SAEMPL — European Research Council Advanced Grant project "Scattering and Absorption of Electromagnetic Waves in Particulate Media"

Project description

The canonical problem of electromagnetic scattering in complex particulate media is solved numerically using multiple-scattering theory based on the Maxwell equations, with an exact treatment of the leading ladder and cyclical interaction diagrams. The numerical methods are validated using a nanotechnology-based scattering experiment that, simultaneously with the measurement of the full scattering matrix at arbitrary illumination and observation geometries, allows for a detailed physical characterization of the scattering object using microscopy and white-light interferometry. The numerical and experimental methods will have a major impact on how knowledge is accrued on objects in our Solar System based on their scattering characteristics, with wavelengths spanning from the ultraviolet to radio, using both space-based and ground-based observing programs. The methods will have immediate applications in Earth observation, including remote sensing of the atmosphere, land, and sea.

Project timeline is 2013–2018.

Personnel

- Prof. Karri Muinonen, project leader (2013–)
- Dr. Antti Penttilä, senior scientist, experimental light scattering (2013–)
- Dr. Maria Gritsevich, senior scientist, light scattering applications (2016–)
- Dr. Ivan Kassamakov, senior scientist, experimental light scattering (2015–)
- Dr. Johannes Markkanen, post-doctoral scientist, light scattering methods (2013–)
- Dr. Evgenij Zubko, post-doctoral scientist, light scattering methods (2013)
- Dr. Anne Virkki, doctoral student and post-doctoral scientist, light scattering methods (2015–)
- Mr. Olli Wilkman, doctoral student, light scattering applications (2016)
- Mr. Timo Väisänen, doctoral student, light scattering methods (2015–)
- Dr. Daniel Guirado Rodríguez, visiting post-doctoral scientist (2013)

The SAEMPL project and its personnel are associated with the Planetary Research System (PSR) group at the Department of Physics, University of Helsinki, Finland.

Publications

Please see the University of Helsinki TUHAT research database for the list of publication in this project.

Workshops

- Workshop on Spectroscopy, Photometry, and Polarimetry of Airless Solar System Objects, Tuusula, Finland, September 14–15, 2017
- Multiple scattering (One-billion-particle problem) workshop at EMTS 2016, Espoo, Finland, August 19, 2016
- (S3) Multiple Scattering session at EMTS 2016, Espoo, Finland, August 16, 2016

Internal SAEMPL page for project members.