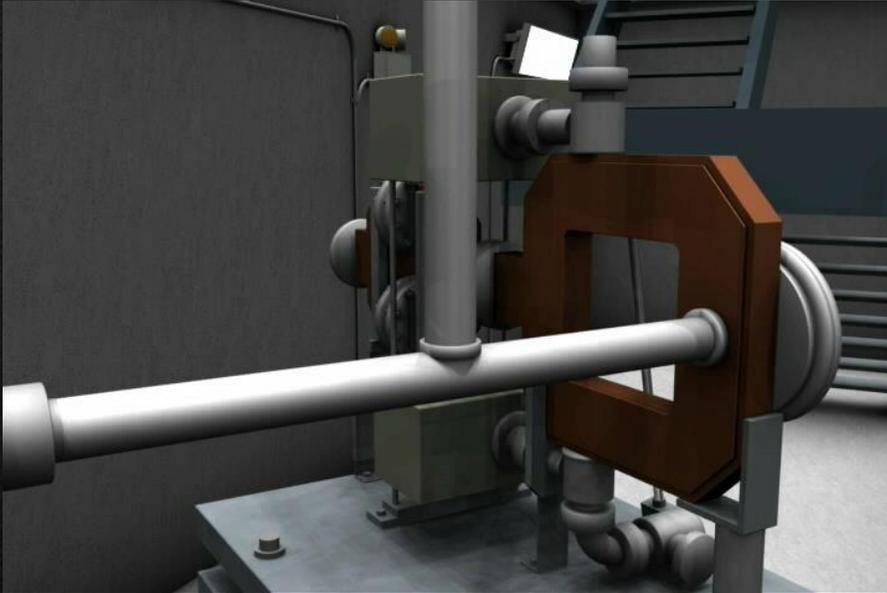


WP3 – Gun and Injector

Massimo.Ferrario@LNF.INFN.IT



- Laser/Photocathode
- RF/DC Gun
- Solenoid
- RF Velocity Bunching

- RF Linearizer and L. Heater
- Magnetic Chicane
- Transv. RF Deflector
- Beam Diagnostics

- To design the Compact High Brightness Injector
- To design the proper matching with the X-band Linac

Deliverables

- **D3.1** - Preliminary assessments and evaluations of the optimum e-gun and injector solution for the CompactLight design, (**=>M18**).
- **D3.2** – A review report on the bunch compression techniques and phase space linearization, (**=>M18**).
- D3.3 – Design of the injector diagnostics/beam manipulations based on a X-band cavities, (**=>M36**).
- D3.4 - Design of the CompactLight e-gun and injector, with phase space linearizer (**=>M36**).

Tasks and sub-Tasks

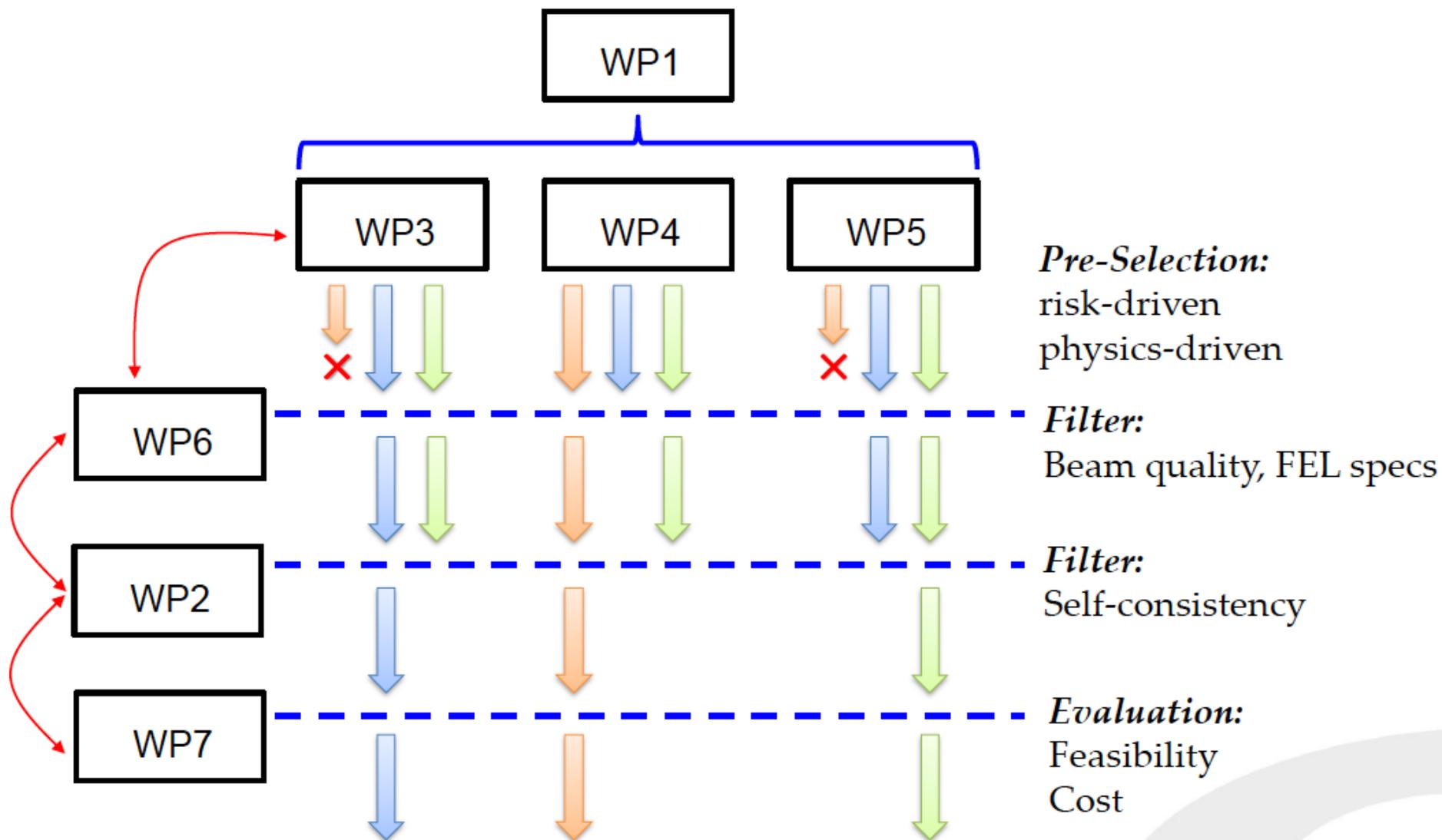
(task leaders institutes in **bold**)

- **Task 3.1 - Gun Design (RF, Solenoid, Cathode, Laser, Diagnostics) => D3.1 M18 => D3.3 M36**
 - a) S-Band Gun RF Design (**CNRS** + IASA+UAIAT-INFN+ALBA)
 - b) C-Band Gun RF Design (**INFN** +IASA+Sapienza)
 - c) X-Band Gun RF Design (**CSIC-IFIC** + UAIAT+ Sapienza)
 - d) DC Gun Design (**TU/e**)
 - e) **Laser/Photocathode** (**IASA**+CNRS+INFN)
- **Task 3.2 - Compressor Design (Velocity Bunching, Magnetic Chicane)) => D3.2 M18 => D3.3 M36**
 - a) S-Band Velocity Bunching (**TU/e** + IASA+ALBA)
 - b) C-Band Velocity Bunching (**INFN** +IASA+TU/e)
 - c) X-Band Velocity Bunching (**Sapienza**+CERN+IASA+INFN)
 - d) Magnetic Compressor (**ST** + CERN+INFN+CNRS)
- **Task 3.3 – X-Band Transverse RF Deflector (Sapienza+ IASA+) => D3.3 M36**
- **Task 3.4 - : RF Linearizer Design => D3.2 M18 => D3.3 M36**
 - a) X-Band RF Linearizer Design (**Sapienza**)
 - b) K-Band RF Linearizer Design (**ULANC** +Sapienza)
 - c) Passive linearizer (**CNRS**)

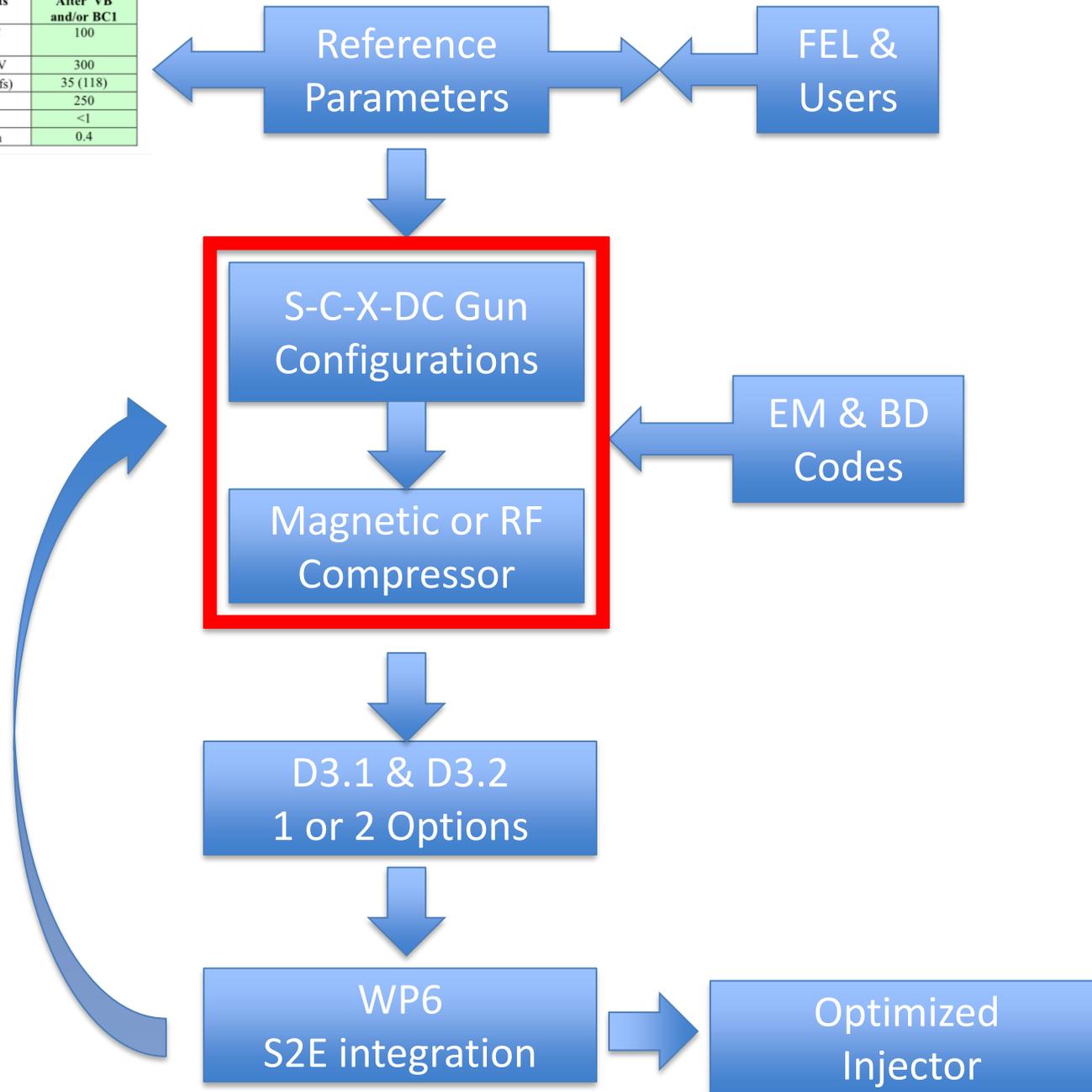
CDR Proposed Contents

1. Executive Summary - *WP1/WP2*
2. Introduction - *WP1/WP2*
3. Science goals and photon output requirements - *WP2*
4. Systems design and performance
 1. Facility Layout - *WP2/WP6*
 2. Electron injector - *WP3*
 3. RF systems - *WP4*
 4. Undulators - *WP5*
 5. Accelerator lattice design and FEL performance - *WP6*
 6. Photon beamlines and user facilities - ?
 7. Building and site considerations - ?
5. Strategic issues - *WP7*
 1. Global integration
 2. Cost estimates
 3. Technology transfer
6. Appendices - *WP1*
 1. Institutes contributing to the project
 2. CompactLight publications/presentations
 3. ??

Process



XLS Hard X rays case	Units	After VB and/or BC1
Charge (Uniform Distribution)	pC	100
Beam energy	MeV	300
Rms Bunch length	μm (fs)	35 (118)
Peak current	A	250
Rms Energy Spread	%	<1
Rms norm. emittance	μm	0.4

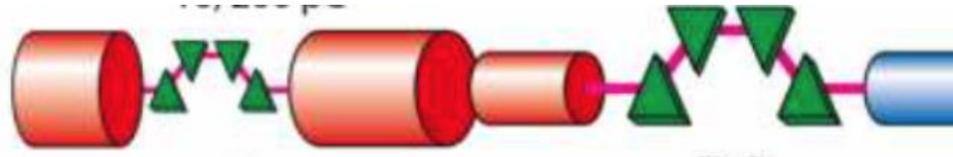


Reference Parameter List

A tentative parameter list at the injector exit has been also discussed. The following table shows a list of reference parameters as expected at the exit of the gun + first compression:

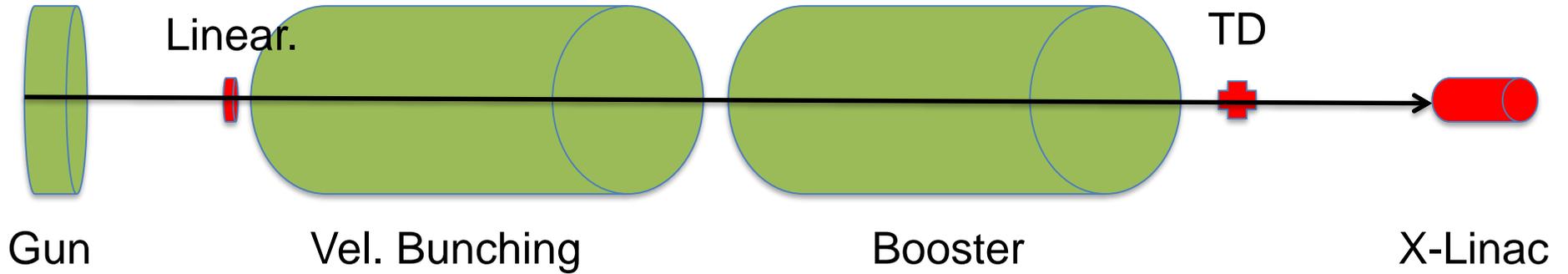
XLS Hard X rays case	Units	After VB and/or BC1
Charge (Uniform Distribution)	pC	100
Beam energy	MeV	300
Rms Bunch length	μm (fs)	35 (118)
FWHM Peak current	A	250
Rms Energy Spread	%	<1
Rms norm. emittance	μm	0.4

Rep rate 100 Hz



Configurations with Velocity Bunching

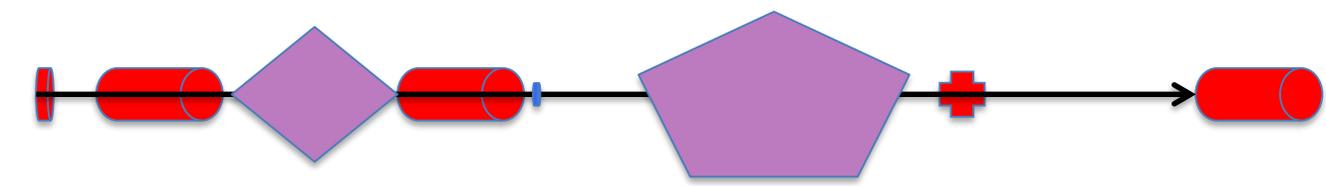
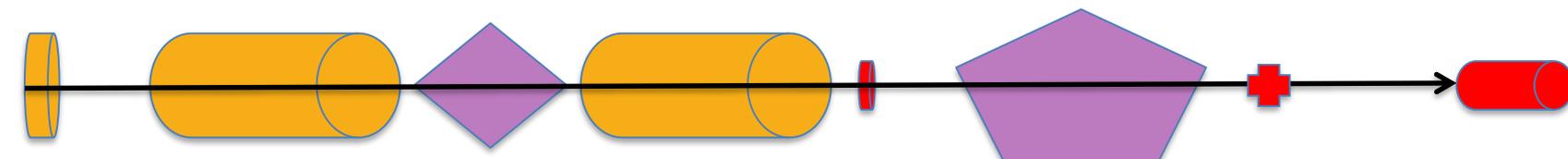
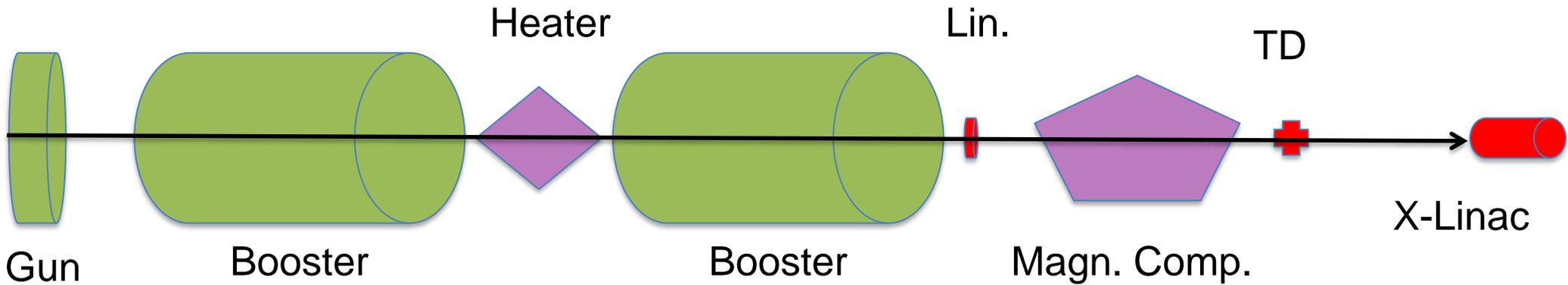
S-band , C-band , X-band , K-band



K-Linear.

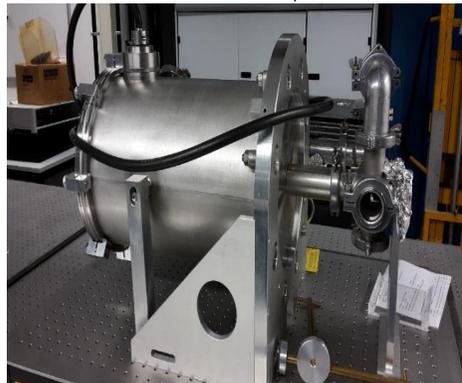
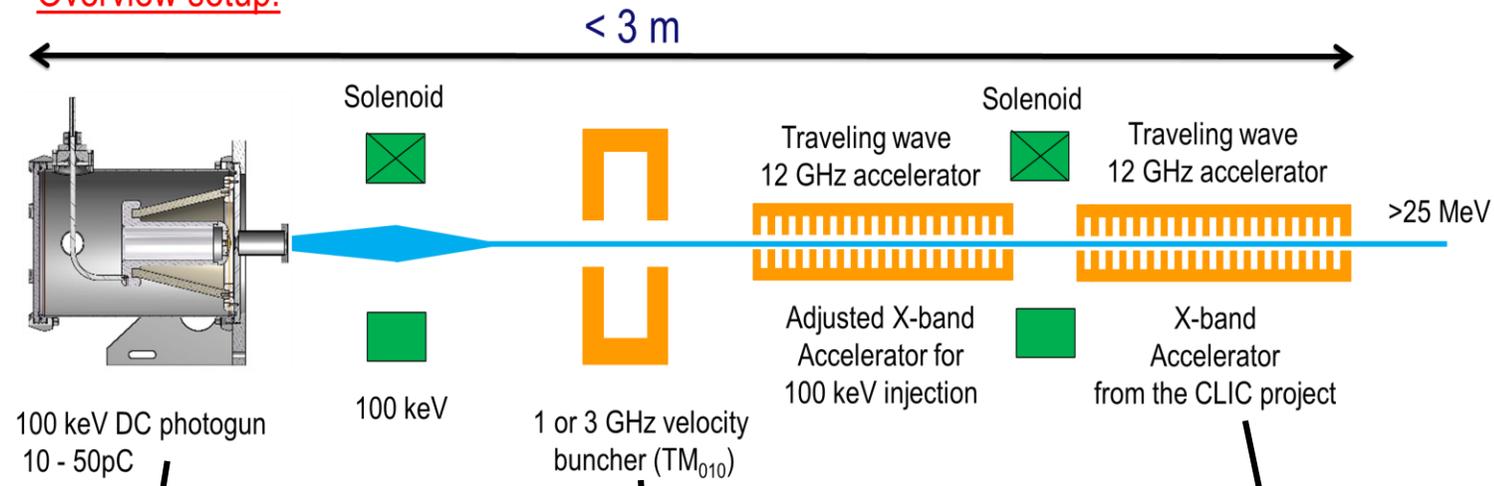
Configurations with Magnetic Compressor

S-band , C-band , X-band , K-band

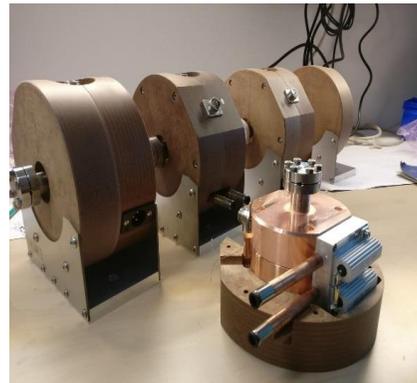


Already developed and available material

Overview setup:



Made by ACCTEC



Made by ACCTEC



CLIC accelerator

XLS | CompactLight 1st Annual Meeting

Barcelona, 10th-12th December 2018

Monday, 10 December 2018			
13:45	14:00	Welcome	
14:00	14:30	XLS Status	
14:30	14:45	Update from the Collaboration	Partner Activity Reports
15:45	16:00	Coffee Break	
16:00	17:15	Update from the Collaboration	Partner Activity Reports
17:15	18:30	WP2 Update and Discussion	WP Activity Report
Tuesday, 11 December 2018			
08:30	09:45	WP3 Update and Discussion	WP Activity Report
09:45	11:00	WP4 Update and Discussion	WP Activity Report
11:00	11:30	Coffee Break	
11:30	12:45	WP5 Update and Discussion	WP Activity Report
12:45	14:15	Lunch	
14:15	15:30	WP6 Update and Discussion	WP Activity Report
15:30	16:30	Supplementary Presentation	Parallel Sessions
		SAC Internal Discussion	
16:30	17:00	Coffee Break	
17:00	18:00	XLS-SAC Joint Session	
20:00	22:30	Dinner	

Agenda WP3

- M. Croia (INFN), C-band injector design study (10')
- A. Mostacci (Sapienza), X-Band Velocity Bunching (10')
- S. Di Mitri (ST), Magnetic Compressor design study (10')
- G. Campbell Burt (ULANC), K-Band RF Linearizer Design (10')
- B. Spataro (INFN), A possible linearizer at 35.982 GHz (10')
- Discussion (all), 15'

<https://conferences.pa.ucla.edu/hbb-2019/index.html>

“High Brightness Beam Physics”

7-11 April 2019

Crete – Greece



Thanks for your attention

Compact 