



Welcome to

CompactLight Complementary Use and Opportunities

Workshop

November 8-9, 2021

Gerardo D'Auria

Elettra – Sincrotrone Trieste

on behalf of the CompactLight (XLS) Collaboration

<http://www.compactlight.eu>



The goal of the workshop is to investigate possible complementary uses of the design developed in the context of the CompactLight Project.

Workshop numbers:

- 19 Presentations
- 100+ Participants



Monday 08-11

Chair E. Longo Elettra-ST	14:00	14:15	Welcome and Introduction	Gerardo D'Auria
	14:15	14:35	X-ray phase contrast CT - moving closer to clinical implementation: recent experiences and planned activities at the IMBL	Patrick Brennan
	14:40	15:00	Multiscale phase contrast imaging in biomedical research: the experience at Elettra - Part I	Cristian Dullin
	15:00	15:15	Multiscale phase contrast imaging in biomedical research: the experience at Elettra - Part II	Giuliana Tromba
	15:20	15:40	Potential biomedical imaging with ICS sources - prospects for dual-energy applications	Paolo Cardarelli
Chair E. Granados CERN	15:45	16:05	ICS system application for semiconductors wafer inspection	Jos de Klerk
	16:10	16:25	Break	
	16:25	16:45	High gradient accelerators, electromagnetic undulators and Compact light sources	Giuseppe Dattoli
	16:50	17:10	ICS studies at CERN	Vlad Musat
	17:15	17:35	Optical cavities for ICS	Aurelien Martens
	17:40	18:00	Burst mode high-power ps pulses at GHz repetition rates	Eric Cormier

Tuesday 09-11

Chair A. Latina CERN	14:00	14:20	The Munich Compact Light Source	Martin Dierolf
	14:25	14:45	The ThomX project statu	Hugues Monard
	14:50	15:10	The STAR Infrastructure	Raffaele Agostino
	15:15	15:35	Towards Ångström Laser @ FREIA	Vitaliy Goryashko
	15:40	16:00	Very Compact Inverse Compton Scattering Gamma-ray Source at Tsinghua University	Jiaru Shi
Chair G. D'Auria Elettra-ST	16:05	16:20	Break	
	16:20	16:40	BoCXS: An ICS-Based Multipurpose Compact X-ray Source	Massimo Placidi
	16:45	17:05	Smart*Light: a compact hard X-ray ICS source based on X-band acceleration	Otger Jan Luiten
	17:10	17:30	EuPRAXIA@SPARC_LAB: An X-band linac as driver for plasma acceleration	Massimo Ferrario
	17:35	17:55	The CHUV-CERN collaboration on a high-energy electron FLASH therapy facility	Walter Wuensch
	18:00	18:20	Development of C-band electron linacs for FLASH-RT at La Sapienza University & INFN	Luigi Palumbo

For all the speakers: please upload our presentation on the indico web page



The CompactLight Project (XLS) is an EU funded design study aimed at promoting the construction of the next generation FEL based photon sources with innovative accelerator technologies.

The XLS Collaboration includes in total 26 Partners:

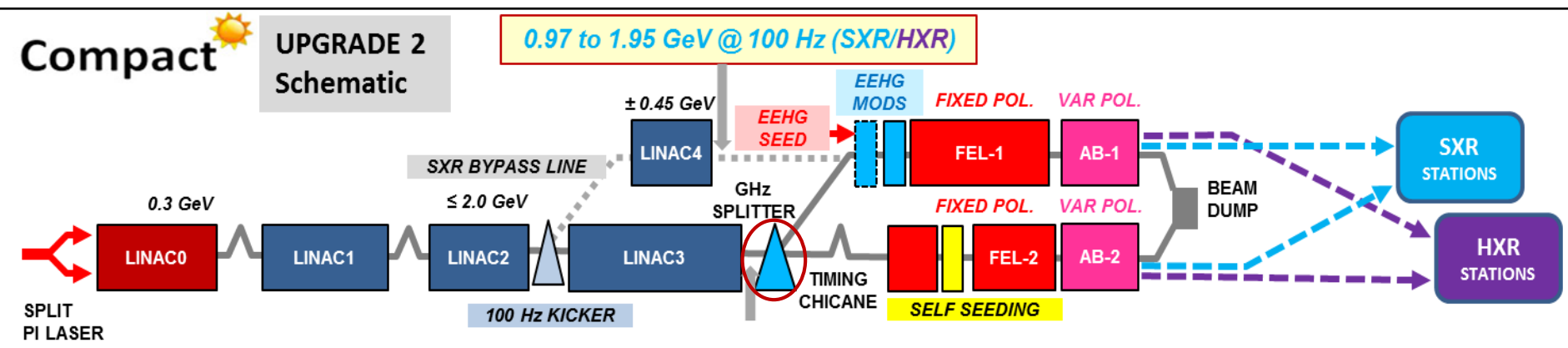
23 International Laboratories and Universities + 3 Private Industries.

Its main deliverable is the conceptual design of a high energy linac (5.5 GeV), based on C and X band technologies, with short period SC undulators, to drive a FEL facility with soft and hard X-ray options.



Compared with the current facilities, the CompactLight design will be:

- ✓ **significantly more compact** (using high gradient structures + SC undulators);
- ✓ **more efficient** (lower power consumption);
- ✓ **more affordable** (much lower construction and running costs).



Operating modes:

- ✓ 0.97 to 1.95 GeV @ 1000 Hz (SXR/SXR)
- ✓ 2.75 to 5.5 GeV @ 100 Hz (HXR/HXR)
- +
- ✓ 2.75 to 5.5 GeV @ 100Hz (SXR/HXR at the same time)

CDR will be ready at the end of 2021

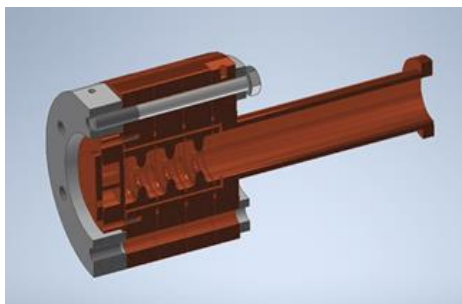
**e⁻ beam
(HXR)**

Parameter	Value
Max energy	5.5 GeV @ 100 Hz
Peak current	5 kA
Normalised emittance	0.2 mm.mrad
Bunch charge	< 100 pC
RMS slice energy spread	10 ⁻⁴
Max photon energy	16 keV
FEL tuning range at fixed energy	×2
Peak spectral brightness @ 16 keV	10 ³³ ph/s/mm ² /mrad ² /0.1%bw

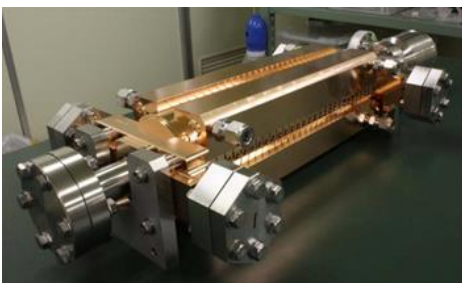
FEL

Parameter	Unit	Soft-x-ray FEL	Hard-x-ray FEL
Photon energy	keV	0.25 – 2.0	2.0 – 16.0
Wavelength	nm	5.0 – 0.6	0.6 – 0.08
Repetition rate	Hz	1000	100
Pulse duration	fs	0.1 – 50	1 – 50
Polarization		Variable, selectable	Variable, selectable
Two-pulse delay	fs	±100	±100
Two-colour separation	%	20	10
Synchronization	fs	<10	<10

Main sub systems designed in the context of CompactLight

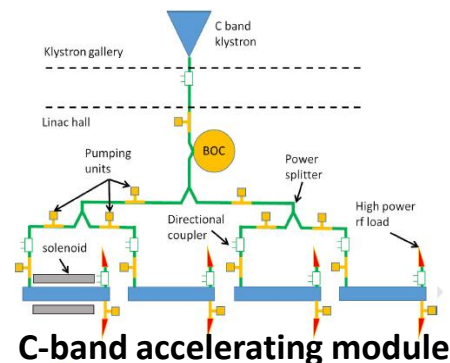


C-band photoinjector

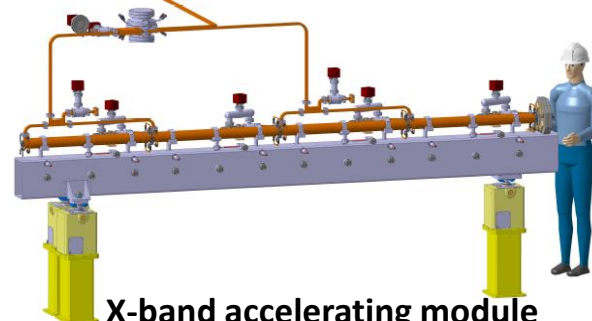


C- and X-band accelerating structures

Two
prototypes
under
construction
in the context
of the I.FAST
project

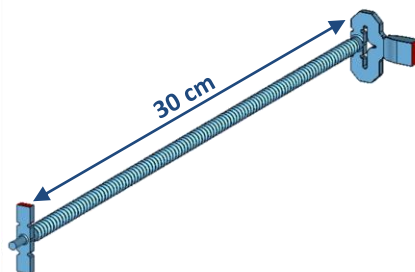


C-band accelerating module

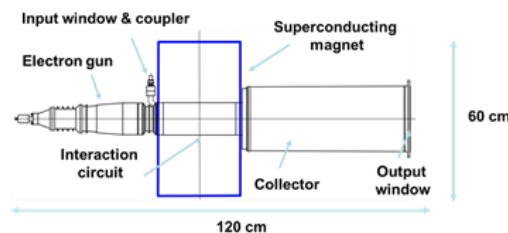


X-band accelerating module

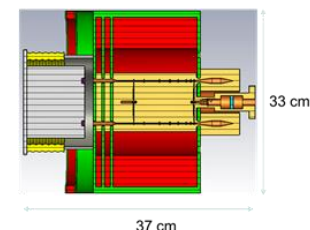
The XLS
Collaboration
is also strongly
promoting with
industry the
development of
C- and X-band
high power RF
sources that can
operate
up to 1 KHz



K_a-band structure for beam linearizer



Gyro-klystron



Multi-beam klystron

K_a-band RF sources



Del.	Deliverable name	Type/Del. date	Yr
D1.1	CompactLight Public Website.	DEC-PU-M3	2
D1.2	Data Management Plan	ORDP-PU-M6	0
D2.1	Report providing users requirements and FEL performance specification.	R-PU-M12	1
D3.1	Evaluation report of the optimum e-gun and injector solution for the XLS CDR.	R-PU-M18	8
D3.2	A review report on the bunch compression techniques and phase space linearization	R-PU-M18	
D4.1	Computer code report for RF power unit design and cost optimization.	R-PU-M18	2
D5.1	A review report comparing the different technologies for the CompactLight undulator.	R-PU-M18	0
D6.1	Review report on the most advanced computer codes for the facility design	R-PU-M18	1
D2.2	Report summarizing the FEL design with accelerator and undulator requirements.	R-PU-M24	9
D7.1	Mid-term report with CompactLight global integration and cost analysis	R-PU-M24	
2020 Deliverables postponed to 2021			
D3.3	Design report of the injector diagnostics/beam manipulations based on a X-band cavities	R-PU-M39	
D3.4	E-gun and injector Design Report with diagnostics and phase space linearizer	R-PU-M39	
D4.2	Design report of the optimized RF unit	R-PU-M39	
D4.3	Report on RF unit design and fabrication procedure	R-PU-M39	
D5.2	Conceptual Design Report of the undulator	R-PU-M39	2
D6.2	Final report with start to end facility simulations	R-PU-M42	0
D8.1	XLS electron and photon beam diagnostics layout and machine implementation	R-PU-M42	2
D7.2	Final report with CompactLight global integration analysis, services and cost.	R-PU-M48	1
D2.3	Hard X-ray FEL Conceptual Design Report.	R-PU-M48	
D1.2	Production of a short monograph summarizing the Conceptual Design Report.	R-PU-M48	

OK

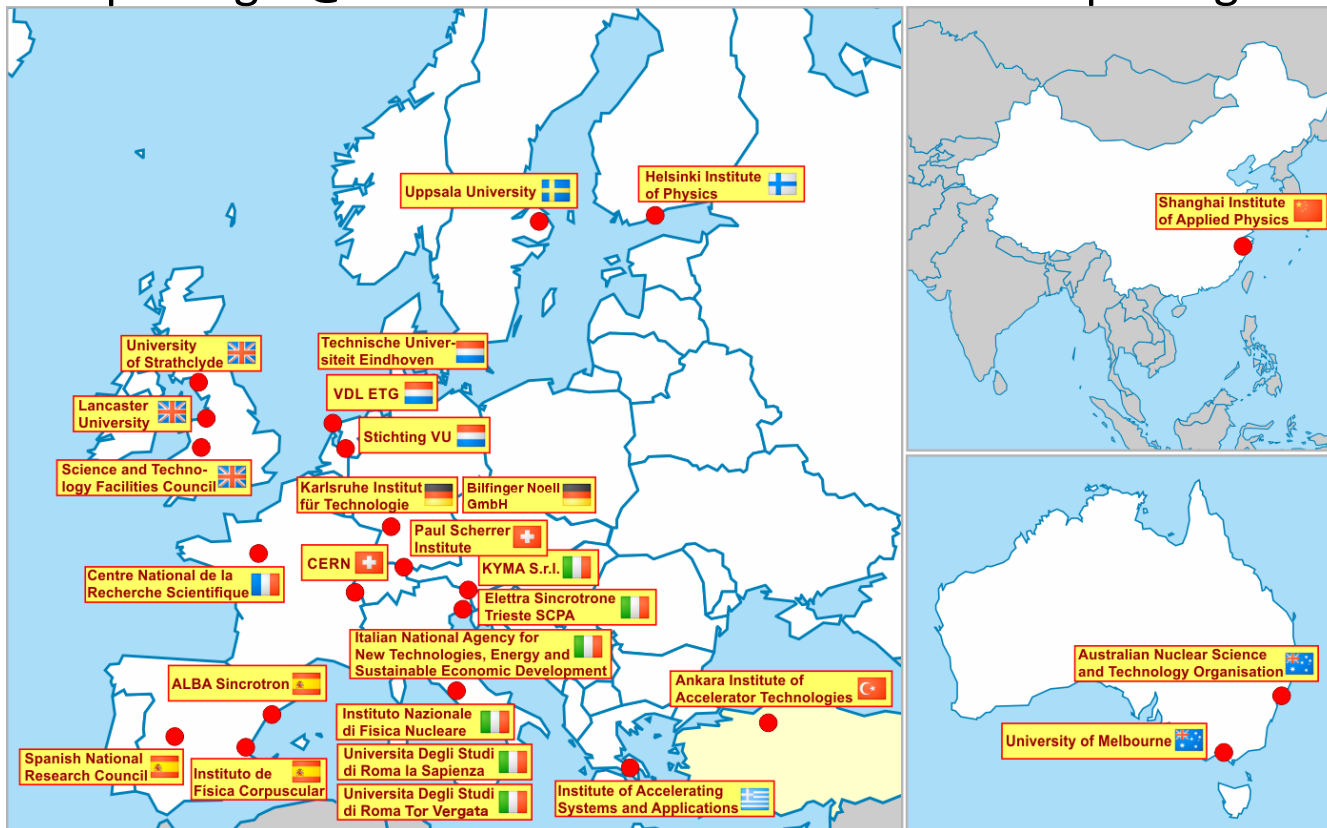
31 Dec
2021



Thank you!

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www.CompactLight.eu



CompactLight is funded by the European Union's Horizon2020 Research and Innovation program under Grant Agreement No. 777431