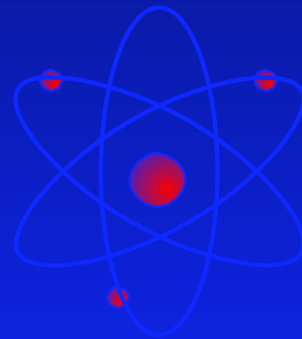


EXCITATION ENERGY DEPENDENCE OF FRAGMENT MASS AND TOTAL KINETIC ENERGY DISTRIBUTIONS IN PROTON-INDUCED FISSION OF URANIUM ISOTOPES

Ichiro Nishinaka

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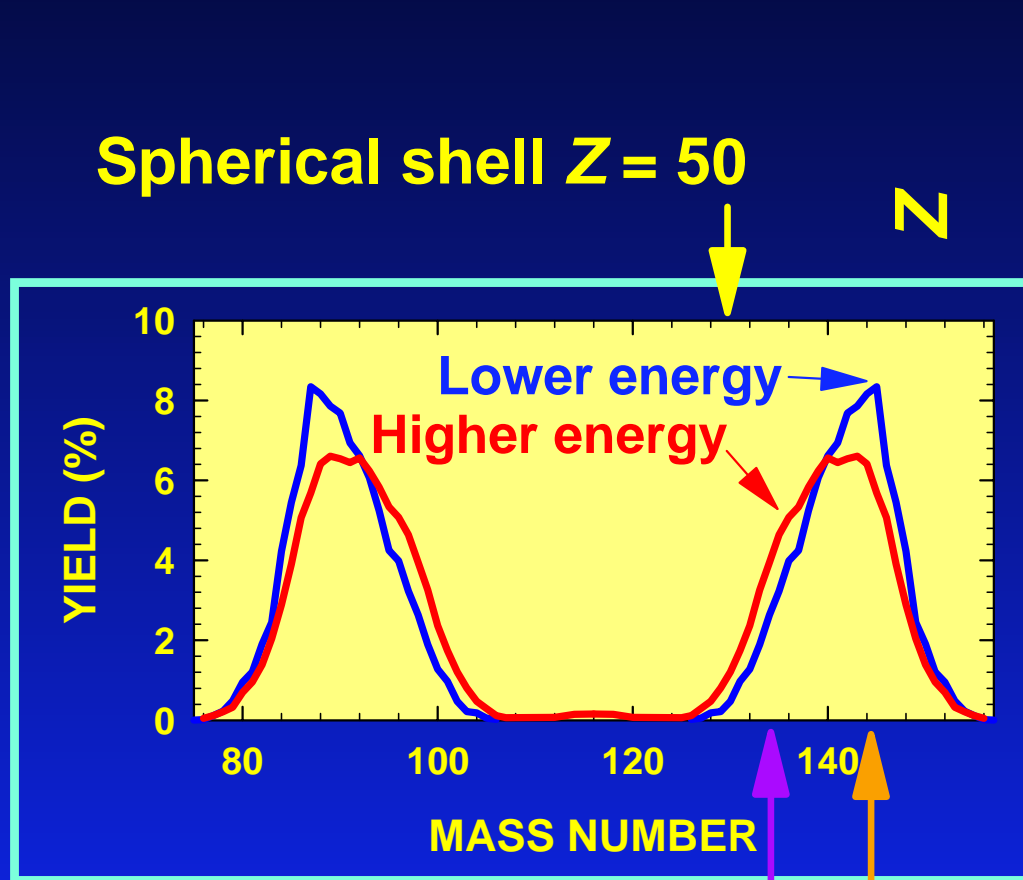


INPC2007 TOKYO, JAPAN JUNE 3-8, 2007

INTRODUCTION

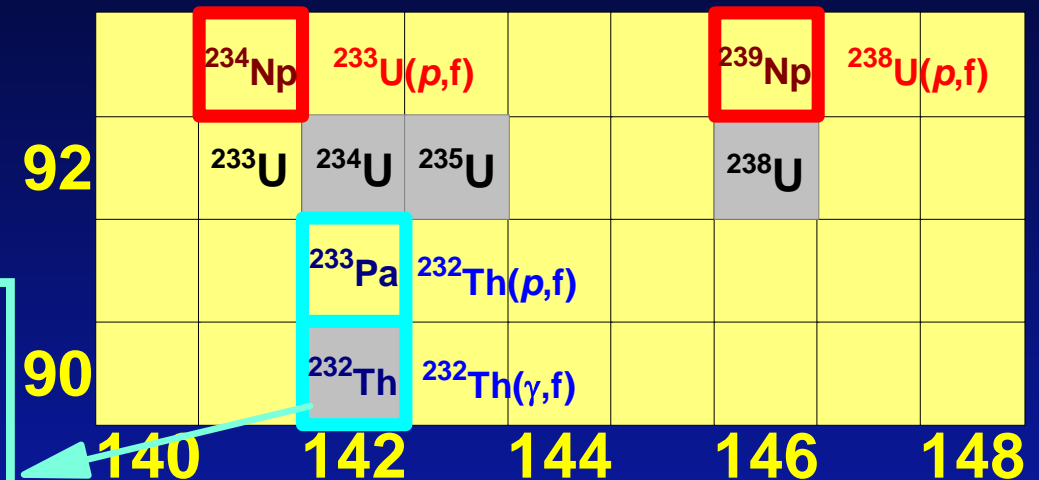
Shell effects play an important role in fission.

How shell effects are responsible for deformation and mass division ?



Spherical shell $N = 82$

Deformed shell $N = 86-88$



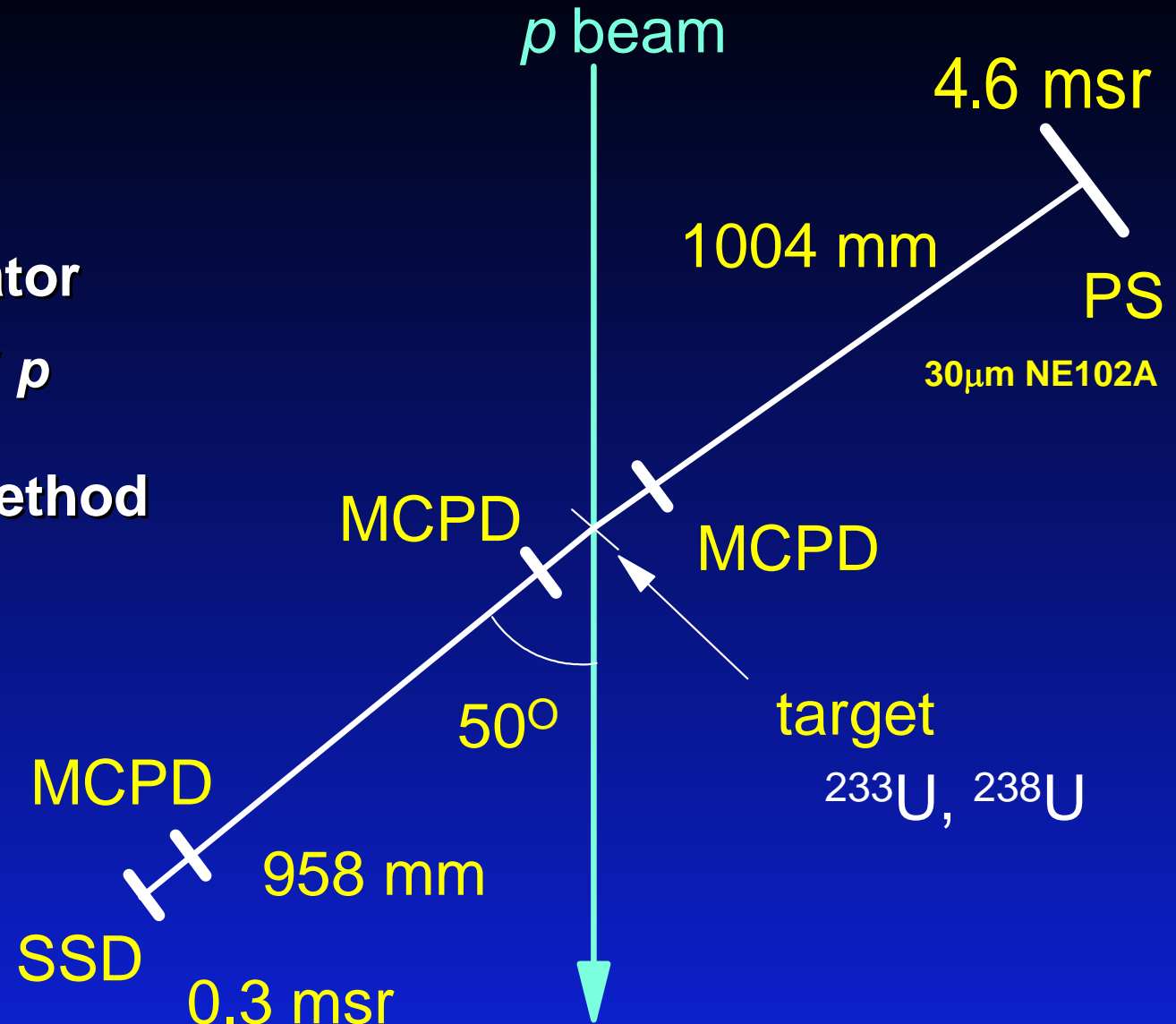
M. Piessens et al.,
Nucl. Phys. A556 (1993) 88

The aim of this work

To study how the excitation energy dependence is related with the neutron number of the fissioning nuclide.

EXPERIMENTS

- JAEA Tandem Accelerator
 - ▶ 10.0, 11.5 and 13.0 MeV p
- Double time-of-flight method



Calibration

240 MeV ^{127}I

^{89}Y , $^{\text{nat}}\text{Ag}$, $^{\text{nat}}\text{In}$, ^{141}Pr , ^{159}Tb (30 - 60 $\mu\text{g}/\text{cm}^2$)

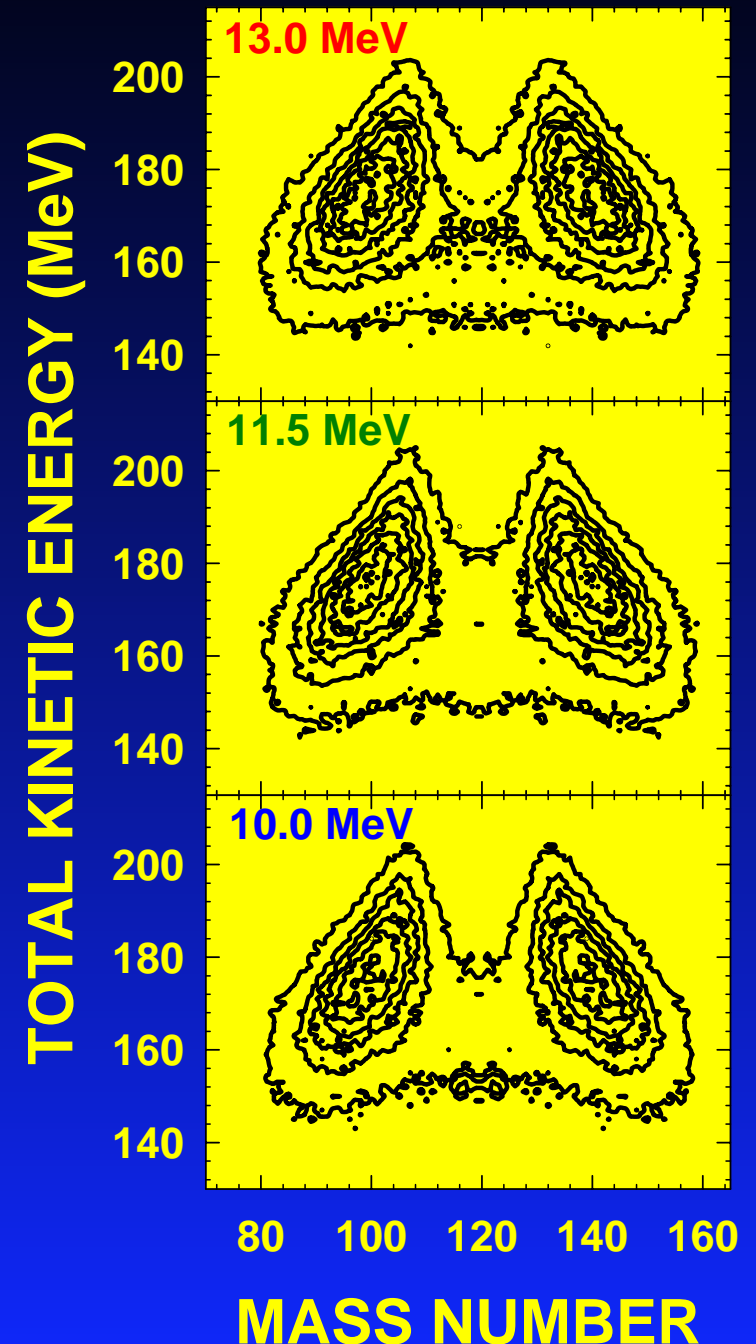
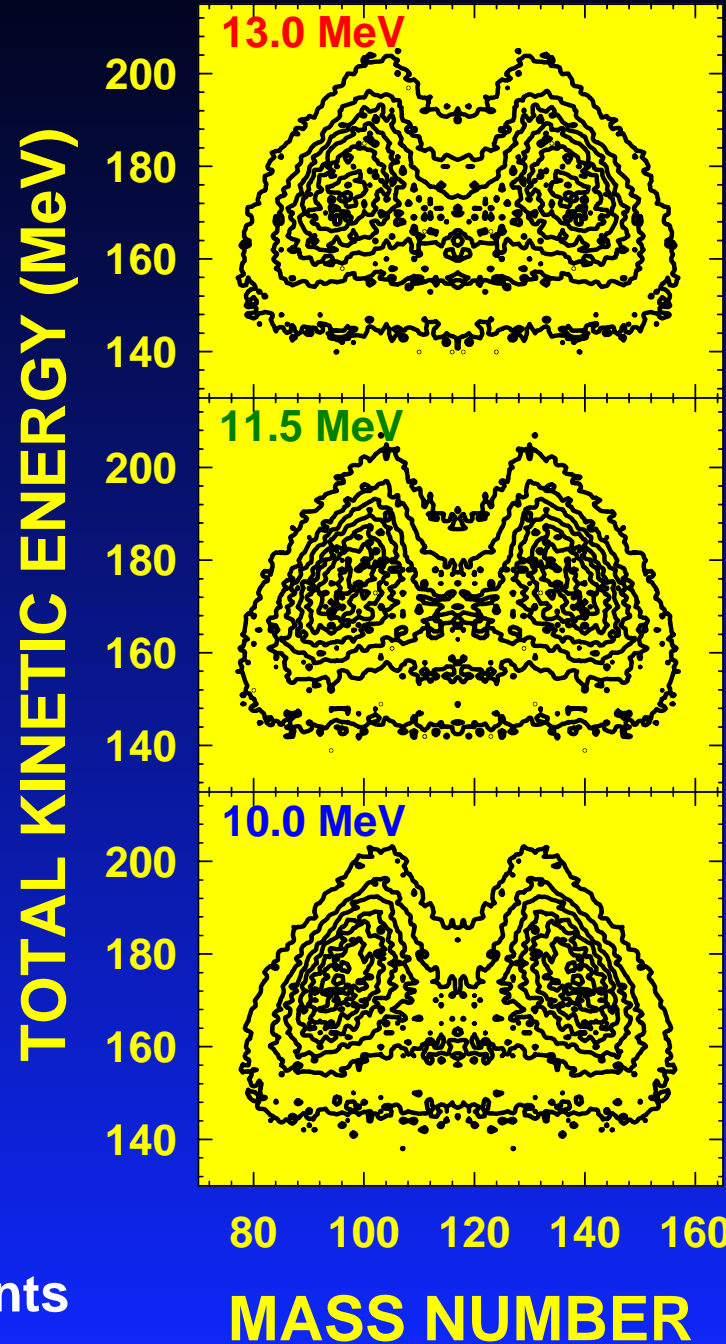
EXPERIMENTAL RESULTS

■ Mass and Total Kinetic Energy Distributions

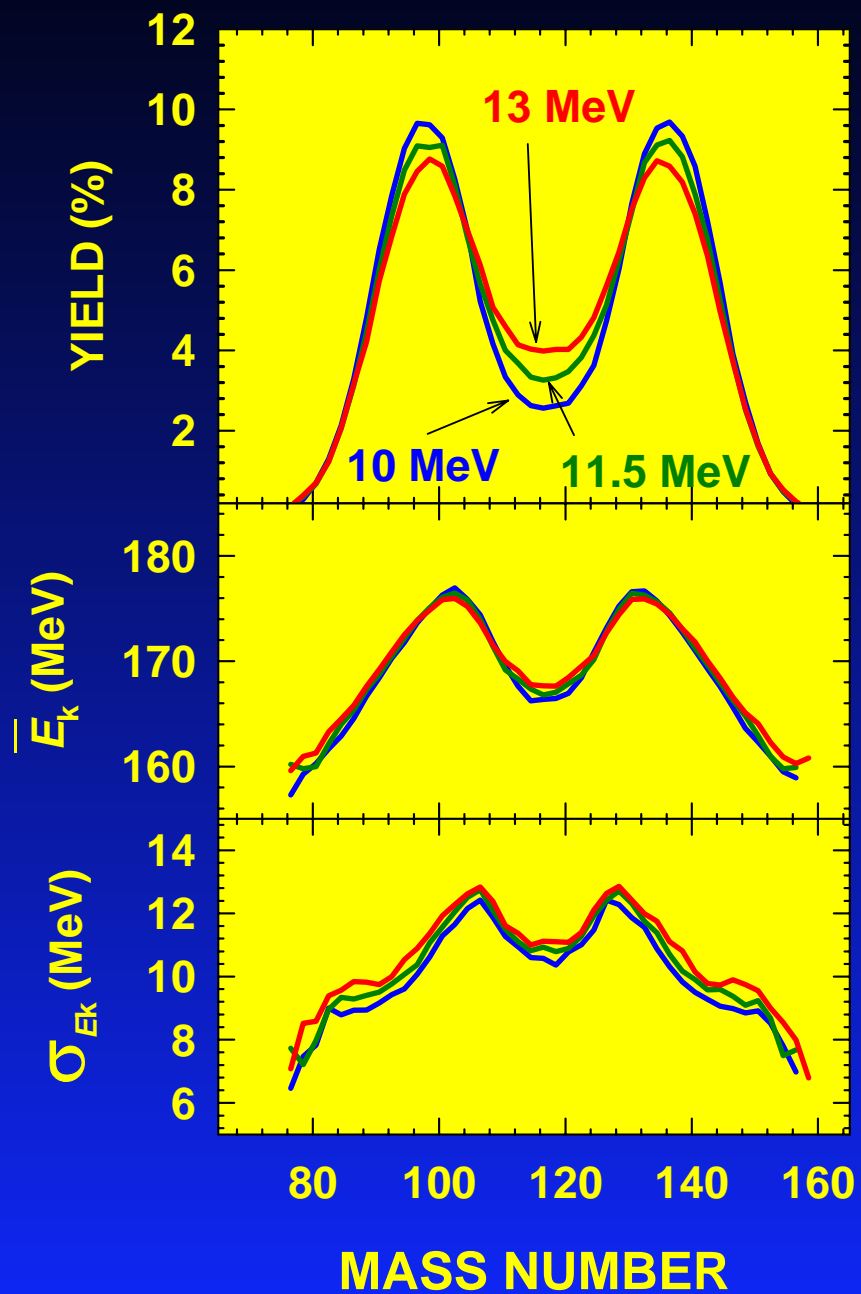
- Mass and momentum conservation
- Isotropic neutron emission from fragments

^{233}U $(1.3 - 1.4) \times 10^5$

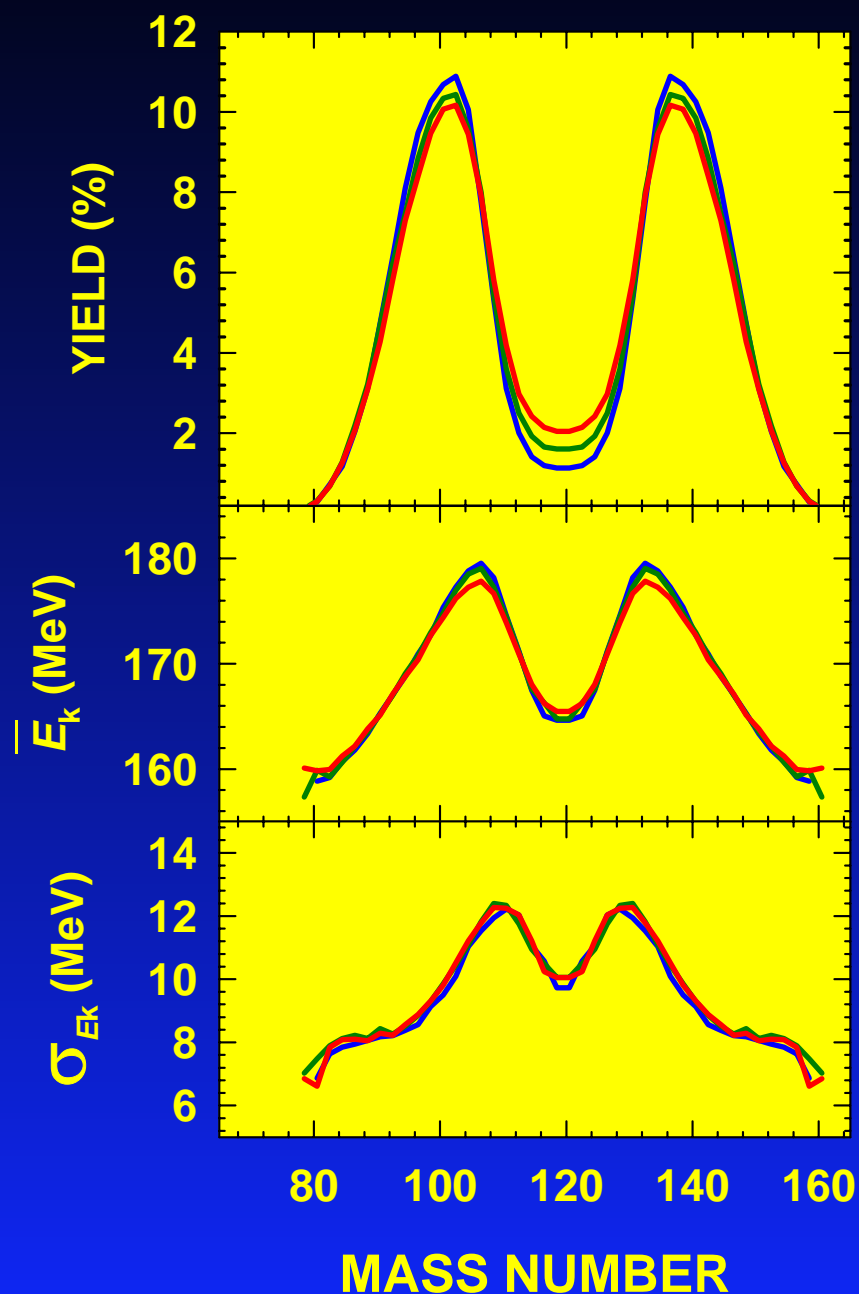
^{238}U $(0.9 - 1.2) \times 10^5$



$^{233}\text{U} + p$



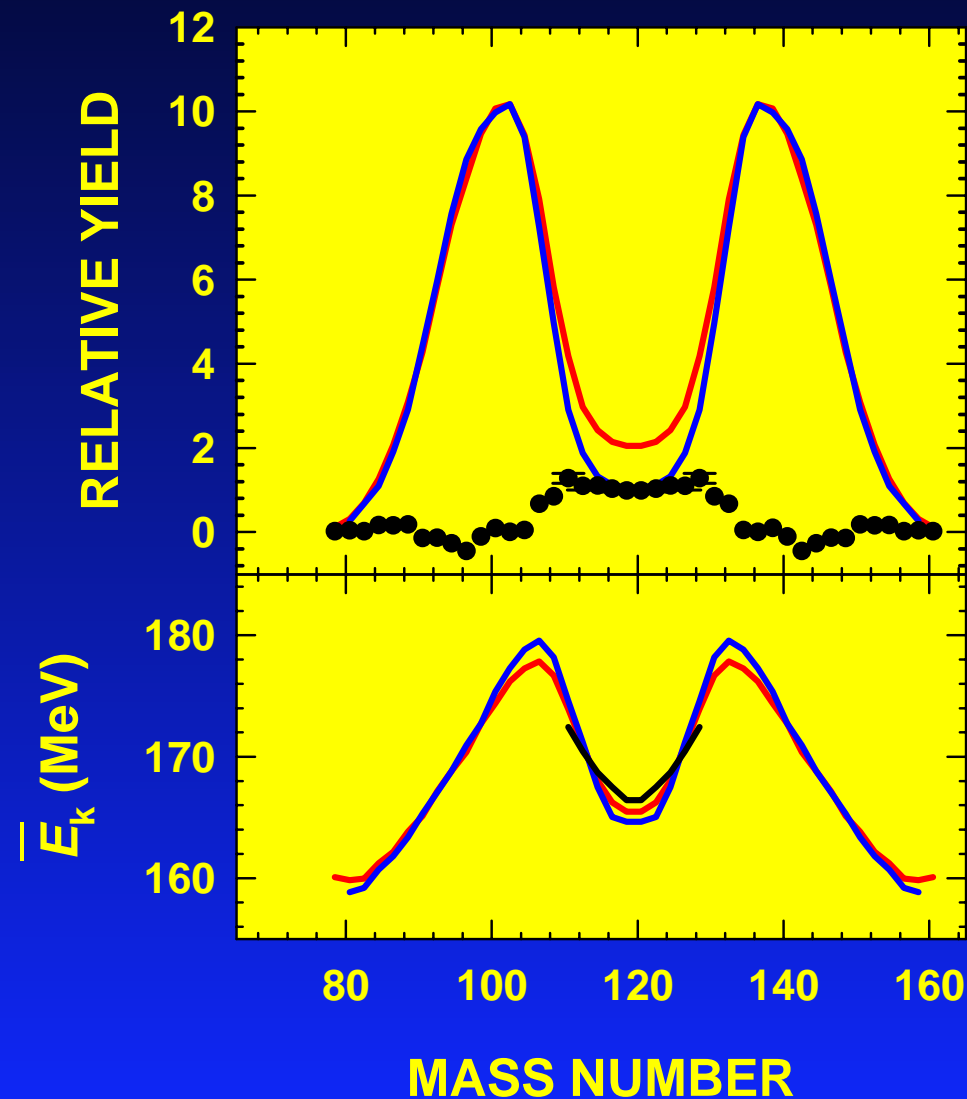
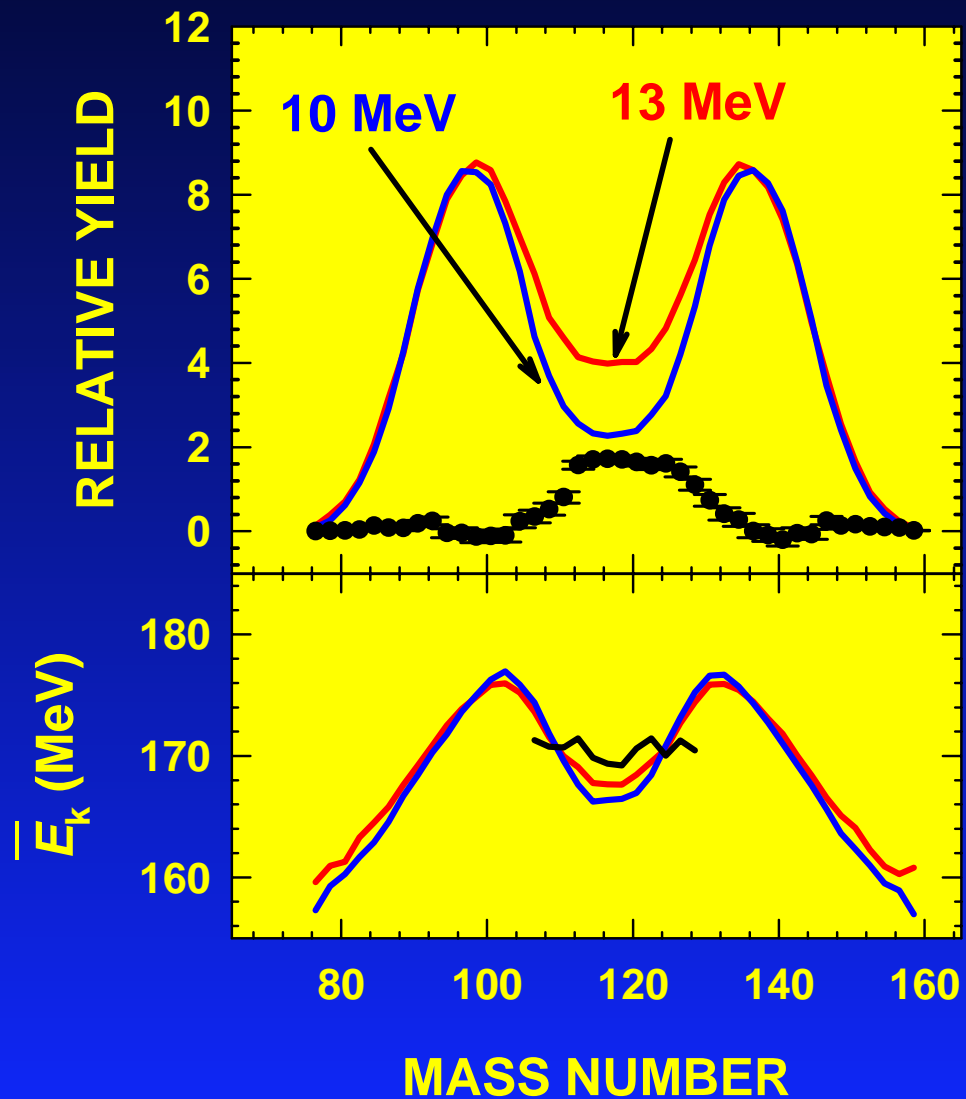
$^{238}\text{U} + p$



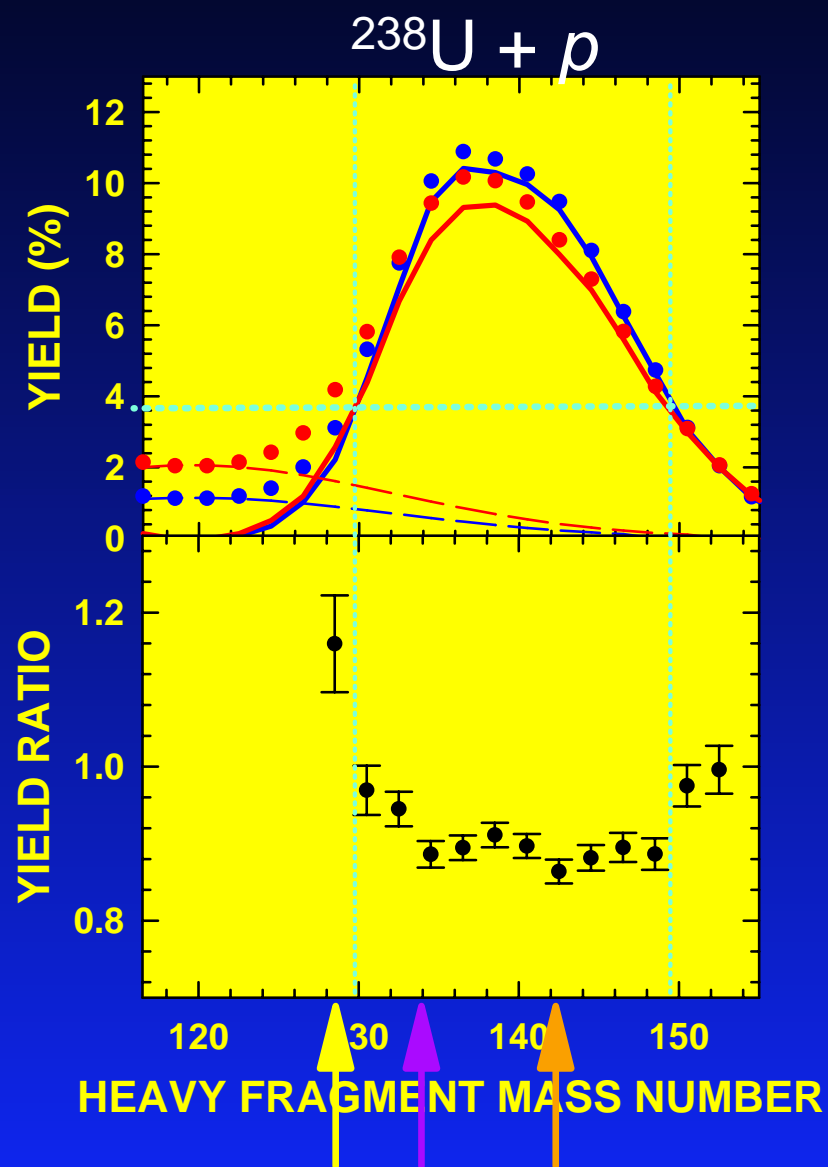
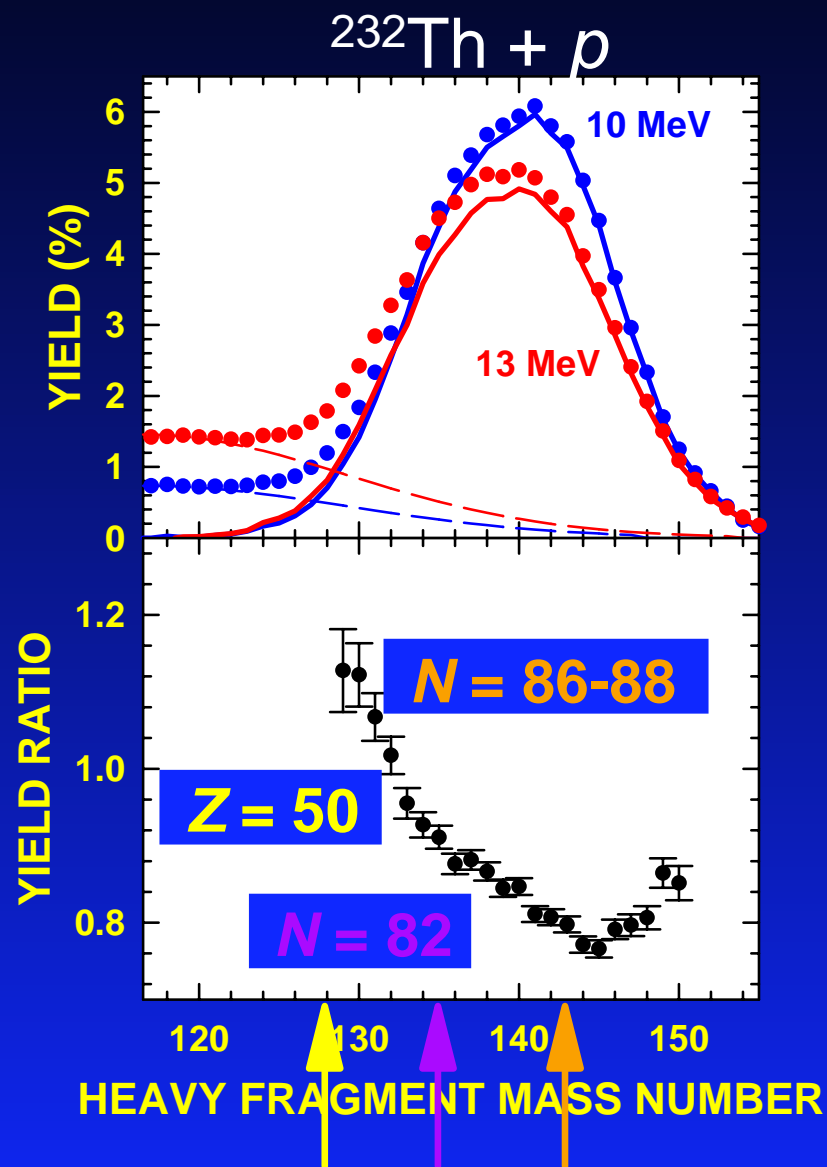
EXCITATION ENERGY DEPENDENCE

$^{233}\text{U} + p$

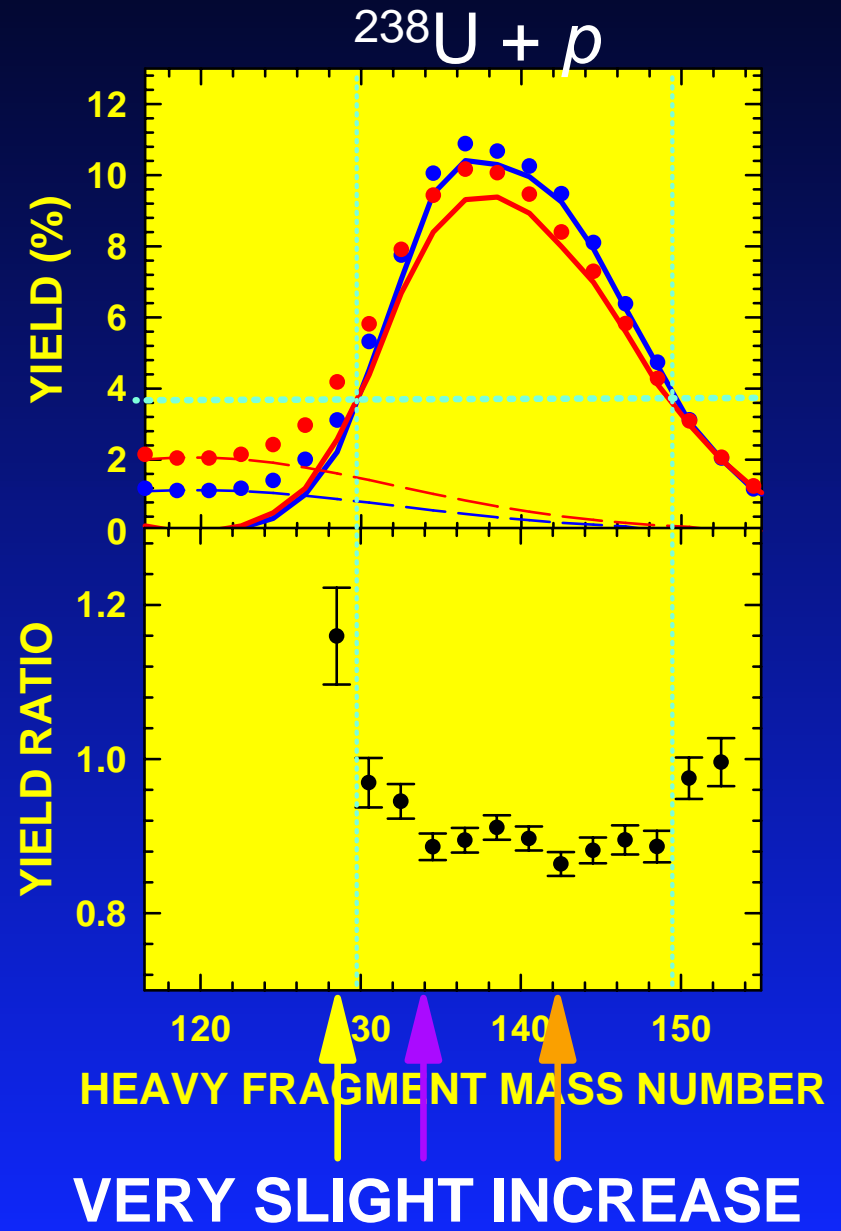
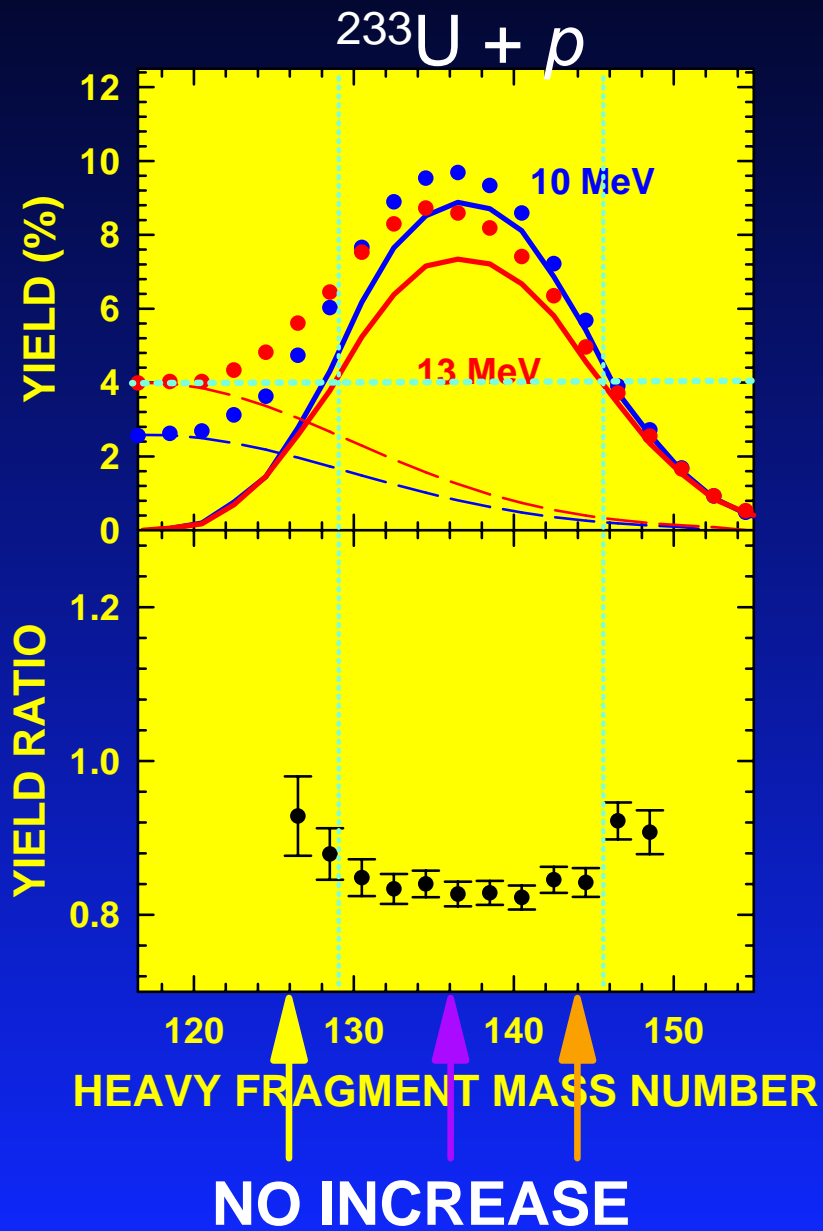
$^{238}\text{U} + p$



EXCITATION ENERGY DEPENDENCE OF ASYMMETRIC FISSION MODE



EXCITATION ENERGY DEPENDENCE OF ASYMMETRIC FISSION MODE



SUMMARY

Fragment mass and total kinetic energy distributions in the proton-induced fission of ^{233}U and ^{238}U at beam energies of 10, 11.5 and 13 MeV have been determined by the double time-of-flight method.

The yield at $A \sim 132$ with the spherical shells of $Z = 50$ and $N = 82$ seems to increase very slightly compared with that at $A \sim 143$ with the deformed shell of $N = 86 - 88$.

The excitation energy dependence of mass yields of the fragments with the spherical and deformed shells in the asymmetric fission modes is not evident in the proton-induced fission of uranium isotopes.

The excitation energy dependence seems to be sensitively related with the proton number of the fissioning nuclide.

Collaborators

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THANK YOU !