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FLUids incl. gases, vapors and COmplex fluids

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The FLUCO sample Environment ?




- Soft condensed matter research.
- Electrochemistry , energy research.
- In Situ and Operando techniques, chemistry

FLUCO - Toolbox

- Devices and Methods.
- Multi parameter setups.
- Dedicated holder, cells, troughs.
- Lab. methods for characterization and preparation

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"Large Scale Structures"

- **Related instruments of first 8 within NSS budget :**

- LOKI (SKADI)	- SANS
- ESTIA (FREIA)	- Reflectometer
- MAGIC (NMX)	- Crystal Diffractometer
- CSPEC (TREX)	- TOF Spectrometer , partly CSPEC
- BIFROST, (VESPA , MIRACLES)	- Indirect geometry Spectrometer
- DREAM (HEIMDAL)	- Powder Diffractometer , partly
- ODIN	- Imaging , Engineering , partly
- BEER	- Engineering , partly

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Quick sample changes, automation/robotics.

- **Sample changers / Sample environment system changers.**
  - **e.g. Cells/troughs,…**
  - **Robotics / translation- / rotational stages.**
  - **Examples : Changer at POWGEN / VISION.**

- **Before starting two requirements have to be defined.**
  - ❖ **Sample area of instruments has to be fixed/defined.**
  - ❖ **Devices (SES) have to be defined.**

    - ✓ **Shape**
    - ✓ **Weight**
    - ✓ **Connected pipes/cables**
    - ✓ **Risc assessment**

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Planned suite of devices and sample environment systems (SES)

Provided by the ESS within NSS (construction budget) for the first 8 instruments:

• Humidity Chamber(s)	SES
• Rheometer (RheoSANS)	SES
• Stopped Flow devices	SES
• Magazines (multiple samples)	SES
• Troughs, langmuir troughs , > 2024	SES
• 7 position rotating sample cell magazine	SES / Device
• Liquid-Solid-Cells	Device
• Shear cells, Cuette cells	Device
• Syringe Pumps , Peristaltic Pumps	Device
• Gas Process Handling, Manifolds	Device
• Water (Oil) bath circulating devices, aka Chiller	Device
• Thermalizing gas blower	Device
• HPLC-Pump	Device
• Temperature-Controller / Monitors	Device
• Potentiostat / HF-Frequency Analyzer	Device

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Planned suite of sample environment equipment

Provided as part of instrument budgets :

• Sample changer , multiple samples	CSPEC/MIRACLES	TUM, Ger	SES
• Troughs, Langmuir troughs	FREIA	STFC, GB	SES
• 50 pos. thermalized magaz.	LOKI/SKADI	STFC/FZJ , GB/Ger	SES
• Sample changer	VESPA	CNR/STFC, IT/GB	SES
• HPLC Pump	LOKI/FREIA/ESTIA	STFC/PSI , GB/SH	Device
• Liquid-Solid-Cells	FREIA/ESTIA	STFC/PSI , GB/SH	Device
• Cryostream	NMX	ESS , DK, FR	SES
• Humidifiyer	NMX	ESS , DK, FR	SES

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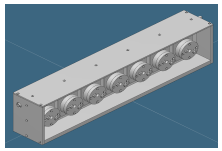
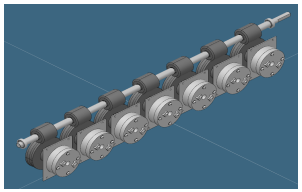
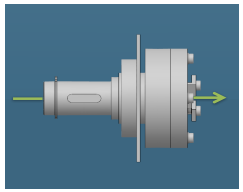
Planned suite of sample environment equipment, started

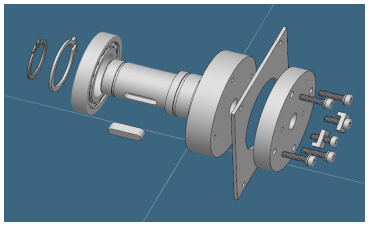
Provided as internal R&D , FLUCO & Basque intern Sonia G. Scheifler
7 position rotating sample holder magazine

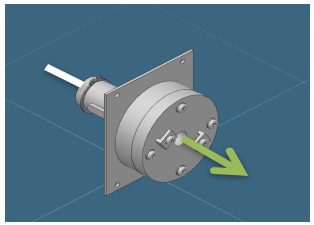
Rotating cell magazine
Sonia Garcia Scheifler











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Planned suite of sample environment equipment, started

Provided by external universities : FlexiProb - project , Ge

• Sample changer, magazine	In situ DLS/SLS	University of Bielefeld
• Humidity chamber magazine (3 pos)	In situ WLI/UV-Vis Conductivity Meas.	Technical University of Munich
• Foaming cells magazine (3 pos)	In situ optical track.	Technical University of Darmstadt

Note : DLS – Dynamic Light Scattering , optional
SLS – Static Light Scattering
WLI – White Light Interferometry
UV-Vis – Ultraviolet Visible spectroscopy
DWS – Diffusing wave spectroscopy

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- **Commercial procured equipment , devices , now to STAP 2018 :**

  - **LakeShore LS 224 12 Channel Temperature Monitor**
  - **Solartron 1255 , HF Frequency Response Analyzer**
  - **Solartron 1286A , Potentiostat**
  - **Knauer Azura HPLC pump , P 6.1L Pump**
  - **3 of Julabo water bath circulators**
  - **New Era NE-1002X-ES, Microfluidics syringe pump**
  - **New Era NE-1600 Multi programmmable, 6 channel syringe pump**
  - **New Era NE-9000G Peristaltic Dispensing pump**

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- **Current pool "core" equipment, to STAP 2018 :**
  - Rheometer, Rheo-SANS, Pending FZJ, VAT issues
  - Laser Pump Probe , successfully finished !
  - Laser Pump Probe 2 , CDR for pod successful done - Updated comp. to STAP 2017
  - Humidity chamber, TA signed, Kick off/start Q2/18 Partner : Tartu, EE
  - Rotating cell magazine 7 pos, Design done/man. started - Updated comp. to STAP 2017
  - Gas process handling systems , Running - Updated comp. to STAP 2017
  - Stopped flow unit, TA signed, Kick off/start Q2/18 Partner : Tartu, EE
  - *In Situ Light scattering*, within BMBF – FlexiProb-project , still ongoing
  - Thermalizing blower , conv. to In-Kind, Pend. FZJ, VAT issues, Updated comp. to STAP 2017
  - 5 position Peltier SANS changer , successfully finished !
    - Upgrade internally to 20/25 pos. started , Updated comp. to STAP 2017

  - Chemical process chamber, R & D , cash
  - Ultrasonic levitator
  - In Situ thermal analysis
  - In Situ gas adsorption

  } OPS >2025 funding

Blue – Funded as In-Kind
Green – Own devel. Build., Cash
Red – Not yet funded

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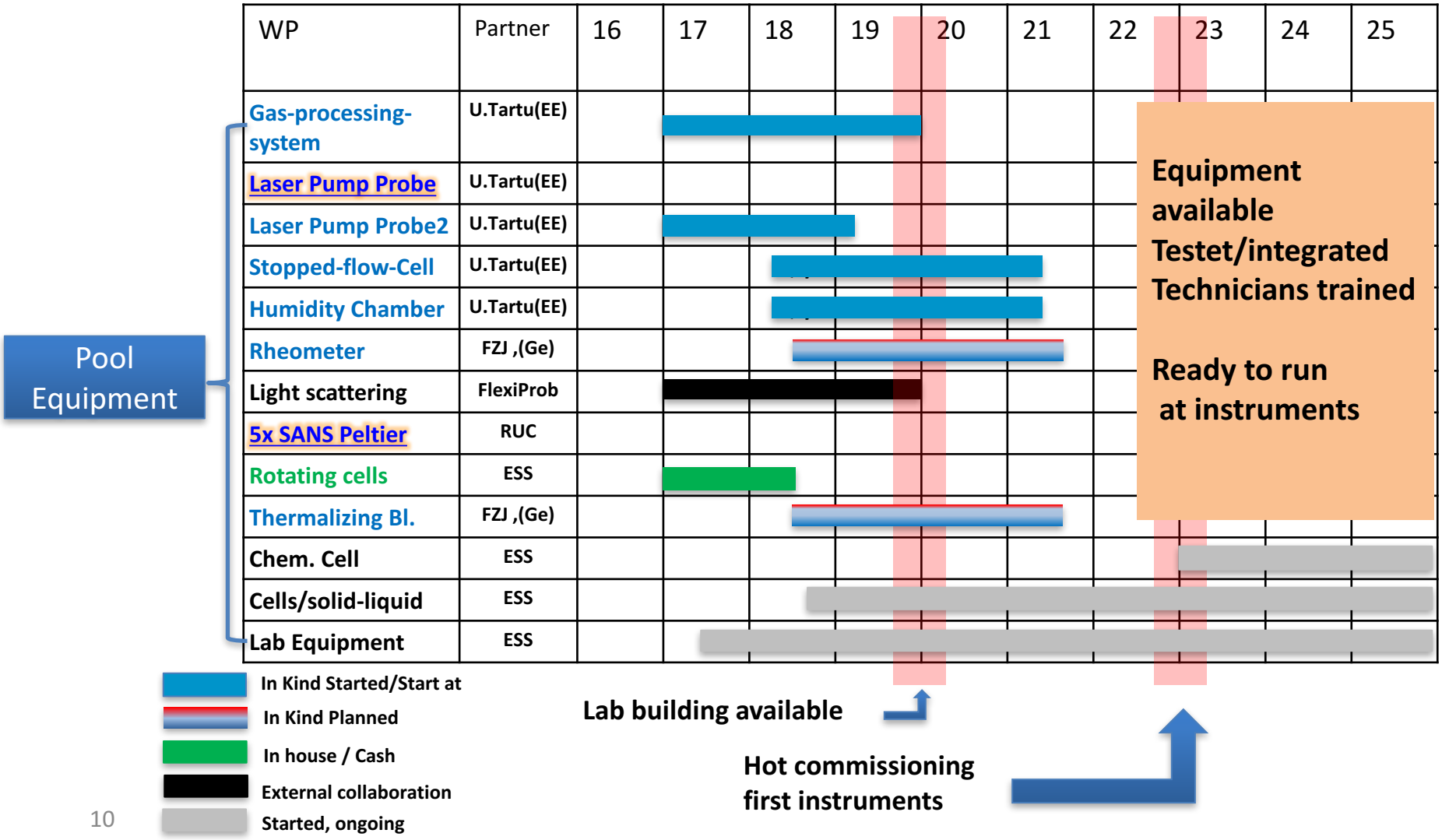

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Staff development up to 2025 as envisaged start of steady state operation

personnel	15	16	17	18	19	20	21	22	23	24	25
Scientific engineer	0.5	1	1	1	1	1	1	1	2	2	2
Technician	-	-	-	-	0.5	1	1	1	2	3	3

Lab building available

Hot commissioning
first instruments

ops funding

Staffing tasks from FLUCO view as part of sample environment [20 FTE]

FTE :	**5 FTE (Full Time Equivalent)**
Management	**0.3 FTE = 6%**
R & D	**1.0 FTE = 20%, or minimum 1 person**
FLUCO Infrastructure	**0.2 FTE = 4%**
User operation / support	**2.5 FTE = 50%**
Platform service	**1.0 FTE = 20%**

Note :

- **The last 2 points can vary between beam on target/downtime&maintenance.**
- **Platform service = Maintenance/Repair/Upgrade/Calibration**
- **Leading and fixed No's are 20 % for R & D and 50% providing service.**

Conclusions about the FLUCO platform

- **For the hot commissioning of the first 8 instruments, the mandatory pool equipment will be available, independent from the actual or in the future adapted timescale**

- **The BMBF Flexiprob project continues being in good shape.**

- **The staffing plan is adapted to the envisaged timescale.**

- **Additional commercial devices have been procured.**

- **ESS developments have been started and are in production.**