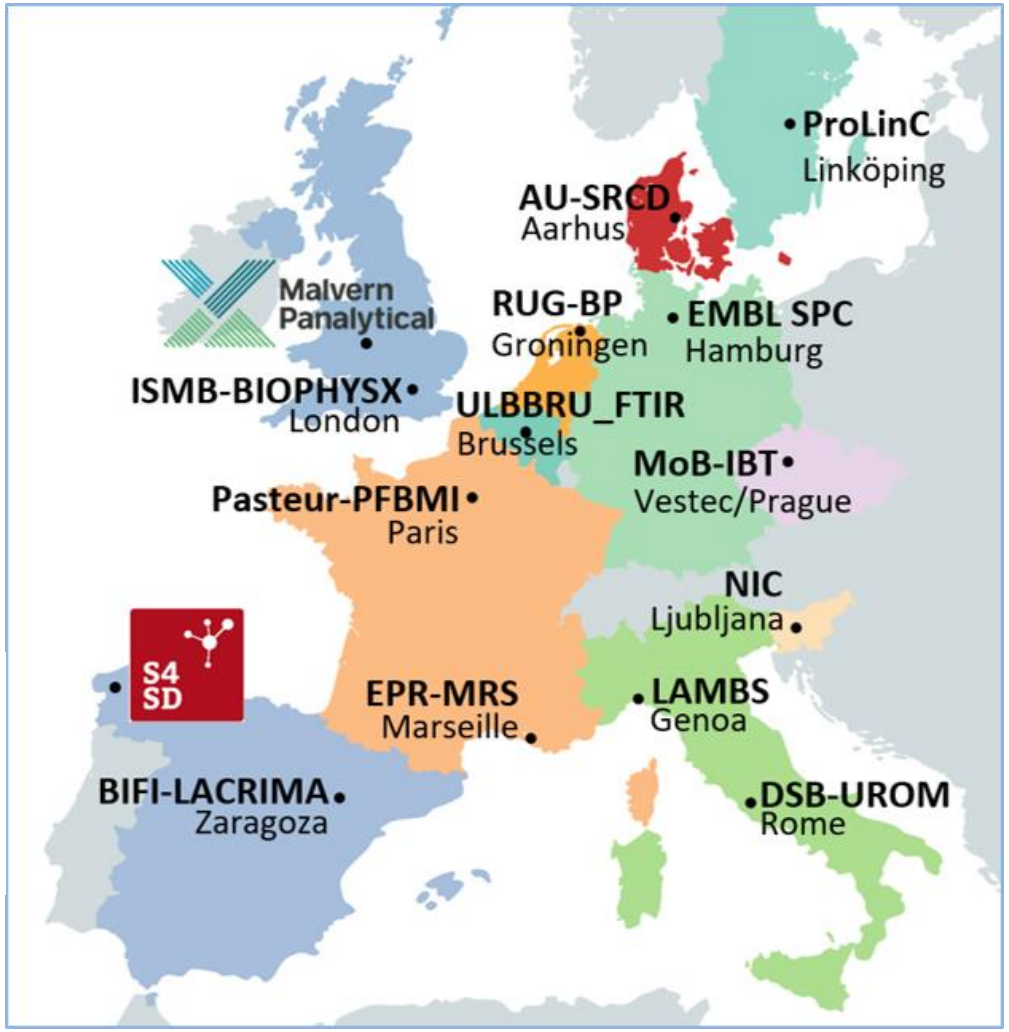
MOSBRI
Molecular-Scale Biophysics
Research Infrastructure

End user short course 5 of MOSBRI - Label-free techniques for the characterization of protein interactions

Institute of Biotechnology, Czech Academy of Sciences
Centre of Molecular Structure
Vestec near Prague
3 – 5 May 2023

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004806

Scientific Coordinator:
Patrick ENGLAND
(Institut Pasteur,
Paris)



- *EC project to provide open access to molecular biophysics techniques*
- *15 partners, 11 countries*
- *July 2021 – June 2025*
- *Research activities – standards, improvement of services, scientific data management*
- *Networking activities*

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004806

MOSBRI Molecular-Scale Biophysics Research Infrastructure

What can MOSBRI offer?

Access to biophysical techniques across Europe

- 13 centres of MOSBRI provide trans-national access
- "all inclusive" – just apply
- **NEW – 1-2 month stays at IBT possible – just ask …**

https://www.mosbri.eu/apply-for-tna/

Advanced spectroscopies

- **CD**: Circular Dichroism
  AU-SRCD
  Pasteur-PFBMI, EMBL-SPC, ProLinC, NIC, ISMB-BIOPHYSX, MoB-IBT, BIFI-LACRIMA
- **EPR**: Electron Paramagnetic Resonance
  EPR-MRS
- Fluorescence Spectroscopy
  ProLinC
  EMBL-SPC, NIC, ISMB-BIOPHYSX, BIFI-LACRIMA
- Fluorescence Microscopy
  LAMBS

Hydro-dynamics

- **AUC**: Analytical Ultra Centrifugation
  Pasteur-PFBMI
  ProLinC, MoB-IBT
- **DLS**: Dynamic Light Scattering
  Pasteur-PFBMI
  EMBL-SPC, ProLinC, ISMB-BIOPHYSX, MoB-IBT, BIFI-LACRIMA
- **SEC-MALS**: Size Exclusion Chromatography – Multi-Angle Light Scattering
  Pasteur-PFBMI, **ISMB-BIOPHYSX**
  ProLinC
- **SAXS**: Small Angle X-ray

Real-time biosensing

- **BLI**: BioLayer Interferometry
  EMBL-SPC
  Pasteur-PFBMI, ISMB-BIOPHYSX
- **QCM**: Quartz Crystal Microbalance
  NIC
- **SPR**: Surface Plasmon Resonance
  ProLinC, **NIC**
  Pasteur-PFBMI, EMBL-SPC, MoB-IBT, BIFI-LACRIMA
- **SEAHORSE:** Live cell metabolic biosensing
  DSB-UROM
- **SURFE²R N1:** SSM based

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004806

MOSBRI Molecular-Scale Biophysics Research Infrastructure

What can MOSBRI offer?

Training of users and experts

- 10 End User Short Courses – check the web site for the upcoming ones

- Basic Level Schools

BLS1 (Pasteur-PFBMI) Quality control of protein samples

When: Monday 4th– Friday 8th April 2022, **Where:** Institut Pasteur, Paris, France (Pasteur-PFBMI)

School material available on the MOSBRI web

BLS2 (MoB-IBT) **Techniques to study single molecule/particle interactions**

When: Monday 13th– Friday 13th May 2024

Where: Institute of Biotechnology of the Czech Academy of Sciences

- Advanced Level Schools

ALS1 (BIFI-LACRIMA) Protein stabilization: Design, experiments and assessment

When: 3rd -7th July 2023. **Where:** Institute BIFI, Zaragoza, Spain

ALS2 (Pasteur-PFBMI) Biophysical methods to characterize molecular interactions (ITC, SPR, BLI, MST, …)

https://www.mosbri.eu/training/

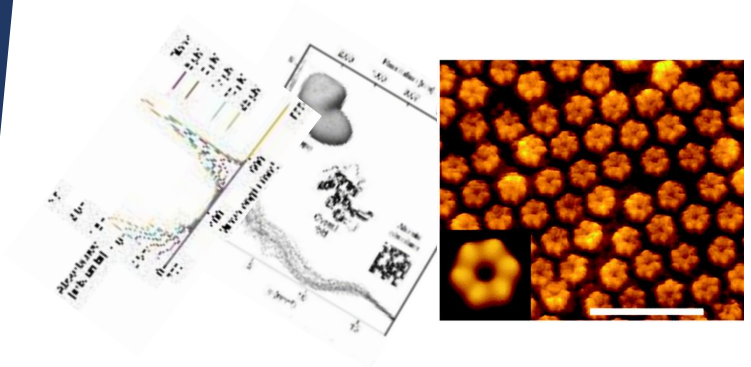
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004806

MOSBRI Molecular-Scale Biophysics Research Infrastructure

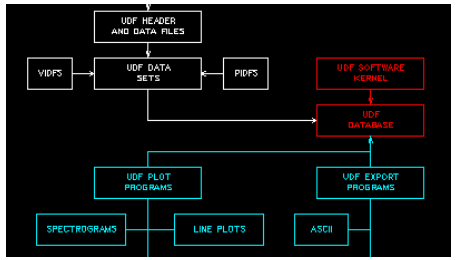
What can MOSBRI offer?

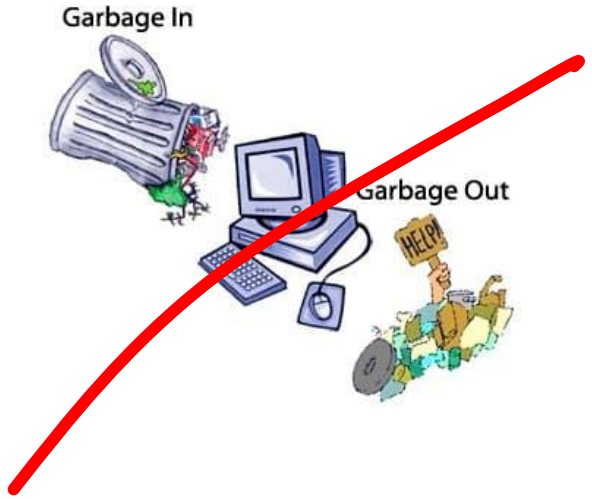
Development of pilot database for selected biophysical techniques

OBJECTIVES



1. New data standards for biophysical data exchange and archiving





2. Support for improved data processing protocols

3. Pilot database for biophysical data

"FORMATS"

"TOOLS"

"DATABASE"

- MST, SPR, BLI – methods selected to be covered first
- Beta testers – contact me (dohnalek@ibt.cas.cz), testing to start near the end of 2023

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004806

MOSBRI Molecular-Scale Biophysics Research Infrastructure

Centre of Molecular Structure, Instruct-CZ centre

Who we are, what we offer

Research infrastructure for (not only) structural biology

- High-end instrumentation, expertise, open access, subsidized pricing, government and EU funding, > 30 techniques
- Operated by the Institute of Biotechnology of Czech Academy of Sciences

Lead, admin, IT
Jan Dohnálek
Magdalena Schneiderová
Ľubica Škultétyová
Michal Strnad

Protein production
Miroslava Alblová
Mária Trundová
Tereza Nepokojová

Biophysical techniques
Tatsiana Charnavets

Crystallization of proteins and nucleic acids
Jiří Pavlíček

Diffraction techniques
Jan Stránský
Jiří Pavlíček

Structural mass spectrometry
Petr Pompach
Pavla Vaňková

Access
www.ciisb.org
instruct-eric.eu
mosbri.eu
isidore-project.eu

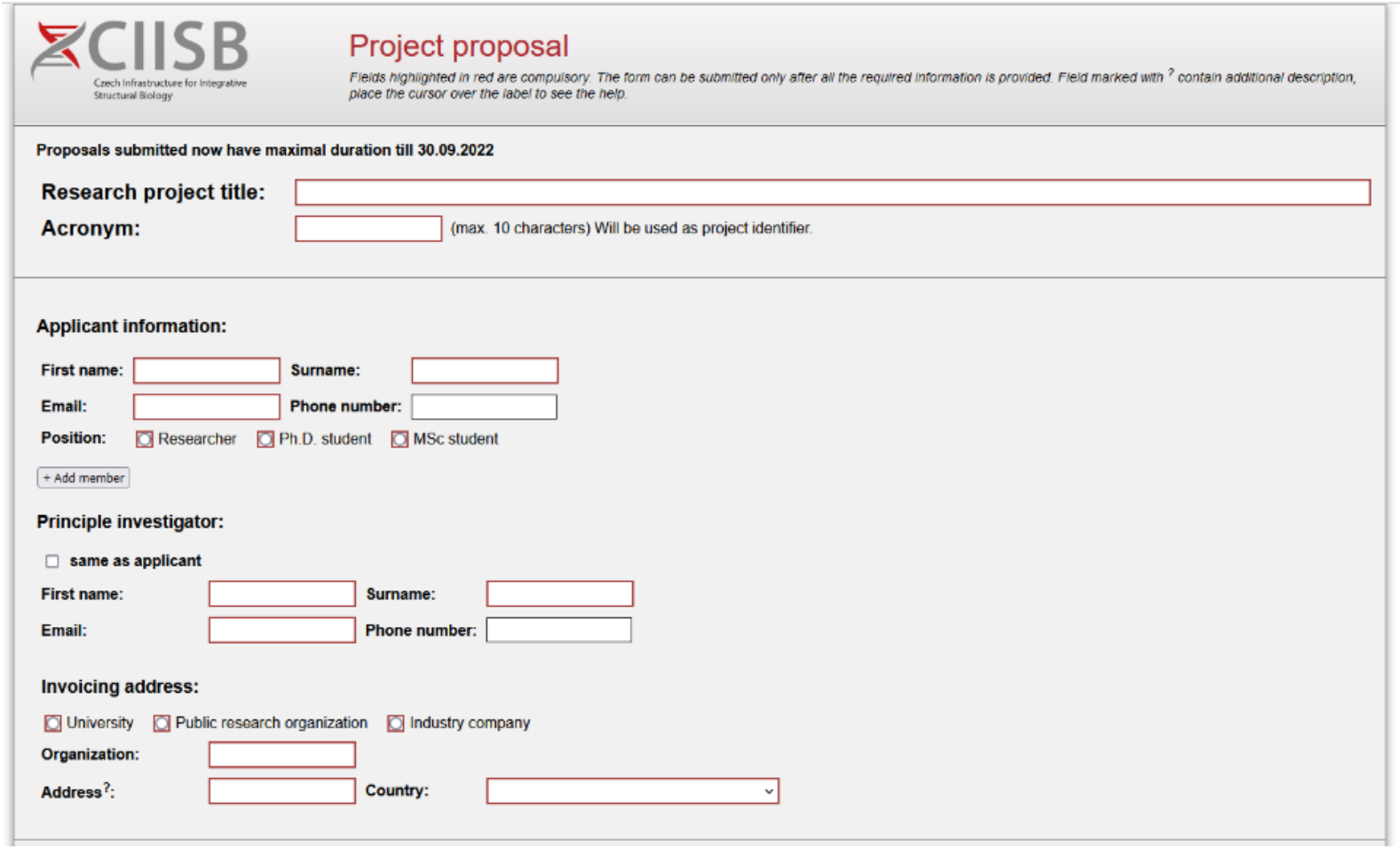
MEYS (LM2015043, **LM2018127, LM2023042**), Small users contribution; Industrial users; Investments and in-house research – OP VVV CIISB4HEALTH; ELIBIO – OPVVV ERT – Structural dynamics of biomolecular systems; **CIISB UP - Investments into CIISB 2020-2022, MEYS, ERDF OPVVV, no. CZ.02.1.01/0.0/0.0/18_046/0015974**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004806

Access to CMS via Czech Infrastructure for Integrative Structural Biology

Access www.ciisb.org

Acknowledge use of facility with the current infrastructure grant support



CIISB Czech Infrastructure for Integrative Structural Biology

Project proposal

Fields highlighted in red are compulsory. The form can be submitted only after all the required information is provided. Field marked with ? contain additional description, place the cursor over the label to see the help.

Proposals submitted now have maximal duration till 30.09.2022

Research project title:

Acronym: (max. 10 characters) Will be used as project identifier.

Applicant information:

First name: **Surname:**

Email: **Phone number:**

Position: Researcher Ph.D. student MSc student

+ Add member

Principle investigator:

same as applicant

First name: **Surname:**

Email: **Phone number:**

Invoicing address:

University Public research organization Industry company

Organization:

Address?: **Country:**

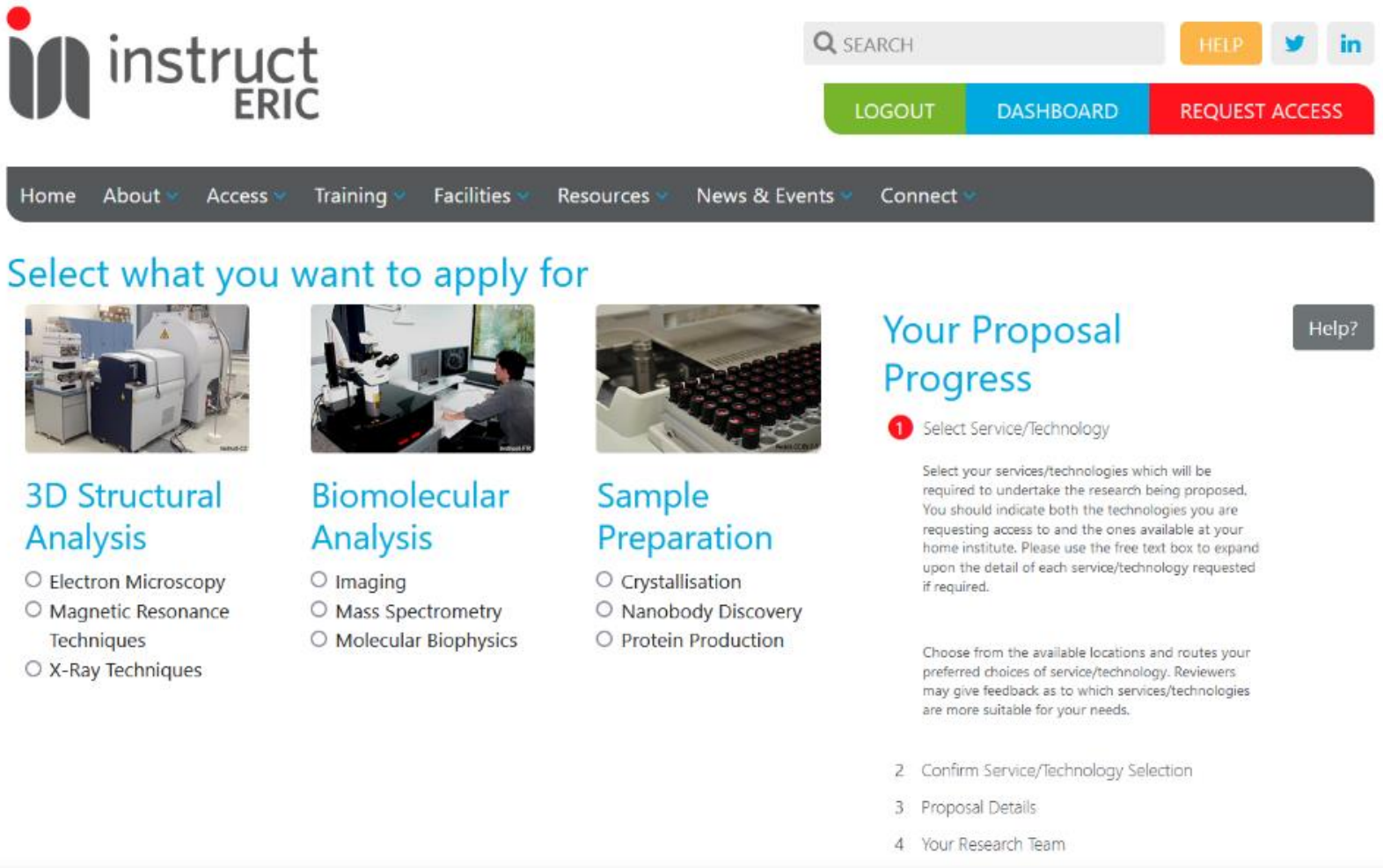
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004806

Centre of molecular structure
Access via Instruct infrastructure

Access
instruct-eric.eu

No charge back to you!

Acknowledge
use of Instruct



LONG-TERM INTERNSHIPS!

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004806

INTEGRATED SERVICES FOR INFECTIOUS DISEASE OUTBREAK RESEARCH

https://isidore-project.eu/

Specific calls for particular types of pathogens or emerging threats

Access not only to structural biology services

- Cell models
- In vivo models
- Vaccine development
- Clinical samples
- And more …

- Do you need specific research services, tools or resources to advance your research in infectious diseases?

ISIDORe provides an integrated portfolio of cutting-edge research services and resources to study epidemic-prone pathogens including SARS-CoV-2

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004806

ESC5 - Label-free techniques for the characterization of protein interactions

Time	Programme	Place	Speaker
3. 5. - Wednesday			
12:30 - 12:50	Arrival, coffee	hall in front of red/green seminar room	
12:50 - 13:00	Introduction	red/green seminar room	Jan Dohnálek
13:00 - 14:00	**Lecture 1: Introduction to iTC: principles**		Tatsiana Charnavets
14:00 - 14-20	Coffee break	hall in front of red/green seminar room	
14:20 - 15-00	**Lecture 2: Introduction to iTC: experimental design**	red/green seminar room	Tatsiana Charnavets
15:00 - 16:00	**Lecture 3: Principles of MST techniques, label-free MST**		Josef Houser
	Differential scanning fluorimetry technique		Josef Houser
16:00 - 16:20	Coffee break	hall in front of red/green seminar room	
16:20 - 17:50	**Tour of the Centre of Molecular Structure**	CMS	Charnavets, Stránský, Pavlíček, Pompach, Trundová
19:00	Dinner	Šalanda - Pankrác	
4. 5. - Thursday			
9:30 - 10:00	Arrival, coffee	CMS - Biophysical techniques lab	
10:00 - 13:00	**Hands-on workshop in two groups of five participants**		
	1st group - iTC		Tatsiana Charnavets
	2nd group - LF MST, DSF		Eva Paulenová
13:00 - 14:00	Lunch break + coffee	Caffeteria + CMS - Biophysical techniques	
14:00 - 17:00	**Hands-on workshop in two groups of five participants**	CMS - Biophysical techniques lab	
	1st group - LF MST, DSF		Eva Paulenová
	2nd group - iTC		Tatsiana Charnavets
5. 5. - Friday			
9:30 - 10:00	Arrival, coffee	CMS - Biophysical techniques lab	
10:00 - 11:00	**Work in two groups of five participants**		
	1st group - Review of techniques for the measurements of molecular interaction, iTC troubleshooting, questions		Tatsiana Charnavets
	2nd group - Interaction determination by Mass photometry, data analysis, questions		Jan Stránský
11:00-12:00	**Work in two groups of five participants**		
	1st group - Interaction determination by Mass photometry, data analysis, questions		Jan Stránský
	2nd group - Review of techniques for the measurements of molecular interaction, iTC troubleshooting, questions		Tatsiana Charnavets

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004806