

An SLR Receiver to discriminate single- from multiphoton events

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In Satellite Laser Ranging the distance to satellites is determined by laser pulse time-of-flight measurements. To minimize systematic errors in the measurements usually time-correlated single photon counting is applied. This method provides a high dynamic range as long as the signal is kept at the single photon level. Higher signal levels introduce systematic errors. Assuming a Poisson distributed signal, which is valid for a coherent light source such as a laser, the single photon level can be reached at a detection rate of below 10 percent. In Satellite Laser Ranging, however, laser pulses are sent through the turbulent atmosphere. This leads to speckle formation at the satellite and at the ground side. Speckle causes the photon statistics to change to that of thermal light. Therefore it is not ensured to stay at the single photon level during Satellite Laser Ranging measurements at a detection rate up to 10 percent. To investigate the effects caused by the turbulent atmosphere on the photon statistics in more detail we build a photon number sensitive receiver. The receiver allows to discriminate single- from multi-photon events. We want to give an overview of the technical details of this receiver.