

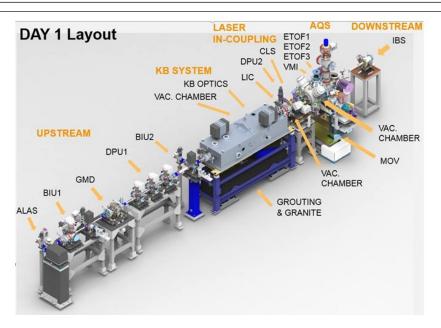


Thomas M. Baumann Scientific Instrument SQS

Readiness Meeting Schenefeld, 01.06.2018

### **SQS Installation Progress**

	OVER			ALL PROGRESS: 23		5	TODAY	7: 30.05.1	8
PROGRESS									
TIMESCALE			I						
2018.03.26				30.05.18					2018.07.22
		PAST DAYS: 6				REMAINING DAYS:		53	
		\$10000100000000000000000000000000000000	5-6-21						
		VR SYSTEM		ASFR IN-COUDLING		AOS		DOWNSTREAM	
JPSTREAM	73%	KB SYSTEM	15%	LASER IN-COUPLING	11%	AQS	10%	DOWNSTREAM	7%
JPSTREAM ALAS	73% 36%	KB SYSTEM GROUTING & GRANIT	15% 100%	LASER IN-COUPLING VAC. CHAMBER	11% 7%	AQS MOV	10% 7%		
JPSTREAM ALAS BIU1	73% 36% 71%	KB SYSTEM  GROUTING & GRANIT  VAC. CHAMBER	15% 100% 36%	VAC. CHAMBER LIC	11% 7% 14%	AQS MOV VAC. CHAMBER	10% 7% 7%	DOWNSTREAM	7%
JPSTREAM ALAS BIU1	73% 36%	KB SYSTEM GROUTING & GRANIT	15% 100%	LASER IN-COUPLING VAC. CHAMBER	11% 7%	AQS MOV	10% 7%	DOWNSTREAM	7%
JPSTREAM  ALAS BIU1 GMD DPU1	73% 36% 71%	KB SYSTEM  GROUTING & GRANIT  VAC. CHAMBER	15% 100% 36%	VAC. CHAMBER LIC	11% 7% 14%	AQS MOV VAC. CHAMBER	10% 7% 7%	DOWNSTREAM	7%
ALAS BIU1 GMD	73% 36% 71% 57%	KB SYSTEM  GROUTING & GRANIT  VAC. CHAMBER	15% 100% 36%	LASER IN-COUPLING  VAC. CHAMBER  LIC  CLS	11% 7% 14% 14%	AQS MOV VAC. CHAMBER ETOF1	10% 7% 7% 14%	DOWNSTREAM	7%



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MOLB	DONE	ķ							7%
VMI	DONE	ļ							7%
ETOF3	DONE					§			14%
ETOF2	DONE				DONE				14%
ETOF1	DONE	÷			DONE	<u> </u>			14%
VAC. CHAMBER	DONE				-				7%
MOV	DONE	·		DONE		Y			7%
AQS	100%	42%	0%	0%	0%	0%	0%	0%	10,1%
DPU2	DONE	DONE							14%
CLS	DONE	ļ							14%
LIC	DONE	÷							14%
VAC. CHAMBER	DONE								7%
LASER IN-COUPLING	100%	58%	0%	0%	0%	0%	0%	0%	11,3%
KB OPTICS		<u></u>		<u></u>	<del></del>	<u></u>		<del></del>	0%
VAC. CHAMBER	DONE	DONE	DONE	DONE			DONE		36% 0%
GROUTING & GRANITE	DONE		DONE	DONE			DONE	DONE	100%
KB SYSTEM	35%		35%	3%			35%	3%	14,7%
BIU2	DONE	DONE	DONE	DONE	DONE	DONE	DONE	DONE	100%
DPU1	DONE	DONE	DONE	DONE	DONE	DONE	DONE	DONE	100%
GMD	DONE	DONE	DONE	DONE	DONE		DONE	<del></del>	57%
BIU1	DONE	DONE	DONE	DONE	DONE	DONE	DONE		719
ALAS	DONE	DONE	DONE			<u> </u>	DONE		369
UPSTREAM	100%	100%	100%	80%	80%	60%	100%	40%	72,9%
	77,0%	50,6%	30,5%	15,4%	15,4%	11,9%	30,5%	8,3%	23,03%
COMPONENTS	DELIVERY	INSTALLATION	ALIGNMENT	IN VACUUM	VACUUM TES	TEST CRATE	TEST BOX	E2E TEST	TOTAL
SQS DAY1	LIFE-CYCLE (RE	- Conces	CALCULATION	W.ETTIOD.	MODEL1				

**AQS** 



#### **KB** optics

- ▶ Non bendable mirrors
- ► One interaction point
- ▶ One experimental chamber

#### **Downstream diagnostics**

- ► Timing diagnostics
- Beam dump

**NQS** 

#### **Upstream diagnostics**

- ► Alignment laser
- Intensity monitor (XGMD)
- **Imagers**
- Slit systems

#### **Laser In-Coupling**

- Pump-probe laser in-coupling
- Imagers
- ► Slit systems (clean-up)
- ▶ Differential pumping





#### T.M. Baumann

## The SQS Instrument – early April

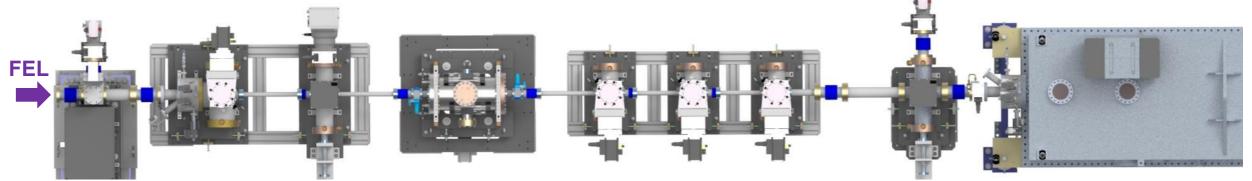


## The SQS Instrument – today



Status of the SQS Instrument T.M.

### **Upstream diagnostic section – early April**



Alignment Water-cooled laser slit system

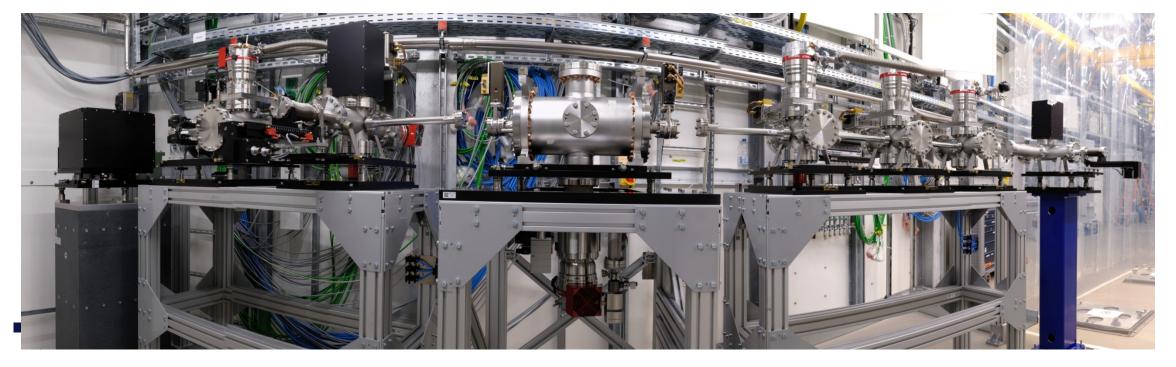
Water-cooled FEL-Imager

XGMD intensity monitor

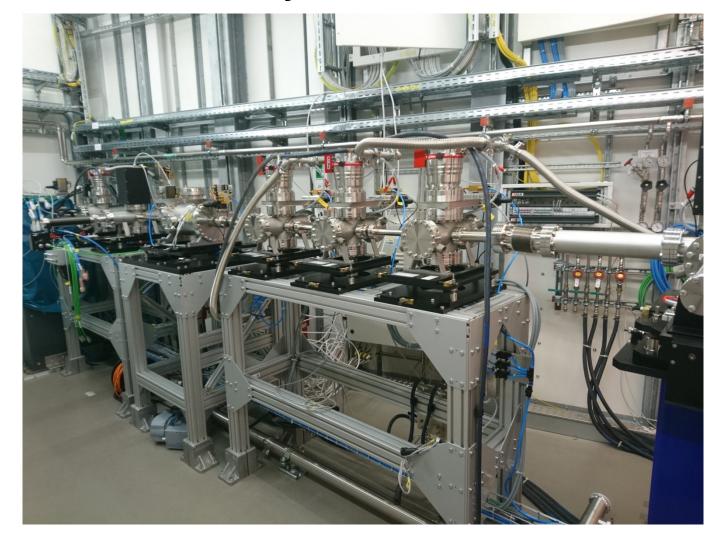
Differential pumping

FEL-Imager Water-cooled slit system

**KB** mirrors

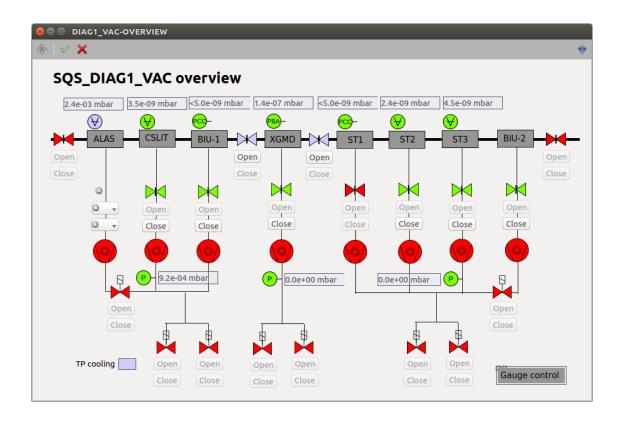


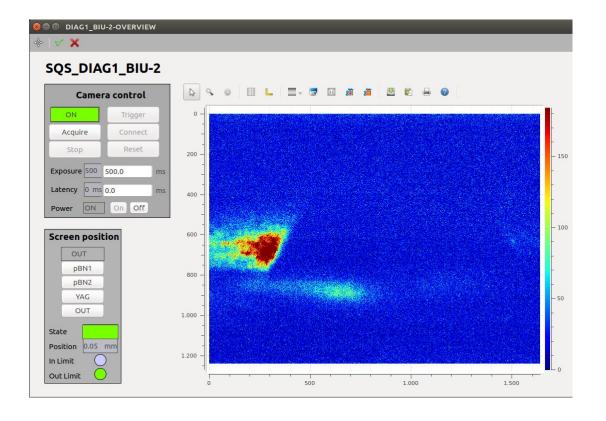
## **Upstream diagnostic section – today**



#### **Upstream diagnostic section – today**

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





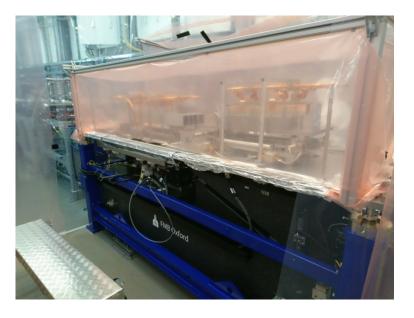
### **KB** optics

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

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





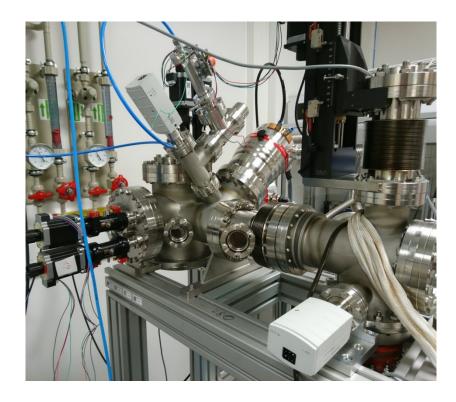


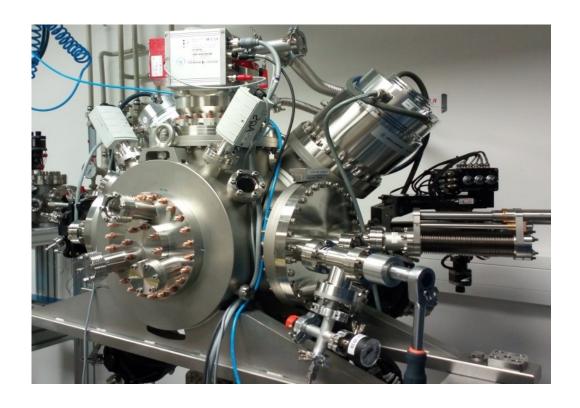
**Status in April** 

**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.

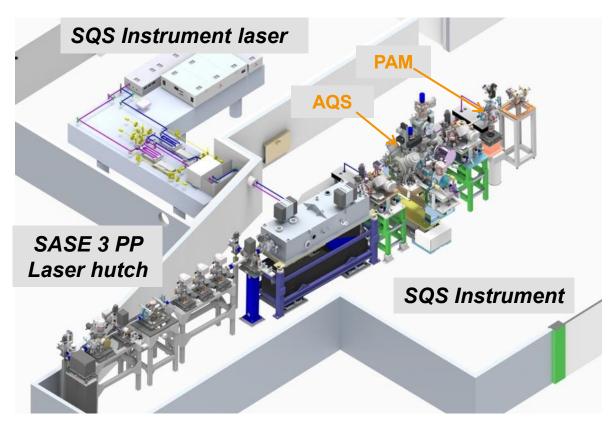




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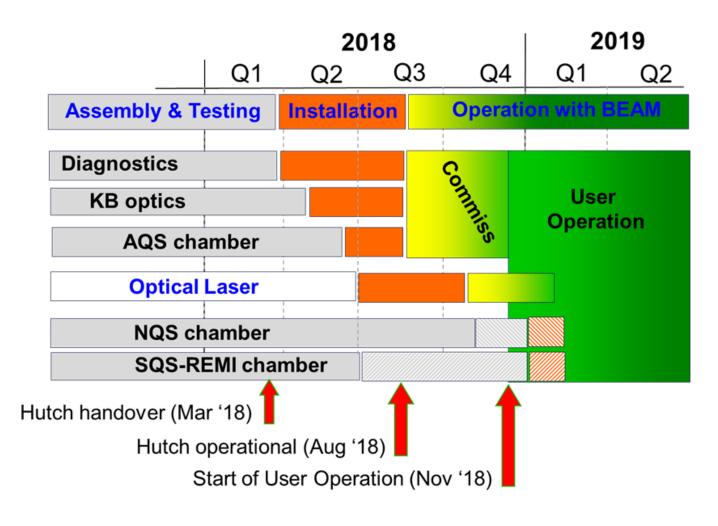
### **Optical laser**

- 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.

Status of the SQS Instrument T.M. Baumann Readiness Meeting, 01.06.2018 13

#### Thank you for your attention!

#### **SQS** Instrument team

#### **Michael Meyer**

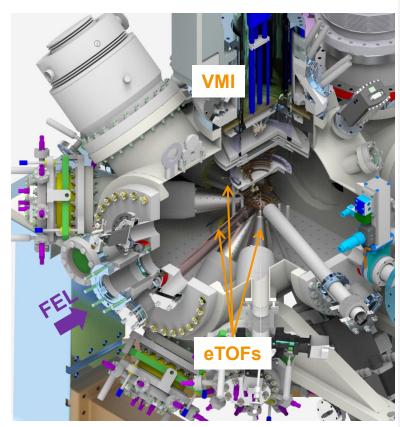
Thomas Baumann
Rebecca Boll
Alberto De Fanis
Sascha Deinert
Patrik Grychtol
Markus Ilchen
Tommaso Mazza
Jacobo Montaño
Yevheniy Ovcharenko
Nils Rennhack
Pawel Ziołkowski
Alexander Achner (PhD student)
Rene Wagner (PhD student)
Haiou Zhang (former member)

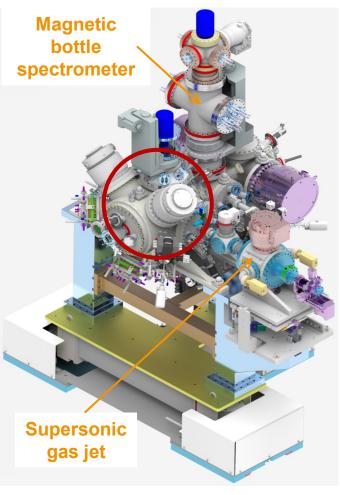


# **BACKUP**

#### **Atomic-like Quantum Systems: AQS end station**

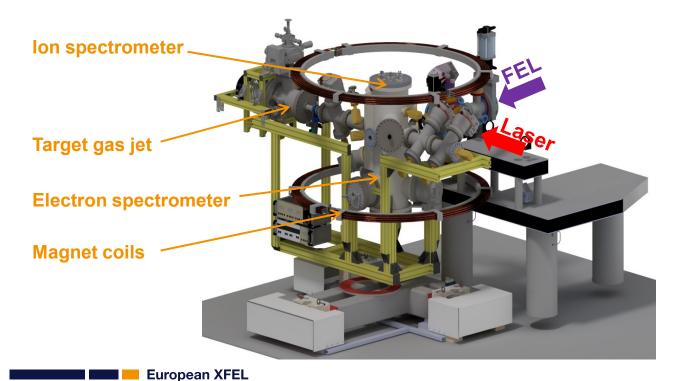
- Investigation of small systems: atoms, ions and small molecules.
- Base pressure of 10<sup>-10</sup> mbar.
- Two interaction zones (F1, F1').
- Charged particle detection
  - Velocity map imaging spectrometer
    - Angle resolved studies.
    - $\blacktriangleright$  4 $\pi$  acceptance.
    - ► High kinetic energy acceptance.
  - 3 electron time of flight spectrometers
    - ► Angle resolved studies.
    - ► High energy resolution.
  - Magnetic bottle electron spectrometer
    - $\triangleright$  4 $\pi$  acceptance.
- Sample delivery
  - Diffusive needle.
  - Supersonic jet.

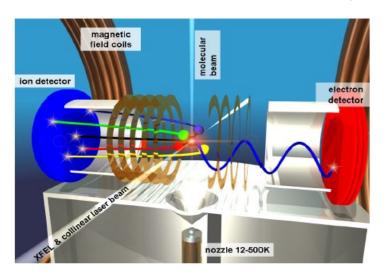


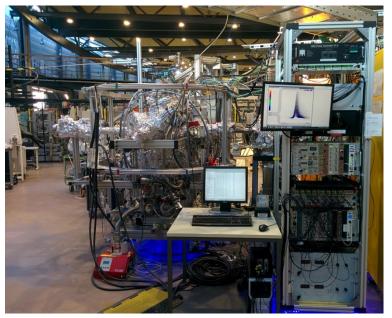


#### **SQS Reaction Microscope (REMI)**

- Angle- and energy-resolved electron and ion spectra.
- Electron-ion coincidence measurements.
- Very good vacuum conditions: 10<sup>-11</sup> 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<sup>-9</sup> 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.

