Infrared Laser Ranging to Satellite and Debris in Shanghai station

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Abstract:

Laser ranging with near-infrared wavelength (1064nm) has better atmospheric propagation, higher photon density and more laser pulse power compared with 532nm one. Advantages above have been well demonstrated in SLR, Debris Laser Ranging (DLR) and Lunar Laser Ranging (LLR). We are reporting on the developments of 1064nm wavelength laser ranging in Shanghai station. With a 60cm telescope and 1064nm laser signal, satellites with an orbital altitude of ~36000 km were successfully measured in both the daytime and night. By using a 8W infrared laser with 60 pico-seconds pulse width, we realized space debris laser ranging with the precision (RMS) of less than 1m and the distance of as far as 2600km and the cross section of as small as 1.3m^2. It is indicated that from the measuring results, infrared SLR measurements shows obvious better performances in many aspects such as high power for pico-second laser system, better return rate and low noise in daytime.