















NUBA-founded in 31 Mayıs 2013

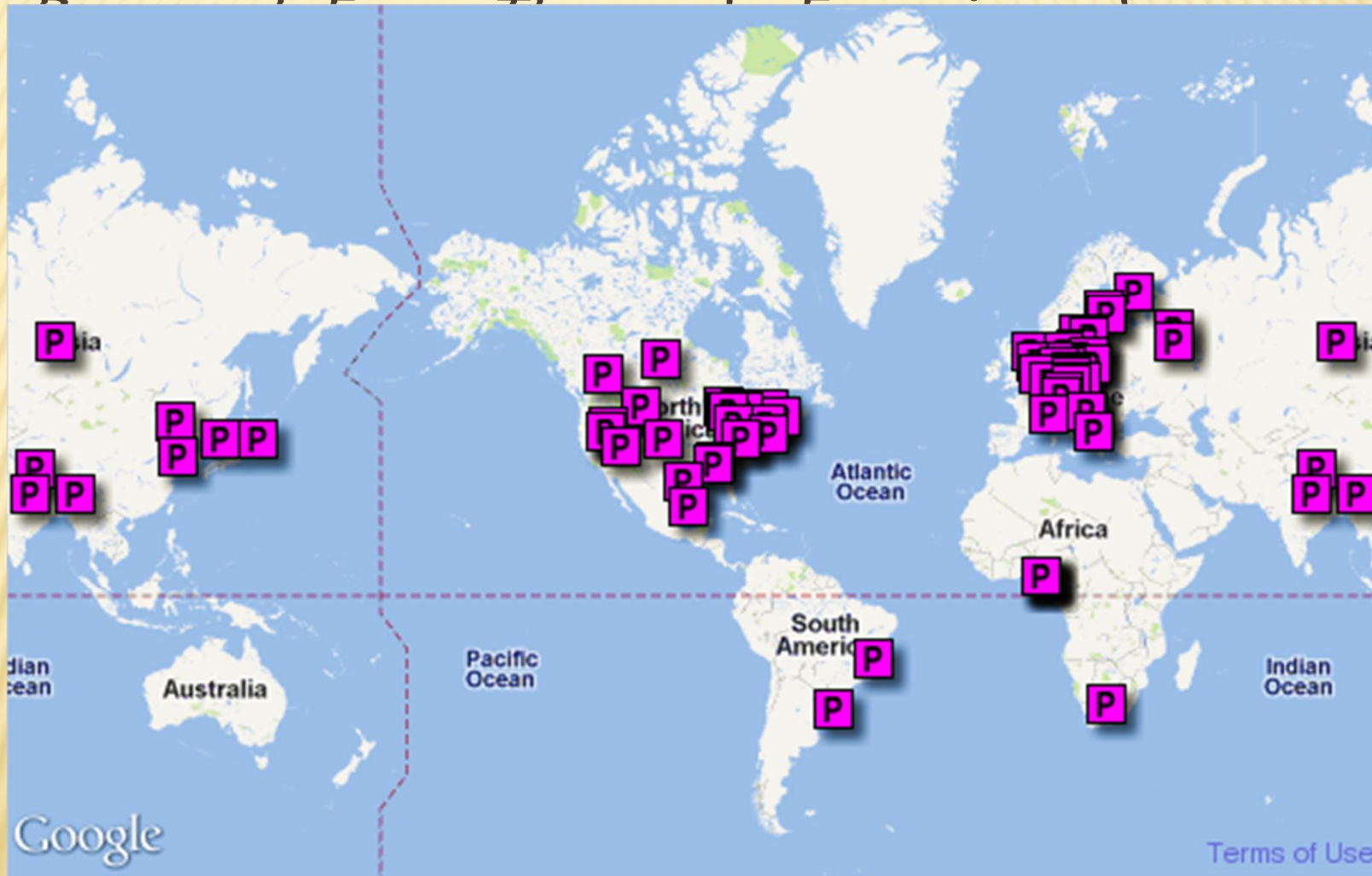
NUBA BOARD OF MANAGEMENT

PROJECT LEADERS

Photonuclear	Photoactivation	Material Science	Medical Physics	Space Science & Astrophysics	Radiative Dating
Mesut Karakoç	Haris DJAPO	Yılmaz Aksu	Yiğit Çeçen	Timur Şahin	Edib Bayram
					
Accelerator & Detector	Environmental Science	Agriculture-Breeding	High Energy Physics	Irradiation Services	Technical Standards
Şerafettin Yaltkaya	Tserenpil Shukruu	Fatih Özmen	İbrahim Albayrak	Deniz Kaya	Christian Segebade
					

NUBA: Motivations

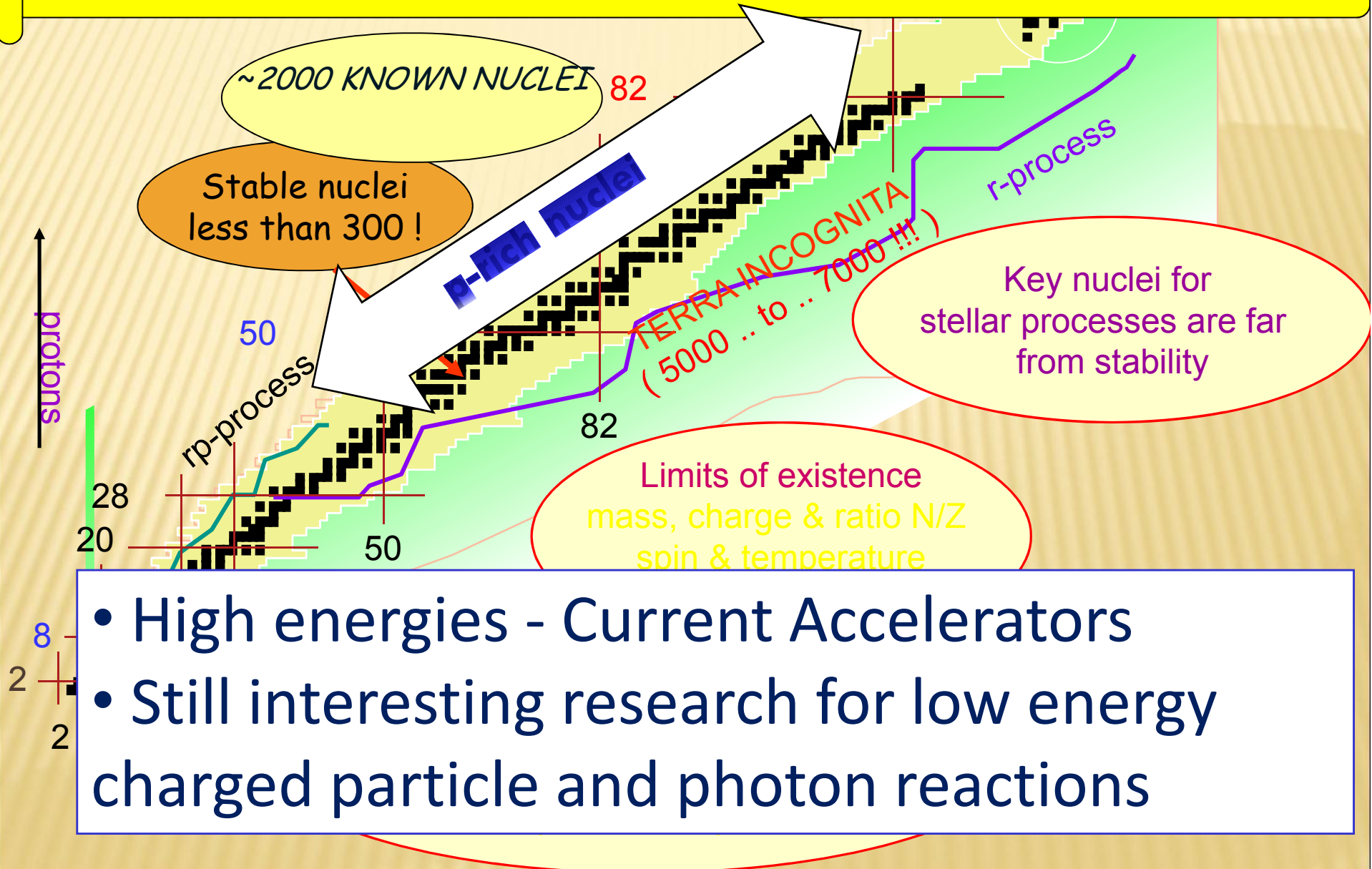
i.



ii.

students

A landscape for Nuclear Research in Developing Countries with Medical Linacs



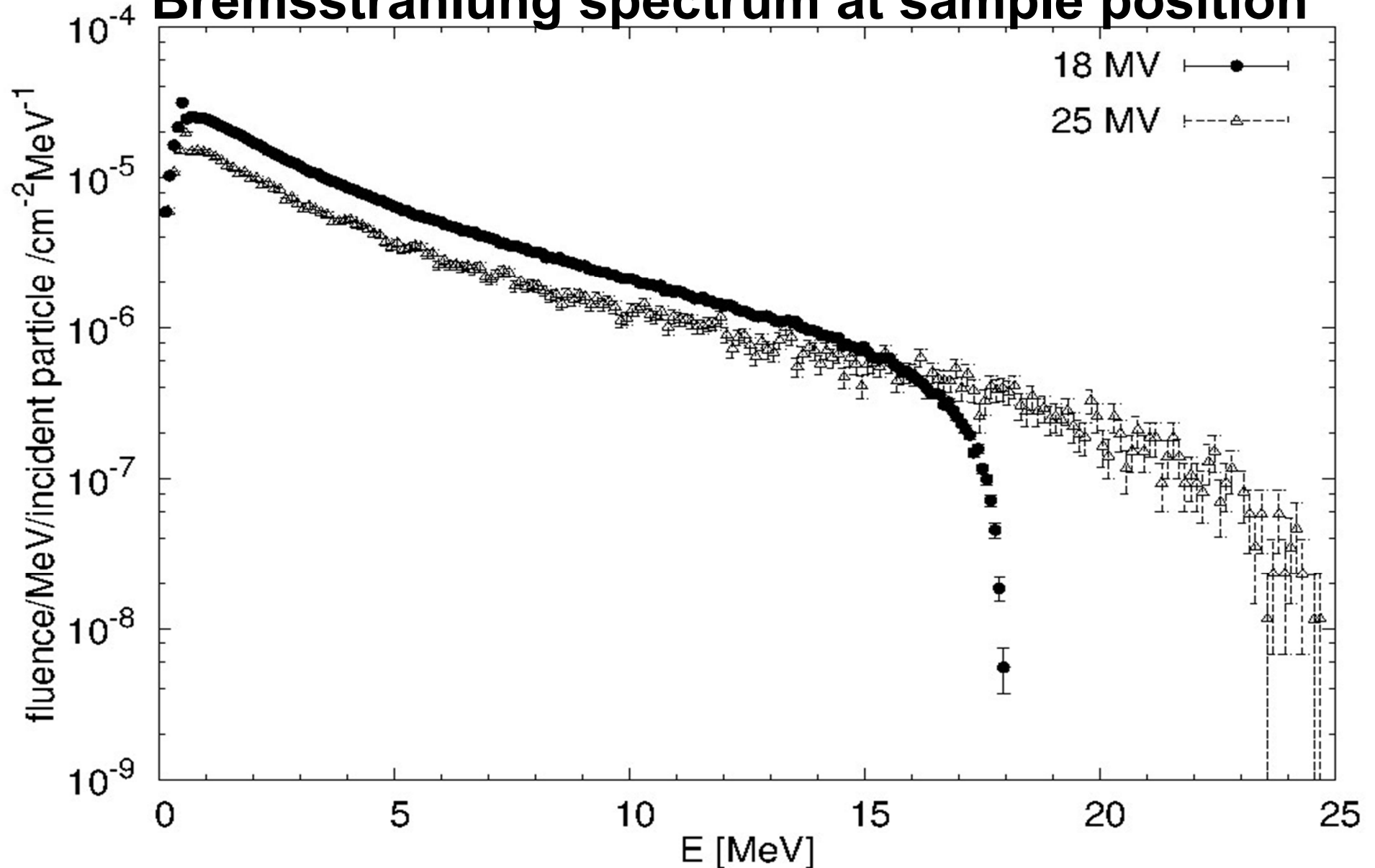
NUBA: Coincise & well-focused Research Program

- A New Oppurtunity for developing countries,
 - Nuclear Reactions
 - A Re-measurement of Phonuclear Cross-section,
 - (γ, n) (γ, p) (γ, γ) and (γ, γ')
 - Nuclear Structure
 - Energy Level & Half Life of Proton Rich Nuclei
 - Pgyne&Giant Dipole Resonance measurements
- Photonuclear and Photoactivation,
- Experimental setup
 - Industrial Electron Linac: Hard/Software
 - Detector Devolopments

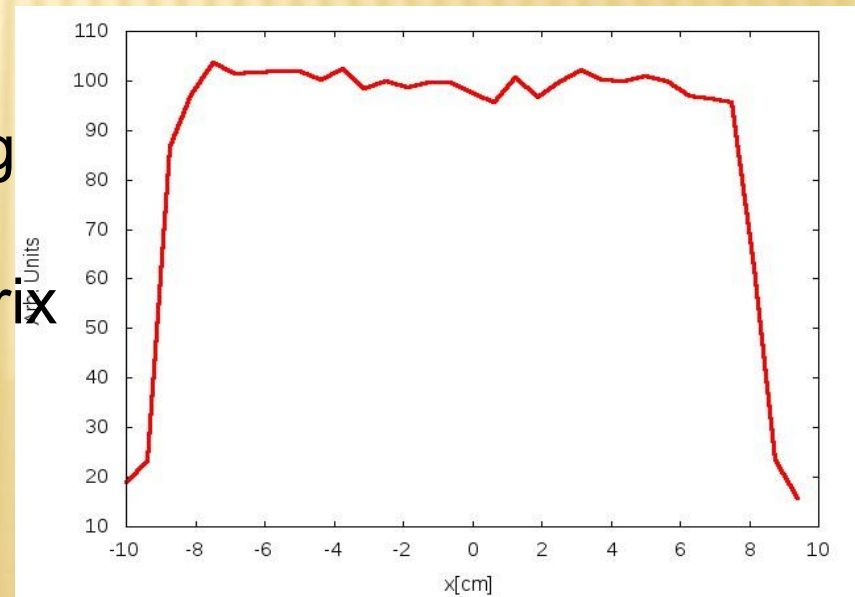
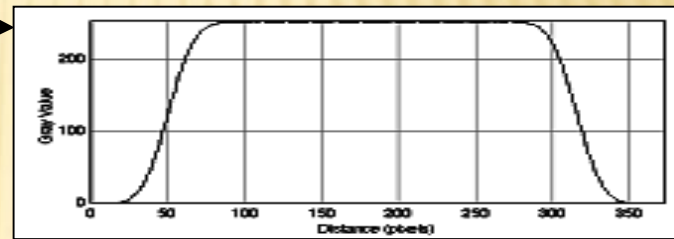
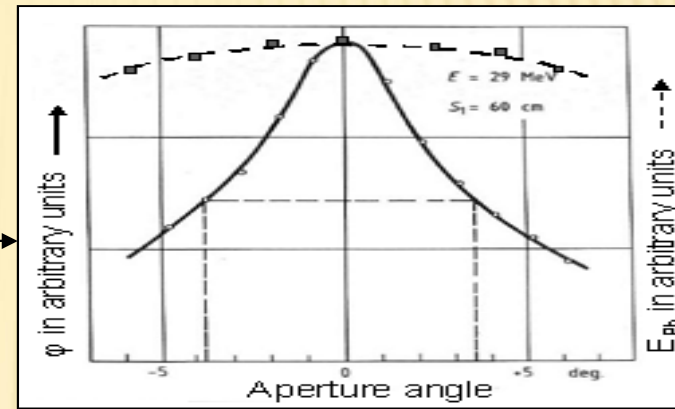
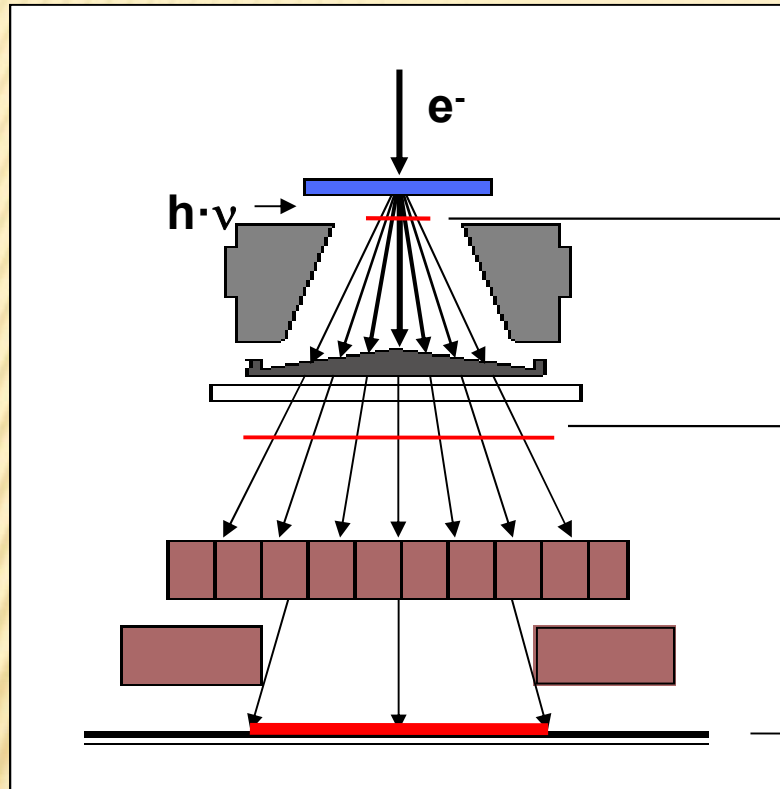
Me

or

Bremsstrahlung spectrum at sample position



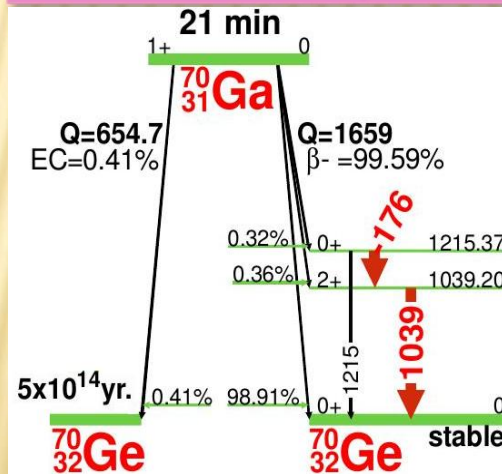
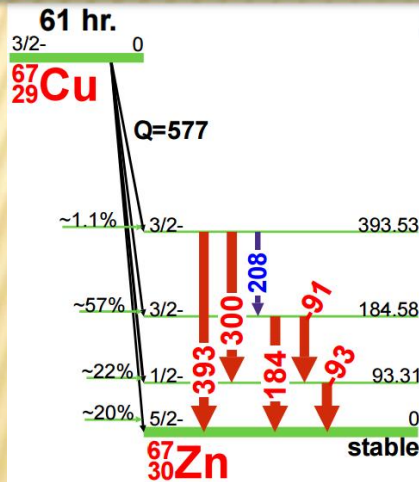
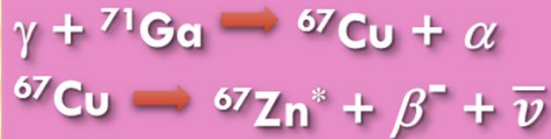
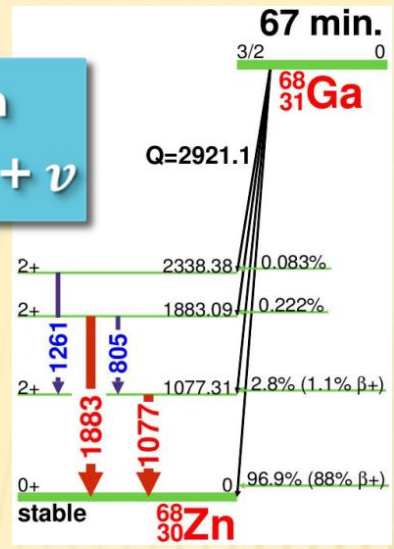
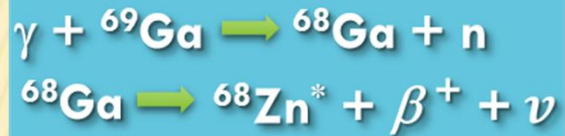
The bremsstrahlung field; lateral homogeneity



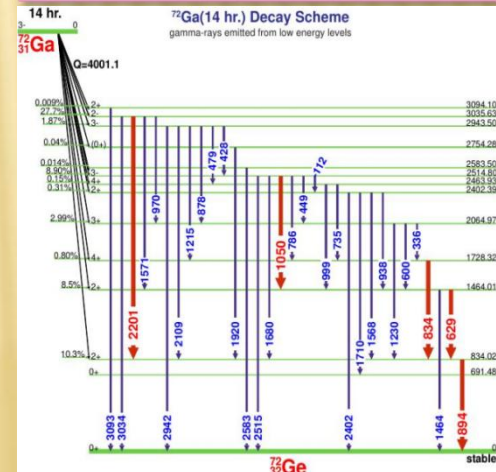
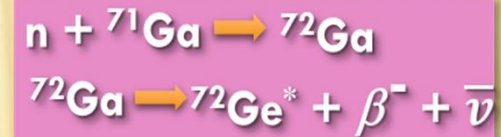
Spatial beam uniformity at $y=0$ along the x -axis

Measurement performed with a matrix of 32x32 ion chambers for 2 s. Longer measurement times reduce the variations.

PHOTONUCLEAR REACTIONS



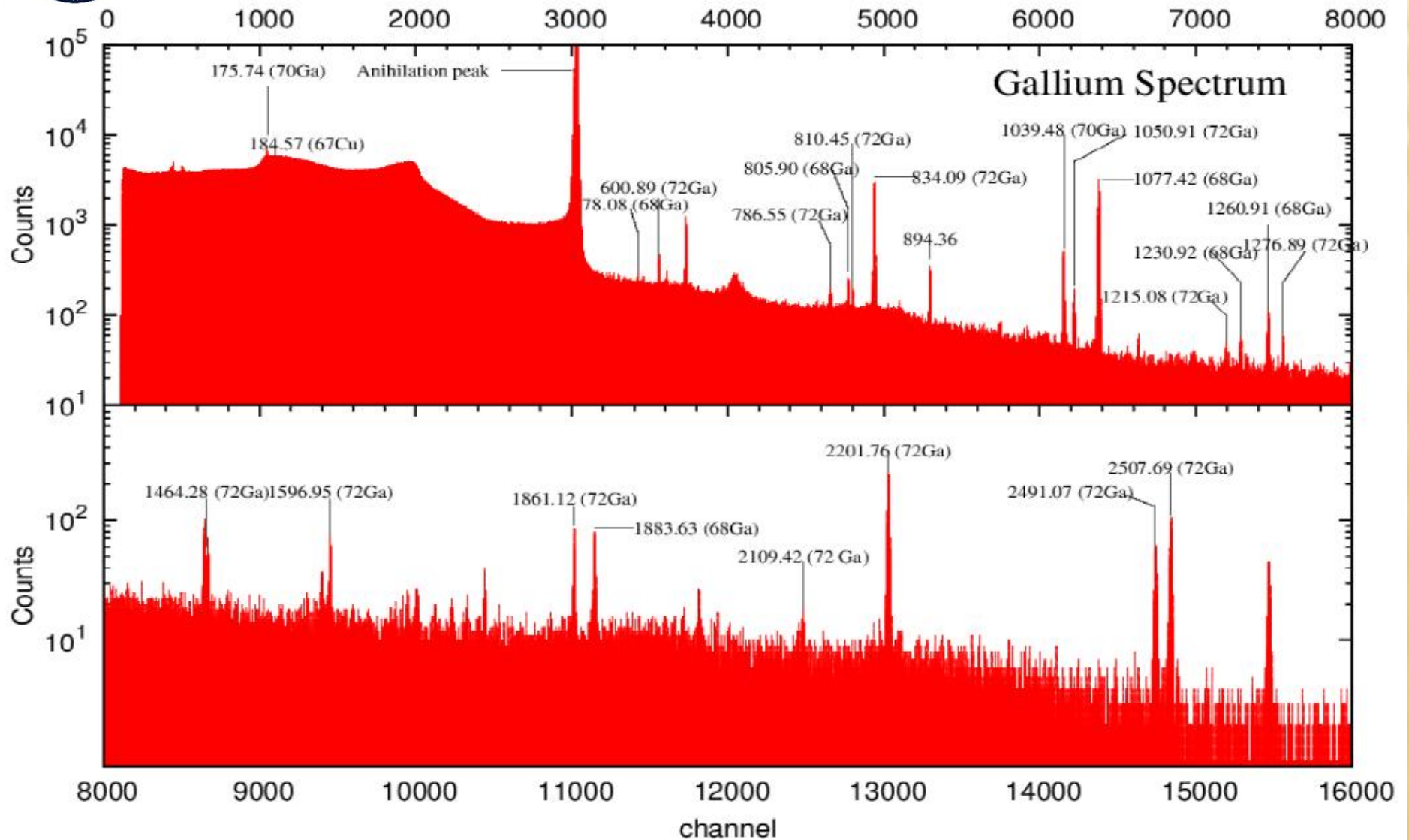
Z	37	38	39	40	41
32	$\epsilon: 100.00\%$ 69Ge 39.05 H	$\epsilon: 100.00\%$ 70Ge STABLE 20.57%	$\epsilon: 100.00\%$ 71Ge 11.43 D	$\epsilon: 100.00\%$ 72Ge STABLE 27.45%	$\epsilon: 66.00\%$ $\beta^-: 34.00\%$ 73Ge STABLE 7.75%
31	$\epsilon: 100.00\%$ 68Ga 67.71 M	$\epsilon: 100.00\%$ 69Ga STABLE 60.10%	$\beta^-: 99.59\%$ $\epsilon: 0.41\%$ 70Ga 21.14 M	$\beta^-: 100.00\%$ 71Ga STABLE 39.89%	$\beta^-: 100.00\%$ 72Ga 14.10 H
30	67Zn STABLE 4.04%	68Zn STABLE 18.45%	69Zn 56.4 M $\beta^-: 100.00\%$	70Zn 22.3E+17 Y 0.61% 2 β^-	71Zn 2.45 M $\beta^-: 100.00\%$
29	$\beta^-: 100.00\%$ 66Cu 5.120 M	$\beta^-: 100.00\%$ 67Cu 61.83	$\beta^-: 100.00\%$ 68Cu 30.9 S	$\beta^-: 100.00\%$ 69Cu 2.85 M	$\beta^-: 100.00\%$ 70Cu 44.5 S
	37	38	39	40	41



Ga-69: 60.1%
Ga-71: 39.9%



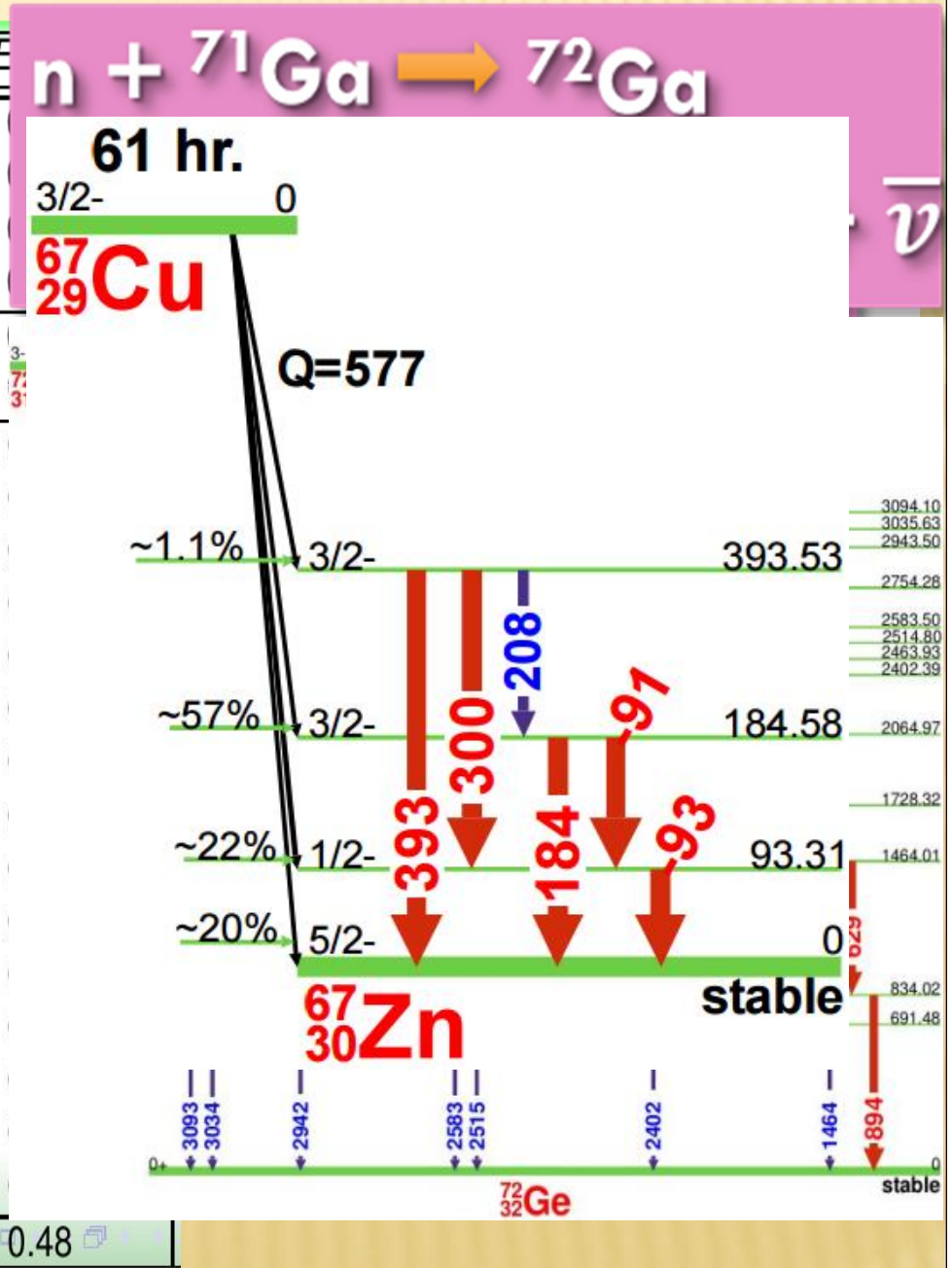
THE GALLIUM EXPERIMENT: GAMMA SPECTRUM





THE GALLIUM EXPERIMENT: ENERGY LEVELS

Eic.	E_{NUDAT} (keV)	σ_{NUDAT}	E (keV)	σ_E	$\Delta = E_{NUDAT} - E $
^{68}Ga	805.83	0.08	805.91	0.07	
^{68}Ga	1077.34	0.05	1077.28	0.02	
^{68}Ga	1261.08	0.09	1260.8	0.1	
^{68}Ga	1883.2	0.2	1883.39	0.09	
^{70}Ga	176.17	0.02	176.1	0.1	
^{70}Ga	1039.2	0.08	1039.28	0.04	
^{72}Ga	600.91	0.02	600.91	0.05	
^{72}Ga	629.97	0.02	629.86	0.02	
^{72}Ga	786.53	0.01	786.43	0.09	
^{72}Ga	834.13	0.04	833.97	0.02	
^{72}Ga	894.33	0.02	894.09	0.04	
^{72}Ga	999.99	0.02	1000.6	0.1	
^{72}Ga	1215.14	0.01	1215.15	0.08	
^{72}Ga	1230.93	0.01	1230.9	0.2	
^{72}Ga	1260.12	0.01	1260.8	0.1	
^{72}Ga	1464.05	0.01	1464.13	0.09	
^{72}Ga	1596.73	0.01	1596.87	0.09	
^{72}Ga	2109.36	0.02	2109.8	0.2	
^{72}Ga	2201.59	0.02	2202.01	0.04	
^{72}Ga	2491.03	0.02	2490.72	0.08	
^{72}Ga	2507.71	0.02	2507.27	0.06	
^{67}Cu	184.58	0.01	184.1	0.7	0.48



SUMMARY & OUTLOOK

- ✘ A unique research center having an accelerator that is capable of performing spectroscopy and instrumentation
 - + Important to promote Nuclear Science at developing countries
 - + Training and education facility for the PhD and MSc students: *i.e.* For the case of Turkey, CERN membership, Nuclear & HEP studies
 - + Material hardening, space radiation and detector studies: compton background test for AGATA and ELI-NP
- ✘ Nuclear Reactions: (γ, n) (γ, p) (γ, γ) and (γ, γ') for PR and GDR
- ✘ Energy Levels and Half-life measurements for proton rich nuclei: Better results
 - ✘ Nuclear structure: level densities and transitions
 - + Nuclear structure: Shape-Phase transitions
 - + Nuclear Astrophysics: Nucleosynthesis for early universe
- ✘ Applications of Nuclear Techniques from Archeology, Engineering to Agriculture for developing countries

Outcomes: First photonuclear paper with local resources

Eur. Phys. J. Plus (2015) **130**: 185
DOI 10.1140/epjp/i2015-15185-2

THE EUROPEAN
PHYSICAL JOURNAL PLUS

Regular Article

Photonuclear reactions with zinc: A case for clinical linacs

I. Boztosun^{1,2}, H. Dapo^{1,2,a}, M. Karakoç^{1,2}, S.F. Özmen^{1,2}, Y. Çeçen^{2,3}, A. Çoban^{1,2}, T. Caner^{1,2}, E. Bayram⁴, T.R. Saito^{5,6,7}, T. Akdoğan⁸, V. Bozkurt⁹, Y. Kuçuk^{1,2}, D. Kaya^{1,2}, and M.N. Harakeh¹⁰

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Received: 4 June 2015 / Revised: 14 August 2015

Published online: 14 September 2015 – © Società Italiana di Fisica / Springer-Verlag 2015



NUBA SCIENTIFIC EVENTS: THIS SUMMER



<http://nukleer.akdeniz.edu.tr/nubaiss2>

<http://nukleer.akdeniz.edu.tr/lumidoz9>

NUBA-2015: The 2nd International Nuclear Physics Summer School

Akdeniz University Department of Physics



This Summer School aims at providing basic knowledge and perspectives of nuclear physics for graduate students and postdoctoral researchers. It consists of lectures by leading scientists in the field of both experimental and theoretical nuclear physics. Each lecture will start with an introductory talk from the fundamental point of view and end with up-to-date topics in the relevant field. During summer school, short presentations by students and post-docs and poster session are also planned.

For participants, accommodation and travel supported only in Turkey.

We can supply any documents necessary for foreign students who are interested in attending the school to obtain travel support from their local national science funding agencies.

Please do not hesitate to contact us about such inquiries



The 9th International Conference on Luminescence and ESR Dosimetry

This year, Akdeniz University, Nuclear Research and Application Center will host the 9th International Conference on Luminescence and ESR Dosimetry (Lumidoz 9) on September 2 - 4, 2015. Conference is bilingual, both English and Turkish contributions are welcome.

Proceedings of both oral and poster presentations - those eligible for peer-reviewed publication - will be published in Journal of Nuclear Science (limited to one first-author paper per active participant).

OPICS

Luminescence Mechanisms

- Thermoluminescence (TL)
- Optically Stimulated Luminescence (OSL)
- Radoluminescence (RL)
- Photoluminescence (PL)
- Other Luminescence Mechanisms

<http://nukleer.akdeniz.edu.tr>



Thank you!

*This research has been supported by TÜBİTAK with
grant number 114F220*

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