Discovery of the TRAPPIST-1 Planets

Gillon et al., 2017, Nature, 542, 456
Graphics courtesy: NASA/JPL-Caltech/ R. Hurt (IPAC)
500 Hours:
Exploring the 7 Exoplanets of TRAPPIST-1 with NASA's Spitzer Space Telescope

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Graphics courtesy: NASA/JPL-Caltech
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- Mass estimates for the six inner planets suggests rocky compositions.

- Precision of mass estimates not yet sufficient to constrain fraction of volatiles.

- Need follow up with Hubble, Webb to better understand atmospheric conditions.

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Transit Timing Variations

• Inner planets form a near-resonant chain
  
  • $P_c/P_b$, $P_d/P_c$, $P_e/P_d$, $P_f/P_e$, $P_g/P_f$: 8/5, 5/3, 3/2, 3/2, 4/3
  
  • Substantial TTVs – from few 10s to 30 minutes
  
  • Favored theoretical model $\rightarrow$ disk-driven inward migration (Cresswell et al. 2006; Terquen et al. 2007)
  
  • Implication is planets should have a volatile rich composition (reflecting where they formed) with lower densities than Earth.

Gillon et al., 2017, Nature, 542, 456
Scene from TRAPPIST-1e

Graphics courtesy: NASA/JPL-Caltech/T. Pyle (IPAC)
PLANET HOP from TRAPPIST-1e
VOTED BEST "HAB ZONE" VACATION WITHIN 15 PARSEC OF EARTH