

# Impacts in the Solar System

## SUMMARY.

Small bodies, such as asteroid, comets and moons, hold a key role in the Solar System evolution. They contain protoplanetary disc's primitive material, which identification is one of the Holy Grails in Planetary Sciences. Collisions are amongst the most important processes that have sculpted their surfaces blurring these primordial material from our sight. How these catastrophic events, have affected the planetary bodies since their birth? By studying the outcome of collisions, we gain insight into the initial form of small bodies. Large impacts could have broken the largest of them, producing collisional families of asteroids where their members are genetically related to a parent body. Smaller impacts produce impact craters on the surfaces of the terrestrial planets, rocky and icy moons and asteroids. In addition

the understanding of the impact processes at such large scales is of paramount importance for the mitigation of impact hazard that asteroids pose on our planet and on space missions.

## OBJECTIVES

The students will learn the population of small bodies of the Solar System. They will learn about the current state-of-the-art on large scale collisions in our Solar System and in the laboratory, as well as the fundamentals on impact scaling. Furthermore the students will be taught the most up-to-date achievements in the study of asteroid families.

## PREREQUISITES

Dynamics & Planetology are a plus.

## THEORY

by AVDELLIDOU & DELBO

- Population of minor bodies.
- Large scale collisions in the asteroid belt and generation of asteroid families of fragments.
- Cratering record on planetary surfaces.
- Small scale collisions in laboratory experiments.
- Relation of impact outcome with size impactor and material properties.
- Modern understanding of impact results from the asteroid space missions Hayabusa2 and OSIRIS-REx.

## APPLICATIONS

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- Study of impacts on lunar surface.
- Material mixing via impacts in the asteroid belt.
- Chronology of small body surfaces.
- Study of asteroid families.

Scaling of the impact events.

- Second half of the period: Application project.
- Last week: Preparation of presentation.

## EVALUATION

- Literature review.
- Scientific project.
- Written exam.

## BIBLIOGRAPHY & RESSOURCES

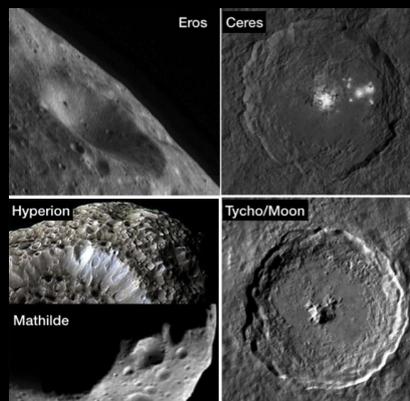
Appropriate literature will be given at the beginning of the course.

## CONTACT

Chrysa Avdellidou is a Research Fellow at Observatoire de la Côte d'Azur, collaborator at OSIRIS-REx (NASA) and Martian Moon eXplorer (JAXA) space missions. She is specialised on laboratory impact experiments and is Research Visitor at the Impact Lab of the University of Kent (UK).

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## MAIN PROGRESSION STEPS

- First half of the period: Theoretical courses.