TRAINING OPTIONS

Reactor Courses:

Reactor Training	Training in Radiation Protection
Reactor Start-up	Counter Characteristics
Control Rod Calibration	Distance Law
Activation and Decay of Radioactive Nuclides	Shielding Performance
	Gamma Spectroscopy
Critical Experiment	Radiation Field Measurements
Adjoint Flux Function	Half-Life Determination
Pile-Oscillator	Identifcation of unknown Nuclides
Critical Mass	
Neutron Flux Distribution	Neutron and Gamma Dose Rate

Studium Generale:

	Visit to Training Nuclear Reactor	Nuclear Reactor Training
Duration	3 hours (once)	3 Credit Points
Dates	by arrangement	by arrangement
Crediting	no	Certificate of Attendance, Examination Certificate
Contents	Introduction to AKR, Demonstration of the Reactor Start-up	2-3 Introductory Lectures and 6 experiments

Public relations:

For pupils of secondary schools (minimum age 16 years) and other interested people, we offer a 3-hours information program covering main questions concerning nuclear energy. This event includes the demonstration of the reactor start-up procedure.
Visits should be arranged by phone.

Contact:

Prof. Dr. A. Hurtado
Phone: +49-351-463 34472

Prof. Dr. W. Hansen
Phone: +49-351-463 33831
Fax: +49-351-463 33831
E-Mail: wolfgang.hansen@tu-dresden.de

Dr. T. Wolf
Phone: +49-351-463 33831
Fax: +49-351-463 33831
E-Mail: tilo.wolf@tu-dresden.de

Dr. C. Lange
Phone: +49-351-463 33831
Fax: +49-351-463 33831
E-Mail: carsten.lange@tu-dresden.de

Web:

http://tu-dresden.de/mw/akr

Address:

TU Dresden
Ausbildungskernreaktor AKR-2
Walther-Pauer-Bau
George-Bähr-Straße 3b
D-01069 Dresden

TECHNISCHE UNIVERSITÄT DRESDEN

Education – Research – Information

TRAINING REACTOR

GENERAL DESCRIPTION

The main purpose of the training reactor AKR is the education of students in fundamental experiments of nuclear and reactor physics as well as in radiation protection.

In addition, the reactor is involved in scientific projects (e.g. as a neutron source).

Furthermore, the AKR is a center of information on questions about nuclear energy. For visitors, the reactor provides practical as well as educational options for demonstrations in the field of nuclear technology.

The Training Nuclear Reactor AKR is a

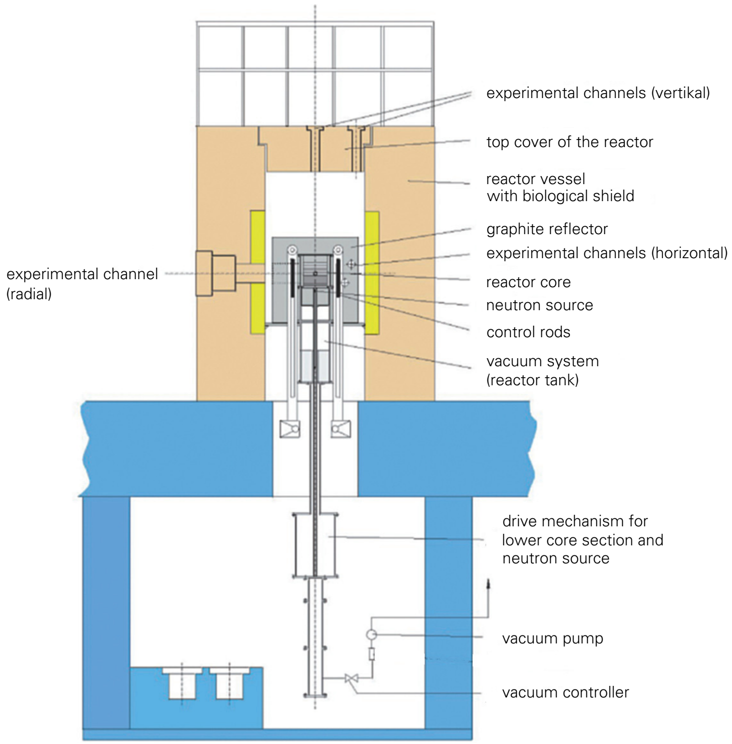
*** thermal** nuclear fission is mainly caused by thermal neutrons

*** homogeneous** the nuclear fuel and the moderator are homogeneously distributed in the fuel plates

*** solid material moderated** moderator material is polyethylene, no water

Zero Power Reactor low power of only 2 Watts, hence, virtually
no temperature effects,
no fuel burnup,
no nuclear waste,
no activation of structural materials,
no Xe-poisoning,
and no other power-related effects.

REACTOR DESIGN



The cylindrical core has a diameter of 250 mm and a height of 275 mm. It consists of disk-shaped fuel elements. For safety reasons, the core is divided in two separate, hermetically sealed sections. The critical mass is about 790 g Uranium-235. The core is surrounded by graphite-reflector material from all sides. Three absorber rods made from Cadmium allow the chain reaction to be controlled. They are moved vertically within gaps inside the reflector. A paraffin layer and baryte concrete embedded in the reactor vessel ensure reliable and sufficient radiation shielding. The reactor status is monitored using three redundant neutron-measuring channels. Their detectors are radially distributed around the core outside of the reflector. The AKR has four horizontal and two vertical experimental channels. The reactor cover can be removed. The AKR reached its first criticality in 1978. In 2005, the reactor facility was completely refurbished according to the current state-of-the-art in nuclear technology.

TECHNICAL PARAMETERS

AKR
Diameter: 250 cm
Total Height: 350 cm
Total Mass: 30 t

Fuel Elements (disk-shaped):
Diameter: 250 mm
Thickness of disks: 2-23 mm
Material: homogeneous mixture made from Uraniumdioxide and polyethylene
Enrichment: 19.8 % Uranium-235

Reflector:
Material: high-purity graphite
Thickness: 32 cm radial, 20 cm axial

Neutron Source
Am-Be: $2.2 \cdot 10^6$ neutrons/s

Reactor Control: 3 combined control and safety rods
Material: cadmium
Reactivity: ca. 0.35 $ per rod

Nuclear Instrumentation:
2 wide-range channels (fission chambers)
1 power-range channel (ionisation chamber)

Biological Shield:
axial: 48 cm baryte concrete
radial: 12 cm paraffin, 63 cm baryte concrete

Experimental Channels:
horizontal: 4
vertical: 2

Fast Reactor Shut-down (SCRAM):
Separation of the two core sections
Drop-down of the control rods

Maximum Excess Reactivity: 0.3 %

Maximum Continuous Power: 2 W