Transit Lightcurve Signatures of Artificial Objects

The paper proposes a novel method that could be utilized to attract the attention of, and ultimately communicate with, extraterrestrial intelligence.

The paper suggests that artificial, planet-sized structures could be intentionally designed by an advanced civilization to produce transit lightcurves distinguishable from those of natural planetary bodies. Such objects - a triangle, a 2-screen configuration, or a louver-like 6-screen structure - would generate specific and detectable photometric signatures when transiting their host star.

In particular, the author emphasizes that multiple artificial objects transiting sequentially could be used to create attention-getting signals, especially if their transit patterns encode mathematical sequences such as prime numbers or powers of two.

This method aligns with the idea that an advanced civilization might choose to embed communicative signals within the framework of ongoing astronomical observations.

The paper also compares this transit method to traditional SETI approaches like laser pulses and argues that it offers comparable sky coverage and may even be more efficient in certain respects.

In conclusion, the author proposes that transits of artificial objects could serve as a new channel for interstellar communication, both as detectable beacons and as potential carriers of symbolic information.

Searching for GEMS: Confirmation of TOI-5573b, a Cool, Saturn-like Planet Orbiting an M-dwarf

This paper reports the following in brief:

Using 11 transits observed by TESS and follow-up photometry and radial-velocity measurements the researchers confirm the existence of TOI 5573b, a Saturn-sized exoplanet with high confidence. It’s among the coolest and rarest Saturn-like “GEMS”.

Parallax Effect in Microlensing Events due to Free-Floating Planets

The paper investigates how undetectable annual parallax can nonetheless distort the observed light curves of short-duration microlensing events caused by free-floating planets.

Earth as an Exoplanet: Investigating the effects of cloud variability on the direct-imaging of atmospheres

The paper uses Earth as an exoplanet analogue to study how real-time cloud variations influence the reflected-light spectra and detectability of key atmospheric biomarkers. By employing detailed 3D cloud data from MERRA-2 and simulating direct-imaging observations, the authors find that:

- Cloud coverage and vertical distribution significantly alter the signal-to-noise ratios of these molecules, impacting our ability to detect them.
- Temporal changes in cloud cover can confound efforts to retrieve a stable baseline atmosphere, complicating atmospheric characterization.
- These effects will influence future missions like the Habitable Worlds Observatory, affecting target visibility and required observation time.