Toward high-rate on-time mm-accurate SLR at Stafford, Virginia

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The current status of a new system under development at NRL will be presented. This new system is designed for participation in the European Laser Timing experiment with state-of-the-art accuracy and precision. It consists of an ultrafast passively stabilized short-pulsed laser, optical trigger device, C-SPAD detectors, and Pico Event Timers, all of which are disciplined by a new low phase noise H-maser clock that is steered to UTC(USNO) via two-way satellite time and frequency transfer. The laser can transmit at 532nm or 1064nm with PRFs ranging from single-shot to ~20 kHz. Though, the current detector gating system limits the PRF to <4 kHz. The laser cavity is tunable by ±2 kHz, so that transmitted pulses can be controlled to arrive on-time at a satellite in LEO. Safe operation is enabled by a new laser safety interlock and aircraft avoidance system. The H-maser clock disciplining the electronics is hosted in a remote building. The clock signals are transferred to the SLR facility over dedicated single-mode fiber, and copied and distributed throughout the facility using high-performance synthesizers and amplifiers. One of the copied 10 MHz signals is used as an external frequency reference for the Septentrio PolaRx5 receiver of a new co-located GNSS station, providing additional clock monitoring capabilities via geodetic GPS post-processing techniques. This new NRL system is still in early development, but as it evolves we seek new techniques for measuring, monitoring, and compensating end-to-end system delays.