Compact?

http://compact-light.web.cern.ch

1. **Proposal:** 777431 — XLS
2. **Topic:** INFRADEV-01-2017 — Design Studies
3. **Type of action:** Research and Innovation Action
4. **Starting date:** 01-01-2018
5. **Duration of the action:** 36 months
6. **Maximum grant amount:**
   a. Total cost of the project > 3.5 M€
   b. Requested EU contribution (according to proposal): 2,999,500 €
   c. Maximum grant amount (proposed amount, after evaluation): 2,999,500 €

The CompactLight Consortium

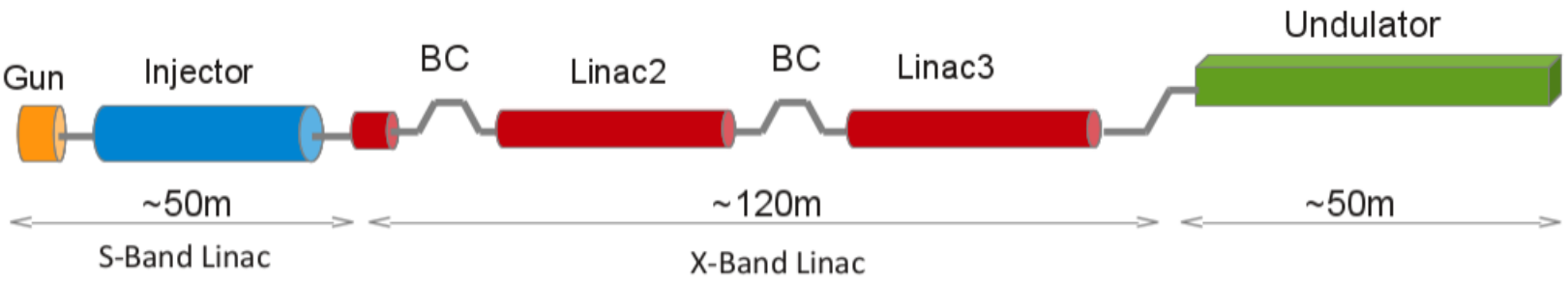
List of Participants

Participant		Participant organisation name	Country
1	ST (Coord.)	Elettra – Sincrotrone Trieste S.C.p.A.	Italy
2	CERN	CERN - European Organization for Nuclear Research	International
3	STFC	Science and Technology Facilities Council – Daresbury Laboratory	United Kingdom
4	SINAP	Shanghai Institute of Applied Physics, Chinese Academy of Sciences	China
5	IASA	Institute of Accelerating Systems and Applications	Greece
6	UU	Uppsala Universitet	Sweden
7	UoM	The University of Melbourne	Australia
8	ANSTO	Australian Nuclear Science and Tecnology Organisation	Australia
9	UA-IAT	Ankara University Institute of Accelerator Technologies	Turkey
10	ULANC	Lancaster University	United Kingdom
11	VDL ETG	VDL Enabling Technology Group Eindhoven BV	Netherlands
12	TU/e	Technische Universiteit Eindhoven	Netherlands
13	INFN	Istituto Nazionale di Fisica Nucleare	Italy
14	Kyma	Kyma S.r.l.	Italy
15	SAPIENZA	University of Rome "La Sapienza"	Italy
16	ENEA	Agenzia Nazionale per le Nuove Tecnologie, l'Energia e lo Sviluppo Economico Sostenibile ENEA	Italy
17	ALBA-CELLS	Consorcio para la Construccion Equipamiento y Explotacion del Laboratorio de Luz Sincrotron	Spain
18	CNRS	Centre National de la Recherche Scientifique CNRS	France
19	KIT	Karlsruher Institut für Technologie	Germany
20	PSI	Paul Scherrer Institut PSI	Switzerland
21	CSIC	Agencia Estatal Consejo Superior de Investigaciones Científicas	Spain
22	UH/HIP	University of Helsinki - Helsinki Institute of Physics	Finland
23	VU	VU University Amsterdam	Netherlands
24	USTR	University of Strathclyde	United Kingdom

Third Parties		Third party's organisation name	Country
AP1	Oslo	Universitetet i Oslo - University of Oslo	Norway
AP2	ARCNL	Advanced Research Center for Nanolithography	Netherlands
AP3	NTUA	National Technical University of Athens	Greece
AP4	AUEB	Athens University Economics & Business	Greece

Italy	5
Neth.	3+1
UK	3
Spain	2
Australia	2
China	1
Greece	1+2
Sweden	1
Turkey	1
France	1
Germany	1
Switz.	1
Finland	1
Norway	0+1
Internat.	1

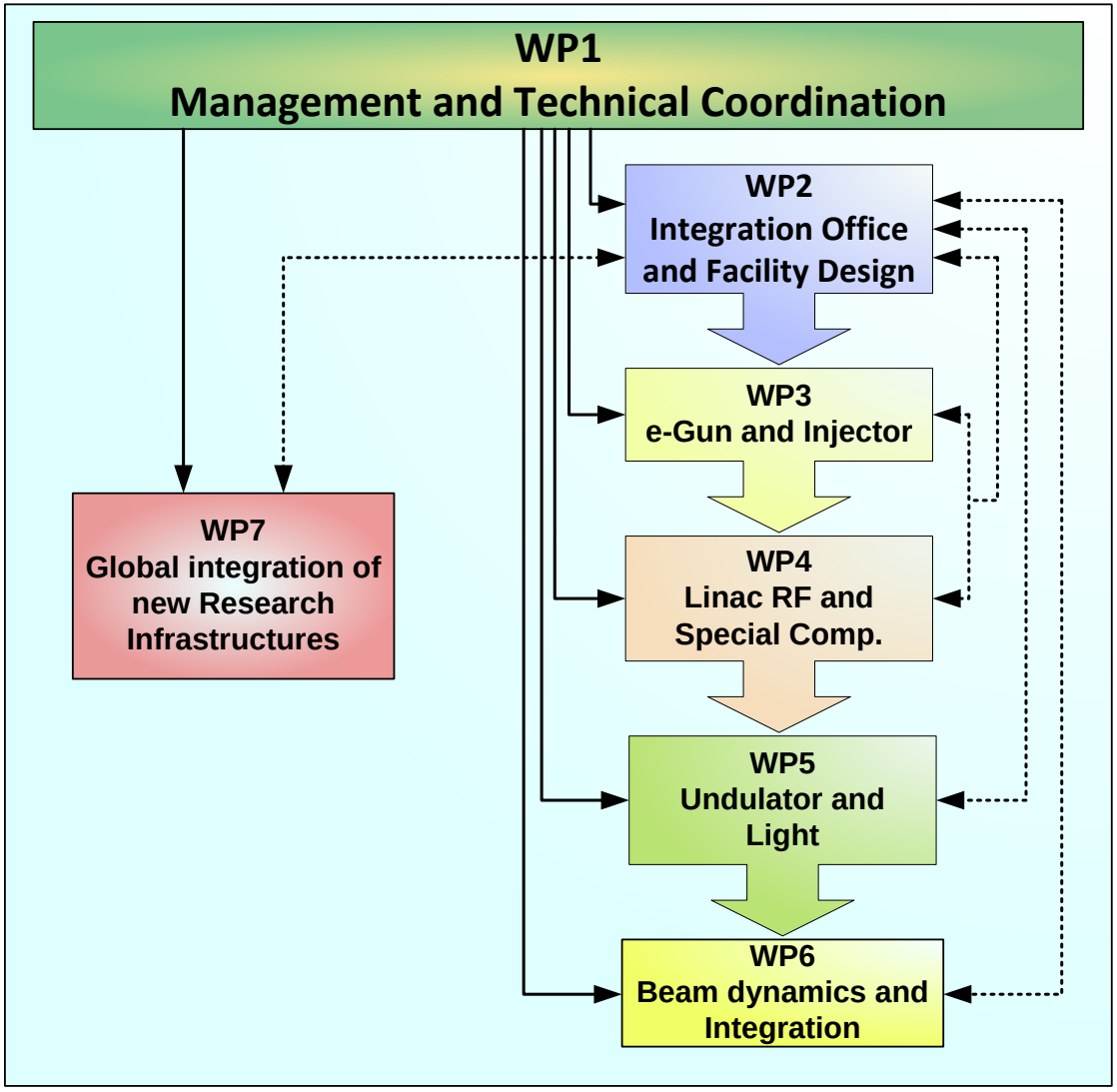
The main deliverable of CompacLight will be a Conceptual Design Report of an X-band Hard X-ray facility



The CDR will include:

- ✓Executive summary
- ✓Overall concepts
- ✓Layout and parameters
- ✓Detailed design at the sub-system level
- ✓Cost evaluations

WPs Structure



WPs description

WP1: Project management and coordination (ELETTRA)

WP1 carries the overall management of the XLS Design Study to ensure timely achievement of project results through technical and administrative management. It will be lead by the Project Coordinator and be focused on the effective management and coordination of all the WPs and deliverables, the budget and the project implementation plans.

WP2: FEL science requirements and facility design (STFC)

The objective of WP2 is to provide the overall design of the FEL. It will determine performance specification for the Facility based on user-driven scientific requirements. It will identify and choose the most appropriate technical solutions considering cost, technical risk and performance.

WPs description

WP3: Gun and injector (INFN)

The objective of WP3 is the comparative assessment of advanced gun and injector designs. Options considered:

- A full-X-band solution, inclusive of higher-harmonic linearization in K band. This aims to utilize the recent achievements in the design of X-band guns and reduce limitations of machine repletion rate currently given by the injector.
- High-gradient injectors at existing gun frequencies, S and C bands (towards lower emittance guns).

WP4: RF systems (CERN)

The primary objective of WP4 is to define the rf system for the linac of the XFEL in the main and sub-design variants.

Additionally the WP will take responsibility for defining specialized rf hardware in other systems, for example for an eventual 36 GHz lineariser system in the injector and deflectors for longitudinal profile measurement systems.

A key goal will be to define a standardized rf unit:

- simplify the preparation of future construction projects
- cost savings (industrialization of linac hardware)

WP5: Undulators and light production (ENEA)

The primary objective of WP5 is to determine the undulator design for XLS. It will start by investigating state-of-art undulators and then it will consider on-going developments. “Ambitious undulators” will be compared with the boundary conditions of technologies available, on a 4-5 year time scale. These will include:

- novel short period undulators
- superconducting undulator
- RF-microwave undulators

WP6: Beam dynamics and start-to-end modelling (UA-IAT)

The main objective of WP6 is to provide key parameters and performance estimates of the Facility. Consistent tools for modelling the machine, as the basis for the integrated performance studies, will be developed.

- S2E simulations from the cathode to the undulator exit.
- Tolerance studies will be also performed.
- Beam-based alignment and tuning methods that can relax the tolerances.

WPs description

WP7: Global integration with new Research Infrastructures (ELETTRA)

WP7 will address strategic issues related to the objectives of XLS, namely the impact and benefits for the user community, in both the public and private sectors, at the scientific and technical level. The results of this work package will be a series of reports which target funding agencies and policy makers and that can be used in the decision making process for the approval of new research infrastructures or the upgrade of existing facilities.

The main deliverable of CompacLight will be a Conceptual Design Report of an X-band Hard X-ray facility.

The CDR will include:

- ✓ Executive summary
- ✓ Overall concepts
- ✓ Layout and parameters
- ✓ Detailed design at the sub-system level
- ✓ Cost evaluations

WP Task	Description	Year 1												Year 2												Year 3											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	**Project Management and Technical Coordination**	M	M	D			M						M						M						M						M					M	D
1.1	General governance of CompactLight and scientific management																																				
1.2	Monitoring and reporting, partners coordination																																				
1.3	Administrative and financial coordination																																				
1.4	Dissemination of information																																				
2	**FEL Science Requirements and Facility Design**		M				M						M D						M						M D						M					M	D
2.1	User requests and FEL performance																																				
2.2	FEL layout, accelerator and undulator requirements																																				
2.3	CompactLight CDR																																				
3	**Gun and Injector**		M				M						M						M D						M						M					M	D
3.1	Evaluation of e-gun and injector technologies and options																																				
3.2	Bunch compressors and phase space linearization																																				
3.3	Beam diagnostics and manipulation																																				
3.4	E-gun and injector design																																				
4	**RF Systems**		M				M						D						M D						M						M					M	D
4.1	Parametrized of performance and cost model of the RF unit																																				
4.2	Design report of optimized rf unit																																				
4.3	Accelerating structure design and fabrication procedures																																				
5	**Undulators and Light production**		M				M						M						M D						M						M					M	D
5,1	Near and medium term (4-5 years) undulator technology																																				
5,2	Design report of the baseline undulator for the facility																																				
6	**Beam Dynamics and Start to End modeling**		M				M						M						M D						M						M					M	D
6,1	Tools for evaluating the facility performance																																				
6,2	Start to end simulation of the facility																																				
7	**Global integration with new Research Infrastructures**						M						M												M D											M	D
7,1	Mid term reports for integration and services analysis																																				
7,2	Final report integration, services and cost analysis																																				

D = Deliverable
M = Milestone

CompactLight Gant chart