

Dr. Mauro Ciarniello

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Current position: Staff Researcher (from 1 Dec 2018) at INAF, Istituto di Astrofisica e Planetologia Spaziali, 00133 Rome, ITALY. **Former positions:** *2 Nov 2015 – 30 Nov 2018:* Research associate, at INAF-IAPS, Rome, Italy; *1 March 2013 to 1 November 2015:* Research fellow, at INAF-IAPS, Rome, Italy; *1 Mar 2013 - 1 Aug 2009:* Research fellow, at INAF-IAPS, Rome, Italy.

Education: National Scientific Qualification as Associate Professor (ASN) in Astronomy, Astrophysics, Physics of the Earth and Planets (02/C1), from May 2019; Astronomy Ph.D. at Università degli Studi di Roma La Sapienza, January 2012; Astronomy and Astrophysics Master Degree at Università degli Studi di Roma La Sapienza, June 2008, (Score: 110/110 cum laude).

Professional Background

- Investigation of the light-matter interaction and study of the radiative transfer problem in particulate media: characterization of the physical properties of planetary surfaces, minor bodies, planetary rings, and diffuse distributions of dust.
- Application of analytical solutions of the radiative transfer problem in particulate media for the investigation of composition and photometric properties: Hapke's theory, Mie theory.
- Development and application of numerical codes for the simulation of the light scattering process in particulate media: ray-tracing Monte Carlo.
- Analysis of VIS-IR hyper-spectral data from remote sensing instruments onboard space missions: observations of Saturn's rings and icy moons from VIMS-Cassini; observations of the comet 67P/Churyumov-Gerasimenko from VIRTIS-Rosetta for the study of the nucleus and of the cometary dust; observations of Ceres from VIR-Dawn.
- Modeling and photometric correction of observations of atmosphereless bodies in the Solar System from VIS-IR imaging spectrometers space missions.
- Spectral modeling and investigation of the composition and physical properties of planetary surfaces, minor bodies and planetary rings from hyper-spectral observations by VIS-IR imaging spectrometers onboard space missions.
- Analysis and treatment of geo-referenced hyper-spectral datasets: production of global maps of albedo, spectral indicators and mineralogical phase abundances.
- Laboratory activity for the measurement and modeling of VIS-IR reflectance of planetary surface analogues: silicatic powders; water ice and icy mixtures with cometary analogues; derivation of effective optical constants by inversion of laboratory reflectance spectra in support of the modeling of remote sensing observations.
- Support to in-flight calibration and cross-calibration of imaging spectrometers.

Most relevant activity and responsibilities

- Associated scientist for the VIRTIS-Rosetta instrument: investigation of the spectrophotometric properties of the nucleus and coma of the comet 67P/Churyumov-Gerasimenko; responsible for the photometric correction of nucleus observations.
- Team member of the VIR-Dawn instrument: investigation of the spectrophotometric properties of dwarf planet Ceres; responsible for the photometric correction of nucleus observations.

- Collaborator of the VIMS-Cassini team: study of Saturn's icy moons and rings spectrophotometric properties and composition.
- Associated scientist of the MAJIS-Juice spectrometer: study of Jupiter's icy moon surface spectrophotometric properties and composition.
- PI of the ISSI international team "Comet 67P/Churyumov-Gerasimenko Surface Composition as a Playground for Radiative Transfer Modeling and Laboratory Measurements" (<http://www.issibern.ch/teams/churgerasim/>; ID 397);
- Member of the combined Cassini and New Frontiers Data Analysis Program(s) review panel for evaluation of NASA ROSES proposals (Nov 2017); external reviewer for evaluation of NASA ROSES proposals submitted to the combined Cassini and New Frontiers Data Analysis Program(s) (Nov 2018).

Selected Publications

Author of 77 refereed publications (7 as first author), h-index: 23 (source: Google Scholar), 20 (source: ADS).

1. G. Filacchione, F. Capaccioni, **M. Ciarniello**, et al. An orbital water-ice cycle on comet 67P from colour changes. *Nature*, 578, 7793, 2020.
2. A. Raponi, **M. Ciarniello**, et al. Infrared detection of aliphatic organics on a cometary nucleus. *Nat. Astron.*, 2020.
3. **M. Ciarniello**, et al. Ceres observed at low phase angles by VIR-Dawn. *A&A*, 634, A39, 2020.
4. **M. Ciarniello**, et al. Cassini-VIMS observations of Saturn's main rings: II. A spectrophotometric study by means of Monte Carlo ray-tracing and Hapke's theory. *Icarus* 317:242–265, 2019.
5. G. Filacchione, **M. Ciarniello**, et al. Photometric Modeling and VIS-IR Albedo Maps of Dione From Cassini-VIMS. *Geophysical Research Letters*, 45:2184–2192, 2018.
6. **M. Ciarniello**, et al. Spectrophotometric properties of dwarf planet Ceres from the VIR spectrometer on board the Dawn mission. *A&A*, 598, A130, 2017.
7. **M. Ciarniello**, et al. The global surface composition of 67P/Churyumov-Gerasimenko nucleus by Rosetta/VIRTIS. II) Diurnal and seasonal variability. *MNRAS*, 462_1:S443–S458, 2016.
8. E. Ammannito, M. C. De Sanctis, **M. Ciarniello**, et al. Distribution of phyllosilicates on the surface of Ceres. *Science*, 353, 2016.
9. G. Filacchione, A. Raponi, F. Capaccioni, **M. Ciarniello**, et al. Seasonal exposure of carbon dioxide ice on the nucleus of comet 67P/Churyumov-Gerasimenko. *Science*, 354, 2016.
10. M. C. De Sanctis, A. Raponi, E. Ammannito, **M. Ciarniello**, et al. Bright carbonate deposits as evidence of aqueous alteration on (1) Ceres. *Nature*, 536(7614):54–57, 08 2016.
11. M. C. De Sanctis, F. Capaccioni, **M. Ciarniello**, et al. The diurnal cycle of water ice on comet 67P/Churyumov-Gerasimenko. *Nature*, 525:500–503, 2015.
12. **M. Ciarniello**, et al. Photometric properties of comet 67P/Churyumov Gerasimenko from VIRTIS-M onboard Rosetta. *A&A*, 583, 2015.
13. **M. Ciarniello**, et al. A test of Hapke's model by means of Monte Carlo ray-tracing. *Icarus*, 237, 2014.
14. C. Carli, **M. Ciarniello**, et al. Spectral variability of plagioclase-mafic mixtures (2): Investigation of the optical constants and retrieved mineral abundance dependence on particle size distribution. *Icarus*, 219, 2014.
15. **M. Ciarniello**, et al. Hapke modeling of Rhea surface properties through Cassini-VIMS spectra. *Icarus*, 555, 2011.

Rome, 24th March 2020

