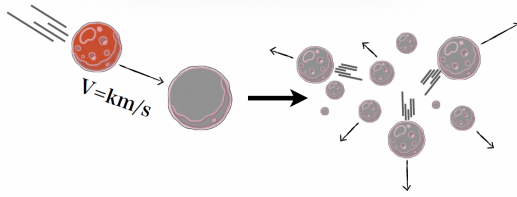# Characterisation of asteroid families

Disruption & asteroid family formation

SUMMARY.

Planetesimals were the first generation of large objects that accreted directly from the protoplanetary disk of our solar system. This population should have had compositional gradient according to the heliocentric distance they were formed. Asteroids, along with all small bodies, are what is left of the original planetesimal disk from the planet-formation era. But not all asteroids are planetesimals. Most asteroids are collisional fragments.

The asteroid main belt consists of > a million known asteroids, which have a plethora of compositions and have been discovered >100 families of asteroid collisional fragments. A careful assessment of compositional diversity or homogeneity of family members can reveal key information about the nature of the broken planetesimal. Therefore, by characterising the asteroid families we can look inside the original planetesimals.

— OBJECTIVES

The objective of this meteor is to study the spectra profiles of selected asteroid families using the Gaia catalogue of asteroid reflectance spectra.

— INSTITUTE

- School of Physics and Astronomy, University of Leicester, University road, LE1 7RH, UK
- Institute URL

— THEORY

by C. AVDELLIDOU

The meteor courses will include the presentation of physical properties of small bodies. Special focus will be given to asteroid spectra and albedos and their classification to the most used taxonomic scheme. It will be discussed the asteroid family formation and evolution and the state-of-the-art in asteroid family identification and characterisation. Methods to link asteroid families with known meteorites will be also presented.

— APPLICATIONS

by C. AVDELLIDOU

Familiarise and use of Gaia asteroid reflectance spectra and other physical properties such as albedo and diameters using the Minor Planet Physical Properties Catalogue. Retrieve from the literature additional ground-based spectra and combine them with Gaia. Work in Python to produce asteroid family spectral profiles, identify and reject interlopers, classify the results in Bus-DeMeo taxonomic scheme.
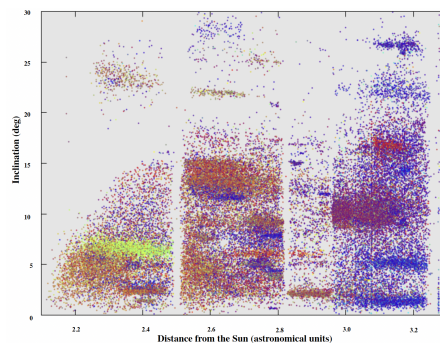
View of the asteroid main belt coloured using spectral data. Credits M. Delbo (OCA).

— MAIN PROGRESSION STEPS

- **Tier 1**: Courses and Assesment
- **Tier 2**: Presentation of a relevant paper
- **Tier 3**: Project and preparation of final presentation

— EVALUATION

- `Theory grade [30%]`
  - Assessment (70%): theoretical questions from lectures
  - Presentation of an article (30%): understanding and critical spirit

- `Practice grade [30%]`
  - Project (100%): initiative, progress, analysis and result

- `Defense grade [40%]`
  - Oral and slides quality
  - Context
  - Project / Personal work
  - Answers to questions

— BIBLIOGRAPHY & RESOURCES

- Asteroids IV book
- DeMeo et al., 2009, Icarus
- Delbo et al., 2017, Science
- Delbo et al., 2019, A&A
- Avdellidou et al., 2022, A&A
- Gaia Collaboration, 2023, A&A
- Delbo et al., 2023, A&A
- Galinier et al., 2024, A&A
- Avdellidou et al., 2024, Science
- Minor Planet Physical Properties Catalogue

— CONTACT

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