

2015 ILRS Technical Workshop

6.2 Single Photon Tracking under difficult Condition

J. J. Eckl (1), K. U. Schreiber (2)

(1) Federal Agency for Cartography and Geodesy, Geodetic Observatory Wettzell, Bad Kötzing, Germany;

(2) Forschungseinrichtung Satellitengeodäsie, Technische Universität München, Geodetic Observatory Wettzell, Bad Kötzing, Germany;

The accuracy of SLR measurements is reduced when there is a large variation in the brightness of the return pulse. Therefore modern high repetition rate Satellite Laser Ranging Systems perform “Single Photon Tracking” to avoid systematic biases in the measurement. The term “Single Photon Tracking” usually means that the laser power is reduced so that the return rate is controlled to a level below 10%. At these rates, the probability of receiving stronger return signals is negligible, provided the measurement is performed under well controlled conditions. However under normal operations such conditions are not usually met because of small clouds, high detector dark noise, beam pointing issues or a low repetition rate of the SLR system. Consequently an estimate of the true signal level based on the return rate is difficult. In this paper we want to show the relation between the return rate and the mean photon number in Satellite Laser Ranging measurements for the Wettzell Laser Ranging System during 2014. Furthermore we introduce an approach to extend the common model for the center of mass correction, valid for single photon data to also correctly perform the center of mass correction as a function of the mean photon number of a Boltzmann distributed signal intensity.