Direct Imaging of Exoplanets with ELTs (English)

Title: Direct Imaging of Exoplanets at the Era of the Extremely Large Telescopes

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This paper discusses how upcoming Extremely Large Telescopes (ELTs), such as E-ELT, TMT, and GMT (operational between 20242028), will revolutionize exoplanet direct imaging. The study focuses on three major scientific themes:

1. Initial Conditions for Planetary Formation:
ELTs will probe protoplanetary disk structure, star-disk interactions, dynamic transport of water and organic molecules, and the conditions required for planet formation.

2. Architecture of Planetary Systems:
High-resolution imaging will allow detection of planet-disk interactions, newly formed giant planets, multi-belt structures, and the environments conducive to the formation of terrestrial planets.

3. Physics of Exoplanets:
High-dispersion spectroscopy will enable the detection of atmospheric molecules (H2O, CO2, CH4, etc.) and search for biosignatures like O2, O3, CH4 in Earth-like planets through transmission or reflection spectroscopy.

In conclusion, ELTs have the potential to not only image giant exoplanets but also characterize Super-Earths and Exo-Earths in habitable zones.