BEATS

Work Package 1
Management of the BEATS project

Notes of the 2nd Annual Meeting

D1.7

February 2021

Funded by the EU's H2020 framework programme under grant agreement n°822535

PROJECT DETAILS

PROJECT ACRONYM
BEATS

PROJECT TITLE
BEAmline for Tomography at SESAME

GRANT AGREEMENT NO:
822535

THEME

START DATE
2019

DELIVERABLE DETAILS

WORK PACKAGE 01

EXPECTED DATE: JANUARY 2021

WORK PACKAGE TITLE: BEATS MANAGEMENT

DELIVERABLE TITLE REPORT ON THE BEATS 2ND ANNUAL MEETING

WORK PACKAGE LEADER: ESRF

DELIVERABLE DESCRIPTION: REPORT

DELIVERAVLE ID: D1.7

PERSON RESPONSIBLE FOR THE DELIVERABLE

NATURE

☒ R - Report ☐ P - Prototype ☐ D - Demonstrator ☐ O - Other

DISSEMINATION LEVEL

☒ P - Public
☐ PP - Restricted to other programme participants & EC: Click here to enter text.
☐ RE - Restricted to a group Click here to enter text.
☐ CO - Confidential, only for members of the consortium

REPORT DETAILS

VERSION 1.0 *DATE 24/02/2021* *NUMBER OF PAGES: 66*

DELIVERABLE REPORT AUTHOR(S):
K.COLVIN, A. KAPROLAT

FOR MORE INFO PLEASE CONTACT: KAPROLAT@ESRF.FR

STATUS

☐ Template ☐ Draft
☒ Final ☒ Released to the EC

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AGENDA

2nd Annual Meeting of the BEATS project

17/02/2021 @ 09:00 CET via zoom

09:00 Welcome (Mirjam van Daalen, Patricia Postigo-McLaughlin) 5'

09:05 The "soft" work packages (chair Adriana Wawrzyniak)

09:05 Global status (WP1, deliverables, schedule, budget, GAA, Axel Kaprolat) 20'

09:25 User community building (WP2, Kirsi Lorentz and Frank Lehner) 15'

09:40 Procurement, status update SESAME (WP5, Andrea Lausi) 15'

09:55 Discussion (all) 30'

Virtual coffee break 15'

10:30 The "hard" work packages (chair Kirsi Lorentz)

10:30 X-ray source fabrication (WP3, Andrea Ghigo and Susanna Guiducci) 10'

10:40 The beamline incl. front end (WP4, Gianluca Iori) 25'

11:05 The IT environment (WP7, Charalambos Chrysostomou) 25'

11:30 Discussion (all) 25'

Short break 5'

12:00 Meet the / feedback from the Commission (Patricia Postigo-McLaughlin, all. Chair: Mirjam van Daalen) as long as needed

Wrap-up, closing remarks (Michael Krisch)

NOTES OF THE MEETING

On 17th February, 2021, the BEATS project team met remotely for the 2nd Annual Meeting, hosted by the ESRF, Grenoble, France. 35 participants from the BEATS member institutes joined the half-day event, which combined presentations from the work packages interspersed by lively discussion sessions. The meeting marks the half-way point in the project, due for completion end 2022.

Patricia Postigo-McLaughlin, project officer for BEATS at the European Commission (EC), together with Mirjam van Daalen, chairwoman of the BEATS Steering Committee, welcomed the participants and opened the meeting.

Adriana Wawrzyniak, head of the Accelerator Division at SOLARIS, chaired the first session, dedicated to a review of the "soft" work packages.

Axel Kaprolat, project coordinator, gave a brief overview of the activities and achievements in 2020 then continued with a report on the global status of the project in terms of deliverables, time-line, budget and communication activities.

After explaining how BEATS had adapted to and coped with the perturbations caused by the COVID pandemic, he reported how the project had confronted a difficult phase following the external technical review by the European Commission in June 2020. The technical design is almost complete and now lies ahead the manufacture and procurement of major beamline components. Concerning other actions for the coming year, he added "*BEATS will also strive to expand and consolidate the BEATS/SESAME user community and will focus efforts on long-term sustainability in the form of funding opportunities and stewardship models. The project is fully up to expectations with all due deliverables having been accepted by the EC. BEATS is on track to face the upcoming challenges*."

Next, Kirsi Lorentz, vice-chair of the Steering Committee and tasked with user community building within WP 2, gave an overview of activities to date and the focus of activities to come. As well as continued actions to build up the user community through regional dedicated events, WP 2 will also be concentrating on industry-targeted marketing and training activities (e-learning) for future users. These efforts, which involve individual tailored approaches, are labour intensive and will be re-evaluated. Kirsi Lorentz presented a revised strategy adapted to the conditions caused by the pandemic. Frank Lehner, work

package leader, then complemented by reporting on the remaining tasks of WP 2 including the establishment of a Purchasing Advisory Board, staff training in all aspects of beamline operation and establishing the concepts for the long-term sustainability of BEATS.

Andrea Lausi, SESAME Scientific Director and leader of WP 5 gave a status update of procurement at SESAME. All major calls for tender will be finalised with contracts placed end March 2021. He reported on the first civil works that had started inside SESAME to make room for the new beamline.

Kirsi Lorentz chaired the second session, dedicated to the more technical work packages.

Andrea Ghigo, leader of WP 3, and Susanna Guiducci gave a status update on the construction of the x-ray source and related activities. The characterisation of the magnetic structure will be conducted at the site of manufacture before shipping the device to SESAME.

Gianluca Iori, BEATS beamline scientist, reported on the progress within WP 4, explaining the overall technical design of the beamline (from front end to the experimental station) and the radiation protection calculations. He addressed in detail the ongoing design of the experimental station (sample environment, sample stage, and detector stage) which is carried out with the help of Tebogo-Fortune Mokoena (ESRF trainee from the University of Johannesburg). Concerning the overall timeline of the project, Gianluca explained that due to delays with the procurement of the X-ray source, the radiation tests of the optics and experimental hutch will very likely be around three months late.

Charalambos Chrysostomou, leader of WP 7, covered the progress on the IT environment, data analysis and management. The work package contributed to the establishment of the SESAME Data Policy which was submitted and approved by SESAME's Council in summer 2020. He then explained in detail the proposed IT infrastructure, both the image acquisition chain as well as the mid- and long-term data storage concepts. Procurement will begin soon, following the in-depth analysis of suitable suppliers. The procurement of the components will begin soon, work package 7 is currently carrying out a thorough market study. Later in 2021, WP 7 will concentrate on the tomography software applications and efforts to establish data analysis as a service.

Prior to the wrap-up session, Patricia Postigo-McLaughlin reported on some forthcoming organisation changes within the European Commission. She stated that "*BEATS is a great project, a lovely endeavour. It is a prime example of how humans can come together, work together, to help other people explore the world*."

In his wrap-up remarks, Michael Krisch, who contributed considerably to the establishment of the BEATS grant application and served until recently as ESRF's representative in the BEATS Steering Committee, thanked the EC for their frank interaction and feedback over the first two years of the project. He added, "*Our collaboration with the EC is a good example of colleagues working together and of people who respect each other. There is a lot of hope to deliver the promises of BEATS and the project is a great example of how science should stay open and remain unaffected by politics, religion, or gender. I have no doubt that the beamline will deliver cutting-edge science for the region*." He then encouraged the whole BEATS community

to join their expertise to investigate opportunities to help SESAME to secure a long-term stability based on its own funding scheme and proposed measures to this effect.

To conclude, Mirjam van Daalen, said she was "*very impressed by how the project is gaining momentum and progressing well*". She thanked all the participants and actors in the BEATS project, especially the coordinator for keeping everyone on track and motivating the different teams to keep moving forward.

PRESENTATION A. KAPROLAT

BEATS

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BEATS, The Global Status

Axel Kaprolat, ESRF – ISDD
BEATS Project Coordinator
2nd Annual Meeting of the BEATS project, online, 17.92.2021

Content:

- What happened in 2020?
- Where do we stand?
- What will happen in 2021?
- Overall situation of the project

BEATS

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January: Autrans TDR writing retreat

Brainstorming

Raytracing
Flux calculations
Science Case
Timeline modified

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March: An uninvited guest

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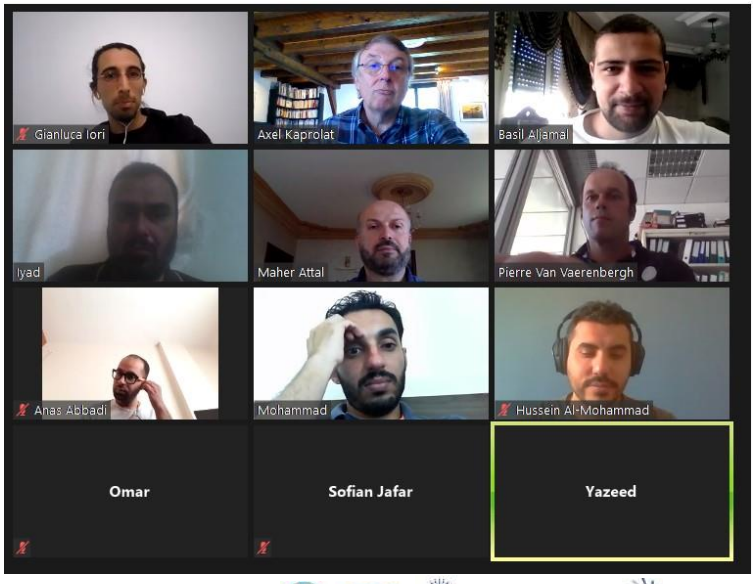
March: An uninvited guest



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Spring: Submission of deliverables:

Among others these heavyweights:

- D 2.2 The BEATS Science Case
- D 3.2 Final Source Design
- D 3.3 Front End Thermal Analysis
- D 3.4 Technical specifications of the x- ray source magnets

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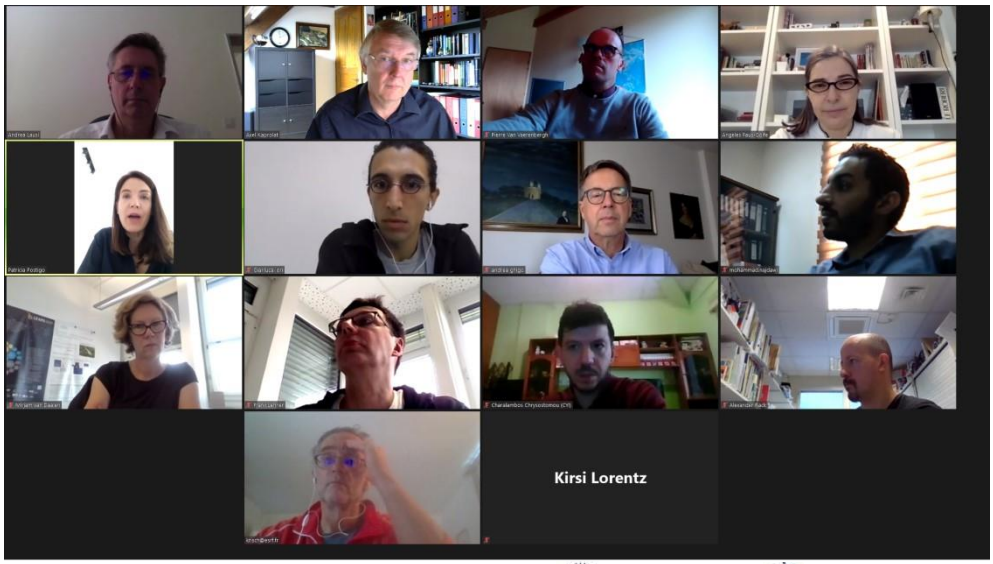
June: Technical Review



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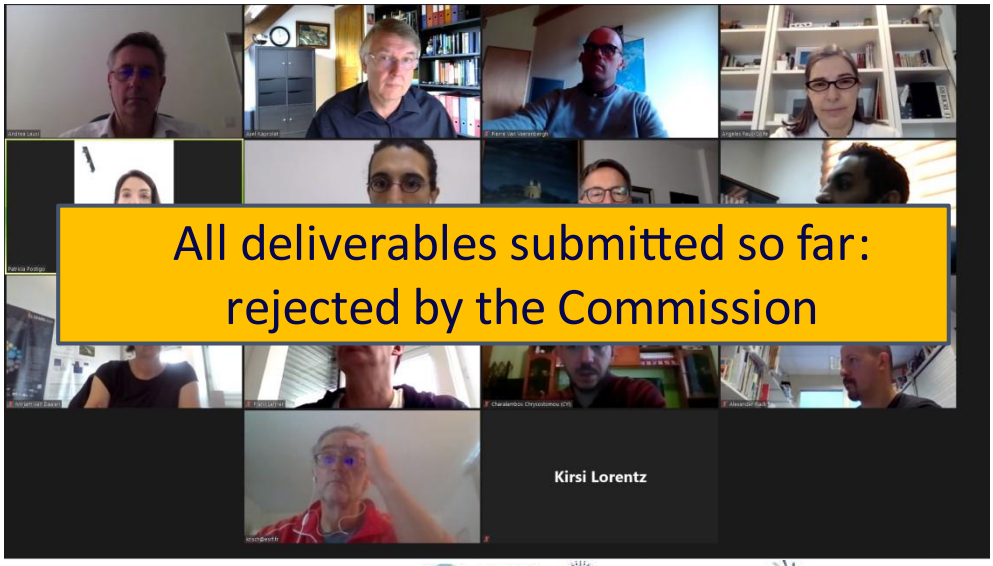
June: Technical Review



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Where did we stand mid 2020?

Del. No.	Description	Type	Dissemination	expected	submitted	approved
D 1.01	Notes of the Kick -off Meeting	R	PU	31/01/2019	17/06/2019	28/06/2019
D 1.02	Poject Web Site	DEC	PU	31/03/2019	14/05/2019	16/05/2019
D 3.01	Report Superbend vs. Three Pole Wiggler	R	PU	30/06/2019	04/08/2020	10/11/2020
M3.1	Decision source			30/06/2019	n/a	n/a
D 1.03	Concept Poster	DEC	PU	31/08/2019	31/01/2020	27/01/2020
D 1.04	Notes of SC meeting 2019	R	CO	31/01/2020	27/01/2020	28/05/2020
D 1.05	Notes of the 1st Annual Meeting	R	PU	29/02/2020	13/03/2020	28/05/2020
D 2.01	BEATS Science Case	R	PU	29/02/2020	04/08/2020	rejected
D 3.02	Final Source Design	R	PU	29/02/2020	04/08/2020	rejected
D 3.03	Front End thermal analysis	R	PU	29/02/2020	04/08/2020	rejected
D 4.01	Technical Design Report	R	Pu	31/03/2020	31/08/2020	late
D 3.04	Magnet technical specifications	R	PU	31/05/2020	04/08/2020	rejected
D 2.02	List of suitable suppliers	R	CO	30/06/2020	04/08/2020	late
D 3.05	Front End technical specifications for CfT	R	CO	30/06/2020	04/08/2020	rejected
M7.1	SESAME Data Policy endorsed by SAC and Council			30/06/2020	n/a	n/a
D 4.02	Specifications for the Radiation Protection Hutches	R	PU	31/07/2020	04/08/2020	10/11/2020
D 7.01	SESAME Data Policy	R	PU	31/07/2020	31/08/2020	10/11/2020
D 7.02	Required Computing Hardware / Software	R	PU	31/08/2020	31/08/2020	10/11/2020
M2.1	Science Case endorsed by SESAME SAC			31/08/2020	n/a	n/a
D 5.01	CfT Radiation Protection Hutches	R	PU	30/09/2020	02/10/2020	10/11/2020
M4.1	Evaluation of TDR by SESAME SAC			30/09/2020	n/a	n/a
D 5.02	CfT Personnel Safety System	R	PU	30/09/2020		
M3.2	Contract X -ry source placed			31/10/2020	n/a	n/a
M3.3	Contract Front End placed			31/12/2020	n/a	n/a
D 1.06	Notes of SC meeting 2020	R	CO	31/01/2021		

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June, July, August: Rewrite-party!

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June, July, August: Rewrite-party!

1. Overall assessment

1. Overall assessment
Project has fully achieved its objectives and milestones for the period.
2. Significant results linked to dissemination, exploitation and impact potential
Project will likely provide results with significant immediate or potential impact in the next reporting period (even if not all objectives mentioned in the Annex 1 to the GA were achieved).

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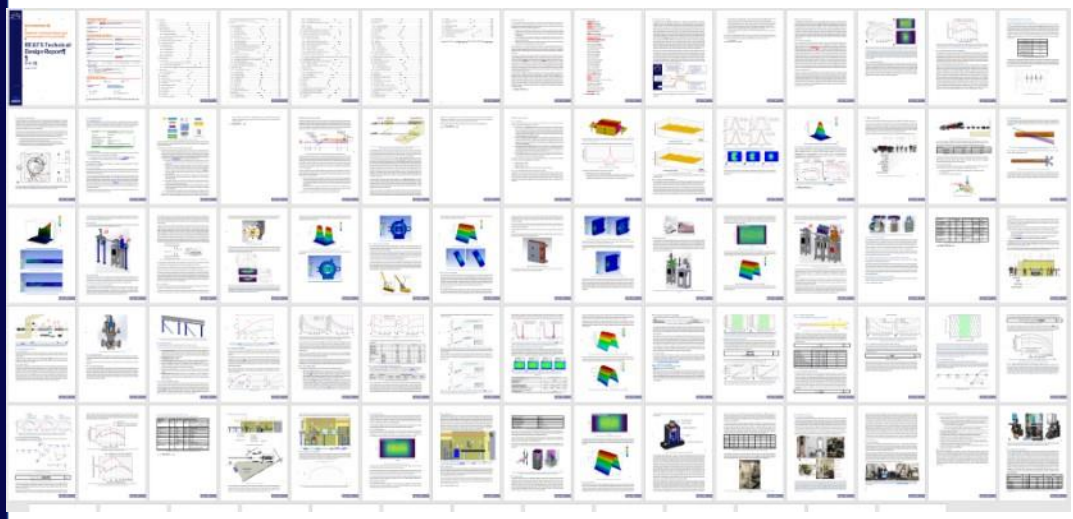
August: Technical Design Report



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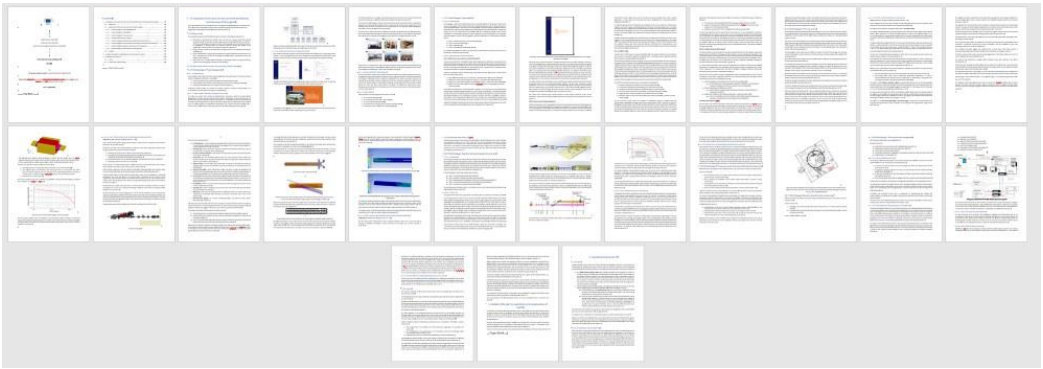
September: 1st Periodic Report



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September: 1st Periodic Report

EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR RESEARCH AND INNOVATION
Research & Innovation Outreach
Research & Industrial Infrastructures

Axel KAPROLAT
EUROPEAN SYNCHROTRON
RADIATION FACILITY
71 AVENUE DES MARTYRS
38000 GRENOBLE
FRANCE

Subject: Horizon 2020 Framework Programme
Project: 822535 — BEATS
Periodic reporting: RP 1
Interim payment (Article 21 GA)

Dear Madam/Sir,

In connection with your request for interim payment, I would like to inform you that we will soon make a **payment** of **EUR 836,720.95**.

You will find the detailed calculations (including cost rejections and limit to the interim payment ceiling, if any) in the enclosed documents.

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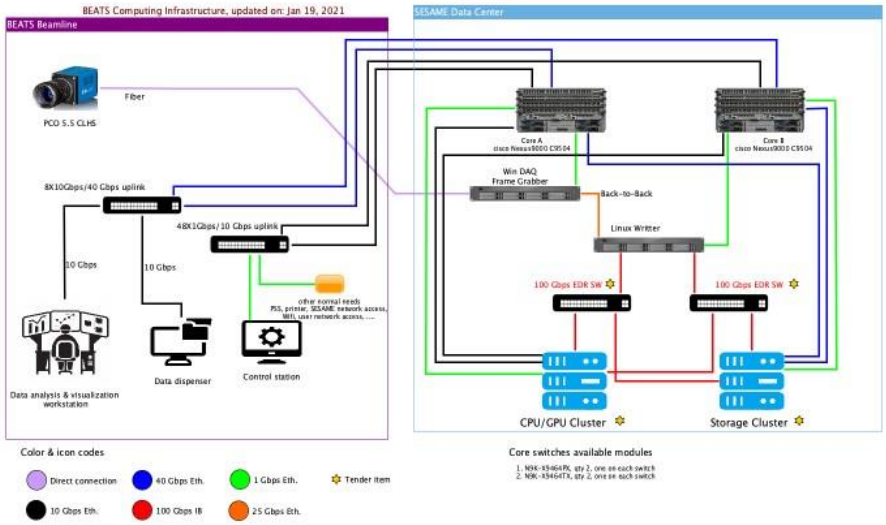
All year: IT infrastructure, Data Policy



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BEAmline for Tomography at SESAME

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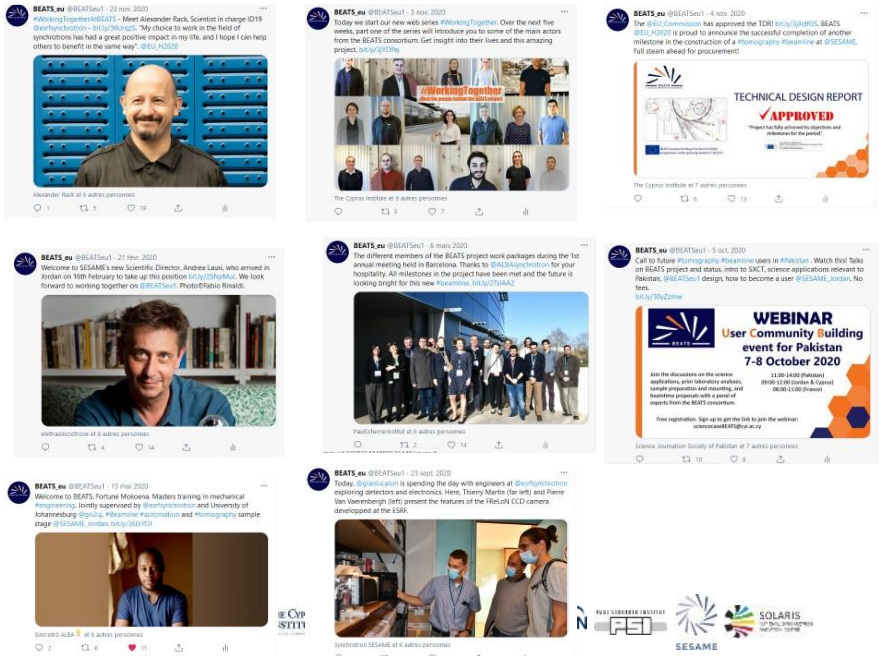
All year: Communication: social media



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All year: Communication: social media

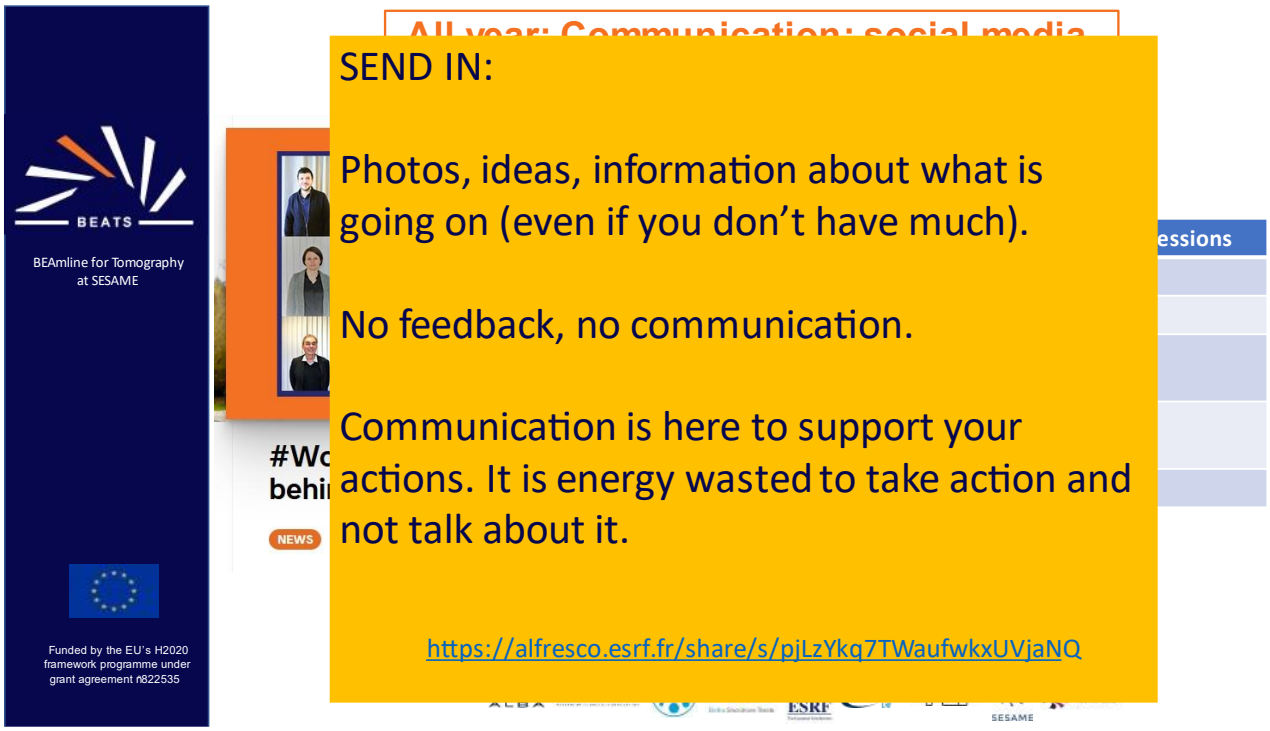
#WorkingTogether - Meet the people behind the project

NEWS 08 NOV 2020

Tweets with best response:

Subject	Impressions
CFT wiggler	3025
Gianluca training @ ESRF	2809
Alexander Rack #WorkingTogether	2483
Announce #WorkingTogether series	1980
UCB Pakistan	1902

- Tweets: 102 (2019: 50)
- Followers: 171 (2019: 89)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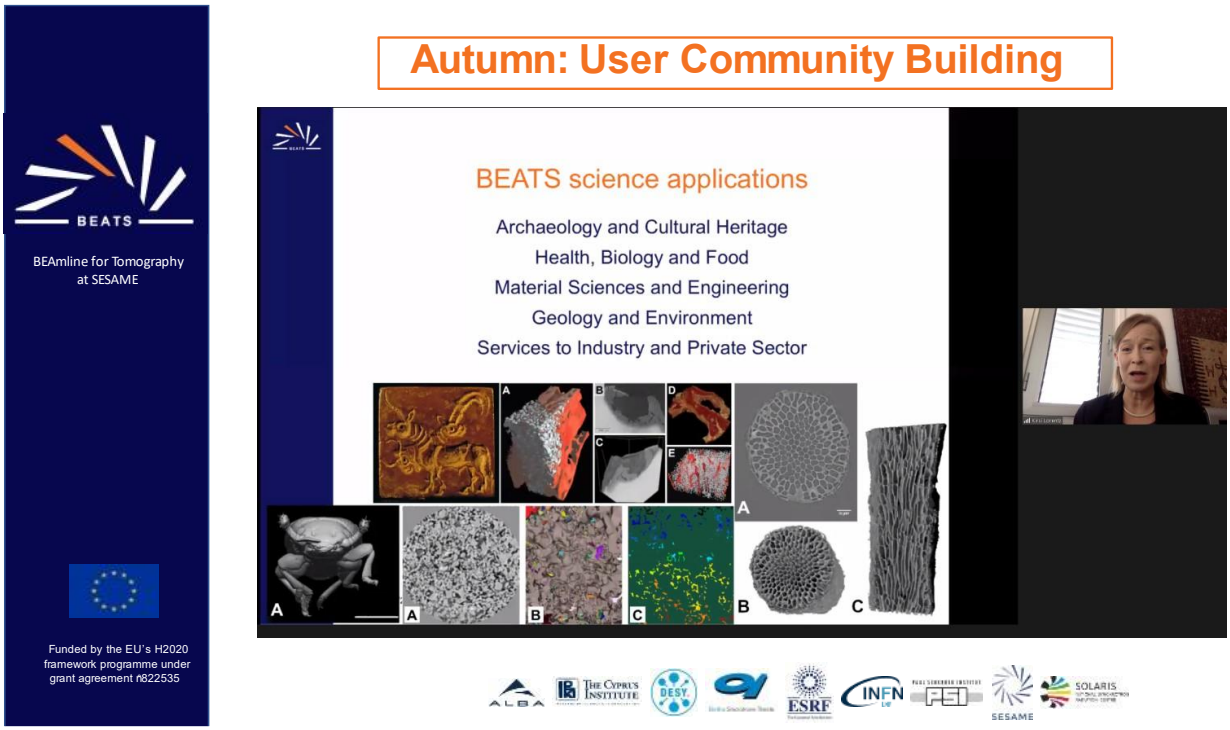
All year: Communication: social media
SEND IN:
Photos, ideas, information about what is going on (even if you don't have much).
No feedback, no communication.
Communication is here to support your actions. It is energy wasted to take action and not talk about it.
https://alfresco.esrf.fr/share/s/pjLzYkq7TWaufwkxUVjaNQ
essions
NEWS
ESRF
SESAME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Autumn: User Community Building
BEATS science applications
Archaeology and Cultural Heritage
Health, Biology and Food
Material Sciences and Engineering
Geology and Environment
Services to Industry and Private Sector
ALBA
The Cyprus Institute
DESY.
ESRF
INFN
PSI
SESAME
SOLARIS

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2nd half of 2020: Procurement

- X-ray source
- Front end
- Beamline hutches
- Monochromator

- IT infrastructure
- Experimental Station

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November: Presentation to SESAME SAC

BEATS: Beamline for Tomography at SESAME.
Progress Report:

Activities around the BEATS project have been reported to SAC by Dr. Axel Kaprolat (ESRF, project leader) and Dr, Gianluca Lori (SESAME staff). This 4 year project is in its 2nd year. Work is divided 7 different work packages. The Science Case has now been presented and approved.

The 3-pole wiggler as the source has been decided, designed, and went to procurement. There was one bid, and negotiations are under way. Front End, radiation safety hutches, monochromator are part of Work Pacjage 4 and they are under tender process. Civil work to accommodate this long beamline is underway at SESAME by modifying the two laboratories under the mezzanine area.

Among the achievements is the completion of BEATS Science Case, BEATs Technical Design Report, SESAME Data policy, configuration of architecture for data analysis and handling in collaboration with Cyprus Institute. The project is estimated to be running with a few months delay due to CoVid-19 related issues at the vendor and facilities .

SAC enthusiastically congratulated […] the BEATS team for running the project so far on-time, on-budget and on-spec. SAC considers BEATS an exemplary case of how a beamline project at SESAME should be carried out, and commends the project team.

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Where do we stand now (02/2021)?

Del. No.	Description	Type	Dissemination	expected	submitted	approved
D 1.01	Notes of the Kick -off Meeting	R	PU	31/01/2019	17/06/2019	28/06/2019
D 1.02	Poject Web Site	DEC	PU	31/03/2019	14/05/2019	16/05/2019
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D 1.05	Notes of the 1st Annual Meeting	R	PU	29/02/2020	13/03/2020	28/05/2020
D 2.01	BEATS Science Case	R	PU	29/02/2020	04/08/2020	10/11/2020
D 3.02	Final Source Design	R	PU	29/02/2020	04/08/2020	10/11/2020
D 3.03	Front End thermal analysis	R	PU	29/02/2020	04/08/2020	10/11/2020
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D 3.04	Magnet technical specifications	R	PU	31/05/2020	04/08/2020	10/11/2020
D 2.02	List of suitable suppliers	R	CO	30/06/2020	04/08/2020	10/11/2020
D 3.05	Front End technical specifications for CfT	R	CO	30/06/2020	04/08/2020	10/11/2020
M7.1	SESAME Data Policy endorsed by SAC and Council			30/06/2020	n/a	n/a
D 4.02	Specifications for the Radiation Protection Hutches	R	PU	31/07/2020	04/08/2020	10/11/2020
D 7.01	SESAME Data Policy	R	PU	31/07/2020	31/08/2020	10/11/2020
D 7.02	Required Computing Hardware / Software	R	PU	31/08/2020	31/08/2020	10/11/2020
M2.1	Science Case endorsed by SESAME SAC			31/08/2020	n/a	n/a
D 5.01	CfT Radiation Protection Hutches	R	PU	30/09/2020	02/10/2020	10/11/2020
M4.1	Evaluation of TDR by SESAME SAC			30/09/2020	n/a	n/a
D 5.02	CfT Personnel Safety System	R	PU	30/09/2020		
M3.2	Contract X-ry source placed			31/10/2020	n/a	n/a
M3.3	Contract Front End placed			31/12/2020	n/a	n/a
D 1.06	Notes of SC meeting 2020	R	CO	31/01/2021		

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What is next?

M4.1	Evaluation of TDR by SESAME SAC			30/09/2020	n/a	n/a
D 5.02	CfT Personnel Safety System	R	PU	30/09/2020		
M3.2	Contract X-ry source placed			31/10/2020	n/a	n/a
M3.3	Contract Front End placed			31/12/2020	n/a	n/a
D 1.06	Notes of SC meeting 2020	R	CO	31/01/2021		
D 1.07	Notes of the 2nd Annual Meeting	R	PU	28/02/2021		
M5.1	Contract Rad. Safety Hutches placed			31/03/2021		
D 3.06	Measurement of the magnetic field of the source magnets	R	PU	30/06/2021		
D 4.03	Delivery Monochromator	R	CO	31/07/2021		
D 7.03	Site acceptance Computing Hardware	R	CO	31/12/2021		
D 1.08	Thematic Posters	R	PU	31/12/2021		
M3.4	X-ray source and Front End commissioning start			31/12/2021		
M5.2	Sucessful Radiation Test Hutches			31/12/2021		
D 1.09	Notes of SC meeting 08, 09, 10, 11	R	CO	31/01/2022		
D 4.04	Delivery sample end station	R	CO	31/01/2022		
D 5.03	Site acceptance Radiation Protection Hutches	R	CO	31/01/2022		
D 5.04	Site acceptance Personell Safety System	R	CO	31/01/2022		
D 1.10	Notes of the 3rd Annual Meeting	R	PU	28/02/2022		
D 5.04	Request to EMRC for licence to operate	R	CO	28/02/2022		
M5.3	EMRC authrisation obtained			28/02/2022		

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What is next?

- By mid April 2021 we will have concluded the major procurement exercises.
- Then we know exact values for i) budget and ii) delivery dates.
- At that moment we shall review timeline and budget and carry out an amendment of the BEATS Grant Agreement.

BEATS

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Summary: overall project situation

- (Nearly) all technical design studies carried out successfully.
- After a bumpy start re reporting: project back in business.

Things to concentrate on during the 2nd half of the project:

- The project will see some delays.
- Engagement in BEATS is distributed unevenly.
- Pan-European spirit
- User Community Building
- Training of staff
- Sustainability in general (Stewardship models, funding opportunities)

BEAmline for Tomography at SESAME

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PRESENTATION K. LORENTZ

WP2 Sustainability

Task 1: Scientific Case and User Community Building

Progress and Outlook

Kirsi O. Lorentz
Meha B. Abufaur
Sila Kayalp
The Cyprus Institute
k.lorentz@cyi.ac.cy

Frank Lehrer
DESY
frank.lehner@desy.de

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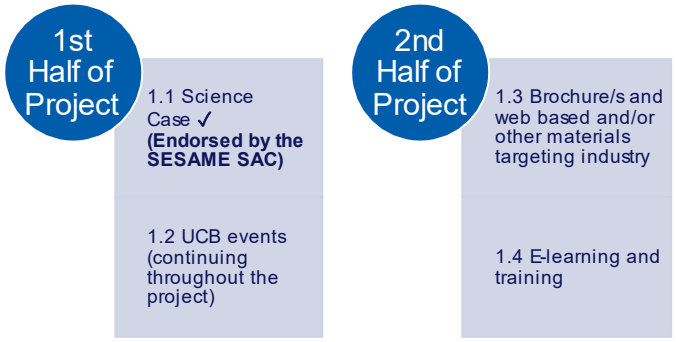
Sub-Tasks and Timeline

Task 1.1: Science case

Task 1.2: User Community Building

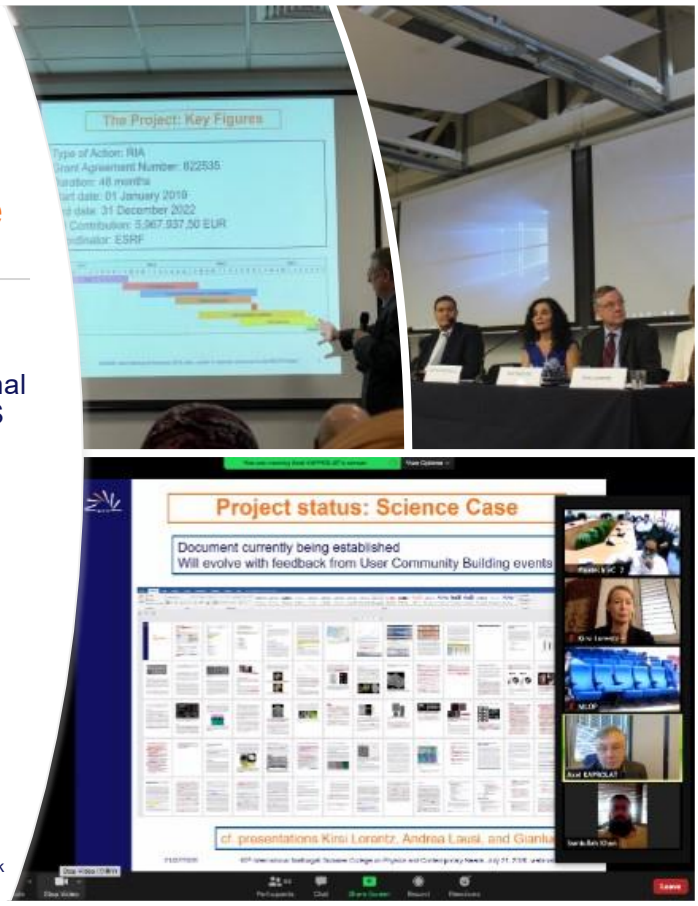
Task 1.3: Brochure/s and web- and/or other materials targeting industry: SR-microCT applications in industry

Task 1.4: Development of SR computed tomography e-learning/blended learning training materials to compliment and go beyond existing initiatives



Task 1: Science Case

- Science Case Workshop: regional users (incl. Enterprise) and BEATS experts
- Science Case document endorsed by SESAME SAC



Task 1: Science Case and UCB, Progress and Outlook

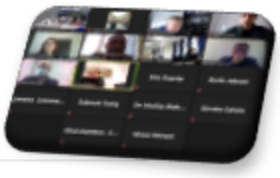
1.2 User Community Building

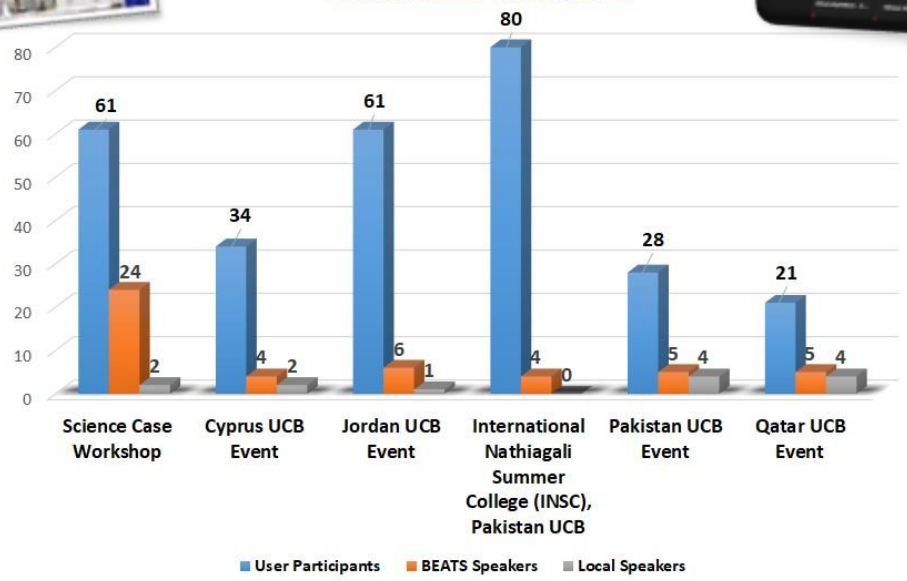
Task 1.2. Workshops at SESAME Member level, by scientific experts in the relevant research field (as elaborated within task 1.1), reaching potential future users from both academic and governmental institutions/researchers, as well as industry where appropriate, within individual SESAME Members.

COMPLETED ACTIVITIES

- **Science Case Workshop** 27-28 June 2019, (61 users)
- **Cyprus UCB Event** 11-12 November 2019 (Coupled with ICAS -EMME2 congress) (34 users)
- **Jordan UCB Event** 30 November - 1 December 2019, (61 users)
- **International Nathiagali Summer College (INSC), Pakistan UCB** 21 July 2020 (80+ users)
- **Pakistan UCB Event** 7-8 October 2020 (28 users)
- **Qatar UCB Event** 12-18 November 2020 (21 users)
- IN TOTAL: 285 participants reached

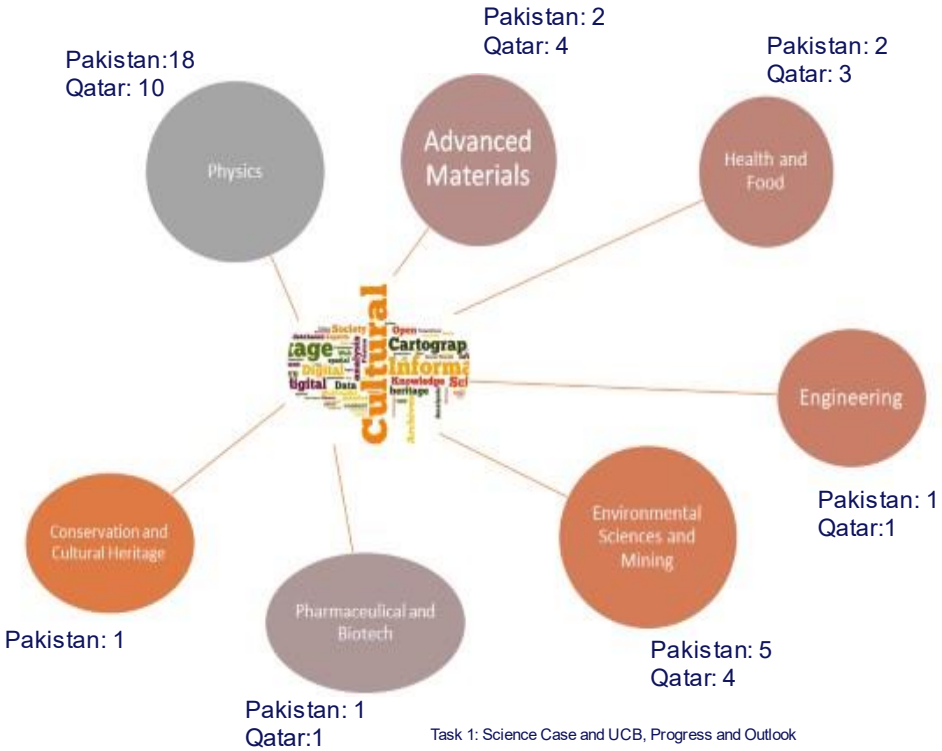
Regional BEATS User Community Building Events



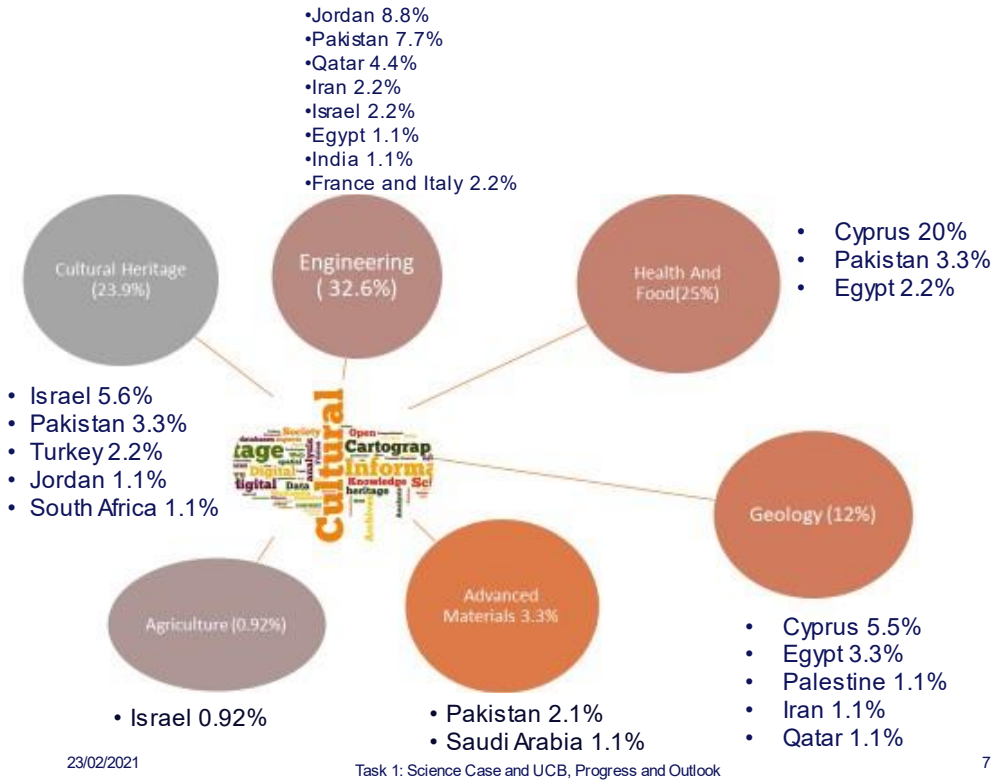


(n: 285 participants)

Graph 1: Application area versus attendees from Qatar and Pakistan UCB events (n= 49)



Graph 2: User interests according to the BEATS database (n = 92).



Targeting and follow-up of individual potential users: tailored approach

Individualised tailored approach:

Identification of a potential user/user group

Individualised contact via email/phone call

Meeting (online) follow-up

Staying connected: emails, invitations to BEATS lectures and events

In person contact/visits to resume when Covid-19 measures allow

Ongoing Effort : Turkey

Potential Users	Contacted Users	Response 2 out of 13 so far
111 Potential Users 12 Facilities (Ercan Alp and BEATS searches)	**13**	Positive feedback from **Didem Ketenoğlu** and **Ozlem Karslı** from TARLA

Two recent strategy meetings for UCB/enterprise/training

- To plan detailed strategy for 1.3 (enterprise) and 1.4 (training/education)
- To re-evaluate strategy for 1.2 (UCB)
- Strategy meeting contributors present from CyI, SESAME, DESY, ESRF; further participation from other BEATS partners welcome – open invitation
- Suggested strategy outlined in the following slides

1.2. UCB
Revised strategy (pandemic; online experience in 2020)

- Online lectures – monthly – alternating with HESEB: 2021
  - These could be organised within regional institutions' colloquia (= ready networks)
- Topical workshops – Cultural Heritage/Archaeology/ Paleontology – Health – Materials Science – Environment/Geosciences : 2021-2022
- Annual BEATS UCB event at the SESAME User Meeting
  - open to all SESAME members and beyond
- microCT facilities (laboratory) workshop – by invitation
- Power users - 5-10 regional users to acquire data at BEATS partners in advance of BEATS commissioning; high profile showcasing of results
- Individualised contact where effective :
  - pilot in Cyprus: State Chief Scientist and Lorentz to visit/target enterprises to promote SESAME and BEATS; SESAME Council President suggested this model could be explored as a template for SESAME members
  - individualised contact with other identified users (ongoing since 2019)
  - project partnerships, incl. BioMERA: mentoring, beamtime proposals – effective approach: the first two enterprise beamtime proposals to SESAME; further organisations geared up for BEATS

1.3 Enterprise/industry

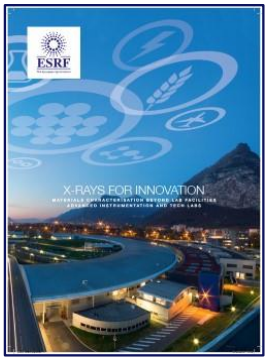
Web materials - ESRF as starting point

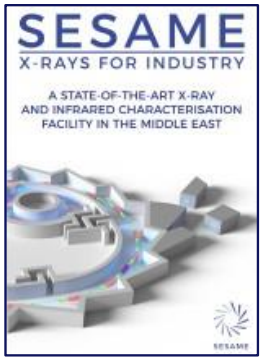
- Selecting high profile materials might be imaged in SESAME

General SXCT brochure, including (but not solely for) industry

microCT facility workshop – by invitation

Individualized contact (e.g. BioMERA –https://biomera.cyi.ac.cy/)





Ongoing Activity

- One on one mentoring of enterprises
- Enterprise beamtime proposals submitted
- Awarded beamtime at SESAME

1.4 Training/education

- **Online course/s:**
  - DCH423 SR-Enabled Research in Heritage Sciences & Archaeology (running since Feb 2020)
    - The Cyprus Institute; doctoral & masters students; course leader Lorentz
    - sessions by Lausi, Iori, Chrysostomou, Lorentz
- **Lectures (as within UCB)**
- **Snippets** – short online videos – showcasing SXCT applications
- **Tutorials** - 'how to' - with real data?

- **Link to OPEN SESAME Training Warehouse**
  - BEATS UCB lectures
  - Further materials will be uploaded as soon as developed
- **One partner workshop/meeting at OPEN SESAME Training Warehouse host (Cyl)**
  - In preparation; at the beginning of the 4th project year Jan/Feb 2022 (TBC)
  - Online preparatory meetings during 3rd project year 2021
- **Component development at partner institutions**
  - e.g. a doctoral and masters level course (DCH423) within the accredited postgraduate program at The Cyprus Institute
  - open invitation for all BEATS partners to get involved

To get involved in the design/execution of BEATS UCB/enterprise/training activities please contact:

b.abufaur@cyi.ac.cy
s.kayalp@cyi.ac.cy
k.lorentz@cyi.ac.cy
Gianluca.Iori@sesame.org.jo
frank.lehner@desy.de

Thank you

PRESENTATION F. LEHNER

BEATS

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BEAmline for Tomography at SESAME

Status of other tasks WP2

ALBA · The Cyprus Institute · DESY. · Elettra Sincrotrone Trieste · ESRF · INFN · PSI · SESAME · SOLARIS

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BEAmline for Tomography at SESAME

WP2

Task 2: Procurement Advisory

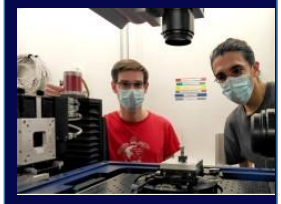
Achievements:

- Set up **Procurement Advisory Board**(PAB); provide guidance on procureme strategy and processes, define procurement standards and best practice exchange; Chair: Josep Nicolas (ALBA Cells)
- **Deliver a list of companies**with appropriate expertise in**SR instrumentation**, including end station components for micro-tomography (D2.2)
- SESAME Tenders:
  - 3-Pole Wiggler X-ray source: signed, after a long process of evaluation and even price negotiation
  - Front-End: evaluation just finished, contract to be signed
  - Lead hutches: under evaluation
  - DMM: tender published, deadline today

Frank Lehner

BEATS

BEAmline for Tomography at SESAME



WP2

Task 3: Training of SESAME Staff

Objective:

- training of SESAME staff in all aspects related to the new beamline
- enhancing the expertise of SESAME staff in commissioning and operating a modern light source facility

Achievements:

- Gianluca's training stays @ ELETTRA, ESRF and PSI
  - getting acquainted with TOMCAT beamline operations
  - performing beamtimes with different conditions covering as many fields of application as possible
  - acquiring benchmark data for BEATS.
- another training at ALBA on radiation protection started but had then to be cancelled with Covid outbreak
- It was foreseen to send 5 more SESAME technical staff members for training. This has not happened due to COVID
- COVID is a serious adverse impact on the training
- Even for post-COVID times there are no real alternatives for hands-on training at laboratories

Frank Lehner

BEATS

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WP2

Task 4: LTS

Objective:

- Long-Term Sustainability (in terms of governance & funding)
- Explore and capture funding opportunities and support/stewardship models

Task was initially designed to support networking and advocacy activities and to foster stakeholder relations.
Due to pandemics unclear if we can deliver what was promised. Better to descope and concentrate on one avenue:

- Link to EU-Africa strategy (launched in 2020)
- SESAME as a „science and training hub" connecting the regions
- Organize meetings with AfLS, workshop

Neighborhood Development and International Cooperation Instrument NDIC

Frank Lehner

PRESENTATION A. LAUSI

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BEATS 2nd Annual Meeting

WP5: Infrastructure Procurement and Construction

Feb 17, 2021

Andrea Lausi, SESAME

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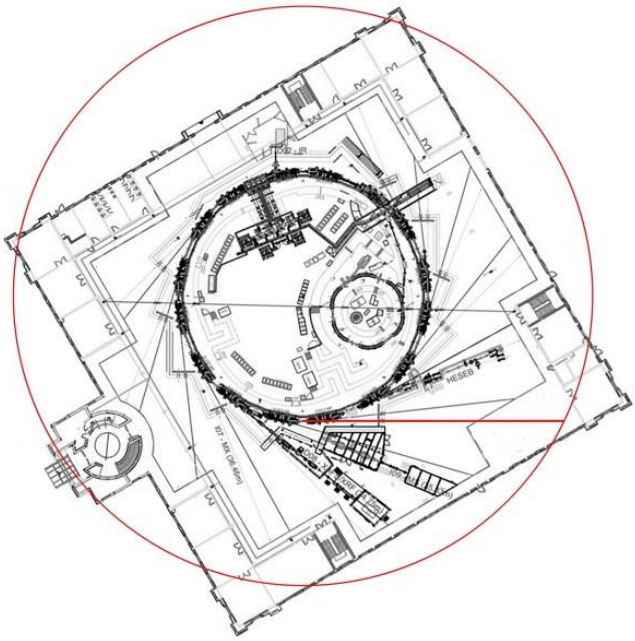
WP5: Infrastructure Procurement and Construction



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Thaer Abu Hanieh
Majeda Salama

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Present Tenders

Restricted International Tender (RIT)
Designing, Manufacturing, Testing, Packing and Delivery of Series of Front End Components for the BEATS Beamline to SESAME
Deadline: 20 December 2020

Restricted International Tender (RIT)
Designing, Manufacturing, Packing, Delivery and Installation of Lead Safety Hutches and Transfer Pipe Shielding for the BEATS Beamline at SESAME
Deadline: ~~04~~ 18 January 2021

Restricted International Tender (RIT)
Designing, Manufacturing, Testing, Packing, Delivery and Installation of a Double Multilayer MonochromatorSystem for the Beats Beamline to SESAME; Located at Allan/Salt/Jordan
Deadline: 17 February 2021

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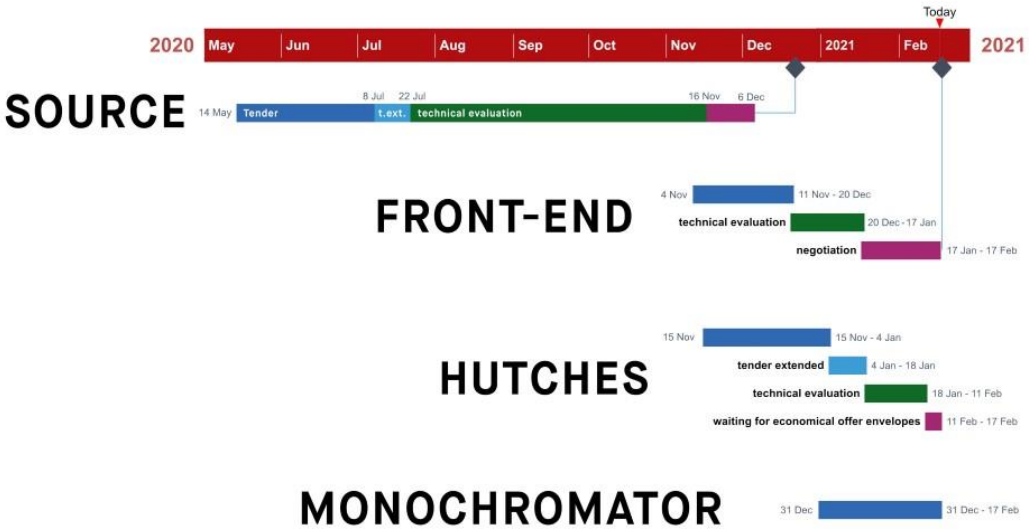
Tenders



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BEAmline for Tomography at SESAME

	3Pole Wiggler	Front End	Hutches	Double Multilayer Monochromator	PSS
Type of Tender and Tender No.	(RIT) BEATS/T/20/01	(RIT) BEATS/T/20/02	(RIT) BEATS/T/20/03	(RIT) BEATS/T/04	N/A
Call for tender issued on	14-May-20	04-Nov-20	15-Nov-20	31-Dec-20	N/A
Deadline for receiving offers	8 July 2020 Extended until 22/7/2020	20-Dec-20	1/4/2021 Extended until 18 January 2021	17-Feb-21	N/A
No. of Bids Received	1	4	2	deadline is tomorrow	N/A
end of the technical evaluation	16-Nov-20	17-Jan-21	11-Feb-21		N/A
opening of the Financial offer	18-Nov-20	24-Jan-21			N/A
End of Negotiation	06-Dec-20	15-Feb-21			N/A
Challenges	1. not receiving 3 competitive bids (waiver approved). 2. Evaluation took long period 3. offer is beyond the allocated budget (cancellation tender procedure) 4. request to single source procedure (waiver approved) 5. Value of contract is more than $500K (Finance	1. Price break-down was requested as we removed trigger unit. Possible discount was requested as Lot 3 will be postponed	1. Only 2 offers received (waiver approved by the Contracts Committee) 2. Both bidders sent original bid by post		single source procurement (Waiver approved)
Contract Value	Euro 480 k				$59,891,00
Contractor's Name	Kyma (Italy)				SAM Engineering (Jordan)
Type of Contract	Single Source				Single Source
Contract signed by both parties	21-Dec-20				08-Dec-20
Duration	13 months				6 months
Status	ongoing	Award letter will be issued today.	Financial Offers to be Opened	Deadline for receiving offers is today	ongoing

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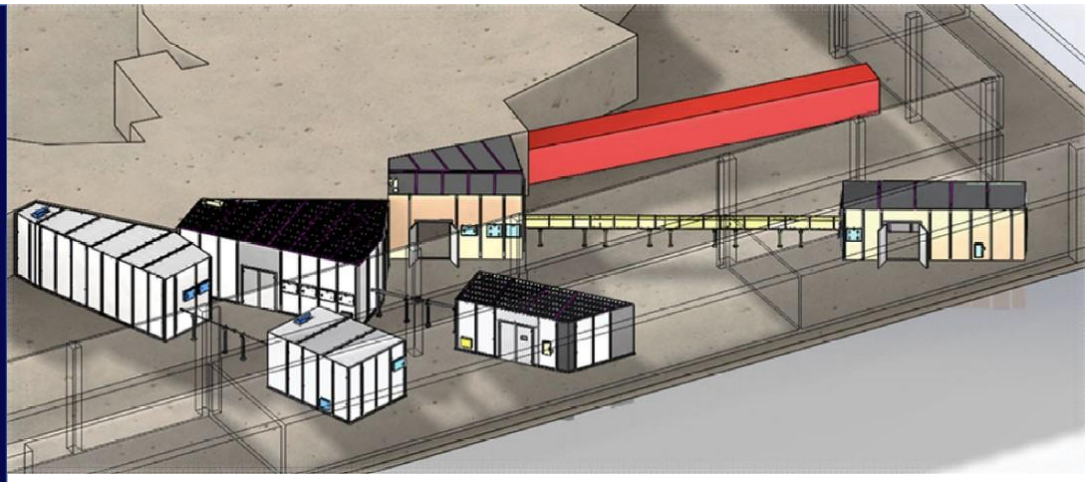

June 2021 – HESEB Undulator sent from HZB
October 2021 – HESEB Front-end and Beamline sent from FMB

Jan 2022 – 3-Pole Wiggler sent from Kyma (see WP3)
Jan 2022 – start of Hutches construction (?)

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THANK YOU

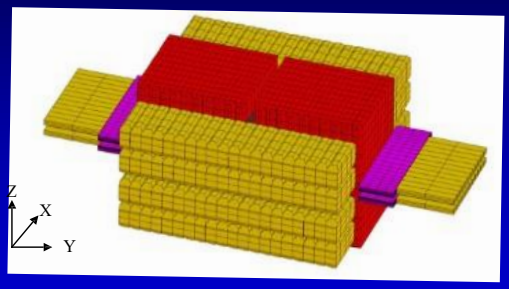
PRESENTATION A. GHIGO

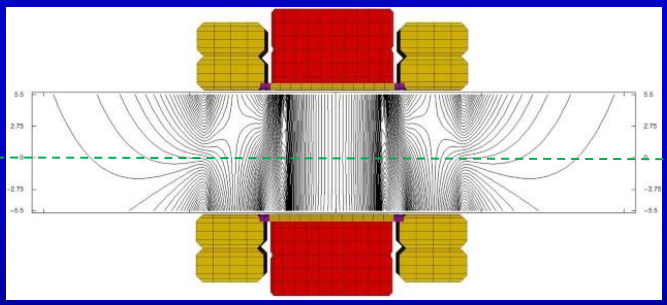
BEATS@SESAME
WP3: the photon source

Andrea Ghigo
on behalf of WP3 collaboration

Three-pole wiggler: Magnet design

The magnet will be produced by KIMA with the electromagnetic design proposed by Josep Campmany (ALBA). The KIMA final project was revised and accepted





Magnetic field lines within the gap at longitudinal position Y=0.

KIMA final design: Magnet evaluation (1)

(Maher Attal report)

- **Field roll-off @ 11mm gap:** it is well within specifications.
- **1st and 2nd field integrals around magnetic axis**:

- The on-axis 1st field integral is well within the specifications (-1.15x10^{-5} T.m while in the specified one < 5x10^{-5} T.m).

- On-axis 2nd filed integral around magnetic axis is very well within the specifications (-3.2x10^{-9} T.m^2 while in the specified one < 5x10^{-5} T.m^2).

- **Integrated high order multipoles:** are small and very well within the machine specified tolerance.

BEATS Steering Committee meeting A.Ghigo 17/02/2021

KIMA final design: Magnet evaluation (2)

- **Variation of 1st field integral with wiggler gap:**

- The maximum on-axis 1st field integral is ~ 8.2x10^{-4} Tm @ 40mm gap. This will result in a horizontal kick of ~ 0.1 mrad, consequently in a horizontal orbit distortion of ± 1mm. **However this will be compensated by the 3PW active correction coils.**

- When the gap is fully opened @ 200mm, the 1st field integral is 2x10^{-4} Tm, which results in a horizontal kick of 0.075 mrad @ injection energy (800MeV) and 0.024mrad @ top energy (2.5GeV). This will result in horizontal orbit distortion of ±0.75mm and ±0.24mm respectively.
This needs to be compensated also in order not to affect the injection efficiency and not to increase the horizontal correctors' strengths.

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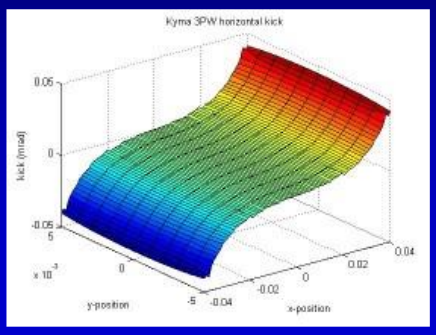
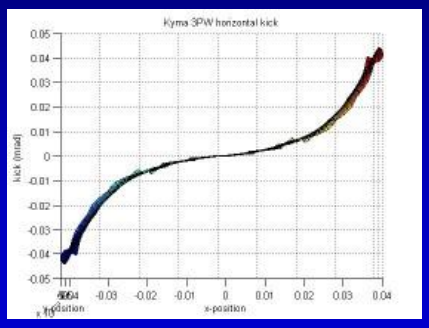
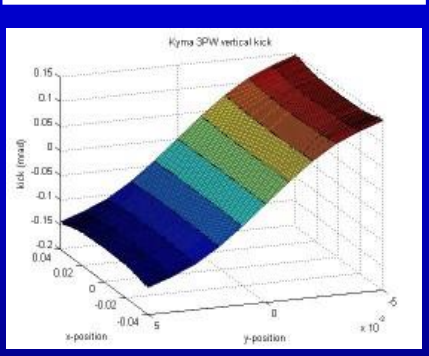
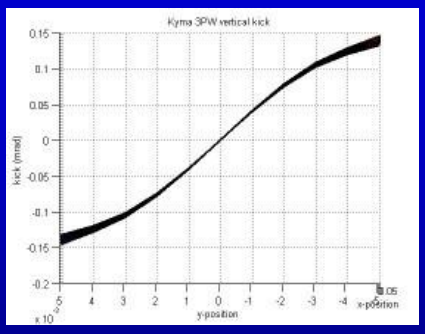
Transverse horizontal and vertical kick maps









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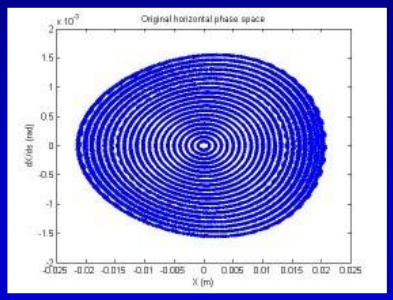
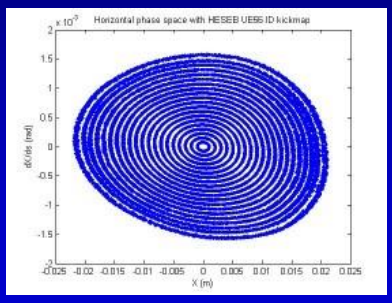
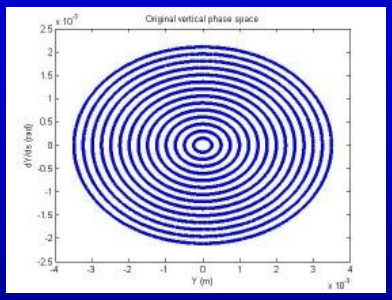
If we compare the contribution to dynamics aperture in the soft x -ray line HESEB

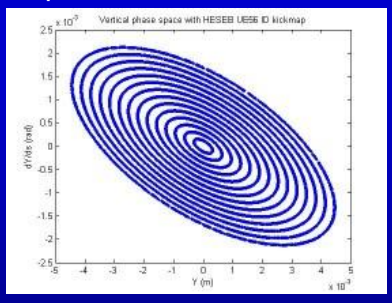
with kickmap





without kickmap





The contribution on the vertical planes to the dynamics aperture is negligible

BEATS Steering Committee meeting A.Ghigo 17/02/2021

Time schedule

- The time needed for the Three pole wiggler production is one year
- The green light for the production is February 2021
- After magnetic measurements and the FAT, it was planned to send the magnet to ALBA to make another set of confirmation measurements (two months): the magnet delivery to SESAME will be April 2022
- The Front-end will be ready for the installation in February 2022 (see G.Iori presentation)
- To install the X-ray source and the Front end in the tunnel in the same shut-down the delivery of the magnet will be anticipated.

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Proposal

- The proposal is to perform the additional magnetic measurements in the Factory with the supervision of magnet experts avoiding to transfer the magnet to ALBA an than to SESAME.
- Josep Campmany agreed to go to participate to the measurements at the factory site with the help of an INFN engineer: Alessandro Vannozzi.
- With this time schedule two months are gained and the installation of the magnet and the front end will be synchronized

Complete Gantt chart of the procurement and installation will be presented by Gialuca Iori

BEATS Steering Committee meeting A.Ghigo 17/02/2021


BEATS
Thanksfor theattention
BEATS SteeringCommitteemeeting
A.Ghigo 17/02/2021

PRESENTATION G. IORI

BEATS

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BEATS annual meeting #2

17.02.2021

WP4: Beamline Technical Design and Instrumentation Procurement

Gianluca Iori
BEATS beamline scientist

BEATS_eu
@BEATSeu1

ALBA · The Cyprus Institute · DESY · Elettra Sincrotrone Trieste · ESRF · INFN · PSI · SESAME · SOLARIS

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WP4 Tasks

Task 1 Preparation of the beamline Technical Design Report (TDR)
Task 2 Radioprotection calculation, specifications for the rad. safety hutches
Task 3 Detailed technical design for beamline instrumentation
Task 4 Procurement of beamline instrumentation
Task 5 Assembly of individual beamline components

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WP4 Deliverables

D4.1 Technical Design Report (month 15)

D4.2 Delivery of specifications for the radio-protection hutches (month 19)

D4.3 Delivery of key component monochromator (month 31)

D4.4 Delivery of beamline key component sample end station (month 37)

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- August 2020 (month ~~15~~ 20) – Submitted
  - Raytracing archived as Zenodo repository

zenodo

Publication date:
August 17, 2020
DOI:
DOI 10.5281/zenodo.3988604
Keyword(s):
python · computed tomography · synchrotron · raytracing
Grants:
European Commission:
- BEATS - Beamline for Tomography at SESAME (822535)

Related identifiers:
Supplement to
https://github.com/gianthk/BEATS_raytracing/tree/v1.0
License (for files):
Other (Open)

- December 2020 – Presented to SESAME SAC
- March 2021 – Abstract submission to sri2021.eu

Design and raytracing of the BEATS beamline of SESAME

Gianluca Iori[1], Pierre van Vaerenbergh[2], Juan Reyes-Herrera[2], Mohammad Al'Najdawi[3], Ivan Cudin[4], Tomasz Kołodziej[5], Matteo Altissimo[4], Andrea Lausi[1], Axel Kaprolat[2]

Workpackage 4

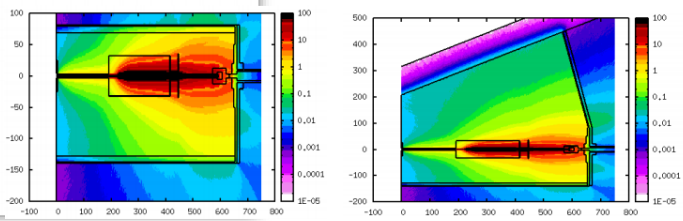
Beamline technical design and instrumentation procurement

Report on the specifications for the radiation protection hutches

D 4.2

July 2020

- July 2020 (month 19) – Submitted
  María-José García-Fusté (ALBA), Iyad Zahran (SESAME)
  - Gas bremsstrahlung source calculations
    - White beam or mirrorless operation mode
    - Monochromatic beam operation mode
    - Safety shutter behaviour
    - Transfer line behaviour in a vacuum accident situation
  - ID source calculations
    - White beam or mirrorless operation mode
    - Monochromatic beam operation mode
    - Transfer line behaviour in a vacuum accident situation



Workpackage 4

Beamline technical design and instrumentation procurement

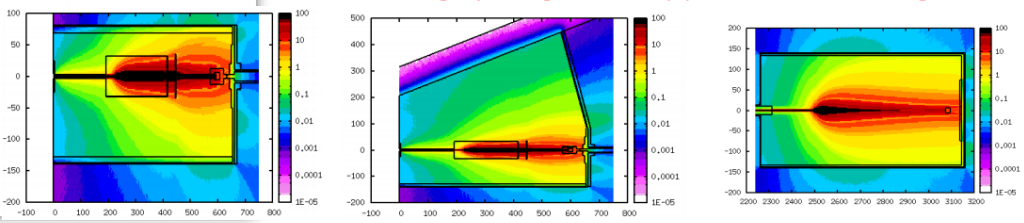
Report on the specifications for the radiation protection hutches

D 4.2

July 2020

- July 2020 (month 19) – Submitted
  María-José García-Fusté (ALBA), Iyad Zahran (SESAME)
  - Gas bremsstrahlung source calculations
    - White beam or mirrorless operation mode
    - Monochromatic beam operation mode
    - Safety shutter behaviour
    - Transfer line behaviour in a vacuum accident situation
    - Sample environment inside experimental hutch
  - ID source calculations
    - White beam or mirrorless operation mode
    - Monochromatic beam operation mode
    - Transfer line behaviour in a vacuum accident situation
    - Sample environment inside experimental hutch
  - Limiting raytracing -> transfer pipe size; collimators design

Aug. 2020



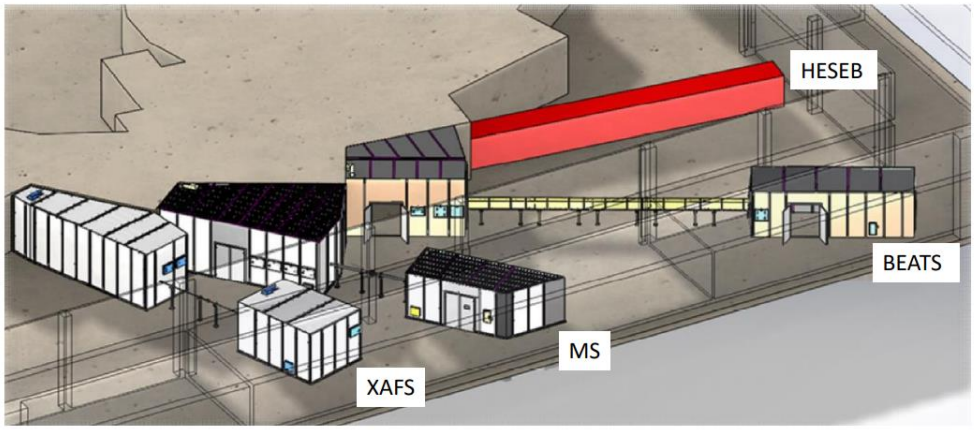
BEATS

BEAmline for Tomography at SESAME

Funded by the EU's H2020 framework programme under grant agreement n°822535

Task 3: Radioprotection calculation, specifications for the hutches

CfT Lead Safety Hutches and Transfer Pipe Shielding



BEATS

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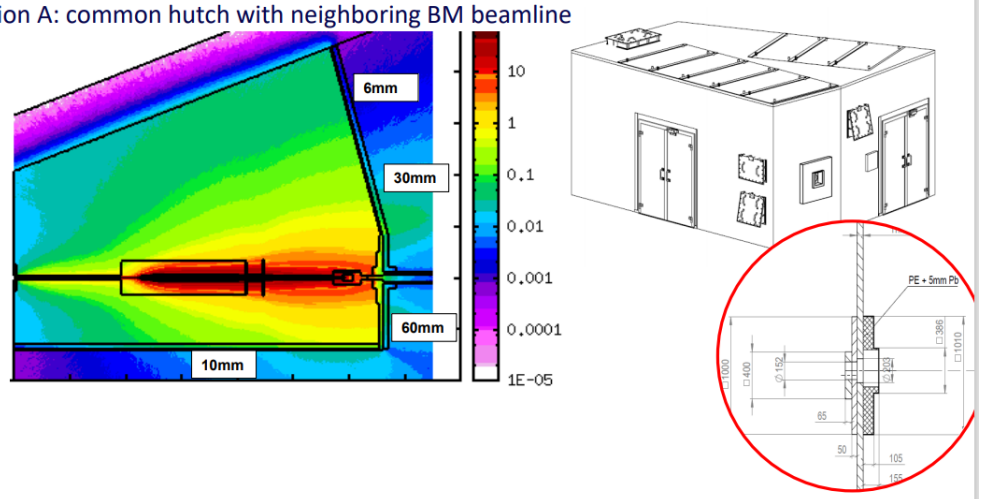
Funded by the EU's H2020 framework programme under grant agreement n°822535

Task 3: Radioprotection calculation, specifications for the hutches

CfT Lead Safety Hutches and Transfer Pipe Shielding - Optics hutch

- Version A: common hutch with neighboring BM beamline



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Task 3: Radioprotection calculation, specifications for the hutches

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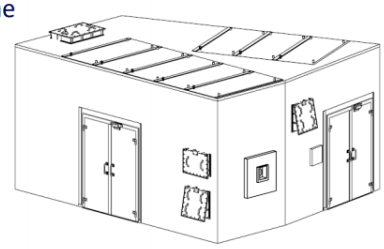
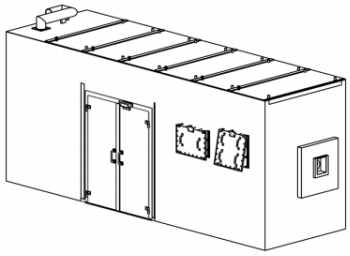
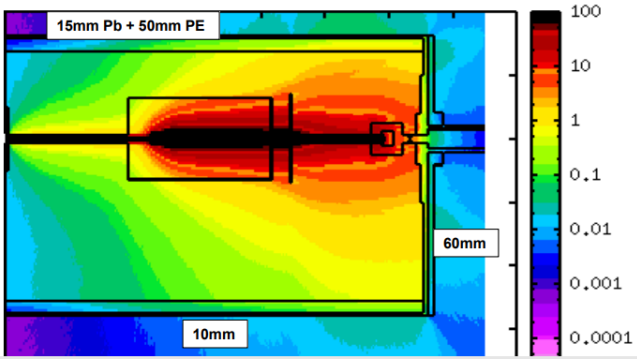
- Version A: common hutch with neighboring BM beamline



- Version B: BEATS beamline only



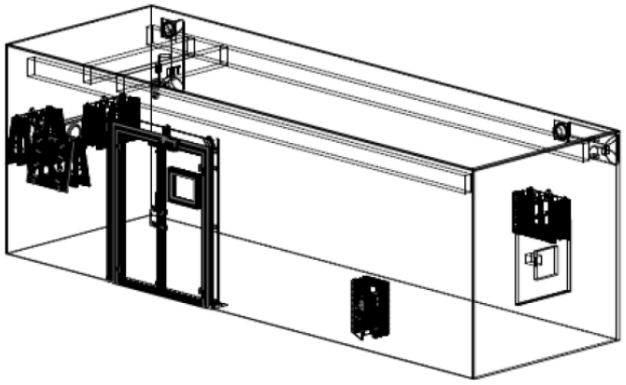


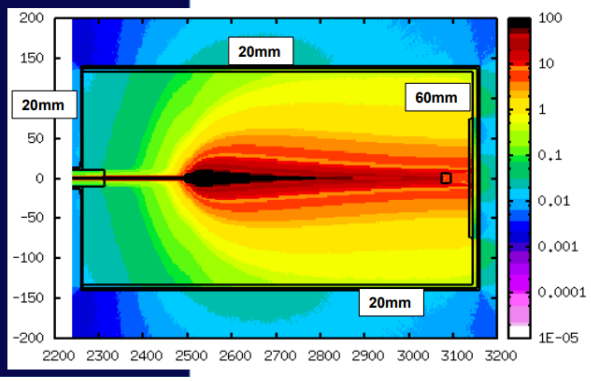
BEATS

BEAmline for Tomography at SESAME

Task 3: Radioprotection calculation, specifications for the hutches

CfT Lead Safety Hutches and Transfer Pipe Shielding - Experiment hutch





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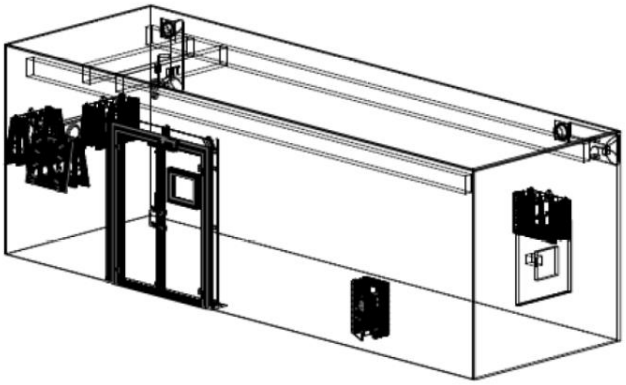
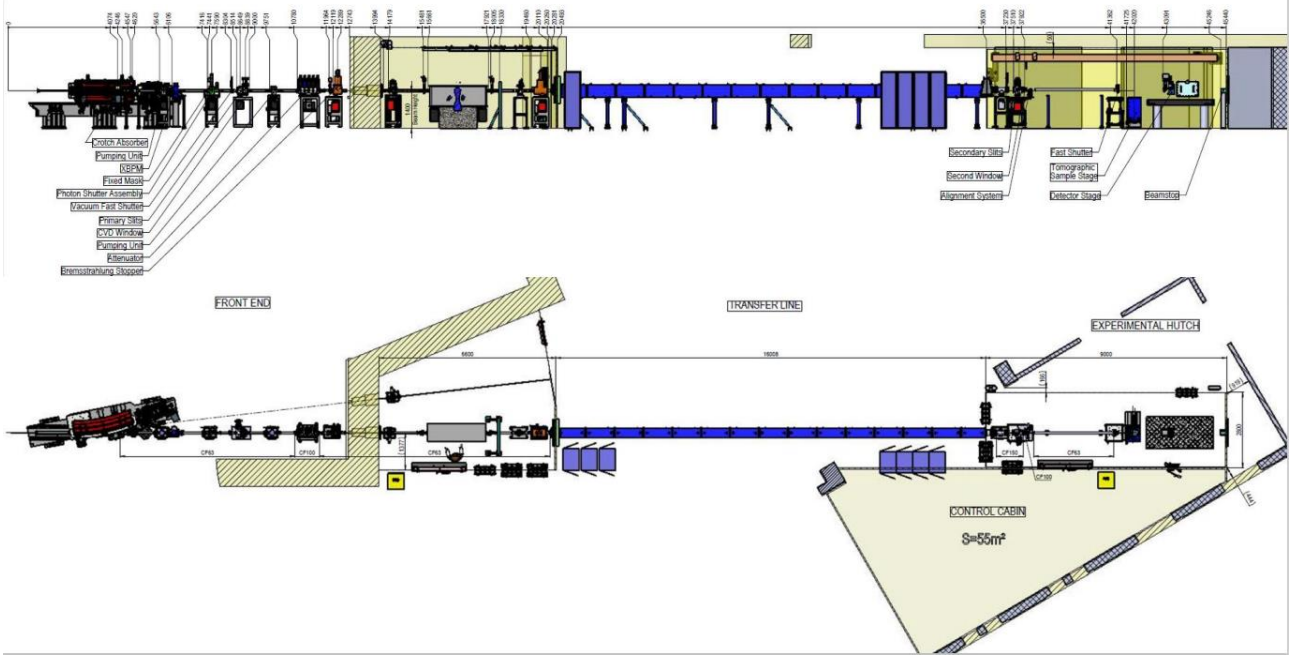
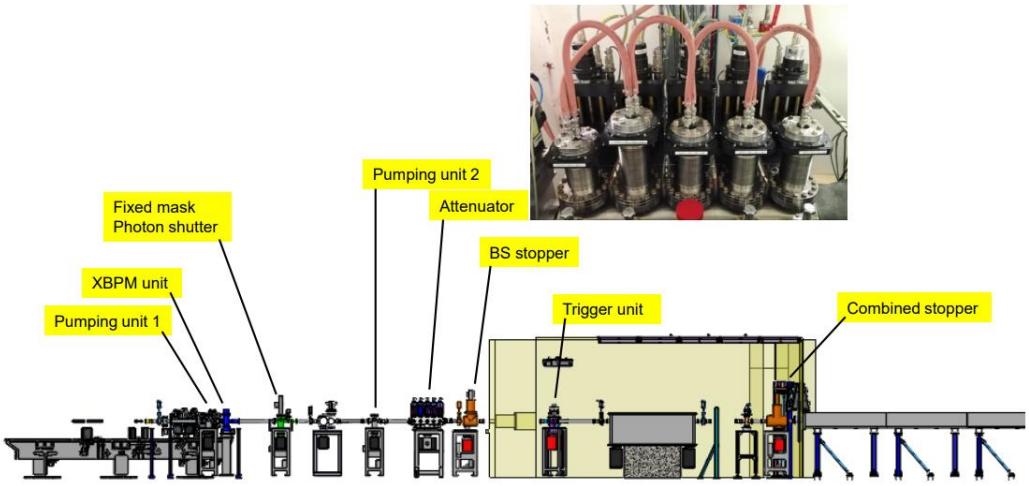


BEATS beamline layout (TDR - August 2020)



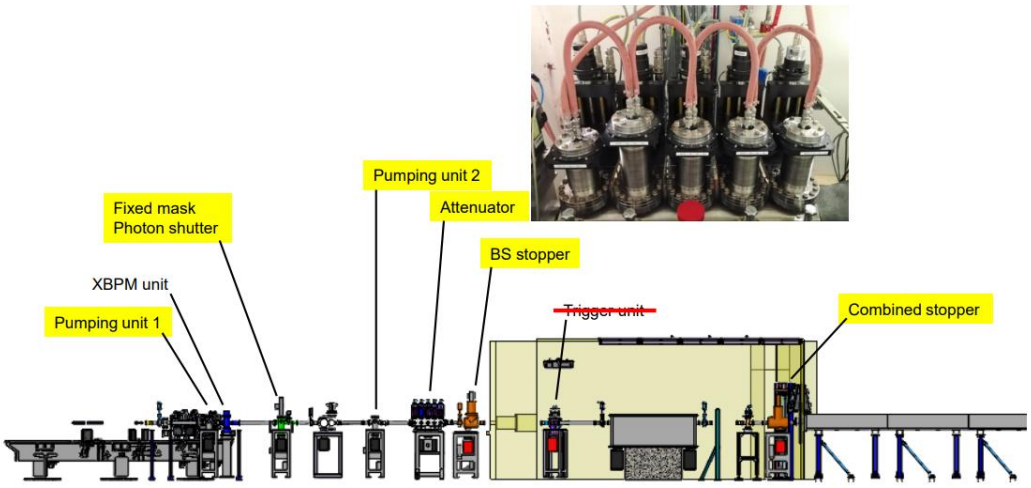
Task 4: Procurement of beamline instrumentation

- **20 Dec. 2020 – CfT BEATS Front End Components**
  - Lot 1: Pumping units; shutter; stoppers; mask; trigger unit
  - Lot 2: Attenuator
  - Lot 3: XBPM



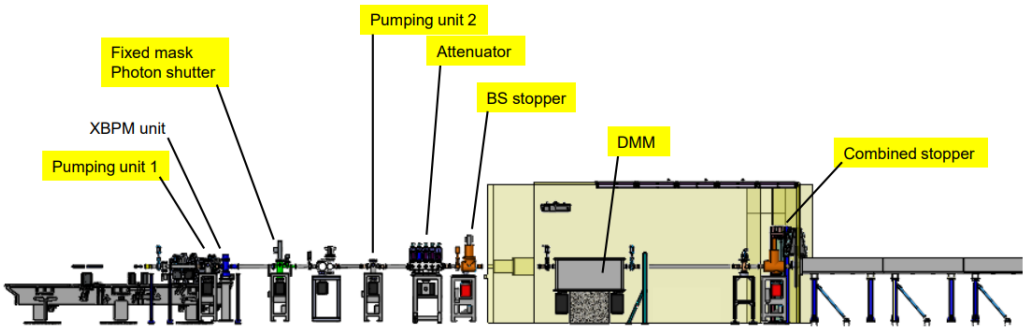
Task 4: Procurement of beamline instrumentation

- **20 Dec. 2020 – CfT BEATS Front End Components**
  - Lot 1: Pumping units; shutter; stoppers; mask; ~~trigger unit~~
  - Lot 2: Attenuator
  - Lot 3: XBPM → wait



Task 4: Procurement of beamline instrumentation

- 20 Dec. 2020 – CfT BEATS Front End Components
- **17 Feb. 2021 – CfT BEATS Double Multilayer Monochromator**



Double Multilayer Monochromator (DMM)

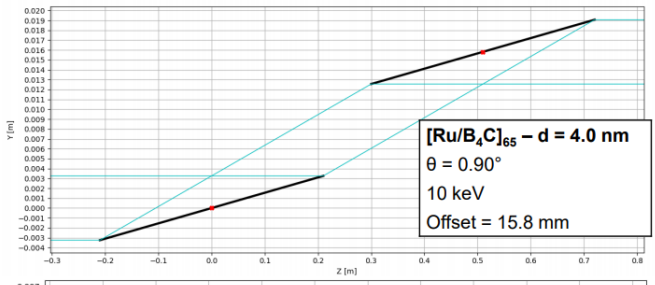
Substrates

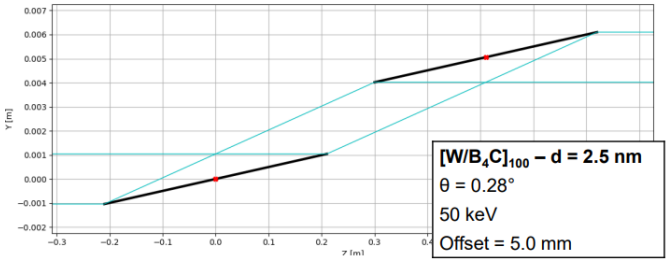
Dimensions	420 mm × 65 mm × 50 mm
Coatings area	400 mm × 25 mm (2 stripes)
Surface roughness (RMS)	< 0.15 nm
Slope error along Z (RMS)	< 0.2 µrad

ESRF
The European Synchrotron
Multilayer laboratory

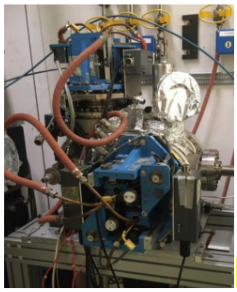
Multilayers

	Stripe 1	Stripe 2
	$[W/B_4C]_{100}$	$[Ru/B_4C]_{65}$
Energies [keV]	20 – 50	8(10) – 22
d-spacing [nm]	2.5	4
Duty cycle γ	0.5	0.5
N. bilayers	100	65
dE/E [%]	~ 2.3	~ 3.1 %
Optical Area [mm²]	400 × 25	400 × 25
Theta (Bragg angle) [deg]	0.29 – 0.75	0.40 – 1.10
Surface roughness (RMS) [nm]	< 0.3	< 0.3
Slope error along Z (RMS) [µrad]	< 0.2	< 0.2

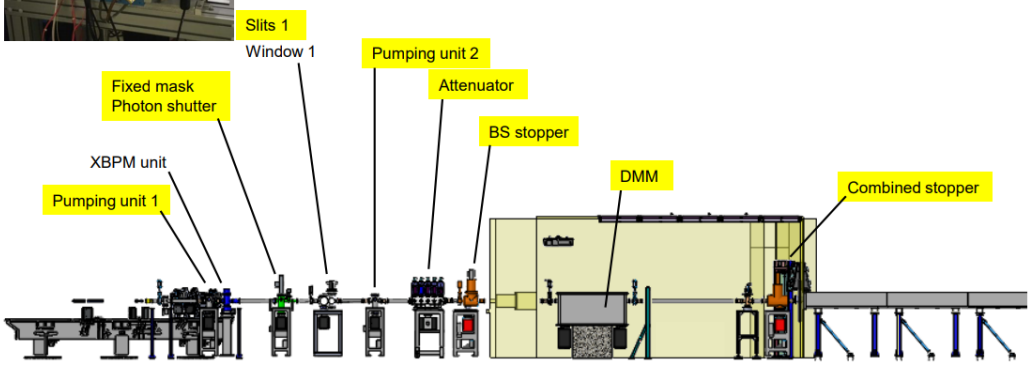




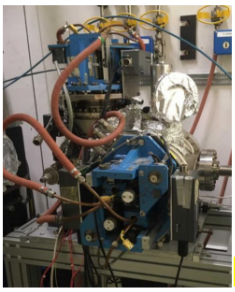
Task 4: Procurement of beamline instrumentation



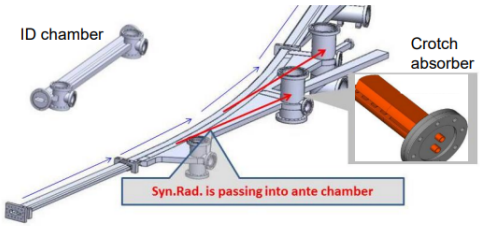
- 20 Dec. 2020 – CfT BEATS Front End Components
- 17 Feb. 2021 – CfT BEATS Double Multilayer Monochromator
- **Front End slits – ESRF ID19 (refurbishment)**

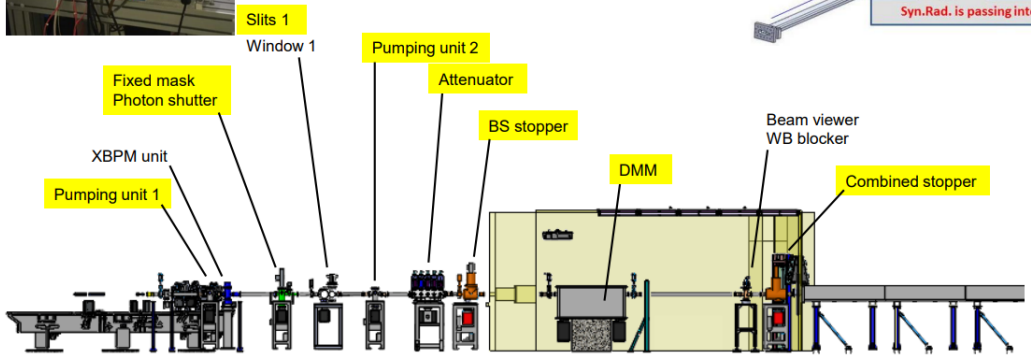


Task 4: Procurement of beamline instrumentation

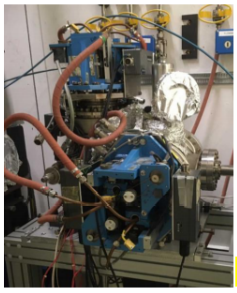


- 20 Dec. 2020 – CfT BEATS Front End Components
- 17 Feb. 2021 – CfT BEATS Double Multilayer Monochromator
- Front End slits – ESRF ID19 (refurbishment)
- **Diagnostic (XBPM, beam viewer)**
- **White beam blocker**
- **ID chamber + Crotch absorber (design)**
- **CVD window 1 and 2**





Task 4: Procurement of beamline instrumentation



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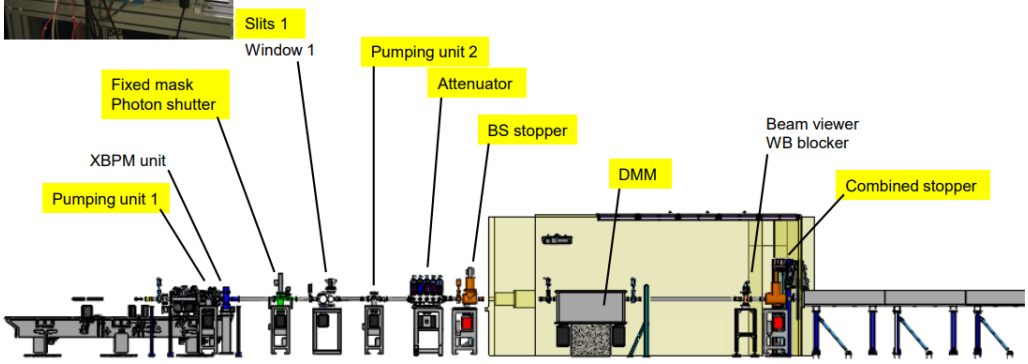
- Front End slits – ESRF ID19 (refurbishment)
- **Diagnostic (XBPM, beam viewer)**
- **White beam blocker**
- **ID chamber + Crotch absorber (design)**
- **CVD window 1 and 2**
- **PSS (ordered)**
- **Pipes, flanges, valves, pumps**
- **Racks, motion boxes, power supplies, cables**



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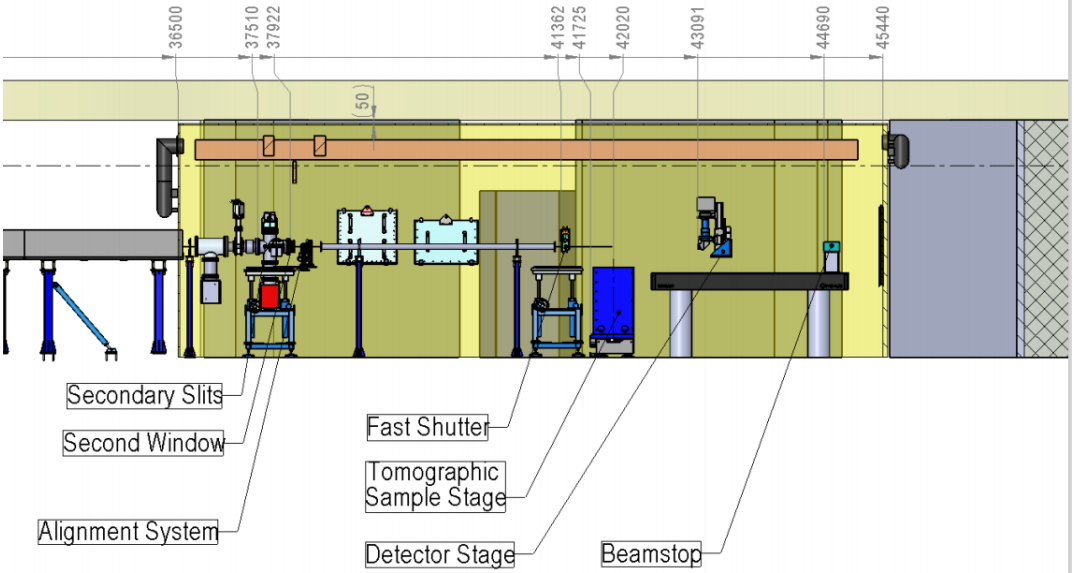
Experiment station



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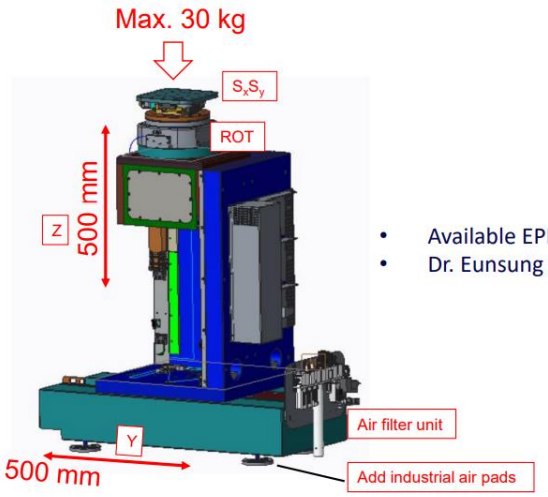
Task 4: Procurement of beamline instrumentation

Sample stage

Heavy-duty, high-precision (ID19 and BM05 @ ESRF)

- Air bearing technology
- Integrated slipring



- Available EPICS driver support only basic motion functions
- Dr. Eunsung Lee, POSTECH, Republic of Korea

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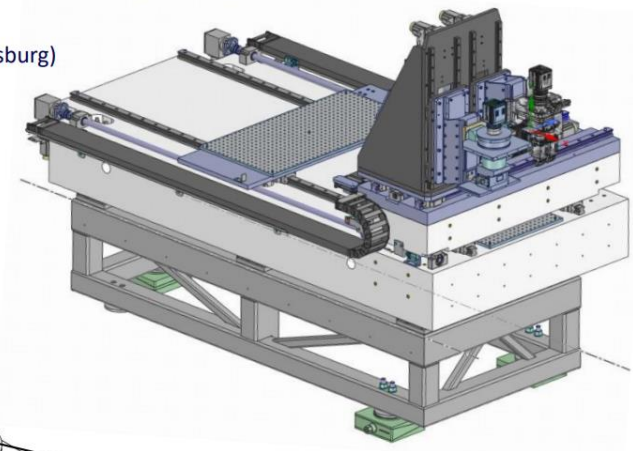
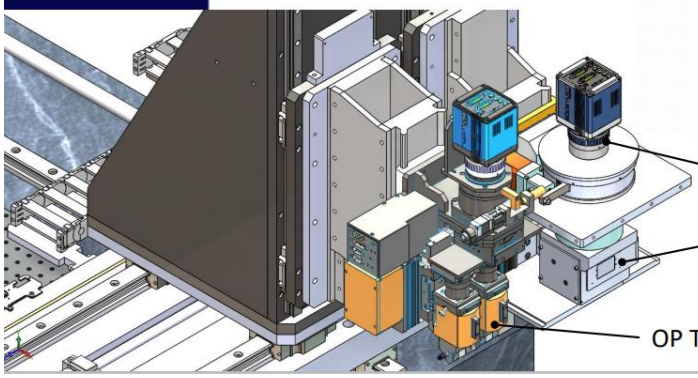
Task 3: Design of beamline instrumentation

Detector stage

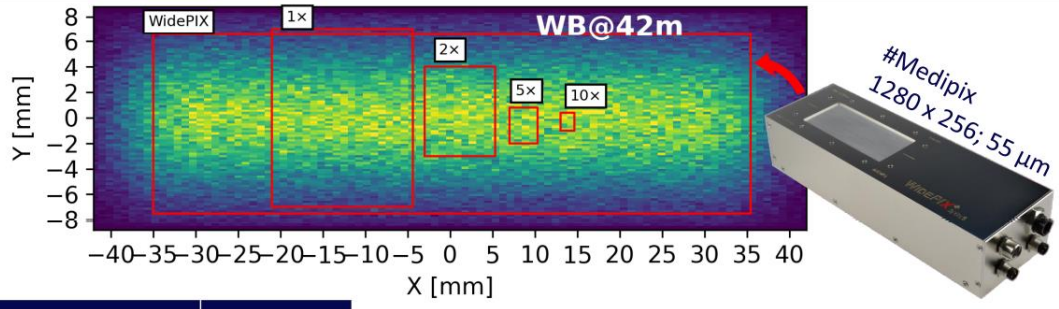
Fortune Mokoena (University of Johannesburg)
Pierre Van Vaerenbergh (ESRF)

- Synergy with ESRF BM5
- Support for 2 detectors
- Characterized vibrational stability

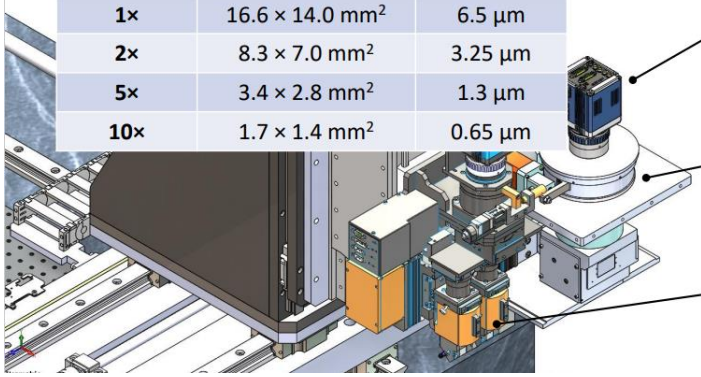




White beam @42m



Magnif.	Field of view	Pixel size
1×	16.6 × 14.0 mm²	6.5 µm
2×	8.3 × 7.0 mm²	3.25 µm
5×	3.4 × 2.8 mm²	1.3 µm
10×	1.7 × 1.4 mm²	0.65 µm



PCO.edge 5.5; 6.5 um pixel size

Low magnification detector (1x; 2x)
White beam compatible
Hasselblad lenses

OP TwinMin (White beam compatible; 2x; 5x; 10x)

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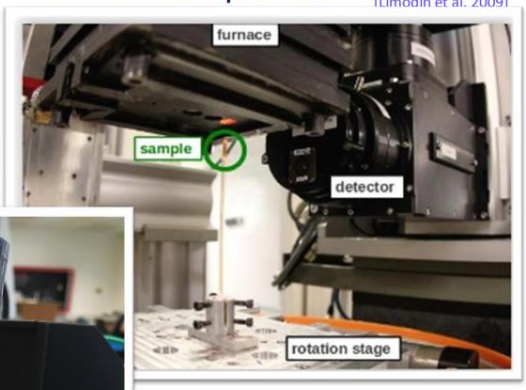
Task 3: Design of beamline instrumentation: sample env.

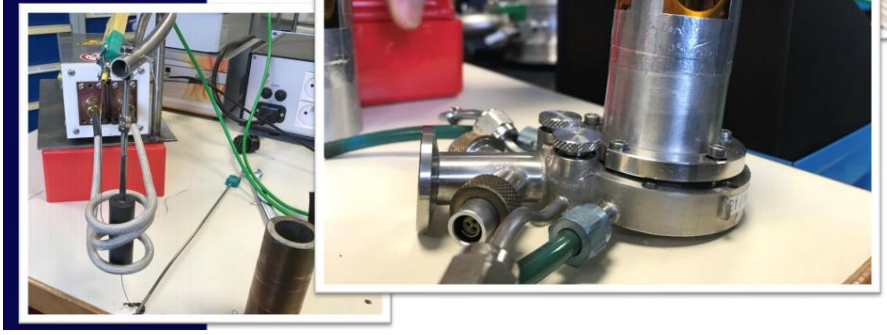
[Limodin et al. 2009]

Furnace

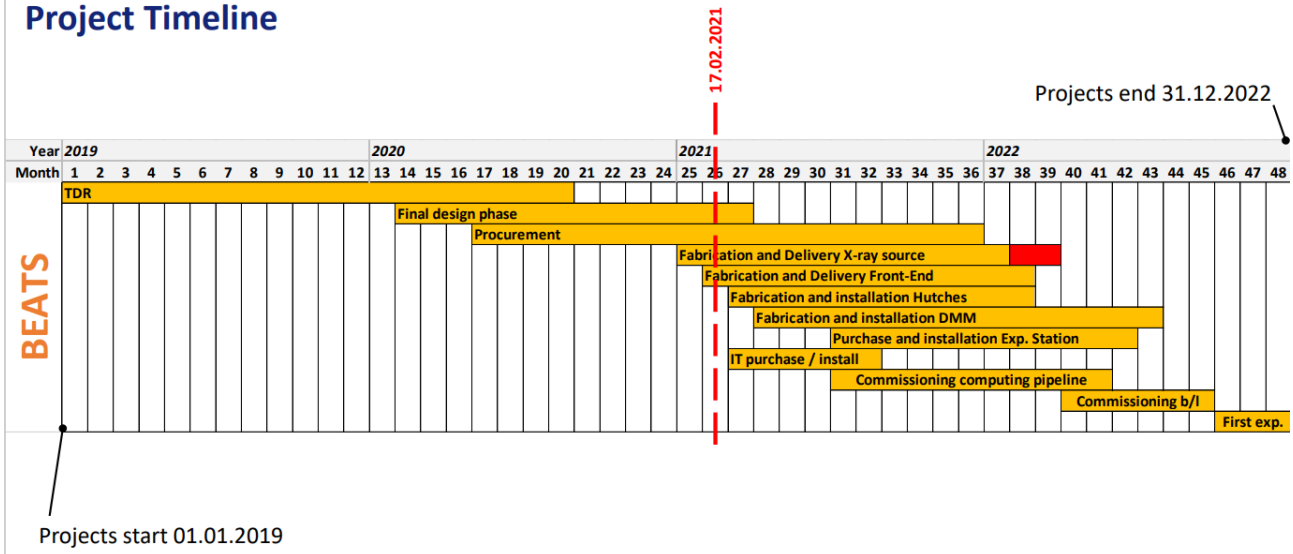
Fortune Mokoena (University of Johannesburg)
Pierre Van Vaerenbergh (ESRF)

- Max. T: 1500°C
- Max. sample size: 5x5mm²
- Resistive VS induction

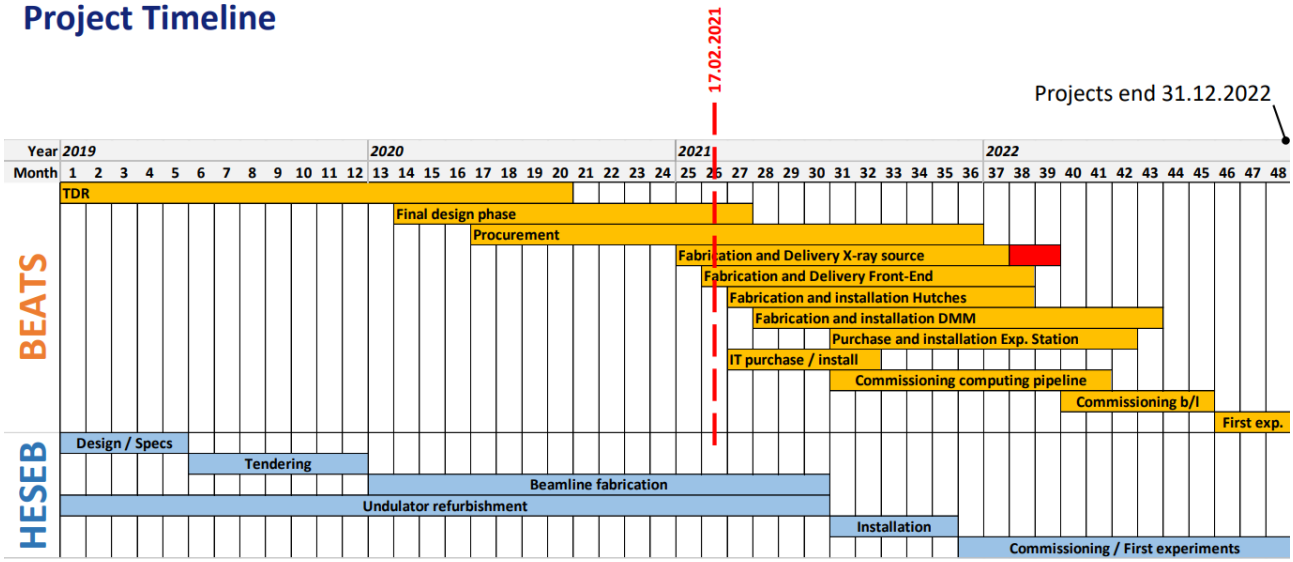




Project Timeline



Project Timeline



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Thank you for your attention

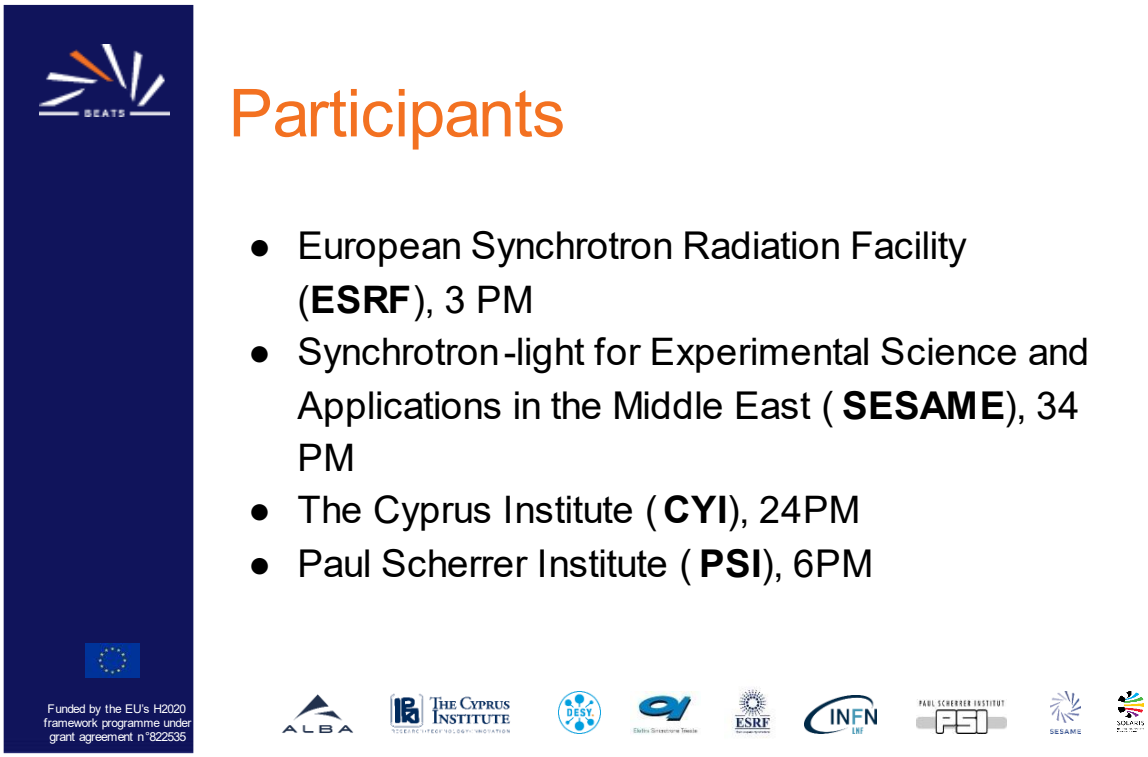
BEATS_eu
@BEATSeu1

PRESENTATION CH. CHARALAMBOS (COMPLEMENT: G. IORI)

BEAmline for Tomography at SESAME (BEATS)

2nd Year Meeting

WP7 - Data Analysis and Management



WP7-Data analysis and management

- **Task 1: Preparation and endorsement of SESAME data policy (SESAME, ESRF, Cyl, PSI); Months 1 – 16**
- **Task 2: Hardware and software requirements definition (SESAME, Cyl, ESRF, PSI); Months 1 – 14**
- **Task 3: Procurement of the hardware (SESAME, Cyl); Months 15 – 29**
- **Task 4: tomography applications - adaptation and data pipelining (ESRF, Cyl, PSI, SESAME) Months 30 – 48**
- **Task 5: Data analysis as a service (Cyl, SESAME) Months 14 - 48**

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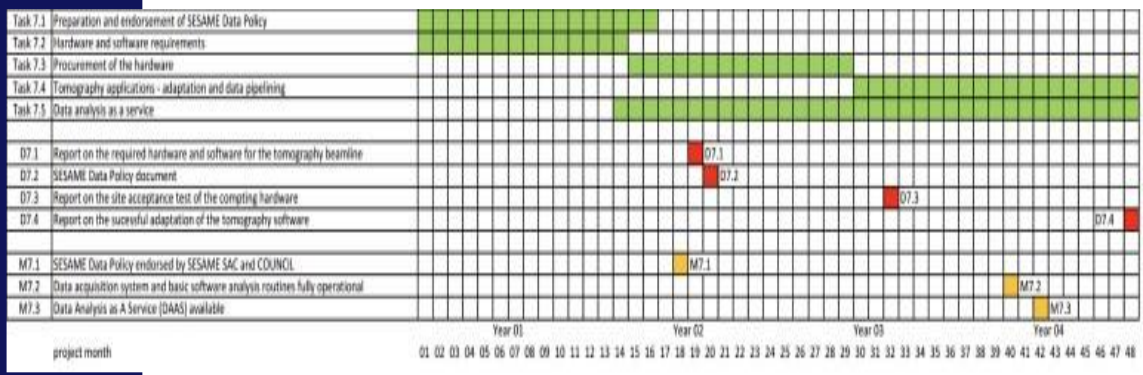
WP7 Gantt Chart



Task 7.1: Submitted
Task 7.2: Submitted
Task 7.3: Ends on M29 (May 2021)
D7.3: M32 (Aug 2021)

Work and reporting on WP7 is on time!

Funded by the EU's H2020 framework programme under grant agreement n°822535

Funded by the EU's H2020 framework programme under grant agreement n°822535

Task 7.1: Preparation and endorsement of SESAME data policy (SESAME, ESRF, CyI, PSI); Months 1 – 16

The SESAME Experimental Data Management Policy defines the rules governing

- **Data ownership**
- **Data curation**
- **Data archiving**
- **Open access to data**

By applying the policy, SESAME is committed to ensuring that there is transparency in the manner in which Experimental Data produced using its facilities is owned, stored, accessed and managed

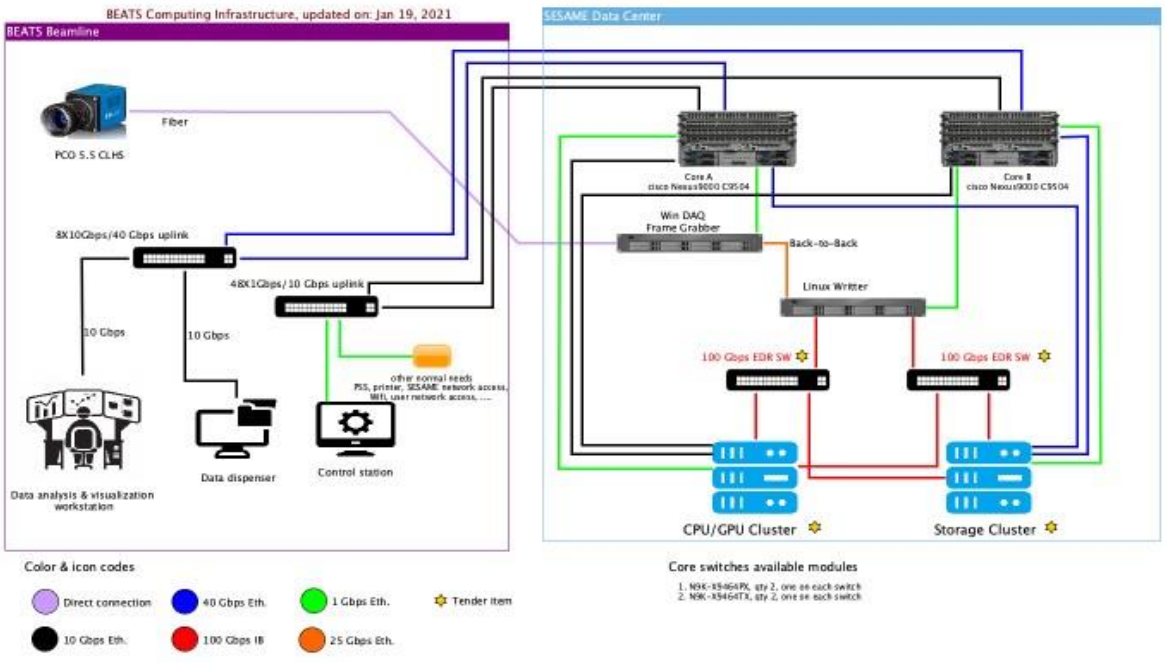
Funded by the EU's H2020 framework programme under grant agreement n°822535

Task 7.1: Preparation and endorsement of SESAME data policy (SESAME, ESRF, CyI, PSI); Months 1 – 16

Progress

- The data policy document has been reviewed from all the involved partners.
- Endorsed by SESAME council in June 2020 (T7.1)
- Successfully submitted in August 2020 (D7.2)
- The policy has been published on SESAME website:

https://www.sesame.org.jo/for -users/user-guide/sesame-experimental-data-management-policy



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Task 7.2: Hardware and software requirements definition. (SESAME, CyI, ESRF, PSI); Months 1 – 14

Progress

D7.1 Report on the required hardware and software for the tomography beamline is successfully **submitted and accepted, August 2020**

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Task 7.3 Procurement of Hardware

10 solution providers were contacted since Jun 2020

1. DDN Company (storage specialist company, Luster file system):
   - No direct reply, but through SMS(#5) company.
2. Synaptic – Apologized:
   - New technology, no experience.
3. JBS (Lenovo):
   - Meeting on Jun 31, 2020
   - Offer received on Nov 29, 2020
   - Total of 335K JOD ≈ **472.5k USD**
   - Request for prices breakdown sent on Nov 29, 2020
   - Updated offer received on Nov 30, 2020
     - ✔ Total of 372.75K JOD ≈ **525.75K USD**
4. GCE (Lenovo):
   - Meeting on Jul 6, 2020
   - Offer received on Aug 27, 2020
     - ✔ Total of 294K JOD ≈ **414.67K USD**
     - ✔ Offer was not clear enough
   - Clarification request along with new specs sent on Nov 22, 2020, they replied on Dec 17, 2020:
     - ✔ Total of 331.1K JOD ≈ **467K USD**
     - ✔ Prices get higher
     - ✔ Problem with quantities, GPFS lic details not clear
   - Meeting request sent on Dec 22, 2020, we met on Jan 2021, updated offer on Jan 25, 2021:
     - ✔ total of 182K JOD ≈ **256.7K USD**
     - ✔ No prices breakdown, one bulk offer.
     - ✔ Quantities not clear
   - Meeting request along with clarifications:
     - ✔ We did not meet yet
     - ✔ Clarifications received: problem with the quantities, After the warranty we can continue using GPFS storage with no support !!
4. SMS (HPE):
   - Meeting on Oct 19, 2020 jointly with DDN
   - Offer received on Nov 22, 2020:
     - 3 years option: 366.25K JOD ≈ **516.58K USD**
     - 5 years option: 454.32K JOD ≈ **640.8K USD**
5. STS (Dell):
   - Meeting on Jul 24, 2020, offer received on Sep 24, 2020:
     - ✔ Just storage: 446.1K JOD ≈ **629.2K USD**
   - Meeting on Oct 14, 2020, offer received on Nov 12 2020:
     - ✔ Full offer, 3 years: **370.68K USD**
     - ✔ Full offer, 5 years: **398.84K USD**
6. 45Drive: Only storage, not PFS.
7. Radiant – No reply.
8. Logicom (technology distributor) redirection to GCE (#4)
9. ClusterVision – based in Netherlands, offer not received yet.

Offers analysis

Company	Storage (K USD)	Computing (K USD)	Notes
JBS	362.49	163.26	Lenovo, GPFS, including the new DAQ servers
GCE	256.7		Lenovo, GPFS, one bulk offer, including the new DAQ servers, problem with the QTY, switches are not mentioned, after 5yrs customer can continue using the FS with no support, costs after the 5 yrs is going to be 20% less of what is shown in the original offer (84.5K USD x 20% less = 67.6K for another 5 13.5 per year), spare parts, SW i.e. slurm and cluster management.
SMS	380.82	135.83	3 years, HPE, Luster FS, including the new DAQ servers, 1 EDR Switch in the Computing part.
	493.66	147.14	5 years, HPE, Luster FS, including the new DAQ servers, 1 EDR Switch in the Computing part.
STS	258.54	112.14	3 years, Dell, GPFS, new DAQ not included
	282	118.25	5 years, Dell, GPFS, new DAQ not included

Budgetary offers averaging (5yrs support):

- **All budgetary offers: 455.87K USD ≈ 376K Euros**
- **Cheapest two offers: 328.47K USD ≈ 271K Euros**

Available Budget:

- **SESAME: 1.9 M competing other WP (131K specifically allocated to WP7)**
- **CYI: 8.2 K for Infrastructure**

Task 7.5 Data Analysis as a Service

Funded by the EU's H2020 framework programme under grant agreement n°822535

Data analysis as a service. Between CYI and SESAME

Network connectivity

- The CyI currently has 0.6 Gbps direct internet connection, with plants to be upgraded to 1 Gbps by the end of 2021.
- Shortly (within one month), SESAME will be connected to GÉANT over 1 Gbps link through Arab States R&E Network (ASREN)
- The CYI is part of the CYNET, the Cypriot NREN is a National Member of GÉANT
- Both networks will be utilised to optimise the transfer of data between the institutions

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Data analysis as a service. Between CYI and SESAME

Storage and Computational Infrastructure

Currently at the CYI with the CYCLONE supercomputer with peak/sustained performance ~600 TFlop/s, and 33 nodes available with more than 20 PB as long term storage available.

Two options are available for BEATS.

- Proprietary access is given to SESAME staff for code development and test the reconstruction pipeline.
- For the users of the SESAME, we will apply for production access for computational resources and storage based on the expected users.

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Data analysis, management and curation

- Software for data reconstruction and data processing:

#	name	URL	features	open source	license type
CT reconstruction					
	TomoPy	https://tomopy.readthedocsio/en/latest/	parallelization, distributed	Yes	
	Nabu	http://wwwsilx.org/pub/nabu/doc/abouthtml	parallelization, distributed	Yes	
	TOMWER	http://wwwedna-site.org/pub/doc/tomwer/latest/	reconstruction workflow manager	Yes	
3D data processing and visualization					
	ImageJ	https://fiji.sc/		Yes	
	Paraview	https://wwwparaview.org/		Yes	
	Dragonfly	https://wwwtheobjectscom/dragonfly/indexhtml	GPU ready; ML ready	No	Academic
	3D Slicer	https://wwwslicer.org/		Yes	
	PALABOS	https://palabos.unige.ch/	fluid dynamics simulations; permeability	Yes	
	Quanfima	https://github.com/rshkarin/quanfima	quantitative analysis of fibrous materials	Yes	
	Calculix	http://wwwcalculixde/	FE solver	Yes	
	iMorph	http://imorph.sourceforge.net/indexhtml	characterization of cellular materials	No	free

[Chrysostomou et al. 2020 - Report on the required hardware and software for the BEATS beamline]

- Synergy between BEATS and The Cyprus Institute:
  - Access to CYCLONE supercomputer for processing of data acquired at BEATS

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ISF-NSFC Joint Scientific Research Program – Ninth round

Cooperation between the National Natural Science Foundation of China (NSFC) and the Israel Science Foundation (ISF), funded by the Chinese and Israeli governments

Sackler Faculty of Medicine
Tel Aviv University

Dr Rachel Sarig Lab
Facial and Dental Anthropology: Evolutionary Aspects in Physiological and Pathological Pro
Human Dentition

Institute of High Energy Physics(IHEP) -computing and data acquisition groups
Prof. Yi Zhang (head of the HEPS data acquisition gr
Prof. Haolai Tian (responsible for the development of HEPS's data analysis s

HEPS | HIGH ENERGY PHOTON SOURCE

中国科学院 CHINESE ACADEMY OF SCIENCES

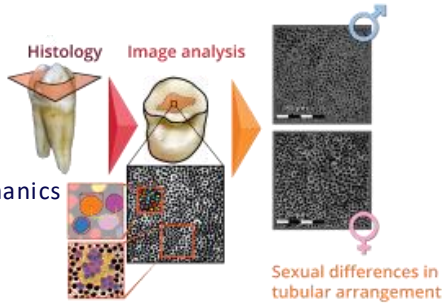
BEAmline for Tomography at SESAME

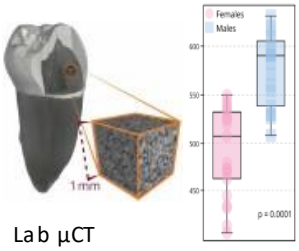
Funded by the EU's H2020 framework programme under grantagreementn°822535

High-throughput synchrotron micro -CT data collection and analysis frameworks for frontier dentin research

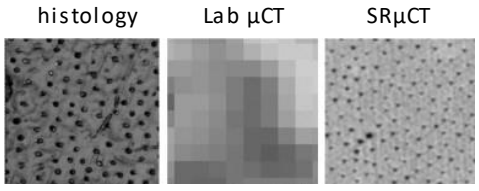
- Reveal sex- and age-related differences in the microstructural properties of human dentin

- Enable tailored clinical intervention
- Improve tooth restoration approaches
- Provide better understanding of tooth biomechanics





Lab µCT



BEAmline for Tomography at SESAME

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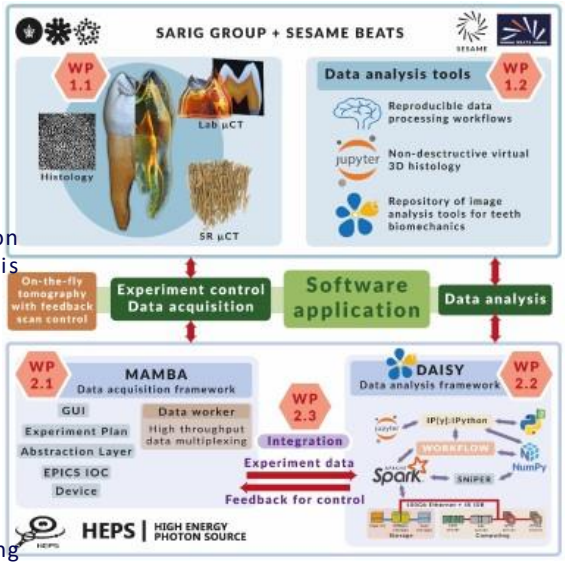
High-throughput synchrotron micro -CT data collection and analysis frameworks for frontier dentin research

WP1: Targeting dentin microstructure using high-resolution SRµCT

- Laboratory µCT
- Histology
- SRµCT @ BEATS
- Tooth/dentin tubules segmentation
- density and microstructure analysis



WP2: Developing data acquisition and data analysis frameworks

- DAQ based on Ophyd/Bluesky
- Feedback control
- High-throughput data collection
- High-performance image processing
- On-the-fly visualization of results