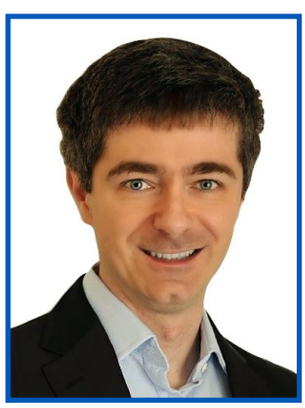
جامعة خليفة
Khalifa University

## Abstract

The Mars atmosphere is believed to have been stripped away by the sun and the solar wind over time, changing the climate from a warmer and wetter environment early in its history to the cold, dry climate that we see today. Recent results from NASA's MAVEN (Mars Atmosphere and Volatile EvolutioN) orbiter offer new insights into physical processes responsible for the atmospheric escape. In this talk, Dr. Gacesa will introduce the major scientific objectives of the MAVEN mission and present its most important findings up to date in the context of what is presently known about the history of water of Mars.

In the second part of the talk, Dr. Gacesa will describe in more detail non-thermal escape mechanisms that play a key role in complex interactions between the upper layers of planetary atmospheres and stellar radiation and plasma. Understanding energy deposition and transport driven by such processes requires detailed cross sections for the participating atomic and molecular species in reactive and non-reactive regime at high temperatures. These quantities are typically not well-known – even though they enter the models used to interpret the observations and affect long-term predictions about the evolution of the Mars' atmosphere.

Similar non-thermal mechanisms take place in the upper atmospheres of other planets and satellites, such as Titan, and may have played an important role in evolution of exoplanetary atmospheres immersed in hot and volatile stellar environments.



## Speaker's Bio

Dr. Marko Gacesa joined the Physics Department at Khalifa University in Fall 2020 after working for four years at Space Science and Astrobiology Division at NASA Ames Research Center in California's Silicon Valley as a NASA Postdoctoral Program Fellow and a Research Scientist jointly with University of California Berkeley. Prior to NASA Ames, Dr. Gacesa was a Research Scientist at the Physics Department at University of Connecticut, Visiting Scientist at the Max Planck Institute for the Physics of Complex Systems in Dresden, Germany, and a postdoctoral researcher at the Institute of Theoretical Atomic, Molecular, and Optical Physics (ITAMP) at Harvard-Smithsonian Center for Astrophysics. He obtained his PhD degree in Atomic, Molecular and Optical Physics at the University of Connecticut. His primary research interest are atomic and molecular processes that take place in astrophysical environments, and their implications for understanding the evolution of planetary atmospheres, stellar system evolution, characterization of exoplanets, and more exotic astrophysical environments such as PDRs and irradiated nebulae. His current area of research are non-thermal processes and escape in the Martian atmosphere - a topic on which he collaborates with NASA's MAVEN mission science team.

In addition to scientific research, Dr. Gacesa has a strong interest in human space exploration and communicating its importance to students and the members of general public. Over a period of five years he volunteered and held leadership roles at Space Generation Advisory Council, the largest global non-profit network of students, young professionals and alumni in the Space industry.