SOLAR SYSTEM(S) SCIENCE WITH LSST

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LSST will revolutionize solar systems science

Exo-planets

- transient phenomena in protoplanetary & debris disks

  - giant impacts

- free-floating planets

Irregular Satellites

- discover >10 times more objects

- explore full Hill spheres of outer planets

- test models of irr. sat. origin, & of dynamical history of planets

Comets

- Long period comets, Halley-type comets

- Oort cloud mass = 0.1 $M_\oplus$? 100 $M_\oplus$?

- huge observational bias - very poorly known population beyond q$\gtrsim$ 2.5 AU

- LSST will get comet census at ~30 AU

- NEED software for detecting *fuzzy* moving objects

Kuiper Belt

- LSST will discover 10-100 times more KBOs

- census of distant [dwarf] planets

- LSST's uniform sky coverage and sub-arcsecond resolution (great for orbit determination)
  ➡ census of special dynamical populations
  ➡ resonant KBOs (nonuniform in azimuth)

- test models of planet migration

Asteroids

- Jupiter Trojans
  - LSST will increase discoveries >10-fold
  - discover dynamical/collisional families
  - test models of Jupiter's migration

- Main asteroid belt
  - LSST will enable rotational info: Periods, Shapes, Phase functions, Surface properties
  - "active" asteroids
    - source of NEOs, meteorites, IDPs, connection with debris disks
    - thought to be due to impacts or rotational break-up (YORP spin-up); connected to origin of close/contact binaries
    - only 2 studied thus far; LSST will discover/study 100s
  - ground truth for impact physics - test theoretical models

NEOs
Near-Earth Objects

- LSST will go ~3 mags fainter than current, with sub-arcsecond astrometry

- discover/study >10x NEOs

- enable 100-yr impact hazard assessment

- meteorite-parent body relationships

- test lunar impact crater chronology