

Spin-axis distribution of members of asteroid families

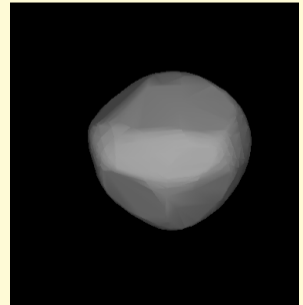
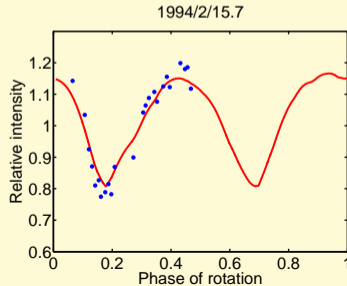
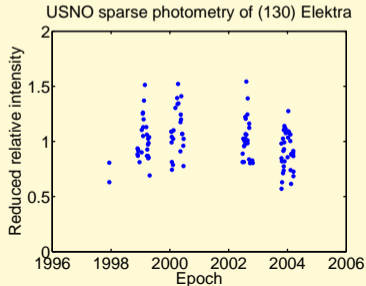
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IAU Focus Meeting FM1: A Century of Asteroid Families, 28 August 2018, Vienna

Context

- long-term project – deriving asteroid models from disk-integrated photometry
- models of ~ 2700 individual asteroids + 900 partial models, together ~ 3600 models
 - ~ 1600 in **D**atabase of **A**steroid **M**odels from **I**nversion **T**echniques (DAMIT)
<http://astro.troja.mff.cuni.cz/projects/asteroids3D>
 - the rest not yet published
- ~ 1500 belong to collisional families
 - enough for studying spin-axis distribution of family members



Lightcurve inversion

DATA

- lightcurves from archives
 - Uppsala Asteroid Photometric Catalogue
- lightcurves from amateur observers
 - ALCDEF (*Warner et al. 2009*)
- sparse-in-time photometry
 - Lowell Observatory photometric database (*Oszkiewicz et al. 2011*)
 - Palomar Transient Factory (*Waszczak et al. 2015*)
 - Pan-STARRS 1
 - Gaia DR2 (*Spoto et al. 2018*)
- WISE “lightcurves” (*Ďurech et al. 2018*)

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MODEL

- lightcurve inversion method of *Kaasalainen et al. (2001)*
- convex model
- rotation period
- **direction of the spin axis**
 - ecliptic coordinates λ, β
 - $\lambda \pm 180^\circ$ ambiguity in the pole/shape
 - sometimes more poles/shapes with similar values of β – **partial models**
 - accuracy $5\text{--}30^\circ$ in the pole direction

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Current sample: **1600 in DAMIT + 1100 unpublished (PTF, PS1, Gaia) + 900 partial**

Family membership

- catalogue of *Nesvorný et al. (2015)* – **Hierarchical Clustering Method**
→ about family 1500 members
- checking position in V-shape plot – removing clear outliers
- TBD
 - taxonomy
 - colors
 - albedos
 - checking size frequency distribution

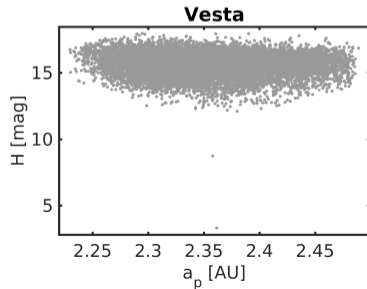
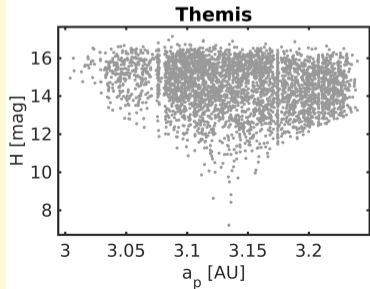
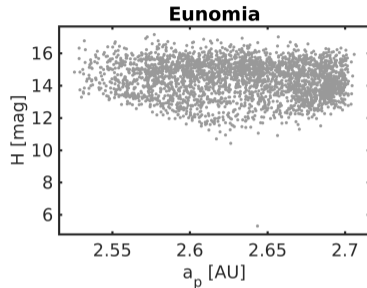
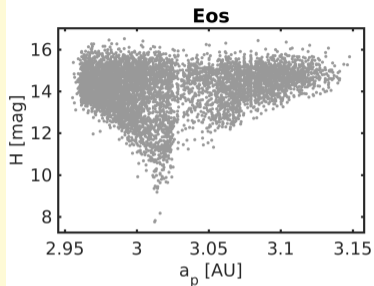
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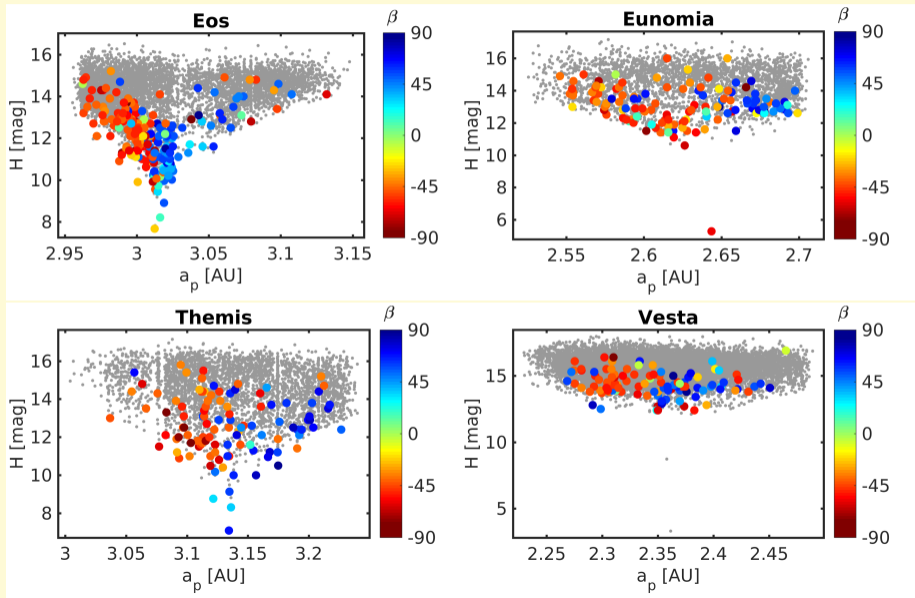
1464 members of 80 families

Eos	Flora	Eunomia	Vesta	Themis	Koronis	Maria	Phocaea	Alauda	other
213	153	129	110	107	66	44	31	17	594

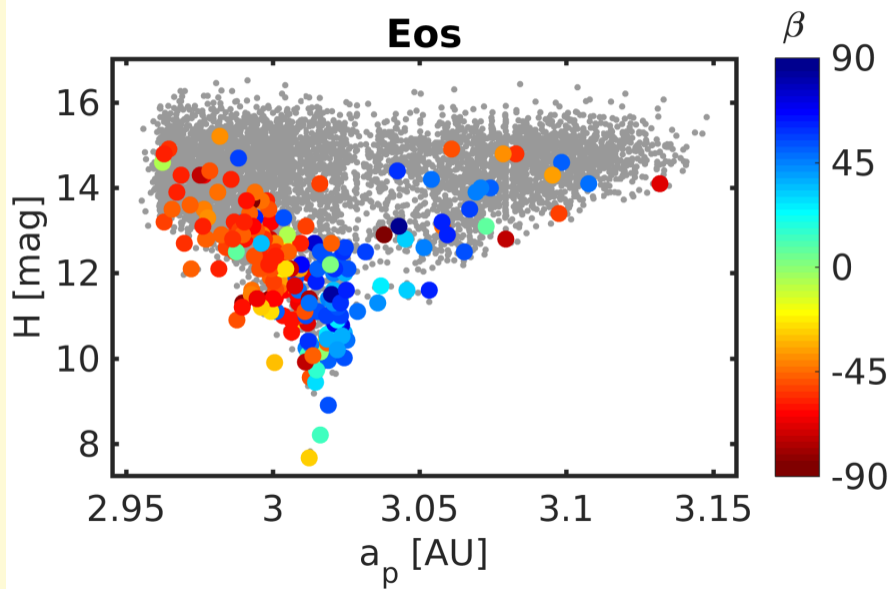
Spin-axis distribution in families – prograde/retrograde dichotomy



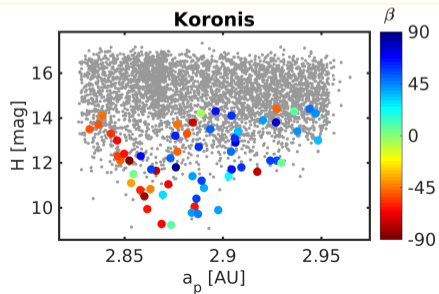
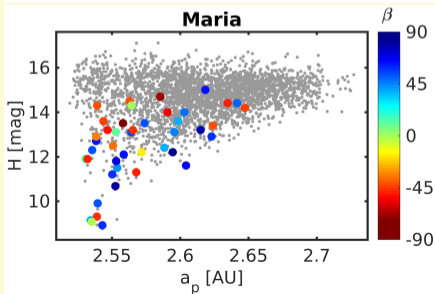
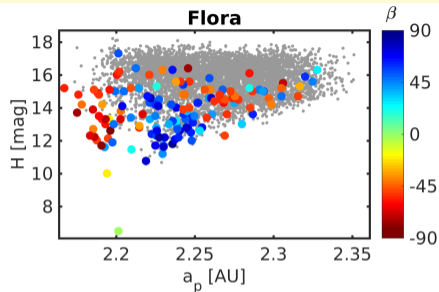
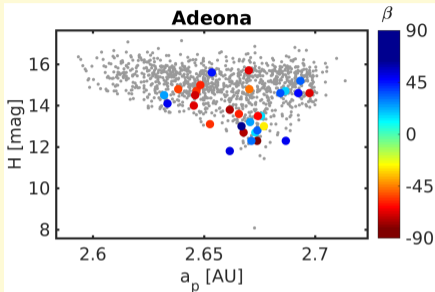
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