

# Measurement of gamma and neutron dose rate

## BME Training Reactor, Exercise BME-08

**Main topic:** Dosimetry of gamma and neutron radiation

**Keywords:** neutron and gamma dose rate meters, reactor as a source of radiation

**Purpose:** This exercise is aimed at making the students familiar with the radiation types and corresponding dose rates that occur near/in particle beam lines of research or training reactors. Proper measurement techniques are shown and applied in order to determine the dose rates at one of the horizontal beam ports of the training reactor. The proportion between the reactor power and the measured dose rates at low reactor power levels are studied. Materials used for shielding and their attenuation characteristics are also studied.

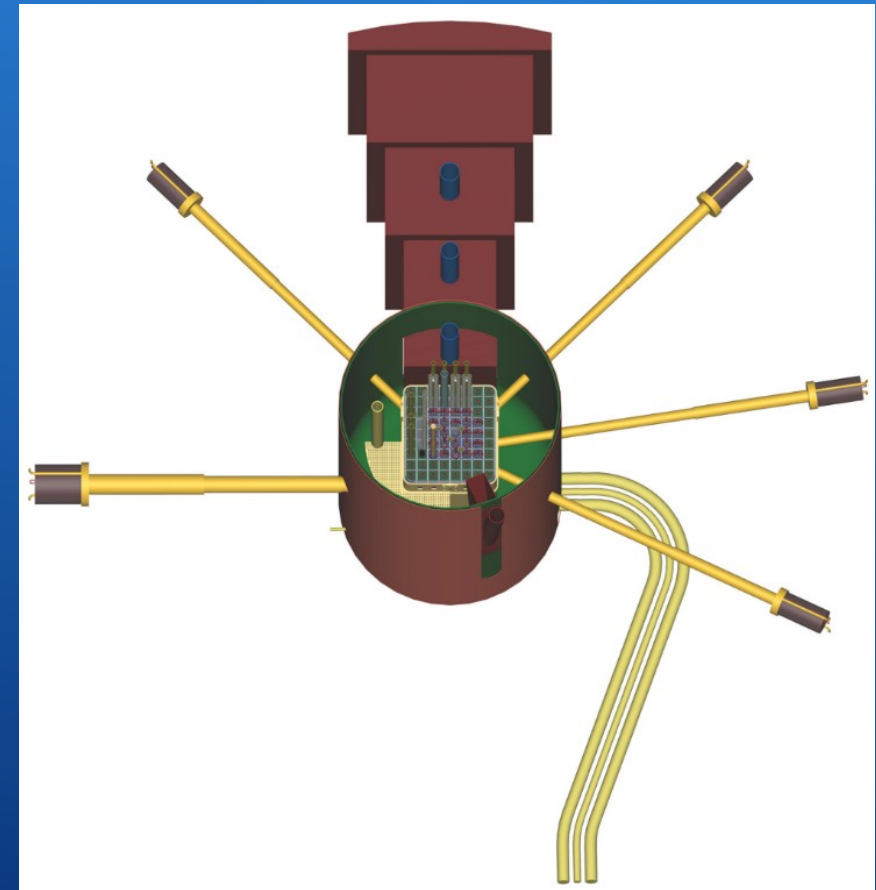
**Level of exercise:**  Basic  Advanced  Complex  
**Level of education:**  BSc  MSc  PhD

### What you will learn:

Students learn the characteristics of neutron and gamma radiation occurring near beam ports of research reactors, the use of appropriate neutron and gamma dose rate meters for measuring these radiation types and the shielding properties of selected materials

### Important information:

- Minimal size of student group: 2
- Maximal size of student group: 6
- 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: 10-12 times per year

Examination modalities: short test before measurement, experiment report after

Teaching languages: English, Hungarian

Pre-knowledge required: Basics on radiation detection and dosimetry / dose rate measurements

### Instruments required for exercise:

- Reactor with horizontal beam port opened
- Gamma dose rate meter
- Neutron dose rate meter
- Shielding materials

### Execution:

- A background dose rate measurement is performed with a shutdown reactor.
- After opening one of the horizontal beam ports, the gamma and neutron dose rates are determined using appropriate dose rate meters.
- The reactor is started and the power level is increased in 5 steps up to 100 W. Both dose rates are measured after each power change. The linearity between reactor power and gamma/neutron dose rates is analyzed.
- Measurement of shielding properties of different materials of various thicknesses is also carried out.

### Limitations:

None.

