

San Fernando laser station updates and new improvements

Manuel Sánchez¹, Manuel Catalan¹, Manuel Larrán¹, Franco della Prugna^{1,2},
Ángel Vera¹, Jesús Marín¹, Jesús Relinque¹.

¹Royal Observatory of the Spanish Navy

²Centro de Investigaciones de Astronomía, CIDA, Mérida, Venezuela.

The laser station of the Royal Observatory of the Spanish Navy has been working on artificial satellite tracking since early 1980s. Nowadays, these observations serve a dual purpose. First, our tracking data on active artificial satellites contribute to the International Laser Ranging Service (ILRS) in order to improve the definition of their orbits, and to define the International Terrestrial Reference Frame (ITRF). Besides, this activity is complemented by space debris tracking.

Regarding the second mission, the number of non-collaborative objects has increased rapidly, particularly in LEO where the probability of collision can reach an alarming level in next few years because of the gradually increases of the number of space debris generated compared to the number of objects extracted because of atmospheric friction. This situation poses a risk for manned and unmanned space missions, with devastating consequences in some cases.

In order to participate in this demanding type of activity it has led to severe modifications and technical developments at the station in order to obtain echoes on this type of objects, some of them with low reflectivity, moving at speeds of several kilometers per second and distances of thousands of kilometers.

These modifications has led to the incorporation of a new laser almost 100 times more powerful than the previous one, to develop an air safety system, or to include new optical and electronic components that improves the signal-to-noise ratio.

Besides that, a new laser bench is nowadays operative. This new laser (30 ps pulse width) transmits 50 mJ per pulses, and it is in charge of the 'leitmotiv' that justifies the appearance of this technique at ROA, that is tracking active collaborative satellites.

In this poster we will show the state-of-the-art of San Fernando station, and we will provide details regarding all these improvements and last figures on echoes and trackings.