

## SIMPLER: the Simultaneous Imaging Polarimeter onboard the MELOS Orbiter

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Polarimetry is a powerful method to reveal properties of planetary aerosols. Polarimetric effects are produced by both the surface and atmosphere on Mars. Polarization dependences on phase angle and wavelength enable us to distinguish aerosols (i.e., water-ice clouds and dust clouds) and the surface.

Mars polarimetry observations were few in the records; imaging-polarimetry observations were fewer, and multi-color polarimetry were much fewer. One of the reason is the difficulty. Usually, polarimetric imaging needs rotating of the polarizer; in the meanwhile, imaging condition changes (e.g, seeing, Mars rotation, and so on), which degrades accuracy.

Polarimetric phase functions of Mars mainly have been investigated with Earth-based telescopes, but observations from the Earth limit the phase angle within the range of 0-45 degrees and cannot obtain a phase curve of a single cloud.

A new imaging-polarimetry instrument, called SIMPLER (SIMultaneous IMaging PoLarimetER), is being designed for a to-be-proposed Mars exploration mission of Japan, MELOS. SIMPLER is a multi-eye camera, like the Venus Monitoring Camera (VMC) on board ESA's Venus Express, so that it can take I+Q, I-Q, I+U and I-U images simultaneously, eliminating uncertainties of ordinary "sequential" data acquisition methods. Another advantage is that the solar phase angle of the planet changes as the spacecraft orbits around the planet. Therefore, polarization phase curves, covering a wide range of phase angles, can be obtained every orbit so that the polarization maps may be interpreted with less ambiguity. This should enable us to distinguish different types of aerosols and to study their spatial and temporal variabilities. In this paper we present the outline of the SIMPLER and related research plans.

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