

# Delayed neutrons detection

## Czech Technical University in Prague, Experiment CTU05

**Main topic:** Experimental reactor physics

**Keywords:** VR-1 reactor, delayed neutrons, prompt neutrons

**Purpose:** Majority of neutrons produced during fission is released within a very short time of the actual fission event. A small portion of neutrons is produced with some delay after the fission process delayed neutrons. Although the delayed neutrons comprise only a small part of the total number of neutrons generated from fission, they play an important role in nuclear reactor control and operation. Reactor operation would be impossible without their existence.

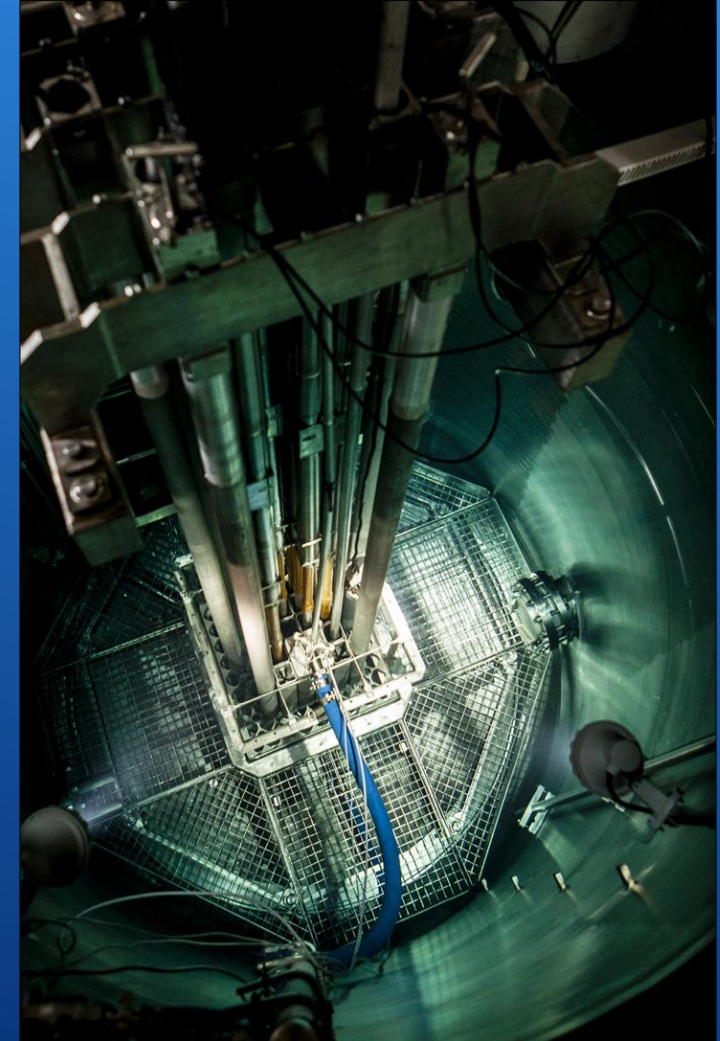
**Level of exercise:**  Basic  Advanced  Complex  
**Level of education:**  BSc  MSc  PhD

### What you will learn:

Learning objective of the experiment is to learn and to understand the delayed neutron detection. The experiment is highly suitable for students studying nuclear engineering as the major curriculum and it is suitable for students studying various major engineering curricula as such as power engineering, mechanical engineering, electrical engineering with future assignment in various nuclear curricula.

### Important information:

- Minimal size of student group: 4
- Maximal size of student group: 10
- Overall duration of the experiment (in wall clock hours): 3



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Possibility to perform experiment on demand:  Yes  No  
 Frequency of occurrence: On demand, ca 30 times/year  
 Examination modalities: Protocol, evaluation, discussion  
 Teaching languages: English, Czech

**Pre-knowledge required:** The students should be familiar with introduction to the reactor physics, particularly with delayed neutrons, and with neutron detection. Prior to this experiment, CTU02 - Neutron detection should be performed.

## Instruments required for exercise:

- The VR-1 reactor
- The instrumentation for delayed neutrons detection

## Execution:

At the Training reactor VR-1, the delayed neutron detection is carried out using the instrumentation for delayed neutrons detection. For the delayed neutron detection, the lecturer chooses one or more samples which are more appropriate to the students' curricula. The lecturer also chooses if the experiment is carried out only in qualitative approach or if also quantitative approach is used to determine the absolute mass of the fission or fissionable materials in the sample.

## Limitations:

No particular limitation for this experiment, only general requirements for entry to research nuclear installation according to the Czech nuclear legislation should be fulfilled.

