

## One-way LASER Ranging to LRO (9:30 – 9:45)

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One-way laser ranging (LR) to Lunar Reconnaissance Orbiter (LRO) from NASA's Next Generation Satellite Laser Ranging System (NGSLR), and ten satellite laser ranging (SLR) ground stations from the International Laser Ranging Service (ILRS) has been ongoing since commissioning of LRO in June, 2009. Over 1200 hours of ranging data have been collected. The LRO clock oscillator is stable to 1 part in  $10^{12}$  over several hours, and as stable for much longer periods after correcting for a long-term drift rate and an aging rate. Simultaneous ranging to LRO from 2, 3, or 4 ground stations allows for relative time transfer among the participating LR stations. Results of new ranging and time transfer experiments using the new time base will be discussed. The increased clock accuracy also provides stronger orbit constraints for LRO POD. The effect of using LR in the OD solution, both alone, and with the S-band tracking will be shown.