

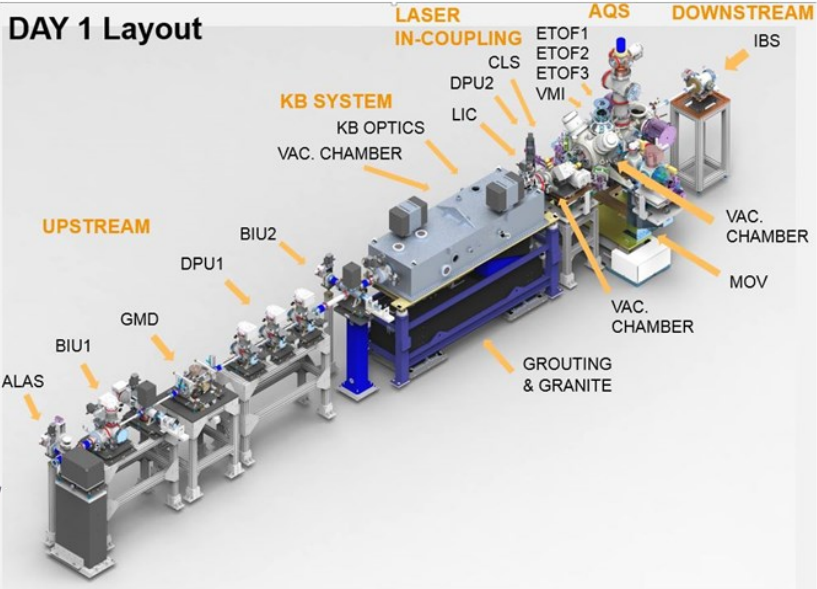
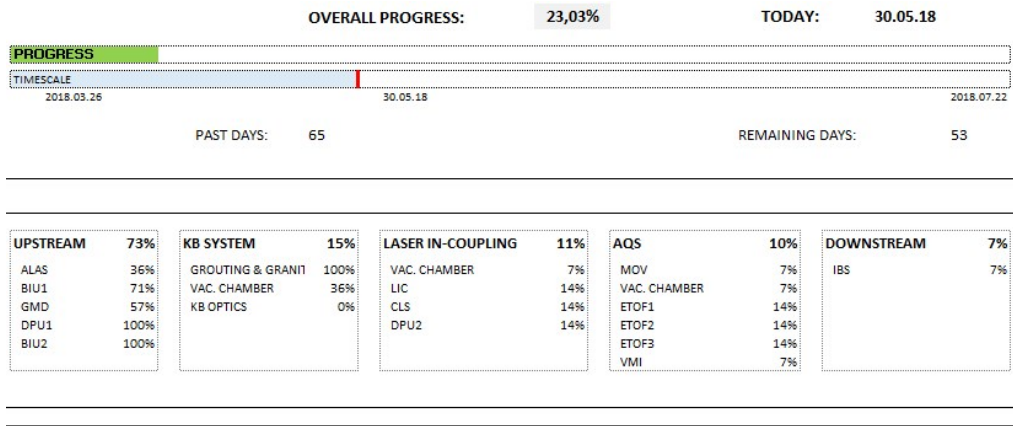
# Status of the SQS Instrument



Thomas M. Baumann  
Scientific Instrument SQS

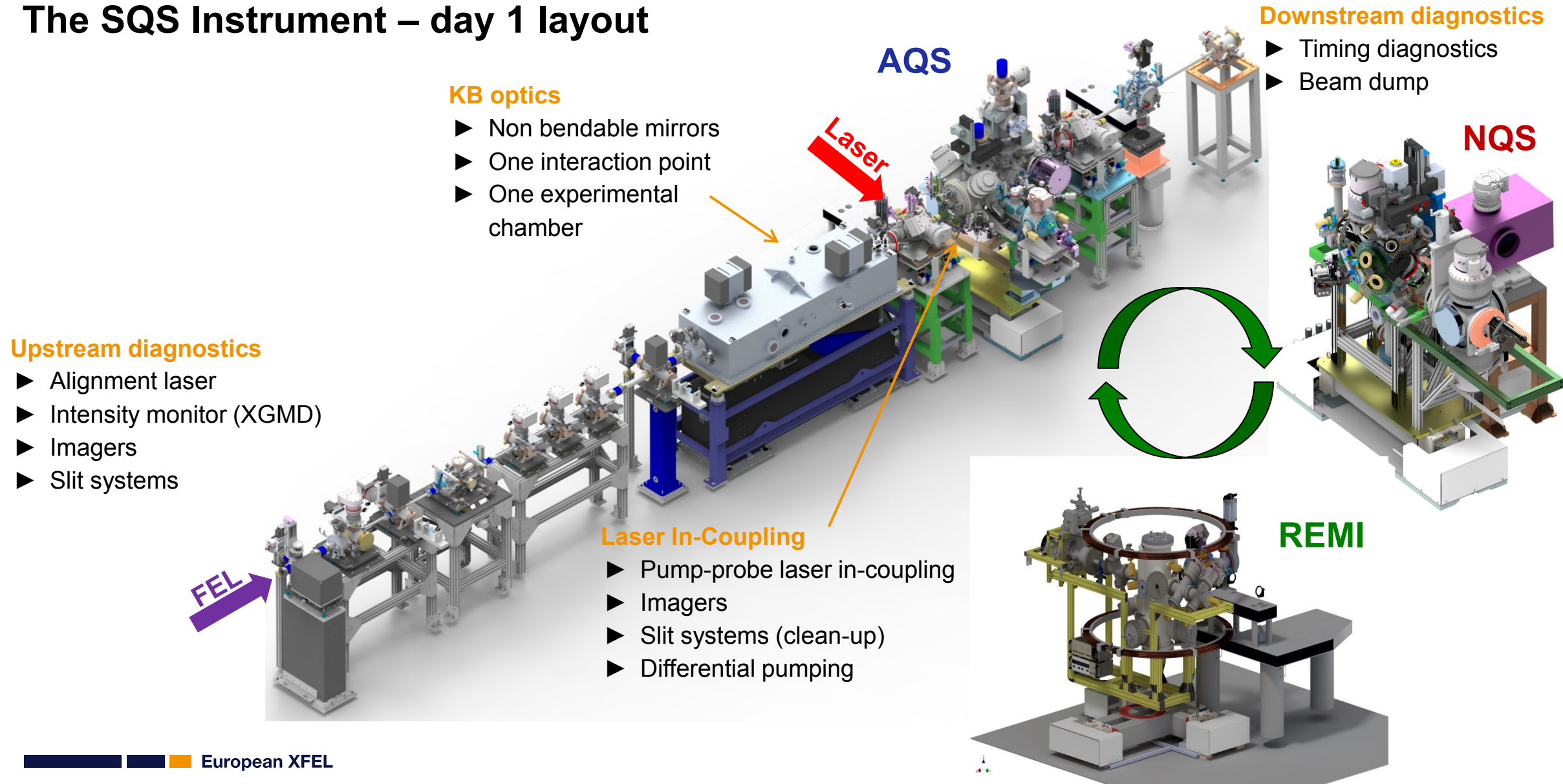
Readiness Meeting  
Schenefeld, 01.06.2018

SQS Installation Progress



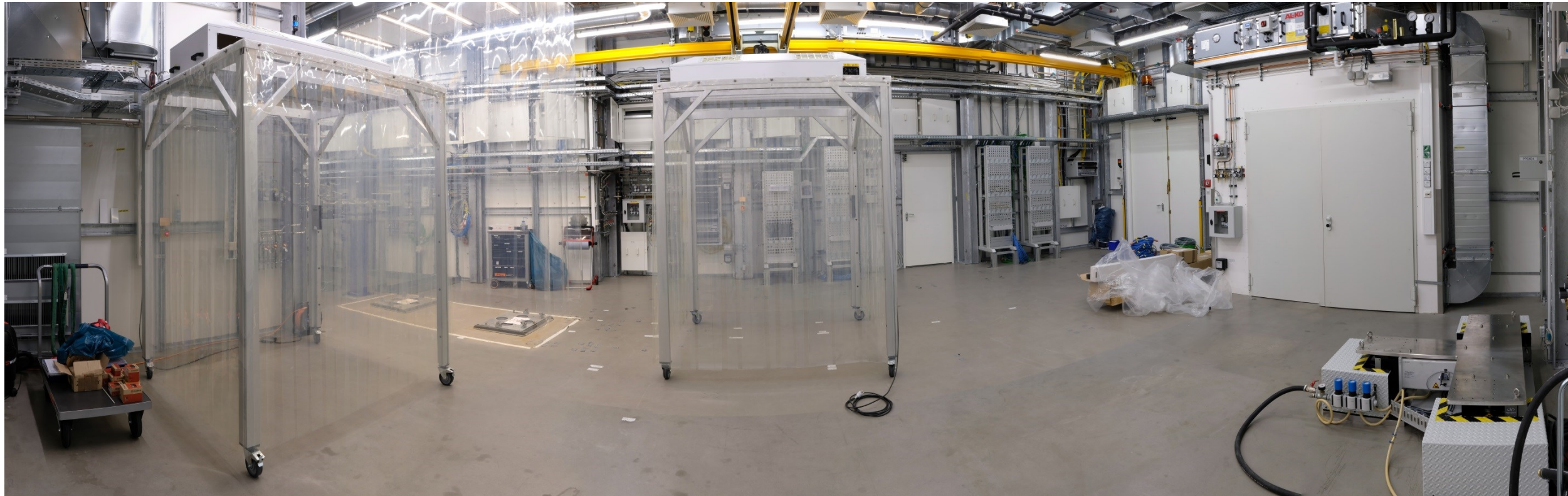
SQS DAY1	LIFE-CYCLE (RESOURCES)		CALCULATION METHOD: MODEL1							
COMPONENTS	DELIVERY	INSTALLATION	ALIGNMENT	IN VACUUM	VACUUM TEST	TEST CRATE	TEST BOX	E2E TEST	TOTAL	
	77,0%	50,6%	30,5%	15,4%	15,4%	11,9%	30,5%	8,3%	23,03%	
UPSTREAM	100%	100%	100%	80%	80%	60%	100%	40%	72,9%	
ALAS	DONE	DONE	DONE	--	--	--	DONE	--	36%	
BIU1	DONE	DONE	DONE	DONE	DONE	DONE	DONE	--	71%	
GMD	DONE	DONE	DONE	DONE	DONE	--	DONE	--	57%	
DPU1	DONE	DONE	DONE	DONE	DONE	DONE	DONE	DONE	100%	
BIU2	DONE	DONE	DONE	DONE	DONE	DONE	DONE	DONE	100%	
KB SYSTEM	35%	35%	35%	3%	3%	3%	35%	3%	14,7%	
GRROUTING & GRANITE	DONE	DONE	DONE	DONE	DONE	DONE	DONE	DONE	100%	
VAC. CHAMBER	DONE	DONE	DONE	DONE	--	--	DONE	--	36%	
KB OPTICS	--	--	--	--	--	--	--	--	0%	
LASER IN-COUPLING	100%	58%	0%	0%	0%	0%	0%	0%	11,3%	
VAC. CHAMBER	DONE	--	--	--	--	--	--	--	7%	
LIC	DONE	DONE	--	--	--	--	--	--	14%	
CLS	DONE	DONE	--	--	--	--	--	--	14%	
DPU2	DONE	DONE	--	--	--	--	--	--	14%	
AQS	100%	42%	0%	0%	0%	0%	0%	0%	10,1%	
MOV	DONE	--	--	DONE	DONE	--	--	--	7%	
VAC. CHAMBER	DONE	--	--	--	--	--	--	--	7%	
ETOF1	DONE	DONE	--	--	DONE	--	--	--	14%	
ETOF2	DONE	DONE	--	--	DONE	--	--	--	14%	
ETOF3	DONE	DONE	--	--	DONE	--	--	--	14%	
VMI	DONE	--	--	--	--	--	--	--	7%	
MOLB	DONE	--	--	--	--	--	--	--	7%	
DOWNSTREAM	100%	0%	0%	0%	0%	0%	0%	0%	7,1%	
IBS	DONE	--	--	--	--	--	--	--	7%	

# The SQS Instrument – day 1 layout





## The SQS Instrument – early April

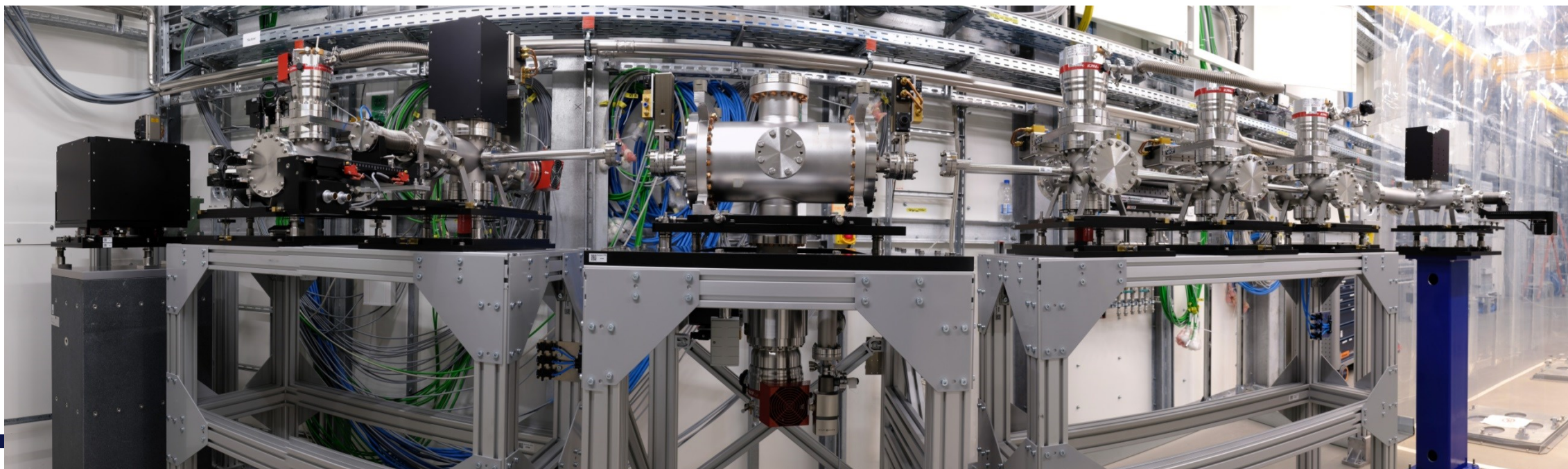
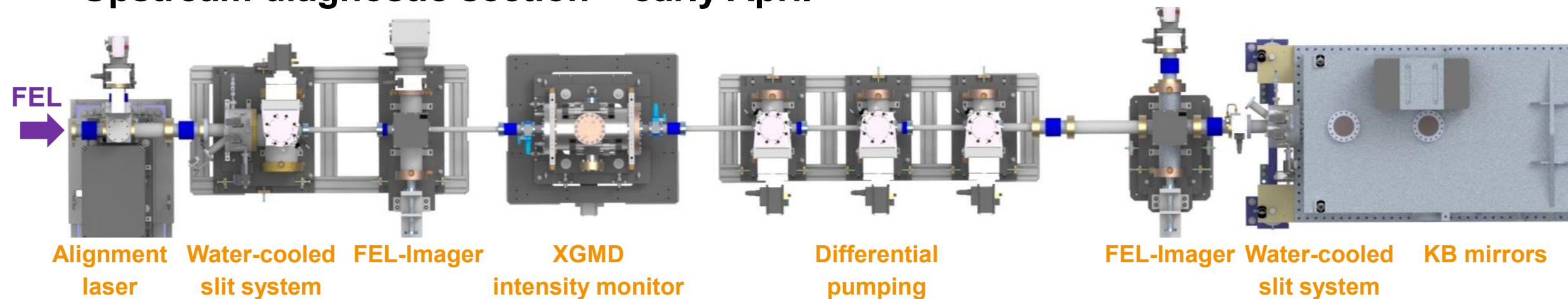


## The SQS Instrument – today



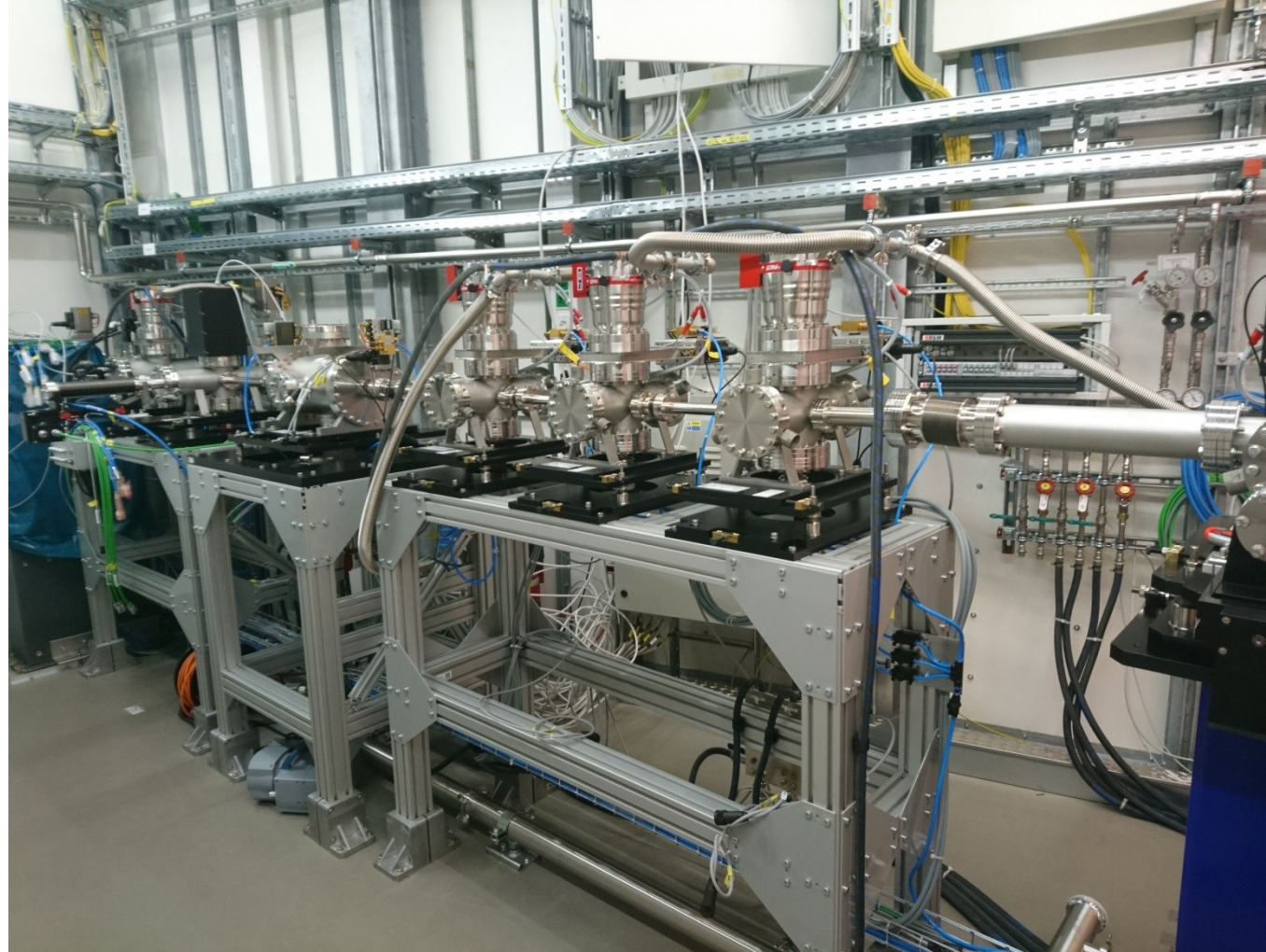


## Upstream diagnostic section – early April



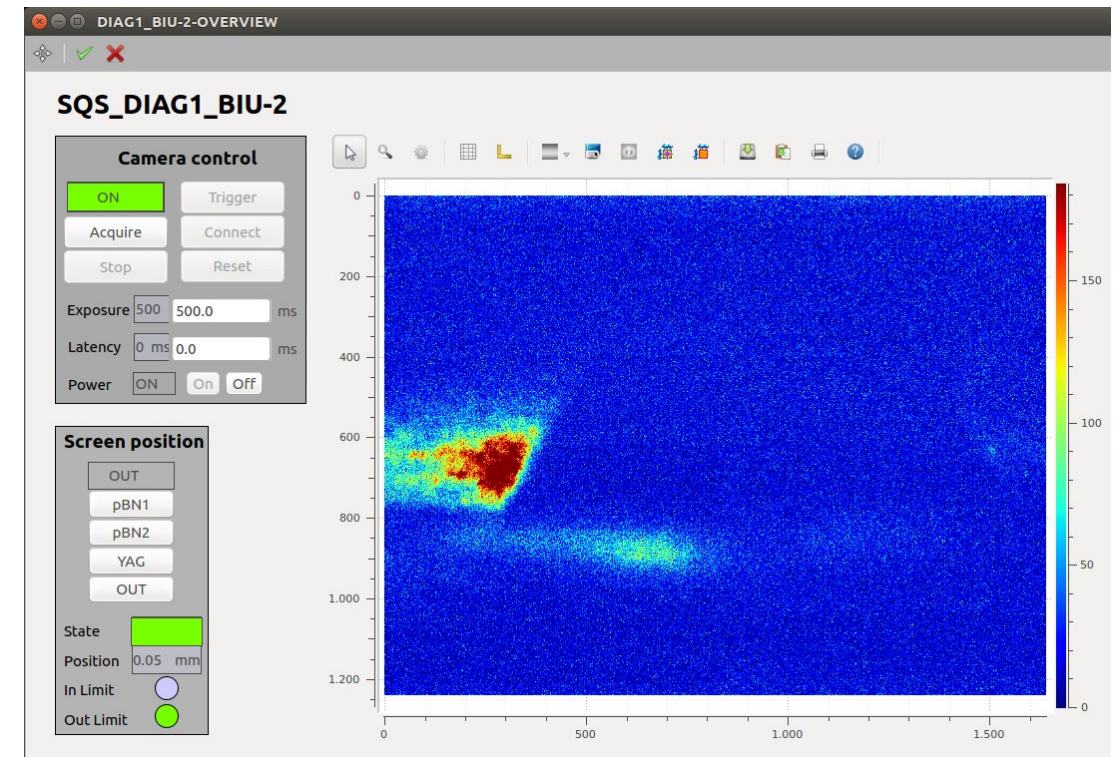
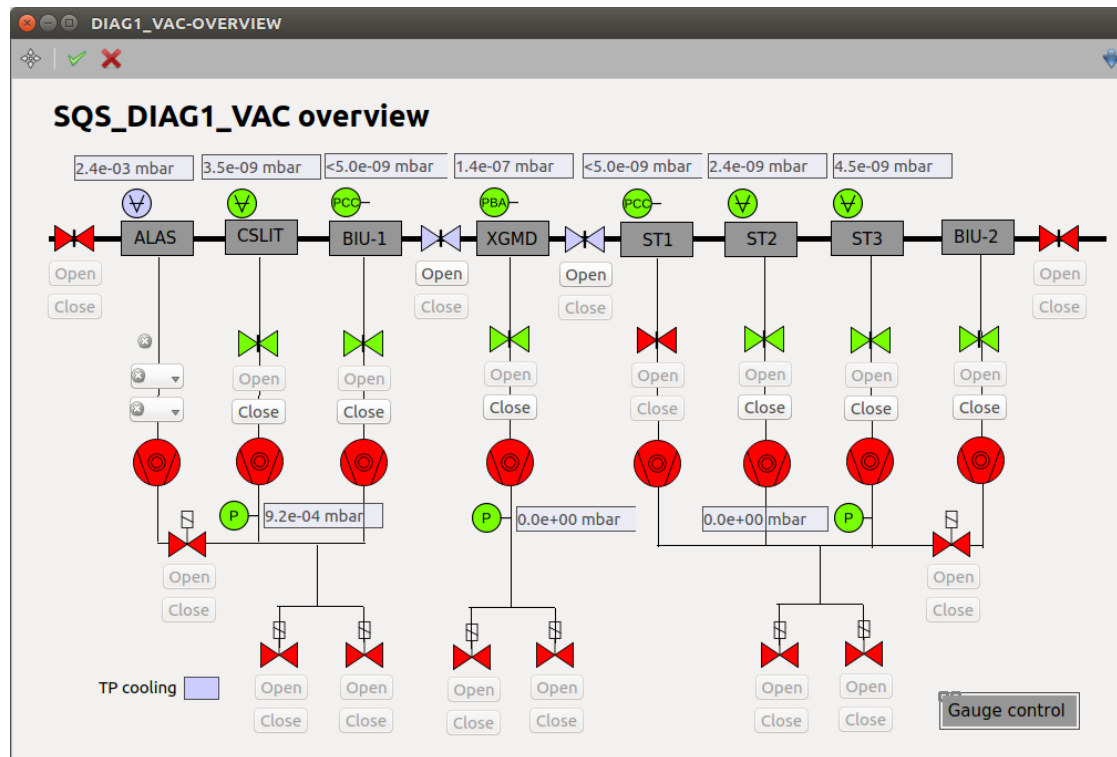


## Upstream diagnostic section – today



## Upstream diagnostic section – today

- Loop 1 is running and mostly tested
- Loop 2 still missing





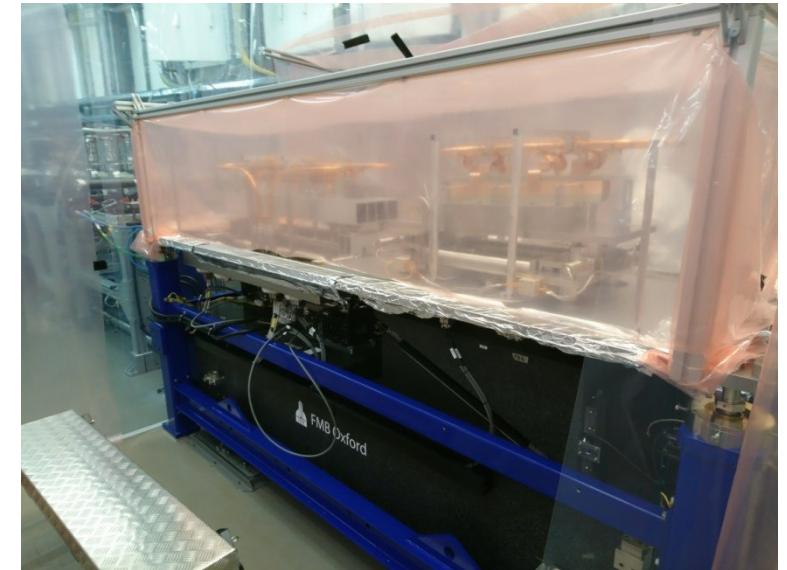
## KB optics

- Loop 3 is running.
- Configuration and tests are ongoing.

- FMB are doing last in-vacuum installations.
- Mirror installation under discussion



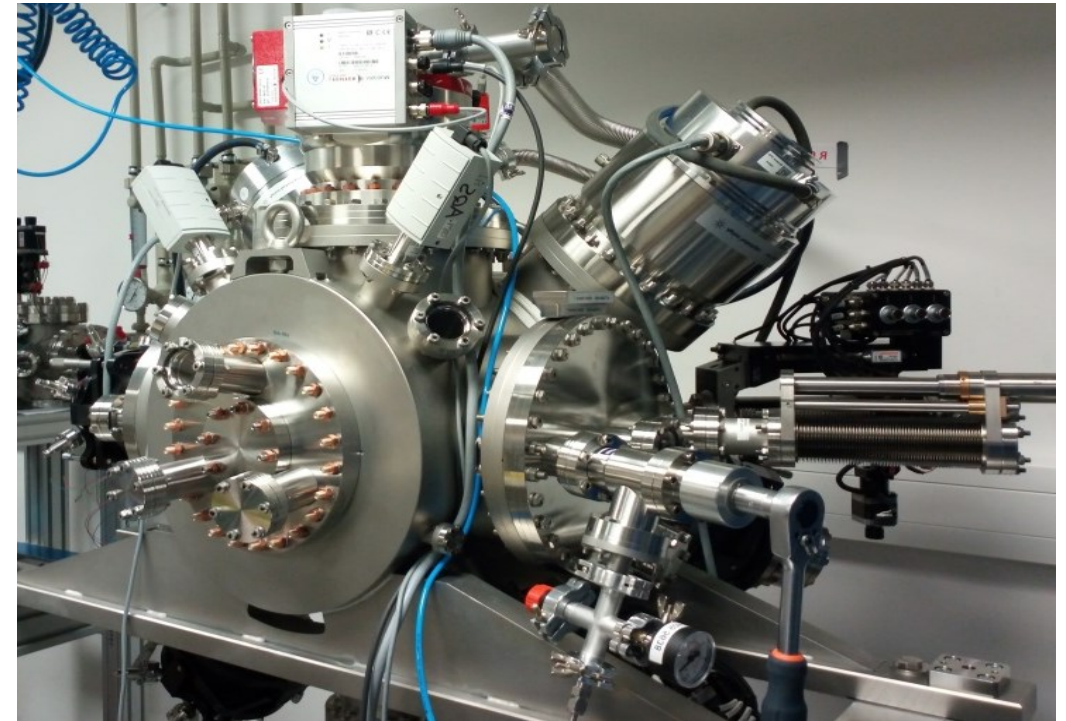
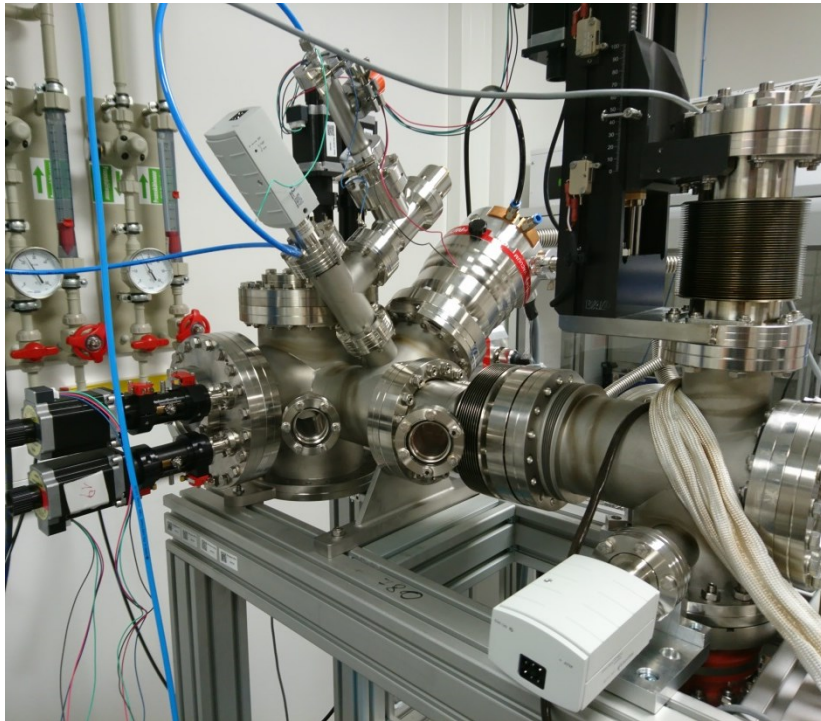
Status in April



Status today

## Laser in-coupling and AQS end station

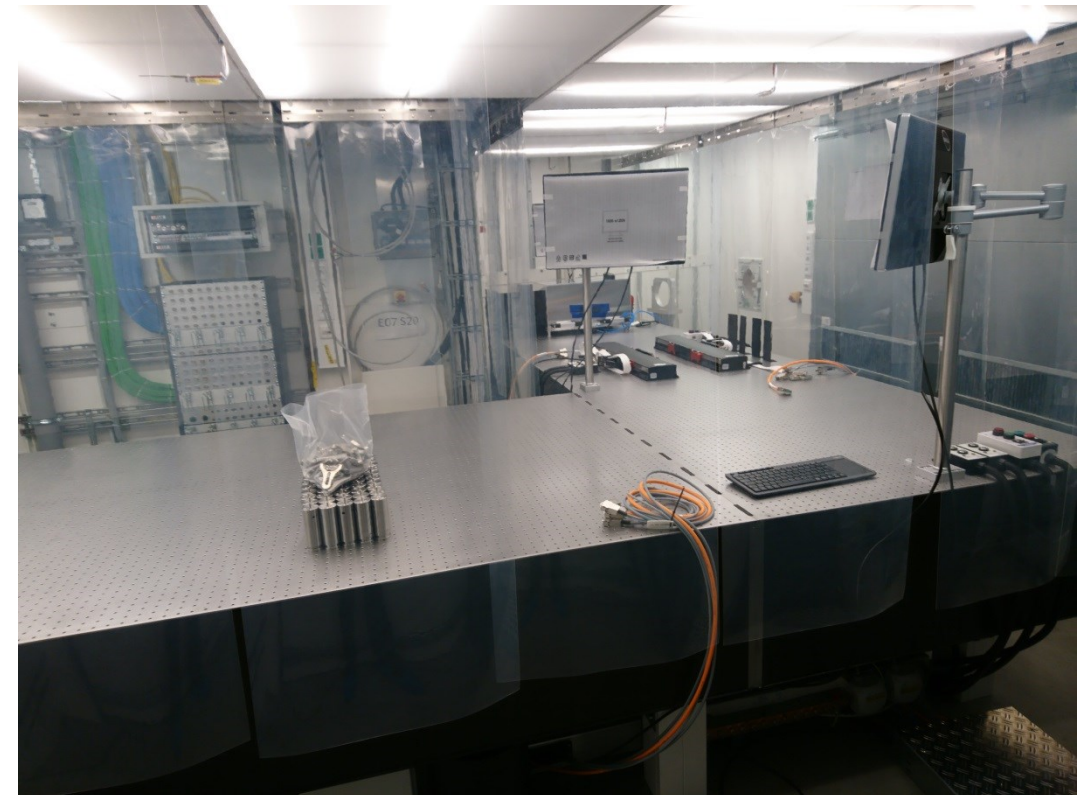
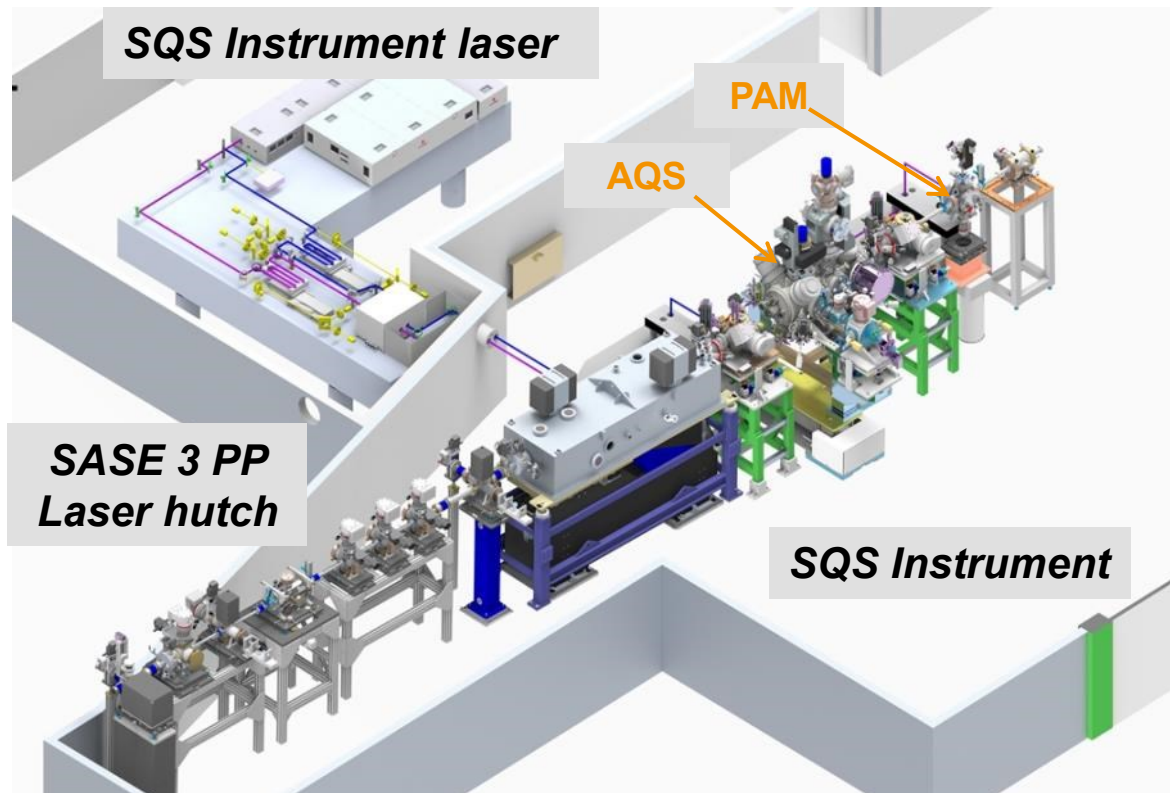
- Currently all components are assembled and tested in our assembly lab.
- Installation in E.07 after works on KB are completed (mid of June).
- Loops 4 and 5 are next in the pipeline.



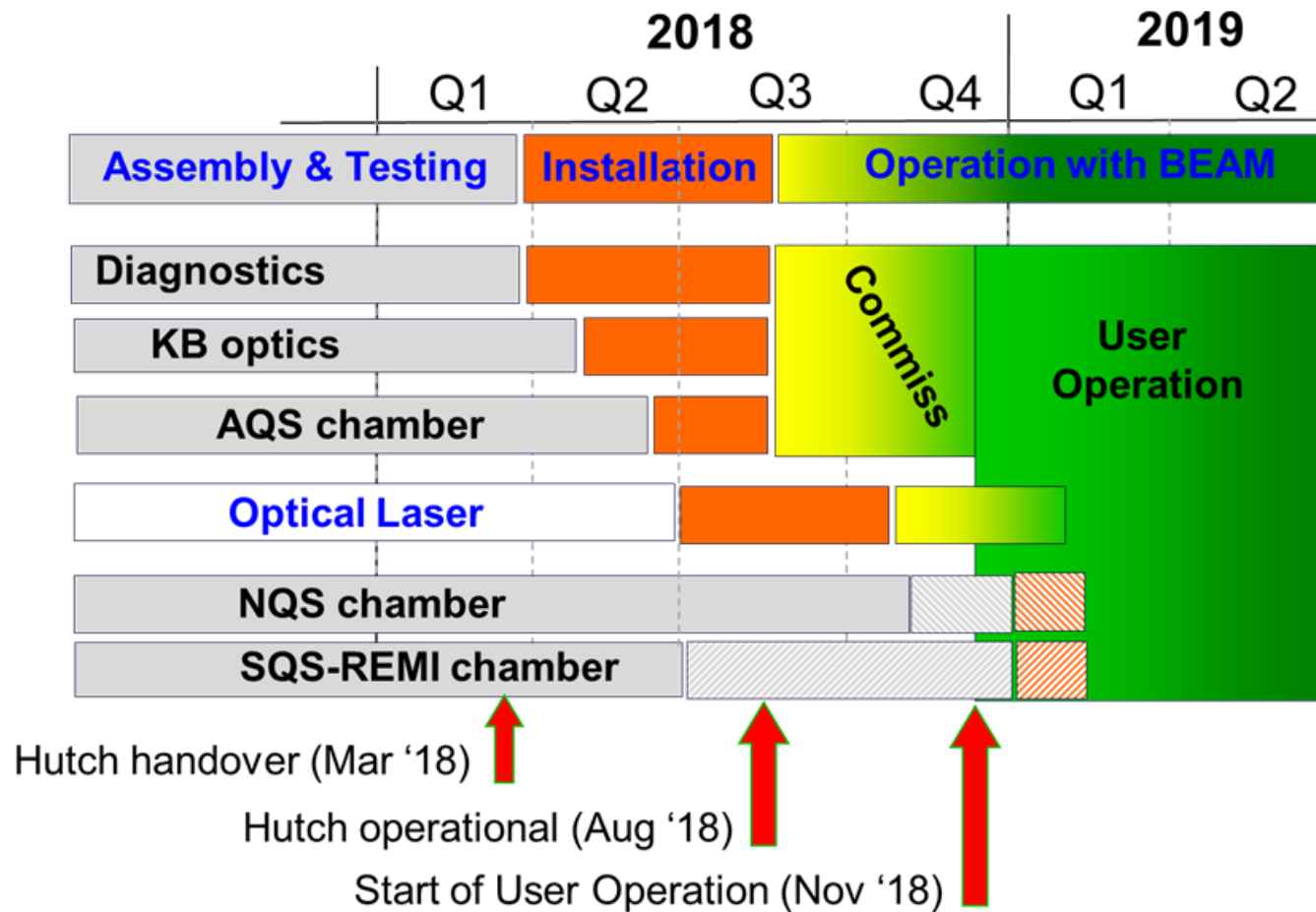


## Optical laser

- Pump-probe laser will be available Q2 of 2019.
- Interim solution: fiber-based laser for day 1.
- Installation planned in Q3 2018.



## Summary and installation schedule



- Loop 1: running beamline components.
- Loop 2: components installed, PLC not running yet.
- Loop 3: running and tests on-going.
- Loop 4: instrumentation will be installed after KB operation.
- Loop 5: AQS chamber will be installed end of June.
- Laser, NQS, REMI loops during the rest of 2018.

**=> Commissioning with FEL from August 2018.**



# Thank you for your attention!

## SQS Instrument team

### Michael Meyer

Thomas Baumann

Rebecca Boll

Alberto De Fanis

Sascha Deinert

Patrik Grychtol

Markus Ilchen

Tommaso Mazza

Jacobo Montaña

Yevheniy Ovcharenko

Nils Rennhack

Pawel Ziolkowski

Alexander Achner (PhD student)

Rene Wagner (PhD student)

Haiou Zhang (former member)



# BACKUP



# Atomic-like Quantum Systems: AQS end station

- Investigation of small systems: atoms, ions and small molecules.

- Base pressure of  $10^{-10}$  mbar.

- Two interaction zones (F1, F1').

- Charged particle detection

- Velocity map imaging spectrometer

- ▶ Angle resolved studies.

- ▶  $4\pi$  acceptance.

- ▶ High kinetic energy acceptance.

- 3 electron time of flight spectrometers

- ▶ Angle resolved studies.

- ▶ High energy resolution.

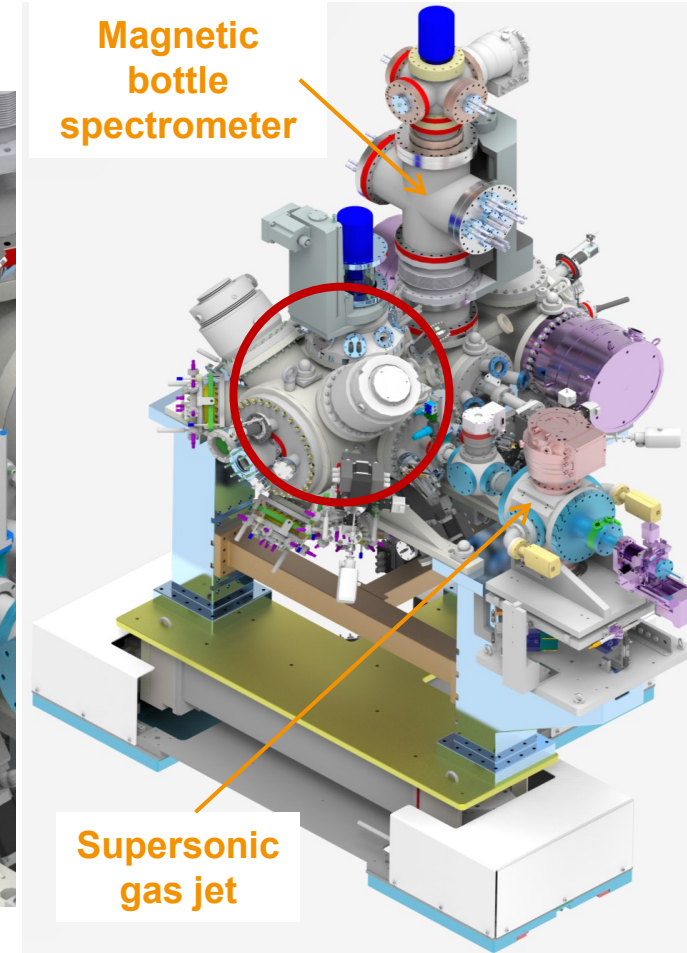
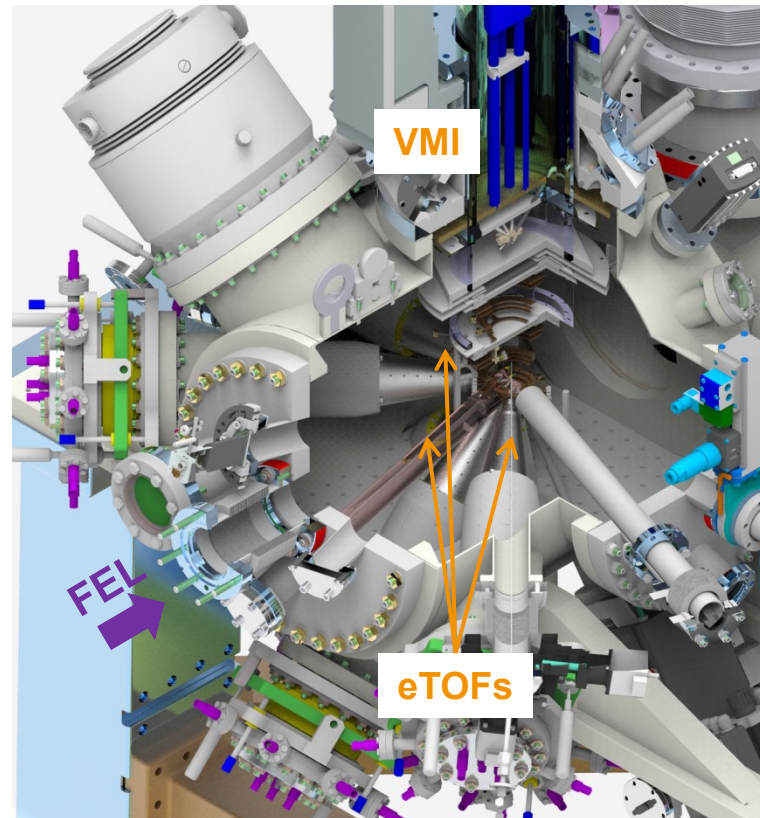
- Magnetic bottle electron spectrometer

- ▶  $4\pi$  acceptance.

- Sample delivery

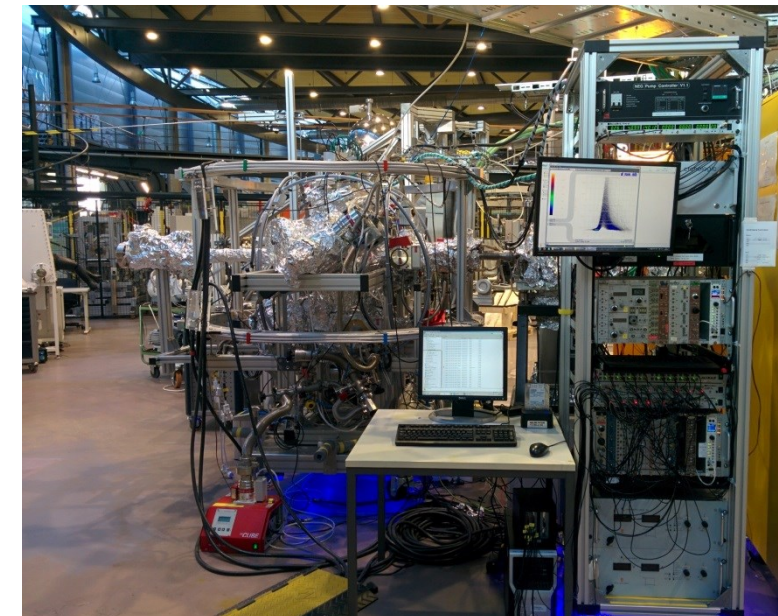
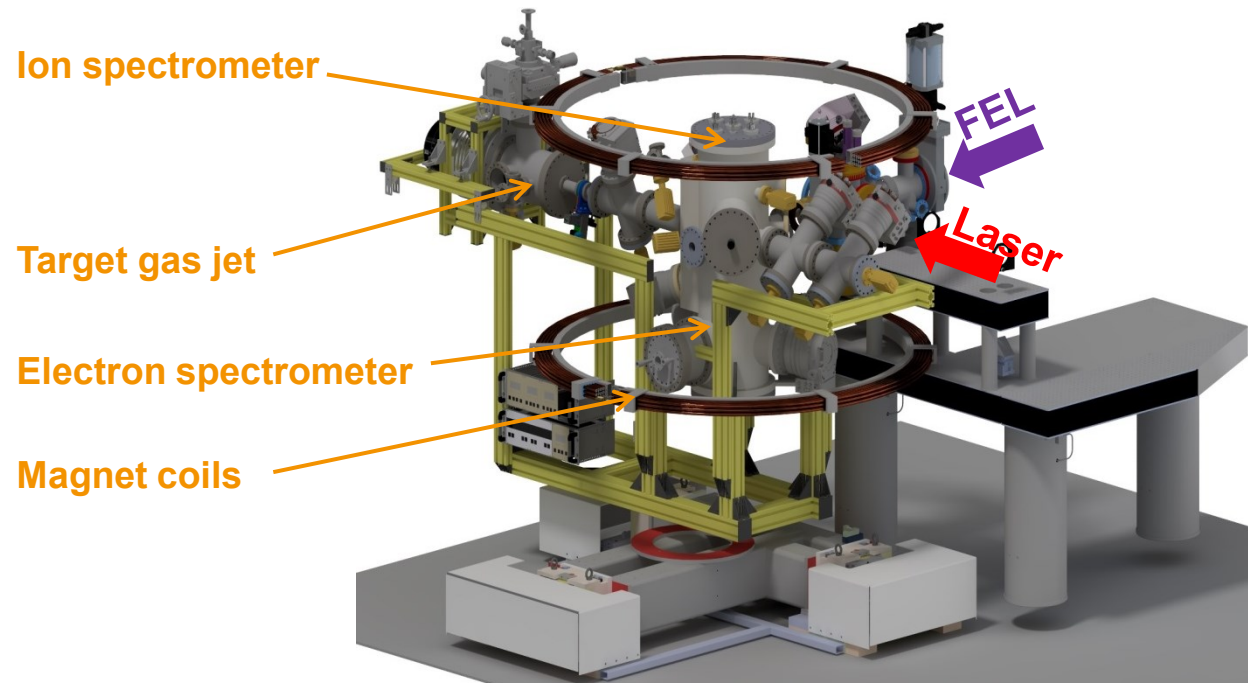
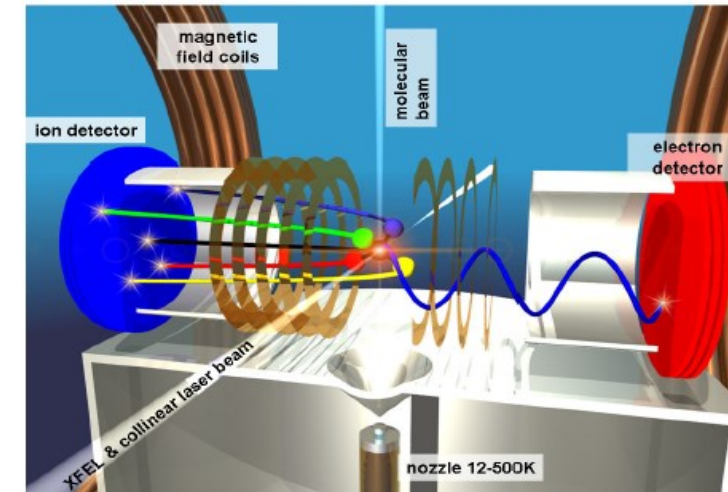
- Diffusive needle.

- Supersonic jet.



# SQS Reaction Microscope (REMI)

- Angle- and energy-resolved electron and ion spectra.
- Electron-ion coincidence measurements.
- Very good vacuum conditions:  $10^{-11}$  mbar.
- Dilute atomic and molecular targets: one event per pulse (MHz rate!).
- Contribution of the University of Frankfurt (R. Dörner, *et al.*).



Commissioning @ BESSY II, U49, June 2017



# Nano-sized Quantum Systems: NQS end station

■ Investigation of larger systems: molecules and clusters.

■ Base pressure of  $10^{-9}$  mbar.

■ Charged particle detection

■ Velocity map imaging spectrometer.

■ Time of flight spectrometer.

■ Photon detection

■ pnCCD (10 Hz).

■ DSSC (4.5 MHz, later upgrade).

■ Various sample delivery systems.

■ Assembly of the system starts in April 2018.

