

SAN FERNANDO SLR STATUS AND FUTURE OBJECTIVES.

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Abstract

San Fernando SLR station is involved in a process of constant evolution. In the frame of the Spanish Government researching projects support, the station is being prepared to be able to extend to three tracking shifts, by using CSPAD not only during nighttime but also during daylight. Some problems have to be overcome before we get this jump, i.e. a more accurate control of the horizontal movement of the telescope and a system to control the ray beam offset during daylight.

As soon as the station meet this goal, we will move to the next objective: the tracking of the highest satellites, ETALON, GLONASS, GPS and the coming GALILEO constellation.

Refurbishment of the SLR facilities

During the spring of 2003, a lot of work were developed in order to improve the quality of the SLR station facilities. Besides the refurbishment of the control hall, a new air-conditioned temperature controlled room was built. Air conditioning equipments were improved in order to keep the temperature for the essential systems as stable as possible. A new rack containing timing devices and control system was installed into the new room. The laser bank is also located there. Laser bank cover was replaced for a new one, more accesible and more easy to manage than the old one, as one can see in fig.1.



Figure 1: San Fernando laser bank: old vs new aspect.

Calibration system

The external calibration target is still mounted on the top of a building located a distance of about 1.5 kilometer from the telescope. Although it is no longer used to make calibrations during the trackings, we use it to periodically check the laser beam divergence, shooting over it with very low energy. To calibrate the system during the tracking sessions we use two optical squares that we have mounted into the dome very close to the telescope, as shown in figure 2. Mirrors and a diffusers are the main components of these squares. Figure 3 is showing the calibration process principle. The short distance from the transmitting telescope and the receiving system tries to ensure we are avoiding tropospheric uncertainties.



Figure 2: Calibration squares mounted into the telescope dome

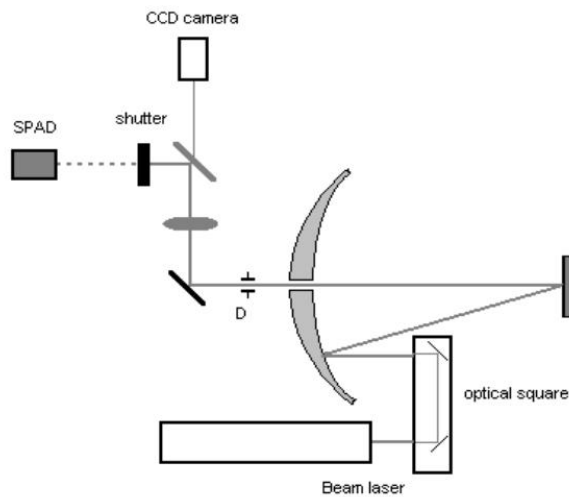


Figure 3: Calibration principles

Receiving System

The receiving device attached to the telescope allows us to choose between a C-SPAD and a Photomultiplier to be used as detector. We only use C-SPAD during nighttime operations, while the photomultiplier is selected as diurnal detector. Different ray paths originate different calibration values depending on which elements is used. We are in the way of eliminate the photo, to improve the single shot rms during daylight tracking.

Control System

The system is controlled by a computer with a Pentium 4 processor, using MSDOS operative system yet. One of the objectives in the near future is to split the work in two different computers. One of them will be devoted exclusively to control the movement of the system in a more smooth and suitable way. Software to control the telescope movement has been written already. The other computer will control the rest of the parameters of the observation. But both of them will be connected through the local network. A migration to a more modern operative system is mandatory. We are considering Linux as a suitable option.

Timing System.

The new rack located at the air controlled room contains up to three SR620i time counters. One of them was calibrated during the EUROLAS Workshop 2003 held at Herstmonceaux Castle. Another one belongs to Graz SLR station. We have to acknowledge Graz SLR staff for their support, by borrowing us the equipment. The idea of using three timing devices is to make comparisons among them, trying to keep the timing system as accurate as possible. On the other hand the synchronization is performed by using a 10Hz signal from the Cesium atomic clocks located at the Observatory Time Department.



Figure 4: Timing devices in the control rack before and after the station refurbishment.

Summary

Data quality and quantity of San Fernando SLR Station is improving in a smooth but continuous way. A strong effort has been made to modernize the station, by recognizing those elements which would need to be improved, and by fixing problems encountered. In this way we expect that in the very near future San Fernando SLR station will be able to track LAGEOS during daylight as well as during the night, and with a high quality standards in the trackings. Next step will be tracking high satellites. But it will be mandatory to improve the quality of the pointing. Servo control of azimuthal and height motor need to be studied and improved.

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