

SGSLR Receiver Validation and Pulse Width Amplitude Correction

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SGSLR has a receiver system using a detector/timer package not previously used for satellite laser ranging. Using an array of silicon photomultipliers and a flight proven event timer designed by Sigma Space, it promises to deliver spatial information to allow bias correction in a robust, economical package. In order to validate its efficacy in millimeter-level ranging, tests were conducted measuring the long term stability of the receiver and its sensitivity to signal amplitude variation. The receiver was tested directly against the conventional SLR MCP technology.

Although SGSLR will operate in single photon mode to control for signal amplitude, there will still be some amplitude variation from pulse to pulse. By recording signal threshold crossing in both directions, it is possible to estimate the width of a given pulse signal and infer pulse amplitude. Using this information, a correction factor can be applied without additional hardware.

This paper details the validation of the SGSLR receiver with some test results, as well as pulse width processing techniques that allow millimeter stability.