# STUDY OF (γ, p)-REACTIONS ON TUNGSTEN ISOTOPES

## Исследование (γ,p)-реакции на изотопах вольфрама

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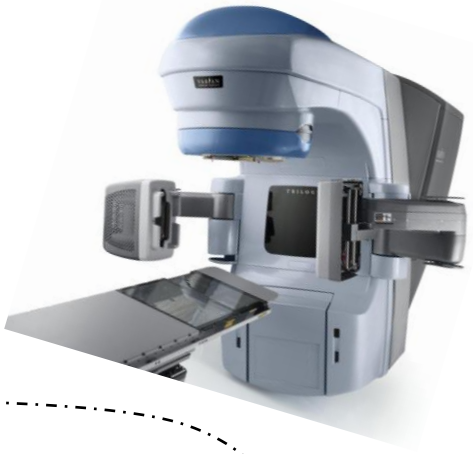
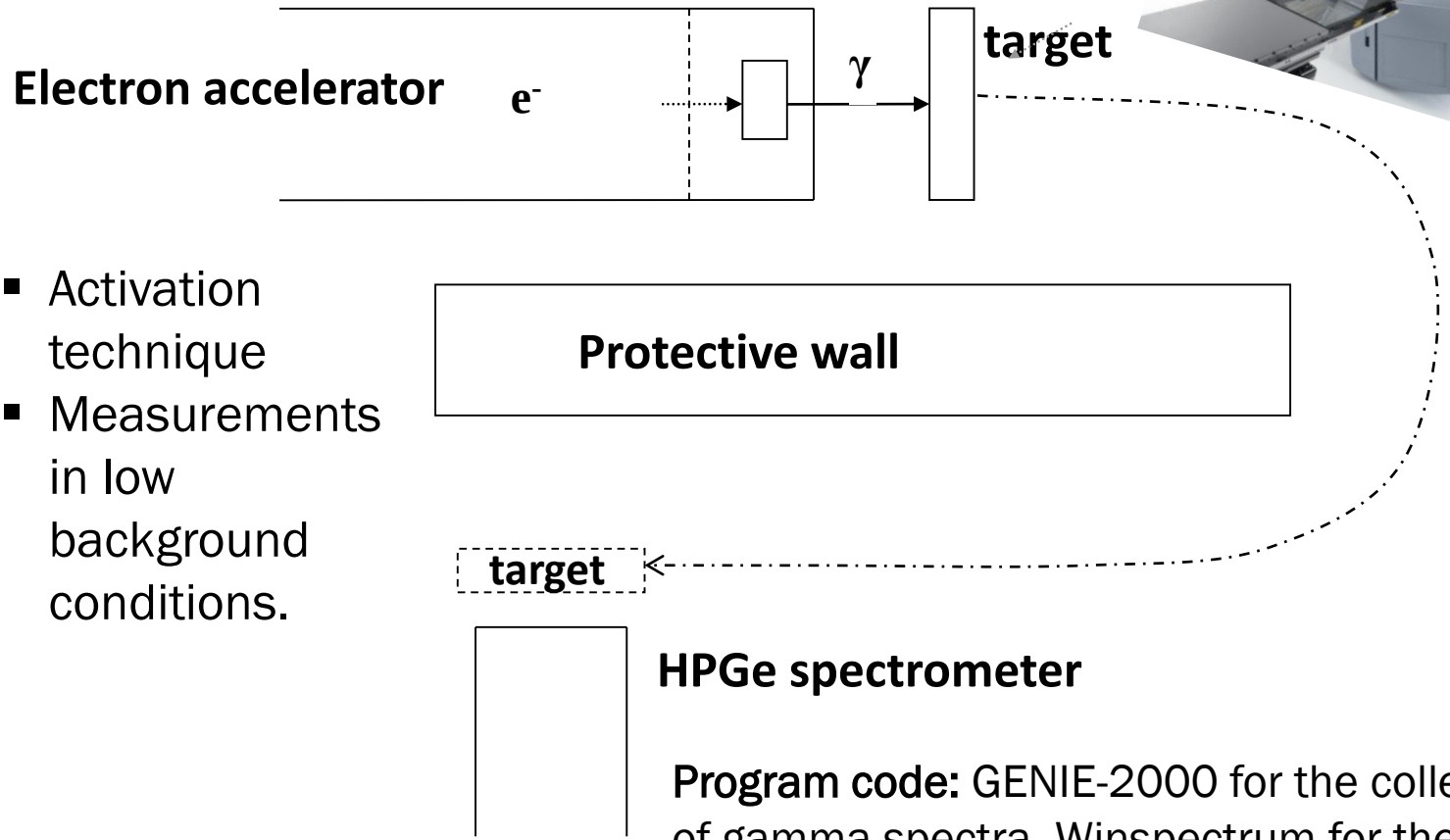
# Scientific interest and research purpose

- The reactions with bremsstrahlung gamma quanta with the emission of charged particles in the giant dipole resonance (GDR) region have been insufficiently studied.
- States that are often inaccessible for the (γ, n)-channel can be excited. Thus, the study of the (γ, p)-reactions opens up the possibility to collect additional information about the structure of excited levels and the mechanisms of the occurrence of nuclear reactions.
- This work aims to study the yields of $^{185,183,182}$Ta in reactions with the emission of a proton when targets are irradiated by bremsstrahlung gamma quanta with energies in the GDR region at $E_{bd}$ = 20 MeV.

# Experiment

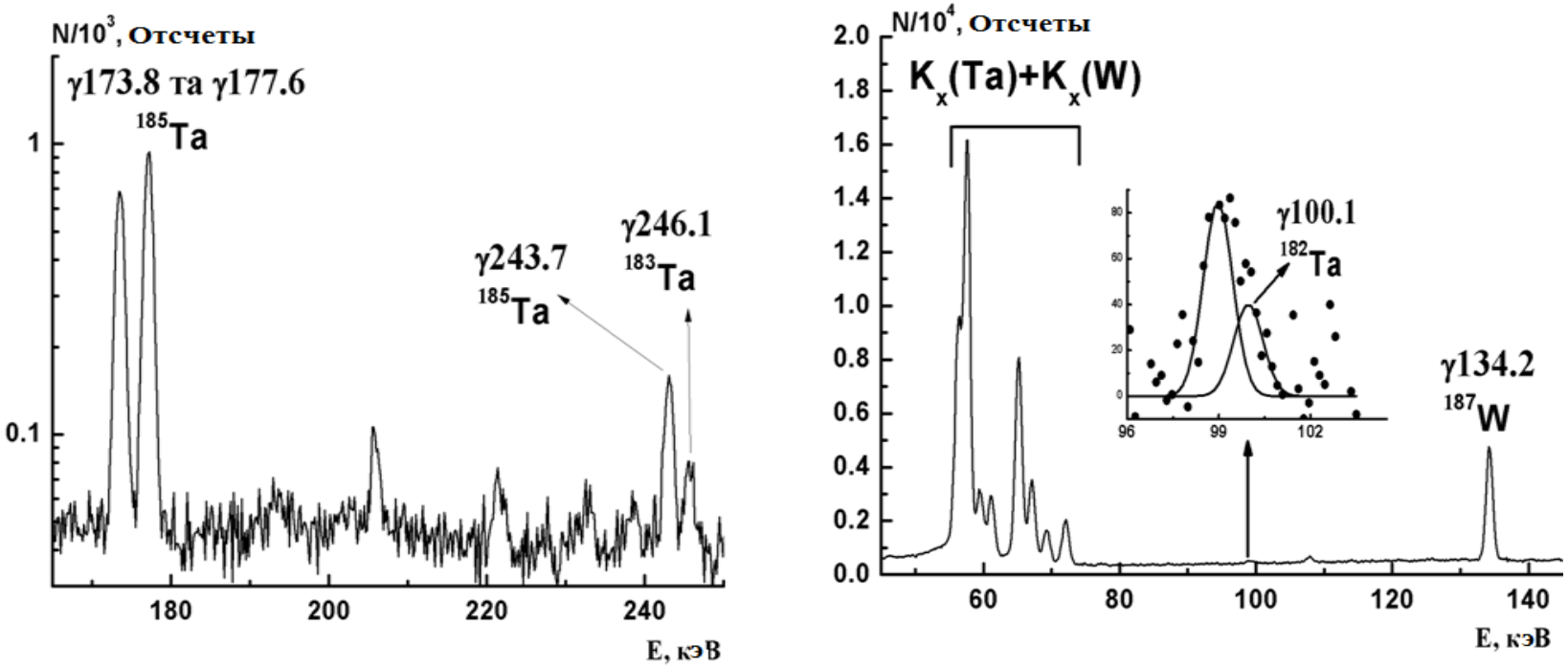





- Activation technique
- Measurements in low background conditions.

**Program code:** GENIE-2000 for the collection of gamma spectra, Winspectrum for the gamma spectra processing

# Results and discussion




- γ-spectra fragments of activated tungsten targets measured over an hour (left) and 2 days (right)

# Results and discussion

- Experimental and theoretical weighted average yields of (γ, p)-reactions for $E_{bd}$ = 20 MeV

| Реакция/ $E_{пор}$, МэВ | эксп, мб $B_k$=0 | эксп, мб/$B_k$, МэВ | эксп, мб/ $B_{изоспин}$, МэВ | TALYS, мб $B_k$=0 | (γ,n), мб | полу-прям. |
|---|---|---|---|---|---|---|
| $^{186}$W(γ,p)$^{185}$Ta/ 8.4 | 0.70(7) | 17.5(18)/ 8.2 | 6.3(6)/ 6.5 | 0.16 | 125 | 6.7 |
| $^{184}$W(γ,p)$^{183}$Ta/ 7.7 | 1.8(3) | 32.7(55)/ 8.2 | 11.3(20)/ 6.2 | 0.4 | 133 | 9.4 |
| $^{183}$W(γ,p)$^{182}$Ta/ 7.3 | 3.9(13) | 60(20)/ 8.2 | 12(4)/ 6.1 | 2 | 135 | 9.2 |

# Conclusion

- The weighted average yields of the reactions $^{186}W(\gamma, p)^{185}Ta$, $^{184}W(\gamma, p)^{183}Ta$, $^{183}W(\gamma, p)^{182}Ta$ have been measured for the first time at the 20 MeV boundary energy of bremsstrahlung gamma quanta.
- TALYS-1.9 code poorly describes experimental results for the (γ, p)-reactions
- Simulation results show that non-statistical processes dominate for such reactions.

# THANK YOU
# FOR THE ATTENTION!