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Proceedings Article

A single-shot optical linear polarimeter for asteroid studies

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Abstract References

abstract

Polarimetric studies of minor Solar System bodies are useful to access physical parameters, such as albedo and diameter, which are both important and difficult to derive by other techniques. Current activities in this field are limited since most instruments adopted in recent observing campaigns involve photomultipliers detectors. These sensors are suitable for observations of objects with fast polarization variations, but usually suffer from low quantum efficiency. This severely limits the number of accessible targets. For asteroids, the polarization evolves slowly enough to allow more sensitive albeit slower detectors (CCD-based polarimeters). However, polarimetric measurement accuracy may be hampered with usual "sequential" polarimeters. Indeed, retarder plate swapping time. readout and exposure time add up. Consequently, the time laps between complementary polarization measurements (some minutes) may be non-negligible in some cases, compared to the evolution time of the polarization parameters. Moreover, polarimetric accuracy may also be limited by airmass variations between complementary exposures. We are developing a new "single-shot" CCD polarimeter based on a "double-Wollaston" configuration already described in literature [9][10]. This allows simultaneous acquisition of the three Stokes parameters I, Q, U without any moving parts. So, the linear polarization degree can be measured accurately, even for targets with fast polarization and/or airmass variations. Presently, the polarization analyzer is in calibration phase, and will be installed soon at the F/12.5 Cassegrain focus of the West telescope at the "Centre Pédagogique Planète et Univers" facility (C2PU, Observatoire de la Côte d'Azur, Plateau de Calern, France).© (2012) COPYRIGHT Society of Photo-Optical Instrumentation Engineers (SPIE). Downloading of the abstract is permitted for personal use only.

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Calibration ; Equipment and services ; Photomultipliers ; Polarimetry ; Polarization ; Quantum efficiency ; Sensors ; Telescopes ; Wave plates

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