



# Michele CERESOLI

Postdoctoral Research Fellow  
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## CURRENT POSITION

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04/2026 – Current

### Postdoctoral Research Fellow

Politecnico di Milano, Milan, Italy

- Design, development and validation of a Physically-Based Rendering software with GPU acceleration.

## PREVIOUS POSITIONS

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01/2025 – 07/2025

### Visiting Expert

European Space Agency, Noordwijk, The Netherlands

- Integration of optical and radiometric observables in navigation filters.
- Design, implementation and testing of navigation algorithms for lunar landings.
- Support to TEC-SEN and Moonlight team activities.

02/2024 – 07/2024

### Visiting Researcher

Telespazio S.p.A., Rome, Italy

- Augmentation of a visual scenario tool based on Unreal Engine 5 for the generation of lunar orbital and surface images.
- Generation of datasets with optical images and depth maps for lunar navigation applications.
- Mission analysis for ESA's Moonlight LCNS Phase B2/C/D/E.

06/2022 – 10/2022

### Research Fellow

Politecnico di Milano and University La Sapienza, Italy

- Design and implementation of TCMs maneuvers for LICIAcube's flight-dynamics operations.
- Design, implementation and validation of navigation filters to support one-way ranging navigation in lunar orbits.
- Design and development of a framework to support high-performance Monte Carlo simulations of navigation algorithms, in Julia.
- Design and development of an open-source framework to support astrodynamics applications, in Julia.

01/2022 – 05/2022

### Research Collaborator

Politecnico di Milano, Milan, Italy

- Design, implementation and validation of an IMU simulator and trajectory reconstruction algorithm for cislunar applications, in C.
- Mission analysis and design for ESA's Moonlight LCNS Phase A/B1.

## EDUCATION

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- 11/2022 – 03/2026 **Ph.D. in Aerospace Engineering**  
Politecnico di Milano, Milan, Italy
- Thesis: *Autonomous Lunar Navigation Through Vision-Based and Radiometric Measurements*
  - Supervisor: Michèle Lavagna
- 10/2018 – 04/2021 **M.Sc. in Space Engineering**  
Politecnico di Milano, Milan, Italy
- Thesis: *Bearing-Only Strategies for Proximity Operations on Cislunar Orbits*
  - Degree Grade: 110 cum laude/110.
- 10/2015 – 09/2018 **B.Sc. in Aerospace Engineering**  
Politecnico di Milano, Milan, Italy
- Degree Grade: 110 cum laude/110.

## RESEARCH PROJECTS

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- 01/2022 – Present **LCNS (Lunar Navigation and Communication System)**  
LCNS is an ESA-funded programme that aims to establish Europe's first satellite constellation for telecommunication and navigation services for the Moon, with Telespazio serving as the prime contractor. M. Ceresoli duties were:
- Leading the mission analysis team (3 individuals) and managing the work organization.
  - Design, development and validation of mission analysis software for the optimization of navigation constellations.
  - Mission analysis related activities.
  - Preparation of technical deliverables to Telespazio and ESA.
- 04/2023 – 03/2025 **HERMES (High Energy Rapid Modular Ensemble of Satellites)**  
HERMES is a constellation of six 3U CubeSats funded by ASI and the European Union's Horizon 2020 program which aims to detect and locate bright high-energy GRBs. M. Ceresoli's duties were:
- Implementation and validation of interface drivers with hardware components.
  - Design, implementation and validation of the hardware and software components for the Iridium SBD message communication system.
- 01/2023 – 08/2024 **e.Inspector**  
e.Inspector is an ESA-funded in-orbit servicing mission which uses a 12U CubeSat equipped with optical sensors to inspect a space debris, with Politecnico di Milano as the prime contractor. M. Ceresoli's duties were:
- Design, development and testing of the vision-based navigation filter.
  - Development and validation of a MATLAB-based Functional Engineering Simulator.
  - Preparation of technical deliverables for ESA.
- 01/2022 – 09/2023 **CUBE (CME Catcher Carousel)**  
CUBE is an ESA-funded study for the conceptual design of a constellation of microsatellites to study Earth's magnetospheric response to Coronal Mass Ejections. M. Ceresoli's duties were:
- Mission analysis related activities.
  - Preparation of technical deliverables for ESA.

- 04/2022 – 12/2022 **LICIACube (Light Italian Cubesat for Imaging of Asteroids)**  
 LICIACube is a 6U CubeSat funded by ASI, part of NASA's DART mission, which aimed to capture images of the impact between the DART probe and the asteroid Dimorphos. M.Ceresoli's duties were:
- Implementation, testing and validation of the flight dynamic software to compute TCM maneuvers.
  - Computation of trajectory maneuvers during LICIACube's flight operations.
- 10/2021 – 06/2022 **MOOD (Moon Testbed)**  
 MOOD is an ESA's NAVISP project that aims to develop a testbed for PNT technologies for receivers located on and around the Moon, with QASCOM as the prime contractor. M. Ceresoli's duties were:
- Design, implementation and validation of a complete IMU software simulator in C.
  - Development and validation of frame systems transformations.
  - Preparation of technical deliverables for ESA/QASCOM.

## RESEARCH ACTIVITIES

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### Teaching Activity

2022 – 2025 Applied Space Mission Analysis and Design

### Co-Supervision of M.Sc. Students

- 2024 **Edoardo Moresi**, Station-Keeping Strategies for Lunar Navigation Constellations, Politecnico di Milano.
- 2024 **Giovanni Parracino**, Integrated Optical Terrain Relative Navigation for Autonomous Lunar Landing, Politecnico di Milano.
- 2024 **Gabriele Monteforte**, Study of Sensor Fusion Model for the Integration of Vision Based Navigation for Lunar User Assets, Università degli Studi di Napoli Federico II.
- 2023 **Fabrizio Maccari**, Towards Automated Planetary Moon Tour Design: Beam Search for Optimal Sequence Generation, Politecnico di Milano.
- 2023 **Miriam Amato**, Pre-Phase A design through MBSE of CUBE Mission, Politecnico di Milano.

### Public Outreach

2023 – 2025 **Festival Dell'Ingegneria**

2023 **Summer School DAER**

### Reviewer Activity

2023 – Present Performed several reviews for: Advances in Space Research, Aerospace.

## AWARDS

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2016 **Top Freshmen of the 2015/2016 A.Y.**

## PUBLICATIONS

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### Journal Papers

- 2025 **M.Ceresoli**, F. Maccari, E. Moresi and M. Lavagna, *Design and Station-Keeping Strategies for Robust Lunar Navigation Constellations*, Acta Astronautica, June 2025, <https://doi.org/10.1016/j.actaastro.2025.06.025>.
- 2025 G. Impresario, A. Zinzi, M. Amoroso, S. Pirrotta, I. Bertini, J. R. Brucato, A. Capannolo, **M. Ceresoli**, B. Cotugno, G. Cremonese, M. Dall'Orta, V. Della Corte, J. D. P. Deshapriya, E. Dotto, E. Fazzoletto, I. Gai, P. H. Hasselmann, S. Ieva, S. L. Ivanovski, M. Lavagna, A. Lucchetti, E. Mazzotta Epifani, A. Meneghin, F. Miglioretti, D. Modenini, M. Pajola, P. Palumbo, S. Patruno, D. Perna, G. Poggiali, A. Rossi, G. Reverberi, E. Simioni, P. Tortora, F. Tusberty, M. Zannoni and G. Zanotti, *The Italian microsatellite mission LICIAcube as an enabler for innovative strategies in interplanetary exploration and planetary defense*, Acta Astronautica, June 2025, <https://doi.org/10.1016/j.actaastro.2025.01.052>.
- 2025 **M.Ceresoli**, S. Silvestrini and M. Lavagna, *Optical Image Generation through Digital Orthophoto Models for Autonomous Lunar Navigation*, Aerospace, January 2025, <https://doi.org/10.3390/aerospace12020092>.
- 2025 **M.Ceresoli**, A. Colagrossi, S. Silvestrini and M. Lavagna, *Robust On-board Orbit Determination through Error Kalman Filtering*, Drones, January 2025, <https://doi.org/10.3390/aerospace12010045>.
- 2024 E. Dotto, J. D. P. Deshapriya, I. Gai, P. H. Hasselmann, E. Mazzotta Epifani, G. Poggiali, A. Rossi, G. Zanotti, A. Zinzi, I. Bertini, J. R. Brucato, M. Dall'Orta, V. Della Corte, S. L. Ivanovski, A. Lucchetti, M. Pajola, M. Amoroso, O. Barnouin, A. Campo Bagatin, A. Capannolo, S. Caporali, **M. Ceresoli**, N. L. Chabot, A. F. Cheng, G. Cremonese, E. G. Fahnestock, T. L. Farnham, F. Ferrari, L. Gomez Casajus, E. Gramigna, M. Hirabayashi, S. Ieva, G. Impresario, M. Jutzi, R. Lasagni Manghi, M. Lavagna, J.-Y. Li, M. Lombardo, D. Modenini, P. Palumbo, D. Perna, S. Pirrotta, S. D. Raducan, D. C. Richardson, A. S. Rivkin, A. M. Stickle, J. M. Sunshine, P. Tortora, F. Tusberty and M. Zannoni, *The Dimorphos ejecta plume properties revealed by LICIAcube*, Nature, March 2024, <https://doi.org/10.1038/s41586-023-06998-2>.
- 2023 G. Zanotti, **M. Ceresoli**, and M. Lavagna, *Exploiting Lunar Navigation Constellation for GNC Enhancement in Landign Missions*, Aerospace, September 2023, <https://doi.org/10.3390/aerospace10100850>.
- 2023 G. Zanotti, **M. Ceresoli**, A. Pasquale, J. Prinetto and M. Lavagna, *High Performance Lunar Constellation for Navigation Services to Moon Orbiting Users*, Advances in Space Research, March 2023, <https://doi.org/10.1016/j.asr.2023.03.032>.
- 2022 A. Pasquale, G. Zanotti, J. Prinetto, **M. Ceresoli** and M. Lavagna, *Cislunar Distributed Architectures for Communication and Navigation Services of Lunar Assets*, Acta Astronautica, October 2022, <https://doi.org/10.1016/j.actaastro.2022.06.004>.

## Conference Proceedings

- 2026 **M. Ceresoli**, F. Melman, Y. Audet, R. Swinden, F. Capolupo and M. Lavagna, *Enhancing Lunar Landing PVT Performance using LCNS Signals and Vision-Based Navigation*, 12th ESA Workshop on Satellite Navigation Technologies, Noordwijk, The Netherlands, 20-22 May 2026. (To Be Presented)
- 2025 **M. Ceresoli**, F. Melman, Y. Audet, R. Swinden, F. Capolupo and M. Lavagna, *Lunar Descent and Landing via Fusion of Deep Learning-Based Visual Navigation and Moonlight Signals*, 10th CEAS Aerospace Europe Conference, Turin, Italy, 1-4 December 2025.
- 2025 G. Parracino, **M. Ceresoli**, S. Silvestrini and M. Lavagna, *CNN-Based Crater Detection for Vision-Based Absolute Navigation in Lunar Landing*, 10th CEAS Aerospace Europe Conference, Turin, Italy, 1-4 December 2025.
- 2025 Y. Audet, **M. Ceresoli**, F. Melman, D. Psychas, R. Swinden, C. Stallo, M. Gotta and J. Ventura-Traveset, *Assessment of Lunar User PVT performances tightly-coupling Moonlight signal with IMU measurement*, European Navigation Conference, Wroclaw, Poland, 21-23 May 2025.

- 2024 G. Parracino, **M. Ceresoli**, S. Silvestrini and M. Lavagna, *Integrated Optical Terrain Relative Navigation for Autonomous Lunar Landing*, 75th International Astronautical Congress, Milan, Italy, 14-18 October 2024.
- 2024 S. Silvestrini, A. Colagrossi, M. Bechini, **M. Ceresoli**, G. Civardi, L. Capra, M. Lavagna and R. Biesbroek, *Integrated GNC Design and Implementation for e.Inspector mission: multi-spectral imaging for spacecraft debris in preparation to active removal*, 75th International Astronautical Congress, Milan, Italy, 14-18 October 2024.
- 2024 M. Lavagna, S. Silvestrini, L. Capra, M. Bechini, **M. Ceresoli**, M. Quirino, A. Colagrossi, D. Labate, P. De Carlo and R. Biesbroek, *e.Inspector: VIS-IR Imaging Real Debris to Support Active Removal and On-Orbit Servicing*, 75th International Astronautical Congress, Milan, Italy, 14-18 October 2024.
- 2024 L. Andolfi, M. Brancati, **M. Ceresoli**, R. Del Prete, A. Di Donna, S. Giannattasio, M. Grassi, M. Lavagna, L. Ostrogovich, A. Renga, G. Tomasicchio and G. Zanotti, *Moon Landing based on Multi-Sensor Fusion of Lunar Navigation Satellites and Onboard Sensor Observables*, 75th International Astronautical Congress, Milan, Italy, 14-18 October 2024.
- 2024 G. Tomasicchio, L. Andolfi, M. Brancati, A. Di Donna, S. Giannattasio, R. Del Prete, L. Ostrogovich, A. Renga, M. Grassi, **M. Ceresoli**, S. Silvestrini and M. Lavagna, *Multi-Sensor Fusion and Resilient PVT Techniques for Safe Lunar Landing Missions*, ION GNSS+ 2024, Baltimore, Maryland, 16-20 September 2024, <https://doi.org/10.33012/2024.19849>.
- 2023 **M. Ceresoli**, A. Pasquale and M. Lavagna, *Multiverse: A Novel High Performance Astrodynamical Tool in Julia*, 74th International Astronautical Congress, Baku, Azerbaijan, 2-6 October 2023.
- 2023 I. Troisi, G. Zanotti, **M. Ceresoli** and M. Lavagna, *Strategy and Lesson Learnt in Telecom Subsystem Testing: the HERMES CubeSat Constellation*, 74th International Astronautical Congress, Baku, Azerbaijan, 2-6 October 2023.
- 2023 G. Impresario, A. Zinzi, M. Amoroso, S. Pirrotta, I. Bertini, J. R. Brucato, A. Capannolo, **M. Ceresoli**, B. Cotugno, G. Cremonese, M. Dall'Orta, V. Della Corte, J. D. P. Deshapriya, E. Dotto, E. Fazzoletto, I. Gai, P. H. Hasselmann, S. Ieva, S. L. Ivanovski, M. Lavagna, A. Lucchetti, E. Mazzotta Epifani, A. Meneghin, F. Miglioretti, D. Modenini, M. Pajola, P. Palumbo, S. Patruno, D. Perna, G. Poggiali, A. Rossi, G. Reverberi, E. Simioni, P. Tortora, F. Tusberti, M. Zannoni and G. Zanotti, *The Italian microsatellite mission LICIAcube as an enabler for innovative strategies in interplanetary exploration and planetary defense*, 74th International Astronautical Congress, Baku, Azerbaijan, 2-6 October 2023.
- 2023 G. Tomasicchio, L. Andolfi, M. Brancati, A. Di Donna, S. Giannattasio, R. Del Prete, L. Ostrogovich, A. Renga, M. Grassi, **M. Ceresoli** and M. Lavagna, *Multi-Sensor Fusion for Improved Navigation in Lunar Landing Missions*, ION GNSS+ 2023, Denver, Colorado, 11-15 September 2023, <https://doi.org/10.33012/2023.19344>.
- 2023 **M. Ceresoli**, G. Zanotti and M. Lavagna, *Leveraging Sensors Fusion to Enhance One-Way Lunar Navigation Signals*, 12th International Conference on Guidance, Navigation and Control Systems, Sopot, Poland, 12-16 June 2023.
- 2023 S. Pirrotta, G. Impresario, E. Bruno, F. Cavallo, **M. Ceresoli**, B. Cotugno, I. Gai, L. Gomez Casajus, E. Gramigna, M. Lombardo, M. Zannoni, G. Zanotti, M. Amoroso, I. Bertini, J. R. Brucato, A. Capannolo, G. Cremonese, M. Dall'Orta, V. Della Corte, J. D. P. Deshapriya, E. Dotto, P. H. Hasselmann, S. Ieva, S. L. Ivanovski, M. Lavagna, A. Lucchetti, E. Mazzotta Epifani, F. Miglioretti, D. Modenini, M. Pajola, P. Palumbo, D. Perna, G. Poggiali, P. Tortora, A. Rossi, F. Tusberti and A. Zinzi, *Italian First Deep Space Exploration Missions with ArgoMoon and LICIAcube*, 17th International Conference on Space Operations, Dubai, United Arab Emirates, 6-10 March 2023.
- 2021 **M. Ceresoli**, G. Zanotti and M. Lavagna, *Bearing-Only Navigation for Proximity Operations on Cislunar Non-Keplerian Orbits*, 72nd International Astronautical Congress, Dubai, United Arab Emirates, 25-29 October 2021.

- 2021 A. Pasquale, G. Zanotti, J. Prinetto, **M. Ceresoli** and M. Lavagna, *Cislunar Distributed Architectures for Communication and Navigation Services of Lunar Assets*, 72nd International Astronautical Congress, Dubai, United Arab Emirates, 25-29 October 2021.
- 2021 **M. Ceresoli**, G. Zanotti and M. Lavagna, *Bearing-Only Navigation to Support Proximity Operations on Cislunar Non-Keplerian Orbits*, 16th International Conference on Space Operations, Virtual Edition, 3-5 May 2021.