Contribution ID: **15** Type: **Submitted**

Beta-delayed fission investigation of ^{188m1,m2}Bi employing isomer-selective laser ionization

Friday 7 December 2018 12:20 (20 minutes)

A dedicated and world-wide unique program to study β-delayed fission (βDF) is being performed by our collaboration since a decade ago at the ISOLDE (CERN), e.g. [1,2,3]. In βDF, the mother nucleus undergoes β decay to excited state in the daughter nucleus with the energy comparable to the fission barrier height and the daughter nucleus then fissions. The excitation energy is limited by Q_β value of parent nucleus, which is usually below 10 MeV. Therefore, βDF represents so called low-energy fission, which is sensitive to structure of the nucleus. It allows us to investigate fission properties of exotic isotopes, for which other low-energy fission studies would be extremely difficult or currently impossible. For example, βDF measurements established a new region (and a new type) of asymmetric fission [1,2].

Beta delayed-fission of ^{188}Bi was previously studied in JINR Dubna [4,5] and at SHIP, GSI Darmstadt [6]. There are two predominantly α-decaying isomers in ^{188}Bi with half-lives of 60 ms and 265 ms [7], and in these studies it was not possible to assign the fission to specific isomer, neither the total kinetic energy (TKE) nor fission fragment mass distribution measurements were done.

In this contribution, we report on the recent βDF measurement of ^{188}Bi performed at ISOLDE. The key goal of our study was to investigate βDF properties of the isomers in ^{188}Bi separately, and to attempt to probe the spin dependence of fission. To obtain isomerically-pure beams, we employed selective power of RILIS. Results of these investigations will be presented, including partial half-lives of βDF for each isomer, and TKE and fission fragment mass distribution for longer-lived isomer. Findings will be discussed in connection to partial half-lives systematics and theoretical calculation of fission fragment mass distribution.

REFERENCES

[1] A. N. Andreyev et al., Phys. Rev. Lett. 105, 252502 (2010).
[2] A. N. Andreyev, M. Huyse and P. Van Duppen, Rev. Mod. Phys. 85, 1541 (2013).
[3] L. Ghys et al., Phys. Rev. C 90, 041301(R) (2014).
[4] Yu. A. Lazarev et al., Inst. Phys. Conf. Ser 132, 739 (1993).
[5] Yu. A. Lazarev et al., Europhys. Lett. 4 , 893 (1987).
[6] J. F. W. Lane et al., Phys. Rev. C 87, 014318 (2013).
[7] A. N. Andreyev et al., Eur. Phys. J. A 18 , 39 (2003).

Author: ANDEL, Boris (Comenius University in Bratislava (SK))

Co-author: IS608 COLLABORATION

Presenter: ANDEL, Boris (Comenius University in Bratislava (SK))

Session Classification: Low Energy Physics 2