Introducere în Laboratorul Virtual

Institutul de Chimie, Chișinău, Republica Moldova

Institutul Unificat (Internațional) de Cercetări Nucleare (IUCN),

Laboratorul de fizică a neutronului, Dubna, Russia

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Planul prezentării:

1. *Institutul unificat de cercetări nucleare (IUCN), informație generală;*
2. *Introducerea în laboratorul virtual IUCN;*
3. *Activitatea personală în IUCN.*

Institut Unificat (Internațional) de Cercetări Nucleare

Organizație internațională, interguvernamentală. *Centru de cercetări științifice, exemplu perfect al integrării cercetărilor teoretice, fundamentale și experimentale, dezvoltarea și aplicarea tehnologiei de vârf și a învățământului universitar:*

- *7 laboratoare;*
- *Mai mult de 5000 de angajați;*
- *Dintre ei peste 1200 cercetători științifici;*
- *Printre ei academicieni sau membri corespondenți ai academiilor de științe naționale;*
- *Peste 260 doctori habilitați;*
- *560 doctori;*
- *Și peste 2000 ingineri și tehnicieni [1].*

1. http://www.jinr.ru/about-en/

Institul Unificat (Internațional) de Cercetări Nucleare

Member States

Armenia	Azerbaijan	Belarus
Bulgaria	Cuba	Czech Republic
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Romania	Russia	Slovakia
Ukraine	Uzbekistan	Vietnam

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Egypt	Germany	Hungary
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- *18 țări membri;*
- *6 țări membri asociați;*
- *Acorduri de colaborare cu 62 de țări [2].*

2. http://www.jinr.ru/jinr_member_states-en/

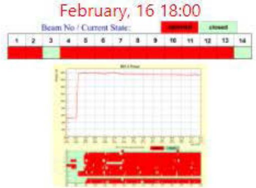
Institutul Unificat (Internațional) de Cercetări Nucleare
Laboratorul de fizică a neutronului

▪ Home ▪ FLNP ▪ History ▪ Facilities ▪ Structure ▪ User Club ▪ Education ▪ Local network

Frank Laboratory of Neutron Physiscs is one of the laboratories of the Joint Institute for Nuclear Research (Dubna, Russia) that investigates the neutron as an elementary particle using various instruments, and employs the neutron as an instrument to investigate the structure and dynamics of condensed matter, including crystals and nanosystems, functional materials, complex liquids and polymers, rocks, etc. so that our findings could find application in molecular biology and pharmacology, engineering diagnostics and in other fields of science and technology.

IBR-2 Status ON

Current cycle: February 06, 20:00 – February, 16 18:00



Current status
Work schedule
Change in the operation of the reactor in 1 and 2 cycles

Events

FLNP SEMINAR, January 25, 2018 (Thursday), 15:00, FLNP Conference hall (3rd floor)

IVANOV A.S.

Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia

Institute Laue-Langevin, Grenoble, France

Spectra of magnetic and lattice excitations in high-temperature superconductors

Read more ...

News

Program for measuring neutron spectra of the moderator on beamlines 7, 8,and 10.
Program

Reactor power starting from the 2nd cycle
Dear colleagues,
Please note that for technical reasons, starting from the 2nd cycle (06.02.2018) the reactor will operate at an approximate power of 1820-1830 MW.

3. http://flnph.jinr.ru/en/

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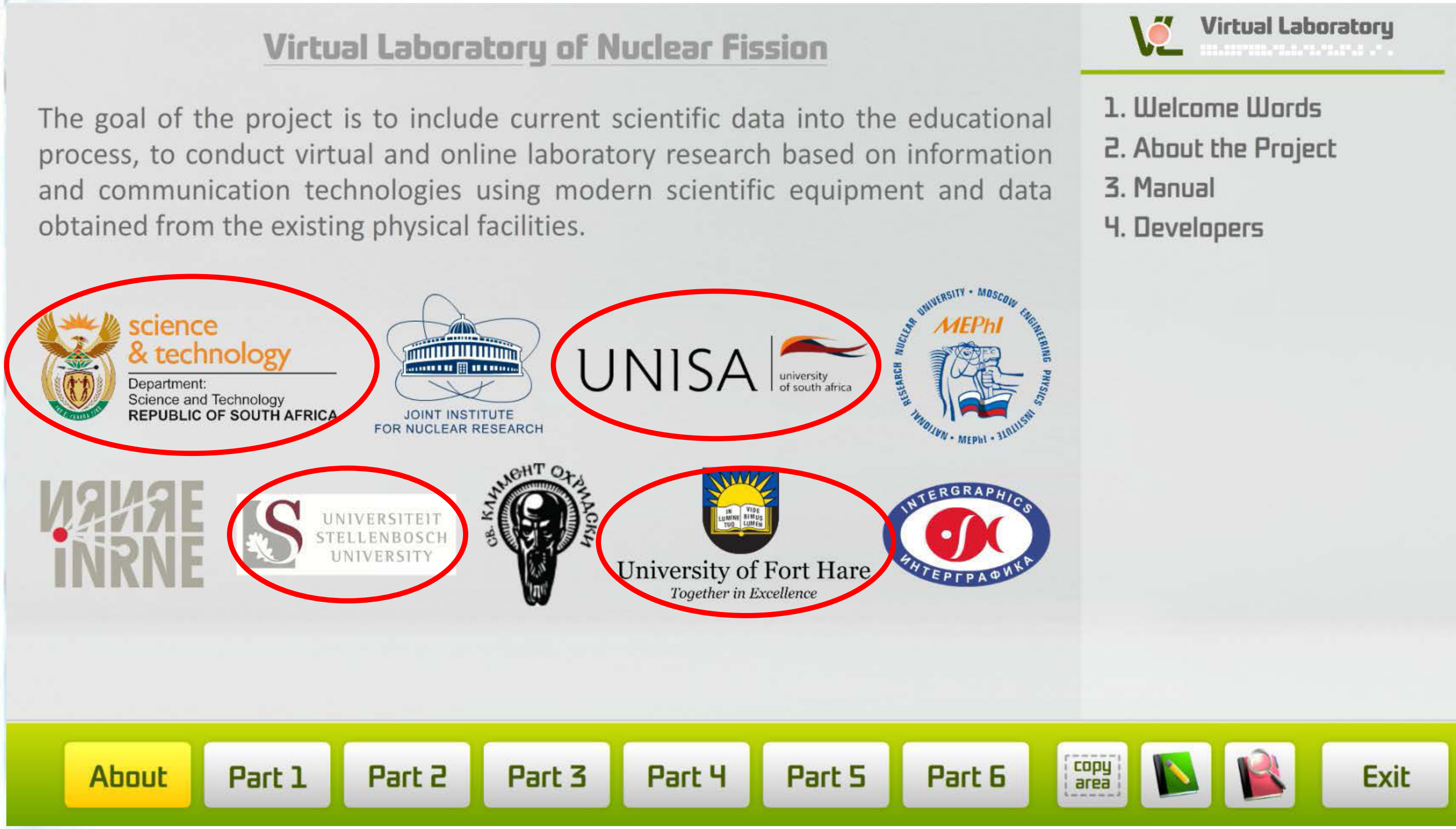

Cristian Netling Barnard(afric. Christiaan Neethling Barnard) — cardiochirurg african, pentru prima dată, la 03.12.1967, a efectuat transplantarea cu succes a inimii omenești [4].

4. https://ru.wikipedia.org/wiki/Барнард_Кристиан

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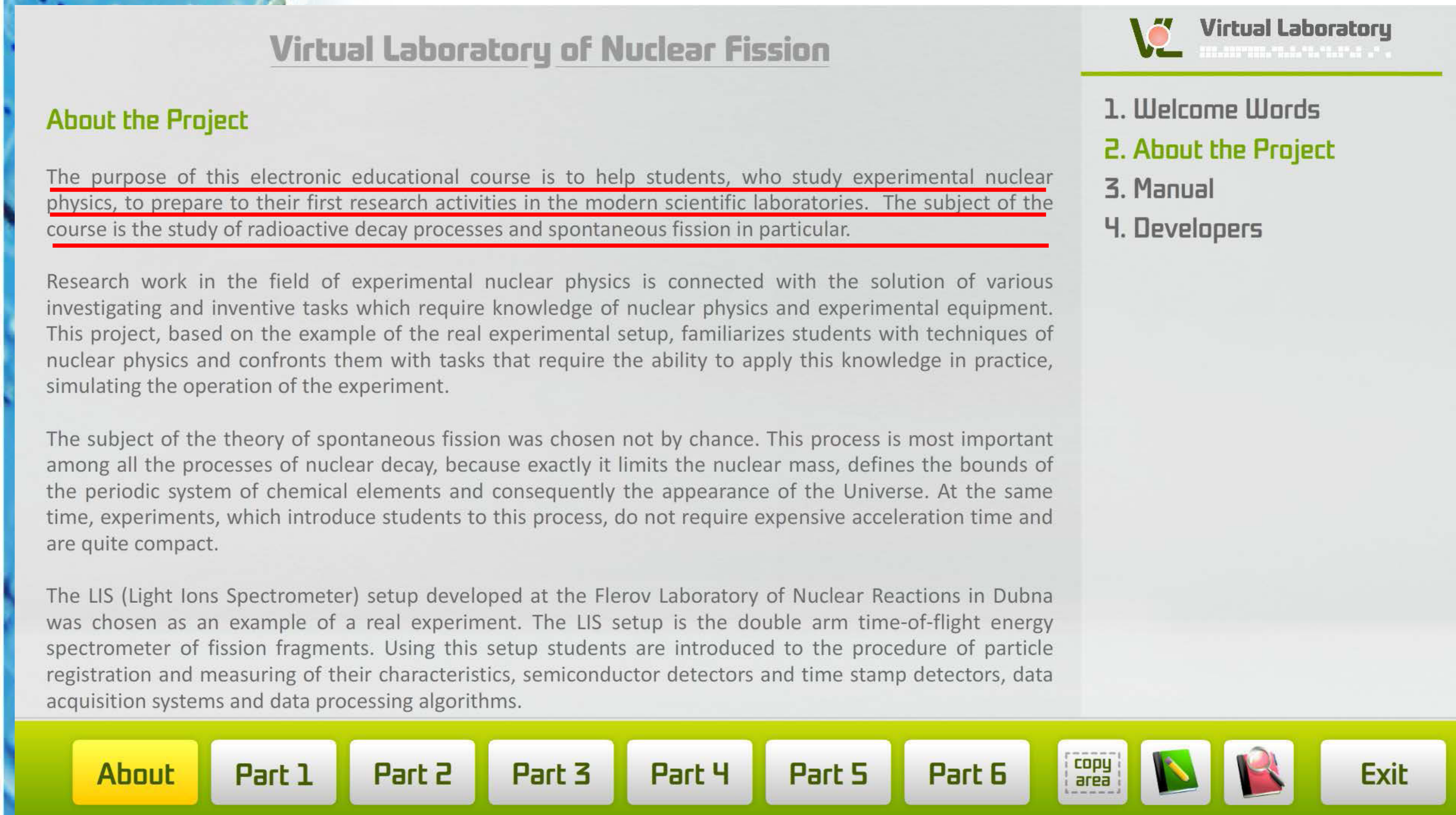

5. http://v-labs.ru/

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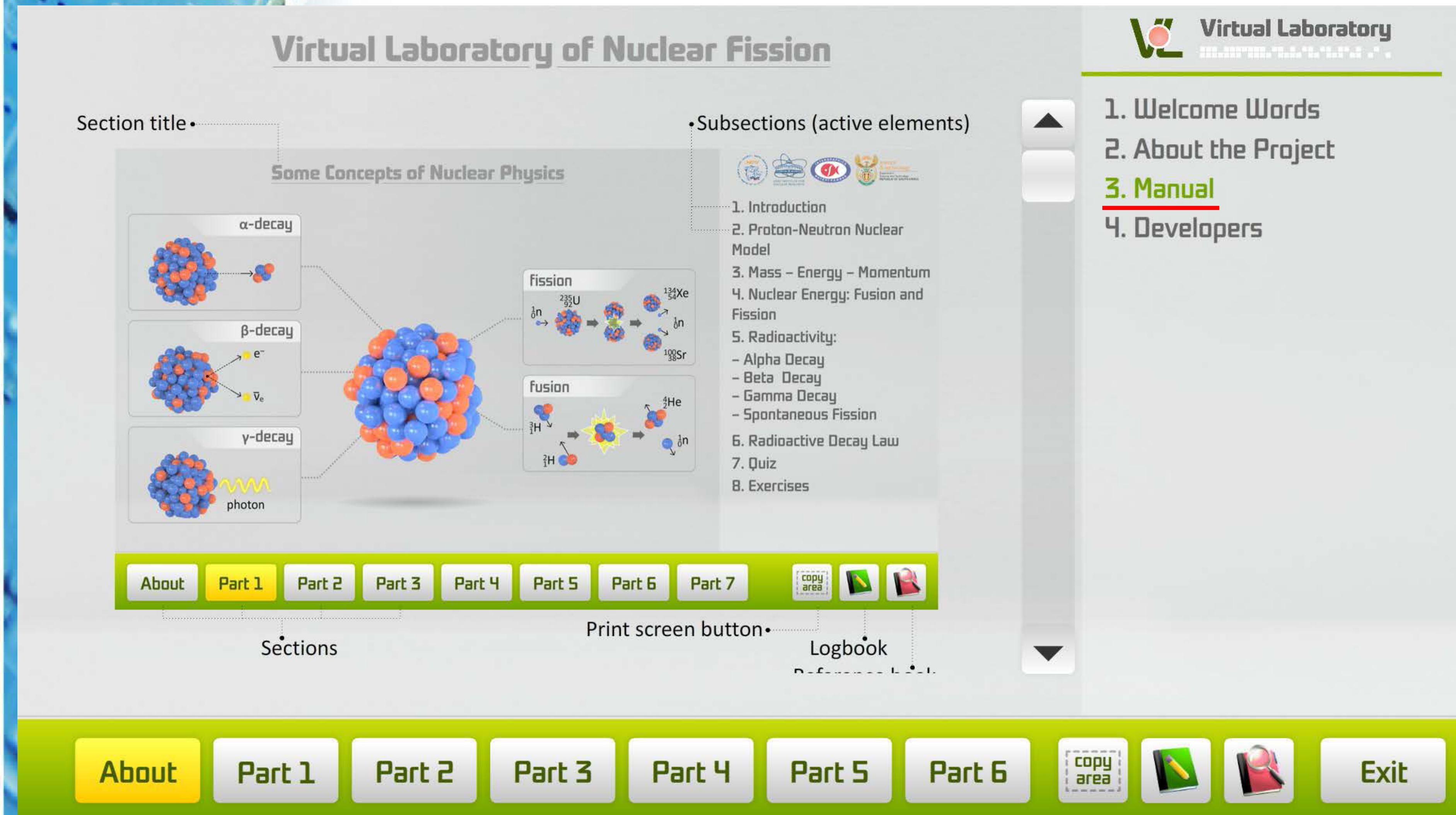

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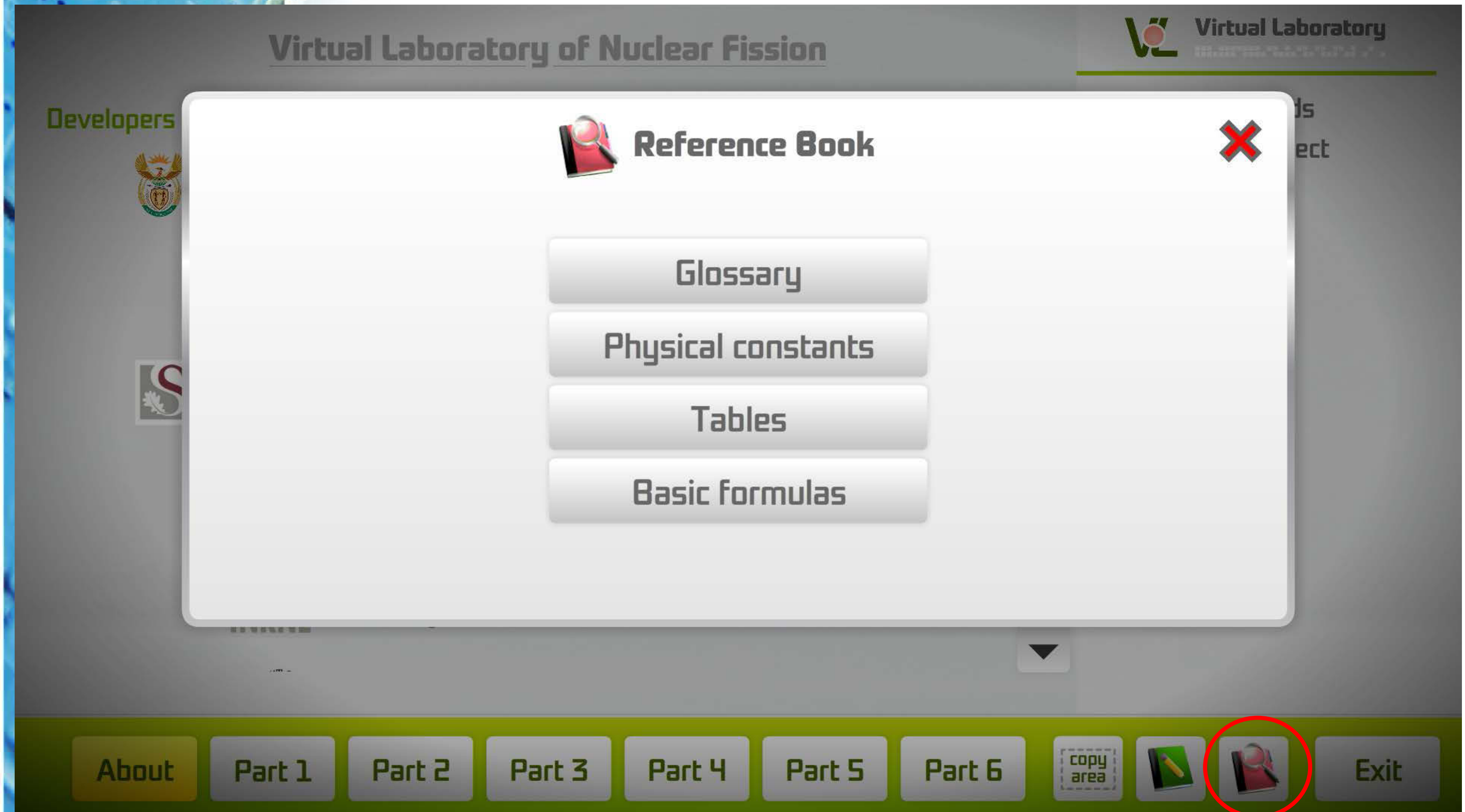

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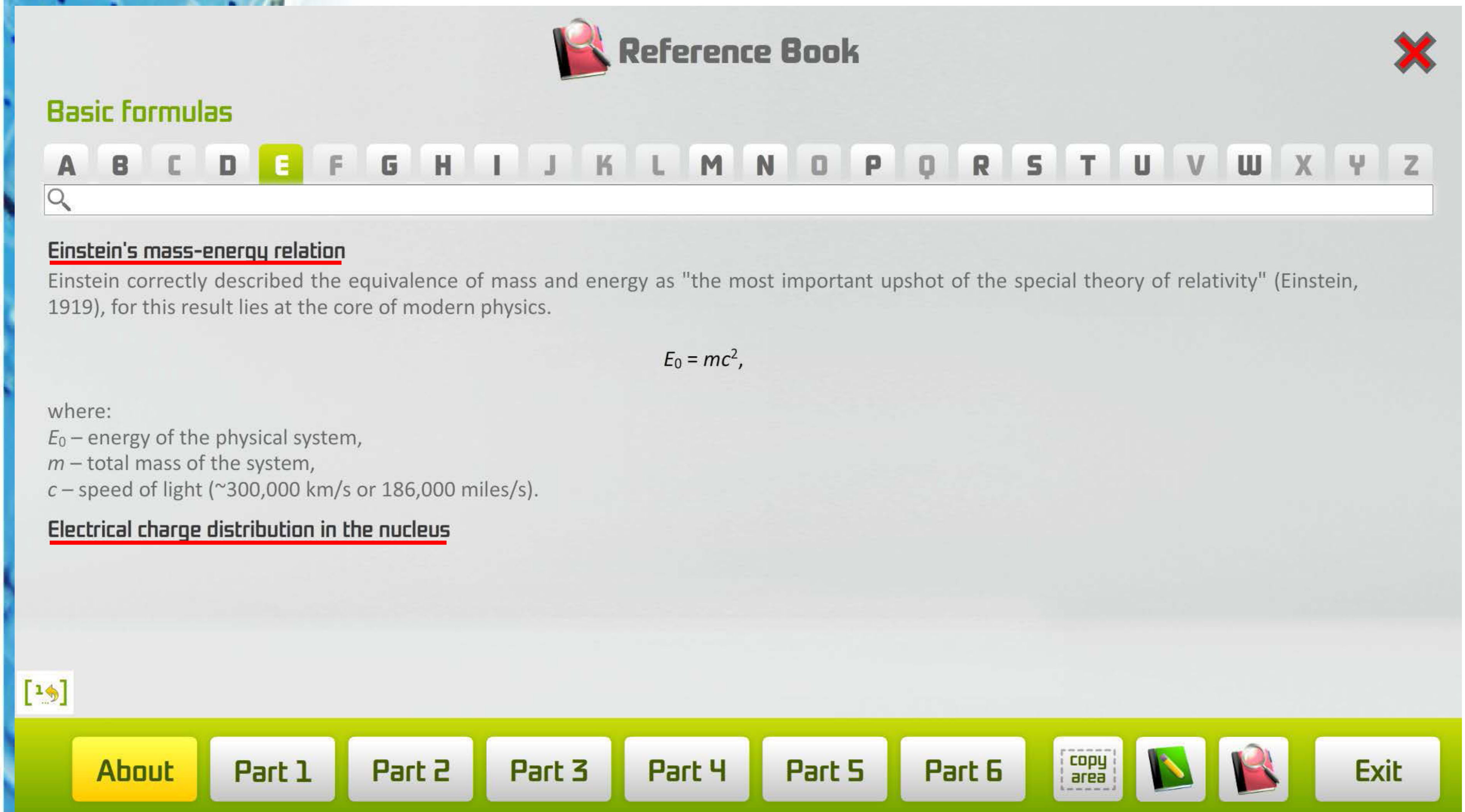

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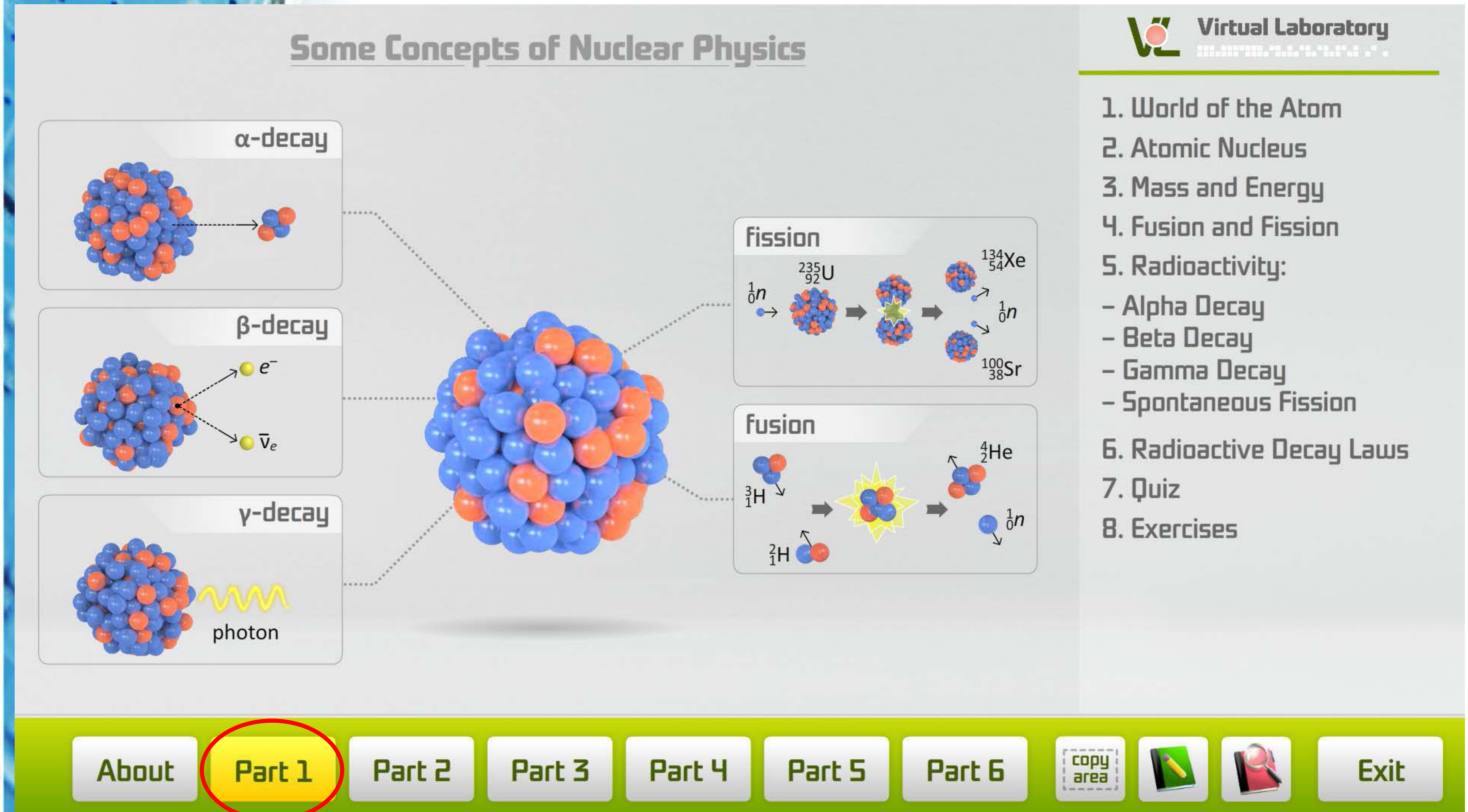

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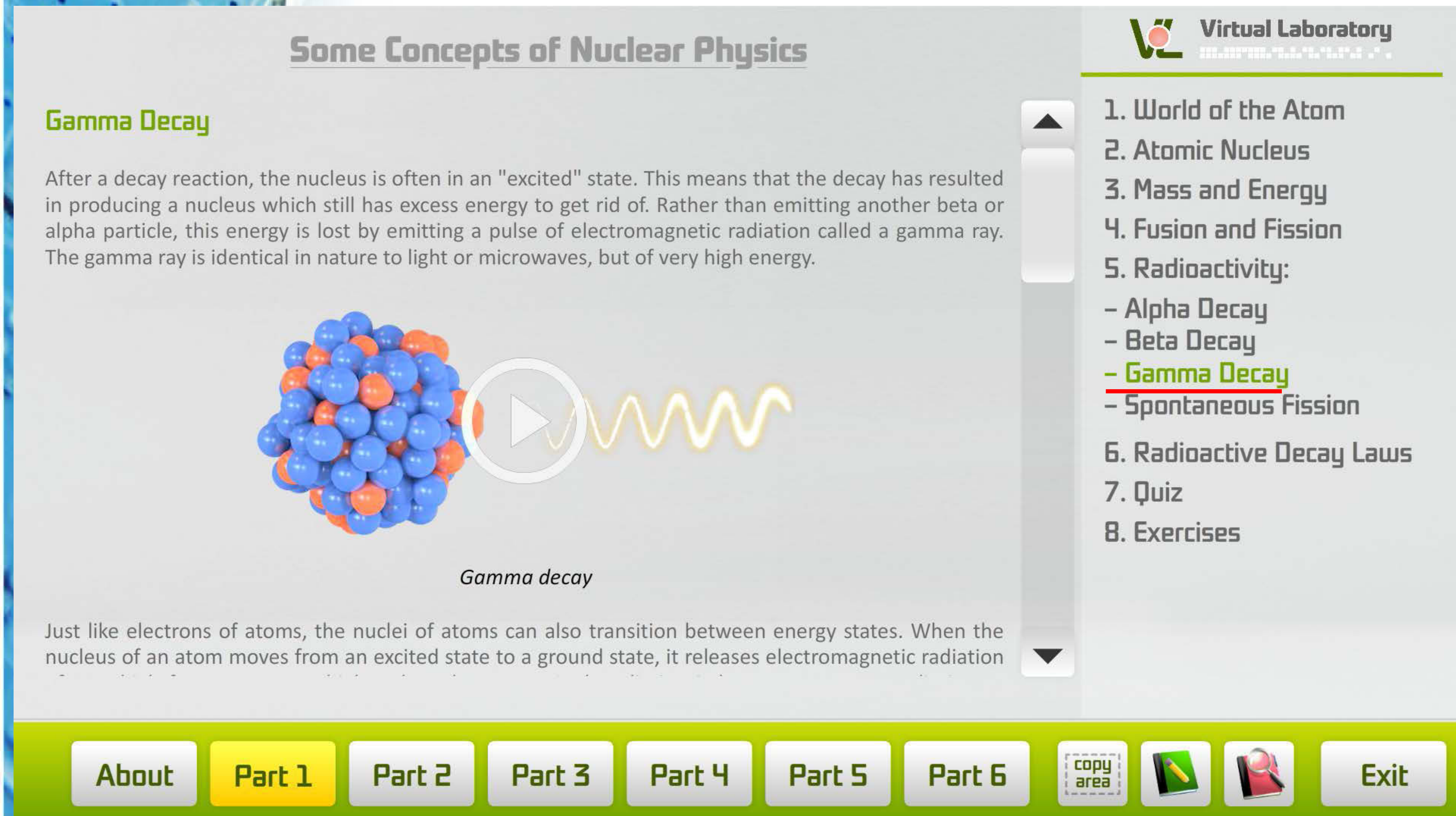

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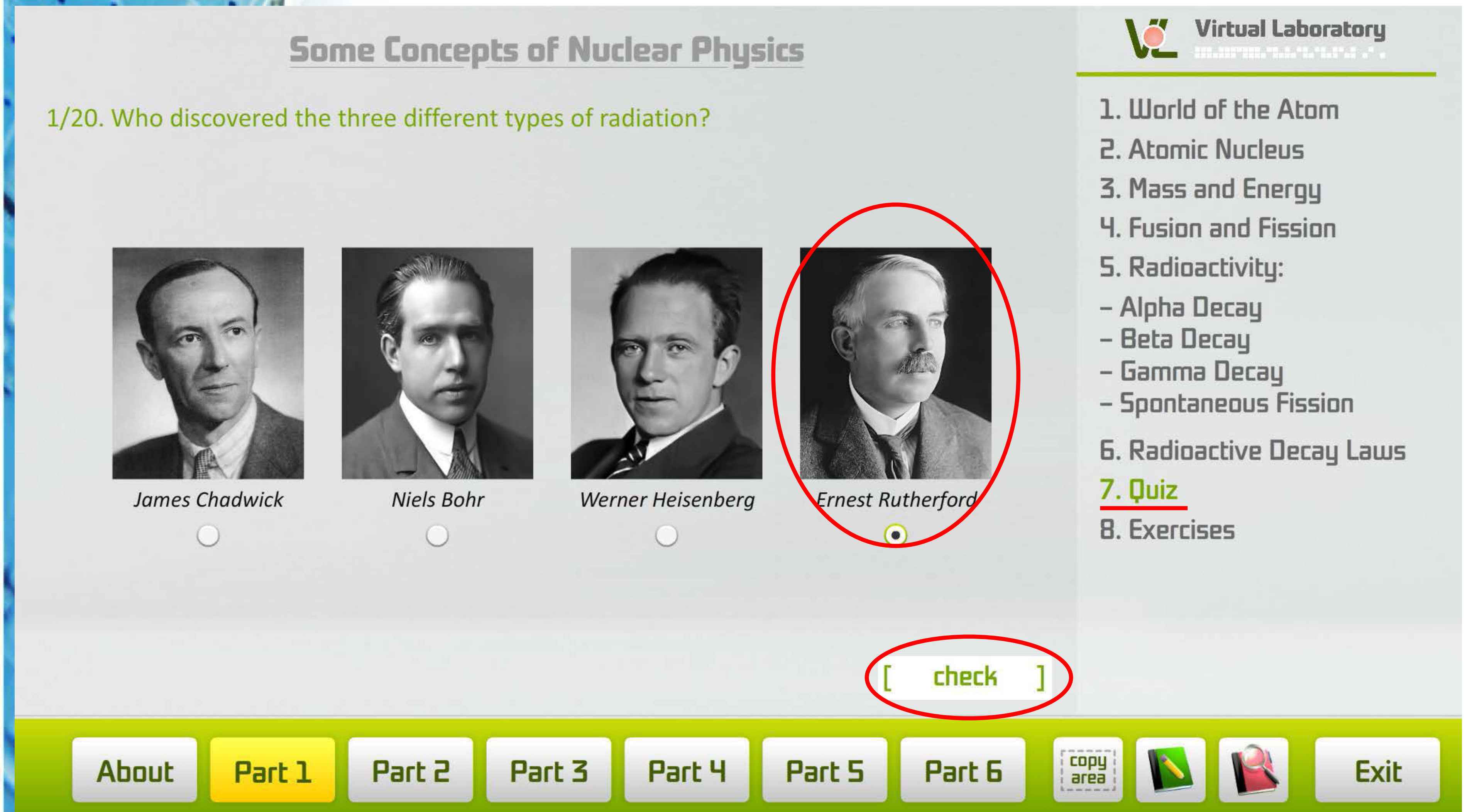

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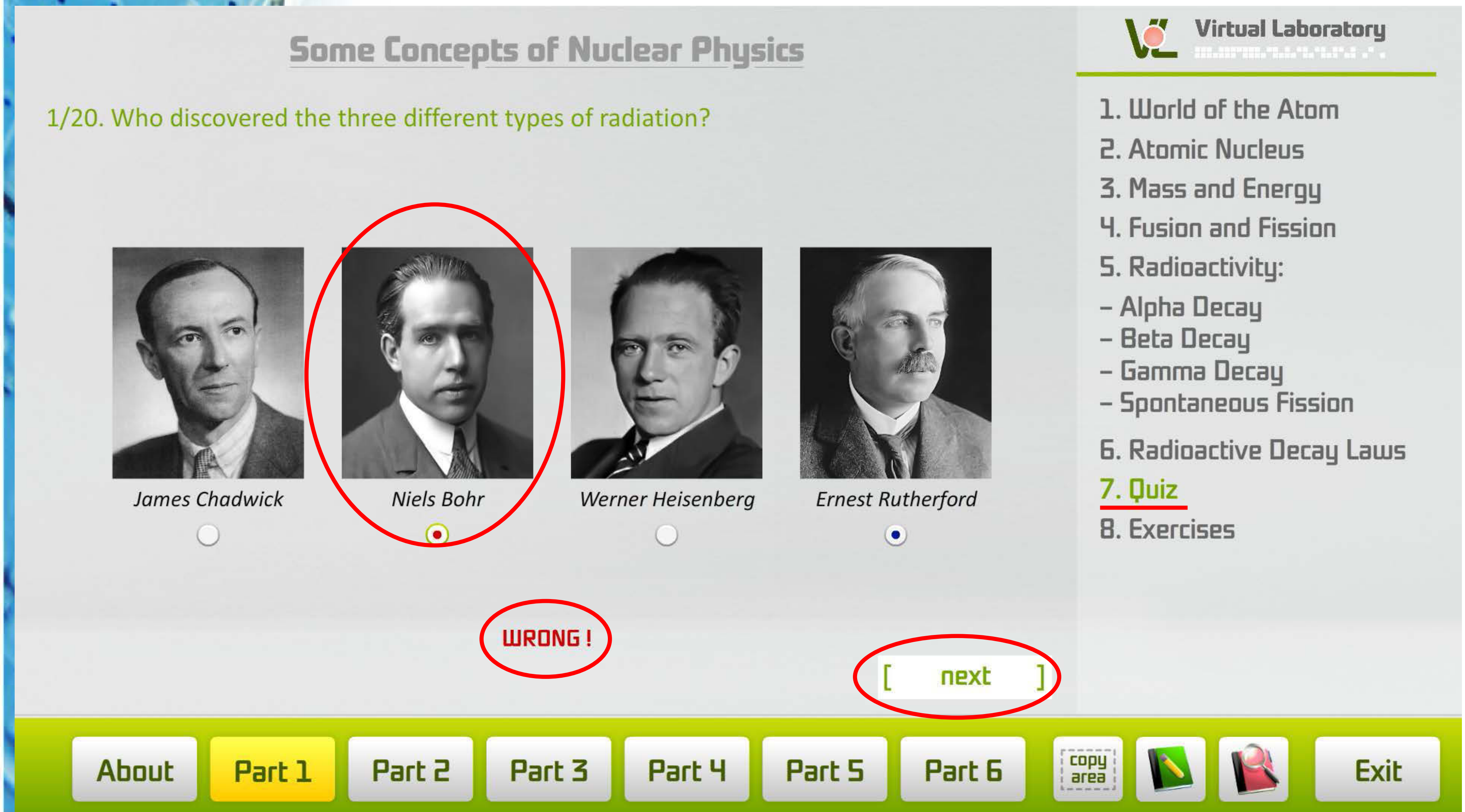

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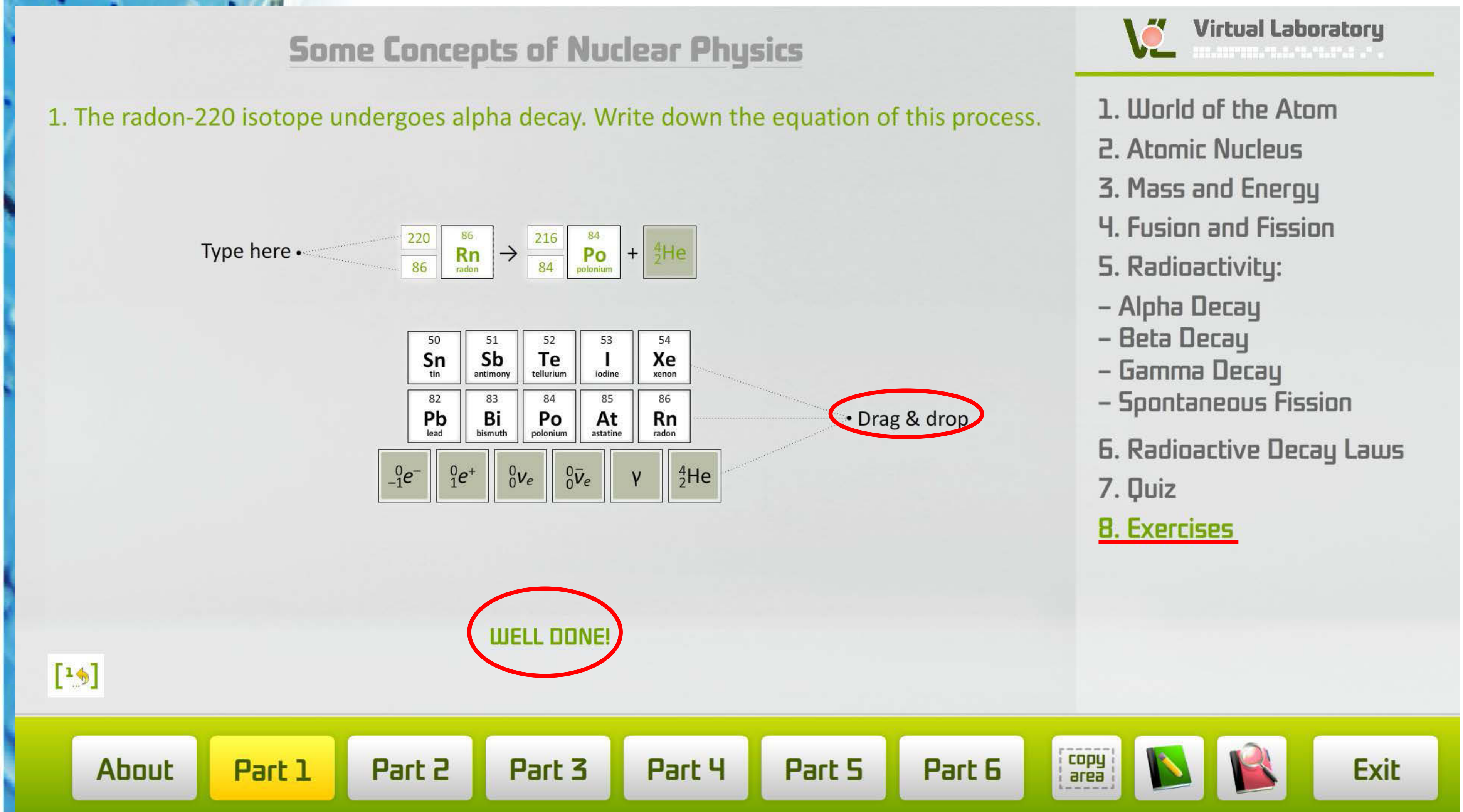

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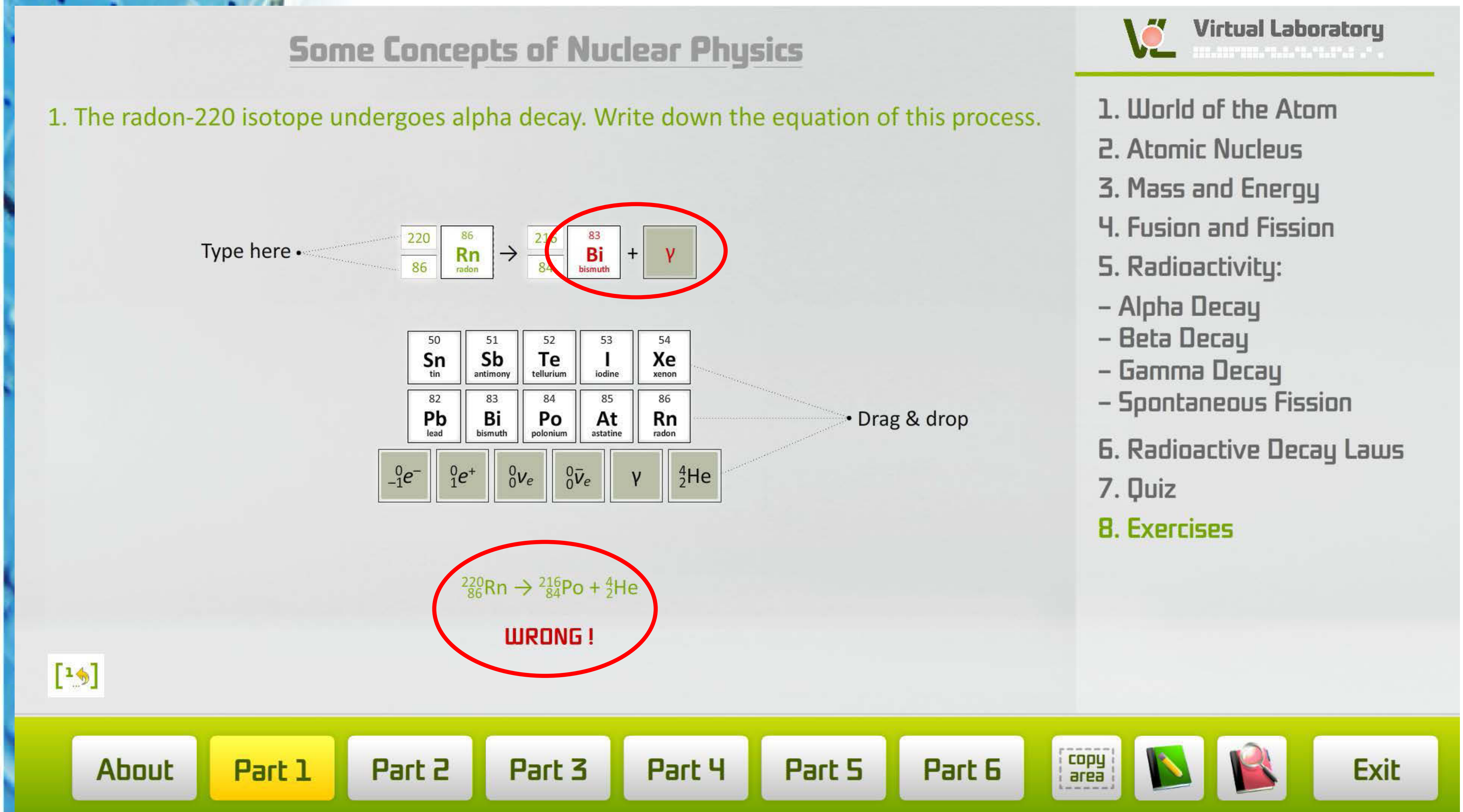

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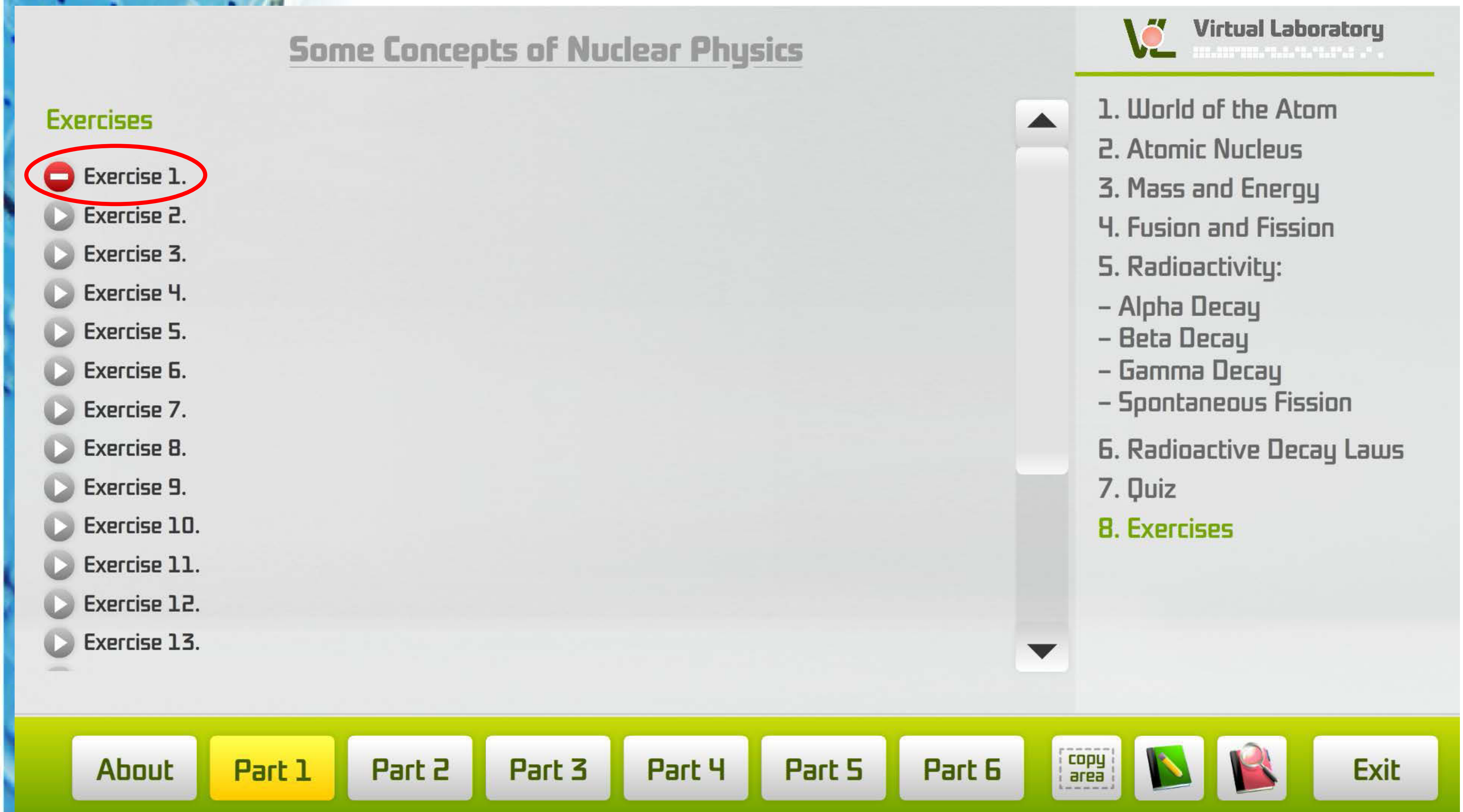

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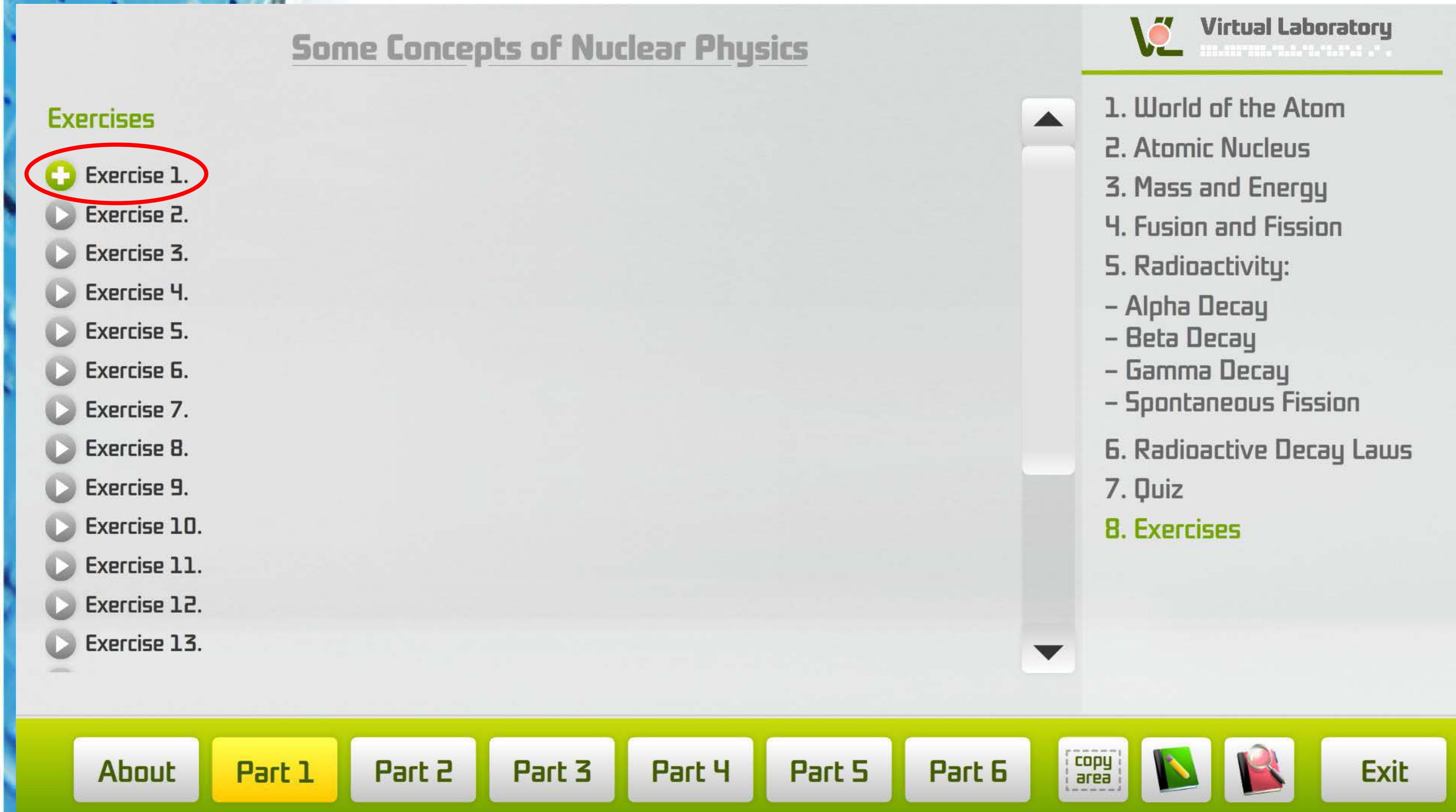

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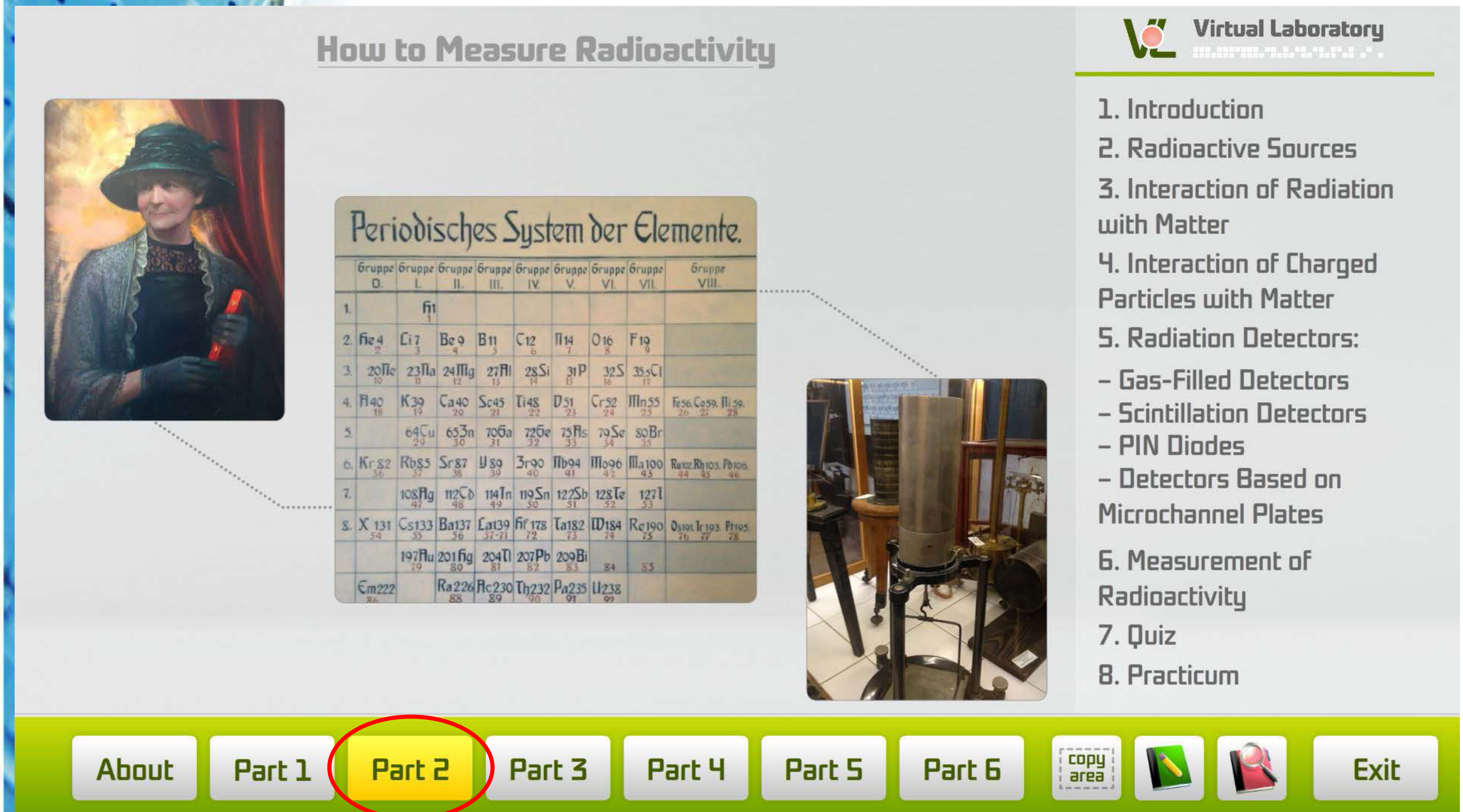

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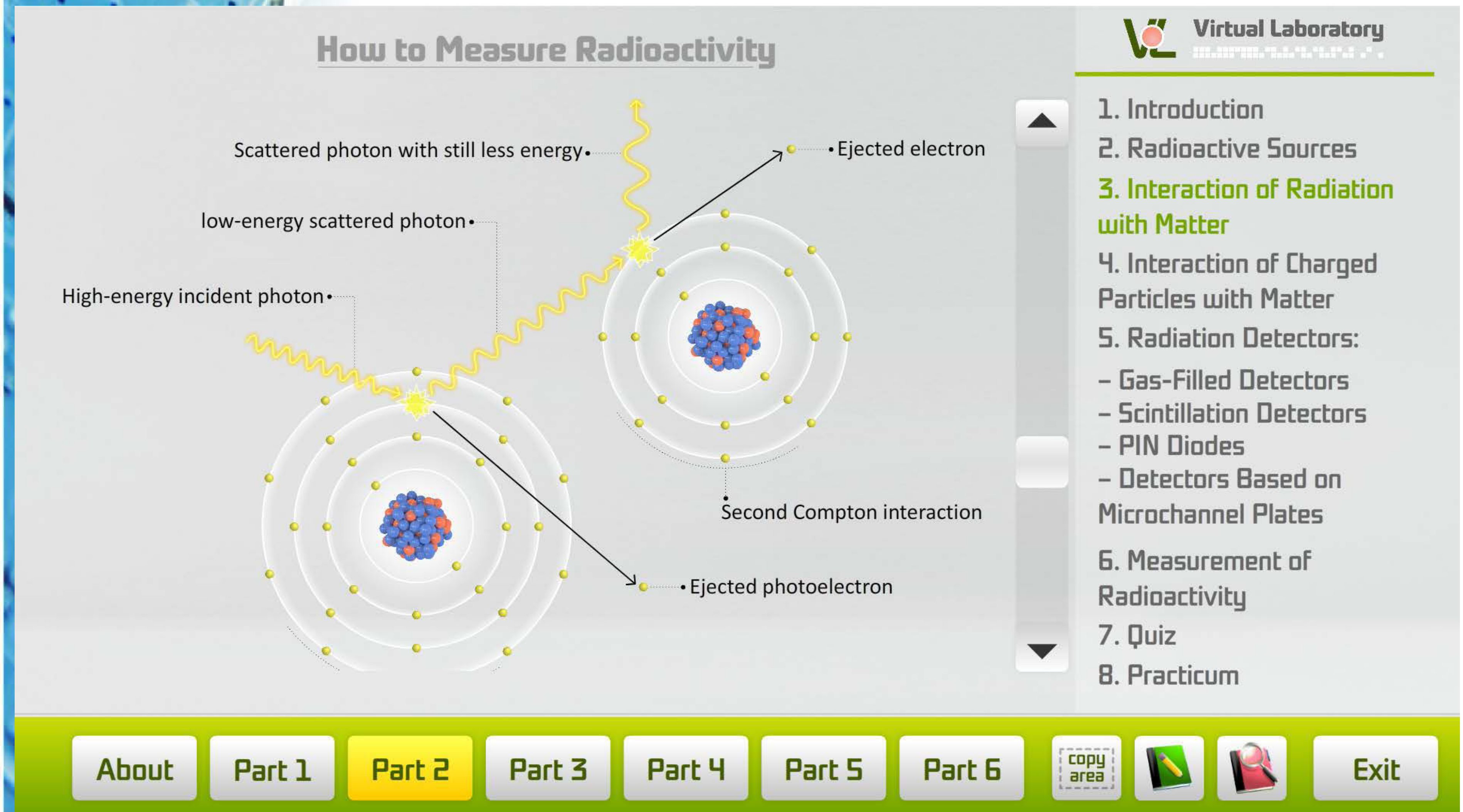

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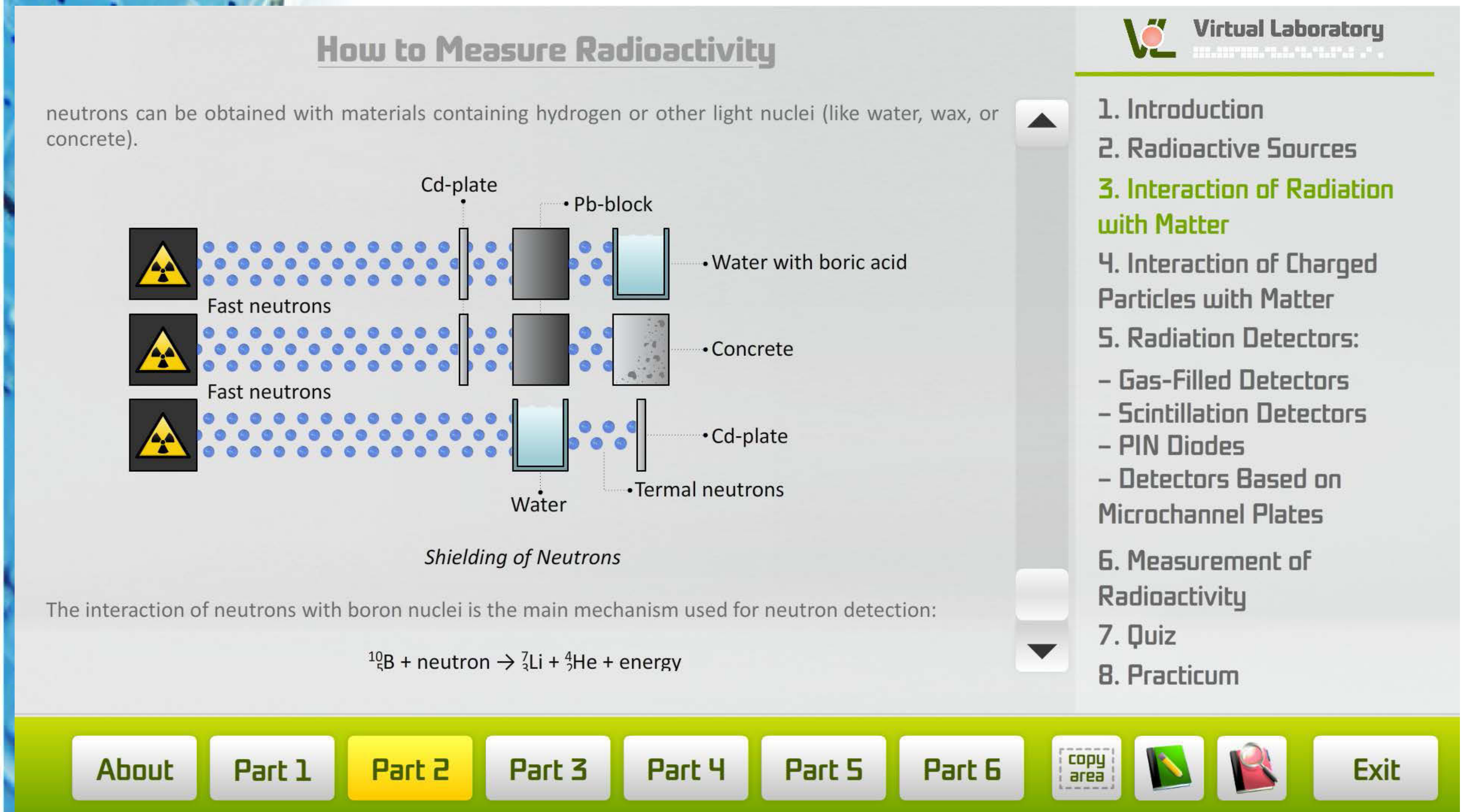

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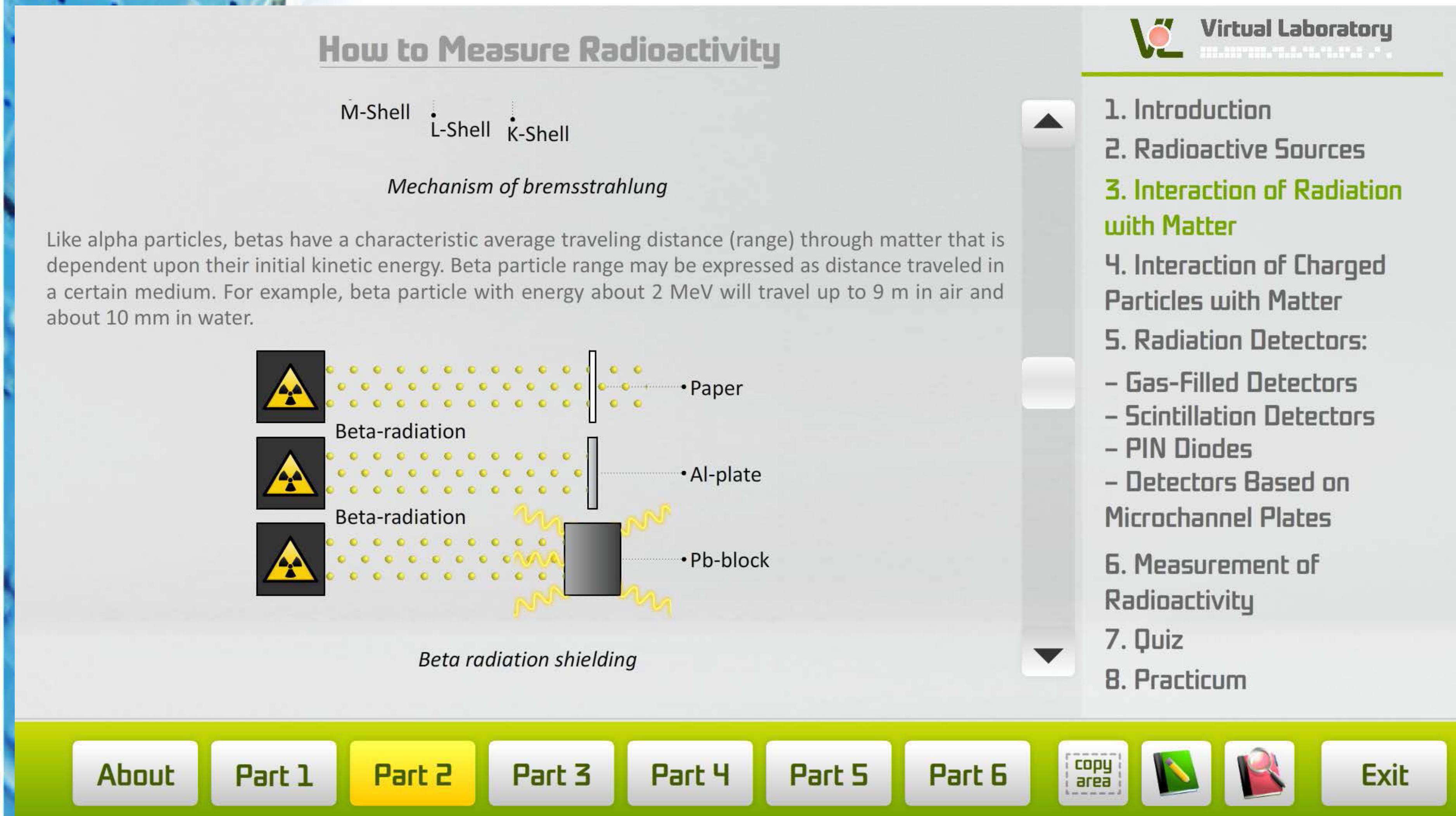

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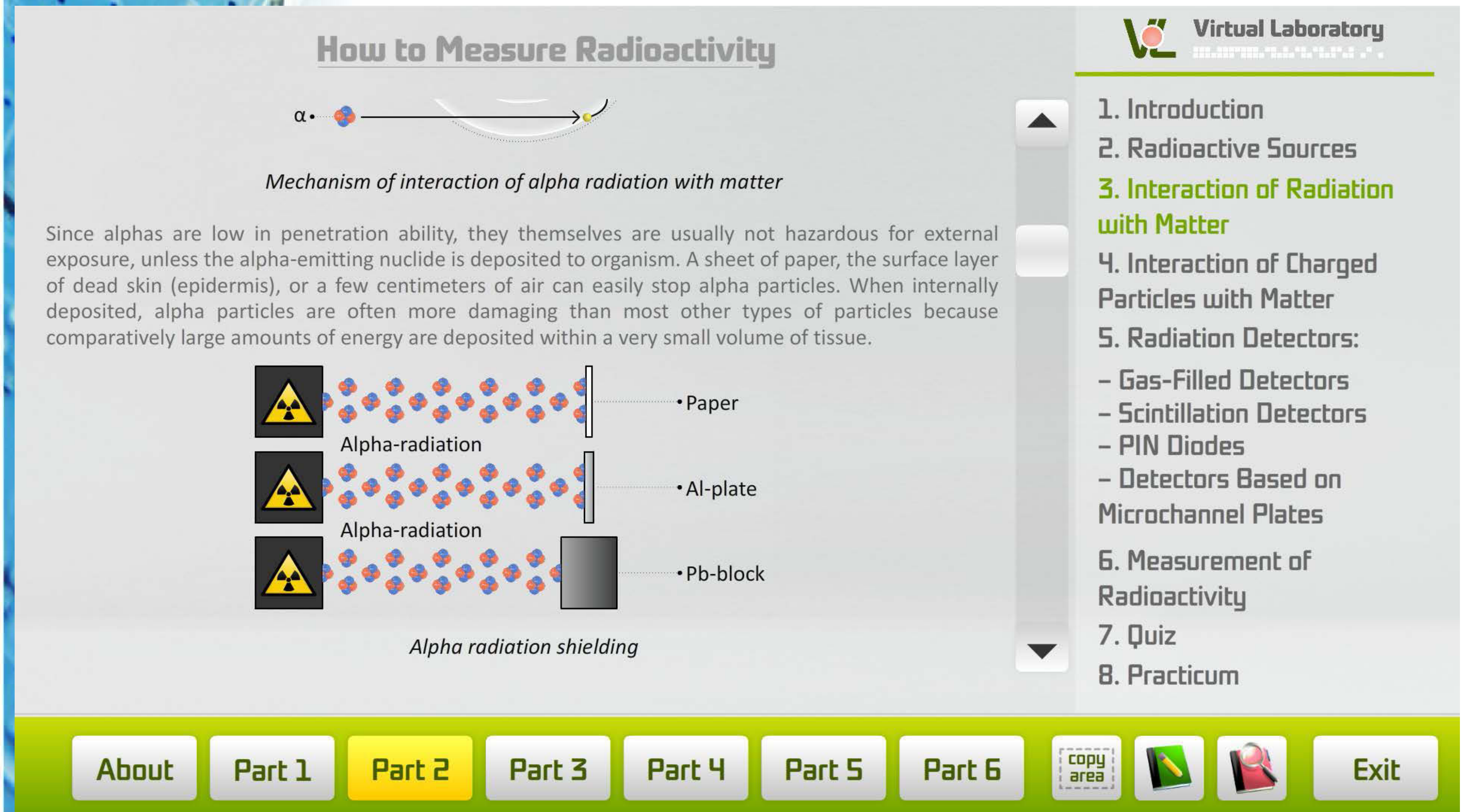

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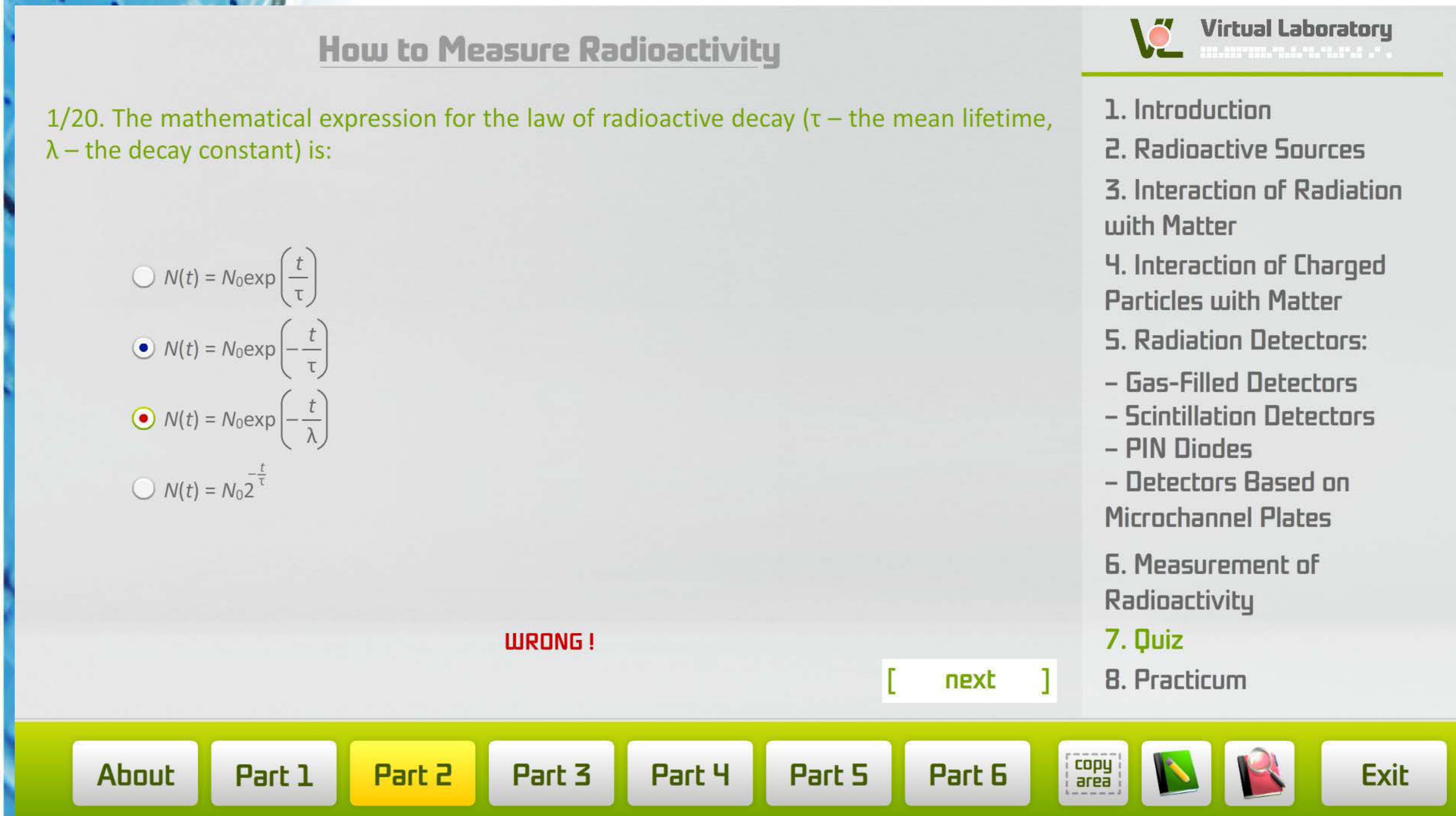

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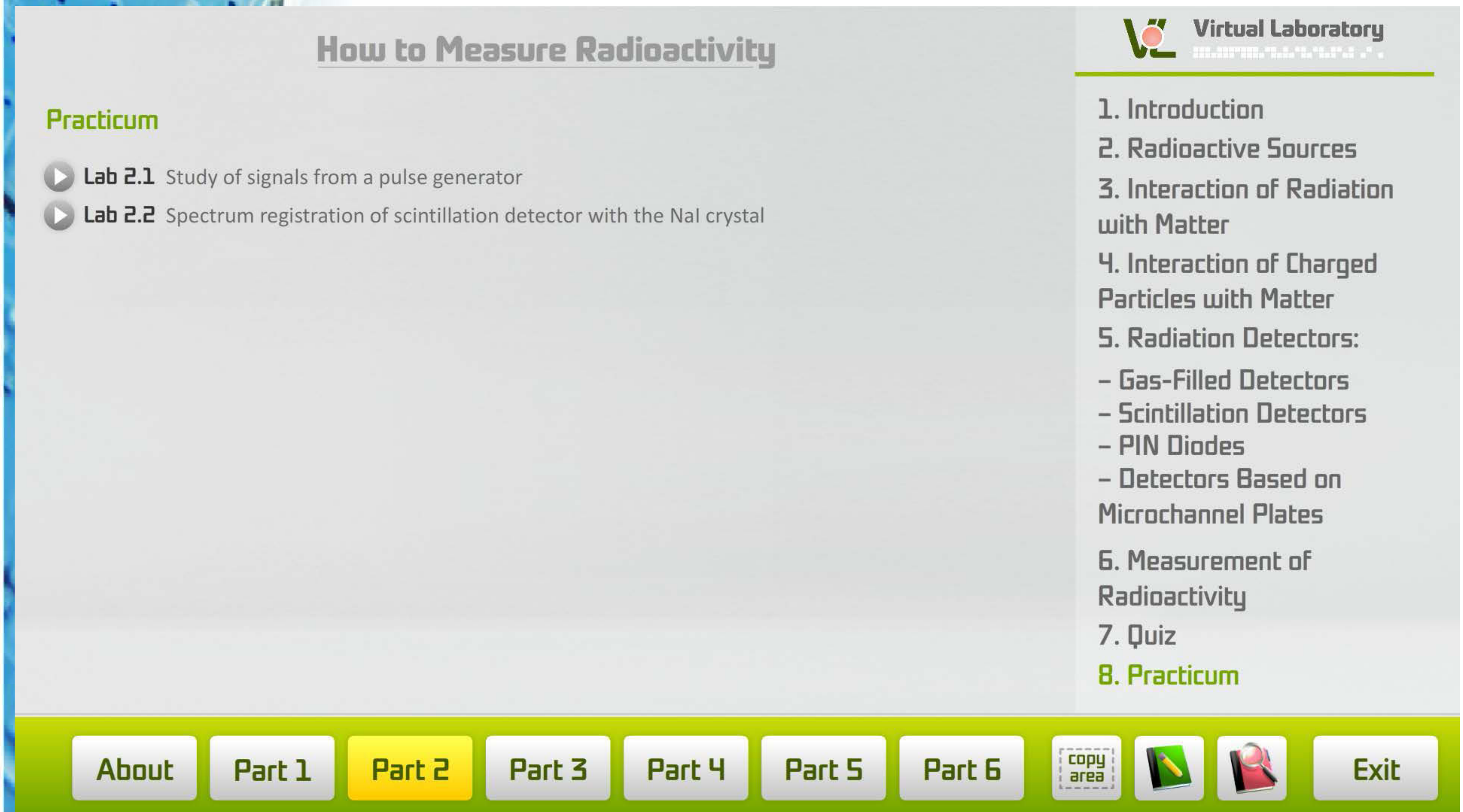

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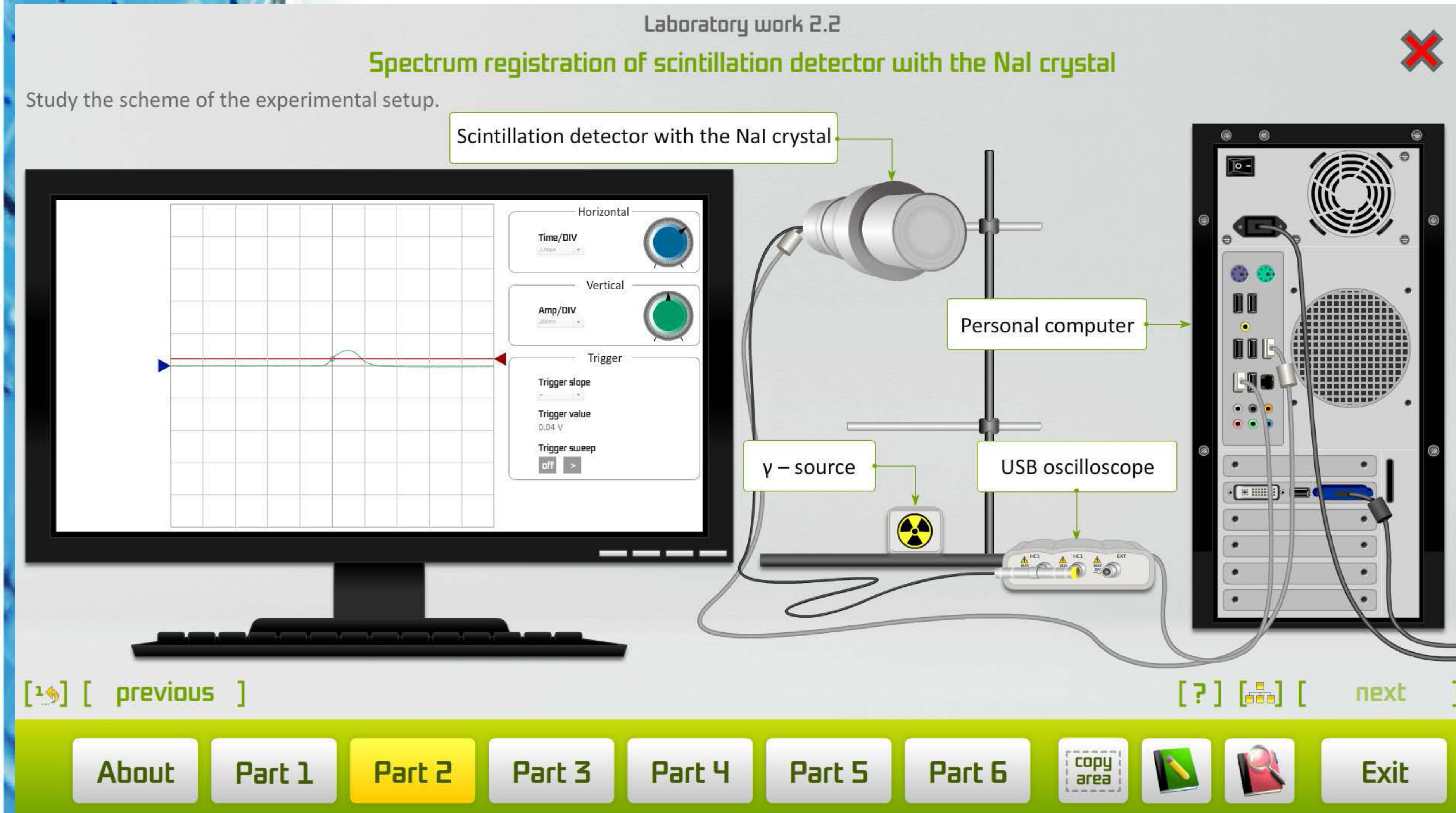

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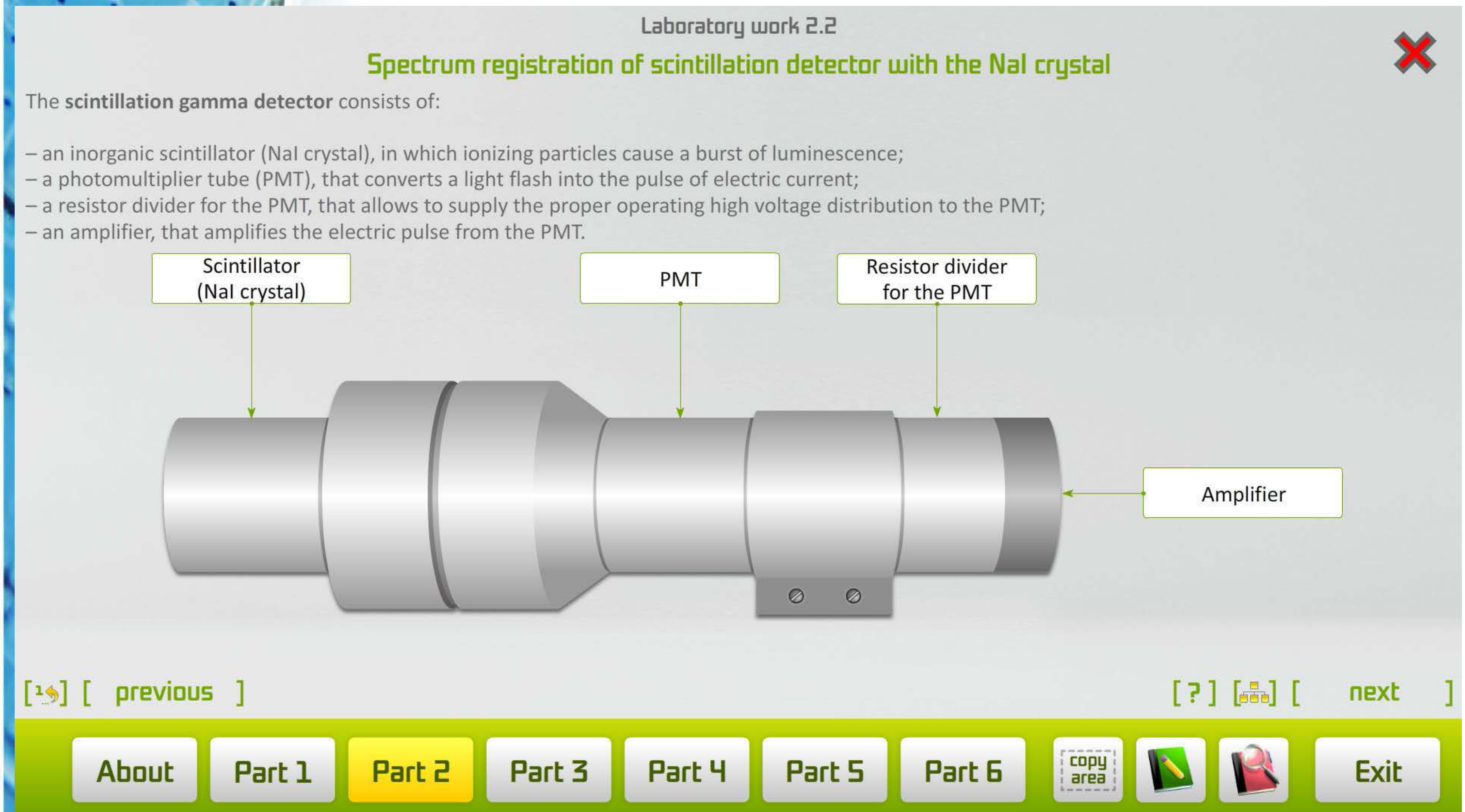

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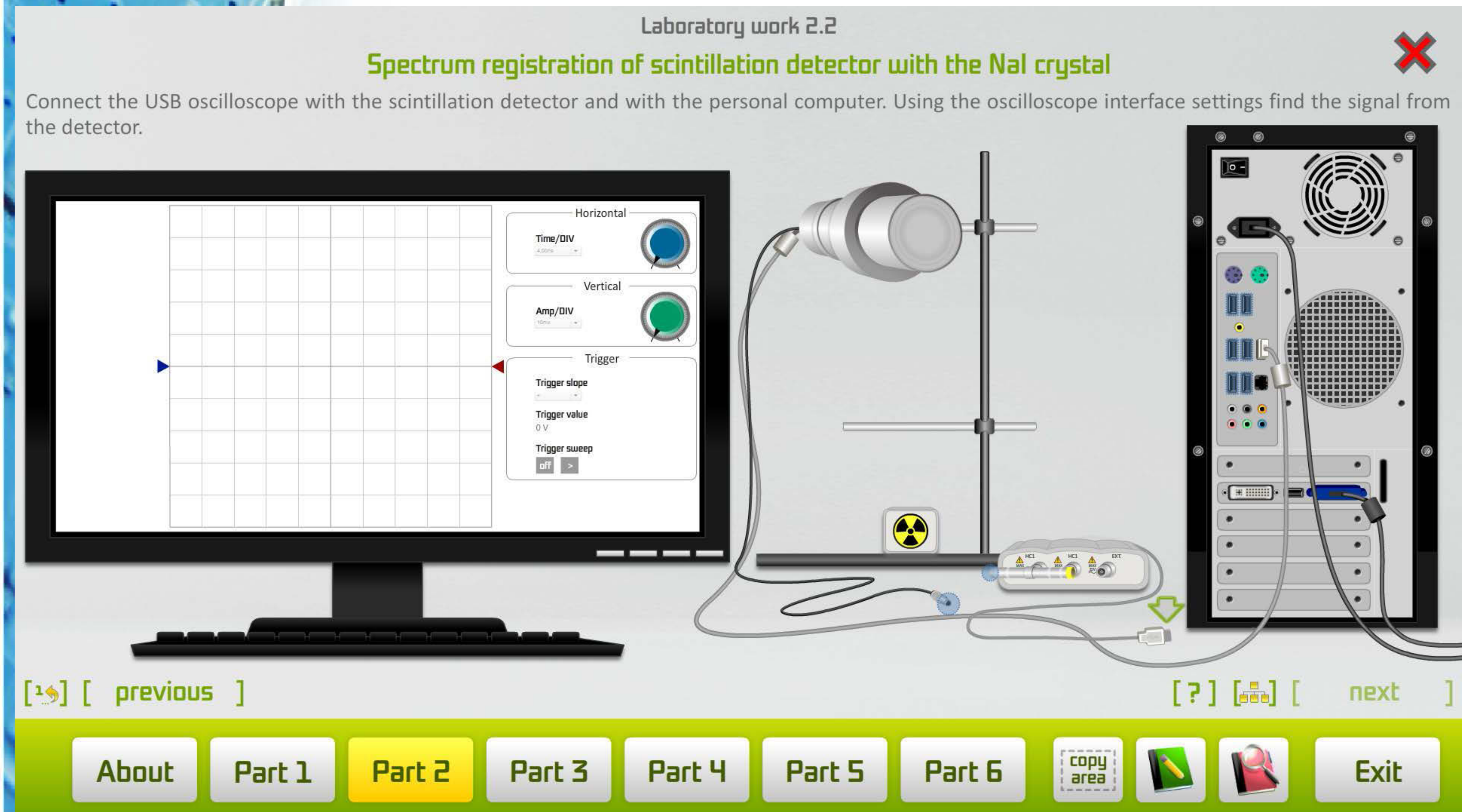

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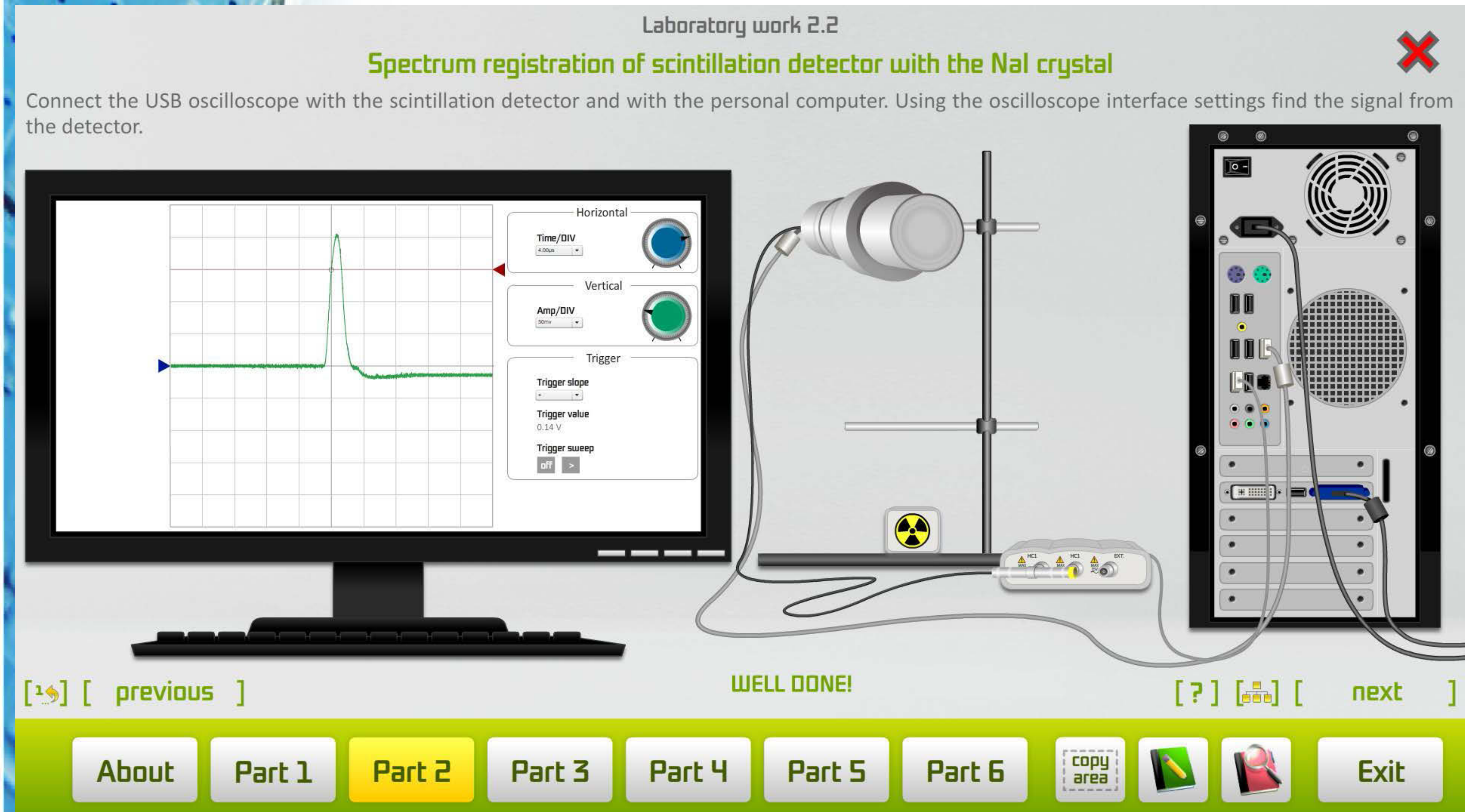

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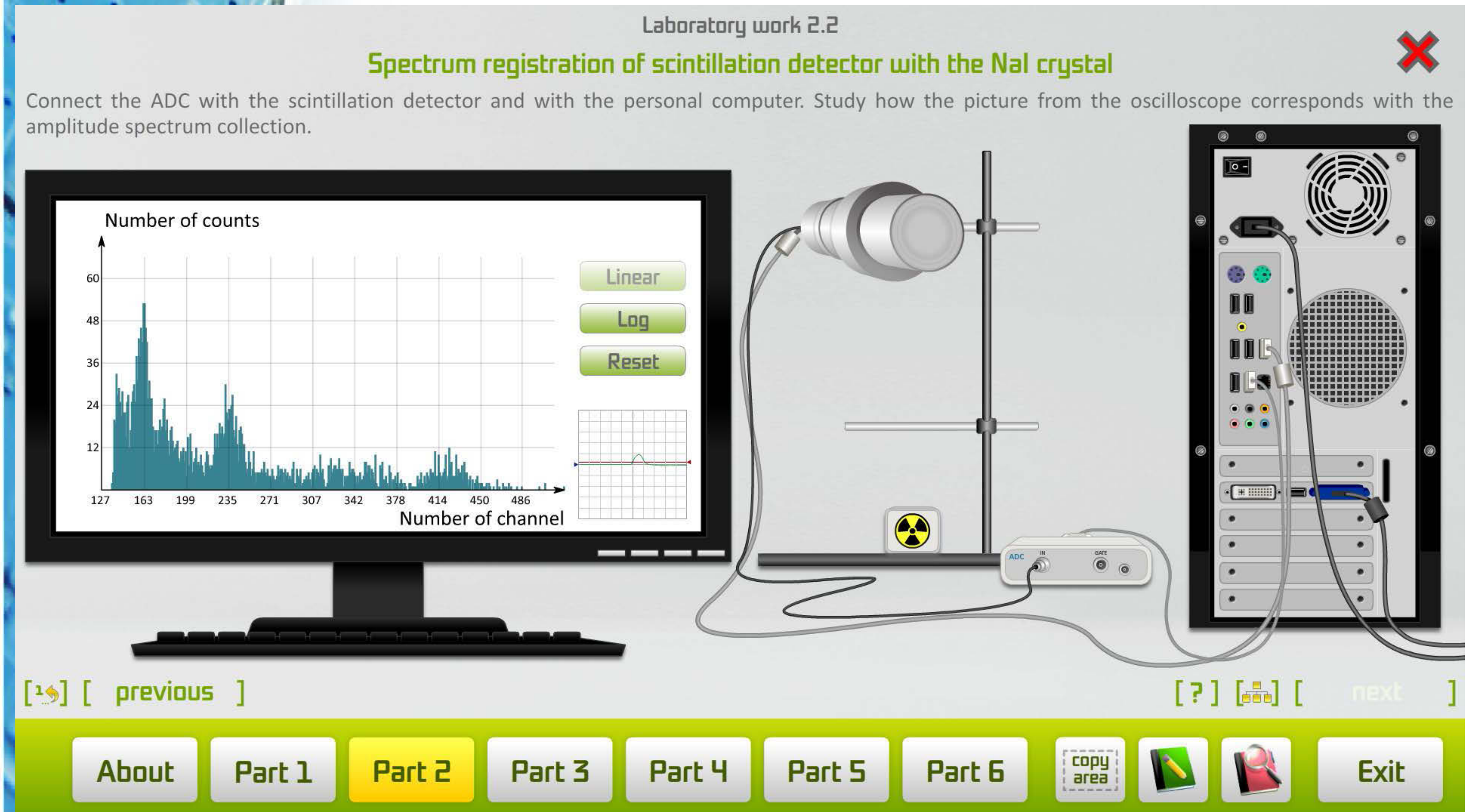

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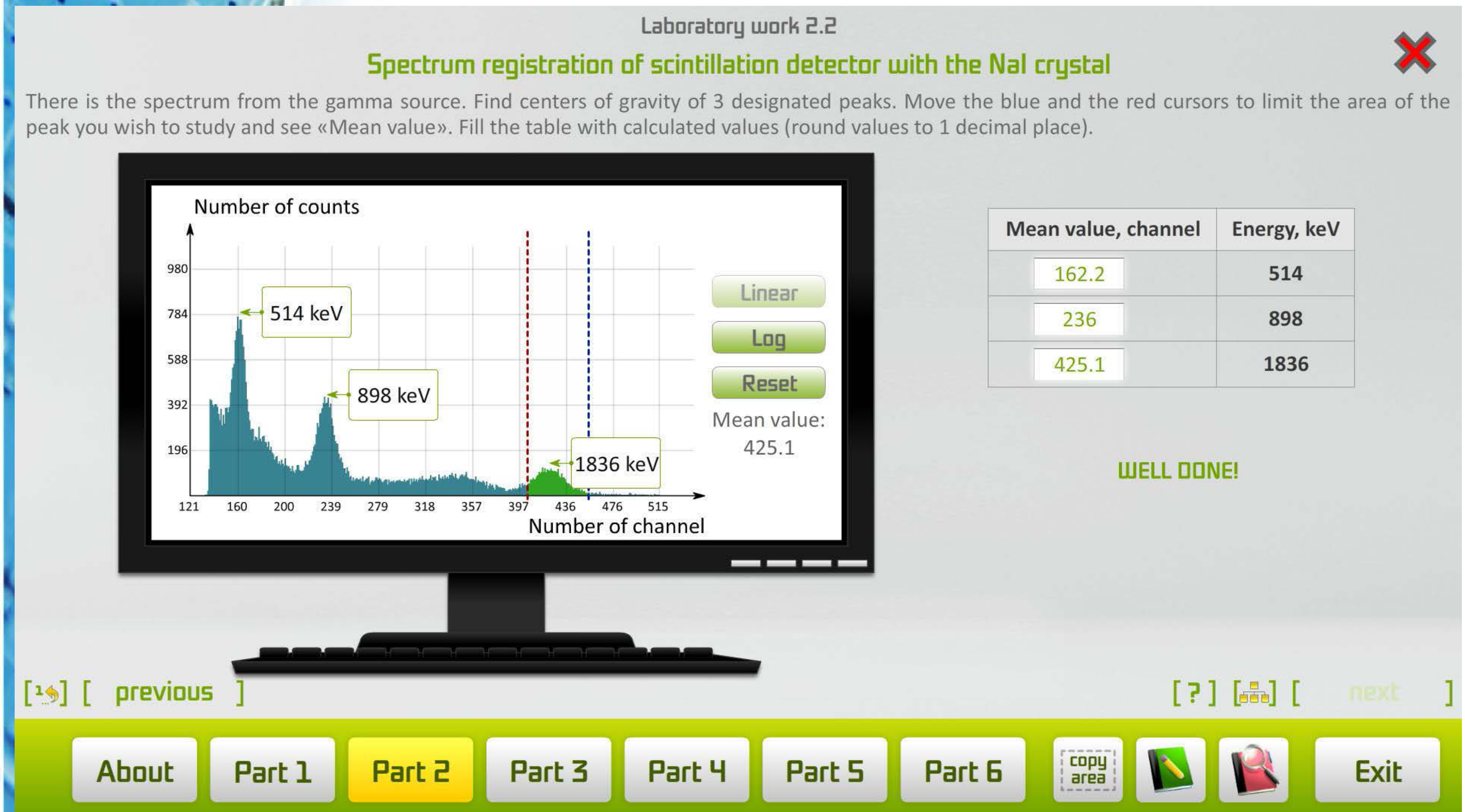

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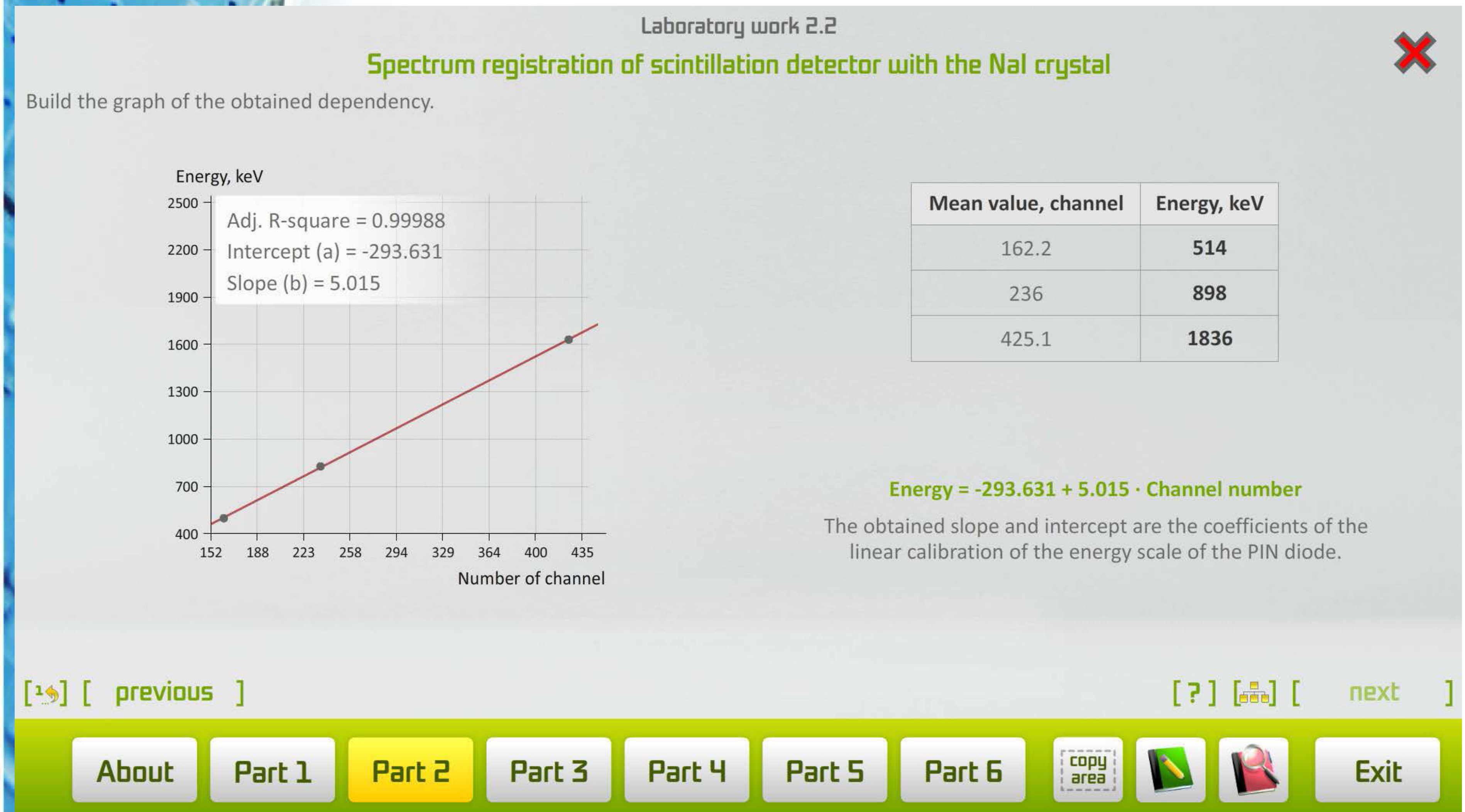

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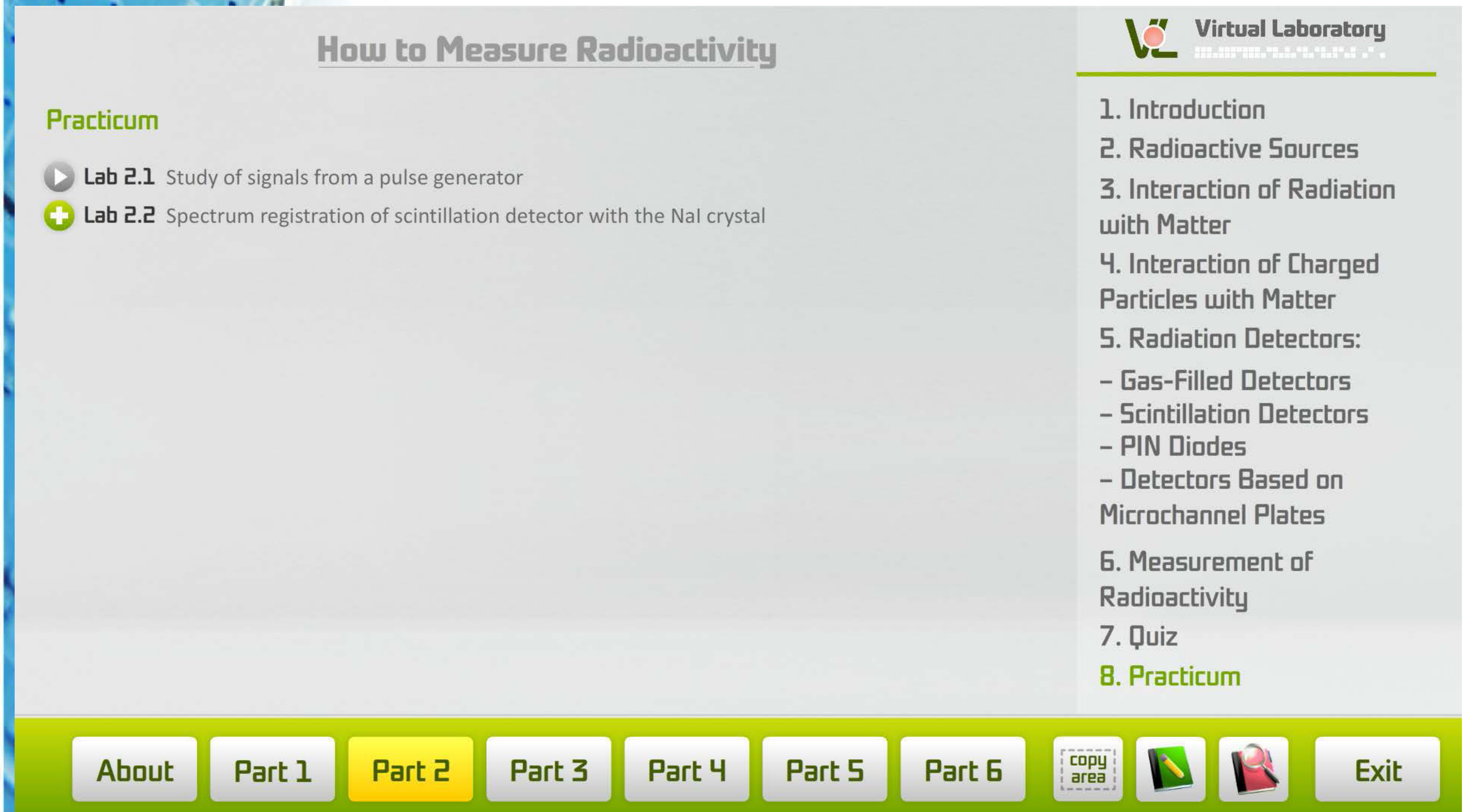

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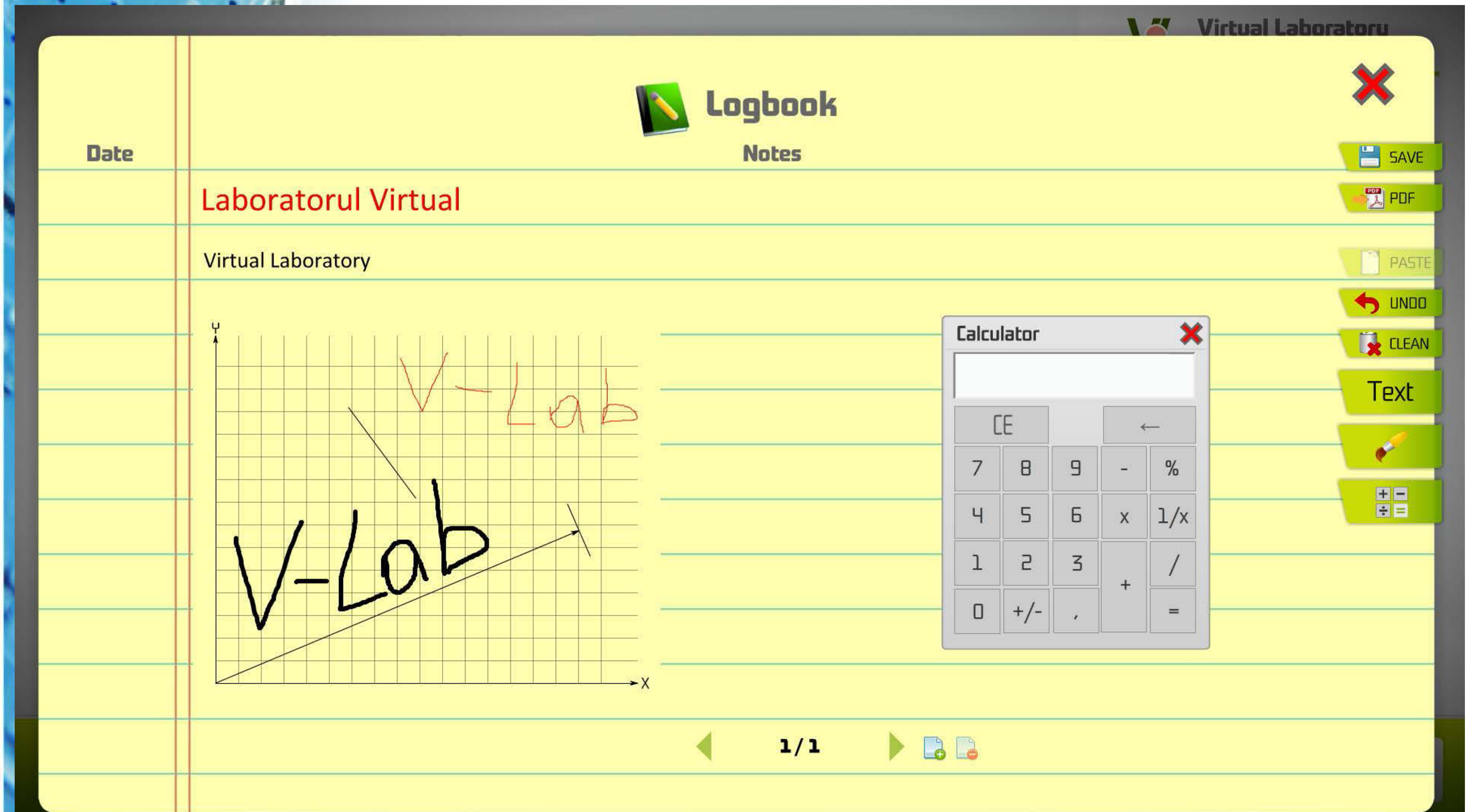

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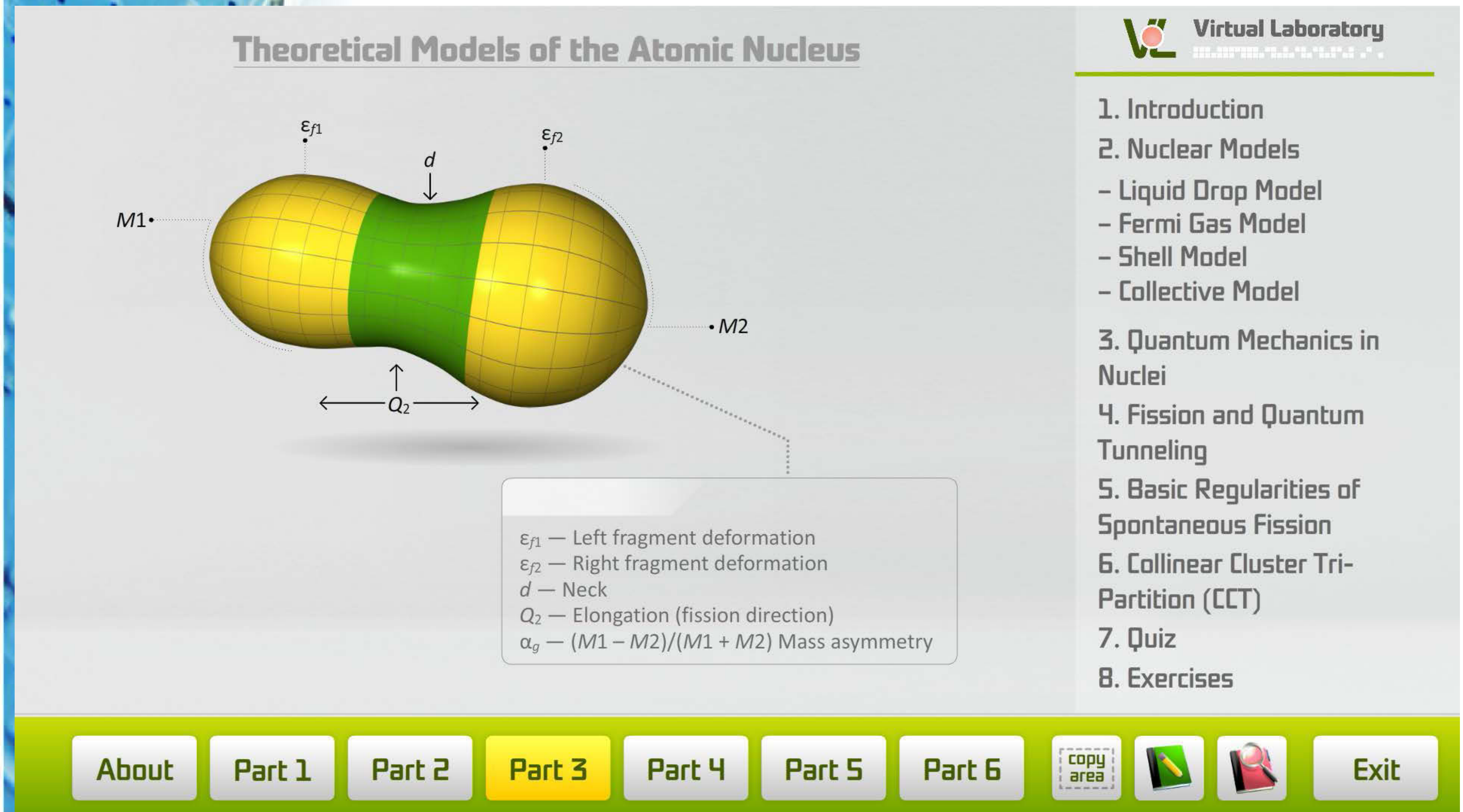

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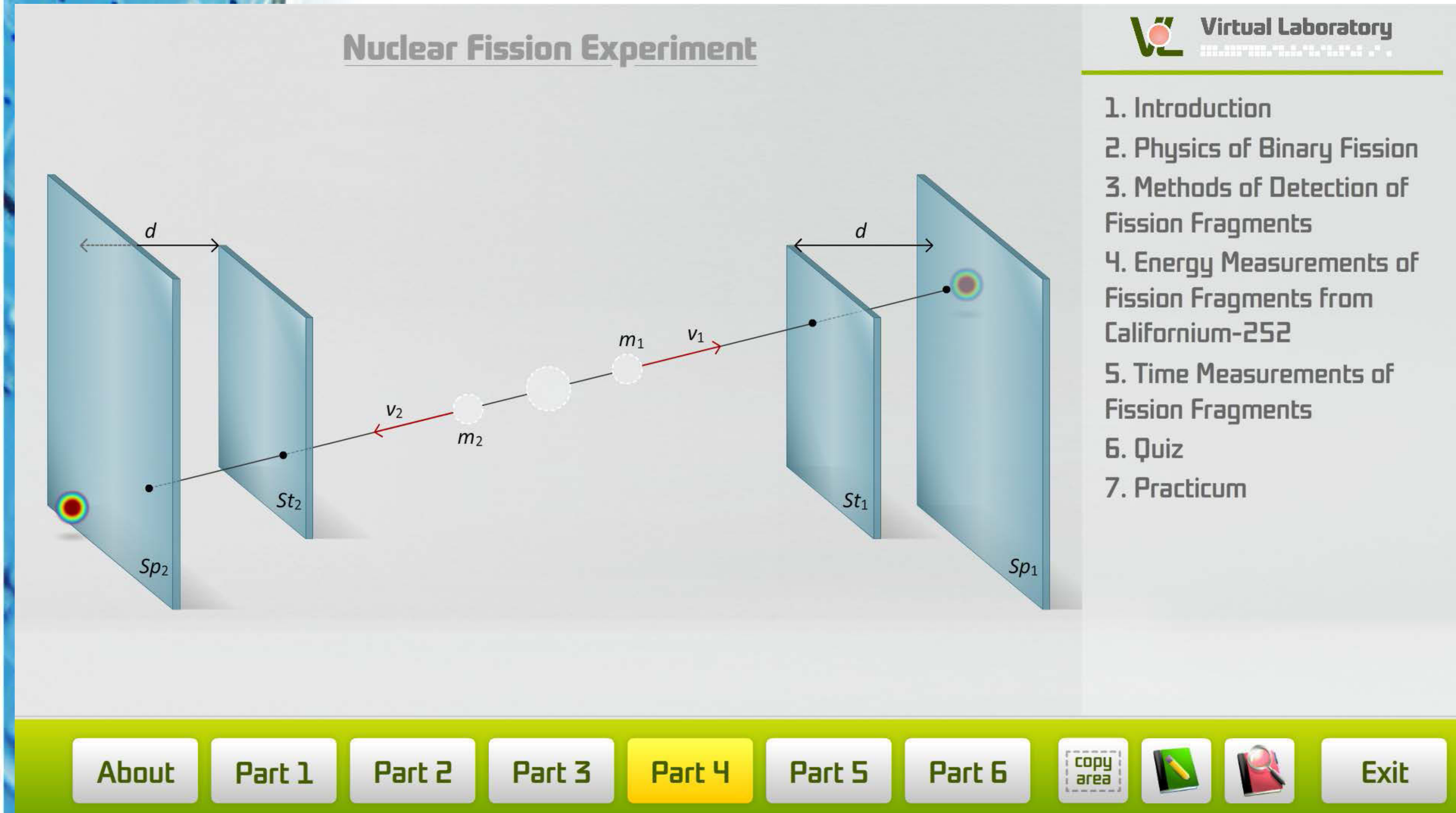

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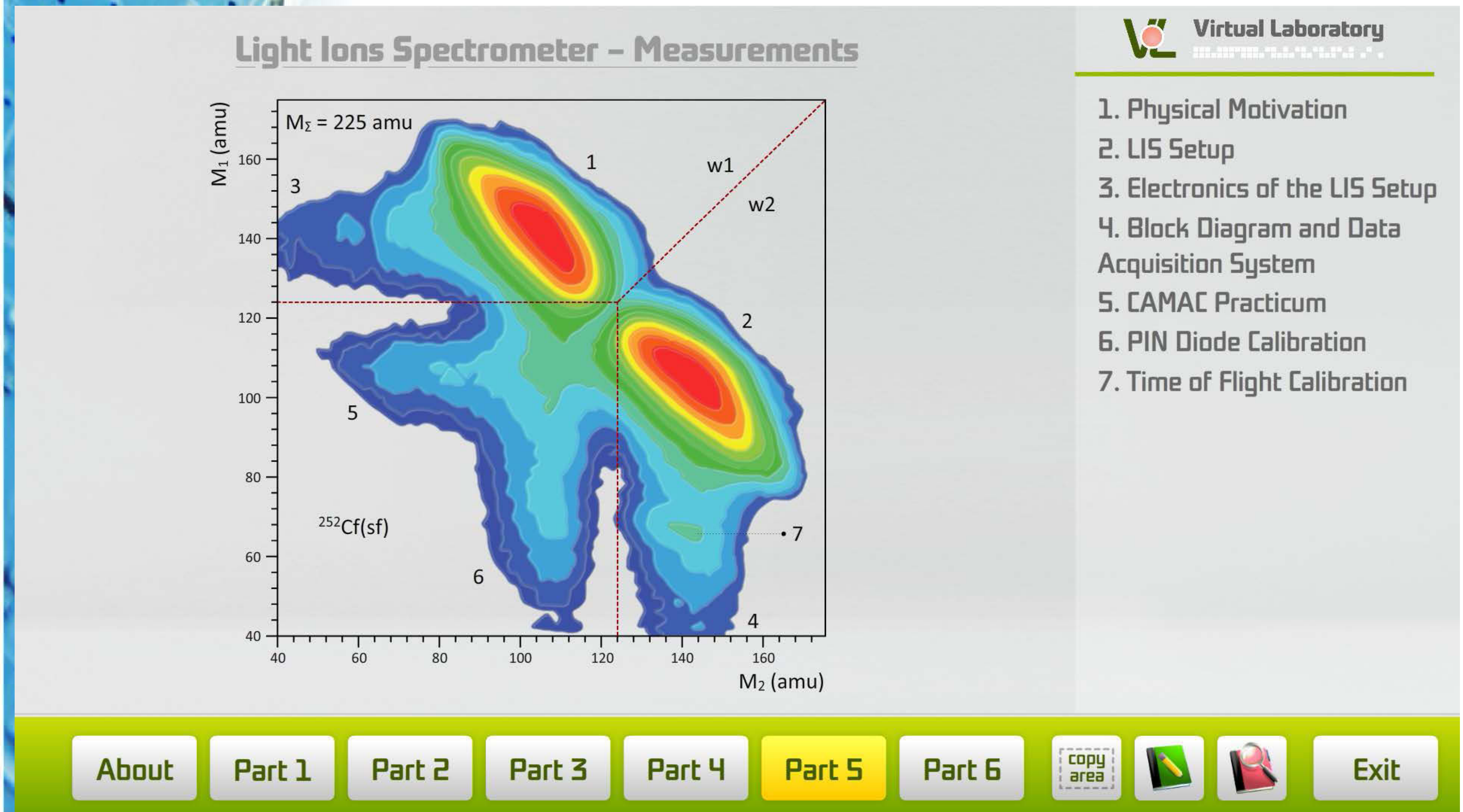

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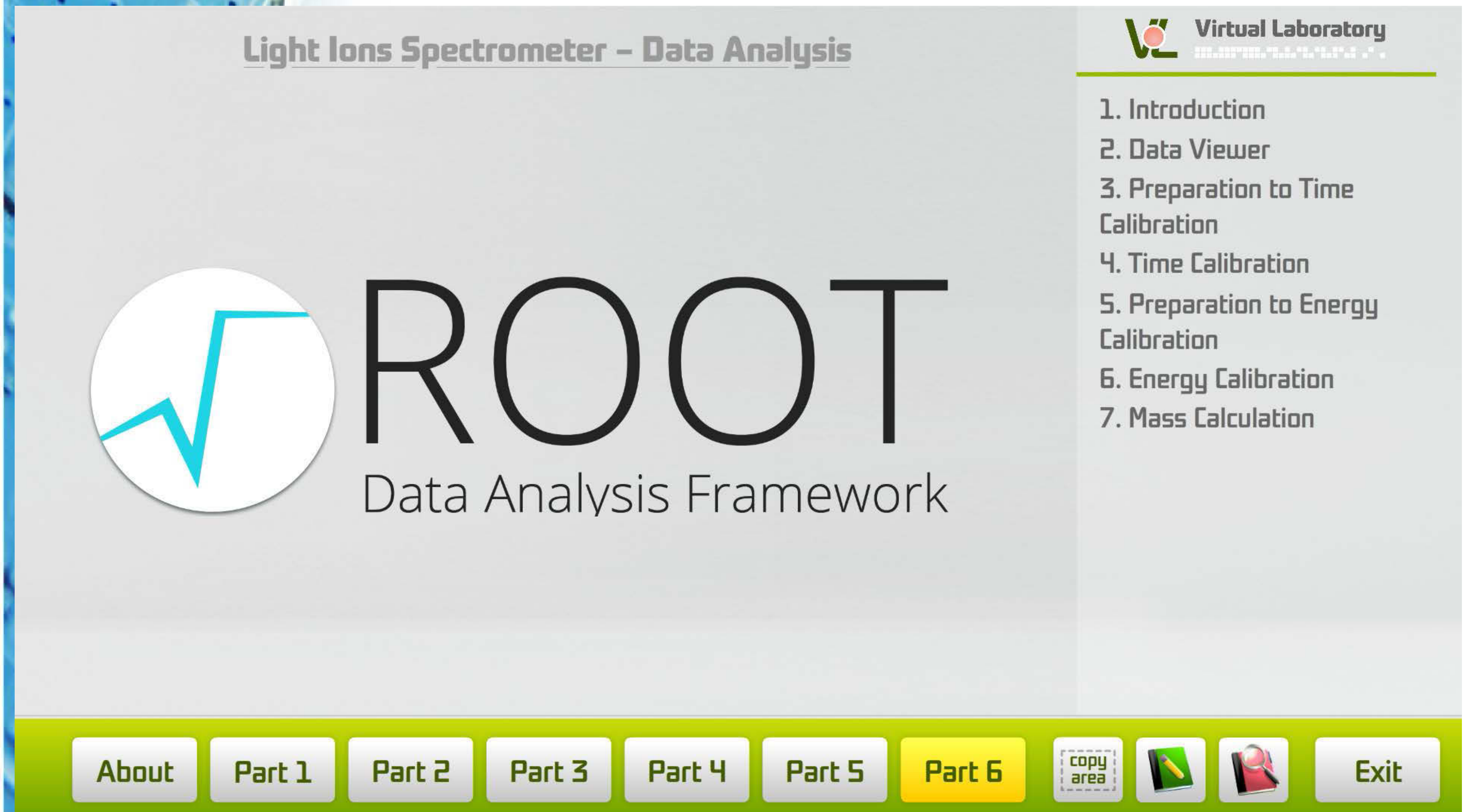

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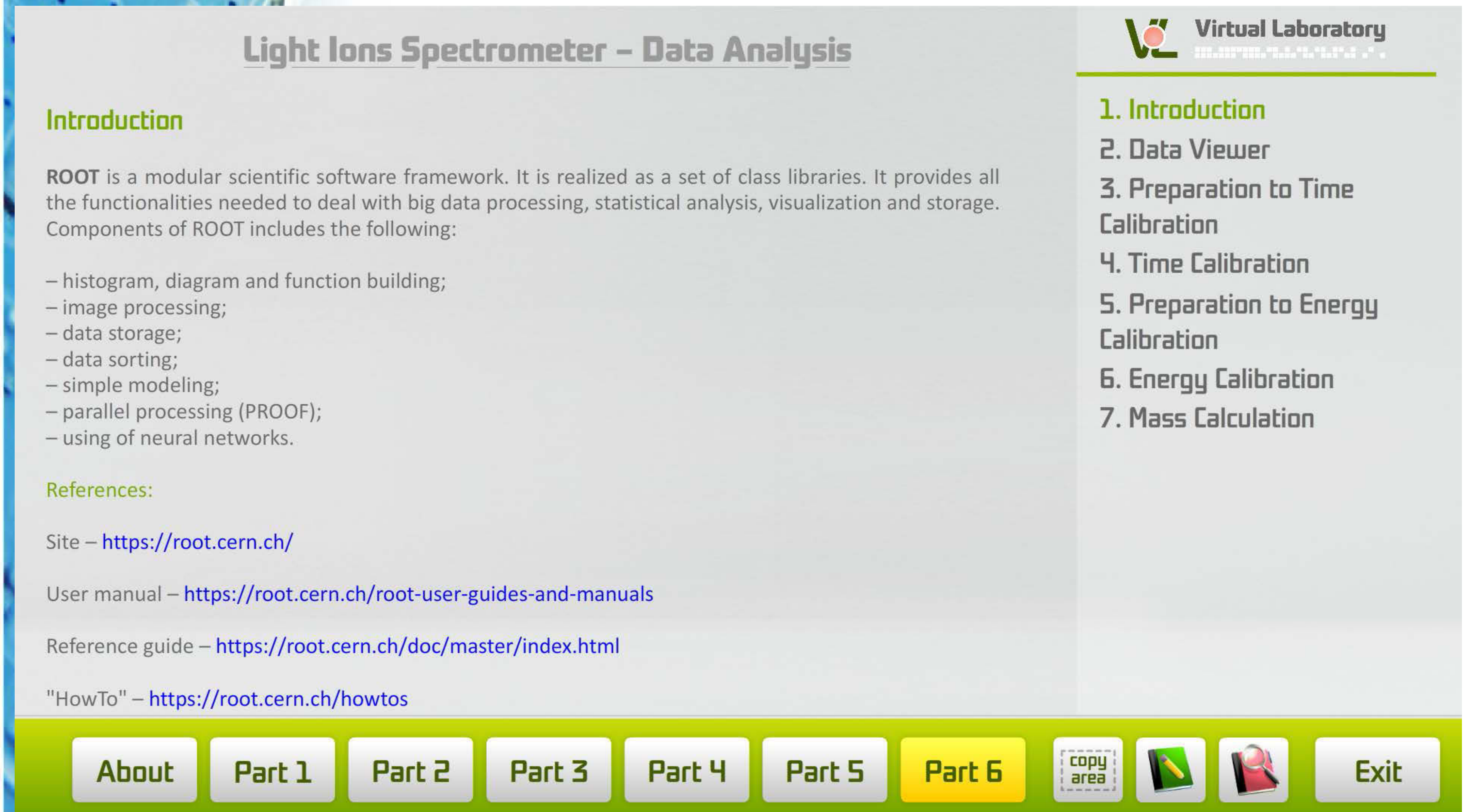

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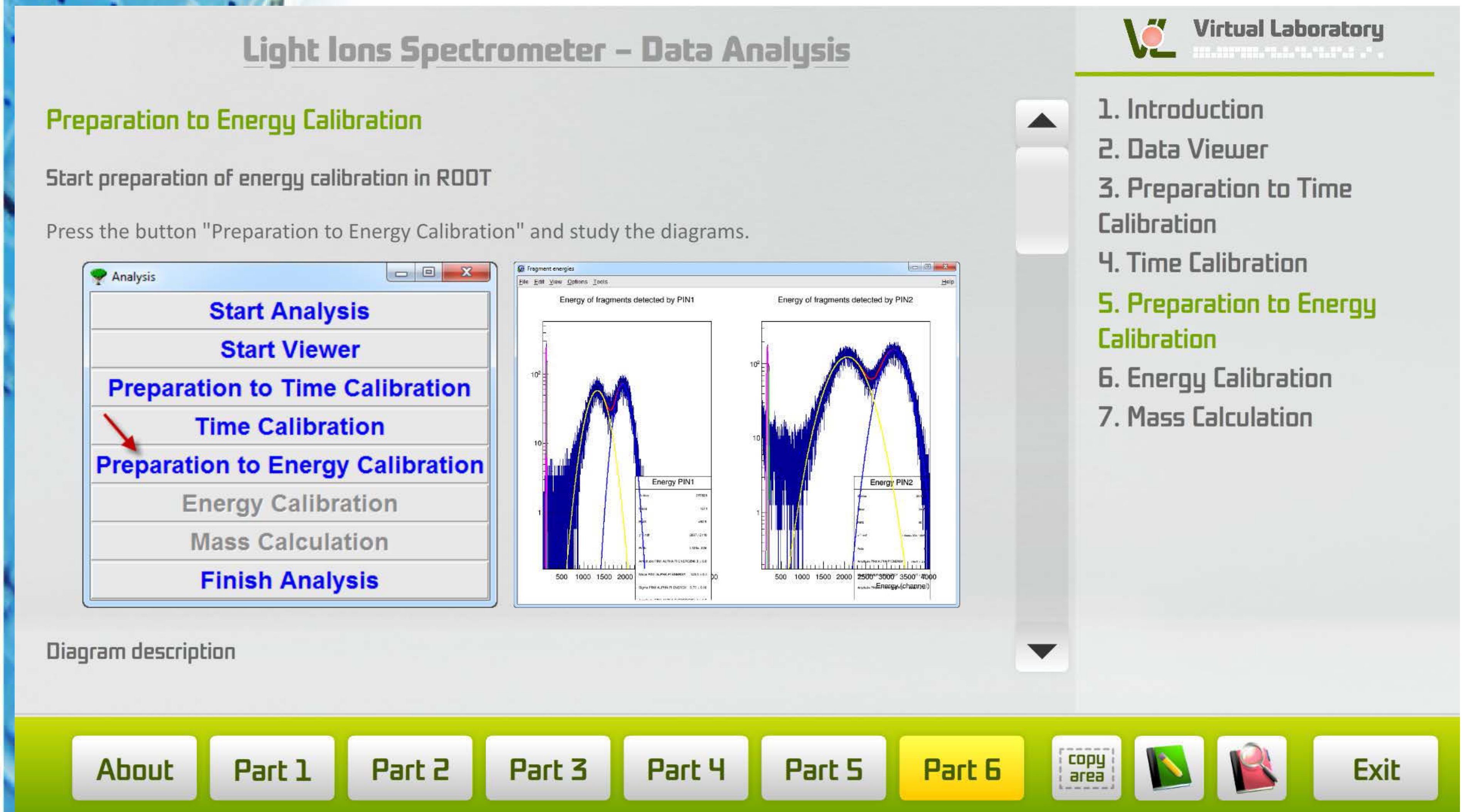

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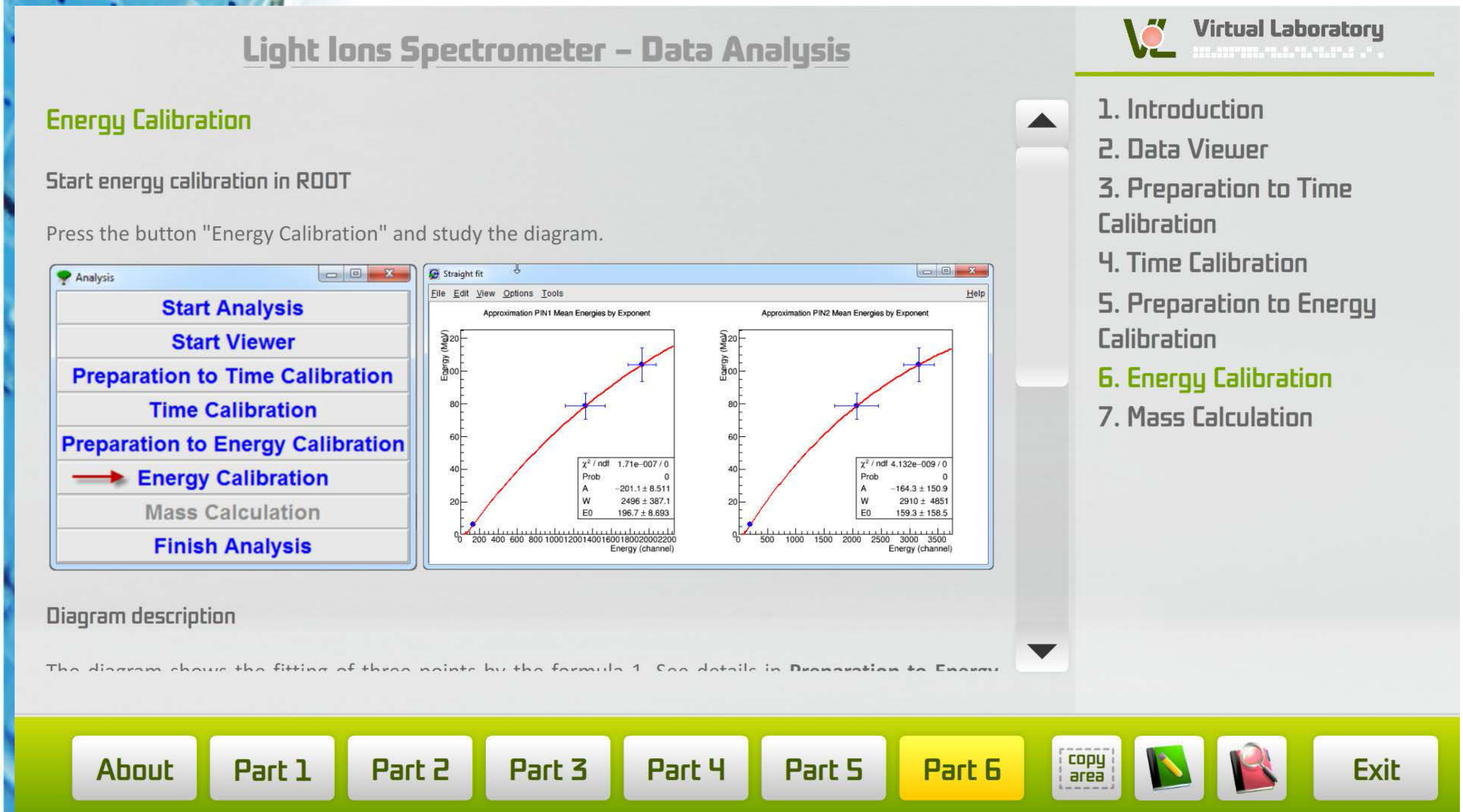

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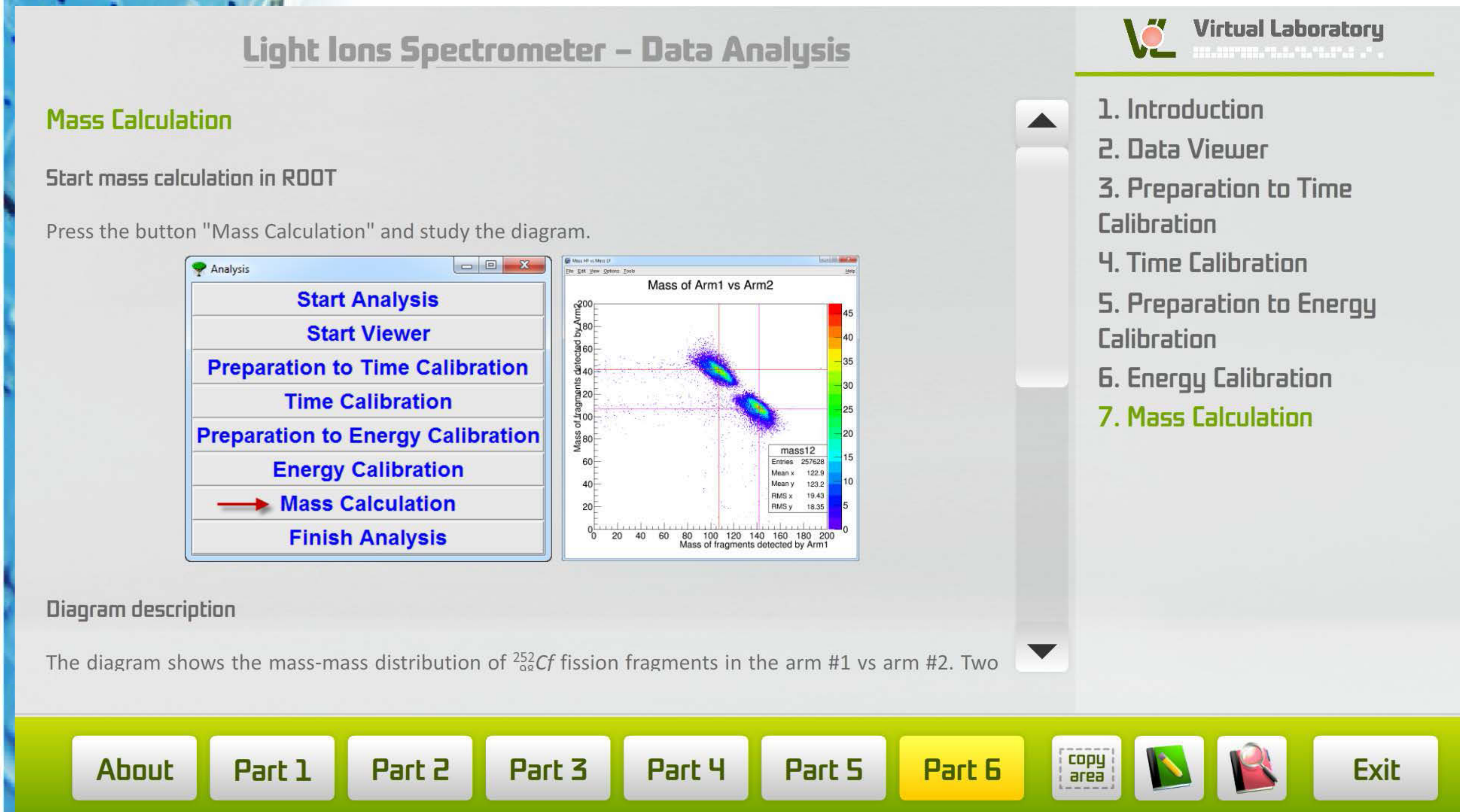

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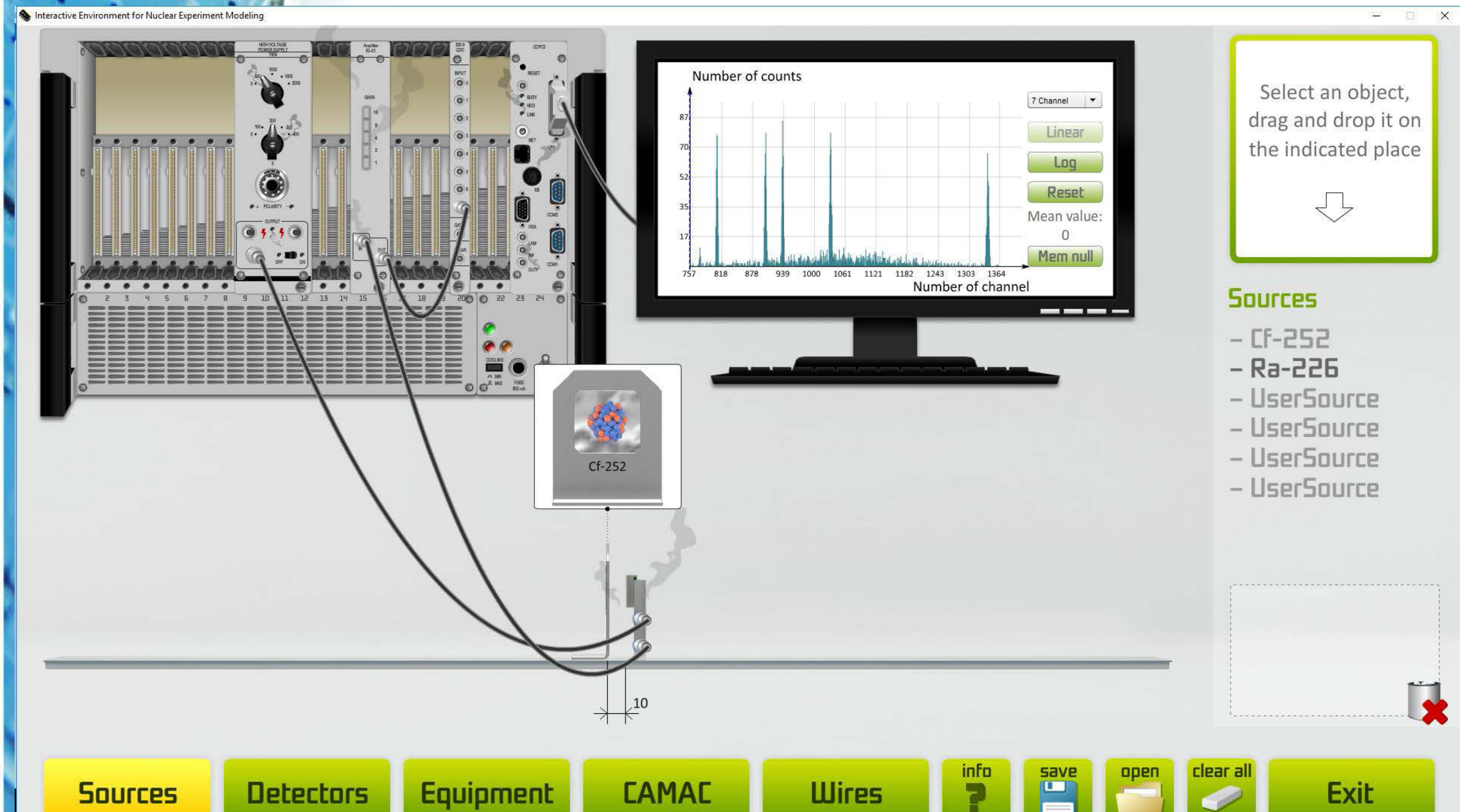

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Prompt-gamma neutron activation analysis in mining.

Frank Laboratory of Neutron Physics
Joint Institute for Nuclear Research

engeneer, Constantin Hramco
costea.edinets@mail.ru

In order to perform the objective, first step is to evaluate the accuracy of HPGe in detecting of gamma-radiation from different elements. This task was reached by assembling the construction that is shown in Figures below:

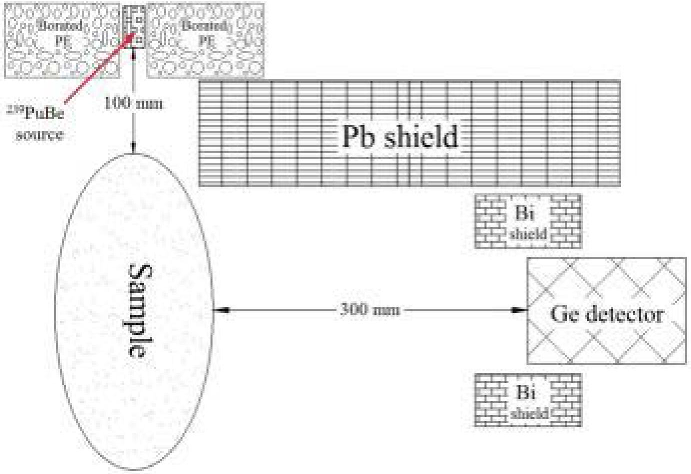
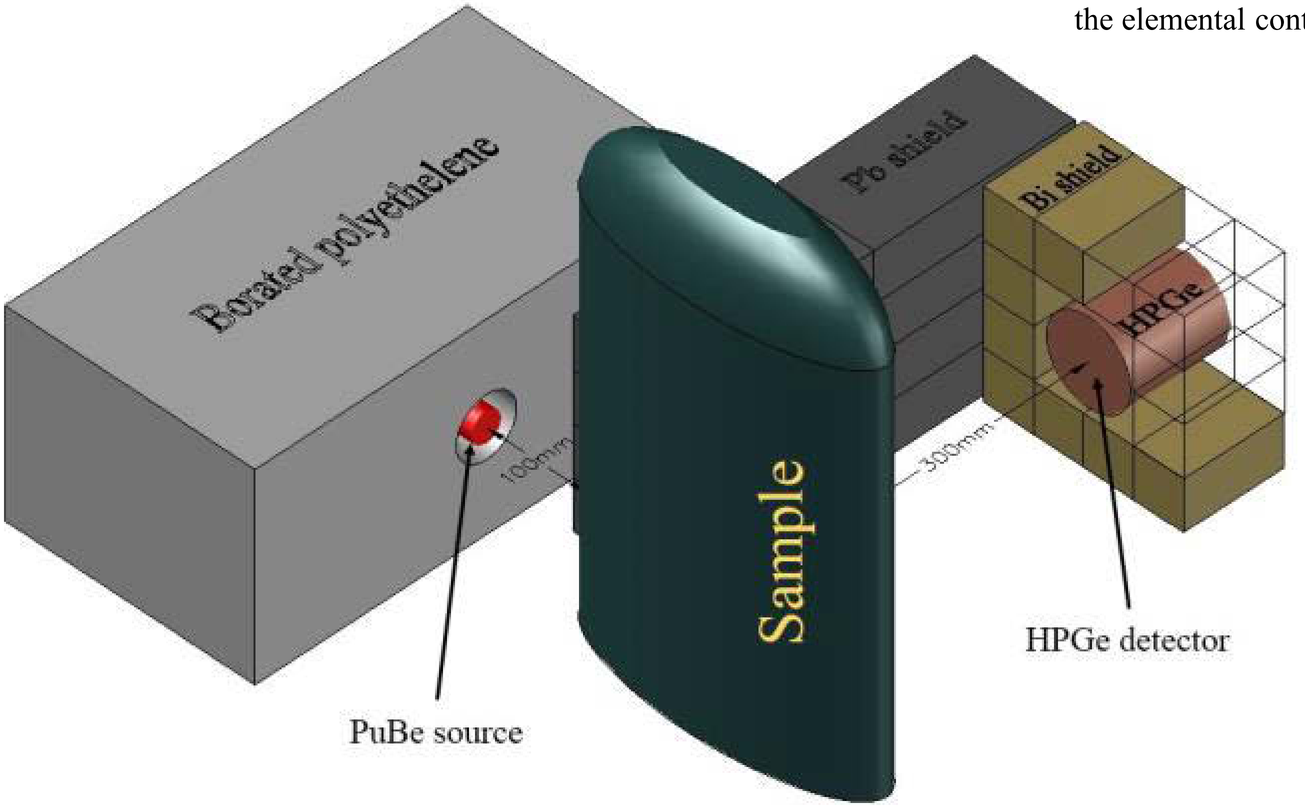


Figure 1. The scheme of assembly for determining the elemental content of phosphate ores.



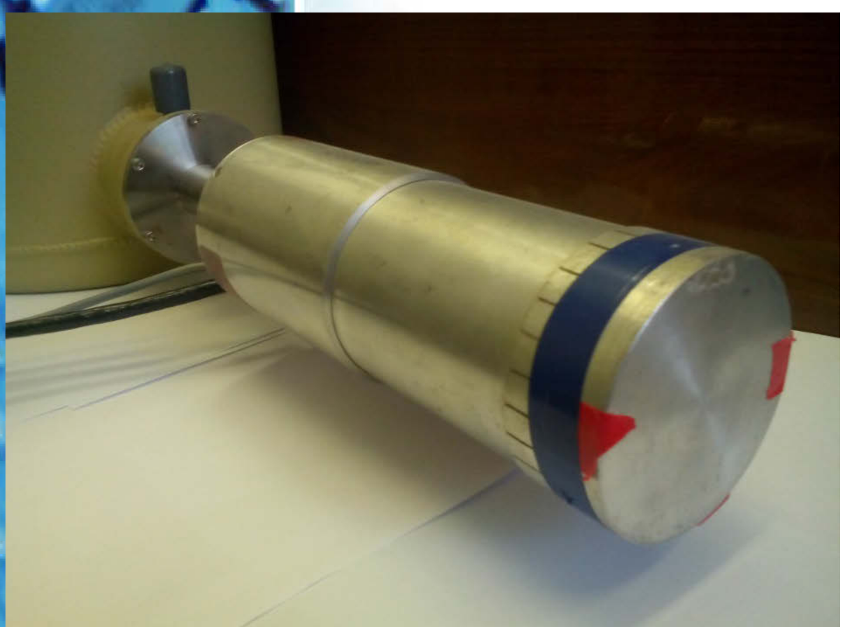
http://www.autodesk.com/solutions/3d-design-software

Figure 2. 3D-model of assembly for determining the elemental content of phosphate ores.

For experimental setup source of neutrons was chose ^{239}Pu-Be mixture with average neutron energy around 4.5 MeV. To detect gamma rays that are coming from interaction of neutrons with nuclei was set a Ortec high-purity germanium detector (HPGe) with the features presented in the table below:

Table 1. Main characteristics of Ortec HPGe gamma-detector.

	Certified	Measured
Resolution (FWHM) at 1.33 MeV, ^{60}Co	1.90 keV	1.90 keV
Relative Efficiency at 1.33 MeV, ^{60}Co	30%	36%



The sample is PET sac containing 10 kg of phosphate ore.

Phosphorite – $Ca_5(PO_4)_3^+$

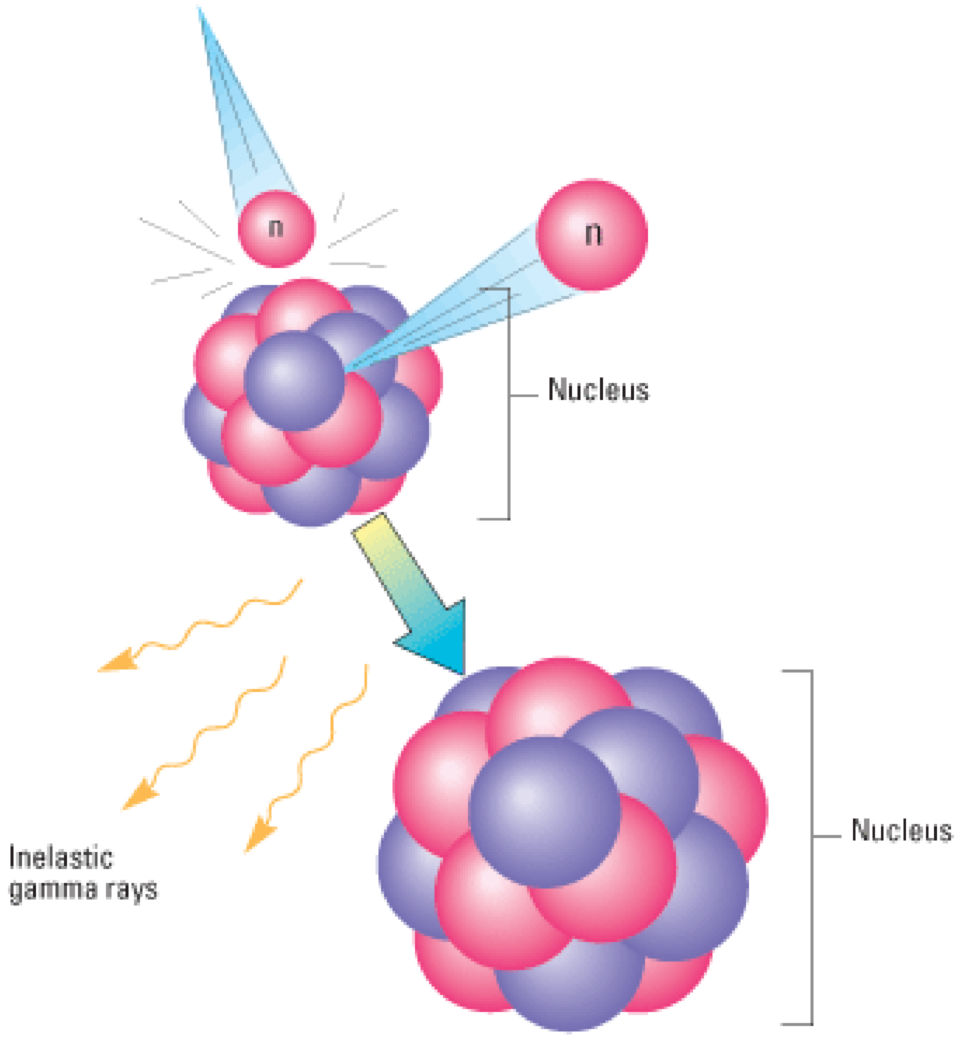
$\omega(Ca) = 41.29\%$

$\omega(CaO) = 57.77\%$

$\omega(P) = 19.15\%$

$\omega(P_2O_5) = 43.87\%$

Used reaction



Important step in work with any gamma-spectroscopy instrument is to have well done channel-energy calibration. In our case the calibration was performed by two methods: by standard point sources (^{60}Co & ^{137}Cs) and by irradiation of metal samples (Cd & Pb).

^{60}Co : 1173.2 and 1332.5 KeV
^{137}Cs : 661.7 KeV

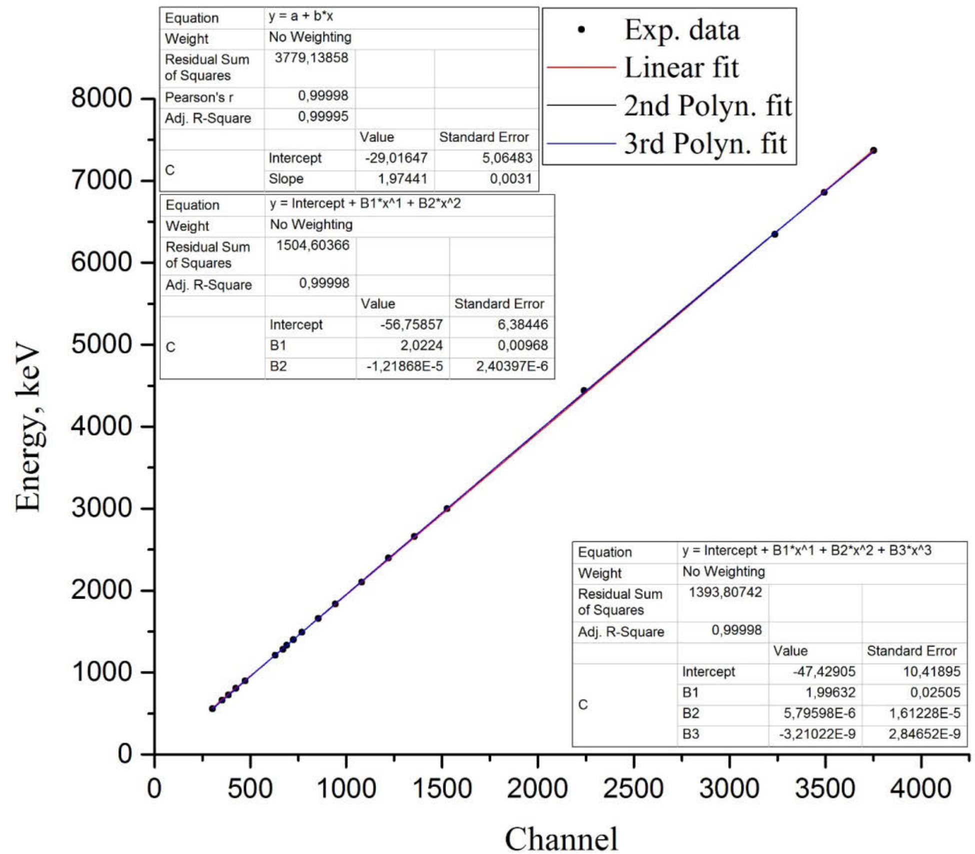


Figure 3. HPGe Channel-Energy calibration curve.

The data acquisition was done by COCOS (COmbined COrrelation System) program developed at JINR FLNP, data processing was performed by Canberra's Genie™ 2000 program. As an example, in the figure below is shown the comparison between gamma-spectra from three irradiated samples (concentrate – black, tails – red, mixture – purple) and background (blue):

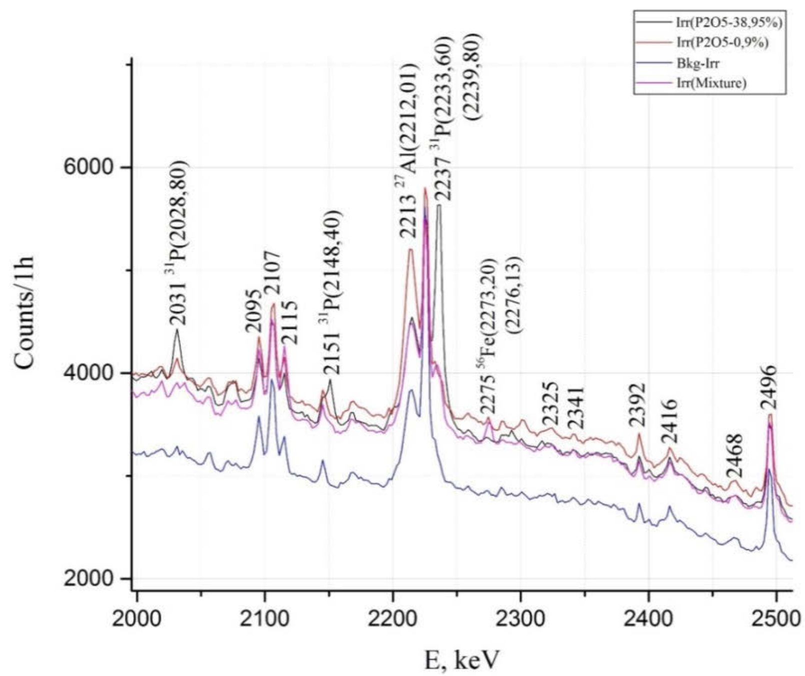


Figure 4. Part of gamma-ray energy spectrum (2.0-2.5 MeV).

http://www.canberra.com/products/radiochemistry_lab/genie-2000-software.asp
http://www.originlab.com/

Acknowledgement

D. N. Grozdanov

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I. N. Ruskov

S. B. Borzakov

V. R. Skoy

NAA a probelor arheologice

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Institutul de Chimie, Chișinău, Republica Moldova

inginer, Constantin Hramco

costea.edinets@mail.ru

NAA a probelor arheologice

Fig.1. Proba №1 pînă la curățire

Fig.2. Proba №2 pînă la curățire

Pr… :

1. … de impuritățile exterioare a p… osoase – …u apă distilată și alcool, a probei de păr – cu acet…

2. Mărunțirea probelor în mojar din agat,

3. Uscarea probelor pînă la masă constantă;

Fig.3. Proba№1 după curățire

Fig.4. Proba№2 după curățire

4. Ambalarea.

NAA a probelor arheologice

Fig.5. Probele analizate și standartele ambalate în containere de plastic pentru iradierea la inslatia IBEN

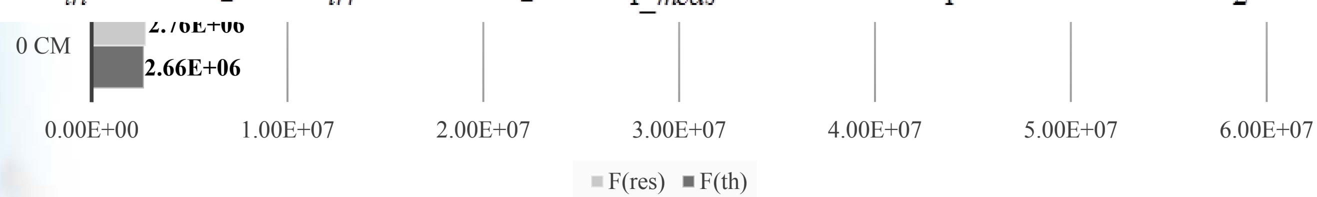
Fig.6. Probele analizate și standartele ambalate în containere de plastic pentru iradierea la rectorul IBR-2

NAA a probelor arheologice

Gradientul de răspîndire a neutronilor în dependență de înălțimea țintei instalației IREN

$$Fres = \frac{N \cdot M \cdot \lambda \cdot e^{\lambda t_{2\_decc}}}{m_{2\_p} \cdot N_A \cdot \gamma \cdot \varepsilon \cdot \theta \cdot Ires \cdot [1-\exp(-\lambda t_{irr})] \cdot [1-\exp(-\lambda t_{2\_meas})]}$$

$$Fth = \frac{M \cdot \lambda}{N_A \cdot \varepsilon \cdot \gamma \cdot \theta \cdot \sigma_{th} \cdot (1-\exp(-\lambda \cdot t_{irr})) \cdot (1-\exp(-\lambda \cdot t_{1\_meas}))} \left(N_{\gamma 1} \cdot \frac{\exp(\lambda \cdot t_{d1})}{m_1} - N_{\gamma 2} \frac{\exp(\lambda \cdot t_{d2})}{m_2}\right)$$



NAA a probelor arheologice

Tab. 1. Partea de masă a arseniului și mercurului în probele analizate

№	Arseniu (As)		Mercur (Hg)	
	p. de masă, mg/kg	eroare, %	p. de masă, mg/kg	eroare, %
1	0,19	30	0,36	19,1
2	0,23	30	0,2	29,5
3	1,18	18,3	46,6	2,5

Tab. 2. Partea de masă a arseniului și mercurului în probele de păr și cele osoase ale oamenilor contemporani

Proba	p. de masă As, mg/kg	p. de masă Hg, mg/kg
păr	$\leq 0{,}05$	$0{,}145 \pm 0{,}009$
oase	$< 0{,}1$	$\leq 0{,}008$

6. **Analysis of Arsenic and Mercury Content in Human Remains of the 16th and 17th Centuries from Moscow Kremlin Necropolises by Neutron Activation Analysis at the IREN Facility and the IBR-2 Reactor FLNP JINR** T.D. Panova, A.Yu. Dmitriev, S.B. Borzakov, C. Hramco, Dubna 2017, ISSN 1547-4771, Physics of Particles and Nuclei Letters, 2018, Vol. 15, № 1, pp. 127–134.

Creșterea monocristalelor de naftalină

Scopul: crearea țintei pentru polarizarea neutronilor de eficiență înaltă

7. **Proton polarization above 70% by DNP using photo-excited triplet states, a first step towards a broadband neutron spin filter**
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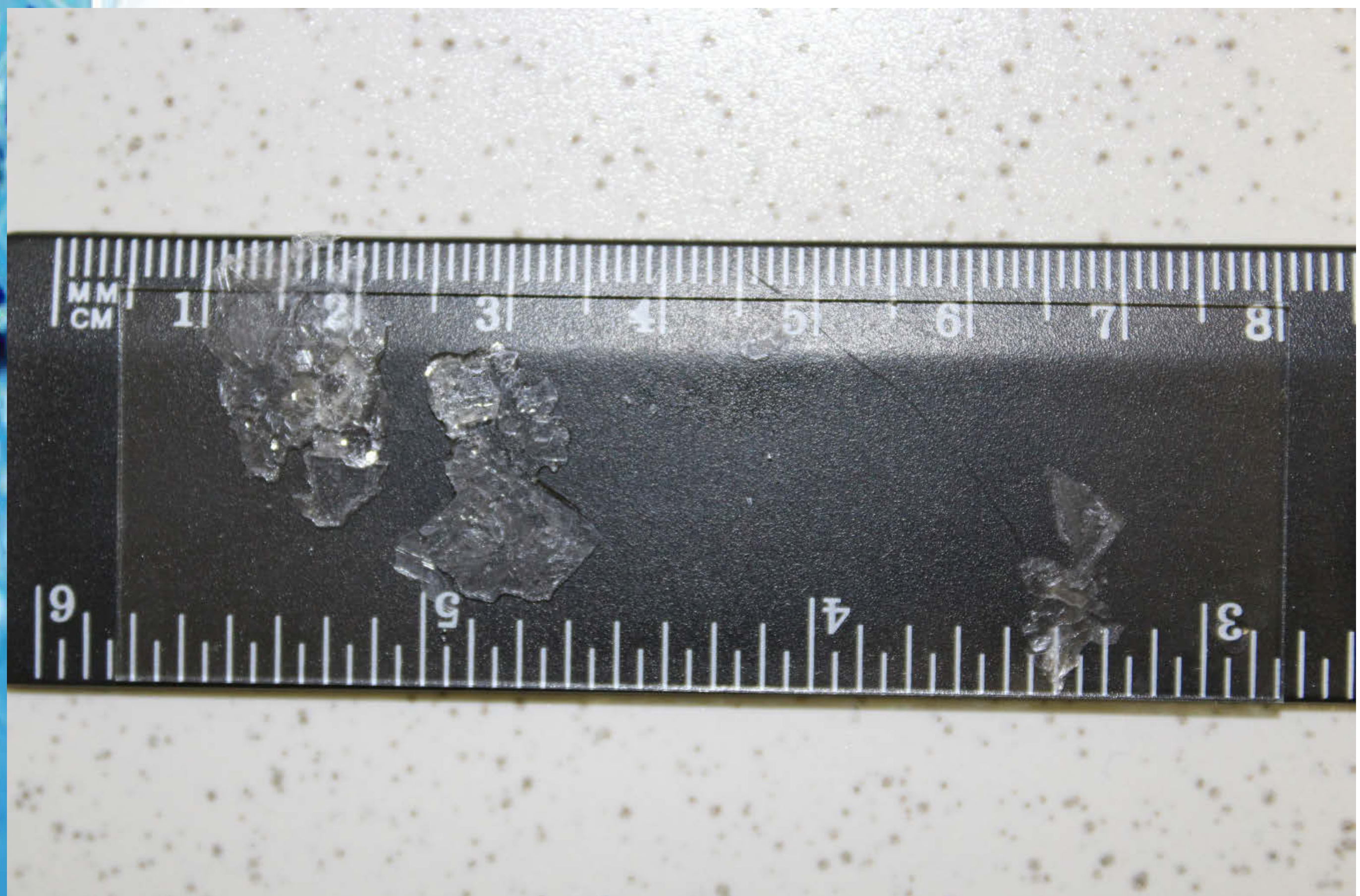
10. **ОБРАЗОВАНИЕ И РОСТ КРУПНЫХ МОНОКРИСТАЛЛИЧЕСКИХ ПЛАСТИН ДИФЕНИЛА И НАФТАЛИНА НА МЕЖФАЗНОЙ ГРАНИЦЕ ЖИДКОСТЬ-ВОЗДУХ**
© 2013 В. А. Постников, КОНДЕНСИРОВАННЫЕ СРЕДЫ И МЕЖФАЗНЫЕ ГРАНИЦЫ, Том 15, № 2, С. 160—164

Creșterea monocristalelor de naftalină

Fig. 1 ... *inerea*
monoc ... *închisă*
ermeti ... *rafața*
soluție

Creșterea monocristalelor de naftalină



Activitate organizatorică, administrativă și pedagogică

Co-președinte al comitetului organizațional al școlii tinerilor cercetători și specialiști ai IUCN, Lipnya-2017

Activitate organizatorică, administrativă și pedagogică

Participarea la programe de popularizare a științei

Vă mulțumesc mult pentru atenție!

Va urez succes și prosperitate!