29. Comets & TNOs
Wikipedia: Comet McNaught
Overview: Structure

Inner system: terrestrial planets, asteroids.

Outer system: giant planets and moons, “KBOs”.

Oort Cloud: comets.
Largest Known Trans-Neptunian Objects (and Satellites)
Pluto and Charon

Double planet + 4 small moons; possibly formed by giant impact (similar to Earth-Moon system).

- orbit $\Rightarrow$ mass: $M_{\text{Pluto}} = 0.0024 \, M_{\text{E}}$
- density: $\sim 200 \, \text{kg/m}^3$
- composition: $1/3^{rd}$ rock, $2/3^{rd}$ ice
- thin atmosphere: $\text{N}_2$, $\text{CH}_4$, $\text{CO}$

Pluto has probably differentiated; Charon may be too small to melt.
Pluto: Norgay Montes
Pluto’s Orbit

Pluto’s orbit is highly tilted (inclination $i = 17^\circ$) to the rest of the solar system.

Pluto is in a $3:2$ resonance with Neptune. This is stable since Pluto avoids Neptune.
KBO Orbits

- Classical: outside Neptune’s orbit
- Resonant: like Pluto’s orbit
- Scattered: highly elliptical
Orbital Populations

Resonant KBOs (plutinos) avoid Neptune’s influence.

Scattered KBOs which cross Neptune’s orbit are easily perturbed.

These scattered KBOs become short-period comets.