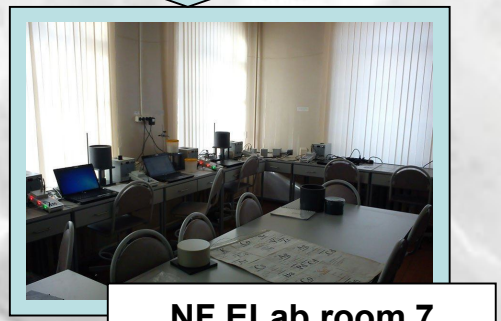
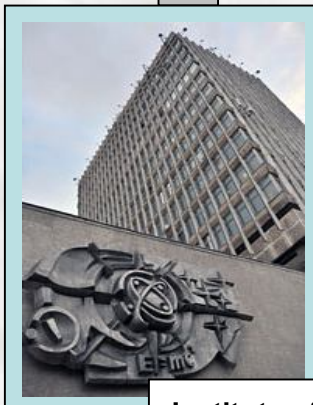
KAZAN (VOLGA REGION) FEDERAL UNIVERSITY
INSTITUTE OF PHYSICS
DEPARTMENT OF SOLID STATE PHYSICS

EDUCATIONAL LABORATORY «NUCLEAR PHYSICS»

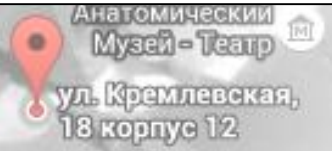
Behind the Main Building of KFU



NF ELab room 7



Institute of Physics



Educational Laboratory «Nuclear physics» (NF ELab)

In this laboratory implemented a workshop on nuclear physics.

Main function:

- Experimental support for lecture course on nuclear physics. Here third year students of Institute of Physics of KFU make educational laboratory-based works
- Practical lessons for courses of «Nuclear physics», «Physics of nuclei and elementary particles»

Additional function:

- Simplified workshop on nuclear physics for non-physics students from other departments of KFU
- Workshop on nuclear physics for English language students

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NF ELab room 7

Lecture room 8

General

The laboratory was improved significantly by means of Leibold Didactic (LD) products in 2011.

Two unique works are presented here, neutron activation analysis and Mossbauer spectroscopy. These works are not covered initially by LD equipment.

The equipment is placed in the room 7 of Nuclear Physics Laboratory building.

Nearby room 8 is a lecture room which also used as a place where students can work with methodical materials and prepare their results to presentation.

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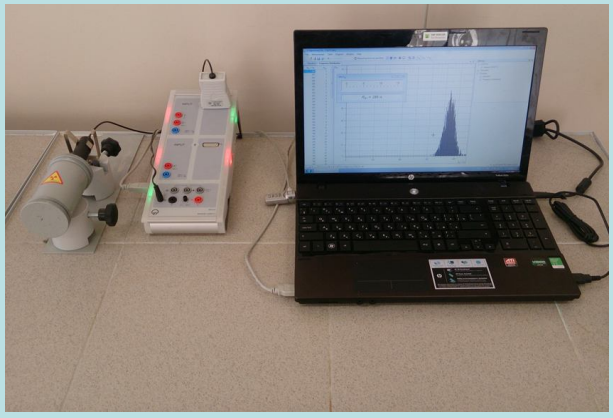
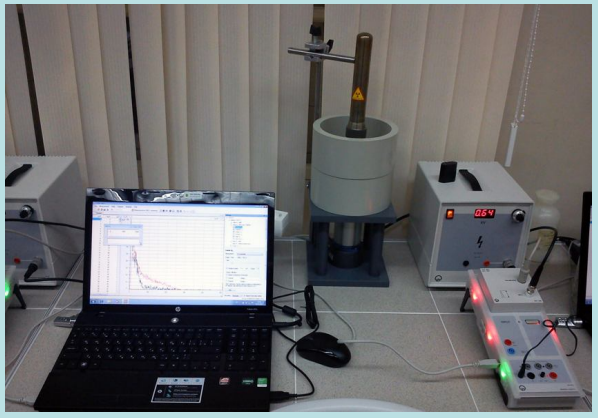
Laboratory-based works

Section 1: radiation detection experimental technique

- Detecting radioactivity. Recording the characteristic of a Geiger-Muller tube
- Statistical nature of radioactive decay. Poisson distribution
- Scintillation detectors. Calibration of gamma spectrometer





preliminary-level experiments

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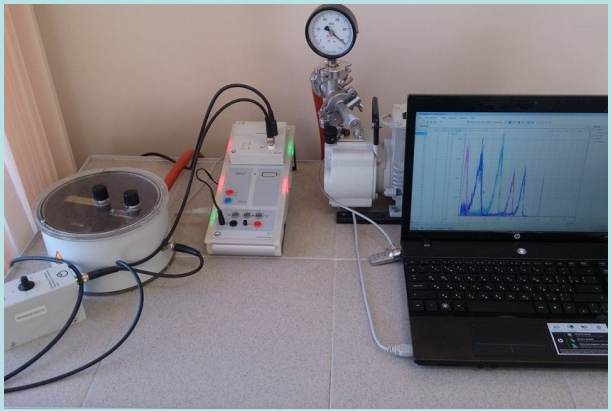
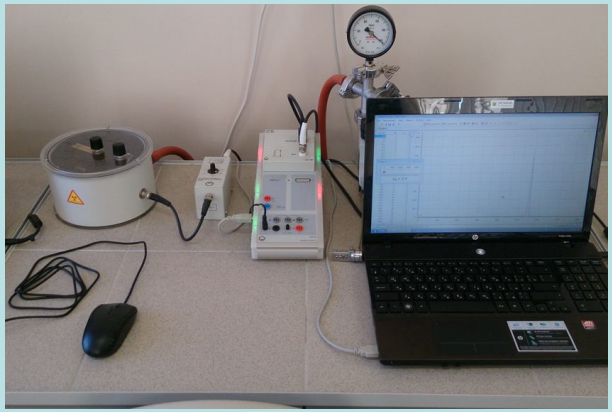
Laboratory-based works

Section 2: alpha radiation

- Detecting alpha particles with semiconductor detectors
- Passing of alpha radiation through matter
- Rutherford scattering





two similar spectrometers are shown; vacuum chamber of the right consists aluminium foil as an absorber

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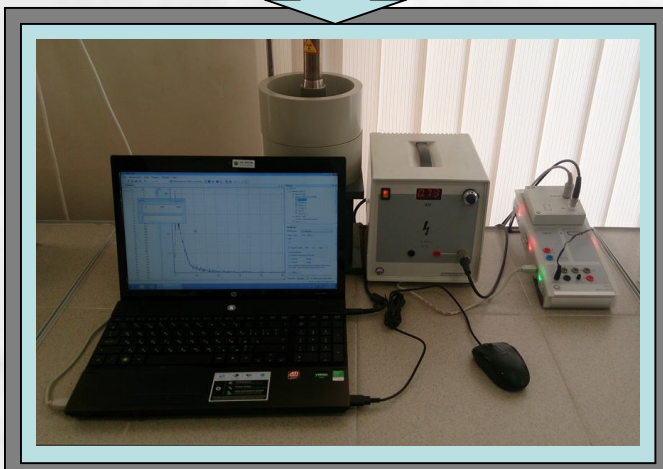
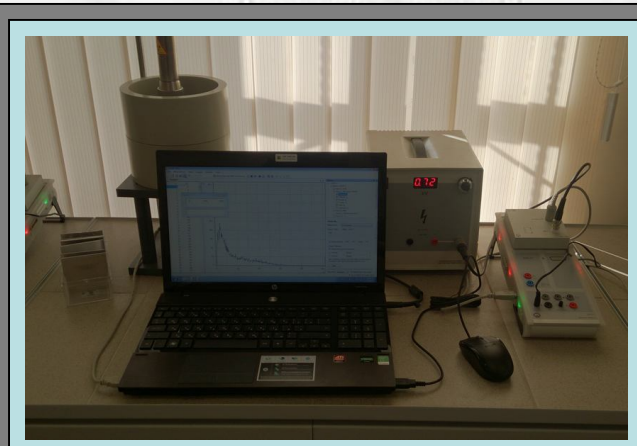
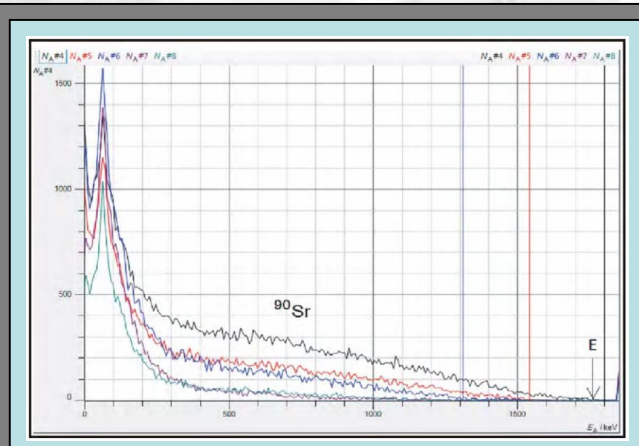
Laboratory-based works

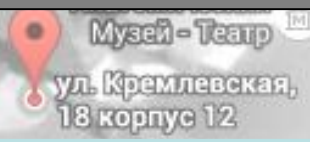
Section 3: beta radiation

- Beta spectroscopy. Passing of beta particles through matter









two identical setups, additional exercise is studying of beta particles passing through matter

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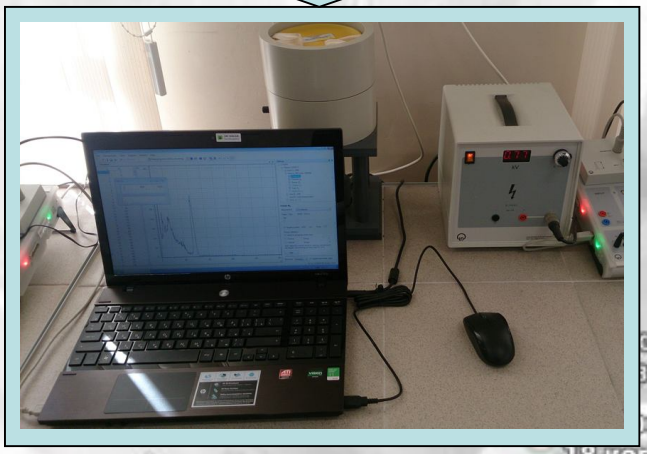
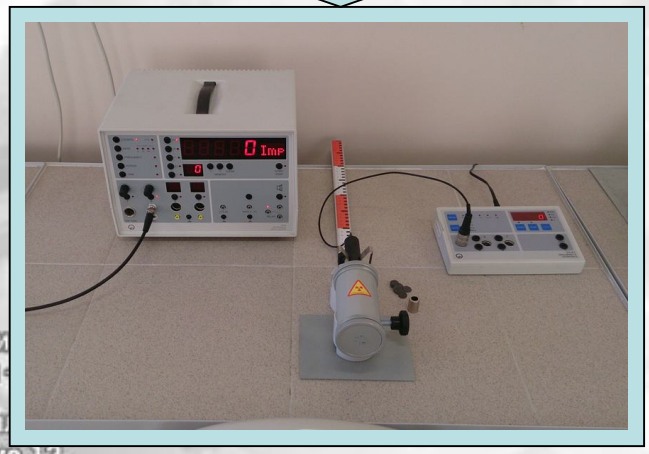
Laboratory-based works

Section 4: gamma radiation

- Gamma radiation. Detecting of weak radioactivity of ^{40}K
- Gamma spectroscopy
- Attenuation of gamma rays by matter. Verification of inverse square law
- Compton effect





verification of inverse square law is also preliminary-level experiment

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Laboratory-based works

Section 5: neutron radiation

- Artificial radioactivity and half-life measurements of nuclides

caused by neutrons nuclear reactions, one of the most beautiful works

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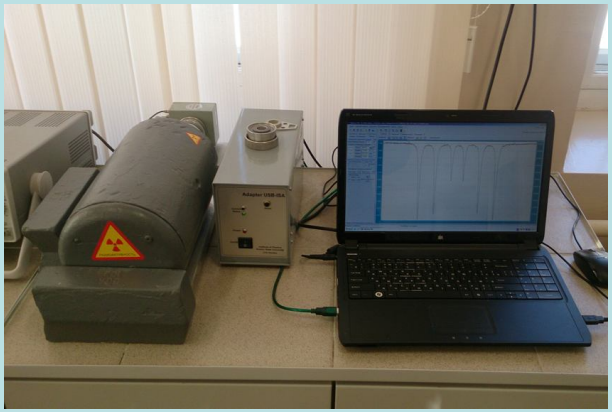
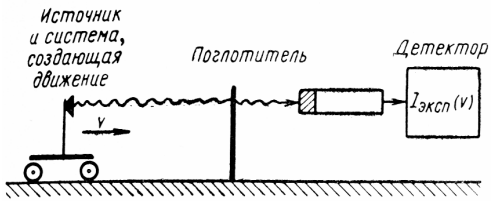
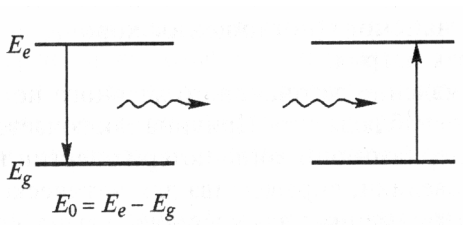
Laboratory-based works

Section 6: mössbauer spectroscopy

- **Mössbauer effect**







Mössbauer effect remains one of the most powerful experimental tools in solid state physics since their discovery and until to present days. Why? The work answers.

nuclear gamma resonance or Mössbauer effect is a specific feature of our laboratory

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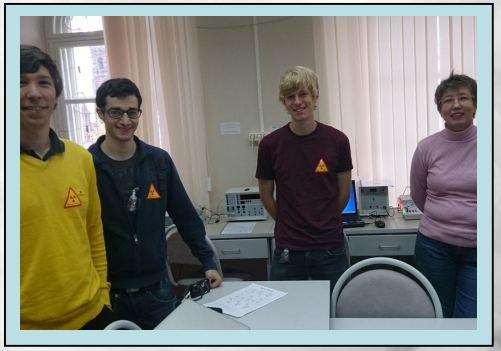
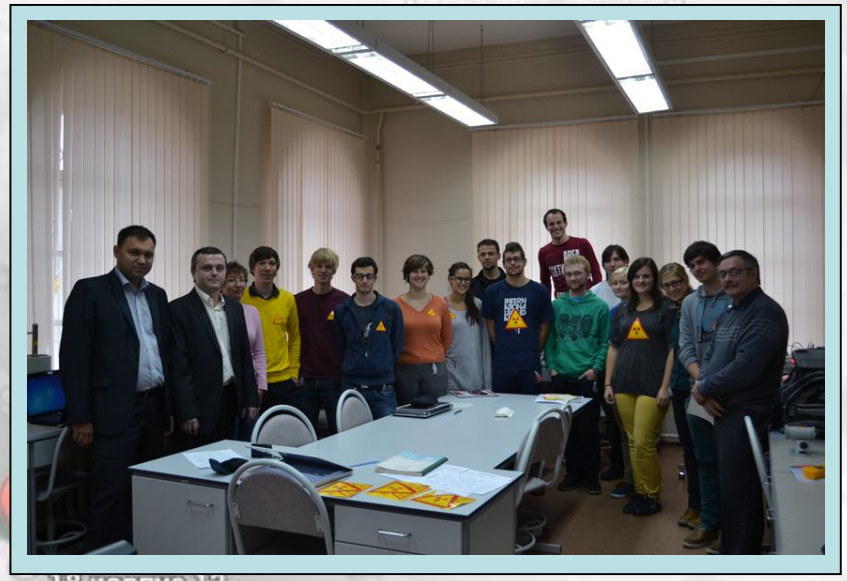
Laboratory-based works

Section 7: experiments for English language students

- Alpha spectroscopy. Passing of alpha radiation through matter
- Recording beta spectrum with a scintillation counter. Passing of beta radiation through matter
- Gamma spectroscopy. Attenuation of gamma radiation when passing through matter
- Detecting radioactivity. Recording the characteristic of a Geiger-Muller tube
- Neutron activation analysis





on photos: students from University of Innsbruck, Austria, and some of our laboratory staff, September, 2013