

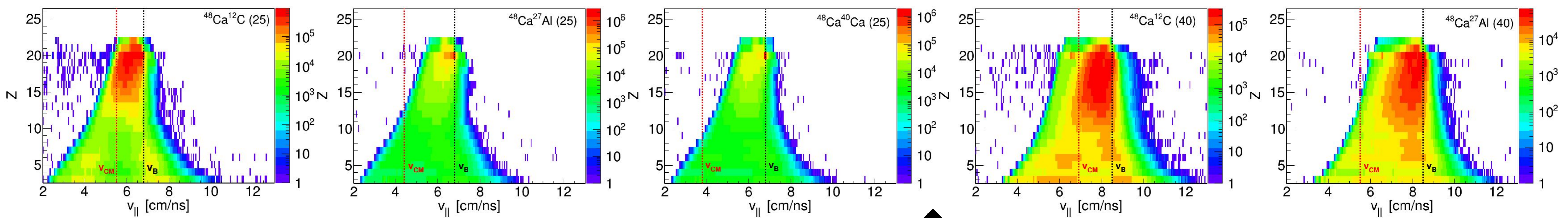
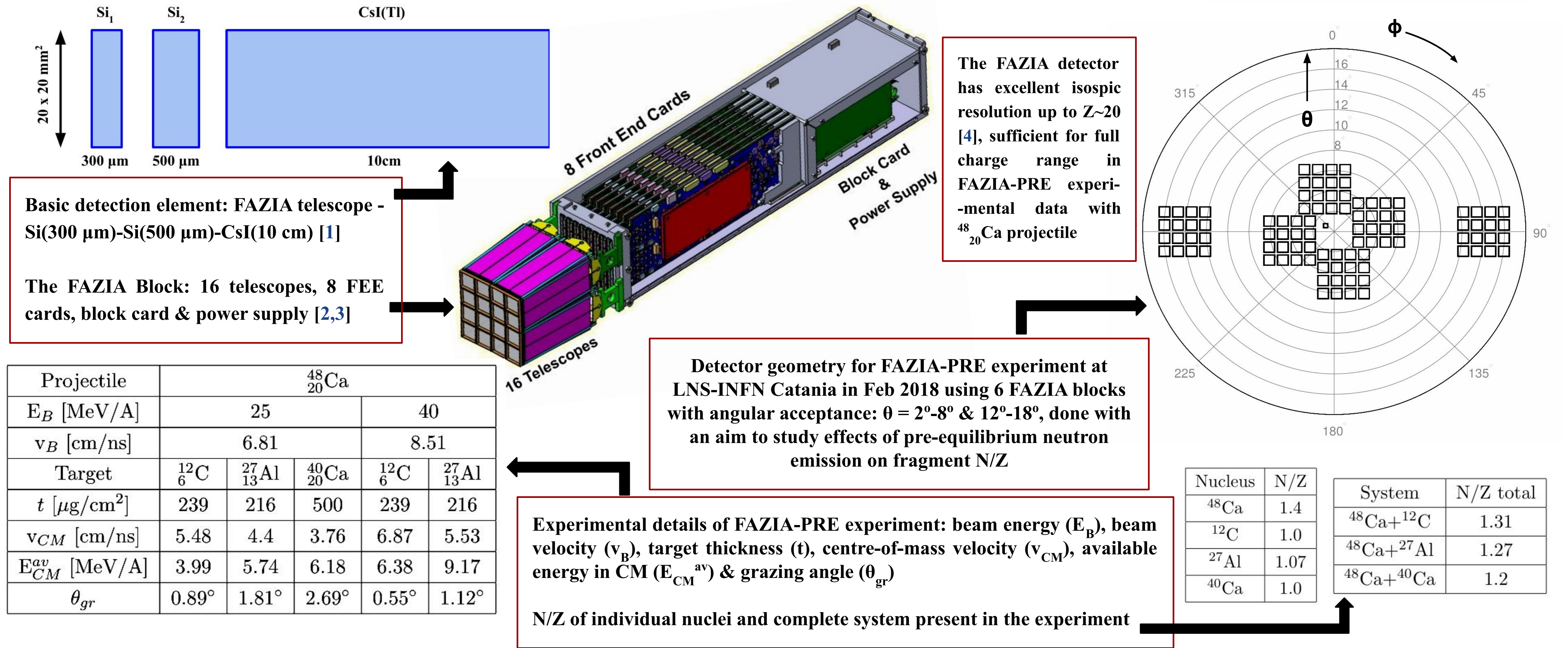
Systematic analysis of nuclear reactions at intermediate energies with a neutron rich projectile on multiple targets

S. Upadhyaya¹, T. Kozik¹, D. Gruyer², K. Mazurek³

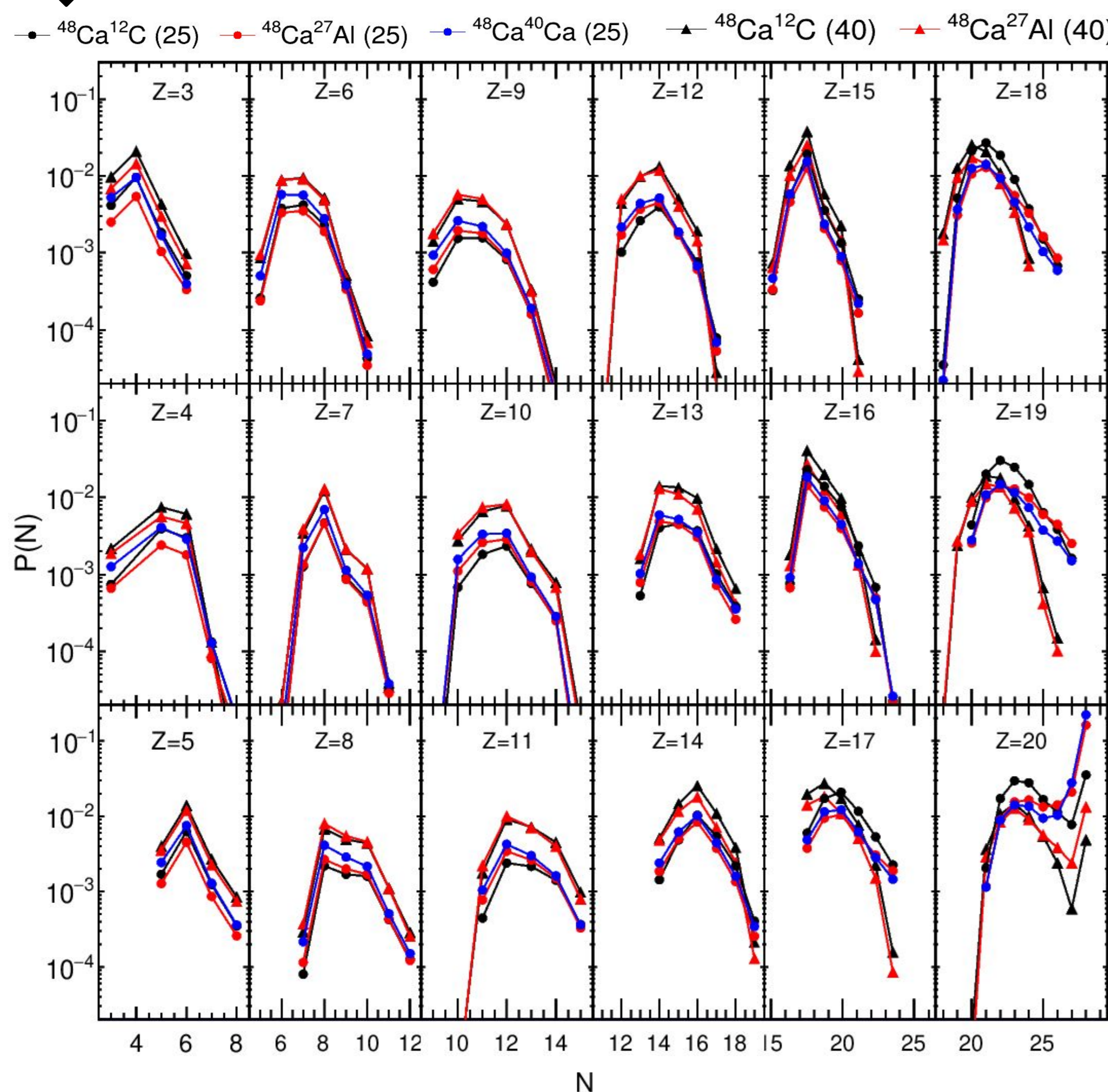
¹Marian Smoluchowski Institute of Physics, Jagiellonian University, 30-348 Krakow, Poland

²Normandie Université, ENSICAEN, UNICAEN, CNRS/IN2P3, LPC Caen, 14000 Caen, France

³Institute of Nuclear Physics, Polish Academy of Science, PL-31342, Krakow, Poland



Neutron (N) distribution obtained directly from $N = A - Z$ to calculate $\langle N \rangle$ for each Z (=3-20)

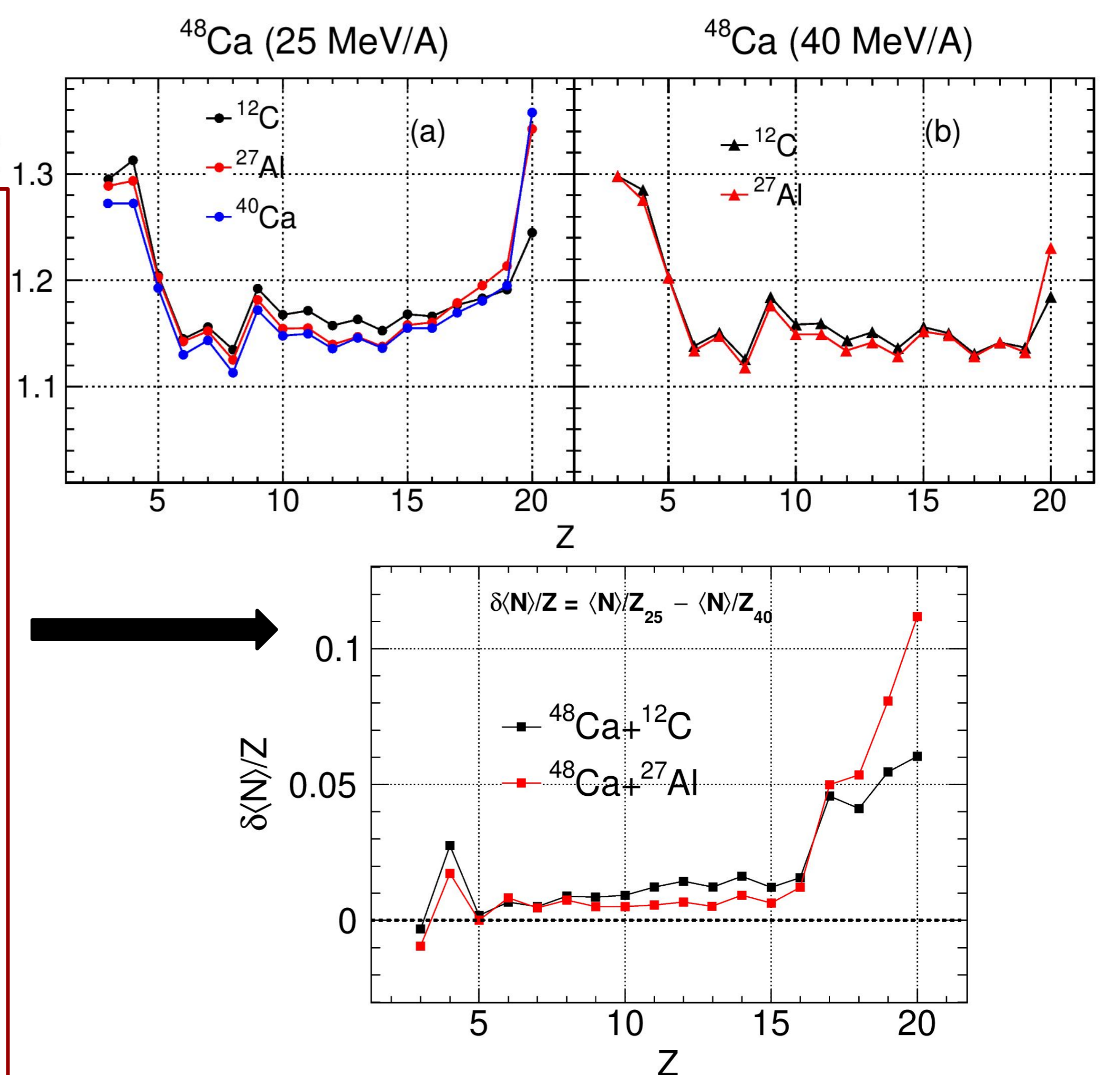


The $\langle N \rangle / Z$ of fragments observed to be decreasing with increasing target mass due to more dissipative collisions leading to higher rate of isospin equilibration, thus decreasing the fragment $\langle N \rangle / Z$.

The fragment $\langle N \rangle / Z$ w.r.t. beam energy (E_B) is observed to be decreasing with increasing E_B using the difference,

$$\delta \langle N \rangle / Z = \langle N \rangle / Z_{25} - \langle N \rangle / Z_{40}$$

Due to N-rich projectile, the fragment $\langle N \rangle / Z$ should increase with E_B because of mainly QP detection. But, with increasing E_B , pre-equilibrium N emission increases from the projectile [5], leading to a decrease in overall N/Z of the system, thus reducing the fragment $\langle N \rangle / Z$. Also, this effect is observed very strongly for heavier fragments ($Z > 16$) suggesting evidence of pre-equilibrium emissions from projectile.



References

- [1] S. Upadhyaya, *Acta Phys. Pol. B* **51** 399 (2020)
 [3] S. Valdré et al, *Nucl. Instrum. Methods A* **930** 27 (2019)
 [5] L. Lassen et al, *Phys. Rev. C* **55** 1900 (1997)

- [2] F. Salomon et al, 2016 *JINST* **11** C01064
 [4] R. Bougalt et al, *Eur. Phys. J. A* **50** 47 (2014)