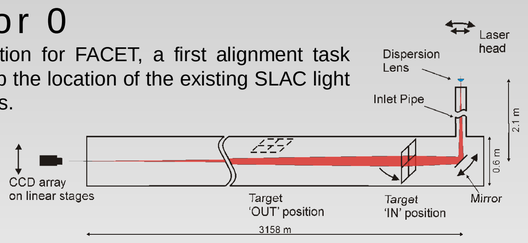
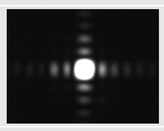
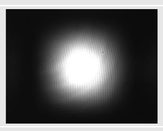
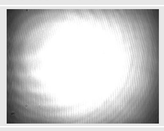
SLAC Status Report

Georg Gassner, Catherine Le Cocq, Robert Ruland

Sector 0

In preparation for FACET, a first alignment task was to map the location of the existing SLAC light pipe targets.



Sector 2-7	Sector 10-1	Sector 20-3
		
Camera Position		
X=0.000 mm	X=3.352 mm	X=6.576 mm
Y=0.000 mm	Y=-4.414 mm	Y=-7.360 mm

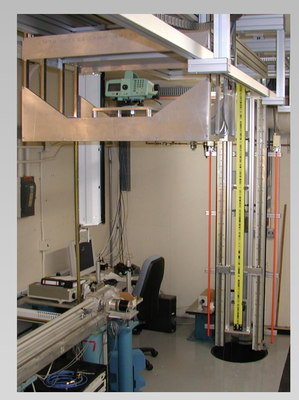
Geodetic Laboratory

The Geodetic Laboratory at Sector 10 along the linac is situated in an old access tunnel with very stable temperatures and stable walls. It is used for a variety of tasks from routine calibration runs of leveling equipment and distance meters to photogrammetric calibration. Laser tracker distance and angle measurement calibration tests are carried out as well as general acceptance tests, performed after instruments are shipped across the country for maintenance.

A wire position monitor performance test is set up using ultra high accuracy RF wire monitors as reference to compare against capacitive and optical monitors.

A setup to determine the thermal coefficient of expansion of leveling rods is presently being commissioned.

See also: G. Gassner, Instrument Tests with the new Leica AT401, Thursday @ 10:50



Photogrammetry

SLAC Metrology photogrammetric projects have progressed in several areas: new cameras, software and calibration. Among these improvements, the combination of the new on-the-fly target recognition software with a wireless image acquisition setup for the Nikon cameras allows the user to validate the picture immediately in the field.

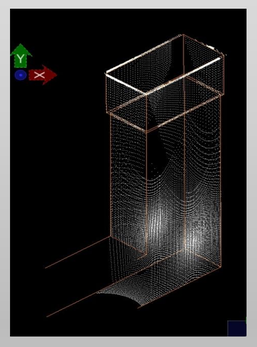
More details in: C. Le Cocq, Camera Choices for Photogrammetric Surveys, Thursday @ 11:10

FACET

Facility for Advanced aCcelerator Experimental Tests

FACET will use the first 2/3 of the SLAC linac to study plasma acceleration, using short, intense pulses of electrons and positrons to create a source called a plasma wakefield accelerator.

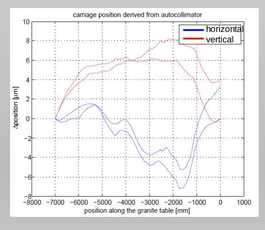
Construction at Sector 20 just started up and for this an alignment network was remeasured. Layouts for stand installation have been done and a 3D model for a new stair installation in an existing shaft was measured with a laser scanner.



Magnetic Measurement Facility

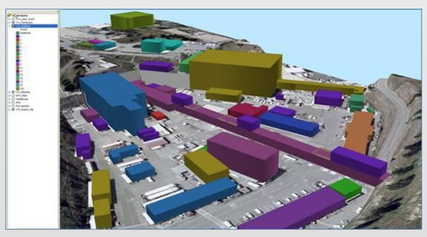
The Magnetic Measurement Facility used to tune LCLS undulators employs a 7m air bearing based measurement bench and a large volume CMM for measurements in the single digit micron domain.

The magnetic measurement bench is regularly checked and if necessary realigned using an interferometer, electronic autocollimators and inclinometers.



An ETALON LaserTracer is used to characterize the CMM.

GIS



Significant advancements have been made in the SLAC Metrology Geographic Information System (GIS). After transitioning to ESRI software, the system is continuing to grow with the addition of a large variety of data types that have been attached and quantified. A 2D demonstration was created providing details on new buildings while a 3D demonstration was focused on SLAC's new LCLS project. Data and graphics related to the structures in and around the LCLS in the Research Yard as well as beam line components were created and the related databases were filled in. The project is expanding to incorporate more Alignment Engineering data and SLAC's fire department and safety groups are beginning to utilize the capabilities of the GIS.

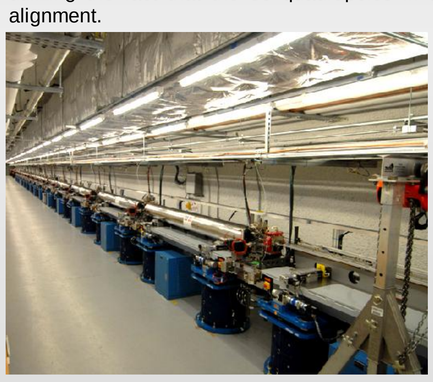
See also: B. Fuss, Integration of Laser Scans into a GIS, Poster, Thursday @ 15:40

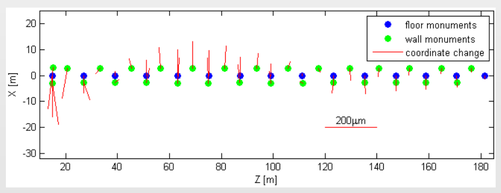
LCLS

Linac Coherent Light Source

During the last two years the front end enclosure installation was concluded and the first high-energy or "hard" X-ray laser light was produced within 2 hours of commissioning.

The alignment network was remeasured due to shrinking walls in the tunnel. The data were analyzed utilizing the fact that the 33 quadrupoles in the undulator hall form a straight line after beam-based alignment.





In the undulator hall a battery of sensors (hydrostatic leveling sensors and wire position monitors) is used to monitor the position of 33 girders.

More in: G. Gassner, Experience Report with the Alignment Diagnostic System, Friday @ 9:00

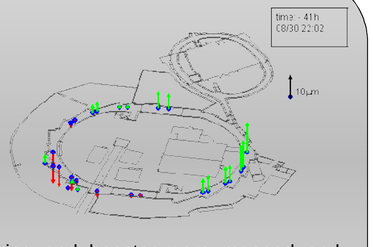
LCLS II

Feasibility studies for additional beam line space were carried out with a laser scanner data based 3-D model (green line indicates proposed beam line)

SSRL

Stanford Synchrotron Radiation Light Source

Since the SPEAR ring is built on unstable soil, an HLS system has been installed in the ring and on several beam lines. During the last two years we expanded the system by adding 6 sensors.

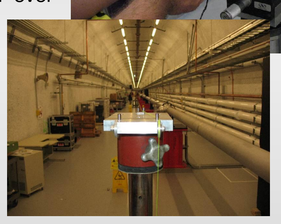


During the September 2009 machine shut down the ring and booster were mapped and components were realigned. To retain the relationship of the ring to the beam lines and to minimize the effect of alignment adjustment caused position changes on the beam lines the measurement data adjustment was constrained at the insertion devices.

LUSI

LCLS Ultrafast Science Instruments

LUSI is a suite of x-ray instruments utilizing the LCLS x-ray beam. An alignment network was established from the three near experimental hutches to the far experimental hall using portable stretched wire measurements, laser trackers and digital levels. The alignment of experiments in the first 3 hutches is an ongoing process with ever changing experimental chambers.



Acknowledgments

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