

Hauser-Feshbach Statistical Modeling of ^{233}U (N, F)

Cristiana Oprea¹, Alexandru Mihul², Ioan Alexandru Oprea³, Ion Gruia⁴

^{1,3}Romanian Scientific Research Agency, Bucharest (ANCS), Romania

⁴University of Bucharest, Romania

^{2,3}CMS, CERN, CH-1211 Genève 23, Switzerland

Abstract

Nuclear data obtained in the research of ^{233}U fission are of great importance for nuclear reactors based on the Th-U fuel cycle. Fission cross-sections, mass and charge distributions, prompt emission in fission including neutron multiplicities, yields of some isotopes of interest as ^{232}U , and associated uncertainties were obtained. This paper presents the theoretical predictions and the first results on $^{233}\text{U}(n,f)$ by applying Talys and the author's computer codes, dedicated to nuclear reaction mechanisms and the structure of nuclei calculations.

First, the fission mass distributions and product yields were simulated using the Brosa model. For some cases, the fission yield isomeric ratios were calculated using different models of gamma and neutron sources. Uncertainties induced by nuclear data were quantified using preliminary, energy-dependent relative covariance matrices evaluated with ENDF nuclear data and processed for the studied fission process.

Keywords: ^{233}U (n,f) process, Hauser-Feshbach modeling, cross sections, mass distribution, fission yields