PAUL SCHERRER INSTITUT

Elia Razzoli:: Furka Group:: Paul Scherrer Institute

FURKA endstation: current status and goals for 2021

Third SwissFEL Performance Workshop– 27.01.2021

Furka beamline

- Ultrafast pump-probe resonant spectroscopies to study correlated and quantum materials

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Ken Egli

Marcel Locher

David Mueller

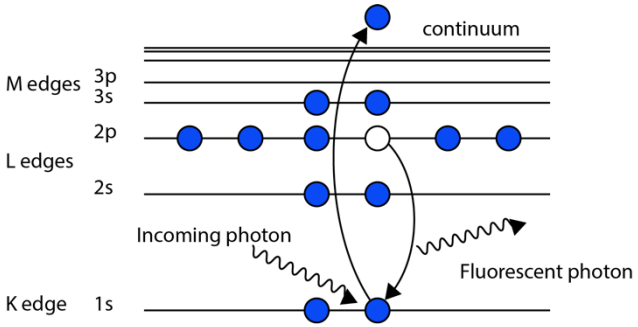
Christoph Schmidt

Thierry Lachat

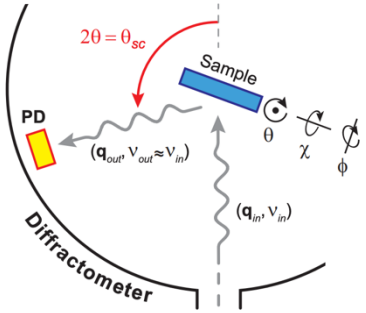
Thierry Zamofing

Claude Pradervand

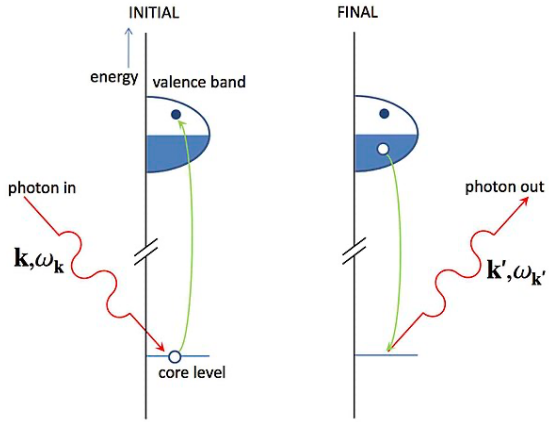
TR- X-ray absorption (XAS)



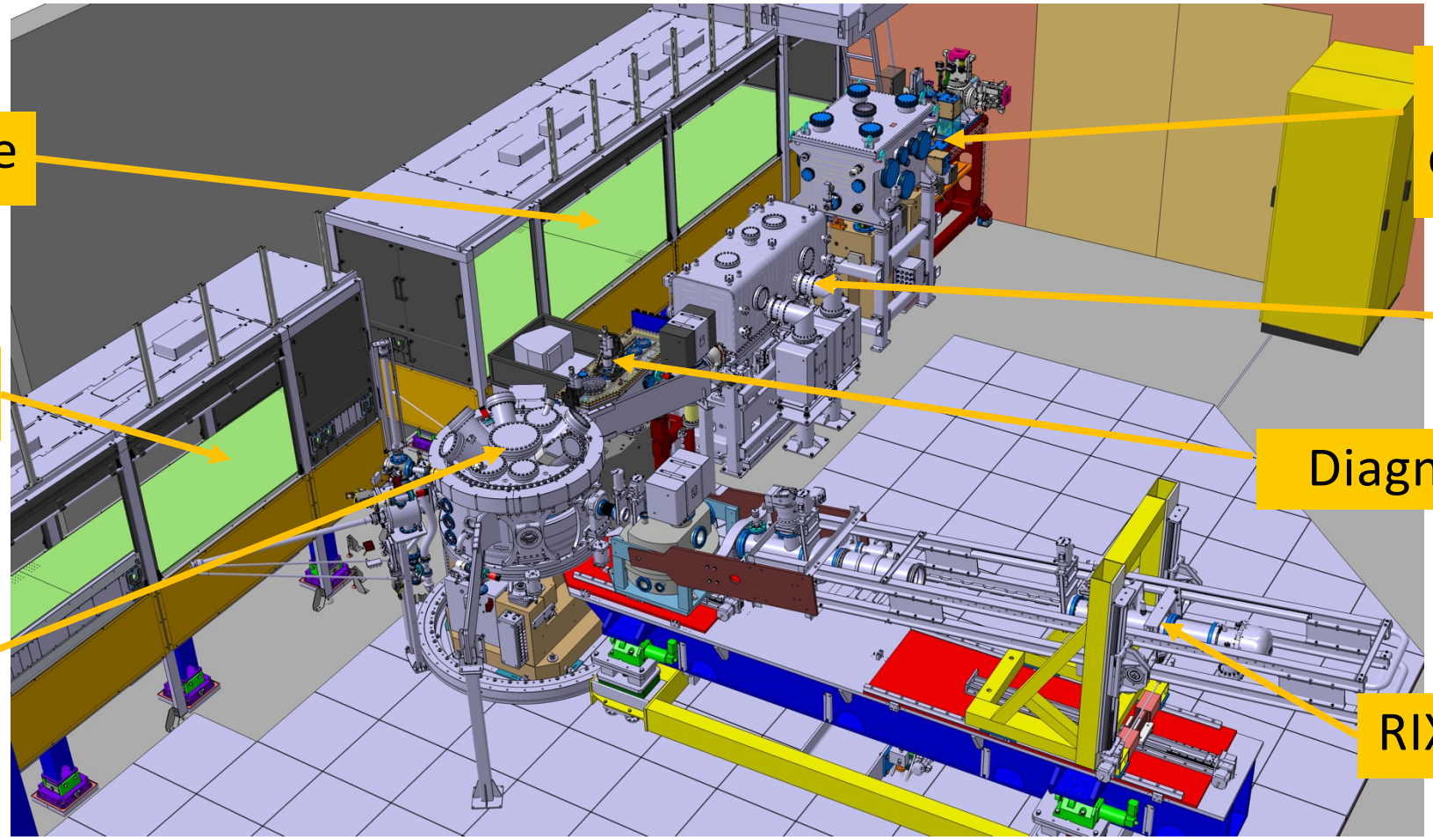
TR- X-ray diffraction (RXRD)



TR- Inelastic X-ray Scattering (RIXS)



FURKA status: design of experimental hutch



- Design of Beamline components and infrastructure has been completed in 2020
- Design of experimental end-station components (Diag. Chamber, Main chamber and RIXS Spectrometer) will be completed in Q1 2021.

FURKA status: installations

Already installed:

- Beamline components (OAPU, OLIR, PSRD,..)
- Vertical mirror chamber
- KB support structure
- Main laser table

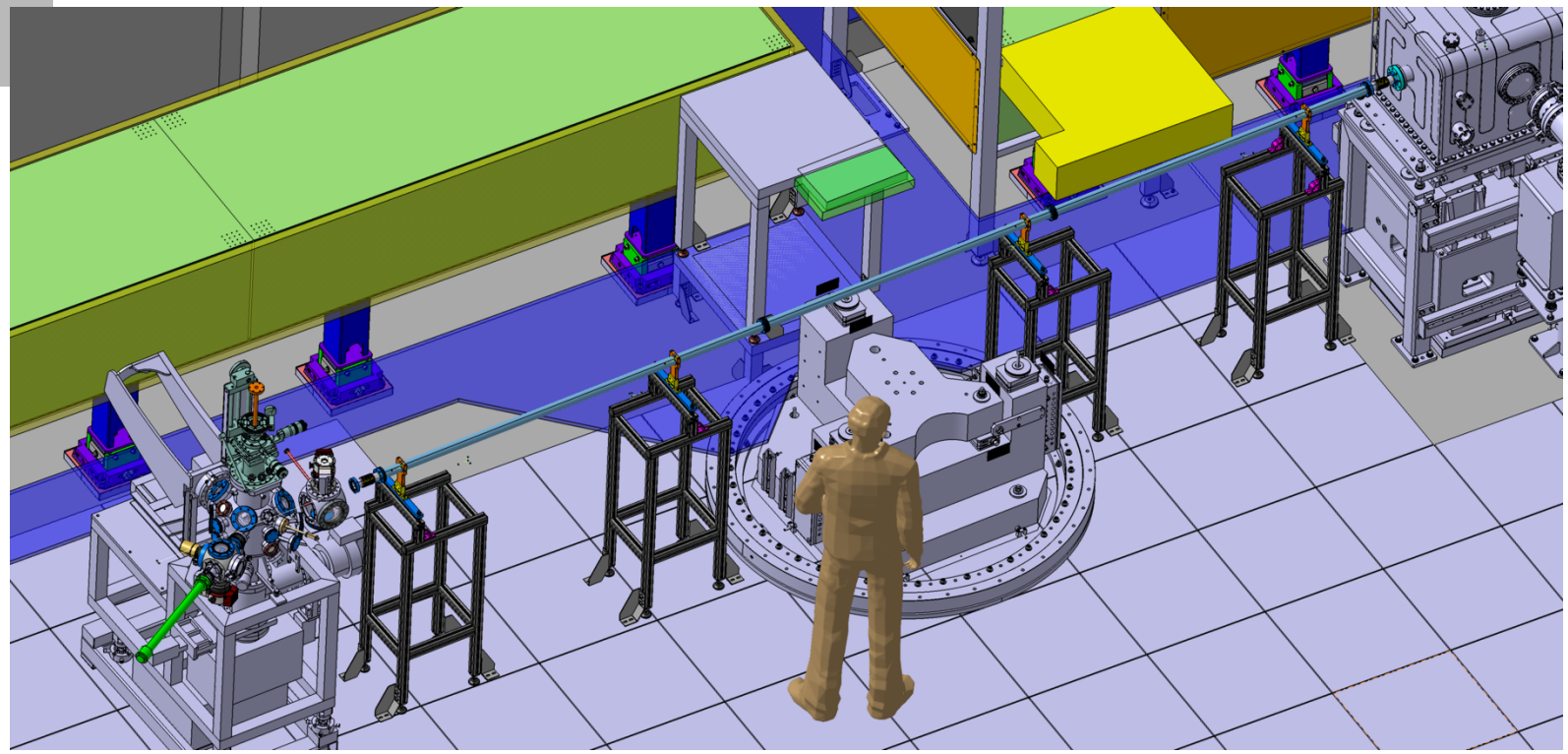
Scheduled next:

- KBs installation - beg. March)
- Laser table enclosure - end of March
- Laser transfer line - April
- Thz laser table - May

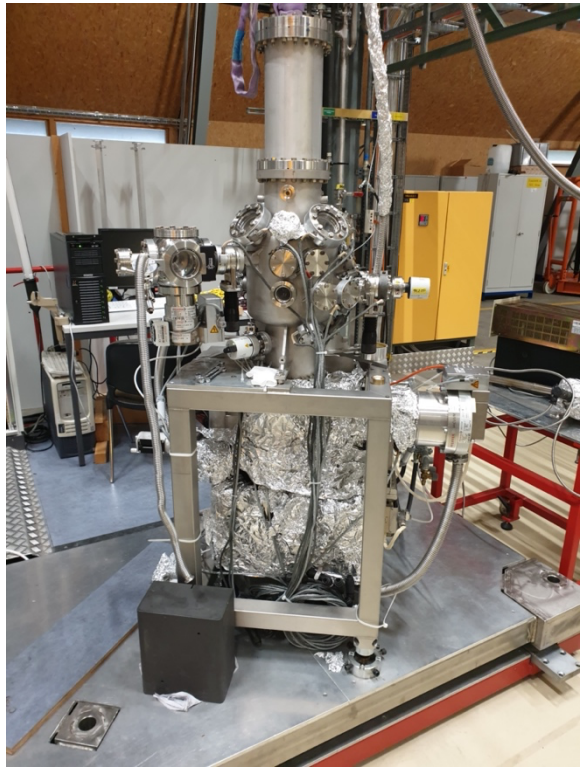
Objectives for 2021: First beam - June 2021

First light in test RIXS chamber June 2021

Test RIXS chamber to perform tr – XAS & TR – RIXS (low energy res, E/ΔE = 2000)



Test-RIXS-chamber from SLS
In collaboration with T. Schmitt

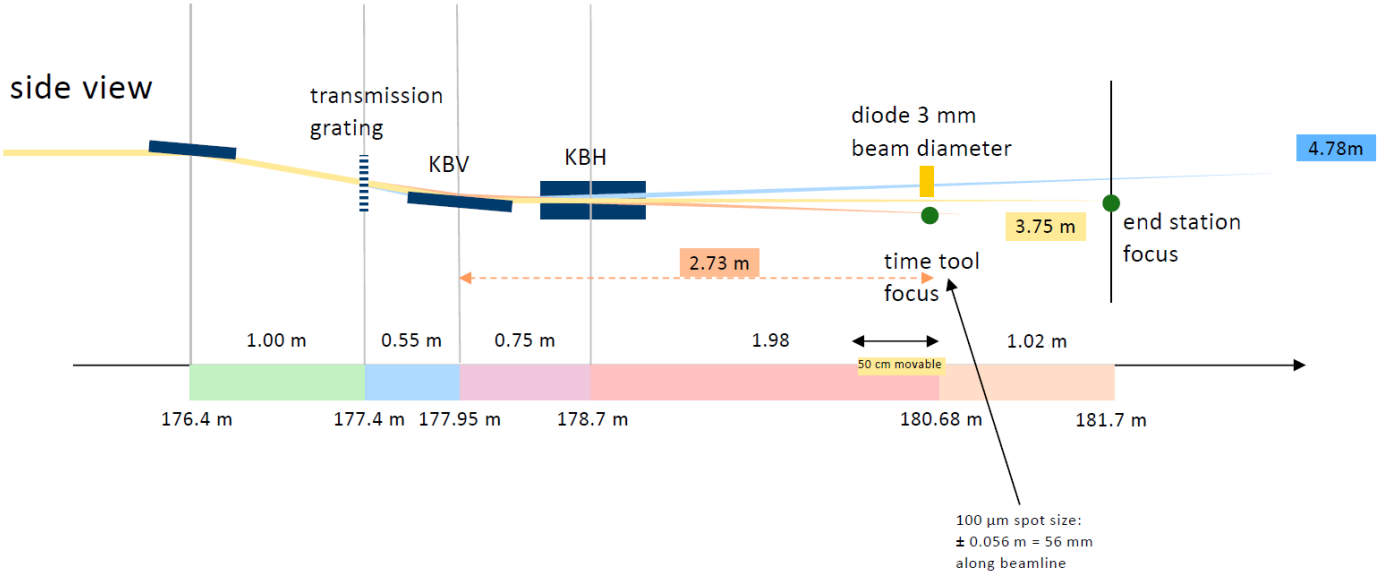


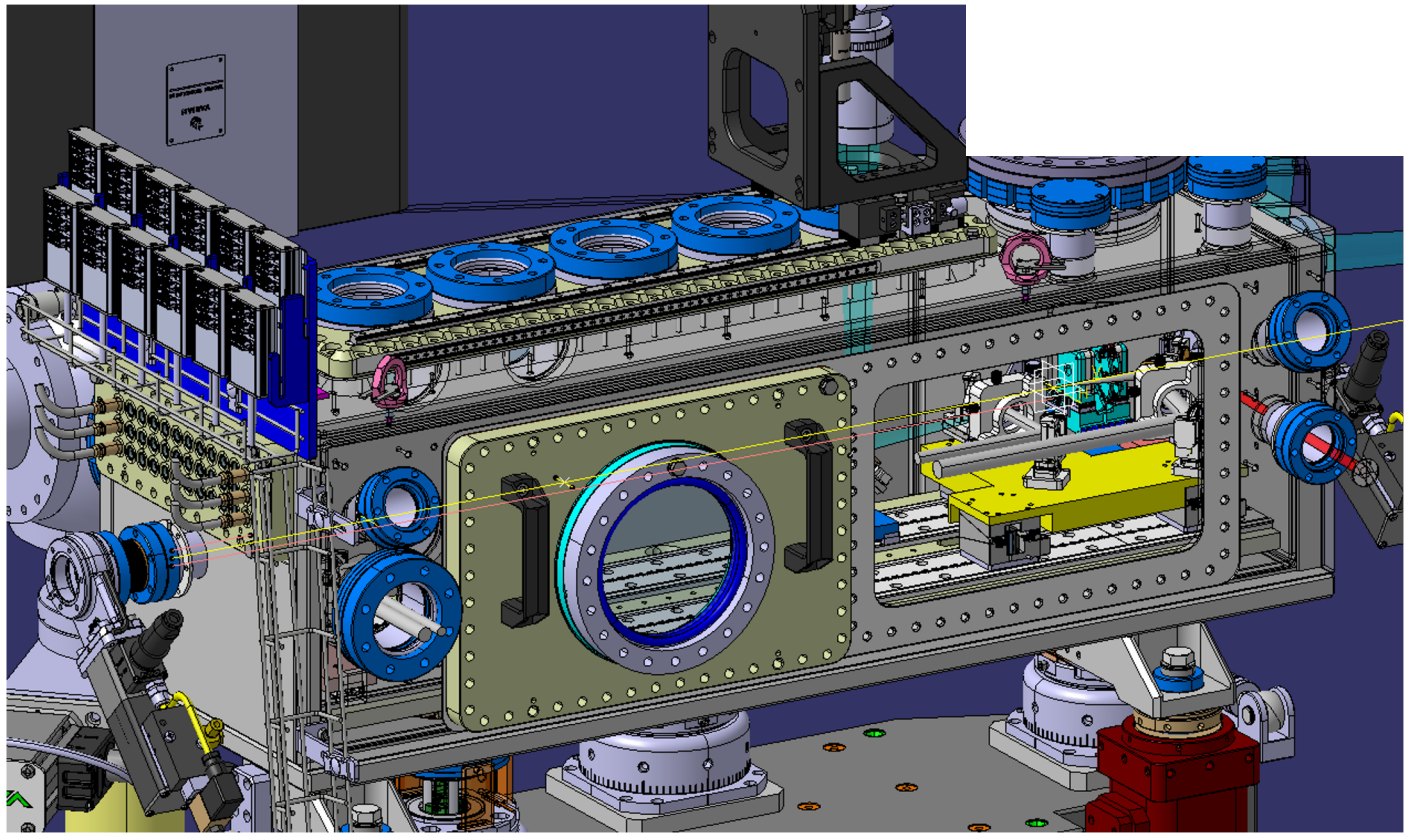
Ideal parameters for the test measurements (Q3-Q4 of 2021):

- hv=500-1000 eV in monochromatic mode
- 30 fs rms, 200 pC, single color, 100 Hz.
- Laser= 800 nm, 400 nm, 266 nm
- PCO-edge beam synchronous

Diagnostic chamber

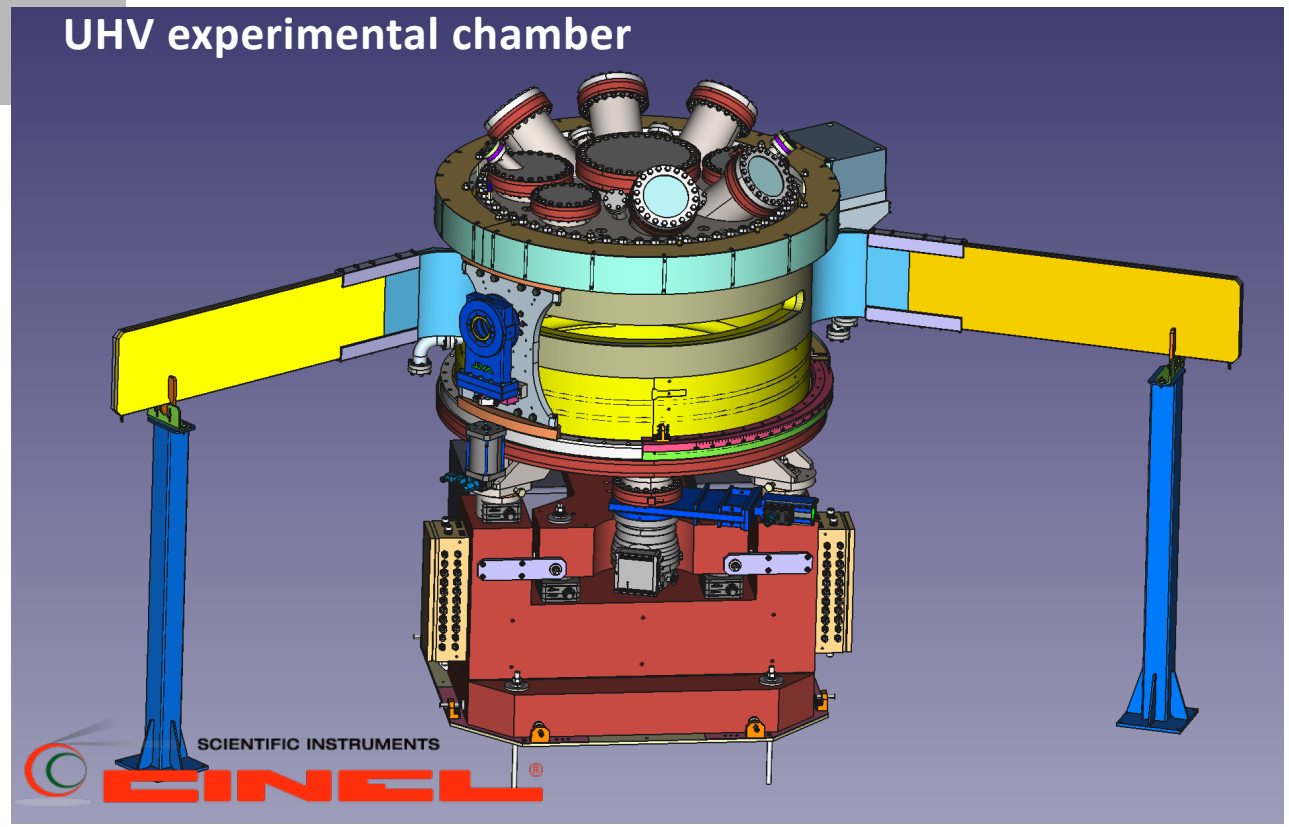
- C. Arrell
- A. Ammon
- H. J. Eckerlin

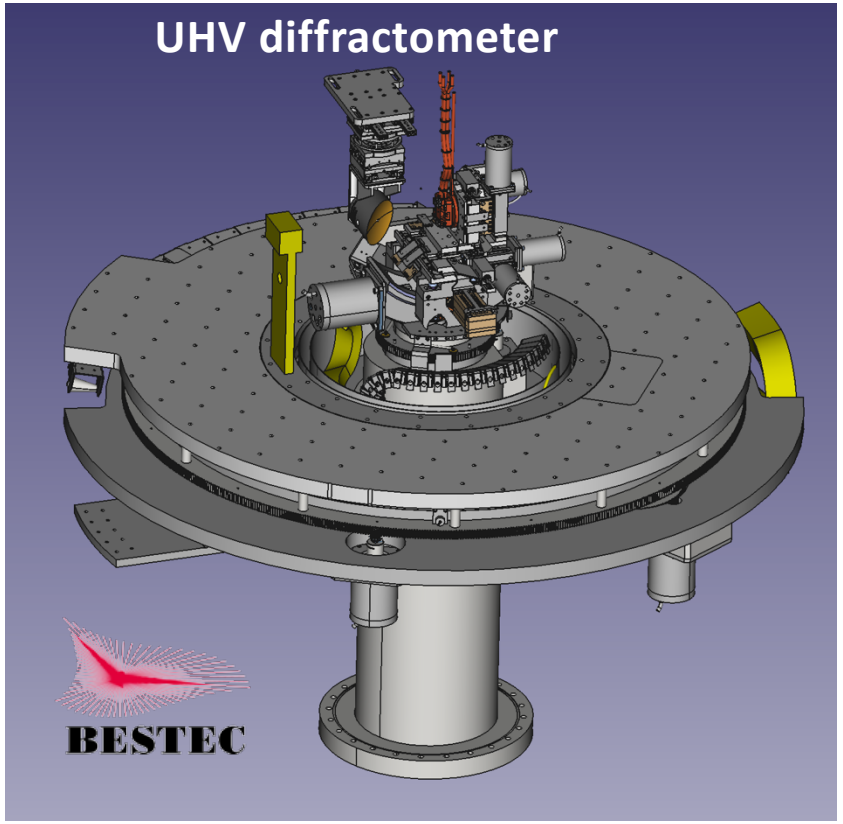




- Concept completer end of 2020
- Design is ongoing
- Goal is to finalize the design by end of Q1 2021

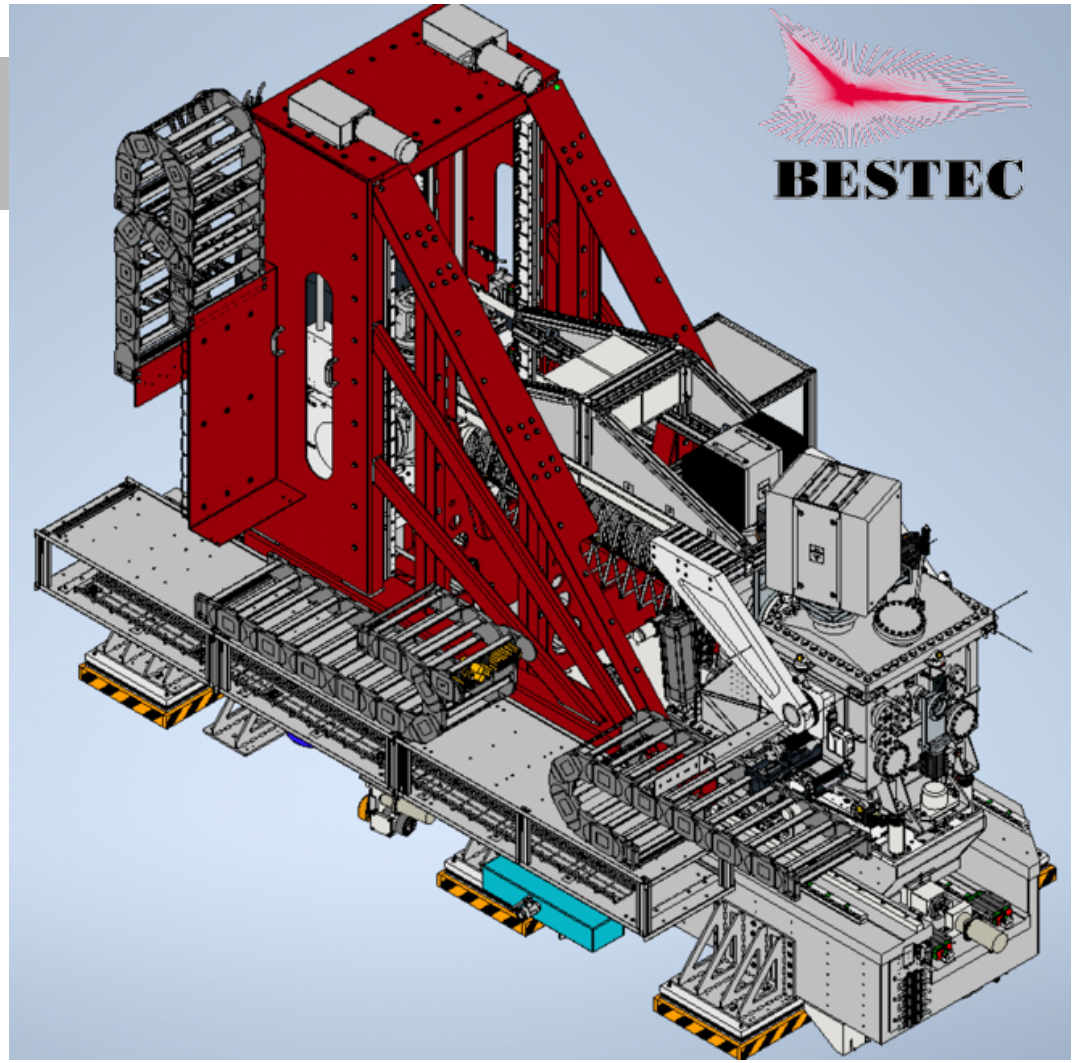
Objective for 2021: main chamber installation by end of the year





- Delivery June (granite support) and November 2021 (main chamber)
- Delivery June 2021

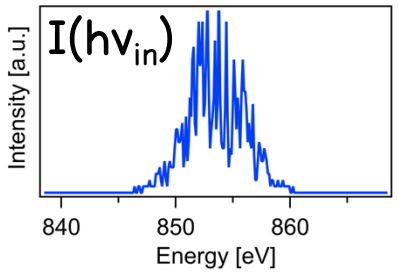
Furka RIXS: design & construction

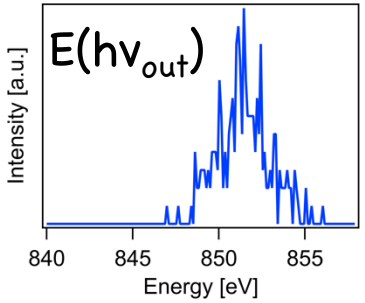


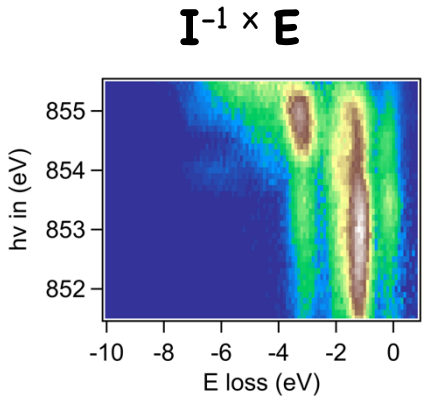
- 5.4 m long spectrometer
- High-flux and High-energy resolution VLS gratings (E/ΔE = 11 000 & 35 000 @ 1keV)
- Recollecting optics in the main chamber
- WTO assigned to Bestec in Dec. 2020
- Design is on-going (kick-off held on beg. of Jan 2021)

- FDR by end of Q1 2021
- Installation foreseen for Q1 2022

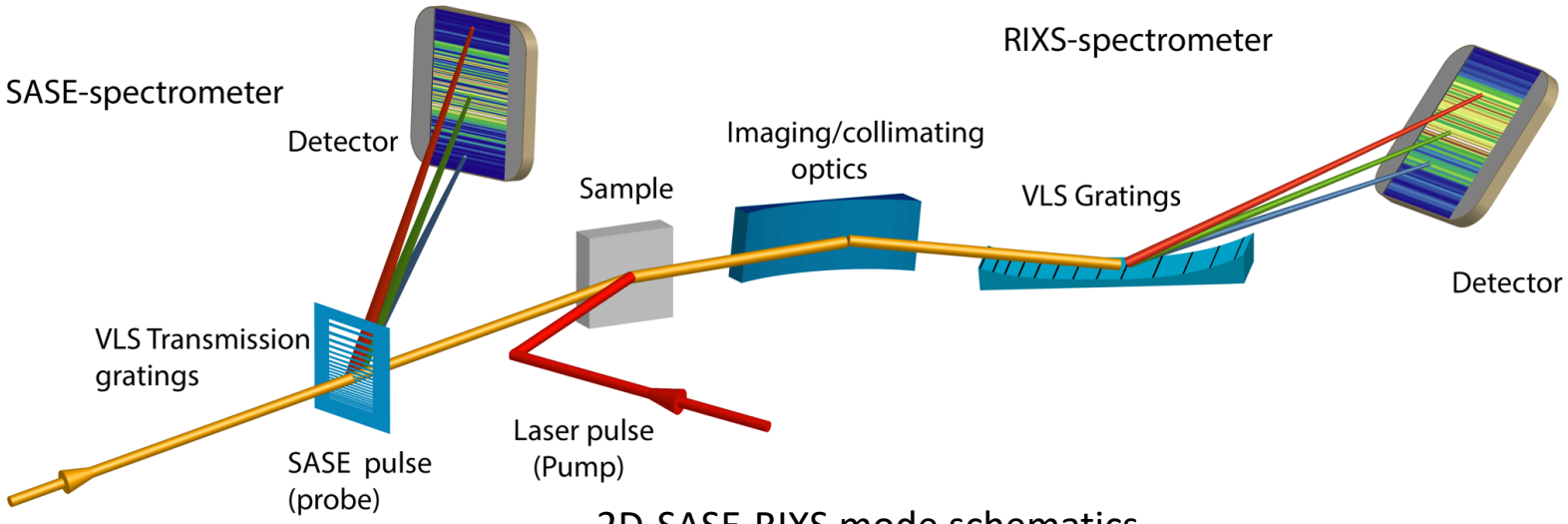
SASE spectrometer: design & construction







40 000 pulses



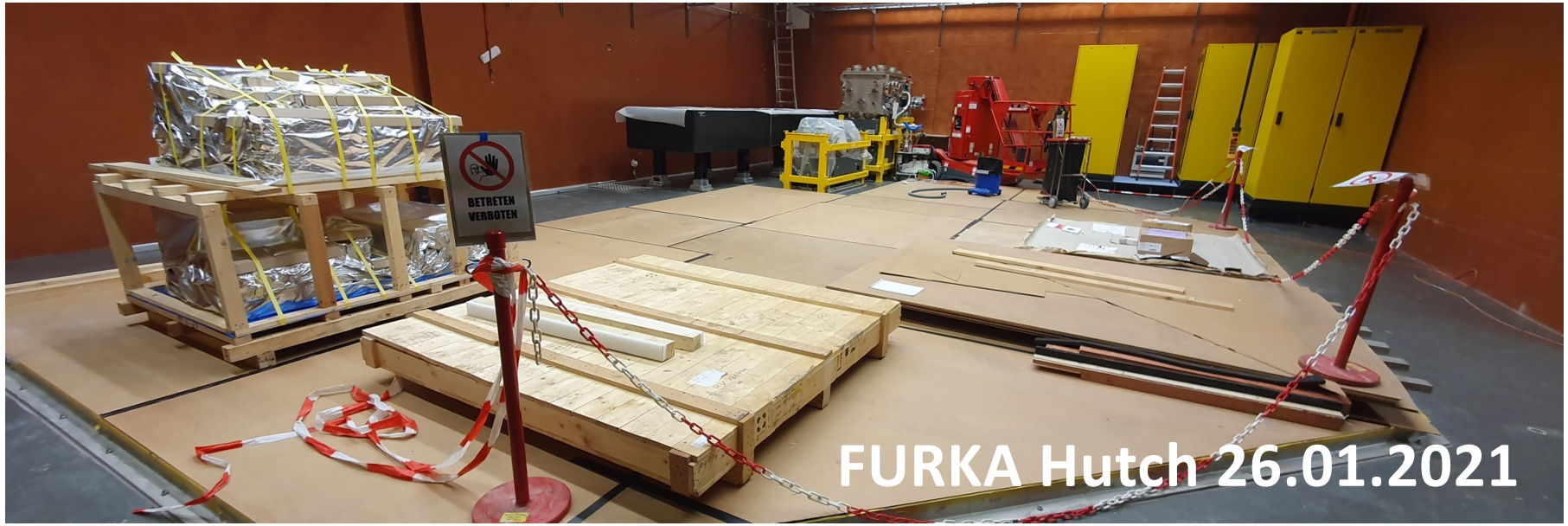
2D-SASE-RIXS mode schematics

Y. Kayser et al., Nat. Comm. 10, 4761 (2019)

J. O. Tollerud et al., PNAS 116 (12) 5383 (2019)

- Combination of two spectrometers for incoming (SASE-) and emitted radiation (RIXS-spectrometer)
- Optimized for short pulses (e.g., 10-20 fs FWHM @ 500 eV) and HB-SASE mode
- Concept will be completed end of Q1 2021.
- FDR by end of Q2 2021
- Installation foreseen for Q2 2022

FURKA time-line summary



	Project >30.04.2021 (44.8M)		Consolidation 2021-2022 (4.55M)							
	Q3/2020	Q4/2020	Q1/2021	Q2/2021	Q3/2021	Q4/2021	Q1/2022	Q2/2022	Q3/2022	Q4/2022
Maloja	Test	Test	Pilot	Pilot	PRC friendly user		PRC user			
Furka										
BL ready					1st beam with test RIXS chamber					
Furka XRD	Design	Construction				Installation	Test	Pilot	Pilot	PRC friendly user
Furka RIXS	WTO		Design	Construction			Installation	Test	Pilot	Pilot
SASE-RIXS		Concept		Design	Construction			Installation	Test	Pilot