production cross sections (136,124Xe + Pb)


Z = 15
Z = 16
Z = 17
Z = 18
Z = 19
Z = 20
Z = 21
Z = 22
Z = 23
Z = 24
Z = 25
Z = 26
cross section [mb]
N

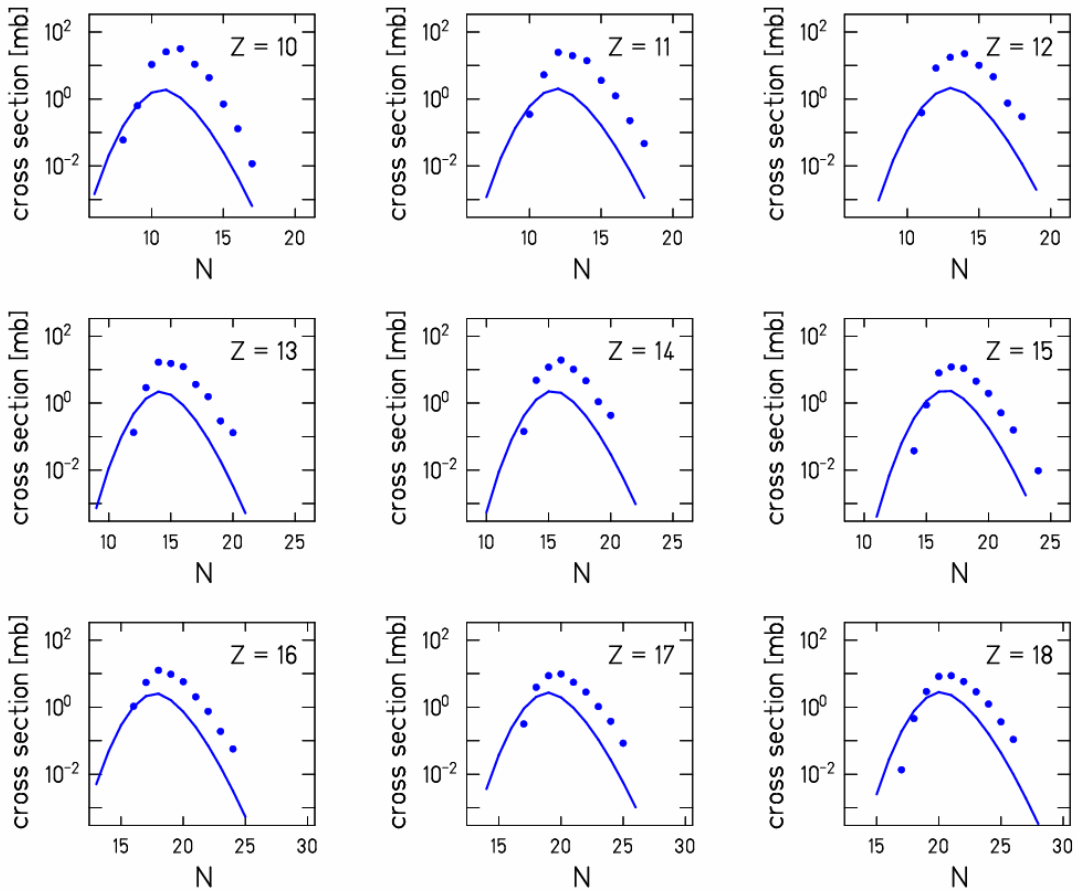

cross section [mb]
Z = 27
Z = 28
Z = 29
Z = 30
Z = 31
Z = 32
Z = 33
Z = 34
Z = 35
Z = 36
Z = 37
Z = 38
N

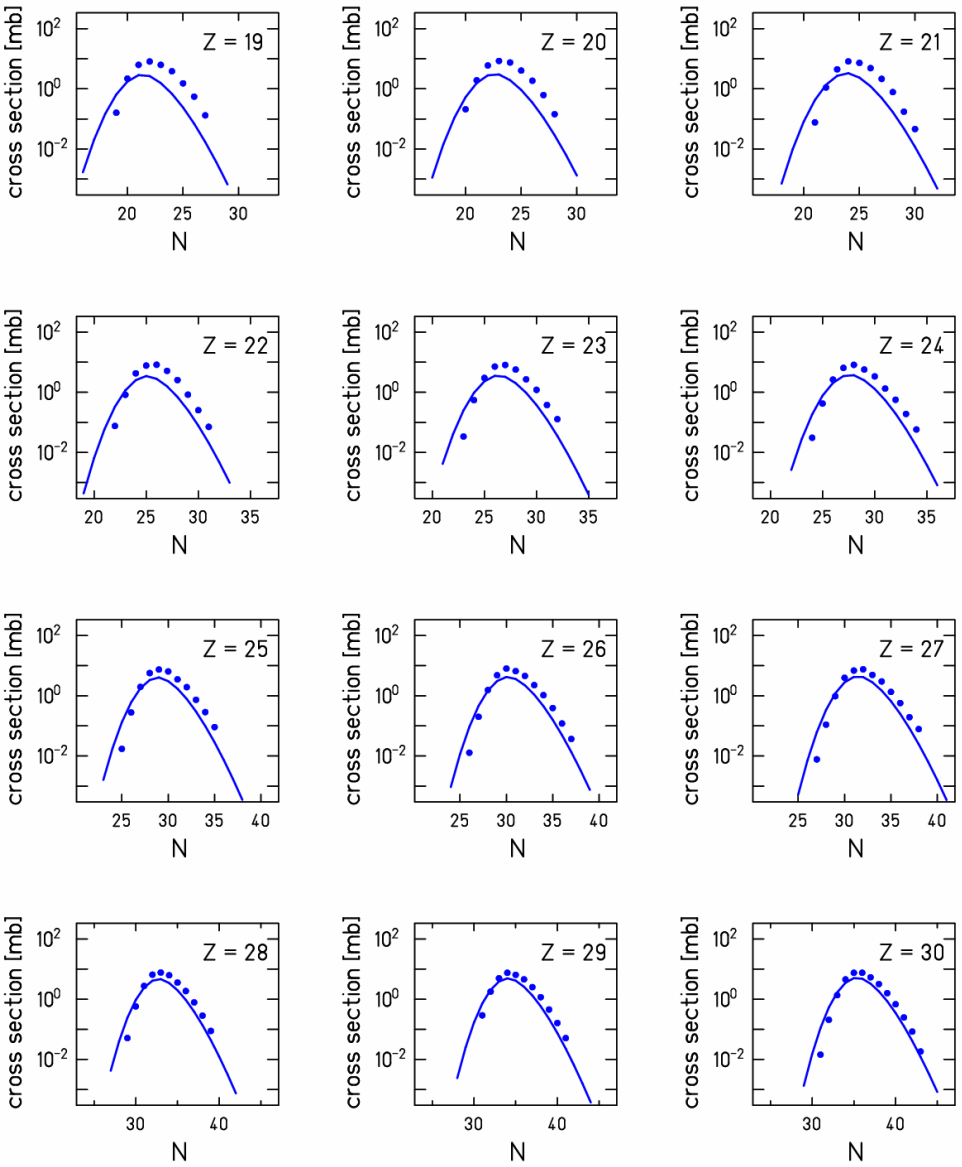

Z = 39
Z = 40
Z = 41
Z = 42
Z = 43
Z = 44
Z = 45
Z = 46
Z = 47
Z = 48
Z = 49
Z = 50
cross section [mb]
N

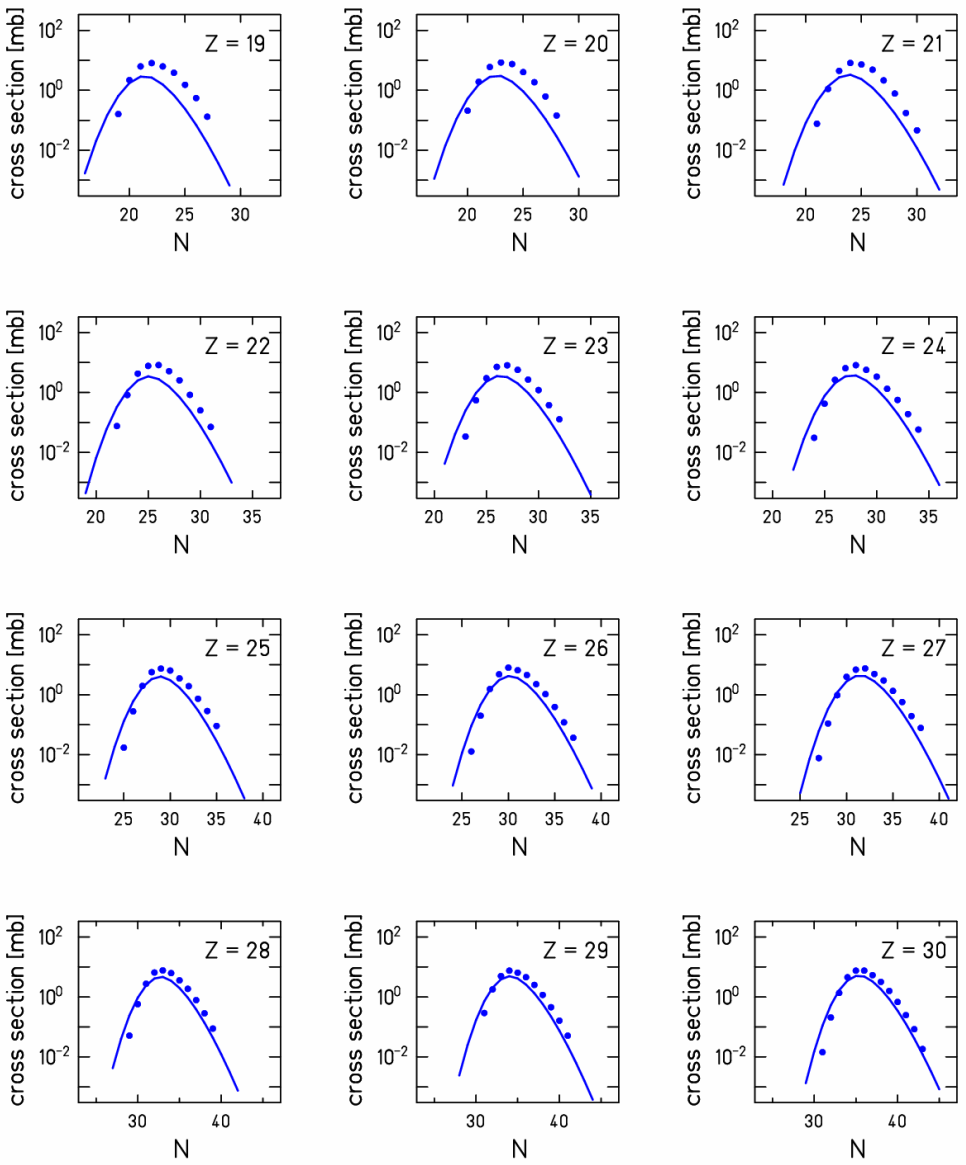

cross section [mb]
Z = 51
Z = 52
Z = 53
Z = 54
Z = 55
Z = 56
N
100
10
1
0.1
0.01
10^4
10^2
10^0
10^{-2}
60
70
80

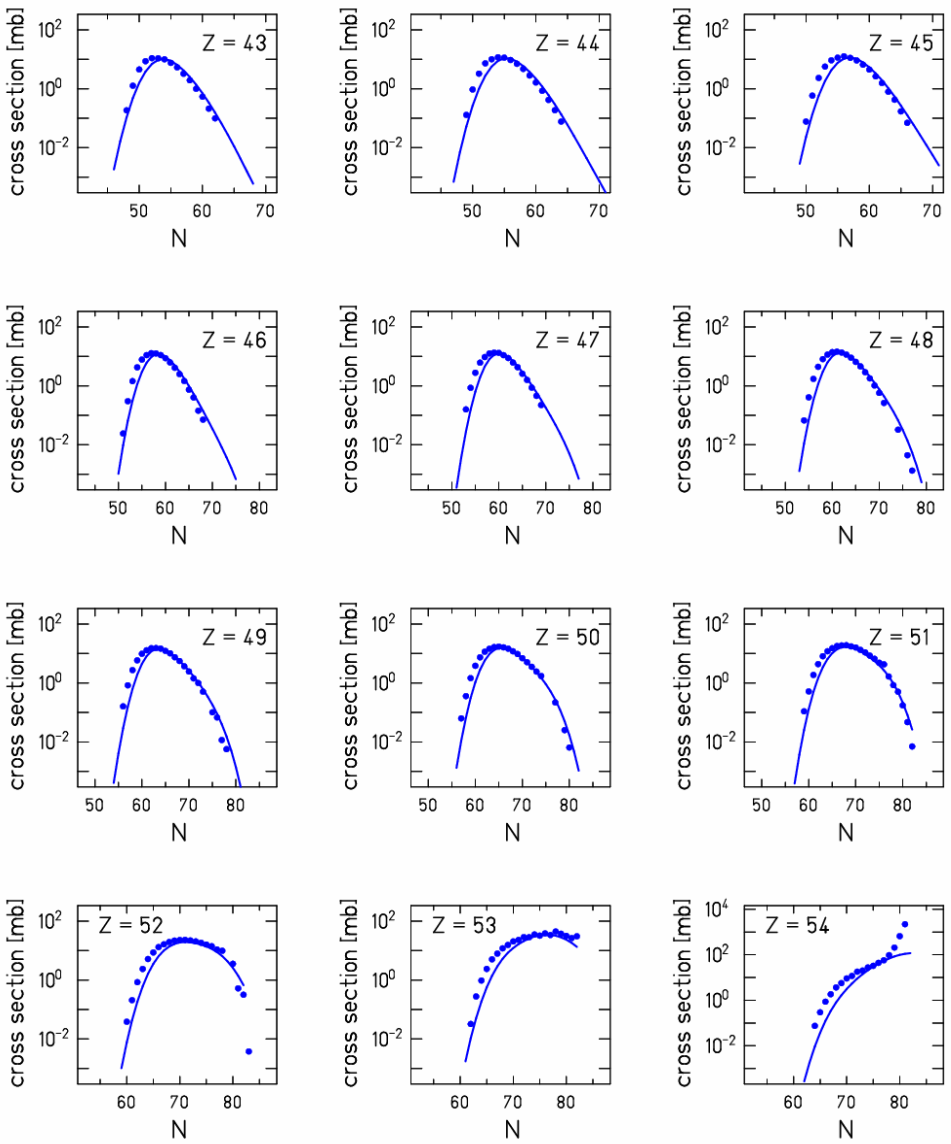

1.5
1.4
1.3
1.2
1.1
<N>/Z
Stability line
0
10
20
30
40
50
Z

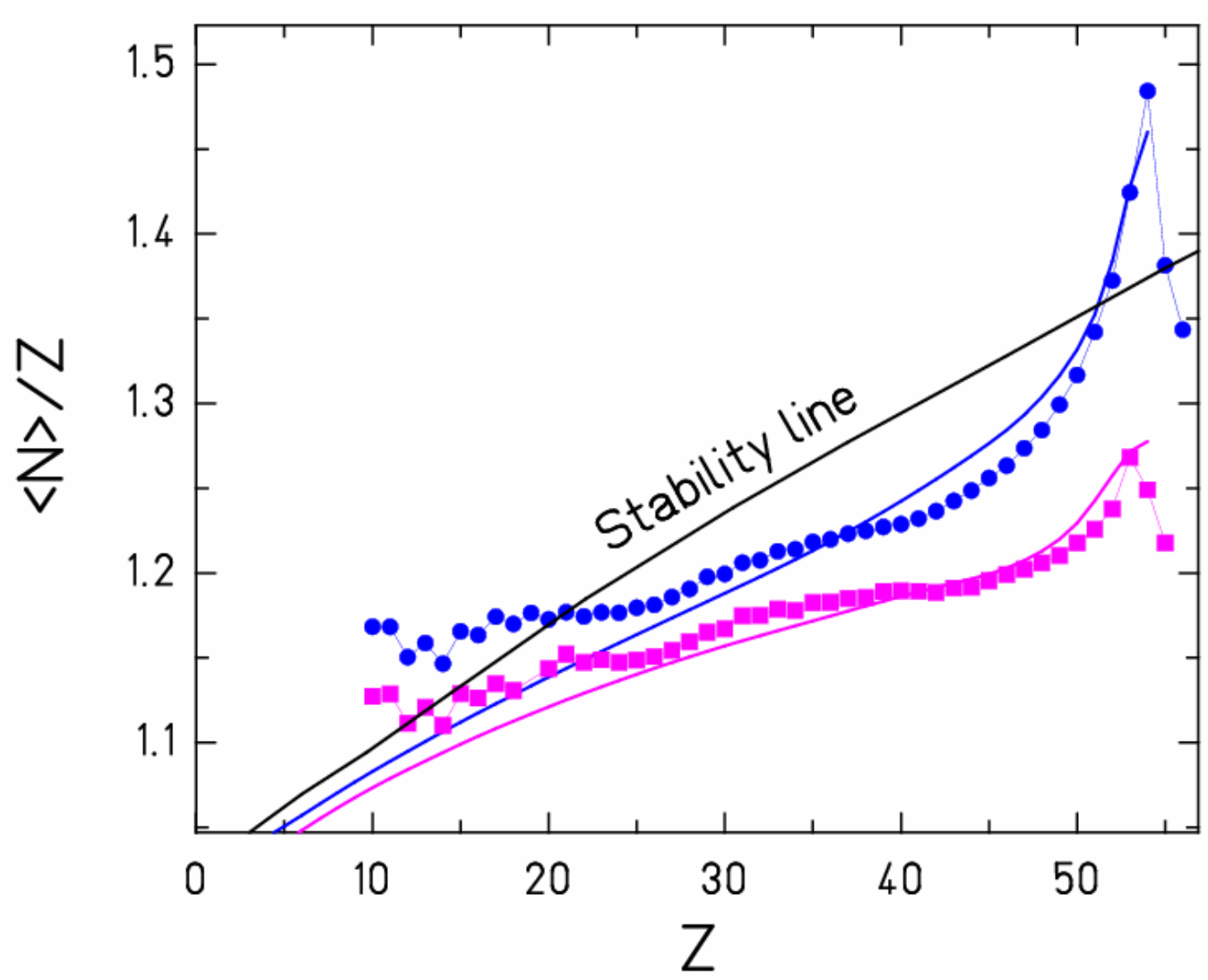
Comparison with EPAX


cross section [mb]
10^2
10^0
10^{-2}
Z = 10
Z = 11
Z = 12
Z = 13
Z = 14
Z = 15
Z = 16
Z = 17
Z = 18
10
15
20
25
30
N


cross section [mb]
10^2
10^0
10^{-2}
Z = 19
Z = 20
Z = 21
Z = 22
Z = 23
Z = 24
Z = 25
Z = 26
Z = 27
Z = 28
Z = 29
Z = 30
N

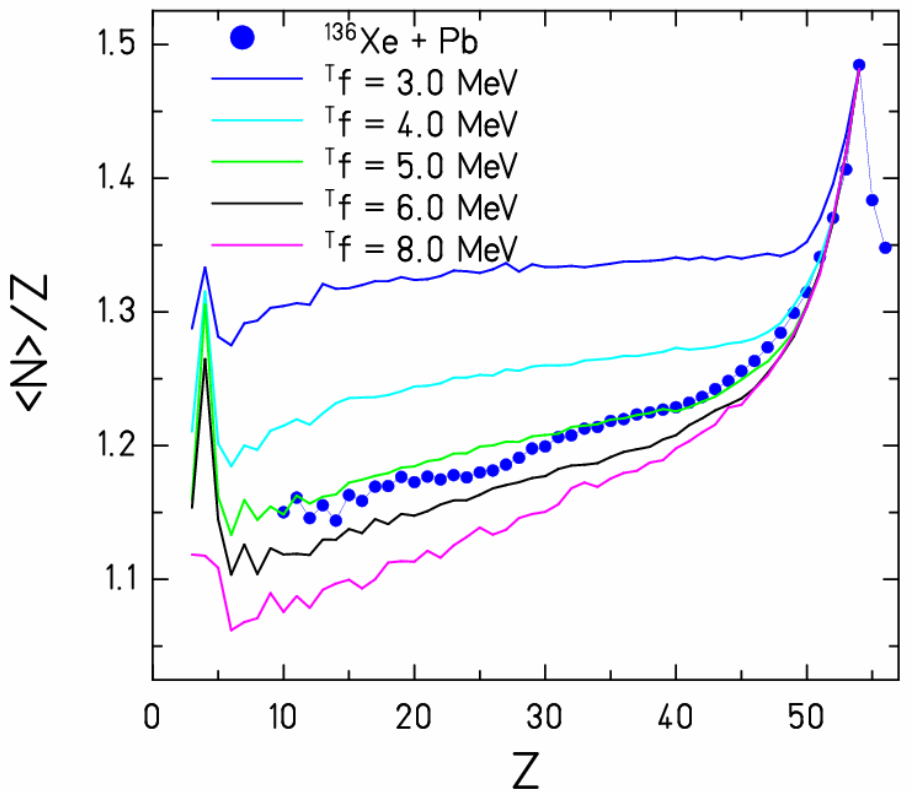

cross section [mb]
10^2
10^0
10^{-2}
Z = 19
Z = 20
Z = 21
Z = 22
Z = 23
Z = 24
Z = 25
Z = 26
Z = 27
Z = 28
Z = 29
Z = 30
N

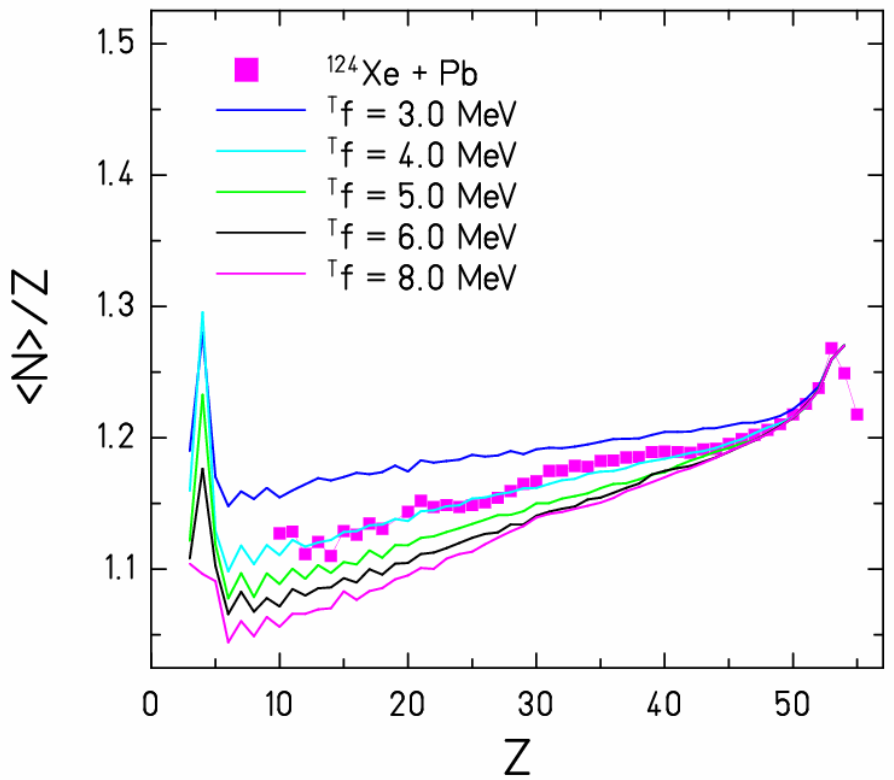

Z = 43
Z = 44
Z = 45
Z = 46
Z = 47
Z = 48
Z = 49
Z = 50
Z = 51
Z = 52
Z = 53
Z = 54
cross section [mb]
N


1.5
1.4
1.3
1.2
1.1
<N>/Z
Stability line
0
10
20
30
40
50
Z

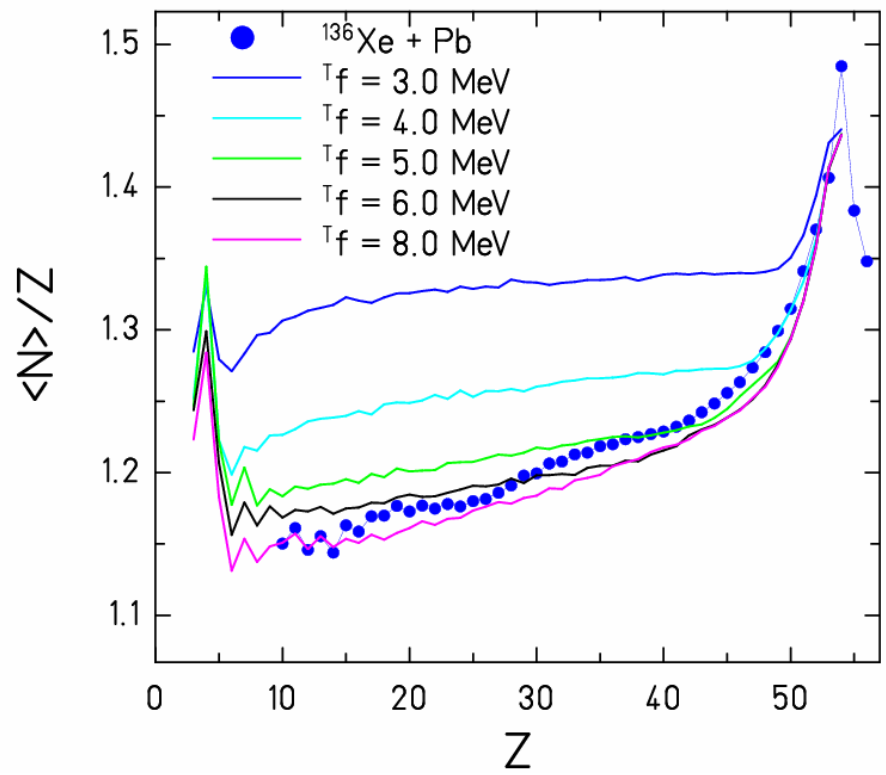
ABRABLA

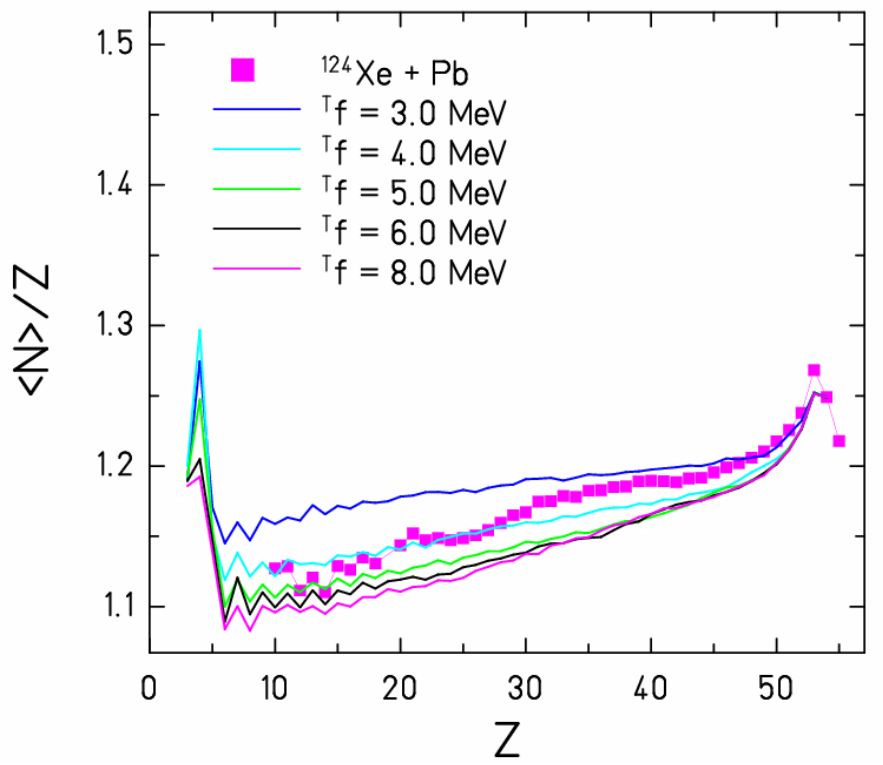
Evaporation of n, p, alpha



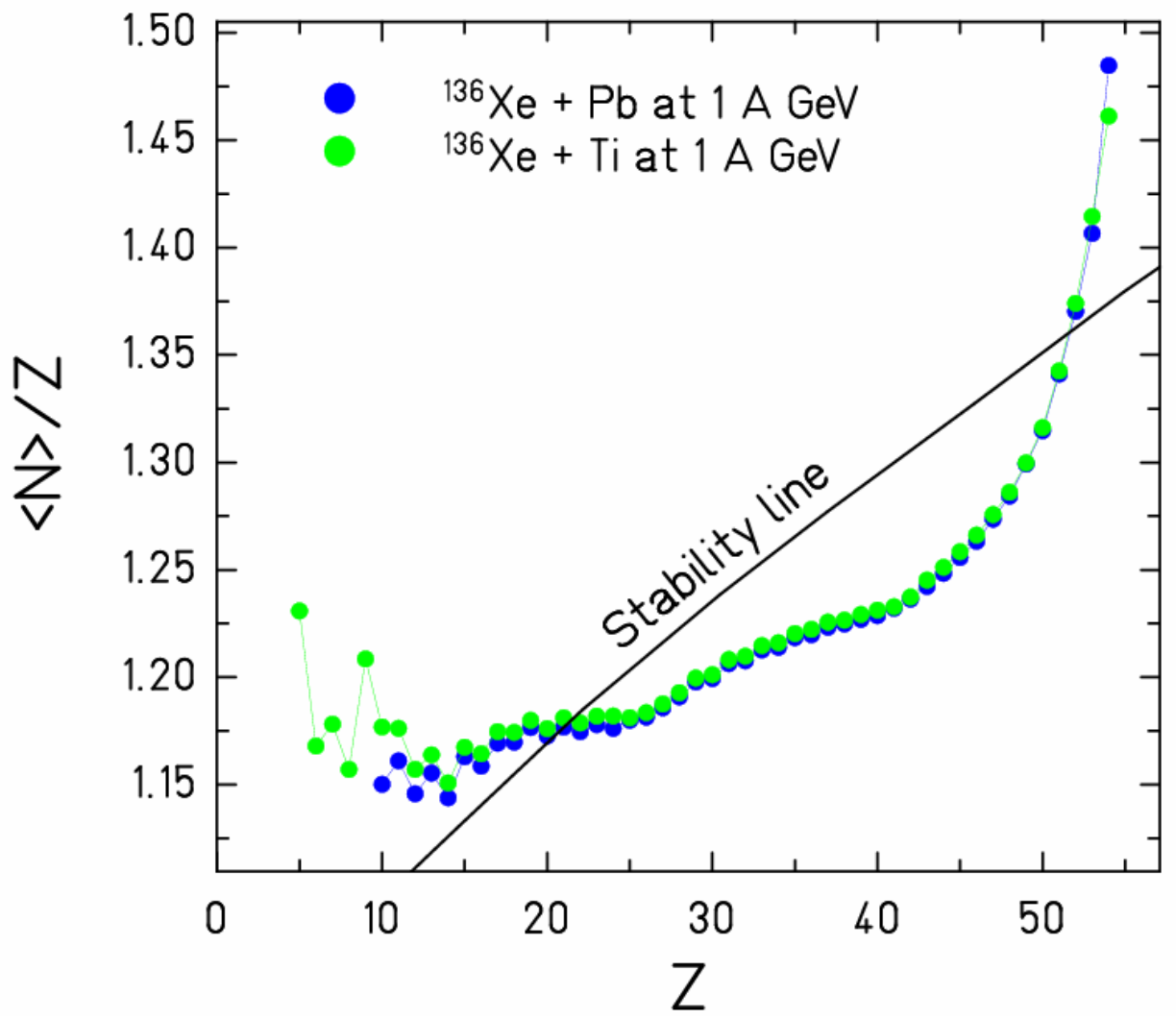


Emission of LCP, IMF

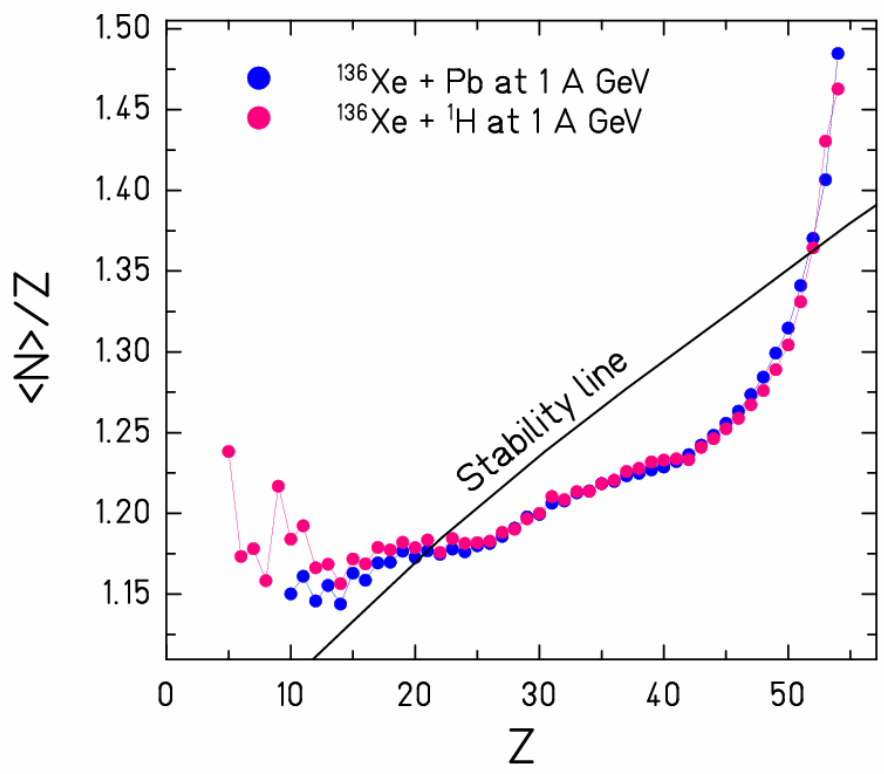


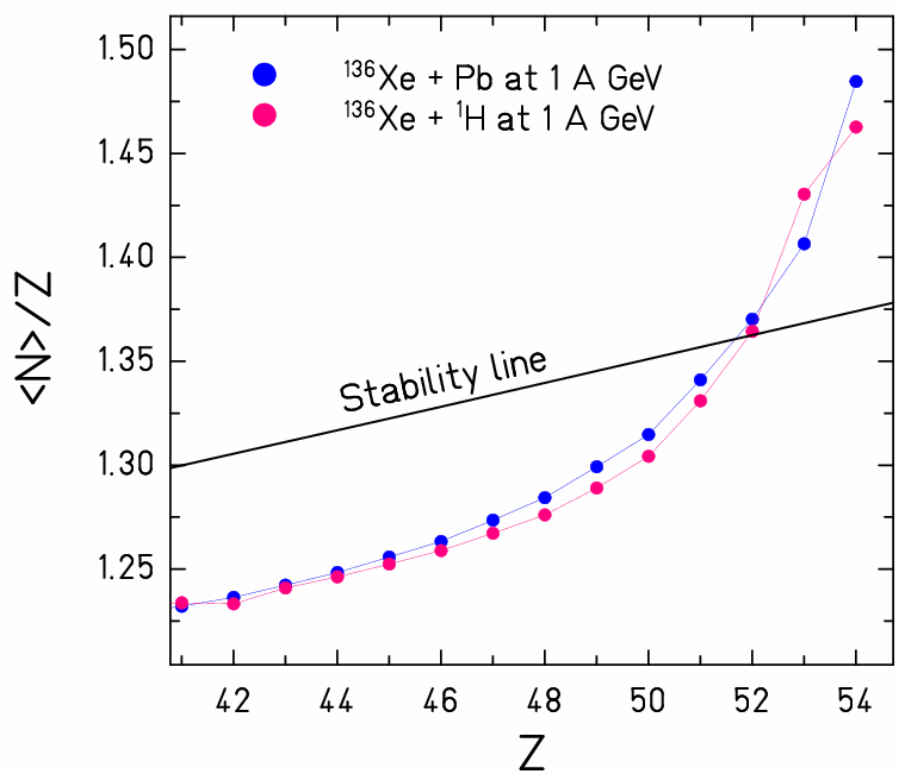


Data comparison



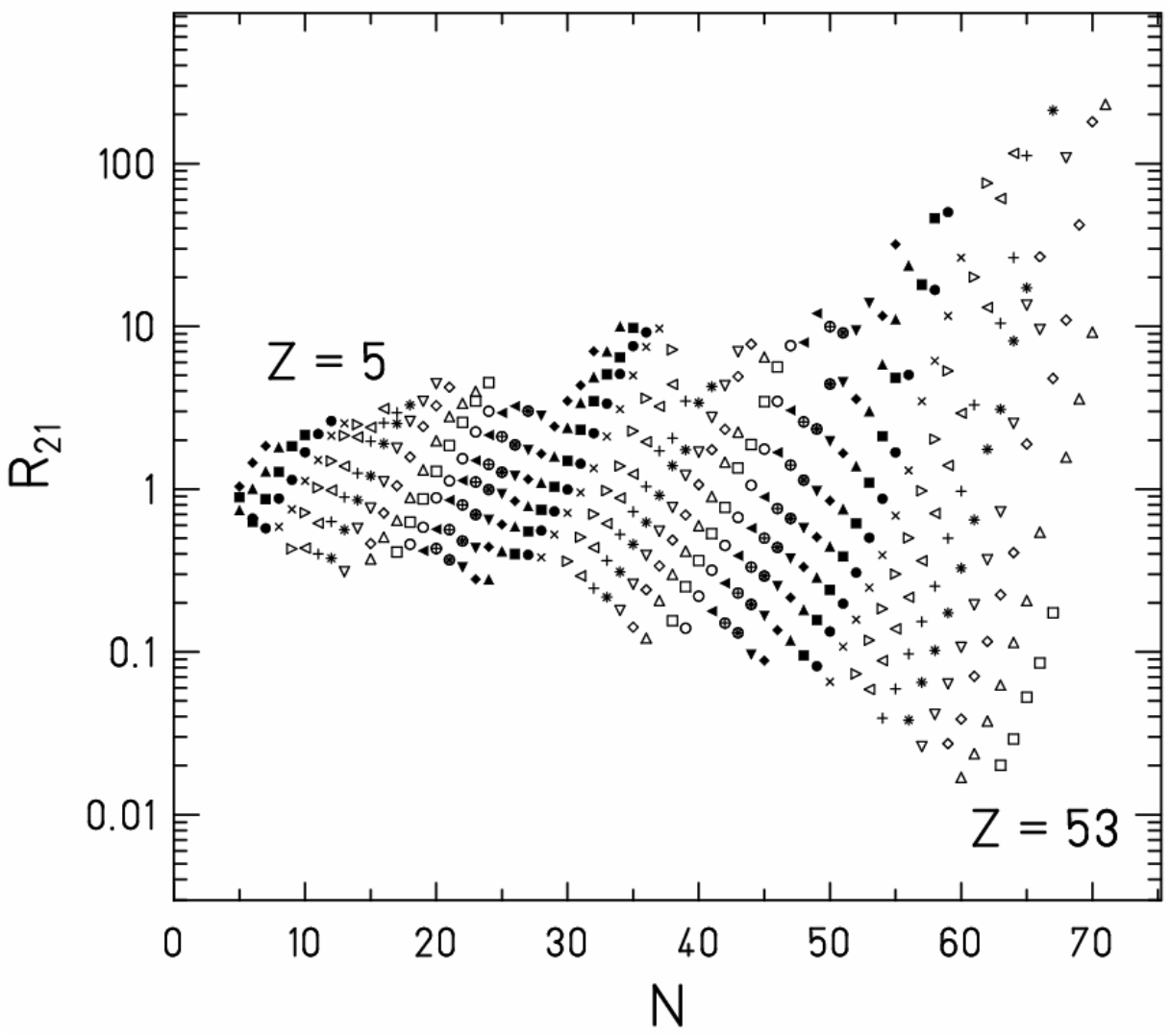
Dependence on the target : Ti, Pb



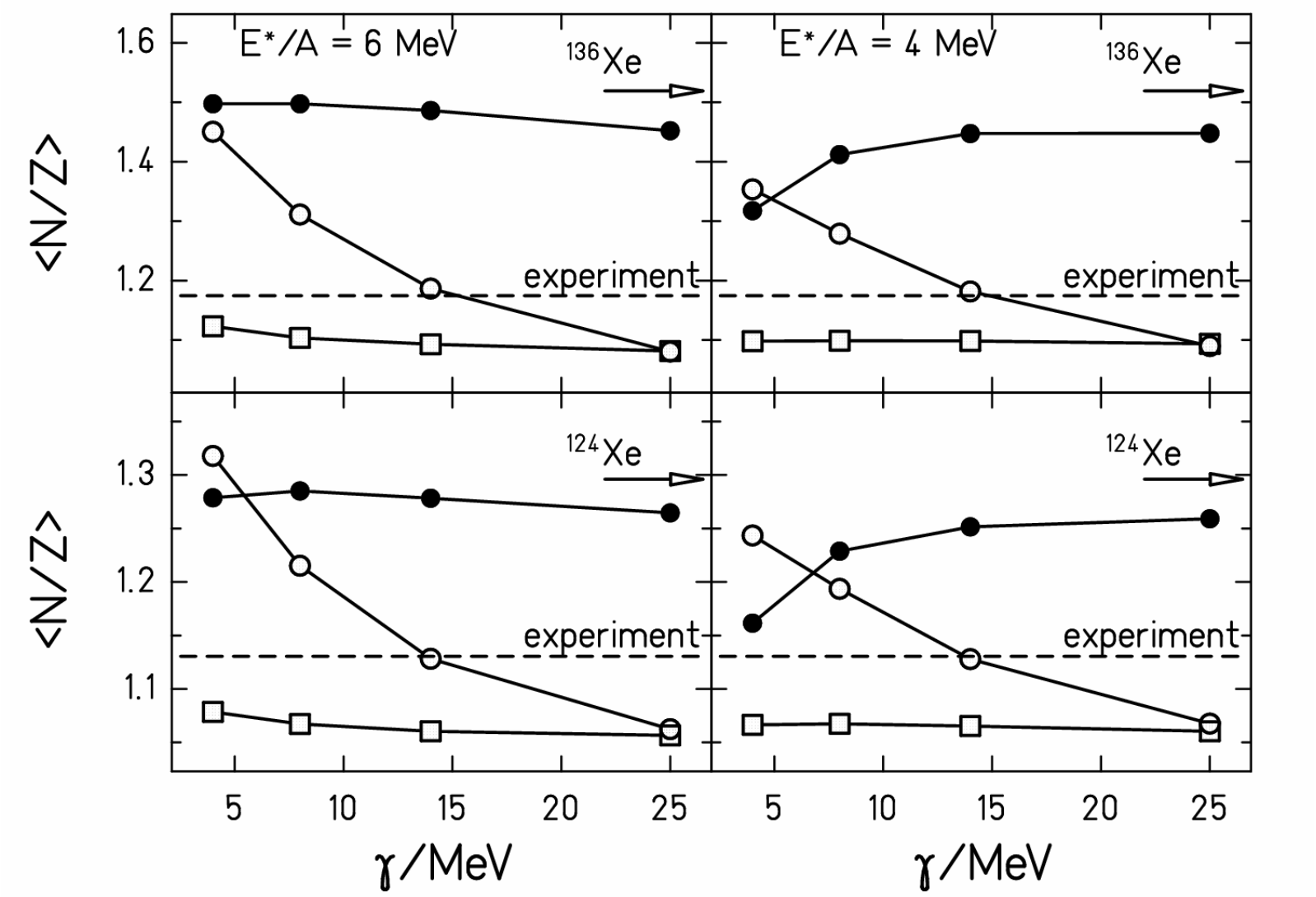


Dependence on the target : Pb, H

Isoscaling



Isoscaling



Reduction of symmetry-energy coefficient deduced (Botvina)

Summary

- **Complex velocity distributions**
  - **Component with heavy remnant in light residues**
- **Complete nuclide distributions in ^{124,136}Xe + Pb**
  - **Light fragments: additional n-rich prod. in ^{136}Xe**
  - **Heavy fragments: shifted (memory in N/Z)**
- **EPAX**
  - **Light fragments: Predictions too low**
  - **Light and heavy fragments: N/Z shifted**
- **ABRABLA**
  - **Influence of IMF emission**
- **Target dependence**
  - **Pb – Ti: identical shape of isotopic yields**
  - **Pb – H: more evaporation in H**
- **Isoscaling**
  - **Reduction of symmetry-energy coefficient**