In-core neutron flux mapping

Jožef Stefan Institute, Exercise JSI-06

Main topic: Reactor Physics

Keywords: Neutron flux distribution, miniature fission chamber, power peaking factors

Purpose: The purpose of the experiment is the measurement of relative axial neutron flux distributions in several experimental locations in the core of the JSI TRIGA reactor. This is accomplished through the use of miniature fission chambers with an external diameter of 3 mm, inserted into specially designed guide tubes and a JSI-developed pneumatic positioning system.

Level of exercise:	☐ Basic	☒ Advanced	☒ Complex
Level of education:	☒ BSc	☒ MSc	☒ PhD

What you will learn:
Students will measure axial neutron flux profiles with miniature fission chambers in several different measuring positions and control rod configurations, visualize the effect of the insertion of a control rod on the neutron flux distribution, analyze the shape of the neutron flux profile and compare it with theoretical predictions.

Important information:
- Minimal size of student group: 4
- Maximal size of student group: 12
- Overall duration of the experiment (in wall clock hours): 3-4

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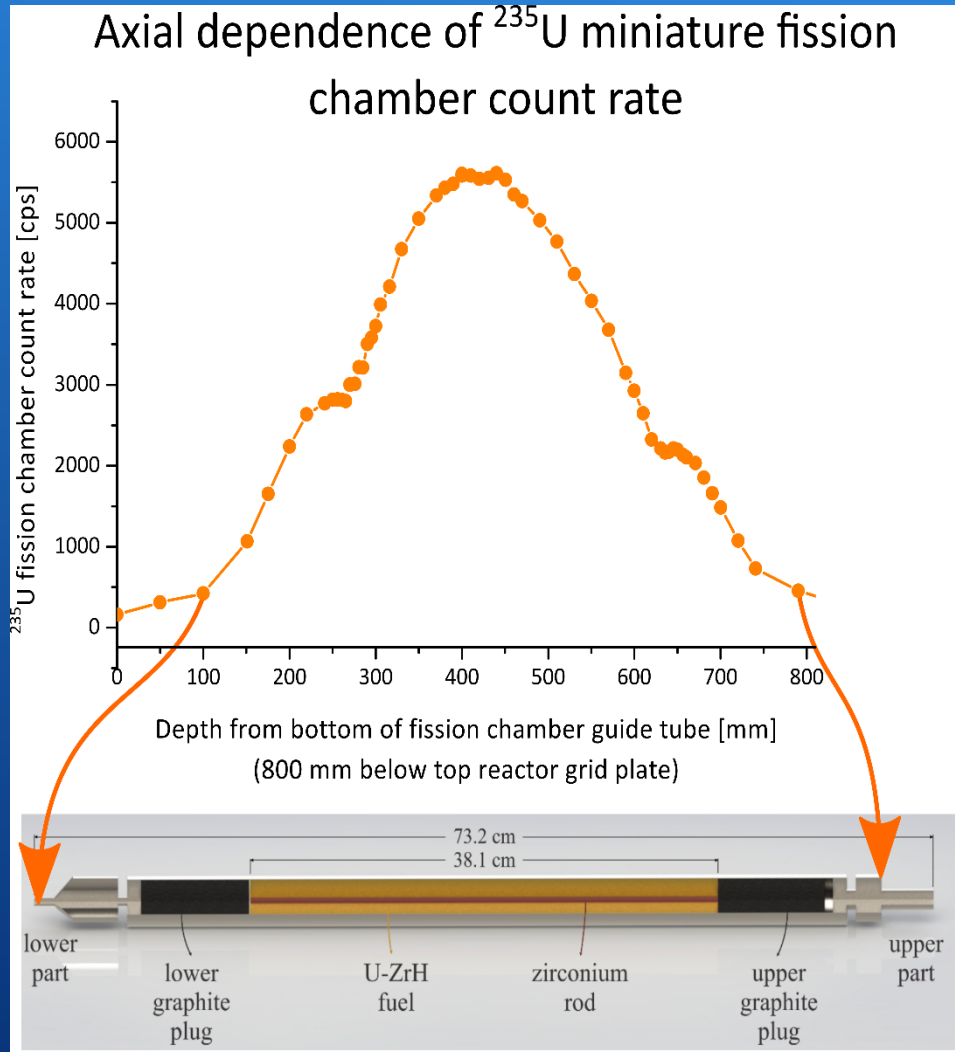
Possibility to perform experiment on demand: ☒ Yes ☐ No
Frequency of occurrence: on demand
Examination modalities: report
Teaching languages: English, Slovenian, Serbian/Croatian, Italian, French

Pre-knowledge required: Basics of Reactor Physics, in particular neutron flux and power distribution inside a reactor core and basics on fission chamber operation.

Instruments required for exercise:
- Reactor instrumentation;
- Fission chamber
- Dedicated software developed by JSI
- Pneumatic fission chamber positioning system

Execution:
- Students perform relative axial fission rate profile measurements in the core of the TRIGA reactor in several radial positions, and compare the measured profiles with theoretical predictions.
- Features in the measured profiles due to heterogeneity of the reactor fuel are discussed.
- Measurements are performed with two control rod configurations in order to visualize on the spot the effect of the insertion of a control rod on the neutron flux distribution.

Limitations:
None



TRIGA reactor fuel element