Compact

ITEMS FOR A COST MODEL FOR THE XLS-XFEL

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**A great thank to CARLO ROSSI/CERN
for his wonderful file and his generous support**

29 May 2019

1. RF Gun System
2. Injector Linac
3. Main Linac
4. Undulator System
5. Mechanical Support System
6. Main Dump System
7. Infrastructure and Services
8. Machine Control and Operational Infrastructure

Note: Any item in green color is added to the initial file

Compact

RF Gun System

CODE	Level 1 Name*	Level 2 Name*	Level 3 Name*	Level 4 Name*
ROOT	XLS			
1	RF Gun System			
1.1		Photocathode System		
1.2		Laser System		
1.3		RF System		
1.3.1			Klystron Modulator System	
1.3.1.1				Modulator
1.3.1.2				Klystron
1.3.1.3				Solenoid System
1.3.2			RF Power Distribution System	
1.3.2.1				RF Waveguide System
1.3.2.2				RF Loads and Hybrids
1.3.3			RF Gun Cavity	
1.3.4			Low Level RF & Timing	
1.3.4.1				RF Driver Amplifiers
1.3.4.2				RF Signal Acquisition and Control
1.3.4.3				Timing Generation and Distribution
1.4		Support and Alignment System		
1.4.1			Alignement DAQ and Control System	
1.4.2			Alignment Instrumentation System	
1.5		RF Gun Vacuum System		
1.5.1			Vacuum Pumps and Connecting Elements	
1.5.2			Vacuum Power Supply	
1.5.3			Vacuum Instrumentation System	

1.6		Magnets and Correctors	
1.6.1			Beam Focusing
1.6.1.1				Solenoid Magnet
1.6.1.2				Solenoid Power Supply
1.6.1.3				Hall probe
1.7		Beam Instrumentation System	
1.7.1		Electron Beam Daignostics	
1.7.1.1			Beam Current Transformer
1.7.1.2			Beam Position Monitor
1.7.1.3			Transverse Profile Monitor	OTR/YAG:Ce-type crystalscreen monitor
1.7.1.4			Longitudinal Profile Monitor
1.7.1.5			Emittance Monitor
1.7.1.6			Beam Loss Monitor
1.7.1.7			Transverse Deflecting Cavities	High-resolution bunch length
1.7.2		Photon Beam Diagnostics	
1.7.2.1			Photon Intensity
1.7.2.2			Photon Beam Posistion
1.7.2.2			Pulse Length & Time Arrival	THz camera
1.7.2.3			Photon Wavelength	Bragg crystal
1.7.2.4			Attenuation (Gas+Solid)	Gas attenuation
1.7.2.5			In-beam Detectors	Screens
1.8		RF Gun Interface to Infrastructure	
1.8.1			Cavity Tuning Control Interface	Cavity Temperature Control
1.8.2			Control System Interface	Control System
1.8.3			High-speed Communication Link	Diagnostics System
1.9		RF Gun Commissioning	

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Compact

CODE	Level 1 Name*	Level 2 Name*	Level 3 Name*	Level 4 Name*
	Injector Linac			
ROOT	XLS			
2	Injector Linac			
2.1		RF System		
2.1.1			Klystron Modulator System	
2.1.1.1				Modulator
2.1.1.2				Klystron
2.1.1.3				Solenoid System
2.1.2			RF Power Distribution System	
2.1.2.1				RF Pulse Compression System
2.1.2.2				RF Waveguide System
2.1.2.3				RF Loads and Hybrids
2.1.3			RF Structures	
2.1.3.1				Velocity Bunching Structure
2.1.3.2				Accelerating Structure
2.1.4			Low Level RF & Timing	
2.1.4.1				RF Driver Amplifiers
2.1.4.2				RF Signal Acquisition and Control
2.1.4.3				Timing Generation and Distribution
2.2		Support and Alignment System		
2.2.1			Alignement DAQ and Control System	
2.2.2			Alignment Instrumentation System	
2.3		Injector Linac Vacuum System		
2.3.1			Vacuum Pumps and Connecting Elements	
2.3.2			Vacuum Power Supply	
2.3.3			Vacuum Instrumentation System	
2.4		Magnets and Correctors		
2.4.1			Beam Focusing	
2.4.1.1				Solenoid Magnet
2.4.1.2				Solenoid Power Supply
2.4.1.3				Quadrupole Magnet
2.4.1.4				Quadrupole Power Supply

2.4.2			Beam Steering	
2.4.2.1				Corrector Magnet
2.4.2.2				Corrector Power Supply
2.4.3			Bunch compression	
2.5		Beam Instrumentation System		
2.5.1			Beam Current Transformer	
2.5.2			Beam Position Monitor	
2.5.3			Transverse Profile Monitor	
2.5.4			Longitudinal Profile Monitor	
2.5.5			Emittance Monitor	
2.6		Injector Linac Interface to Infrastructure		
2.7		Injector Linac Commissioning		

3	Main Linac			
3.1		RF System		
3.1.1			Klystron Modulator System	
3.1.1.1				Modulator
3.1.1.2				Klystron
3.1.1.3				Solenoid System
3.1.2			RF Power Distribution System	
3.1.2.1				RF Pulse Compression System
3.1.2.2				RF Waveguide System
3.1.2.3				RF Loads and Hybrids
3.1.3			Accelerating Structures	
3.1.4			Low Level RF & Timing	
3.1.4.1				RF Driver Amplifiers
3.1.4.2				RF Signal Acquisition and Control
3.1.4.3				Timing Generation and Distribution
3.2		Support and Alignment System		
3.3		Main Linac Vacuum System		
3.3.1			Vacuum Pumps and Connecting Elements	
3.3.2			Vacuum Power Supplies	
3.3.3			Vacuum Instrumentation System	
3.4		Magnets and Correctors		
3.4.1			Beam Focusing	
3.4.1.1				Quadrupole Magnets
3.4.1.2				Quadrupole Power Supplies and Cabling
3.4.1.3				Hall probe
3.4.2			Beam Steering	
3.4.2.1				Corrector Magnets
3.4.2.2				Corrector Power Supplies and Cabling
3.4.3			Bunch compression	
3.5		Beam Instrumentation System		
3.5.1			Beam Current Transformer	
3.5.2			Beam Position Monitor	
3.5.3			Transverse Profile Monitor	
3.5.4			Longitudinal Profile Monitor	
3.5.5			Emittance Monitor	
3.6		Main Linac Interface to Infrastructure		
3.7		Main Linac Commissioning		

Compact

	Undulator System			
	Level 1	**Level 2**	**Level 3**	**Level 4**
CODE	Name*	Name*	Name*	Name*
ROOT	XLS			
4	Undulator System			
4.1		SC undulator system		
4.2		NC undulator system		

5. Mechanical Support System

	Mechanical Support System			
	Level 1	**Level 2**	**Level 3**	**Level 4**
CODE	Name*	Name*	Name*	Name*
ROOT	XLS			
5	Mechanical Support System			
5.1		Girder support system		
5.2		Local support system		

Main Dump System

CODE	Level 1 Name*	Level 2 Name*	Level 3 Name*	Level 4 Name*
ROOT	XLS			
6	Main Dump System			
6.1			Beam Dump Spectrometer	Mean electron beam energy+Energy spread

8. Machine Control and Operational Infrastructure

Machine Control and Operational Infrastructure

CODE	Level 1 Name*	Level 2 Name*	Level 3 Name*	Level 4 Name*
ROOT	XLS			
8	Machine Control and Operational Infrastructure			
		Machine Control Infrastructure		
			Front-end Acquisition System	
			Control Room Infrastructure	
			Network	
		Machine Protection		
			Protection Masks	
			Overall Interlock Controls	
				Injector and Main Linac
				Experimental Area
		Access Safety & Control System		
		Technical Alarm System		

Infrastructure and Services

CODE	Level 1 Name*	Level 2 Name*	Level 3 Name*	Level 4 Name*
ROOT	XLS			
7	Infrastructure and Services			
		Civil Engineering		
			Underground Facilities	
				Shafts
				Injector and Main Linac
				Experimental Area
			Surface Structures	
				Service Buildings
				Injector and Main Linac Klystron Gallery
				Offices
				Workshops
		Electricity		
			Connection to grid	
			HV-MV substation	
			Diesel generator system	
			UPS system	
			Surface main substation (MV & LV)	
			Underground distribution network (MV & LV)	
			Surface buildings electrical infrastructure	
			Tunnel electrical infrastructure	
			Experimental area electrical infrastructure	
		Survey and Alignment		
			Injector and Main Linac	
			Experimental Area	
			Infrastructure & Services	

		Fluids	
		Cooling Systems Primary Circuits	
			Injector and Main Linac
			Injector and Main Linac Klystron Gallery
			Experimental Area
		Demineralised Water Circuits	
			Injector and Main Linac
			Injector and Main Linac Klystron Gallery
			Experimental Area
		Fire Fighting	
		Cooling Tower	
		Ventilation Systems	
			Injector and Main Linac
			Injector and Main Linac Klystron Gallery
			Experimental Area
			Surface Buildings
		Gas	
		Compressed Air	
		Transport / installation	
		Surface and Vertical Shafts	
			PR - Cranes (Surface)
			AS - Lifts
			CH - Handling Machines
		Tunnels	
			PR - Cranes (Underground)
			Integration Studies
		Safety	
		Radiation Protection	
		Environmental Monitoring	
		Fire Safety and Detection	

- Carlo's proposal file has significantly changed the profile of the XLS index structure

- 1st Target: The detailed description of the elements for the basic parts of the accelerator and its operation

- 2nd Target: The feedback of the WP leaders and collaborators on the accelerator structure, i.e. correction, completion, etc. are welcomed

- 3rd Target: The finalization of the XLS structure will guide smoothly to the cost estimation of the project with good precision