Dipartimento
di Scienze della Terra

Sapienza
Università di Roma

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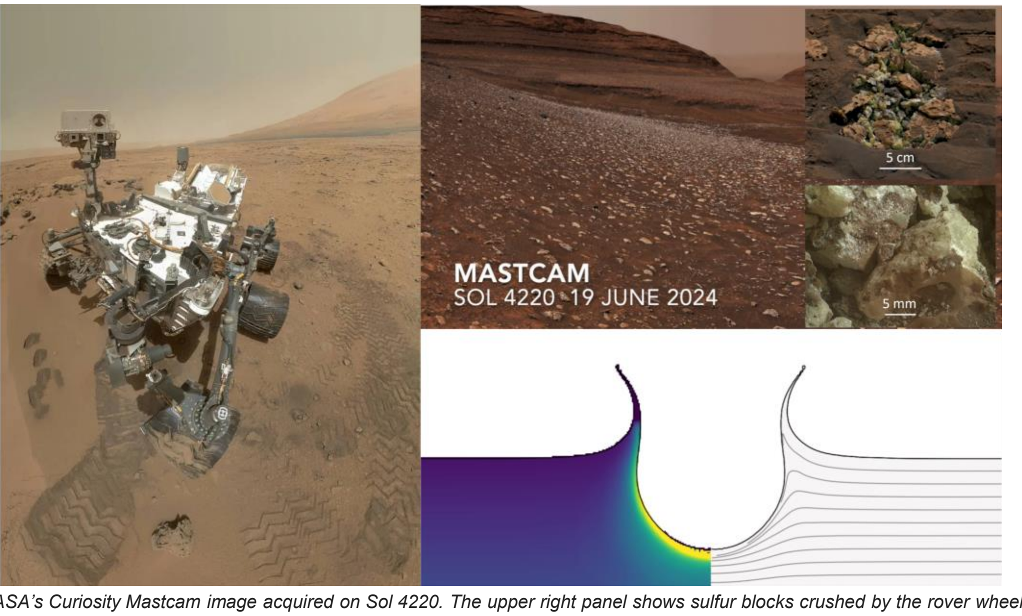
Impact Processes: Geology, Physical Modeling, and The Case of Martian Sulfur



NASA's Curiosity Mastcam image acquired on Sol 4220. The upper right panel shows sulfur blocks crushed by the rover wheels, while the lower right panel presents a close-up image revealing a crystalline texture, obtained with the Mars Hand Lens Imager.

16 Aprile 2026 – ore 14:30 aula Lucchesi (CU005)

Dr. Luca Maggioni
INAF - Institute of Astrophysics and Spatial Planetology (IAPS) in Rome

Abstract

Asteroid and cometary impacts are geologic processes shaping planetary surfaces and evolution across the Solar System, leaving behind cratered landscapes that record billions of years of activity. While these geological records capture the final state of impact events, the underlying processes occur over extreme conditions and timescales that cannot be directly observed. Understanding impact cratering requires combining field evidence with physical modeling, and this implies linking geologic interpretation with shock physics and numerical simulations. In this context, we employ the iSALE hydrocode to investigate impact processes, from crater excavation to melt production. Impact modeling is key to understanding planetary exploration findings.

We examine a recent observation by the NASA Mars Science Laboratory (MSL) mission rover, which identified pure native sulfur deposits in Gale Crater, representing the first confirmed occurrence of elemental sulfur on the planet. The origin of these crystals remains an open question. We explore whether they could result from impact-induced melting of a sulfur-bearing substrate. By combining numerical simulations with thermodynamic modeling, we assess the plausibility of this scenario, illustrating how physics and geology mutually inform and constrain each other.

Partecipa con Zoom Meeting
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