FISSION OF ^{236}Pu BY FAST NEUTRONS

Cristiana Oprea[1,2], Alexandru Oprea[3]

[1]National College “Emanoil Gojdu”, Oradea, Transylvania, Romania
[2]Research and Development Center "NUCLEAR MATTER IN EXTREME CONDITIONS" of the Faculty of Physics, University of Bucharest, Romania
[3]Technical College “Alexandru Roman”, Alesd, Transylvania, Romania

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1. AIMS OF THE WORK. EVALUATIONS OF FISSION VARIABLES IN ^{236}Pu(n,f)

1. Fission variables: Cross sections (XS); 2. Fission fragment mass and charge distributions (yields – Y and XS); 3. Prompt neutron emission (Average prompt neutron multiplicity, Prompt neutron multiplicity distribution); 4. Isotope productions; 5. Isomer ratios (next planned)

2. MOTIVATION. **1.** Isotope ^{236}Pu, like all other isotopes of Pu is produced in fission process in nuclear reactor. 2. ^{236}Pu especially is produced in the new type of research nuclear reactor based on ^{237}Np fuel. 3. ^{236}Pu allows to investigate the radioactive pollution on the environment due to ^{237}Np fission product. 4. Poor experimental data on fission variables for neutron induced fission of ^{236}Pu

3. **METHODS.** 1. For low neutrons up to 100 keV XS is calculated by Multilevel Breit-Wigner approach (next planned); 2. For fast neutrons XS, Y, MD + CD with XS and Y, prompt neutron variables, XS + Y of produced isotopes were evaluated with Talys code; 3. For isomer ratios combined Huizenga approach and Talys evaluations on populations and level density were used.

4. RESULTS. 1. Theoretical evaluation of fission variables. 2. Good agreement of XS theoretical and experimental data -> evaluations of other fission variables 3. Level density and WS optical potential parameter extraction

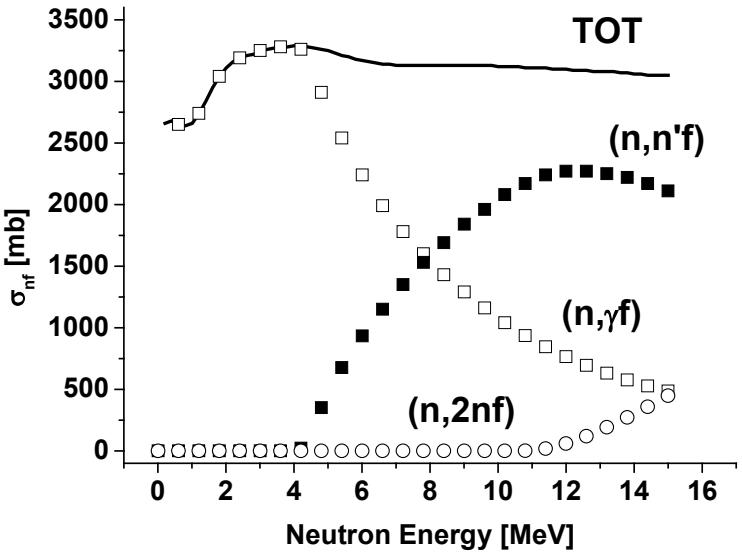
CONCLUSIONS

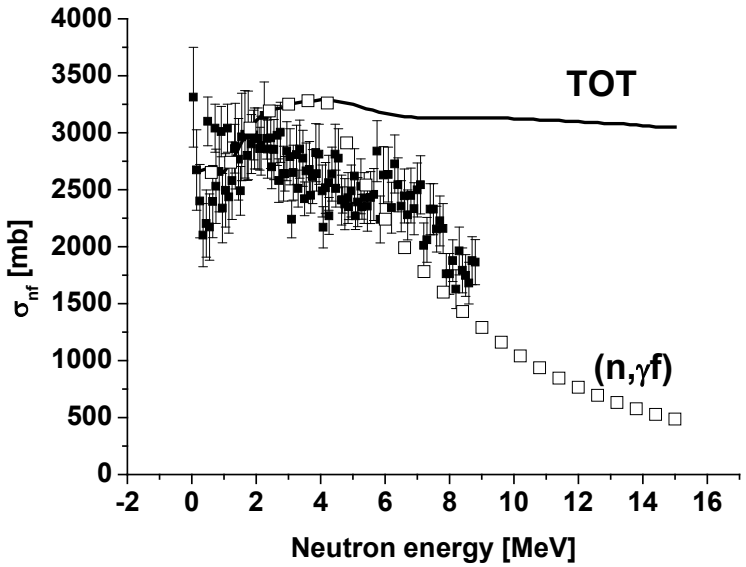
•Observables of fast neutron induced fission process on ^{236}Pu were investigated;
•Cross sections, mass distributions, dependence of average prompt neutron multiplicity on fission fragment mass, isotope production were obtained for incident neutron energy starting from slow up to 15 MeV;
•Cross sections and yields of a large number of isotopes produced in ^{236}Pu(n,f) process, were calculated;
•Calculations were compared with the few existing experimental data. They were well correlated;
•Cross sections well described for fast neutrons;
•The calculations will be extended for cross sections of slow neutron reactions.

Future plans

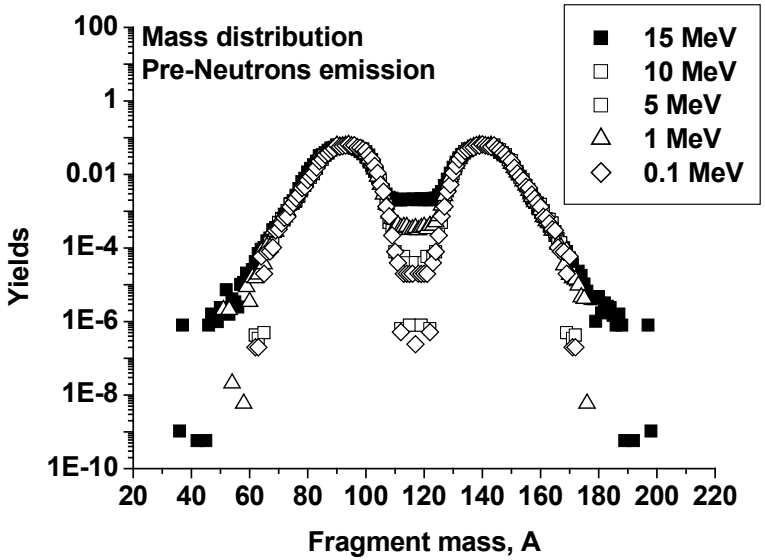
•New experimental data on fast neutrons fission of ^{236}Pu are planned as necessary
•Project proposals for experiment are in preparation
•Improvement of theoretical evaluations and computer simulations, including computer modeling of fission variables for different experimental setups

Total Fission Cross Section – Theoretical calculations + Experimental Data

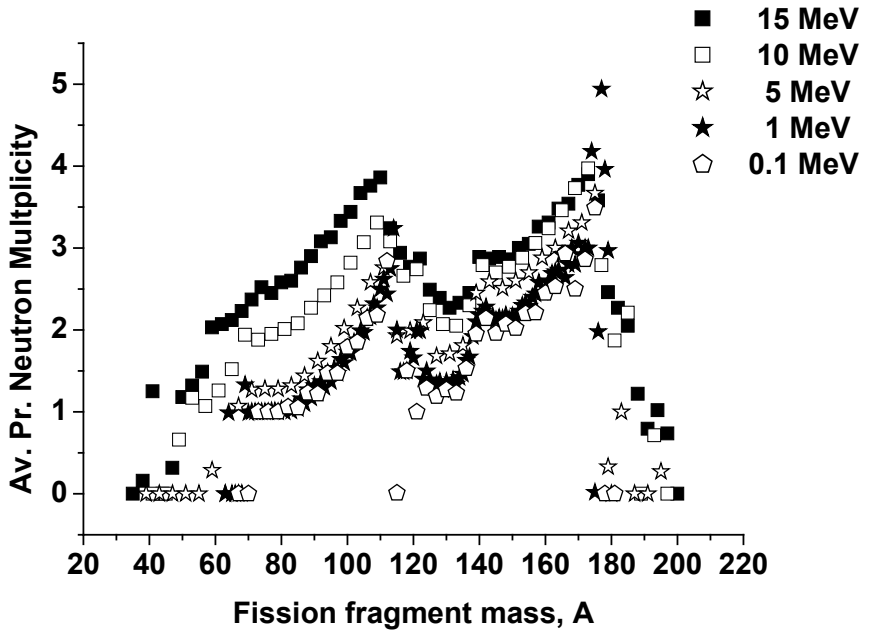




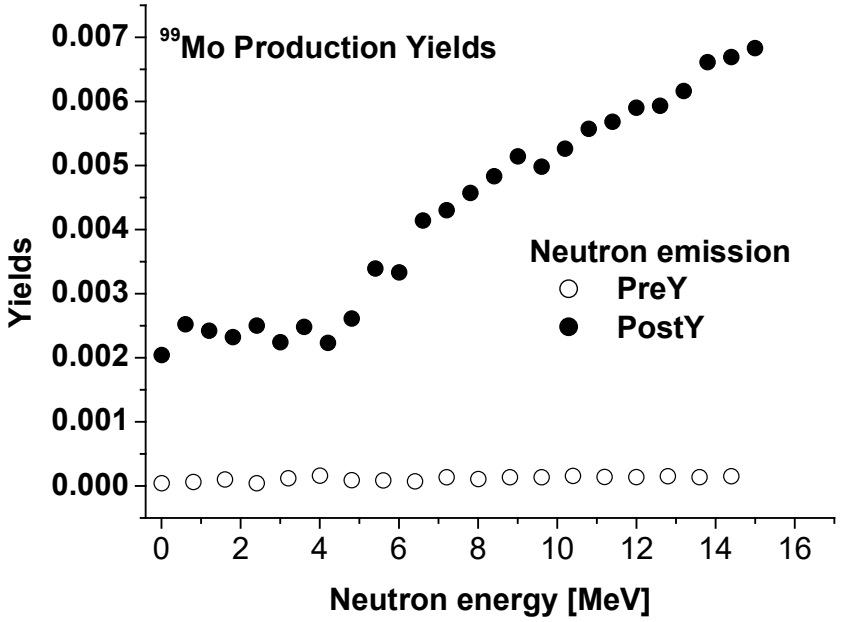
Mass Distributions



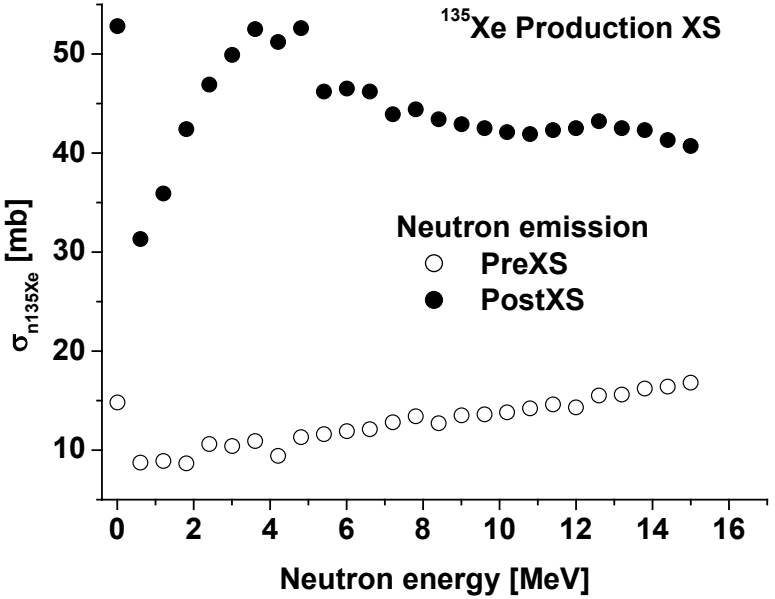
Average Prompt Neutron Multiplicity



Production of ^{99}Mo - Y



Production of ^{135}Mo - XS



^{99}Mo

– Important for medicine

- Calculated with enhancement precision in Talys

^{135}Xe

– High neutron absorber

- Major fission product in Uranium fission

- Calculated with standard precision in Talys