SINE2020 General Assembly

Bilbao, 28th May 2019

WP 3

Training neutron scattering from proposal to publication

E-learning and schools

UCPH, DTU, STFC, CEA, MTA-EK

WP leader: Linda Udby, University of Copenhagen

This project is funded by the European Union (GA no. 654000)

2. Work carried out

Task 3.1: Development of e-learning platform

- 3.1.1: Coordination & management
- 3.1.2: Server maintenance
- 3.1.3: Prospects of student interaction with material and assesement (D3.1)
- 3.1.4: Content development
- 3.1.5: Content collection and adaptation (D3.3)

Task 3.2: Development of virtual neutron facility

- 3.2.1: Development of virtual instrument models **(D3.4)**
- 3.2.2: Development of virtual experiment training material **(D 3.7 & D 3.9)**
- 3.2.3: Implement and test virtual experiments **(D 3.9 - M48)**

Task 3.3: Support for European neutron training Schools

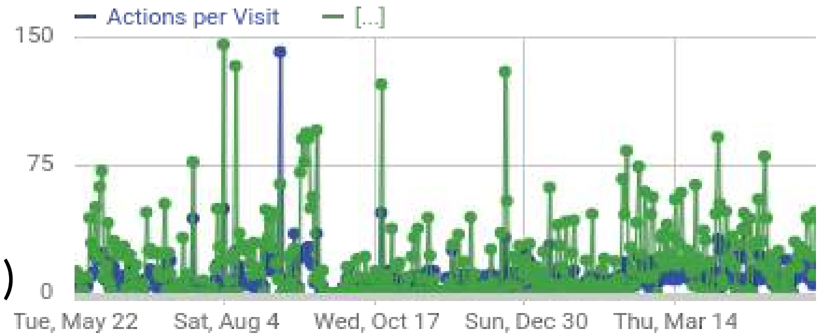
- Support for introductory (D3.2 & D3.6 & **D3.8**) and advanced schools (D3.5) on neutron scattering (**D3.10 - M48**)

2. Work carried out

Task 3.1.1: Coordination & management :

KPI#1: Statistics of website activity and computer performance. Goal, at least per year

- 100 new users – (~230 last year – now 1180 users)
- 3000 unique visits (~3000 last year)
- 6000 visits (~ 4500 last year)
- (~15000 pageviews last year)
- 95% uptime (>95 % last year)
- support for 5 blended learning courses (7 last year)



- PR: Will present WP3 elements at ECNS June 2019
(Special session "Education for mega-science facilities)
- Provision of input for sustainability report beyond SINE2020
- Recruitment
- Negotiation of e-neutrons hosting after SINE2020
(ESS via WP8 in PaNOSC project)

Tommy N W Ech-Knudsen
Student Assistant

Viktor L. Holm
Scientific Assistant

Mads Bertelsen
(Now at ESS-DMSC)

Tasks in WP8

Group	#T	Title	Who
Infra-structure	8.1	Sustainability and maintainability of e-learning platform	ELI, **ESS**
	8.2	Integrating Jupyter technology	**ELI**, ESS
	8.3	Integrate ESFRIs in the e-learning virtual facility	**ESS**, all
	8.4	Staff training in e-learning platform	**ESS**, all
Staff	8.5	Staff training in data stewardship	**ELI**, all
	8.6	Training materials to foster the uptake of PaNOSC services	**ELI,** all
User	8.7	Introductory course to materials science LSFs in the European Research Area	**ESS**, all
	8.8	PaNOSC schools for students	**ELI**, all

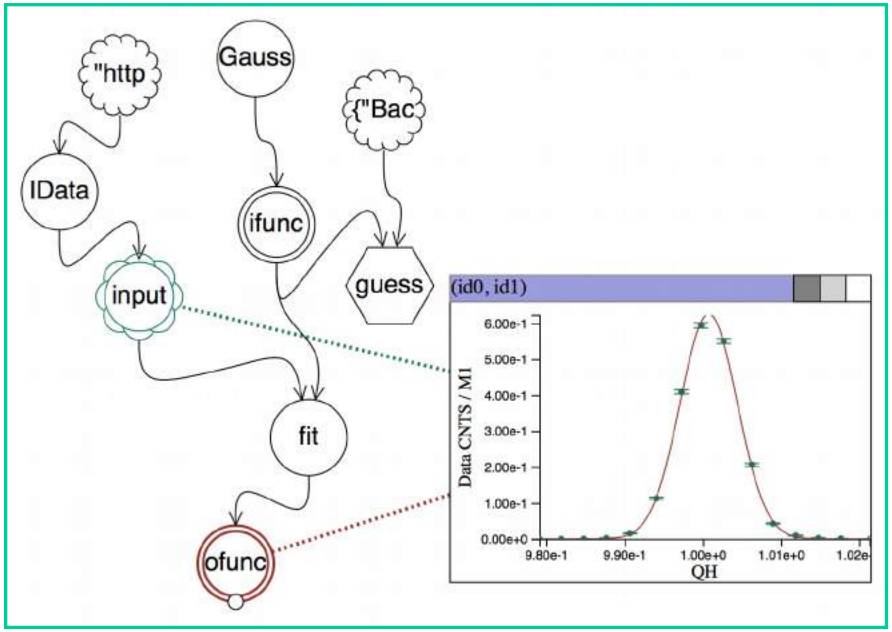
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 823852

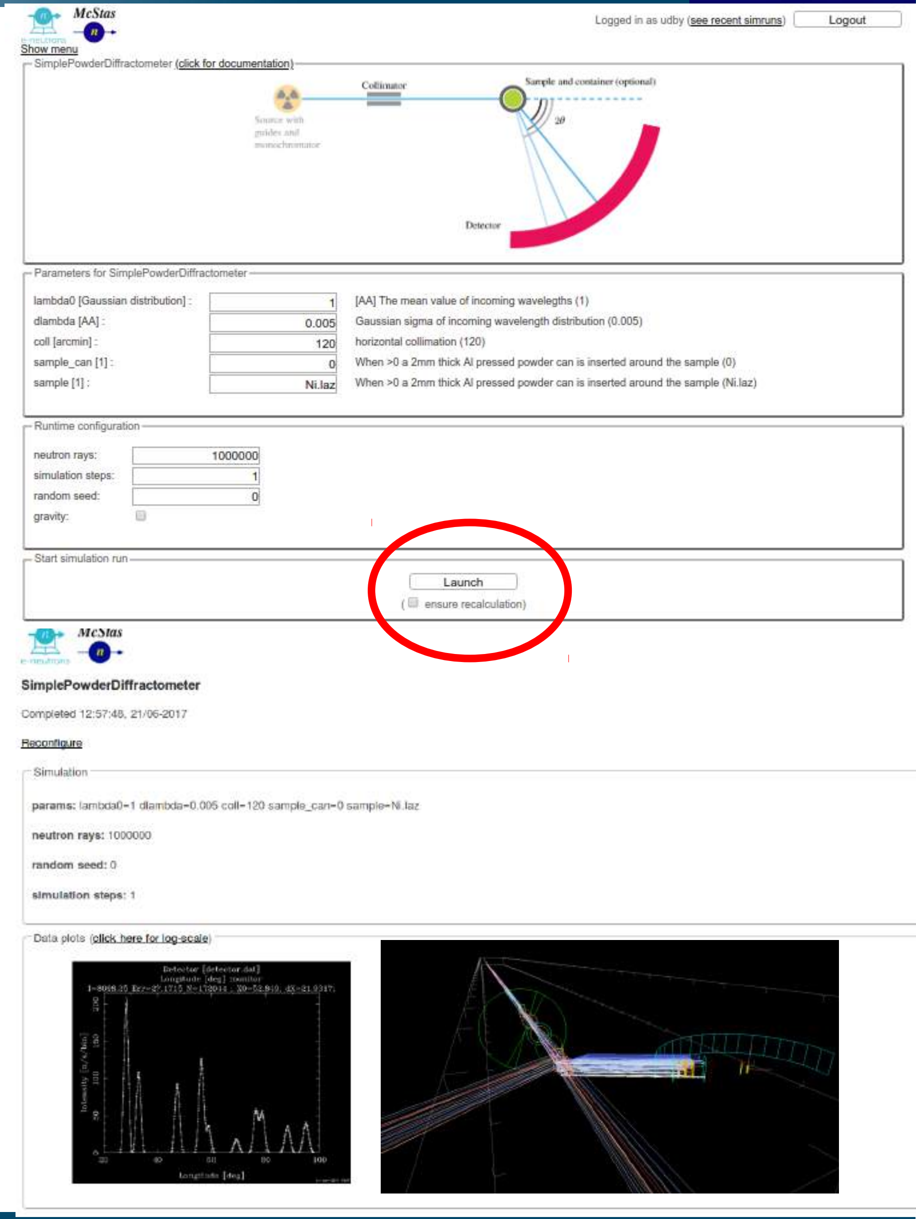
2. Work carried out

Task 3.1.2: Server maintenance and devel.

- LTI support for Labster virtual laboratory
- Performance-improvement of simulator: re-use old simulation results if available
- IfitLab tool: Prototype solution for simple data analysis in the browser

Demo at WP3 meeting by Jakob Garde





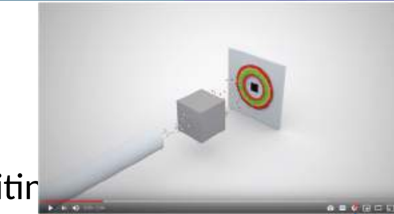
Task 3.1.3: Prospects of student interaction with material and assesment (D3.1)

Work has been completed previously. Report + paper:

„*Network analyses of student engagement with on-line textbook problems*“ , J. Bruun, P.J. Ray & L. Udby, submitted to Computers & Education

https://arxiv.org/abs/1903.11390

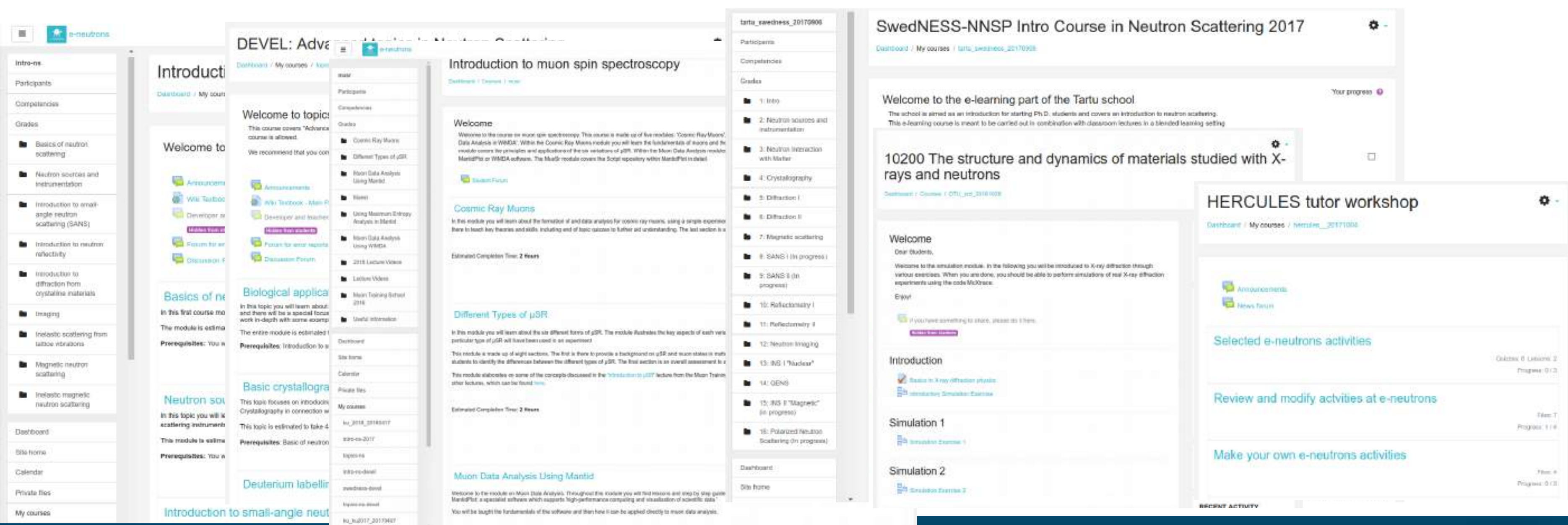
Task 3.1.4: Content development (D3.3)



- Some work still continuing after deliverable
- Intro-ns (open): 10 topics – 2 still under construction (~100 h). Videos have been recorded- editir
- New (open) course "Advanced topics in Neutron Scattering" under construction. Each module/topic stand-alone (~4-10h) but build on intro-ns knowledge. Material to some modules expected to be contrib. from e.g. other WPs

  Example module presented by Viktor Holm

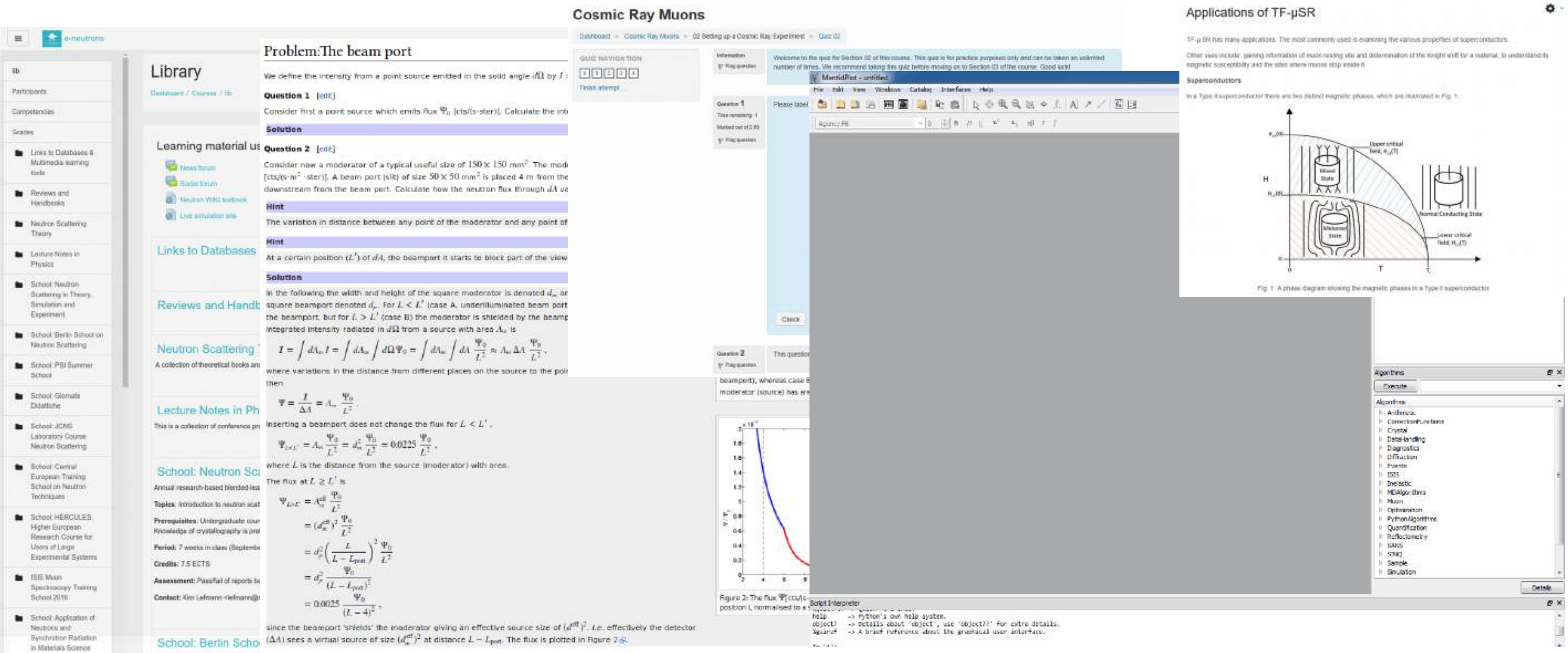
- ISIS e-learning courses (seperate slide) **Presented by Michael Oakley and Peter Baker.**
- Support and development of taylored e-courses connected to schools. Restricted access is needed for teachers to have access to edit material and see student answers etc.



2. Work carried out

Task 3.1.5: Content collection and adaptation (D3.3)

- (ongoing) Material (text format) from all SINE2020 supported schools available in Library
- (ongoing) Updating text-material in WIKI. Implementing hints and solutions to exercises
- (ongoing) ISIS e-learning courses (see seperate slide)



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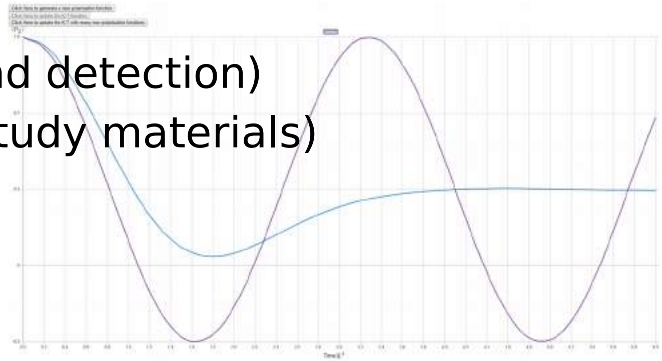
2. Work carried out

ISIS contributions to WP3

- Detailed interactive courses on using Mantid (and WiMDA) to analyse muon data
  - Extending to QENS and should have something useful by end of SINE2020
  - Extending to revised Mantid 4.0 Muon GUI
  - Building direct links with Mantid documentation to give ‘master’ source
- Lecture videos (slides and audio) from two muon training schools - Learned from first attempt to improve the second
- Linked up with data workpackage (WP10) to provide basic online training materials for MuESR and trialled it at ISIS muon school
- Introductory materials about muons to get people who know nothing about them started
  - Cosmic ray muons (basics of particle decay and detection)
  - Different types of µSR (how to use muons to study materials)



Task 3.2: Development of virtual neutron facility

KPI#2: Number of virtual instrument/experiments provided. Our goals are

- to have all instruments in the McStas software package available online (now 97%)
- to develop taylored virtual instruments and virtual experiment exercises for at least 5 ESS relevant instruments (now 10-100% done)

- 3.2.1: Development of virtual instrument models (**D3.4- M48**)
- 3.2.2: Development of virtual experiment training material (**D 3.7-M48**)
- 3.2.3: Implement and test virtual experiments (**D 3.9 - M48**)

- Catching up by extra recruitment in PR3 UCPH (2018-2019).

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2. Work carried out

Task 3.2.1+2: Development of virtual instrument models and training material (D3.4 + D 3.7)

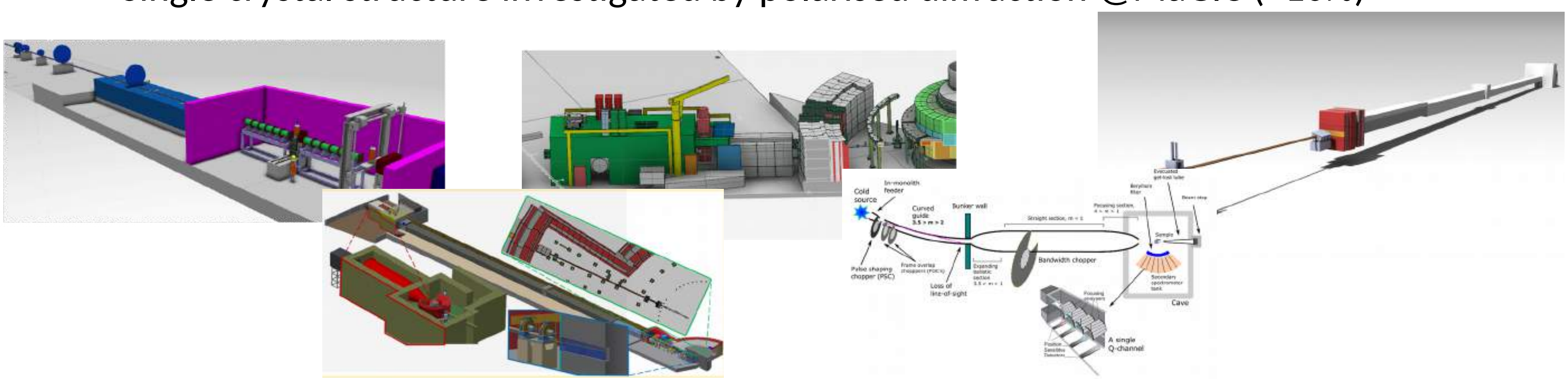
5 ESS relevant science cases & instuments covering a broad range of scientific fields. Tentatively

UCPH+DTU

- Cultural heritage sample investigated by (Bragg edge) imaging @ ODIN (~70%)
- Formation of nanomagnets investigated by SANS&diffraction @ HEIMDAL (~40 %)
- Lipid exchange in nanodiscs investigated by SANS @ LOKI (~100%)
- Spin excitations investigated by INS @ BIFROST (~30 %)

CEA

- Single crystal structure investigated by polarised diffraction @MaGIC (~10%)



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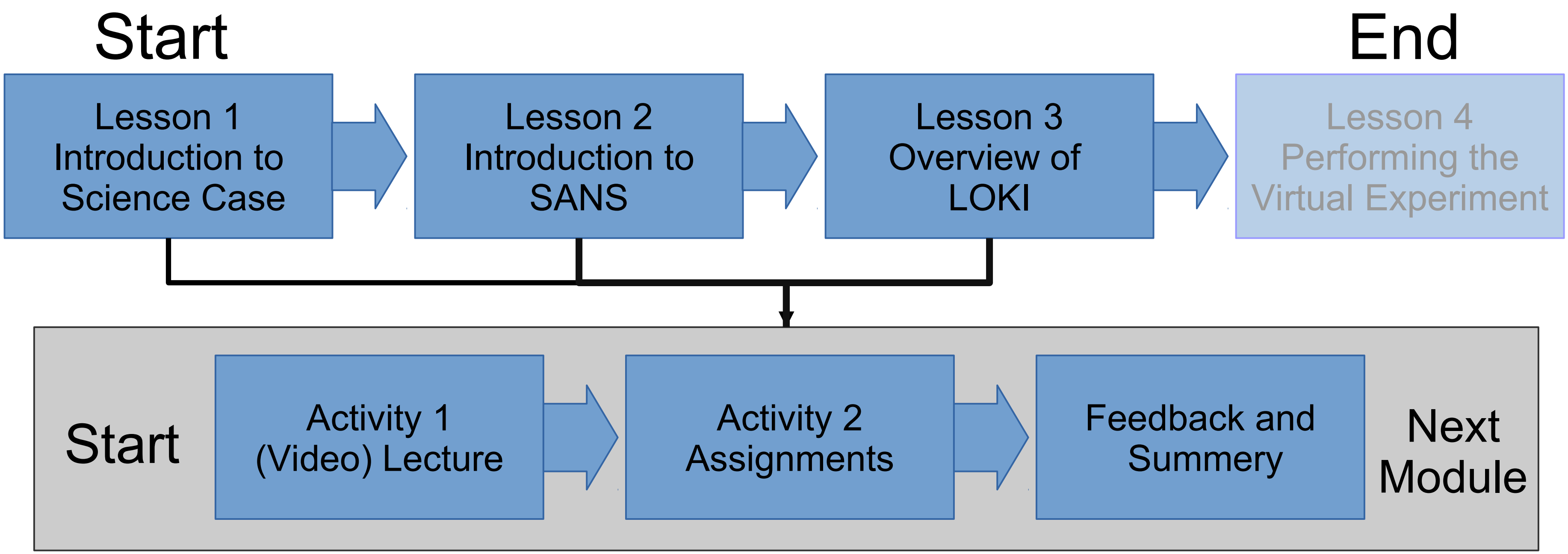
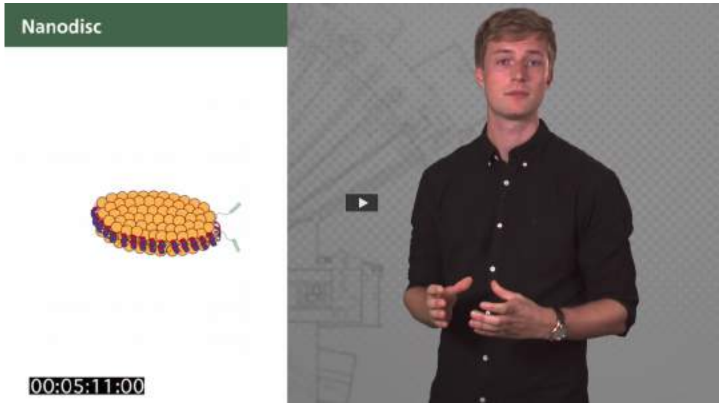
Task 3.2.1+2: STATUS LOKI : Complete Online Module





What do we specifically want to investigate?

- The rate at which the membrane scaffold proteins of the nanodiscs exchanges between discs.
- The rate at which lipids enters the nanodisc during assembly
- The Rate at which lipids are exchanged between the nanodiscs
- The rate of which nanodisc breaks down in the solvent.

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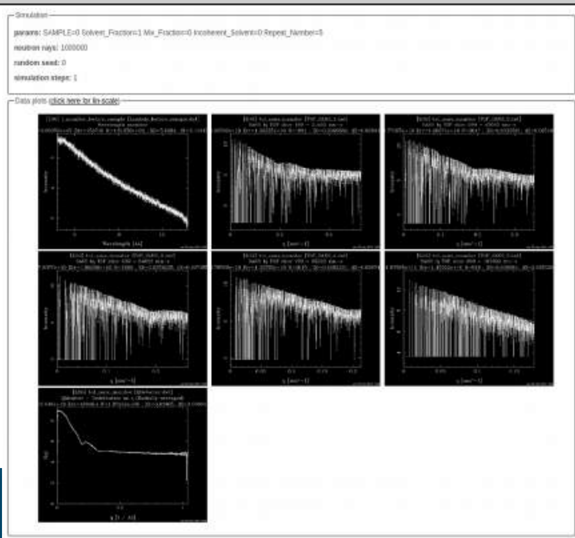
2. Work carried out

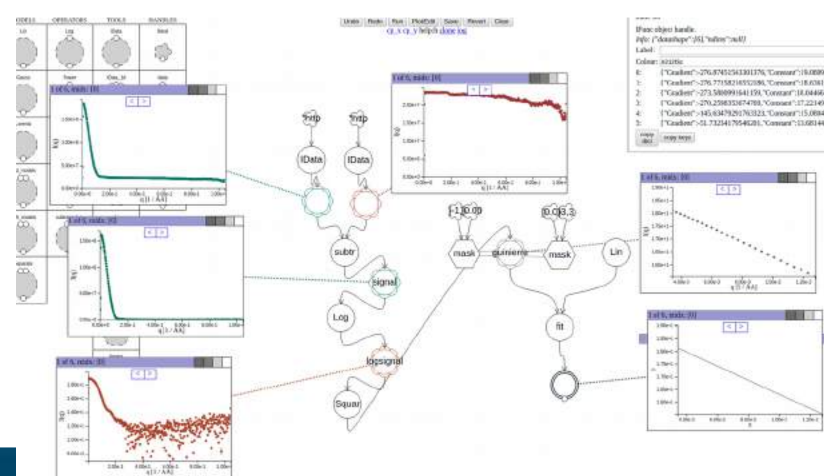
Task 3.2.1+2: STATUS LOKI : Complete Online Module

Start → Lesson 1 Introduction to Science Case → Lesson 2 Introduction to SANS → Lesson 3 Overview of LOKI → Lesson 4 Performing the Virtual Experiment → End

Lesson 4:

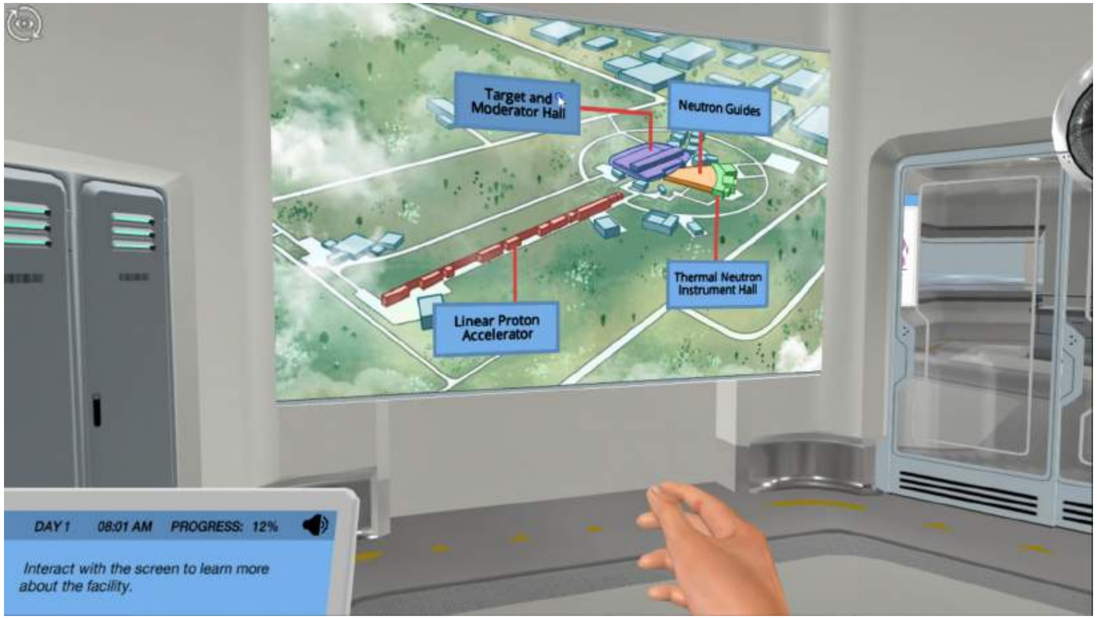
Start → Activity 1 Simulation and assignments → Activity 2 Data Reduction and Analysis → Activity 3 Discussion and Conclusion → End





3.2.3: Implement and test virtual experiments (D 3.9 - M48)

- We plan to test at least one of the virtual experiment learning modules with students before the end of project (during the Nordic Neutron PhD School september 2019, blended learning)
- We furthermore plan to integrate (LTI) and test another form of virtual laboratory (Labster) in selected e-neutrons courses, both online and in blended learning over the summer/autumn 2019.



2. Work carried out

- Task 3.3: Support for European neutron training Schools

was presented by Alain Menelle

KPI#3 Number of students & Number of hands-on practice schools

- Support for Introductory neutron schools (D3.2+ D3.6+ D 3.8+D3.10)

  Goal: 1000 students in SINE2020 (250/year).

  Goal: 20 schools in SINE2020 (5/year).

- Support for Advanced neutron schools (D3.5+ D3.10)

  Goal: 320 students in SINE2020 (80/year).

  Goal: 20 schools in SINE2020 (5/year) .

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2. Work carried out

- Task 3.3: Support for European neutron training Schools

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KPI#3 Number of students & Number of hands-on practice schools

- Support for Introductory neutron schools (D3.2+ D3.6+ D3.8+D3.10)

  Goal: 1000 students in SINE2020 (250/year). Now at 1099 (incl planned)

  Goal: 20 schools in SINE2020 (5/year). Now at 24 (incl planned)

- Support for Advanced neutron schools (D3.5+ D3.10)

  Goal: 320 students in SINE2020 (80/year). Now at 1210 (incl planned)

  Goal: 20 schools in SINE2020 (5/year) . Now at 19 (incl planned)

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Task 3.3.3a Intro schools Current situation

Date	Activity
October 2018 – March 2019	Adjustment (on request of the EC) on financial management of the school funding within SINE2020 (administered by CEA & MTA EK) needed to be done. Reason: a significant number of schools is organised by beneficiaries of SINE2020. As invoicing between beneficiaries is not allowed, an adjustment had to be done. Beneficiaries organising schools claim the related "granted support" in the final cost statement. The schools organised by external parties, will be refunded as before by CEA / MTA EK.
By May 2019	The financial report for all the introductory schools organized in 2018 was accepted and the financial support was transferred to the schools.

- Report D 3.8 delivered
- **New school: Vienna, Austria,Date: 14-17. August 2019**

Satellite event of 32nd European Crystallographic Meeting: ECM32

2. Work carried out

Call 2017 for intro schools

	School	Location	Date	Nr of (planned) participants	Non-national participants	Nr of school days
2018	Berlin	Berlin, Germany	1-9 March, 2018	30	22	9
	CETS	Budapest, Hungary	6-11 May 2018	28	25	6
	Hercules	Grenoble, Saint-Aubin, Villigen, Trieste, Hamburg	March, 2018	82	60	32
	ISIS Muon	ISIS, UK	19-23, March, 2018	34	10	5
	JCNS	Jülich and Garching, Germany	3-14 September, 2018	54	15	10
	SISN Intro	Torino and Grenoble	September, 2018	26	3	10
2019	CETS	Budapest, Hungary	5-10 May, 2019	28	25	6
	Hercules	Grenoble, Saint-Aubin, Villigen, Trieste, Hamburg	March, 2019	78	66	32
	JCNS	Jülich and Garching, Germany	September, 2019	55	25	10
	Oxford	University of Oxford	2-13 September, 2019	60	30	9
	SISN Intro	Torino and Grenoble	June, 2019	26	3	10
	Vienna	Vienna, Austria	14-17 August, 2019	30	25	4

- **Achieved goals: Financed schools: total of 12 schools in 2 years with 99949 EUR supprt**
- 8 different locations (geographical coherence, with Southern and Central European participation)
- offers from March to September
- majority proposed by neutron centres, therefore access for hands-on trainings
- new school (Vienna, Austria)
- access for trainees outside of EU (Russia, Ukraine, Georgia, India, China, Morocco, Argentina, Taiwan, Canada)
- participation of PhD students, post-doc fellows, but also young scientists and newcomers, especially from Universities and Research Centres
- ESS related lectures, proposal writing practice
- training material will be provided to e-learning platform.

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2. Work carried out

Task 3.3.3b: **Specialized** neutron and muon schools

- **Third call** November 2018; 4 out of 6 schools supported for a total of 21.5k€

01. Evolving Soft Matter: Shape, Dynamics Functionality (03/2019 Geilo Norway) 5k€
02. Bilbao Neutron School: Science and instrumentation for CANS (06/2019 Bilbao Spain) already supported
03. French-Swedish school on X-Rays and Neutron (05/2019 Lund Sweden) 4k€
04. Advanced School in Muon Spectroscopy (09/2019 Isis UK) 8.5k€
05. Neutrons for membrane biophysics (07/2019 FRMII Germany) 4k€
06. NESY winterschool on Neutron and Synchrotron Radiation (Austria) Ok€

Total :
18 schools supported
95.5 K€ allocated

From reports of 9 schools and 50k€ distributed
493 students
234 EU non nationals

2. Work carried out

Achieved goals:

Financed schools: total of 18 schools in 4 years

- 7 different countries (Germany 4, Italy 4, France 4, Spain 2, Norway 1, Sweden 2, UK 1)
- Differents subjects : material science, instrumentation, data handling, soft matter, biology, muons
- Large number of students supported

3. Impact

SINE2020 WP3 Support for neutron schools

- Guarantees the availability of grants, therefore the **participation of students from other regions/countries** without neutron sources
- Helps to **grow the neutron/muon community** and recruits new users from various fields
- Helps to pass knowledge and experience about specific methods that often can not be reached in other ways
- Some of the **schools could not be organized without the SINE2020 support**

SINE2020 WP3 development of e-neutrons

- Will provide a **full course on neutron scattering where anyone can enroll for free. Would not be possible without SINE2020 support.**
- Will make neutron experimentation readily available even **for students who cannot attend hands-on training**
- **Gives invaluable supplementary material to schools, particularly „extending the hands-on classroom"**
- Will provide easy accessible e-training elements involving a broad range of science cases which may **attract new users to neutron community and ESS**
- Will make it easier for students to transfer knowledge between neutron techniques by carrying a single science case through several quizzes.
- With course on muon spin spectroscopy, **synergy will be enhanced between the fields (NS and muSR)**.
- Will provide an **e-learning sand-box for each hand-on school** in which teachers/organisers can freely adapt e-learning material from intro-ns course. We expect that schools will also contribute material back to e-neutrons.
- Has opened the possibily to develop an introductory x-ray course based on virtual experiments (similar to the introductory neutron scattering course). If persued it will increase awareness of neutrons in xray community and vice versa. Possible to make a joint xray/neutron course targeted for e.g. industry. Implementation needs funding however.

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Schools

- New introductory school after call deadline to use unspent funds
- Advanced Schools not really advanced; mostly specialized
- 1 school cancelled (Matrac-1 2017 3 k€); other postponed or organized close to contract end (09/2019)
- 1 school will not claim support (ADD 9k€)
- Change of reimbursement process for partners induced difficulties to obtain reports from them
- Difficult to reach and rise interest towards neutron and muon trainings outside of Universities and Research Centres (exception: archaeological field)

E-learning

- D3.4+3.7 : Development of virtual instruments and training material:
- Delivery was postponed to M40-48 to give time to recruit and expand scope by transfer from Adv. Schools unspent budget (see D 3.5). Expect to deliver the promised training material
- D 3.9 : We foresee that we will not have time to test all virtual experiment material with students before end of the project.

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4. Deviations / Problems encountered

Schools

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