

# Nuclear Spectroscopy and Dosimetry Laboratory

## Staff

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## Facilities

We have a high resolution gamma spectrometer Canberra type equipped with a HpGe detector encosed in a Pb shield and a multichannel analyzer operated with the soft Gennie 2000. The spectrometer is used for gamma spectrometry of the artificial radionuclides obtained by neutron irradiation.

The neutron facility contain two isotopic neutron sources of Am-Be and Pu-Be type generating a neutron fluence of  $6.6 \cdot 10^7$  n/s.



The neutrons are moderated by thermalization in paraffin bloc, and the sample is irradiated in channels performed in the paraffin bloc.

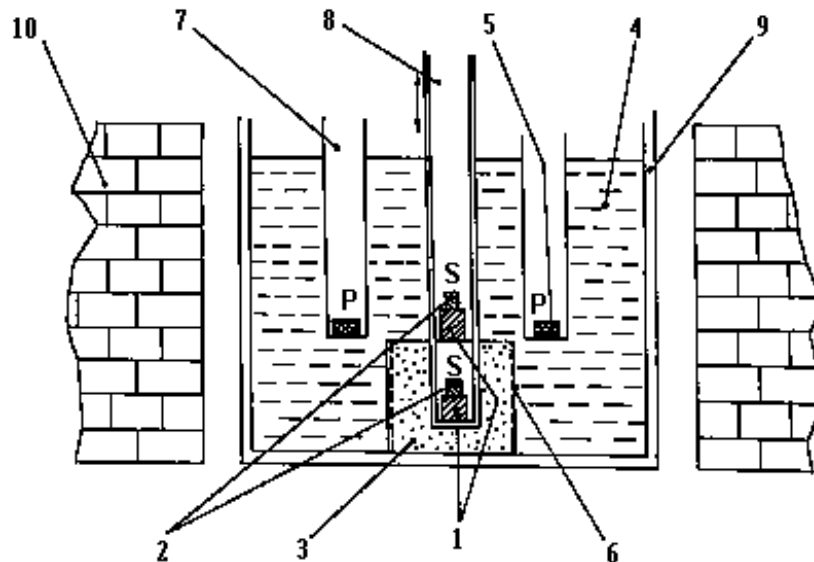
We produce new radioisotopes for nuclear medicine application as:  $^{116m}\text{In}$ ,  $^{198}\text{Au}$ ,  $^{64}\text{Cu}$ ,  $^{175}\text{Yb}$ ,  $^{187}\text{W}$  and others. The disintegration scheme is studied and the cross section of the nuclear reaction is determined.

The TL properties of phosphatic glasses for dosimetry of gamma radiation and neutrons is studied also at this neutron facility and by using the  $^{60}\text{Co}$  gamma source with a dose rate of 3.13 Gy/h.

A new method for cancer therapy: the Brachithery with neutrons by B.N.C.T. method is considered using this isotopic neutron sources. The neutron dosimetry is applied to control the irradiation dose with neutrons by fission tracks and TL methods using  $^6\text{LiF}$  detectors.



The irradiation facility with Am-Be (5 Ci), and Pu-Be (33 Ci) neutron sources. Fluence =  $6.6 \cdot 10^7$  n/s



The irradiation block containing the Am-Be and Pu-Be neutron sources. 1) Am-Be source, 2) Pu-Be source, 3) Borate paraffin, 4) Pure paraffin for the neutron thermalisation, 5) Sample for irradiation, 6) Cd protection, 7) Channel for irradiation, 8) Central channel for irradiation with fast neutron, 9) Fe-walls of paraffin ensemble, 10) Borated paraffine bricks for protection

## Publications:

1. I.C. Ivascu, Alida-Iulia Gabor, O. Cozar, L. Daraban, I. Ardelean, FT-IR, Raman and thermoluminescence investigation of  $P_2O_5$ -BaO-Li $_2$ O glass system, J. OF MOLEC. STRUCT., 993, 1-3, P.249 – 253, 2011
2. Alida-Iulia Gabor, I.-C. Ivascu, S. Vasiliniuc, L. Daraban, I. Ardelean Ioan, C. Cosma, O. Cozar, Thermoluminescence and optically stimulated luminescence properties of the  $0.5P_2O_5$ -xBaO-(0.5x)Li $_2$ O glass systems, APPLIED RADIATION& ISOTOPES, 69, P.780 – 784, 2011
3. Delia Marcu, Victoria Cristea & L. Daraban, Dose-dependent effects of gamma radiation on lettuce (*Lactuca sativa* var. capitata) seedlings, International Journal of Radiation Biology, Early Online: 1–5, 2013
4. L.Daraban, C. Cosar, Measurement of Thermal Neutron Cross-Section for  $^{186}W(n,\gamma)^{187}W$  Nuclear Reaction by the Activation Method Using a Single Monitor, STUDIA UNIV.B-B, physica, LV, 2, P.17-24, 2010
5. L. Daraban, S. P. Gosuly, Resonance Integral and Thermal Cross-Section Measurements on Samarium Using Am-Be and Pu-Be Isotopic Neutron Sources, STUDIA UNIV.B-B, physica, LV, 2, P.41-54, 2010
6. M. Todica, L. Daraban Liviu, P. Van Den Winkel, Absorption Experiments of Beta and Gamma Radiation in Polymers, STUDIA UNIV.B-B, physica, LV, 1, P.133-144, 2010
7. R. Baritski, L. Daraban, Calibration technique for measuring the radioactivity of soil samples by gamma spectrometry, STUDIA Univ.B-B PHYSICA, LVI, 2, pp.3-14, 2011
8. E. Horj, L. Daraban, I. Chereji, Neutron and gamma dose rate measurements in the vicinity of the medical linear accelerators, STUDIA UNIV.B-B, series physica, LIV, 1, PP. 87-93, 2009
9. L. Daraban Liviu, Bianca Coroian, Neutron dosimetry by fission tracks methods, STUDIA UNIV.B-B Physica, LIV, 2, P.41 – 50, 2009.
10. C. Ivascu, I.B. Cozar, L. Daraban, G. Damian, Spectroscopic investigation of  $P_2O_5$ -CdO-Li $_2$ O glass system, Journal of Non-Crystalline Solids, 359, pp.60-64, 2013.
11. O. Cozar, M. Bako, L. Daraban, I. Ardelean, L. David,  $P_2O_5$ -CaO-Li $_2$ O glass system - a possible ESR dosimeter, OPTOELECTRONICS AND ADVANCED MATERIALS-RAPID COMMUNICATIONS Volume: 2 Issue: 5, Pages: 249-252, 2009
12. Laura Daraban, C. Cosma, Li. Daraban,  $^{63}Cu(n,\gamma)^{64}Cu$  nuclear reaction cross-section measurement at thermal neutrons using isotopic neutron sources for  $^{64}Cu$  production, STUDIA Univ.B-B PHYSICA, LVI, 2, pp.3-14, 2013
13. O.A. CULICOV, M.V. FRONTASYEVA, L. DARABAN, CHARACTERIZATION OF OBSIDIAN FOUND IN ROMANIA BY NEUTRON ACTIVATION METHOD, Romanian Reports in Physics, Vol. 64, No. 2, P. 609–618, 2012