



Enhanced satellite laser ranging project



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ESLR is satellite laser ranging project offering a number of attractive new features:

- An advanced **calibration and testing system** for a faster alignment process before and during ranging
- Ranging of small one and/or **set of closely spaced objects** (space debris) Additional data from the field sensor for orbit calculations.
- The **modularity** of the system allows for easy modification and step wise upgrade of the instrument
- Patent pending telescope construction with the autocollimator system allows improved interoperability enabling ESLR to **obtain additional space object's coordinates in real-time**
- The overall system performance enables for precise **observation of objects at lunar distance** and beyond.
- Simply and reliably construction, easy assemble, easy to adjust and align. **Mobile**, located in standard container, adequately equipped, it can be transported by ship, rail or truck.
- Ready for integration of **optical communication** channel

ESLR project incorporates several novel approaches:

- The telescope's main optical system (primary mirror 630 mm) has aberration free long direct focus (~32 m), transmission channel for better outgoing laser beam collimation (2 arcsec in far zone) and another focus (~4.6 m) for receiving and control channels
- Specific design of the telescope's optical and mechanical systems allows the use of different power and frequency lasers
- Lasers. ESLR optical system design allows the use of high power laser for small Space object finding not equipped with retroreflectors as well as far space objects (Moon distance and beyond). ESLR provides modular, optically replaceable laser system (different frequencies, repetition rate and output power, including high energy one with up to 20 J per pulse
- The new event timer is based on digital signal processing, results in high performance and reliability
- Specific telescope construction with autocollimator for the instrument coordinate system aligning to the Earth gravity vector gives more precise adjustment and interoperability, and ability to obtain space object coordinates on observation spot in real-time immediately
- ESLR operation software is highly automated and has easy-to-use central operator interface to command and control

General parameters



ESLR telescope configuration:

- **Mechanical mount**
Alt-Azimuth mount, weight (with optics): less than 130 kg

Optical systems:

Main mirror (aspherical): D=620 mm, thickness: 120 mm, weight: 45 kg

The field telescope provides greater field of view and rigidly fixed to the ESLR telescope mount horizontal axis with its optical axis parallel with the main optical system optical axis and is supplied with replaceable video cameras

The telescope is complete with motorized optical filter wheel and motorized focusing node

Laser transmitter:

Modularity allows use of different lasers. In the project laser up to 10J per pulse at 1064 nm, at least 10 Hz repetition rate < 2 ns pulse duration, has been used

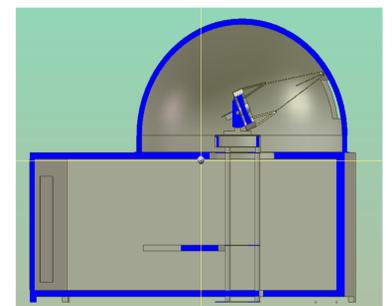
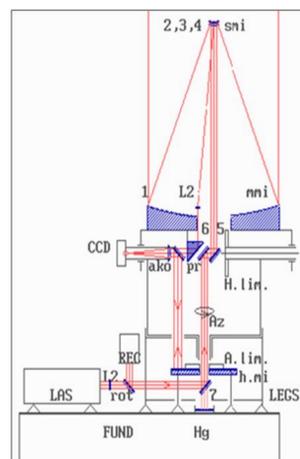
SLR measurement system includes:

High-speed light photon receiver (exchangeable option):
Fast SPAD (Single Photon Avalanche Diode) detector
New generation (ultra fast) PMT (PhotoMultiplierTube),

New generation High-speed Event Timer (HSET) - a PC-based instrument (currently in the development stage) - for close group space object measurements: single-shot RMS resolution - better then 5 ps, measurement rate - up to 200 MHz

The laser operation is synchronized with video sensor and event timer device processing the 3D data in real time scale

Estimated container with system and shelter total weight - less than 3,000 kg.



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