Isotopic distributions of heavy fragmentation products - The isospin thermometer

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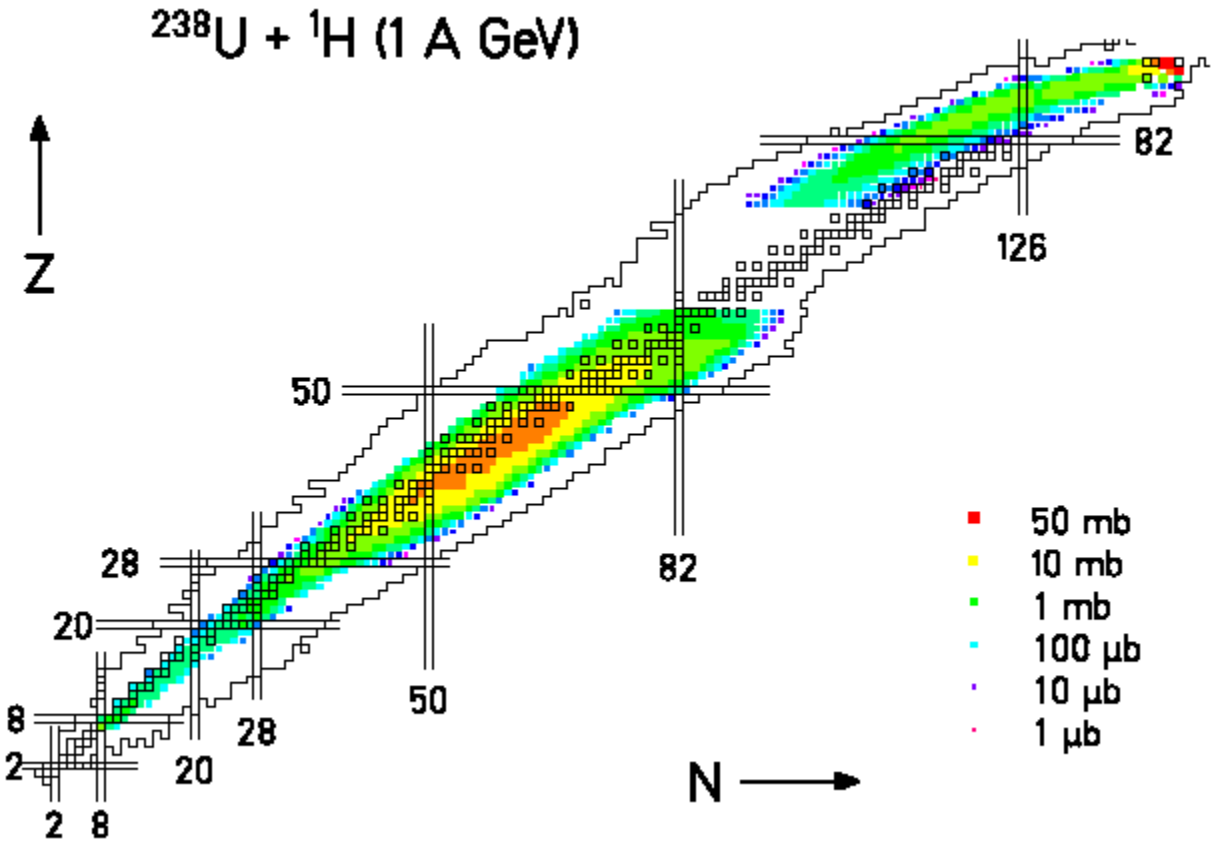
Information contained in <N>/Z ratio of heavy fragments

-- introduction --

• FRS allows to identify Z and A of all the measured fragments up to the projectile



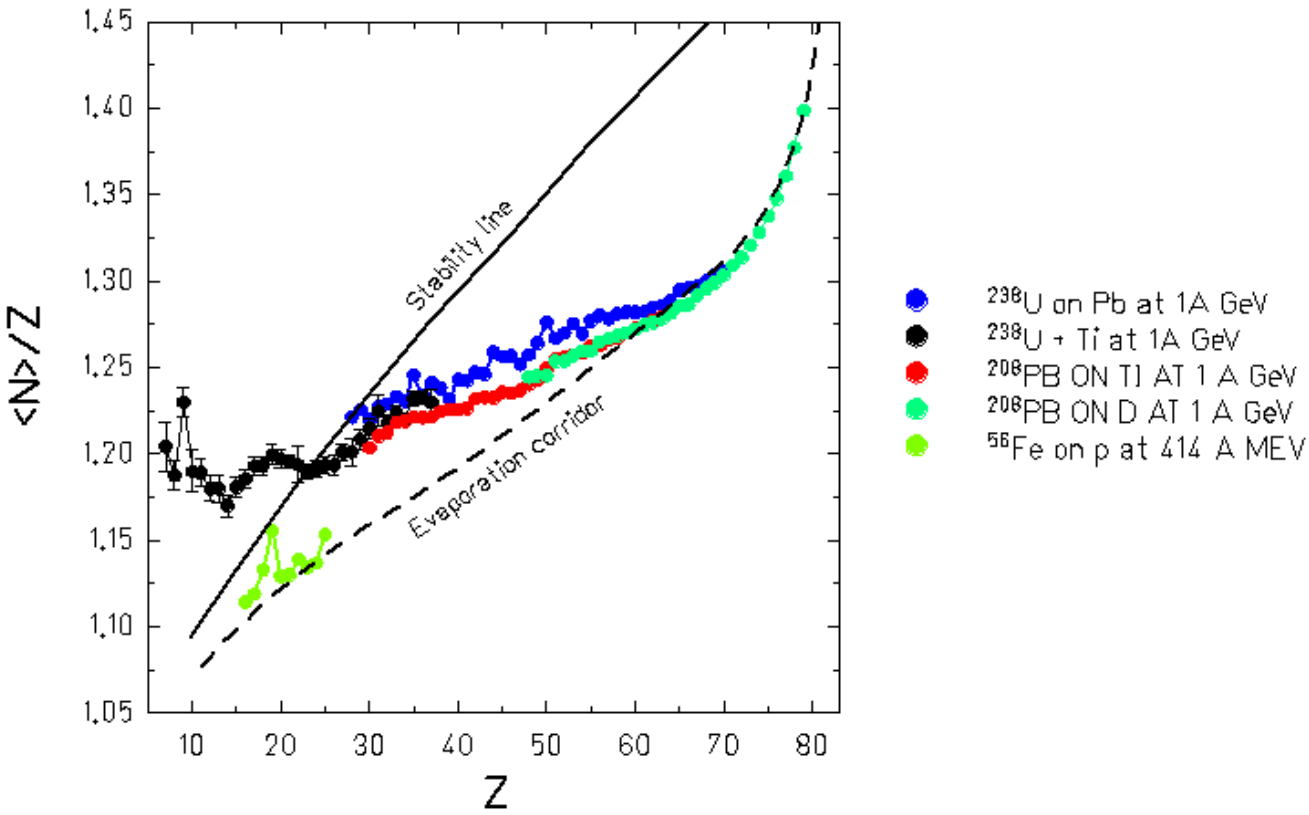
• investigation of the isospin (N/Z) effect in the nuclear reaction mechanism

⇒ fundamental question in the study of the properties of nuclear matter

• important: extension to heavy fragments

Information contained in <N>/Z ratio of heavy fragments

- - indications by previous experiments - -



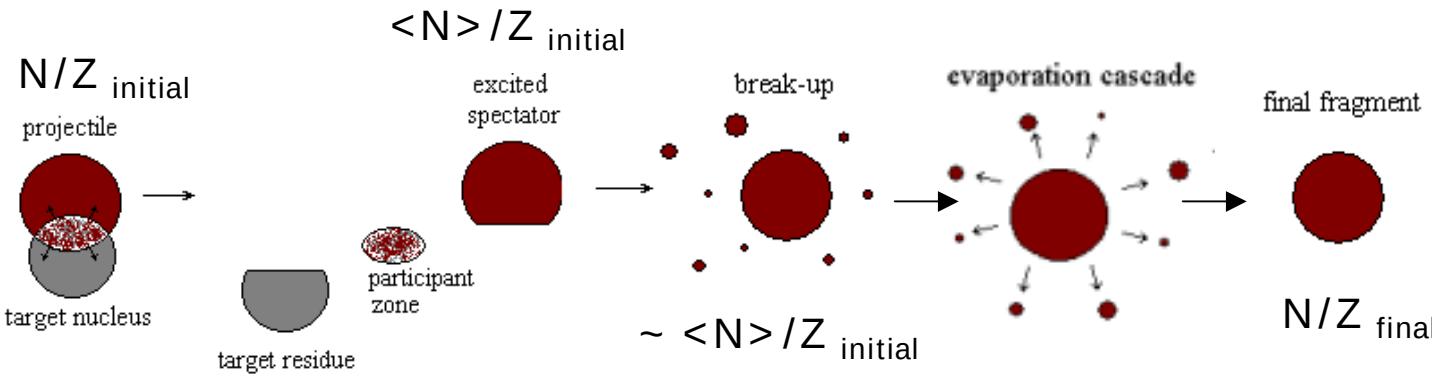
- data do not follow the evaporation corridor

- fragments keep the memory of the N/Z of the initial system

⇨ evaporation does not wash out this memory

Information contained in <N>/Z ratio of heavy fragments

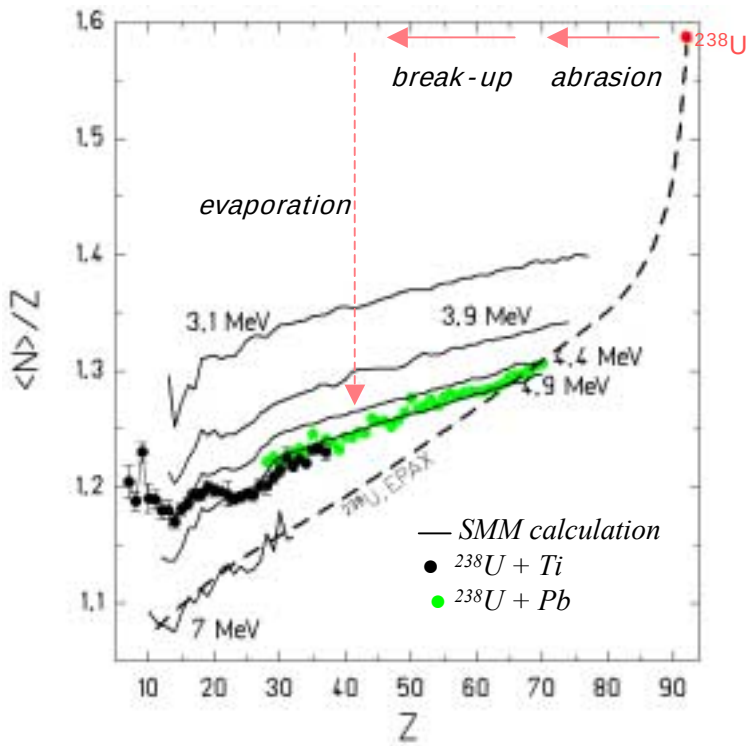
-- the isospin thermometer --



- $N/Z_{initial}$ - $<N>/Z_{final}$ = measure of the length of the evaporation cascade

⇒ possible to trace back the E* ~ T at the beginning of the evaporation stage

⇒ $T_{freeze-out}$ of the break-up stage may be deduced



$T_{freeze-out}$ ~ 5MeV and constant over a wide E range*

⇓

evaporation ends up earlier + does not wash out the information on initial N/Z

Proposed experiment

- deeper investigation of the presented indications
- U and Pb different elements, different fission competitions, small difference in N/Z
- use of two more N/Z different beams (1A GeV) → ^{124}Xe, ^{136}Xe + Pb target
  - ^{136}Xe, ^{124}Xe isotopes of the same element
  - no fission competition

What do we expect?

- more pronounced difference in the measured <N>/Z
- clearer signature of the memory on the initial N/Z
- $T_{freeze-out}$ dependence on the N/Z ratio?

present status:

- ^{136}Xe(1AGeV)+Pb experiment performed in November 2002

⇒ ^{124}Xe part shifted due to the technical problems of accelerator

⇒ presently waits for the beam time