



# CompactLight – 2nd Periodic Report

3rd Annual Meeting | Virtual Glasgow again, 20-25 November 2020



Regina Rochow



## Reporting period: July 2019 – December 2020

“Under Article 19 and Article 20 of the grant agreement (GA), the coordinator must submit to the Commission technical and financial reports, including requests for payment - specifically:

- deliverables identified in Annex 1
- periodic report (both technical and financial) within 60 days of the end of each reporting period (including the final one), including requests for payment ...

26 February 2021

text & data parts ready on:

12 February 2021

[H2020 online manual]

financial parts ready on:

19 February 2021



## Contents of the report:

- part a1: 4 structured tables (**PMO**)
- part a2: forms and lists (**all partners**)
- part b: free text (**all partners**)
- part c: financial report structured forms (**all partners**)



## Summary for publication: mostly ok!

Synchrotron light is electromagnetic radiation generated by charged particles that move at a speed near to the velocity of light on a curved path in accelerating machines called synchrotrons. The produced light, which is billion times more brilliant than light generated by conventional light sources, permits a large spectrum of applications in industry as well as basic and applied research in the fields of physics, chemistry, life sciences and medicine, environmental sciences etc. Currently, more than sixty synchrotron light sources are operational worldwide as giant microscopes for the study of matter.

In view of the huge utility and enormous utilisation of these machines, quantum jumps have been made in the last years in studying and implementing sources of even more intense electromagnetic radiation, called 'Free Electron Lasers' (FELs). These novel machines are based on linear accelerators (Linacs) for electrons followed by chains of undulators that force the high-speed electrons on wiggly trajectories, making them to emit light. The photon flux emitted by a FEL is several orders of magnitude higher than that produced by today's synchrotron radiation sources and consists of light pulses that can be extremely short, with a duration of femtoseconds (fs, 10<sup>-15</sup> sec) and wavelengths below an Ångström (Å, 10<sup>-10</sup> m). This radiation, called hard X-rays, belongs to the high energy range of the X-ray spectrum. At the current state, these characteristics make the FEL the most powerful instrument for basic research on matter.

Given the continuously growing demand in terms of 'beamtime' from the users, FEL sources are however not likewise distributed as synchrotrons, for technical reasons as well as for the huge investment and operation costs required.

CompactLight (XLS) is a H2020 Design Study funded by the European Union that started in January 2018 with a duration of three years. Launched by a group of 22 International Laboratories and two companies it aims at promoting the diffusion of FEL light sources at a global scale. The collaboration, coordinated by Elettra-Sincrotrone Trieste, brings together experts from the fields of electron sources, Linacs, and the structures required for the production of photons, to work on the 'Conceptual Design' of extremely compact FEL sources, with advanced performances and contained costs, in order to permit their diffusion also in contexts, where the financial resources for research are rather limited.



## Work performed and main results: to be updated (PMO)

The key concept of the project, which started in January 2018 with a duration of three years, is to use cutting-edge technologies for realizing each of the different components of a FEL facility, combining them into a single, highly innovative machine: (a) the most advanced electron sources and photo injectors, (b) very high-gradient normal conductive radio-frequency (RF) structures, operating at 12 GHz, developed at CERN in the context of the Compact Linear Collider (CLIC) study group, to increase the global efficiency of the machine and reduce the required length of the linac at a fixed energy of the electron beam, and (c) short period undulators of the last generation to obtain high energy photons with lower electron energies as compared to present-day machines.

Large progress in defining the machine parameters and designing each single subsystem has been made by the partners in the first reporting period of the project. Options for a very compact beam injector in the S-, C- and X-band of frequencies have been investigated and discussed. The definition of a standardised rf unit for the X-band linac is progressing, a component that could even be used as a stand-alone element for smaller projects, i. e. a university-scale Compton source, or smaller FELs for special applications that can be constructed and operated with smaller budgets. New concept undulators like superconductive undulators and cryogenic permanent-magnet undulators, as well as exotic schemes, like microwave undulators have also been, and are still, under investigation.

The collaboration is considering the design of two FEL sources, Soft X-ray (SXR, at lower energies) and Hard X-ray (HXR, at higher energies) that cover the wavelength range from 5.0 nm to 0.08 nm (from 0.25 keV to 16.0 keV), with the possibility to use the two sources contemporarily at 100 Hz, and individually with HXR at 100 Hz and SRX up to a repetition frequency of 1 KHz.

Besides technical feasibility, the choices of the machine parameters are essentially driven by the expectations of the FEL user community concerning photon beam characteristics of future FEL sources and the vision of the consortium to providing a real cutting-edge facility with unique performance and opportunities. In order to explore the scientific users' requests, the partners have established a dialogue with them through presentations and discussions at relevant conferences and workshops, the conduction of an XLS User Survey, and a User Meeting with participation of representatives of the community held in the end of November 2018.



## Progress, expected results, impact: to be updated (PMO)

The overall concept underlying the project is to bring together recent advances in the main technical FEL sub-systems, i.e. electron photo-injector, linac accelerating structures and undulators, to produce the design of a next-generation facility with significantly lower cost and size than existing facilities. This brings to the use of very low emittance and higher repetition-rate sources, high-gradient linacs, high-efficiency klystrons, improved diagnostics, advanced undulators, the whole facility is being simulated using the most advanced beam dynamics and optimization tools, allowing to design such a cutting-edge facility.

The project will deliver to the scientific community a conceptual design of a machine with unique performance parameters and beam characteristics. The report will also include cost analyses and other strategic documents that support the decision-making process for constructing new facilities, or upgrading existing ones, using CompactLight technologies. The project will also consider the complementary use of the technology for small infrastructures, that can be installed and operated at universities. Project data not affecting the potential exploitation of results by the partners will be made accessible as Open Data to facilitate the use of the technologies.

The major goal of CompactLight is to make the construction and operation of X-ray FELs feasible for smaller countries, regions and universities. This will support their wide-spread availability, reducing oversubscription of existing machines, and creating more and unique research opportunities for the scientific users. Given the large importance of FELs their wide dissemination will have an enormous impact on many different research fields, create access opportunities in more countries, and contribute significantly to European scientific and industrial competitiveness. An important aspect is also the coordinated flow of expertise from Europe's larger research institutions to the smaller ones with ambitions to engage in cutting-edge photon science.

Major technology areas benefitting from the project are (a) high brightness e-sources (b) rf production and beam acceleration, (c) high-precision diagnostics, (d) undulators and photon production, etc., each of them with large application potential that goes beyond CompactLight and with clear opportunities for industries.

## Images attached to the summary: to be updated (PMO)

777431 (XLS) RIA  
THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION  
**HORIZON 2020**  
Call: H2020-INFRADEV-2016-2017  
Topic: INFRADEV-01-2017 Unit: RTD/G/03

Summary for publication ✓

Deliverables Ethics, DMP, Other Reports i

Milestones i

Critical Risks ✓

Publications ✓

Disseminat... ✓

Patents (IPR) ✓

Open Data i

Gender ✓

ABS Regulation i

### Summary for publication

Address (URL) of the project's public website

Images attached to the Summary for publication Upload

Image Name	Image Description	Actions
<a href="#">CompactLight_Participants_Review-Helsinki-2019-2.JPG</a>	CompactLight Midterm Review Helsinki 2019 - Participants	✗
<a href="#">CompactLight_Participants_Review-Trieste-2018.jpg</a>	CompactLight Midterm Review Trieste 2018 - Participants	✗
<a href="#">XLS-Partners-margin.png</a>	CompactLight Partnership Logos	✗
<a href="#">XLS_logo_2000x1000.png</a>	CompactLight Project Logo	✗
<a href="#">XLS_map.png</a>	CompactLight Partnership Map	✗

Validate

## Need to update the 'continuous reporting' data:

SyGMA - System for Grant Management - Google Chrome  
 ec.europa.eu/research/participants/grants-app/reporting/DLV-777431

Grant Management Project Continuous Report

777431 (XLS)	RIA	Summary for publication	Deliverables Ethics, DMP, Other Reports	Milestones	Critical Risks	Publications	Disseminat...	Patents (IPR)	Open Data	Gender	Regulation
		ok!	ok!	ok!	ok!	ok!	ok!	ok!	ok!	ok!	ok!

but...

**OPEN DATA:**  
in final report,  
action needed!!

send us all your **PUBLICATIONS**

see website, must be 'OPEN ACCESS', with acknowledgement

**all partners:**  
please send lists by  
**11 Dec 2020**

Integrate the list in our Collab. Workspace (WP1) with your

- **CONFERENCES** attended
- **PRESENTATIONS**
- **POSTERS**
- **PUBLIC EVENTS**

[https://espace.cern.ch/compactlight/WP1/\\_layouts/15/start.aspx#/SitePages/Home.aspx](https://espace.cern.ch/compactlight/WP1/_layouts/15/start.aspx#/SitePages/Home.aspx)



Grant Management | Project Continuous Report

777431 (XLS)	RIA	Summary for publication	Deliverables Ethics, DMP, Other Reports	Milestones	Critical Risks	Publications	Disseminat...	Patents (IPR)	<b>Open Data</b>	Gender	ABS Regulation

Call: H2020-INFRADEV-2016-2017  
Topic: INFRADEV-01-2017 Unit: RTD/G/03

## Open Data

This project does not have open data

Open Datasets suggested

Project Open Datasets

**New Open Dataset**

Please verify or correct the information about the dataset and fill-in any additional information when possible

**D.O.I.**

**Repository Link**

Non-Repository Link

Title

Is Dataset accessible?  Yes  No

Is Dataset reusable?  Yes  No

D.O.I. linked Publication

\* mandatory fields

# How?

DOI needed!!

Repository link needed



New service for H2020 & HE projects

## Open-access articles: How?

**Rapid & Transparent Publishing**  
Fast publication and open peer review for research stemming from Horizon 2020 funding across all subject areas.

**SUBMIT YOUR RESEARCH**

- open access
- peer-reviewed
- free of charge for authors

ARTICLES COMING SOON

We are accepting submissions for these subject areas

- |                            |                                      |                         |
|----------------------------|--------------------------------------|-------------------------|
| Natural Sciences           | Medical and Health Sciences          | Social Sciences         |
| Engineering and Technology | Agricultural and Veterinary Sciences | Humanities and the Arts |

- Enables researchers to publish any research they wish to share, supporting reproducibility, transparency and impact.
- Uses an open research publishing model: publication within days of submission, followed by open invited peer review.
- Includes citations to all supporting data and materials, enabling reanalyses, replication and reuse.

STAY INFORMED

<https://open-research-europe.ec.europa.eu/>



## Required text contributions

### From WP and task leaders

#### Insert in Overleaf WP text document:

- Short description of WP activities and expected results, partners, deliverables, timing... (from last report)
- Description of the work performed in the WP and the tasks during the reporting period
- Overview of the progress made in the WP towards the project's objectives

#### Insert in Overleaf deviations section:

- Description and justification of all deviations from the original planning (description of work) in the WP

### From each partner

#### Send to WP Leaders:

- Detailed description of the partner's contribution to the work carried out in each WP and task in the WPs

#### Insert in Overleaf deviations section or send to Gerardo, Regina & Andrea:

- Descriptions and justifications of all deviations from the original planning of the single partner, divided in:
  - Use of resources (planned financial or human resources etc.)
  - Unforeseen subcontracting (if any)
  - Unforeseen use of in kind contribution from third party against payment or free of charges



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4.4.2	Partner Pyy, Acronym	20
4.4.3	Partner Pzz, Acronym	21

### Work carried out:

- Coordinated by WP Leaders for their WP
- Review by WP partners and PCO

### Deviations in WPs:

- Coordinated by WP Leaders for their WP
- Review by WP partners and PCO

### Other deviations:

- Each partner with deviations
- Review by PCO

### Objectives & Impact:

- PCO will review text from last time

### Exploitation Plan:

- Update: Evangelos, Dimos, Regina
- Review by 'Assets' Working Group

### Data Management:

- Update: Andrea, Regina, Gerardo
- Review by PCO, Communication Team

all texts to be ready for review by  
**12 February 2021**



Menu

XLS\_2nd\_Periodic-Report\_2020

Review
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Rich Text

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    - 📄 XLS\_template.tex
- > File outline

```

34 Synchrotron Radiation is a fundamental tool for the
study of materials in a wide spectrum of scientific
and technological fields. The latest generation of
light sources, Free Electron Lasers (FELs) driven by
linacs, are delivering photon beams with
unprecedented performance in terms of brightness,
pulse duration and coherence and open substantially
novel ways to probe matter. These light sources
provide a very high, largely unexplored potential for
innovation in science and technology and the demand
for such facilities is worldwide continuously
increasing, spurring plans for new dedicated
machines. However, their high costs and complexity
impede their wide diffusion and at present, only
major accelerator laboratories in economically strong
have enough resources to construct and operate
them.\\
35
36
37 In view of this situation, CompactLight (XLS) is
reconsidering now costs and spatial issues
particularly for the hard X-ray facilities driven by
long and expensive multi-GeV normal conducting
linacs. The H2020 design study started in January
2018 and has a duration of 4 years. The project's
main objective is to facilitate a widespread
development of X-ray FEL facilities across Europe and
beyond, by making them more affordable to construct
and operate, through an optimum combination of
emerging and innovative accelerator technologies.
38
39 %*****%
40 % Subsection 1.1: Project Objectives
41 %*****%
42
43 \subsection{General project objectives}
44
45 % List the specific objectives for the project as
described in section 1.1 of the DoA and described the
work carried out during the reporting period towards
the achievement of each listed objective. Provide
clear and measurable details.
46 % PCO
47
48 The project intends to design an hard X-ray FEL
facility beyond today's state of the art, using the
latest concepts for bright electron photo injectors,
```

Funded by the  
European Union

XLS-Report-2021-001  
28 February 2021

## XLS Periodic Report

2nd Reporting Period:  
01/07/2019 - 31/12/2020

G. D'Auria<sup>1)</sup>, J. Clarke, M. Ferrario, W. Wuensch,  
F. Nguyen, A. Aksoy, R. Rochow, A. Cianchi, A. Latina

On behalf of the CompactLight Partnership

Prepared on: 12.11.2020

This project is funded by the European Union's Horizon2020 research and innovation programme under Grant Agreement No. 777431. The contents of this report reflect only the view of the CompactLight Consortium. The European Commission is not responsible for any use that may be made of the information it contains.

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XLS
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Page 2
Abstract



Grant Management Project Periodic Report

Project: 5555 ABC R&I project

HORIZON 2020

Period No: 1 Duration (months): 5  
Reporting Period: [01/08/2014 - 01/01/2015]

Publicisable Summary	Report Core	Deliverables	Milestones	Critical Risks	Genders	Financial Statements
✓	i	i	i	✓	✓	i

Grant Management Project Periodic Report

Beneficiary 1:

Legal Name: [redacted]  
PIC: [redacted] Status: [redacted]  
Legal Address: [redacted]

Financial Statement

Financial Statement

Financial information from contract:

No contribution requested!  Yes  No

Financial Statements

Period	Adjustment	Requested Contribution
01 Jul 2015 - 31 Dec 2016 (Period No. 2)	0.00	0.00 €

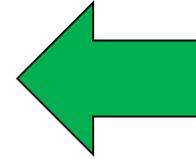
Financial statements for period:

Eligible costs:

Cost Category	x	Item Cost	Number of Units
a) Direct personnel costs declared as actual costs			
b) Direct personnel costs declared as unit costs (average costs)			
▼ c) Direct personnel costs declared as unit costs			
ct) SME owner/Natural person costs		32.15 €	x 0.00
d) Direct costs of subcontracting			
e) Direct costs of providing financial support to third parties			
f) Other direct costs			
g) Costs of internally invoiced goods and services			
h) Indirect costs (= 0.20 * (a + b + c + f + h - p))			
i) Total costs (= a + b + c + d + e + f + h + i)			
j) Receipts			
k) Maximum EU contribution (= 100% * k)			
l) Requested EU contribution			

additional information for indirect costs:

Use of costs of in-kind contributions not used as premises? (p)  Yes  No



Each partner + KyTe:  
the forms for individual financial statements will be available here

to be electronically signed & submitted by your Project Financial Signatory:

## PFSIGN

Make sure to have one!!! Assign an FSIGN role to the project in your organisation



## REPORT ON EXPLANATIONS ON THE USE OF RESOURCES

Project Number	777431
Acronym	XLS
Period Number	1st
Period covered	From 1/Jan/2018 to 30/Jun/2019

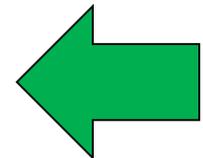
Beneficiary Number	1
Beneficiary Short Name	ST

(effort) pm per WP  
 Consistent with partner's activity description in the WPs

### Direct personnel costs

#### 1. Direct personnel costs declared as actual costs

Person months	Associated WP
15.16	1
1.8	2
1.76	3
0.98	4
0.66	5
2.13	6
3.88	7





## REPORT ON EXPLANATIONS ON THE USE OF RESOURCES

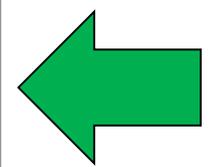
<b>Project Number</b>	<i>777431</i>
<b>Acronym</b>	<i>XLS</i>
<b>Period Number</b>	<i>1st</i>
<b>Period covered</b>	From <i>1/Jan/2018</i> to <i>30/Jun/2019</i>

other direct costs  
with explanation

<b>Beneficiary Number</b>	<i>1</i>
<b>Beneficiary Short Name</b>	<i>ST</i>

**Other direct costs: explanation of major cost items if the amount exceeds 15% of personnel costs**

Short description	Category	Associated WP	Foreseen in Annex 1	Explanations (if not foreseen in Annex 1)	Costs
<i>Kick-off Meeting; Annual Meeting; Workshops; XLS User Meeting; Face to Face Meeting.</i>	<i>Travel</i>	<i>1</i>	<i>YES</i>		<i>12 667.24 €</i>
<b>TOTAL</b>					<i>12 667.24 €</i>





#	Acronym	Total Costs approved	% Total Costs Approved	Total Budget
		state: November 2019		Grant Agreement
1	ST		49%	
2	CERN		59%	
3	STFC		32%	
5	IASA		9%	
6	UU		42%	
9	UA-IAT		26%	
10	ULANC		21%	
11	VDL ETG		13%	
12	TU/e		11%	
13	INFN		3%	
14	Kyma total		20%	
	Kyma srl		35%	
	KyTe		13%	
15	SAPIENZA		56%	
16	ENEA		59%	
17	ALBA-CELLS		59%	
18	CNRS		26%	
19	KIT		77%	
20	PSI		56%	
21	CSIC		66%	
22	UH/HIP		14%	
23	VU		53%	
24	USTR		72%	
	<b>Total</b>		<b>41%</b>	

← 85% received!!

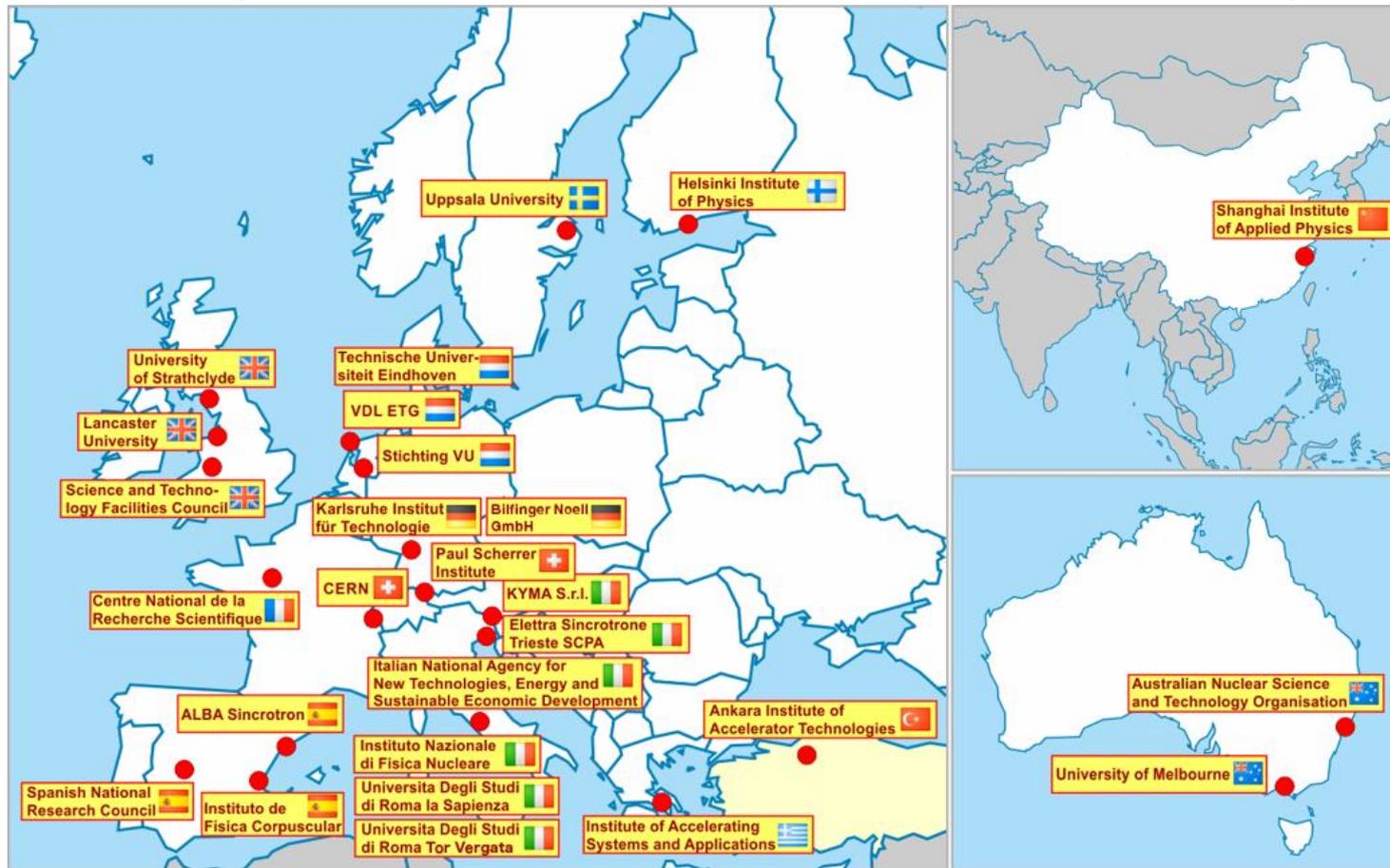
Financial statement submission deadline:  
**19 February 2021**



# Thank you!

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CompactLight is funded by the European Union's Horizon2020 research and innovation programme under Grant Agreement No. 777431.

