

Overarching Theme for Stars + Planets Group

- How solar systems of all flavours form and evolve
- Links nebula-discs-exosolar systems to planets
- Our SS is very important from our point of view although is its just one possible end point of the process.
- Open questions: How many Earth-like planets are there in our neighbourhood and how many are likely to be habitable?

How does solar system science help answer these questions?

By providing constraints on star-disk formation models.

Q. What does an ELT bring that 10m + spacecraft cannot?

A. Spatial resolution and long-term monitoring of small and distant bodies plus rapid response to transients

Get down to cases: Comets

- Density and structural properties of nuclei which tell us about planetesimals form, how big is typical planetesimal (indicates relative importance of accretion vs runaway growth)
- Spatial resolution of nuclei, search for binaries to get mass and density (are nuclei fluffy or compact or rubble piles)

KBO's

- Structure of Kuiper Belt constrains history of planet formation (fossil record of orbital evolution and disk truncation by stellar encounters), Mass distribution and evolution with time. More recently determines the some degree the number of SP comets hence impact rates and volatile delivery to early Earth. This in turn may affect the evolution of life
- Size distribution of small KBOs gives constraints on the collision history and accretion processes
- We get shapes + crude maps for the bigger ones leading to information on cratering, structural strengths and internal structures (rubble piles again)
- Binarity (masses, hence density hence collisions)
- We search for atmospheres via occultations. Bigger ELT collecting area means fainter stars are occulted. Also get more frequent weather reports from Pluto
- Spectroscopy of KBO's gives Chemistry of solar nebula
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Moons of Giant Planets

- Moons of warm Jupiters often quoted as possible habitable zones in non-traditional solar systems
- Must study such moons in our solar system.
Eg Io, Triton - surface, sub-surface-atmosphere interactions
- (Possible link to Earth climate change)