

LCLS WBS DICTIONARY

WBS NUMBER					TITLE	DESCRIPTION
1	2	3	4	5		
1	06				X-RAY END STATION SYSTEMS	This element includes the infrastructure required to integrate x-ray experiments with the LCLS source and conventional facilities. Specifically, this includes safety systems, computer and network systems, a synchronized laser system, and a prototype detector that will be used by most of the foreseeable LCLS experiments. It also includes a complete Atomic Physics Station for the first studies of FEL-atom interactions.
1	06	01			System Management & Integration	This element provides management and integration for all design engineering and construction phases of the Project.
1	06	01	01		Management	Attend meetings, arrange for staffing for the project, prepare reports, formulate conceptual design, and travel as required.
1	06	01	02		SSRL Physics Support	Receive advice and physics support from SSRL Physicists for X-Ray Endstation systems.
1	06	04			Laser Subsystem	Design, procure, and receive the ultrafast laser system, the laser diagnostics, the laser transport of the Atomic Physics Station that will be installed in the Near Experimental Hall. Specify, design and certify the laser safety system.
1	06	04	01		XES Laser	Specify, procure, and receive the XES laser system that will be installed in the Near Experimental Hall for the Atomic Physics Station.
1	06	04	02		Laser Diagnostics	Design, procure, and test the hardware and software that will be used to monitor the operation of the ultrafast laser system in the Near Experimental Hall.
1	06	04	03		Laser Optical Transport	Design, procure, and test the optical transport system for transporting the ultrashort laser pulses to the experimental hutche(s) in the Near Experimental Hall.
1	06	04	04		Laser Safety	Specify, design, review, certify and procure the Laser safety systems for the XES laser system to ensure laser operation according to SLAC Laser Safety rules.
1	06	05			X-Ray Detectors	Specify, procure, and test prototype detectors that will be needed for the first experiments at LCLS. Development of advanced detector concepts that are essential to LCLS are included under 2.6 as R&D.
1	06	05	04		Detectors	Detector Engineering activities to manage and coordinate all detector development programs for the Endstation Systems at LCLS including the R&D detector project in WBS 2.6.
1	06	05	04	01	Detector Management	Detector Engineering activities to manage and coordinate all detector development programs for the Endstation Systems at LCLS including the R&D detector project in WBS 2.6.
1	06	05	04	02	deleted	deleted
1	06	06			System Installation & Alignment	This element provides for System Installation and Alignment in all areas of the X-Ray Endstation system (Front End Enclosure, Near Hall, Tunnel, and Far Hall). Specifically, this includes controls, computer and network systems, safety systems, laser system, x-ray detector and instrumentation and infrastructure for the atomic physics station. This also includes the integration of the X-Ray Endstation system with other components of the LCLS source, such as the LCLS timing and control system, vacuum system and conventional facilities. Initial test activities are included in this section.
1	06	06	01		Front End Install	This element provides for System Installation and Alignment in the Front End Enclosure. Specifically, this includes controls, computer and network systems and safety systems.
1	06	06	02		Near Hall Install	This element provides for System Installation and Alignment in the Near Hall. Specifically, this includes controls, computer and network systems, safety systems, a complete instrument of a Atomic Physics Station with its experimental chambers and their vacuum components, and the laser system and optical transport. Initial test activities of these systems are included in this section.
1	06	06	02	01	Near Hall Install Controls	This element covers all controls system installation and testing in the Near Hall.
1	06	06	02	02	Near Hall Install Mech/Vac	This element covers the installation of the mechanical and vacuum components particularly for the utilities for direct support of the experiments in the Near Hall.
1	06	06	02	03	Near Hall Install Laser	This element covers the installation of the laser system and the optical transport in the Near Hall.
1	06	06	02	04	Reserved	
1	06	06	02	05	Near Hall Install Atomic Physics	This element covers all Atomic Physics system installation in the Near Hall.

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1	06	06	02	06	Near Hall Install PPS	This element covers all Personal Protection System installation, testing and certifying in the Near Hall.
1	06	06	02	07	Near Hall Install Laser PPS	This element covers the installation, testing and certifying of the Personal Protection System for the laser system in the Near Hall.
1	06	06	03		Tunnel Install	This element provides for System Installation and Alignment in the Tunnel. Specifically, this includes controls, computer and network systems, and safety systems.
1	06	06	04		Far Hall Install	This element provides for System Installation and Alignment in the Far Hall. Specifically, this includes controls, computer and network systems, safety systems, and x-ray detectors.
1	06	06	04	01	Far Hall Install Controls	This element covers all controls system installation and testing in the Far Hall.
1	06	06	04	02	Far Hall Install Mech/Vac	This element covers the installation of the mechanical and vacuum components particularly for the utilities for direct support of the experiments in the Far Hall.
1	06	06	04	03	Far Hall Install AMO Particle Physics Exp.	This element covers all Atomic Physics system installation in the Far Hall.
1	06	06	04	04	Far Hall Install Detectors	This element covers all detector system installation in the Far Hall.
1	06	06	04	05	Far Hall Install PPS	This element covers all Personal Protection System installation, testing and certifying in the Far Hall.
1	06	06	05		Electron Dump Enclosure Install	This element provides for System Installation and Alignment in the Electron Dump Enclosure. Specifically, this includes safety systems.
1	06	07			Atomic Physics	This element covers specification, design, procurement and testing of the hardware needed for the AMO instruments including diagnostics and focussing needs. Mangament tasks for the technical and safety reviews are also included.
1	06	07	01		AMO Exp. Management & Design	This WBS section covers the AMO management tasks of performing technical design and safety reviews, and producing documentation and plans.
1	06	07	02		AMO Exp. - X1 High Field Physics	This element includes the procurement, assembly and testing of the AMO High Field Physics instrument. This includes detectors, sample source, vacuum system and the differential pumping system.
1	06	07	03		AP Refocus Optics	This element includes the procurement, assembly,alignment and testing of the AMO refocussing optics.
1	06	07	04		AP Diagnostics	This element includes the procurement, assembly and testing of the AMO diagnostics.
1	06	07	05		AP X2 Particle Imaging	This element includes the procurement, assembly and testing of the AMO Particle Imaging instrument.
1	06	08			K Measurement Spectrometer	This element includes tasks in support of building the k-measurement spectrometer. The remainder of the tasks are covered in the WBS 1.5.
1	06	08	01		K Measurement Spectrometer	This element includes the preparation of the Physics Requirement Document for the k-measurement spectrometer and the procurement of the crystals for this instrument.
1	06	09			Mechanical Systems	This element covers specification, design, procurement, assembly and testing of mechanical systems which include PPS stopper hardware and PPS shielding. The safety and Radiation Physics Review process is also included.
1	06	09	01		PPS Stoppers	This element covers specification, design, procurement, assembly and testing of the PPS stopper hardware.
1	06	09	02		PPS Shielding	This element covers specification, design, procurement, assembly and testing of the PPS shielding.
2	06				X-RAY END STATION SYSTEMS (OPC)	The X-Ray Endstations System (OPC) section of the WBS includes labor and material costs associated with R&D tasks, Spares and Commissioning.
2	06	01			XE System Management	This element provides management support for X-Ray Endstations System for R&D and commissioning work. It also includes travel related to R&D projects.
2	06	03			Commissioning	This element covers the effort associated with integrating, testing and commissioning of all the subsystems of the X-ray Endstation Systems.
2	06	03	01		Global Controls Systems	This element covers integration, testing and commissioning of the Global Controls Systems such as network, safety systems and data management system.
2	06	03	02		XES Laser System	This element covers integration, testing and commissioning of the XES laser system in the Near Hall.

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2	06	03	03		AMOS System	This element covers integration, testing and commissioning of the AMO instruments.
2	06	03	04		reserved	
2	06	03	05		2D X-Ray Detector	This element includes commissioning of the 2D X-Ray Detector from Cornell.
2	06	04			Spares	This element includes procurement and assembly of spare parts for the x-ray Endstation Systems.
2	06	04	01		PPS Stoppers	This element includes procurement and assembly of spare PPS stoppers.
2	06	05			R&D: X-Ray Detectors	This element includes the R&D activities associated with delivering a novel 2D x-ray detector. All the effort in this WBS section is managed via a contract with Cornell University.
2	06	05	01		reserved	
2	06	05	02		R&D: 2-D X-Ray Detector (Cornell)	This element includes labor and materials for the 2D x-ray detector contract with Cornell. It also covers the biannual external detector reviews by the LCLS detector advisory committee (LDAC).
2	06	05	03		deleted	
2	06	05	04		deleted	