

Name: Gael Cascioli

Code: 698

Home institution: University of Maryland Baltimore County (UMBC)

Name of task: Planetary Geodesy, Planetary Science

What do you do for CRESST:

As part of the Planetary Geodynamics Lab my research focuses on the analysis of tracking data collected by interplanetary probes. My main task consists of modelling, understanding, and extracting the signatures of physical phenomena from the noisy radiometric or astrometric data with the ultimate aim of better understanding the environment the probes move within. I mainly work on NASA's Lunar Reconnaissance Orbiter (LRO) and VERITAS with applications spanning planetary geodesy, gravity field determination, fundamental physics test, and radio occultation experiments.



Background:

I grew up in Italy where I obtained my BSc. in Aerospace Engineering and MSc. in Astronautical Engineering. In Rome I have been a PhD student of Prof. Luciano Less with whom I collaborated with until I came to Goddard in March 2022, right after obtaining my PhD from Sapienza University with a thesis on precise orbit determination techniques in the context of the VERITAS mission to Venus. As an engineer, my background is centered on data analysis and force modelling of planetary probes. In this context I have worked on both simulations and data analysis of BepiColombo, MRO and VERITAS, among others. I have also been involved in the development and analysis of General Relativity and fundamental physics experiments in the solar system. During my work on VERITAS, where I concentrated in assessing the capability of the mission of measuring the rotational state of Venus, I started to collaborate with Dr. Erwan Mazarico, with whom I currently collaborate at Goddard.

Favorite part of being a CRESST Scientist:

I love my job! Having the possibility of doing my research within a group of extremely talented and committed scientists which are shaping our knowledge of the Solar System drives me to be in a continuous learning and improving process and allows me to first-handedly contribute to outstanding scientific investigations.

Selected list of recent publications:

Cascioli, G., Hensley, S., De Marchi, F., Breuer, D., Durante, D., Racioppa, P., Iess L., Mazarico E. M. & Smrekar, S. E. (2021). The determination of the rotational state and interior structure of Venus with VERITAS. *The Planetary Science Journal*, 2(6), 220.

doi: 10.3847/PSJ/ac26c0

De Marchi, F., & **Cascioli, G.** (2020). Testing general relativity in the solar system: present and future perspectives. *Classical and Quantum Gravity*, 37(9), 095007.

doi: 10.1088/1361-6382/ab6ae0

F. Petricca, **G. Cascioli** and A. Genova, "A technique for the analysis of radio occultation data to retrieve atmospheric properties and associated uncertainties," *Radio Science*, vol. 56, no. 5, doi: 10.1029/2020RS007205.

Cascioli, G., Petricca, F., & Genova, A. (2020). Mars' atmospheric calibration of radio tracking data for precise orbit determination. *Acta Astronautica*, 177, 103-110.
doi: 10.1016/j.actaastro.2020.07.019

Three fun facts:

I have been a Radio speaker for several years, I am not very good at manual work but I can do the perfect tin soldering, I am a nerd about the history of Central Asia.