



Cooperation in Education and Training in Nuclear- and Radiochemistry in Europe



# Distance Learning Tools

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The CINCH collaboration

*NRC9, Helsinki, 1st September 2016*



<b>Pu 236</b> 2.858 a + 1.796, 3.151, 4.762, 6.762, 1.046, 154, 2.4, 2.228	<b>Pu 237</b> 45.2 d + 0.294, 1.91, 2.445, 3.17	<b>Pu 238</b> 87.74 a + 1.096, 1.496, 4.762, 6.762, 1.046, 154, 2.4, 2.228	<b>Pu 239</b> 2411 10 <sup>4</sup> a + 0.207, 1.146, 4.762, 6.762, 1.046, 154, 2.4, 2.228	<b>Pu 240</b> 6563 a + 1.196, 1.196, 4.762, 6.762, 1.046, 154, 2.4, 2.228	<b>Pu 241</b> 14.35 a 2 <sup>+</sup> 2.228, 2 <sup>+</sup> 4.896, 2 <sup>+</sup> 1.046, 154, 2.4, 2.228
<b>Np 235</b> 396.1 d + 1.4, 5.025, 5.007, 1.046, 154, 2.4, 2.228	<b>Np 236</b> 2.11 10 <sup>4</sup> a + 2.74, 2.74, 1.91, 2.445, 3.17	<b>Np 237</b> 2.144 10 <sup>4</sup> a + 1.196, 1.496, 4.762, 6.762, 1.046, 154, 2.4, 2.228	<b>Np 238</b> 2.117 d 2 <sup>+</sup> 1.2, 2 <sup>+</sup> 0.4, 0.7, 2 <sup>+</sup> 1.046, 154, 2.4, 2.228	<b>Np 239</b> 2.365 d 2 <sup>+</sup> 1.046, 154, 2.4, 2.228	<b>Np 240</b> 7.28 d 2 <sup>+</sup> 1.046, 154, 2.4, 2.228
<b>U 234</b> 0.0054 2.455 · 10 <sup>8</sup> a + 1.171, 1.791, 4.762, 6.762, 1.046, 154, 2.4, 2.228	<b>U 235</b> 0.7204 4.468 10 <sup>9</sup> a + 0.948, 1.496, 4.762, 6.762, 1.046, 154, 2.4, 2.228	<b>U 236</b> 2.34 10 <sup>7</sup> a + 1.496, 4.762, 6.762, 1.046, 154, 2.4, 2.228	<b>U 237</b> 6.75 d 2 <sup>+</sup> 0.2, 2 <sup>+</sup> 0.2, 2 <sup>+</sup> 0.2, 2 <sup>+</sup> 0.2, 2 <sup>+</sup> 0.2, 2 <sup>+</sup> 0.2, 2 <sup>+</sup> 0.2, 2 <sup>+</sup> 0.2	<b>U 238</b> 99.2742 4.468 10 <sup>9</sup> a + 1.496, 4.762, 6.762, 1.046, 154, 2.4, 2.228	<b>U 239</b> 2.34 10 <sup>7</sup> a + 1.496, 4.762, 6.762, 1.046, 154, 2.4, 2.228
<b>Pa 233</b> 27.0 d 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2	<b>Pa 234</b> 1.17 m, 6.76 k 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2	<b>Pa 235</b> 24.2 m 2 <sup>+</sup> 1.4, 2 <sup>+</sup> 1.4, 2 <sup>+</sup> 1.4, 2 <sup>+</sup> 1.4, 2 <sup>+</sup> 1.4, 2 <sup>+</sup> 1.4, 2 <sup>+</sup> 1.4, 2 <sup>+</sup> 1.4, 2 <sup>+</sup> 1.4, 2 <sup>+</sup> 1.4, 2 <sup>+</sup> 1.4, 2 <sup>+</sup> 1.4, 2 <sup>+</sup> 1.4	<b>Pa 236</b> 9.1 m 2 <sup>+</sup> 2.0, 3.1, 2 <sup>+</sup> 642, 687, 1.763, 1.2, 2 <sup>+</sup> 1.4, 2.2, 2 <sup>+</sup> 854, 865, 526, 541, 2	<b>Pa 237</b> 8.7 m 2 <sup>+</sup> 1.4, 2.2, 2 <sup>+</sup> 854, 865, 526, 541, 2	<b>Pa 238</b> 2.7 d 2 <sup>+</sup> 1.4, 2.2, 2 <sup>+</sup> 854, 865, 526, 541, 2
<b>Th 232</b> 1.405 10 <sup>10</sup> a 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2	<b>Th 233</b> 16.7 d 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2	<b>Th 234</b> 24.1 d 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2	<b>Th 235</b> 7.04 10 <sup>4</sup> a 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2	<b>Th 236</b> 3.05 10 <sup>5</sup> a 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2	<b>Th 237</b> 4.51 10 <sup>4</sup> a 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2, 2 <sup>+</sup> 0.2, 0.2



# Our Digital Age



Modern digital technology offer a long range of tools to improve/change our life..

***.. this includes how we teach!***



# Modern Teaching

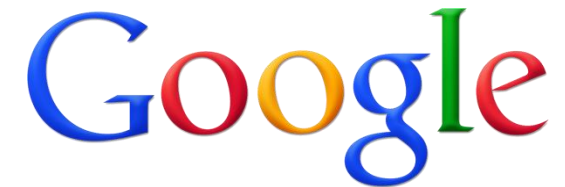


.. needs digital content and methods:

- **Internet** to find information..
- **Computers and on-line applications** to do things “the modern way”..
- **Digital “social networks”** to communicate..



WIKIPEDIA  
*The Free Encyclopedia*



Find us on  
**Facebook**

# Our Digital Age



Good teaching is *not guaranteed* by applying E-learning tools..

**.. we have to do it based on good pedagogical principles and methods!**

In the end, our students' ***learning outcome*** defines the teaching quality!



# CINCH

Part of the CINCH project  
has been to *develop modern  
e-learning tools.*

**CINCH** 



# CINCH E-learning tools



- Wiki for sharing teaching material
- Stand alone e-learning modules
- Remote controlled lab exercises
- Computing in Science Education
- Simulations
- E-book on NRC fundamentals

**NucWik**



*Nuclear and Radiochemistry*  
Teaching Material **Wiki** CINCH

**CINCH**



**Moodle Platform**

**RoboLab**



*Remote Operated RadLab*  
for Teaching Radiochemistry CINCH

**CSE – A UiO concept**

**Written by Jukka Lehto**

# Site for Sharing *Teaching Material*

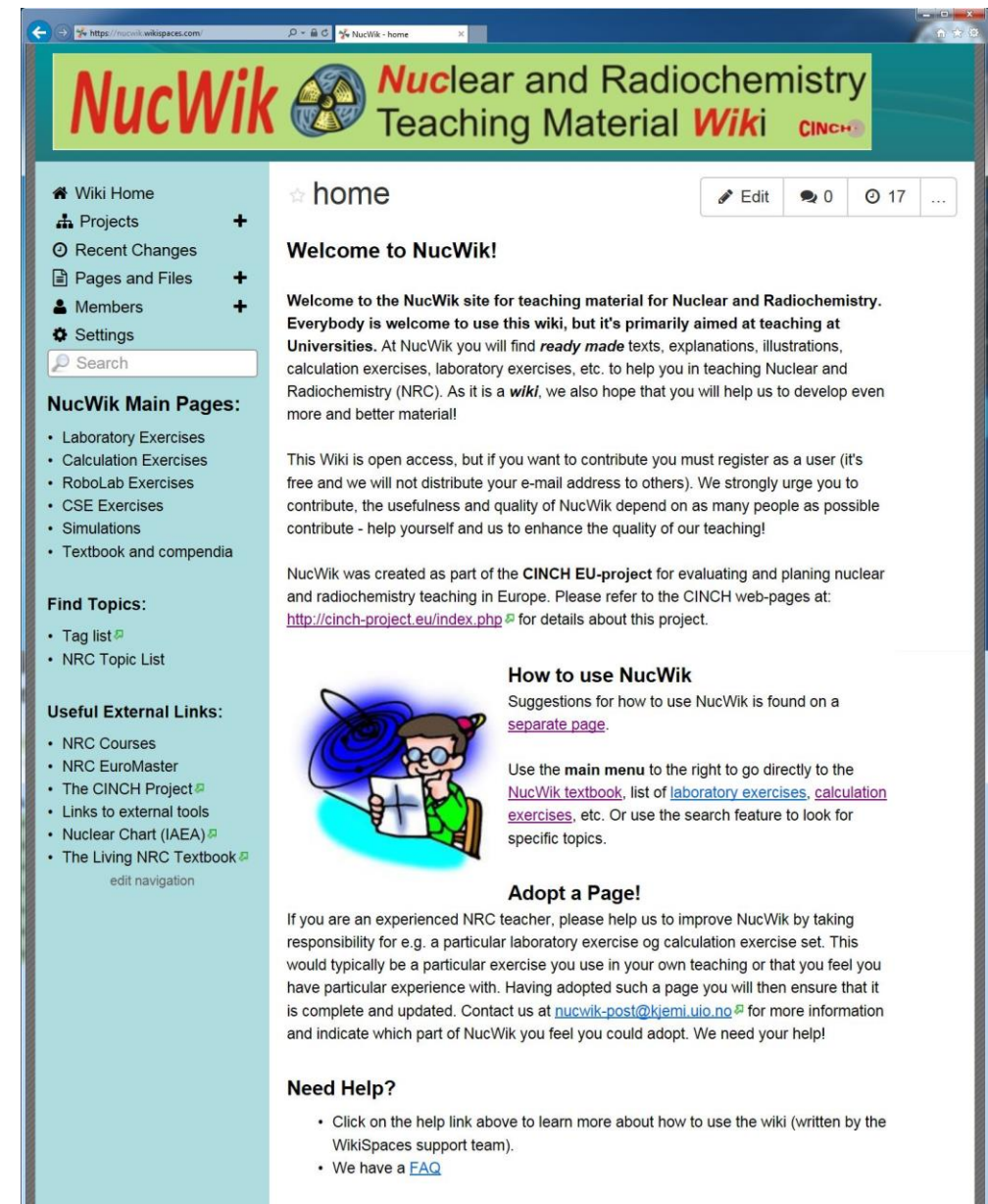


## NucWik:

- No reading or downloading restrictions.
- Must register to upload material or edit content.
- It's free!

<http://nucwik.wikispaces.com/>

.. or just Google "NucWik"



The screenshot shows the NucWik website interface. At the top, there is a navigation bar with the NucWik logo, a radiation symbol, and the text "Nuclear and Radiochemistry Teaching Material Wiki CINCH". Below the navigation bar, there is a sidebar on the left with a menu of options: Wiki Home, Projects, Recent Changes, Pages and Files, Members, Settings, and a search box. The main content area on the right features a "Welcome to NucWik" message, a list of "NucWik Main Pages" (Laboratory Exercises, Calculation Exercises, RoboLab Exercises, CSE Exercises, Simulations, Textbook and compendia), "Find Topics" (Tag list, NRC Topic List), and "Useful External Links" (NRC Courses, NRC EuroMaster, The CINCH Project, Links to external tools, Nuclear Chart (IAEA), The Living NRC Textbook). There are also sections for "How to use NucWik", "Adopt a Page!", and "Need Help?".

# Understand this ..



- NucWik is not a ready made, polished product in its final form.
- It is primarily a tool for active collaboration between teachers.
- You want it better? Then make it so!
- It can be used in many ways, most likely in ways not initially planned for.



**It's up to you!**




# NucWik – Main Menu

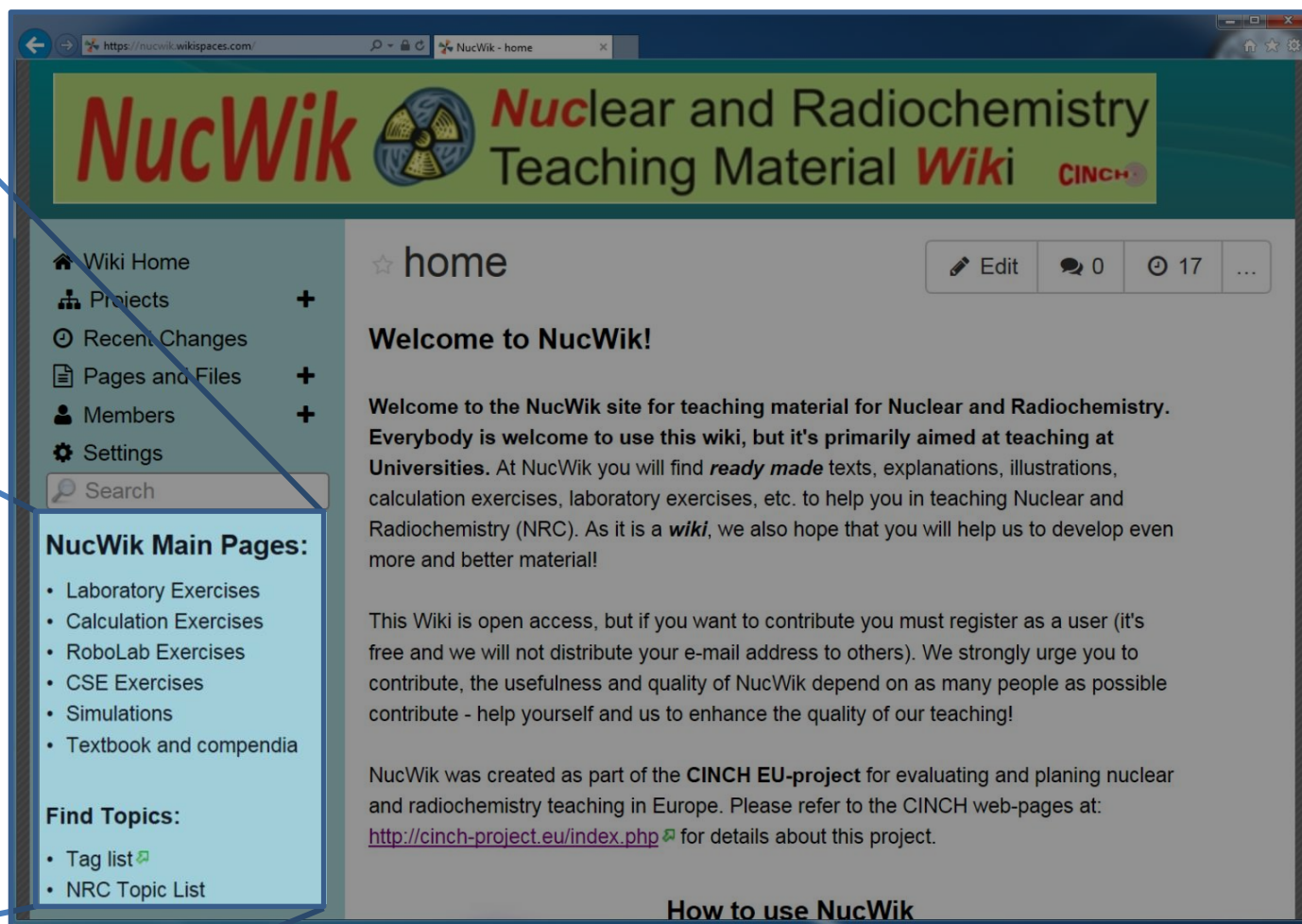


## NucWik Main Pages:

- Laboratory Exercises
- Calculation Exercises
- RoboLab Exercises
- CSE Exercises
- Simulations
- Textbook and compendia

## Find Topics:

- Tag list 
- NRC Topic List




The screenshot shows the NucWik website interface. At the top, there is a header with the NucWik logo (a radiation symbol) and the text "Nuclear and Radiochemistry Teaching Material Wiki CINCH". Below the header is a navigation menu with links for Wiki Home, Projects, Recent Changes, Pages and Files, Members, and Settings. A search bar is also present. The main content area features a "Welcome to NucWik!" message, followed by a paragraph explaining the site's purpose and a note about user registration. At the bottom, there is a link to "How to use NucWik".

**NucWik Main Pages:**

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- Calculation Exercises
- RoboLab Exercises
- CSE Exercises
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**Find Topics:**

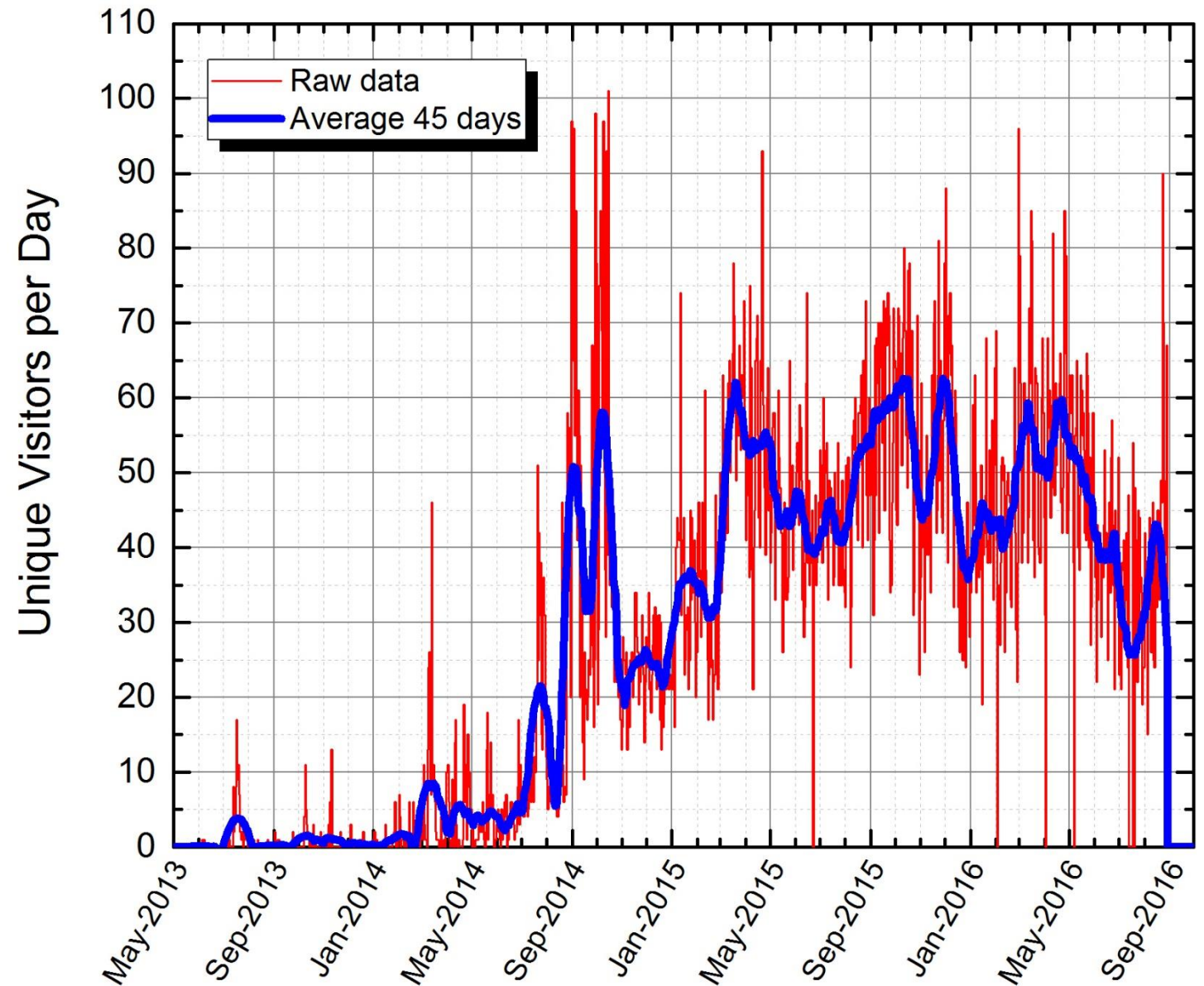
- Tag list 
- NRC Topic List

# NucWik - Usage



About 45 hits per day  
.. about half from the US

Visitors are counted as unique IP addresses in a given day, including search engines and other crawlers.





## RoboLab Exercises

Edit

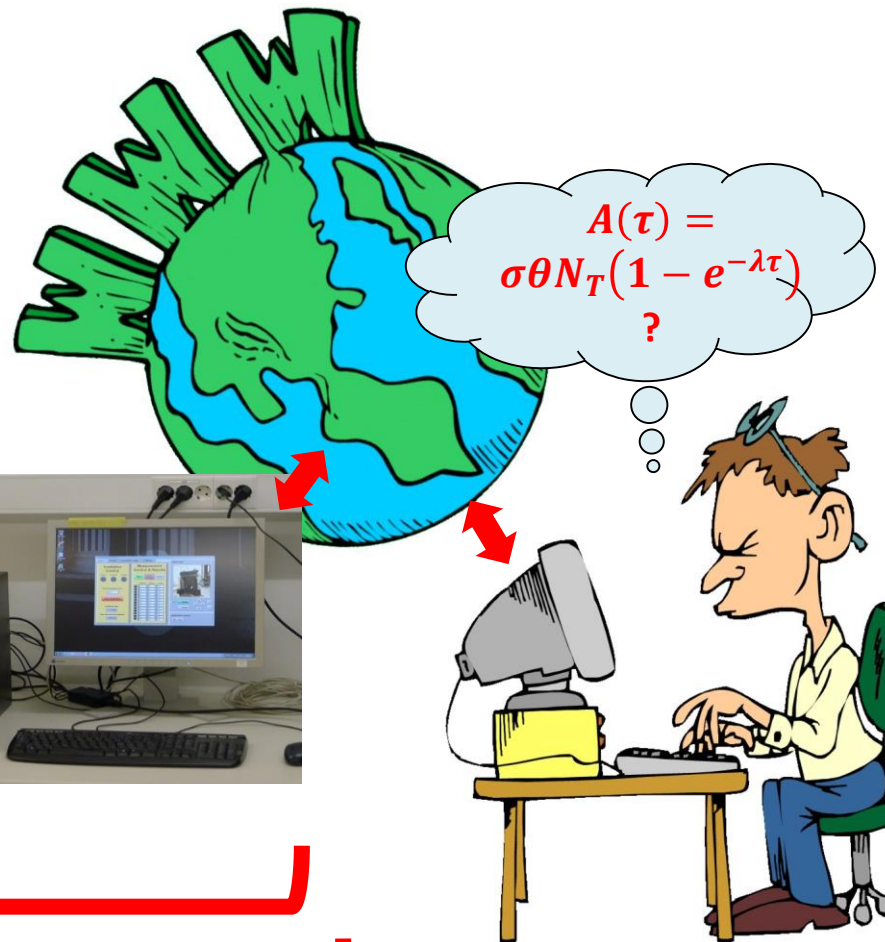
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6

### **What is RoboLab?**

RoboLab is remote-controlled exercises in a real radiochemistry laboratory. It allows you to perform radiochemistry experiments with real equipment in an actual laboratory without all the hassle of being trained, authorized and suited up. It's main purpose is to be used as a complementary teaching tool when teaching radiochemistry to undergraduate and graduate students at university level. This NucWik page explains teachers how to use it. It also provide information on how to build RoboLab remote controlled instruments ("virtual instruments") using LabView from National Instruments.

# RoboLab Principle



A real nuclear laboratory using radioactive material

Student using the lab through his computer

# RoboLab @ NucWik



## Available Exercises (per December 2015)

- RL1: [Absorption of radiation in matter](#) (UiO, online)
- RL2: [RoboLab Exercise: n-activation of Ag](#) (UiO, online)
- RL3: [HPGe  \$\gamma\$ -spectroscopy of environmental samples](#) (IRS, online)
- RL4: [Autodeposition on different metals](#) (IRS, online)
- RL5: [Ion exchange column with "on-line" detection](#) (IRS, online)
- RL6: [Separation and detection of  \$^{234m}\text{Pa}\$](#)  (UiO, under development)

**NucWik** Nuclear and Radiochemistry Teaching Material Wiki CINCH+

### RoboLab Exercises

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**About the RoboLab Project**  
RoboLab exercises is currently being developed in a joint EU-project (CINCH-II) at Institute for Radiation Protection and Radioecology (IRS) at the Leibniz University of Hanover and at the Nuclear Chemistry Section at Department of Chemistry, University of Oslo (UiO). The original concept was developed at UiO in 2004-2007.

**How do I run RoboLab?**  
RoboLab runs in your normal web browser, but you need to install a plug-in from National Instrument.  
• <http://www.ni.com/download/labview/online-engine/2015.sp1/51399en/> (LabView version 2014 SP1)

List is accessible from the main menu on NucWik

# Acknowledgements



- RoboLab was conceived at UiO in 2002. Six RoboLab exercises have been developed under CINCH-II as a collaboration between the Nuclear Chemistry Group at the University of Oslo and the Institute for Radioecology and Radiation Protection at Leibniz University in Hannover.
- NucWik was developed by UiO as part of the CINCH projects.
- **Key CINCH RoboLab contributors: *J.P. Omtvedt (UiO), C. Walter (IRS), S. Bister (IRS), C. Fournier (IRS), Kim-Leigh Gabay (IRS), T. Grønås (UiO), P. Hanemann (IRS), M. Icker (IRS), H.L. Lerum (UiO), J.Ø. Matsdal (UiO), W. Schulz (IRS), J.-W. Vahlbruch (IRS).***
- "Old" UiO RoboLab contributors (pre-CINCH): J.P. Omtvedt, K. Opel, F. Schulz, L. Stavsetra.
- Funding was gratefully received under the Euratom Program for Nuclear Research and Training (FP7-Fission-2009; FP7-Fission-2012)
- Funding for the Norwegian contribution was gratefully received from the Norwegian Research Council.

# Thank You for Your Attention!

Please explore our  
e-tools at NucWik!

<http://nucwik.wikispaces.com/>

.. or just Google "NucWik"

CINCH project site:

<http://cinch-project.eu/>



QR code for copy of talk

Want to contribute or have questions?

E-mail: [j.p.omtvedt@kjemi.uio.no](mailto:j.p.omtvedt@kjemi.uio.no) or [nucwik-post@kjemi.uio.no](mailto:nucwik-post@kjemi.uio.no)

# NucWik

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QR code for NucWik