– DON QUIXOTE – A Possible Parent Body Of A Meteor Shower

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Scientific interest

METEOROIDS

Parent bodies

- A single parent body can give origin to more than one shower

  1P/Halley: Orionids + η Aquarids

  2P/Encke: Taurids (S) + ζ Perseids

- The dynamical groups

  Machholtz complex

  Taurids complex

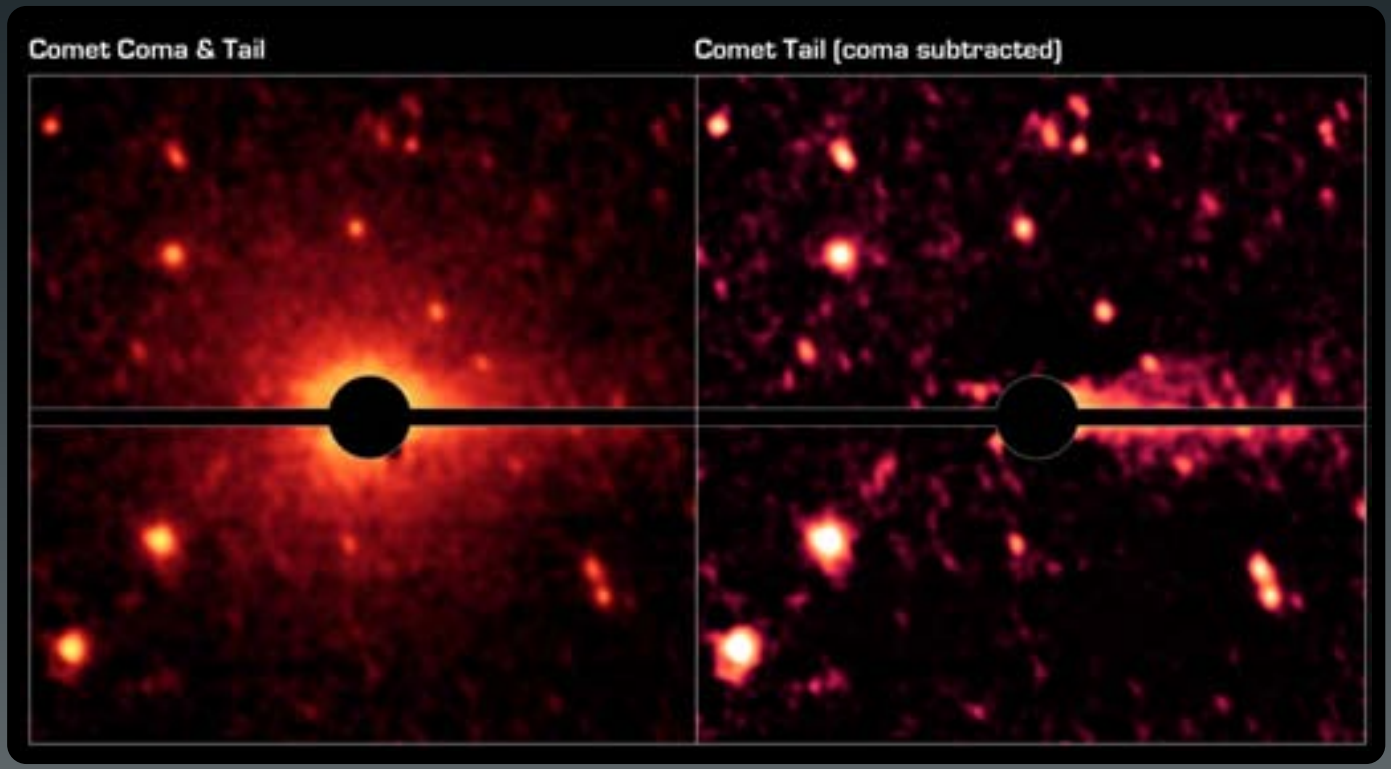
- NEAs considered to be the extinct cometary nuclei

  133P/(7968) Elst-Pizarro

  238P/Read

3552 Don Quixote (1983 SA)

Cometary activity based on
Spitzer IRAC observations on August 22, 2009*

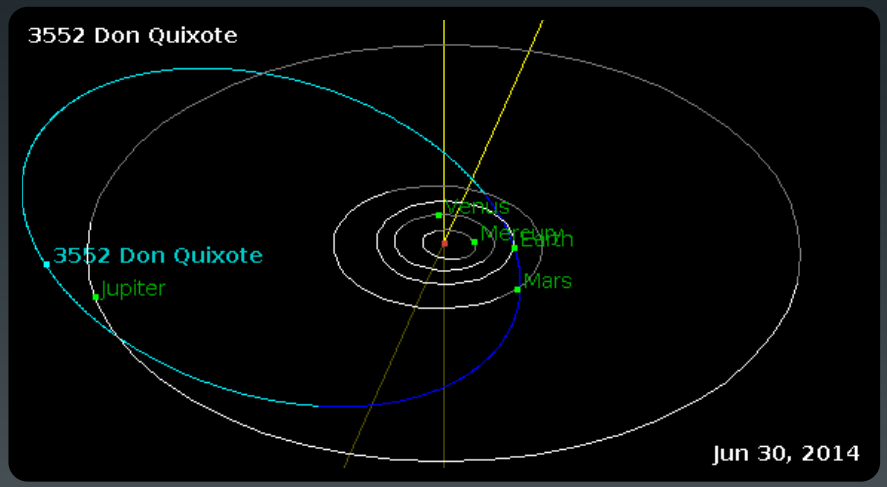


Credit: NASA/JPL-Caltech/DLR/NAU

*Mommert, M., et al. (2014), ApJ, 781, 25

3552 Don Quixote (1983 SA)

- Amor group
- Spectral type: D
- Diameter: 19 km
- $\mathrm{T_J} = 2.315$
- MOID = 0.302 AU

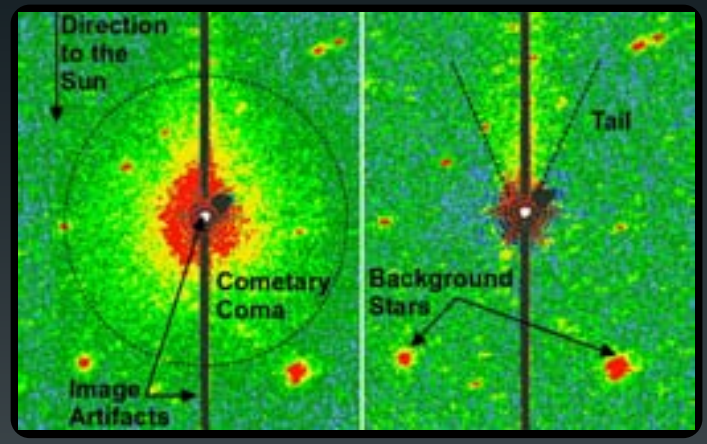


$a\,[\mathrm{AU}]$	e	$i\,[^\circ]$	$\omega\,[^\circ]$	$\Omega\,[^\circ]$
4.2214	0.71324	30.98	317.03	350.27

3552 Don Quixote (1983 SA)

Don Quixote

- Cometary nature unveiled.
- A candidate for a short-period comet.



But

- Does a meteor shower can be created from Don Quixote?
- Is a meteor shower originated from Don Quixote observed on Earth?

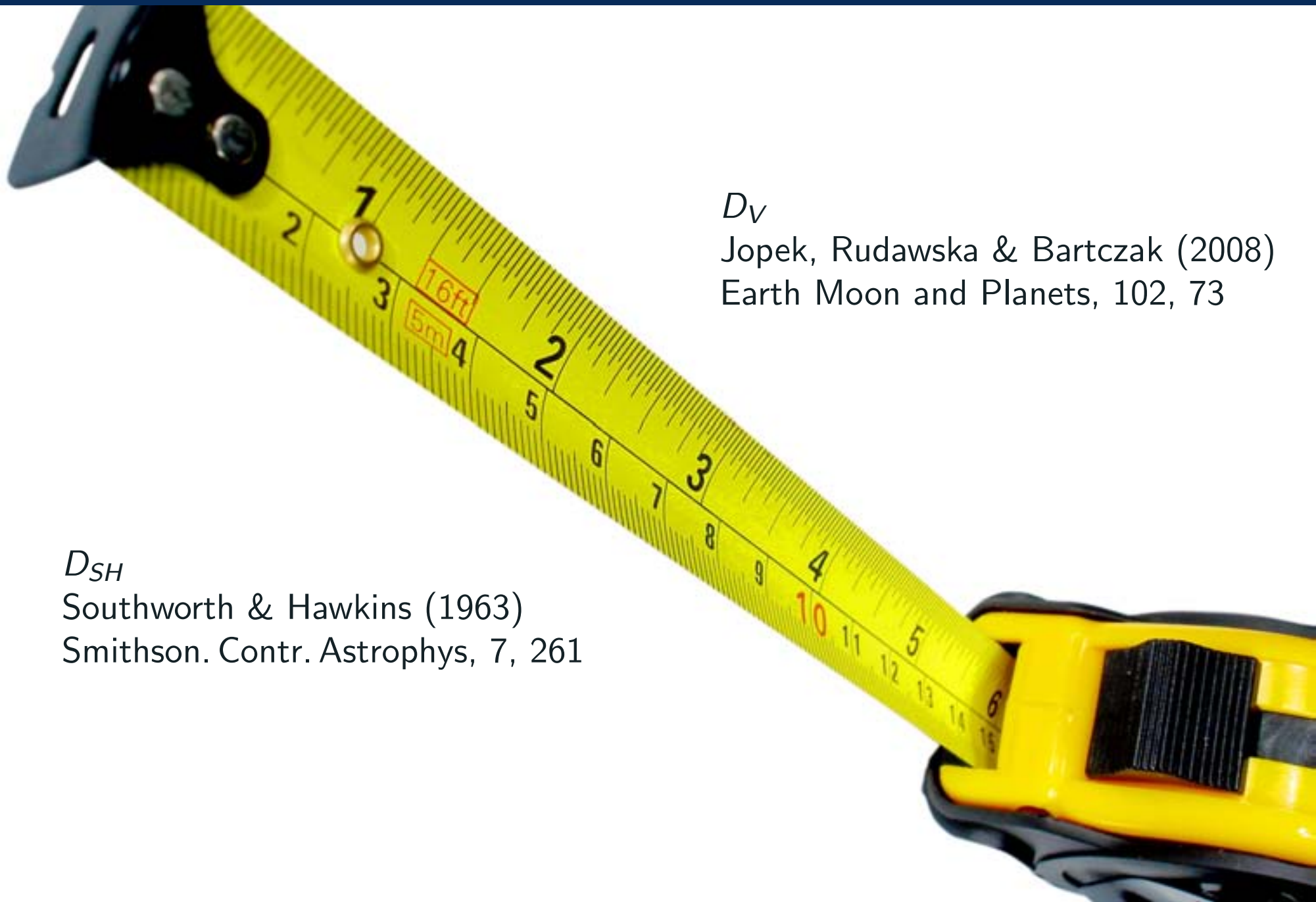
Meteoroid stream modelling

Simulation

- The model: taken from Vaubaillon et al. (2005).
- The orbital elements and physical properties taken from JPL horizons website.
- The ejections: between 5000 B.C. and 2013 A.D.
- The orbits integrated to 2050.

Vaubaillon, J., Colas, F. & Jorda, L. (2005), Astronomy and Astrophysics, 439, 751

D-criterion



D_V
Jopek, Rudawska & Bartczak (2008)
Earth Moon and Planets, 102, 73

D_{SH}
Southworth & Hawkins (1963)
Smithson. Contr. Astrophys, 7, 261

Results

Stream	$\lambda_\odot$ [°]	α [°]	δ [°]	V_g [km/s]
#464 KLY, κ Lyrids	126.9	277.5	+33.3	18.6
#470 AMD, August μ Draconids	145.4	253.7	+58.8	19.5

- Remain on the working list of the IAU Meteor Data Centre.
- Discovered in CAMS database (Rudawska & Jenniskens, 2014).
- Identified in EDMOND database (Kornos et al., 2014).

Rudawska, R. & Jenniskens, J. (2014), arXiv:1405.1769

Kornoš, L., et al. (2014), arXiv:1405.1783

Results

Stream	q	e	ω	Ω	i
#464 KLY, κ Lyrids	0.939	0.698	215.1	126.8	24.7
#470 AMD, August μ Draconids	1.011	0.654	177.2	145.4	30.3
Simulated stream	0.981	0.680	197.4	144.1	28.3

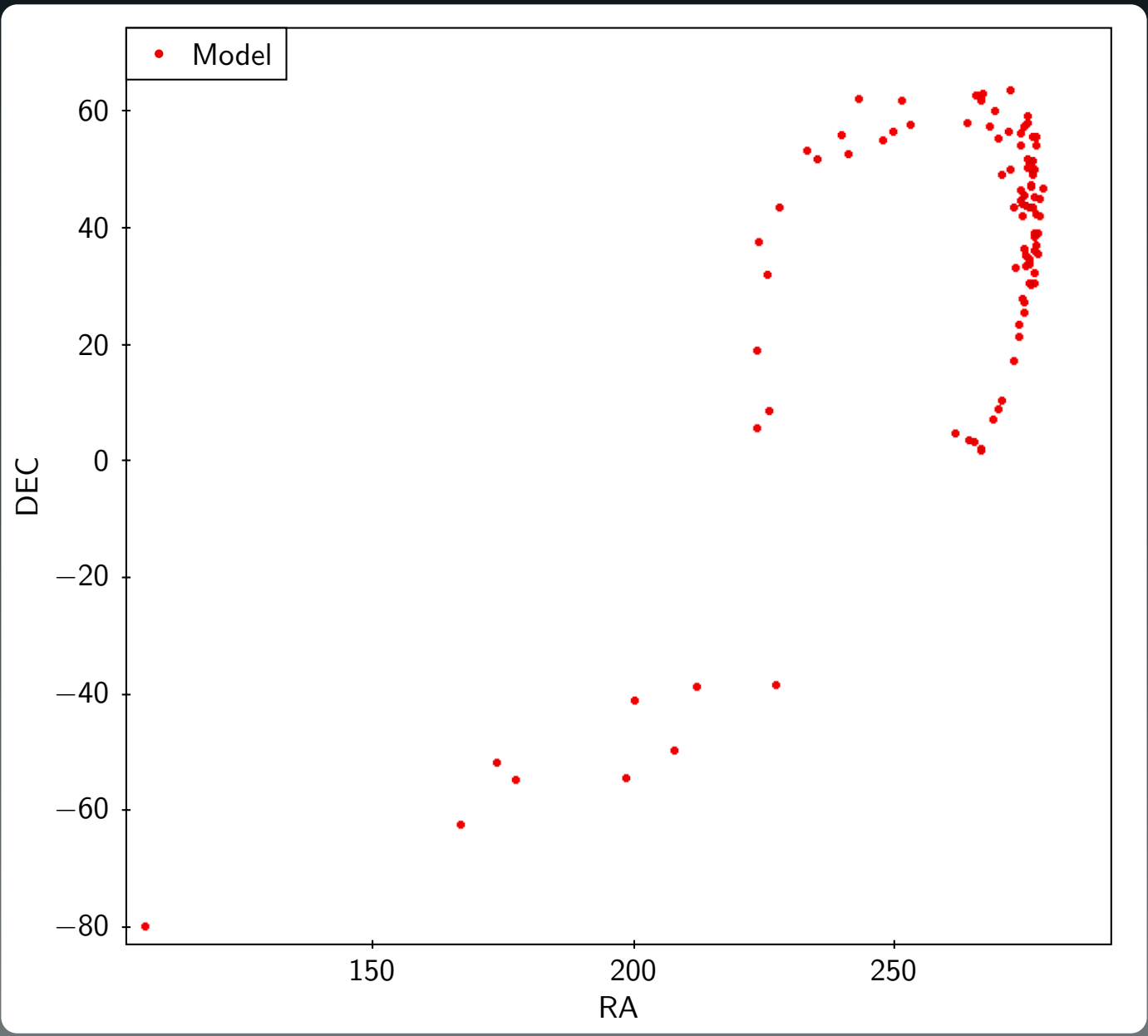
D_{SH}:

- #464 KLY – 0.11
- #470 AMD – 0.12

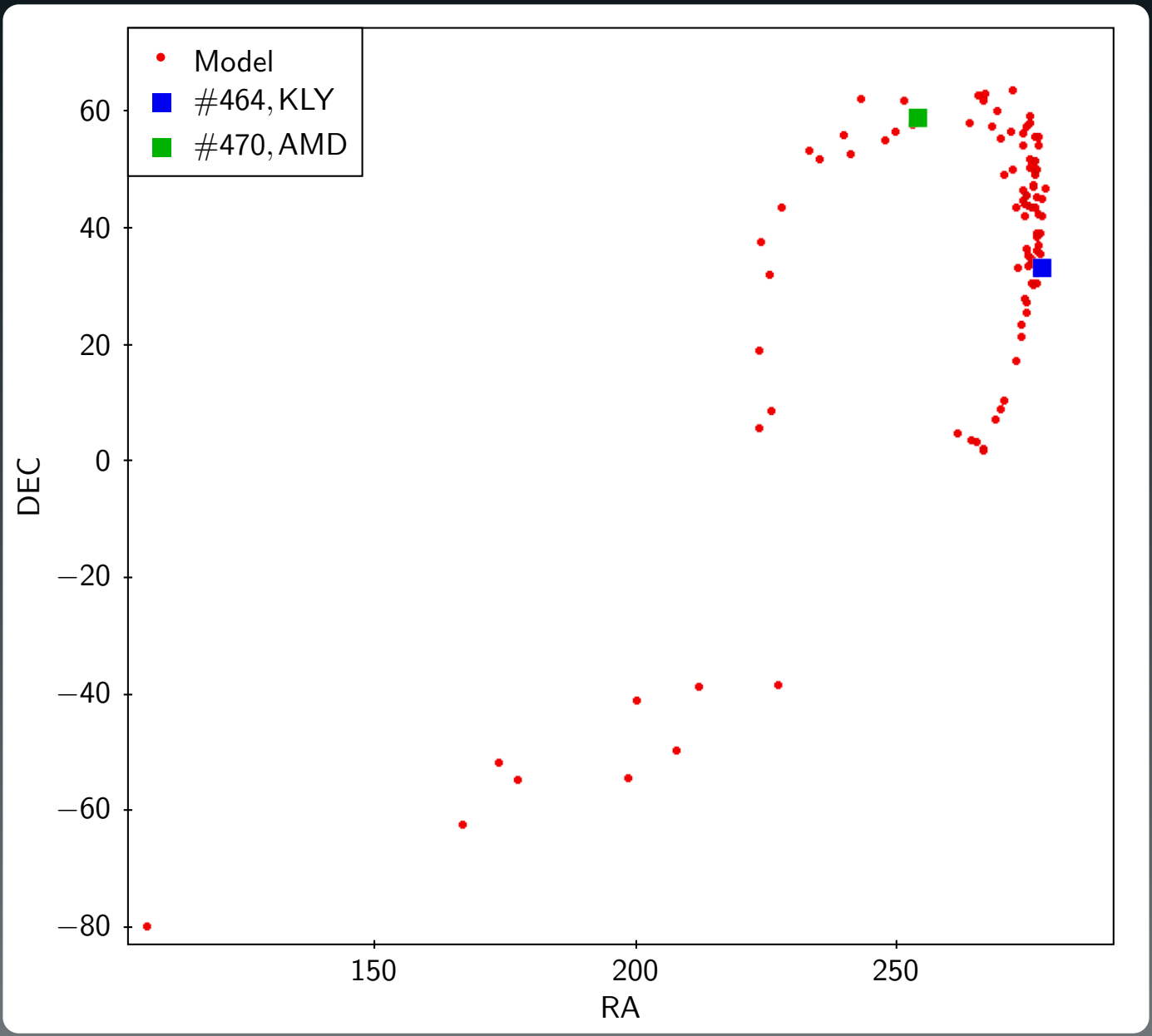
D_V:

- #464 KLY – 0.05
- #470 AMD – 0.05

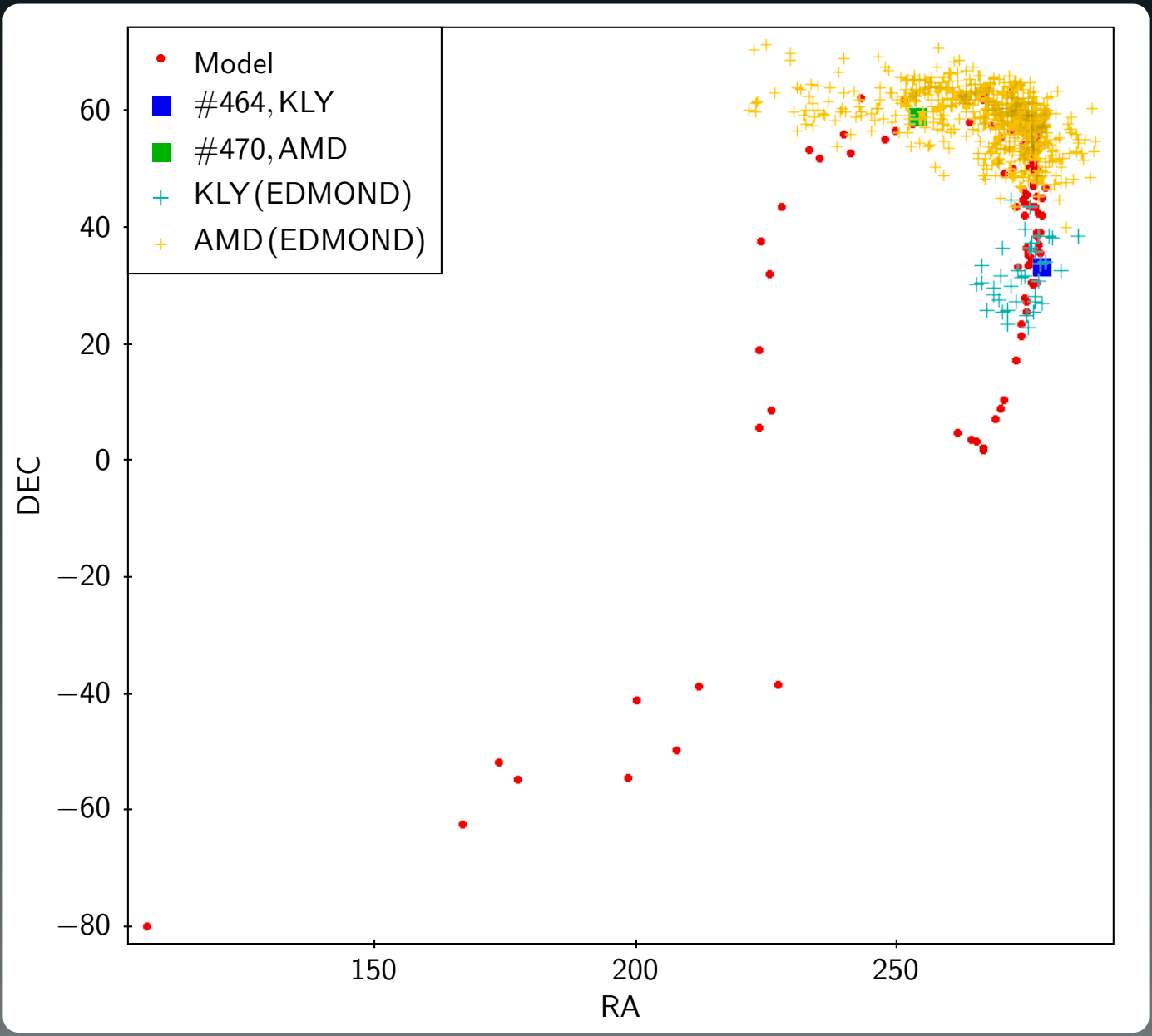
Results



Results



Results



Rudawska, R. et al. (2014), arXiv:1406.6598

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A Parent Body Of August μ Draconids & κ Lyrids Meteor Showers

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Thank You
For Your Attention!