

Research Group for Reactions Involving Heavy Nuclei

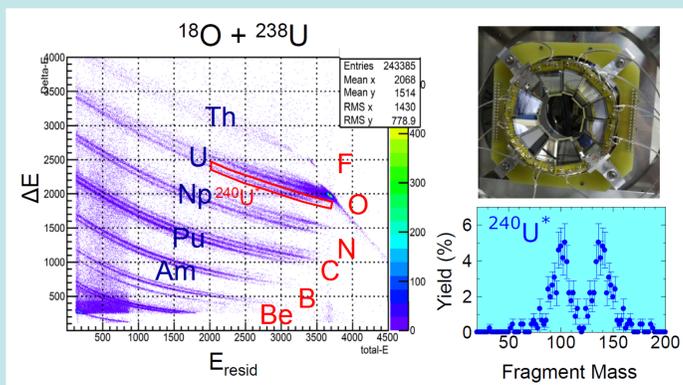
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Research Subject

• Fission process will be studied for nuclei located far from the stable isotopes. Fission properties such as fragment mass distributions are strongly influenced by the motion of nucleons involved in a nucleus at an extremely deformed shape. The new principle and phenomenon which is found in the proposed study would be used to develop a theoretical description in fission, which should be then applied to evaluate nuclear data needed in nuclear engineering.

Method: Transfer Reaction

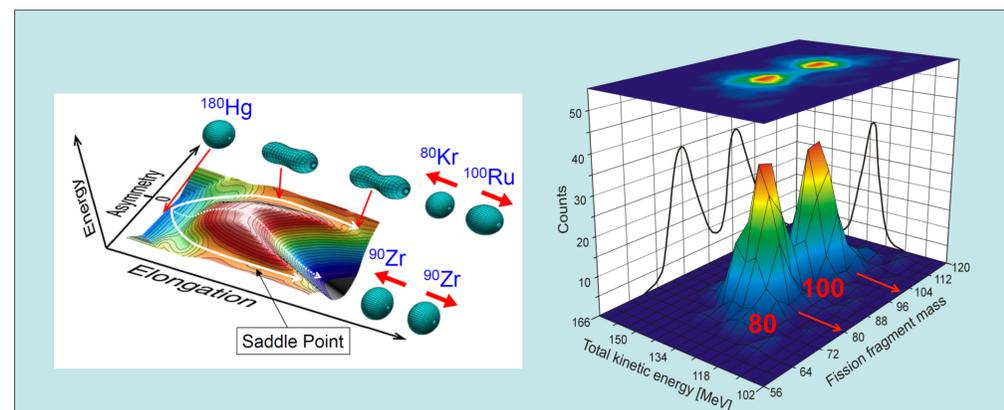
• A method applicable to measure the reaction cross sections of unstable nuclei. It will produce the same compound nucleus as the desired reactions by using different combination of target and projectile, mostly by multi-nucleon transfer reactions, and measure the decay probability to specific channels (such as fission and capture).



Fission fragment mass distributions: These data are obtained in one heavy-ion (transfer) reaction.

Research in exotic shell evolution of heavy nuclei

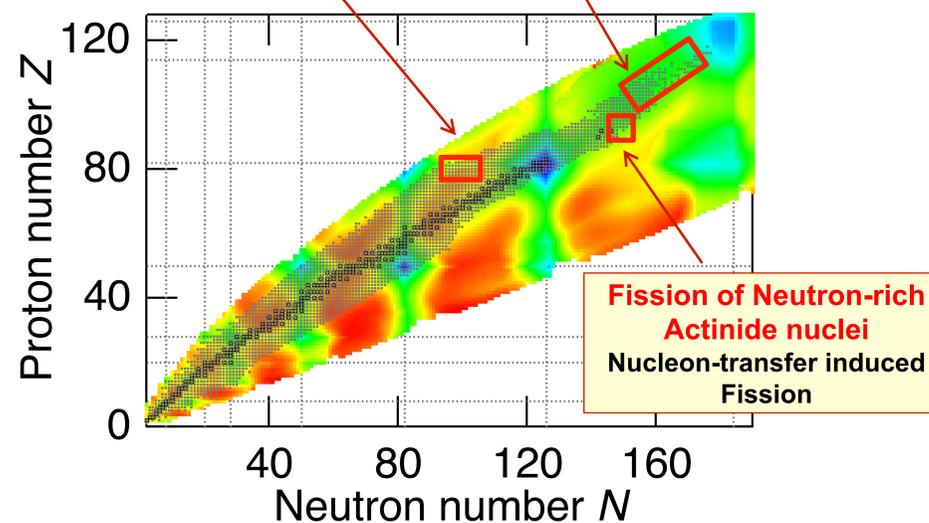
- Understanding the nuclear fission mechanism
- Finding new phenomena and new principle in fission
- Application to atomic energy, nucleosynthesis, etc.



Fission of proton-rich nuclei ^{180}Hg
: Asymmetric fission was observed in ^{180}Hg

Fission of Proton-rich Nuclei
Beta-delayed Fission
Fusion-fission

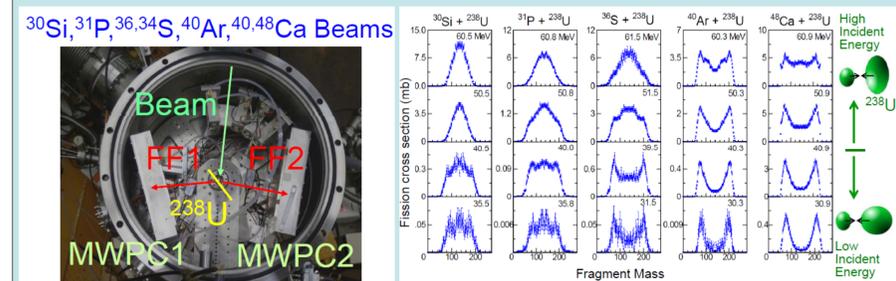
Fission of SHE
Fusion-fission, quasifission,
Spontaneous Fission



New region for fission study

Measurement of nuclear fission

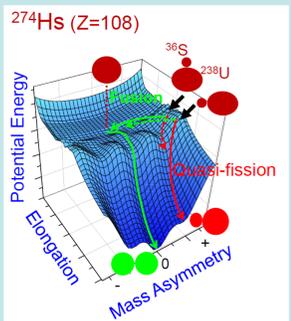
- In-Beam Measurement
Nucleon-transfer induced fission,
Fusion-fission, Quasi-fission
- β^+ -delayed Fission
- Spontaneous Fission



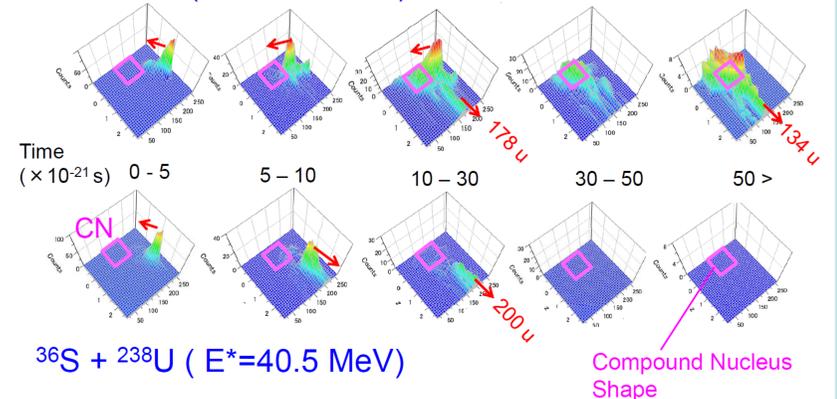
Setup for in-beam fission study at JAEA tandem facility (left) and measured mass spectra in heavy-ion collisions (right)

Theoretical Research

• Our focus in theoretical research is nuclear fission and reactions between heavy nuclei



$^{30}\text{Si} + ^{238}\text{U}$ ($E^*=35.5$ MeV)



Calculated time-evolution of nuclear shape in heavy-ion collisions