

Polarimetric satellite laser ranging

Nils Bartels (1), Daniel Hampf (1, 2), Bernhard Heidenreich (3), Felicitas Niebler (1), Moritz Vogel (1), Wolfgang Riede (1)

(1) German Aerospace Center (DLR), Institute of Technical Physics, Stuttgart, Germany; (2) DiGOS Potsdam GmbH, Potsdam, Germany; (3) German Aerospace Center (DLR), Institute of Structures and Design, Stuttgart, Germany

We report on concepts and laboratory experiments pioneering polarization-modulated SLR. The idea is to equip satellites with specially designed retroreflectors with different polarizing properties. These retroreflectors can be coded into arrays and act as an identifier for satellites (a “number plate” that can be read from ground), while maintaining the precise orbit determining capability of conventional SLR.

[1] The intended demonstration of the technology in a space mission not only requires the design of new retroreflectors with additional polarization optics, but also modifications to our SLR station (the miniSLR®) in terms of hardware and software to be able to emit and detect photons with different states of polarization.

The main focus of our development is to meet increasing demands of space object monitoring, for example of mega-constellations or during cluster launches. However, we think that polarization-modulated SLR might also have applications in space geodesy, which is one of many topics we would like to discuss with the ILRS community.

[1] Bartels, N., Allenspacher, P., Hampf, D. et al. Space object identification via polarimetric satellite laser ranging. *Commun Eng* 1, 5 (2022). <https://doi.org/10.1038/s44172-022-00003-w>.