26.10.2020.

LATVIA ON USING LARGE FACILITIES – WHAT CAN BE ACHIEVED IN THE COOPERATION WITHIN RESEARCH PARTNERS IN THE EU AND BALTIC SEA REGION

LATVIJAS UNIVERSITĀTES
CIETVIELU FIZIKAS INSTITŪTS
INSTITUTE OF SOLID STATE PHYSICS
UNIVERSITY OF LATVIA

Andris Anspoks

Deputy Director for Innovation, Institute of Solid State Physics, University of Latvia;

Adviser to the Prime Minister of Republic of Latvia for Science and Innovation (Latvia)

AFTER-LUNCH SESSION

- *Scientific and technical capabilities of RIs to serve Science and Engineering*
- *Latvia on using large facilities – what can be achieved in the cooperation within research partners in the EU and Baltic Sea Region*
- *Using photons and electrons to understand malaria parasite motility*
- *Laser techniques in Cultural Heritage preservation*
- *Complementary use of laboratory and free-electron X-ray sources to study metal based complexes*
- *Insights into solution structures and dynamics of biomolecules provided by neutron scattering techniques*
- *XFELs as molecular movie cameras*

YOU SAW AND WILL SEE MANY METHODS

FT-IR

UV .. Soft X-ray spectroscopy

XPS

XRD & WAXS & SAXS

BioSAXS

Macromolecular crystallography

X-ray Absorption Spectroscopy

XMCD

X-ray Tomography

Coherence applications

BioImaging

Nano (20-50nm resolution)

..

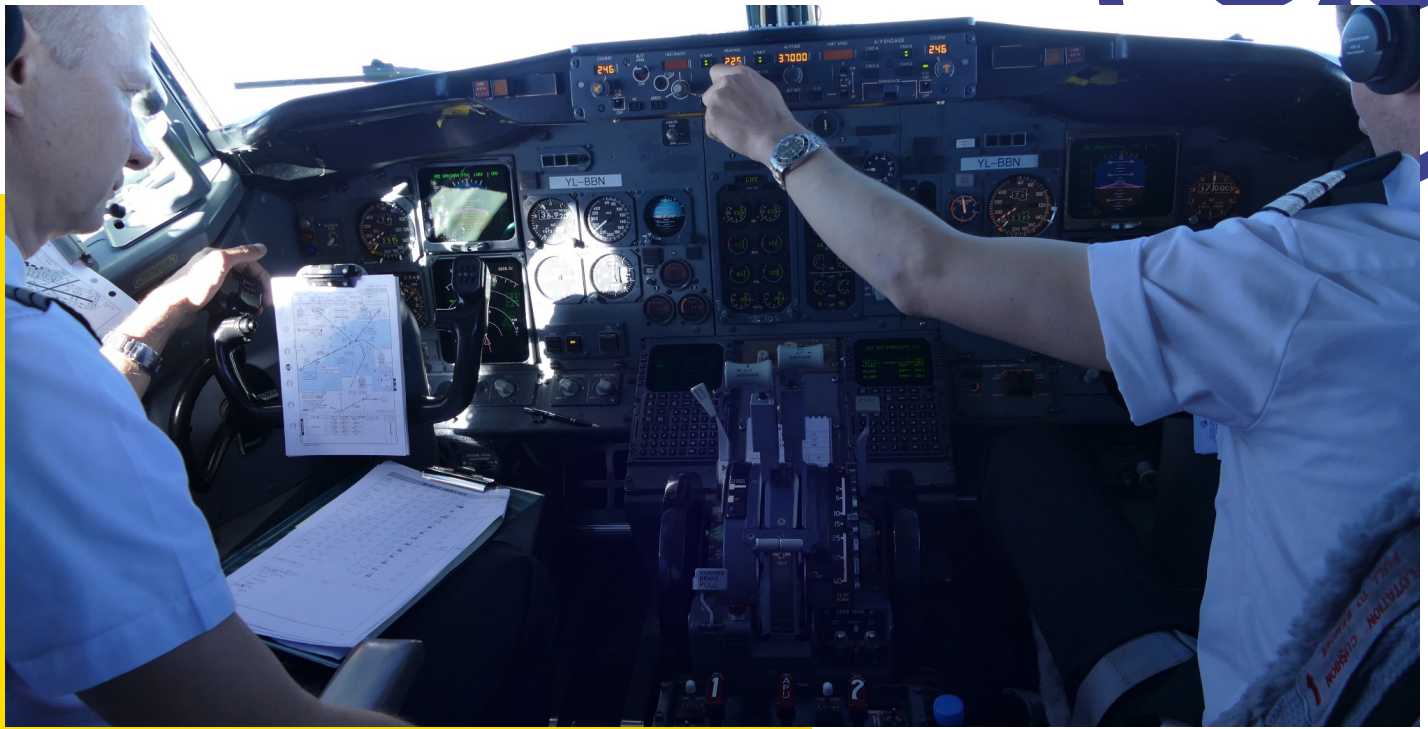
IS THIS REALLY FOR ME?

Why to bother?

YES, IT IS

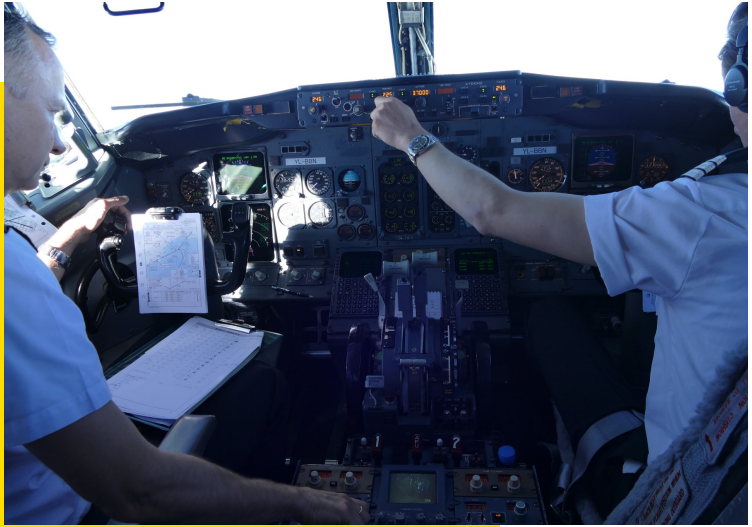
- The most important is YOUR GOAL
- Physics & Chemistry – What you need to measure? Why?

- Large facilities offer you large gun to do the job


YL-BBN
YL-BBN

WE WILL HELP YOU!

This is the main objective of this event!



WHAT CAN I DO?

How? When? What?

MOST IMPORTANT THINGS

- The most important is your goal
- Physics & Chemistry – What you need to measure? Why?

- Select best combination of methods to reach your goal
- Sample design to reach your goals (right samples)
- Feasibility studies
- References

LIFECYCLE

- Proposal submission – January/February
- Waiting for evaluation – May/June
- Assign beam time – June
- Experiment – September/December (9-12 months after submission)
- Data analysis & report
- Publication or other next steps

FEASIBILITY

- **Goal: can we measure suggested effect/property?**
- What sample design & composition we need?
- What special equipment we need?
- Modelling
  - Estimating size of the effect
  - What to measure?
  - How to analyse data?
- It is important stage to decide go-no-go and set-up for experiment!
- Experiment is a one shot show – it is good to be prepared!

REFERENCES

- Componds with known effects, state, compostion, valence, etc.

- Will be used to calibrate equipment
- Can be used as baseline

LIFECYCLE – ACTUAL – 8-12 MONTHS

Idea, feasibility tests, modelling, initial design, initial team

- *Proposal – January/February*

Samples, testing, design, laboratory work

- *Waiting for evaluation – May/June*

Update plan, sample fabrication, special equipment, references

- *Assign beam time – June*

Final team, final plan, final tests, selecting right samples, equipment & references

- *Experiment – September/December*

On-site analysis, comparing with references, be prepared for unexpected

- *Data analysis & report*

Additional characterization & tests (including *post mortem*)

- *Publication or other next steps*

WHERE IS A STORY ABOUT LATVIA?

If we did it, you can do it as well

LATVIA

- There are no large research facilities
- There is a steadily growing number of publications related with use of Synchrotron light sources

HOW?

- This is because of passion and long cooperation history

EXAFS SPECTROSCOPY LABORATORY

Since 1980th we were involved in development of the experimental methodology and data analysis of the experimental data

- Juris Purāns & Alexei Kuzmin
- Russia
- Italy
- France

XAS ACHIEVEMENTS

- Passion
- Talented people
- International cooperation

- 1995 :: EDA s/w package – X-ray spectroscopy tool
- 2009 :: MD-EXAFS – Molecular Dynamics simulation of EXAFS
- 2012 :: EvAX – Reverse Monte Carlo analysis of EXAFS

- Comprehensive methodology

OPTICAL SPECTROSCOPY & NEUTRONS

- Legacy in radiation defects, theoretical calculations and optical spectroscopy

- Anatoly Popov & Vladimir Pankratov

YES, YOU CAN!

- If we did, you can do this as well
  - You can become experts
  - You can team with experts
- We are open for cooperation

NEXT STEPS

Apply with your idea & combine a team

NEXT STEPS

- Think about your idea
- Contact experts (e.g. from this Symposium)
- Create international team

- Everybody wants to be a part of a team with a great idea

THANK YOU

LATVIJAS UNIVERSITĀTES
CIETVIELU FIZIKAS INSTITŪTS

INSTITUTE OF SOLID STATE PHYSICS
UNIVERSITY OF LATVIA