

Developments of Shanghai SLR station and future plan

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Abstract: Since August 2019 Shanghai SLR station performed 2 kHz repetition rate routine SLR measurements through updating laser unit (3W @532nm, 45ps pulse width), RGG and control software. For further increasing the amount of laser data, the routine SLR system updated to 5kHz repetition rate since Nov.2023 by using the laser unit with 20ps pulse width and the output power of 5W (532nm), APD detector with chip of 100 μ m and the calibration precision of 2-3mm. A kind of industrial-level laser unit is installed in Dec.2023 with the repetition rate of 100Hz-1MHz, 15ps pulse width, 380~ 390 μ J @532nm for 100Hz-300kHz. By using this laser unit, the 100 kHz SLR measurements are performed in order to get better statistical uncertainty of normal point. For space debris laser ranging, Shanghai SLR station equips a set of high power laser unit with the repetition rate of 1kHz, the output power of 30W@ 1064nm and InGaAs detector, which can track debris targets at the equivalent distance of 1000km @ RCS 0.3 m². The works of auto-SLR observation are being underway and the servo tracking system will plan to be updated to replace the old one.

For enlarging Chinese SLR network, Shanghai SLR station plans to build three sets of high-performance SLR stations to perform the routine SLR observations at the frequency of 5kHz in the next several years, which will co-locate with VLBI and GNSS sites in the southwest (Tibet), northeast (Jilin), and northwest (Xinjiang) regions of China, respectively.

Key words: Shanghai SLR, 5kHz routine SLR, 100kHz SLR, space debris, new SLR stations