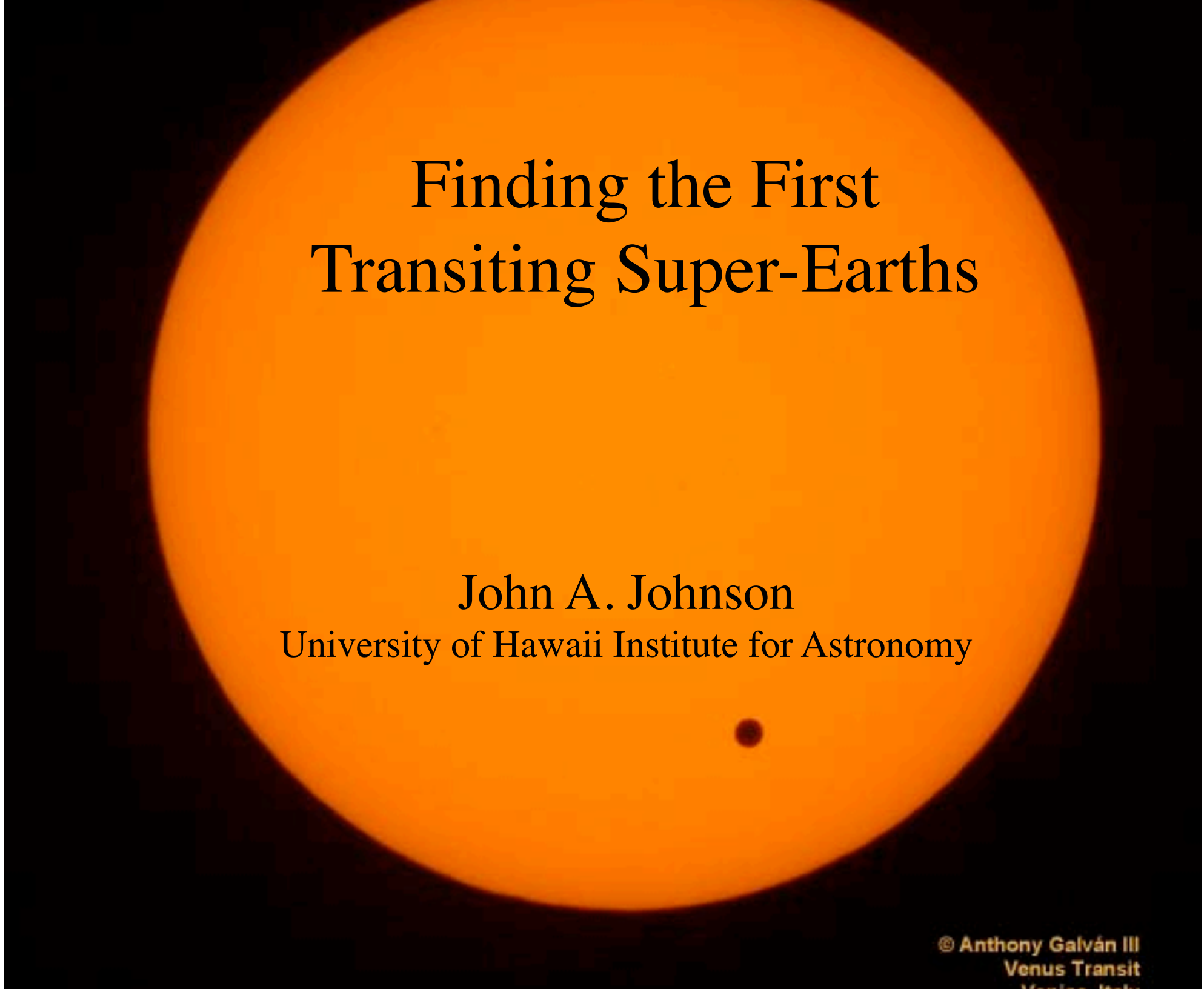


# Finding the First Transiting Super-Earths

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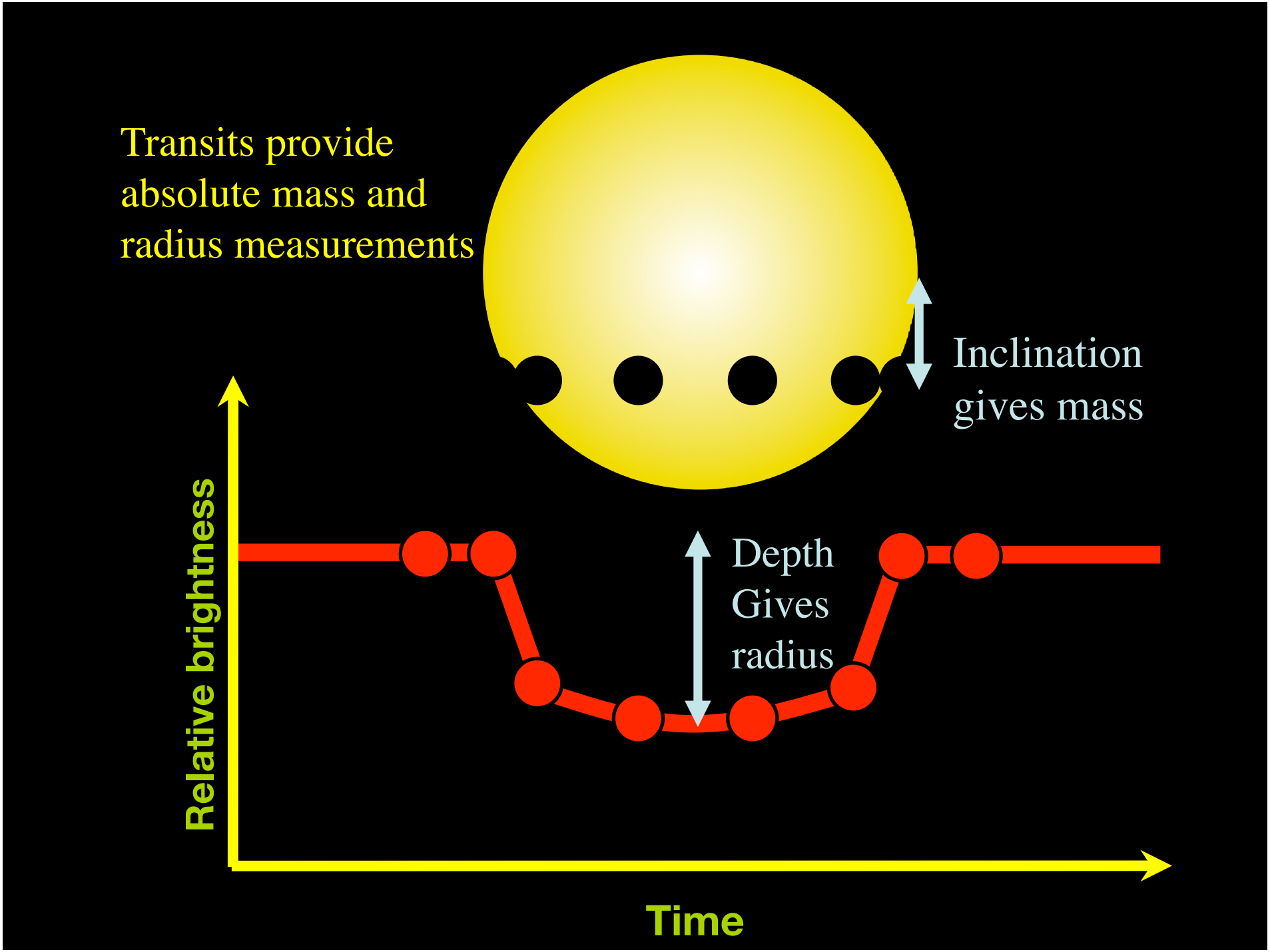
University of Hawaii Institute for Astronomy

**Super-Earths**: Planets with masses 2-10 times greater than the Earth

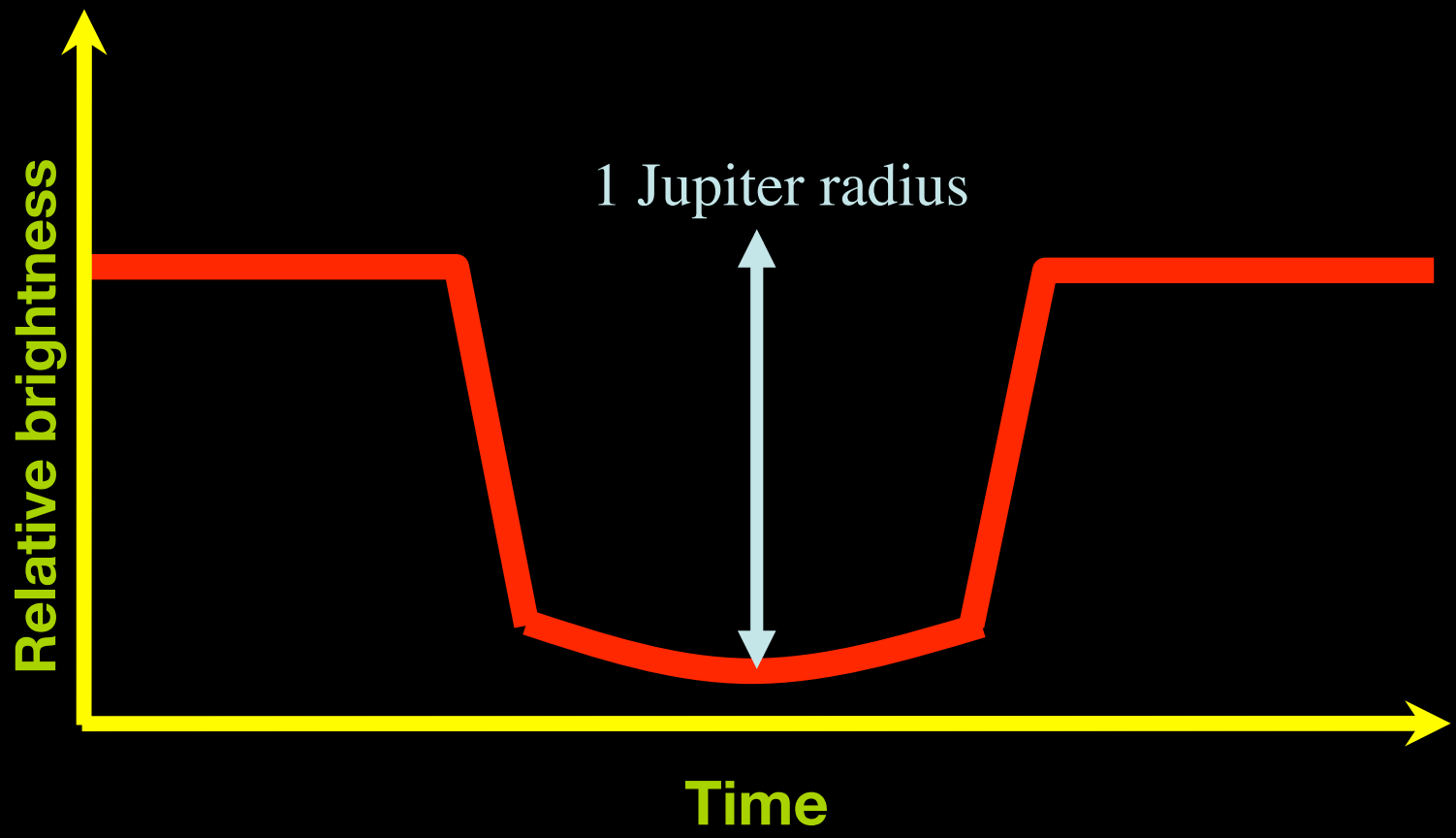
What are their compositions?

Are they terrestrial or Mini-Neptunes?

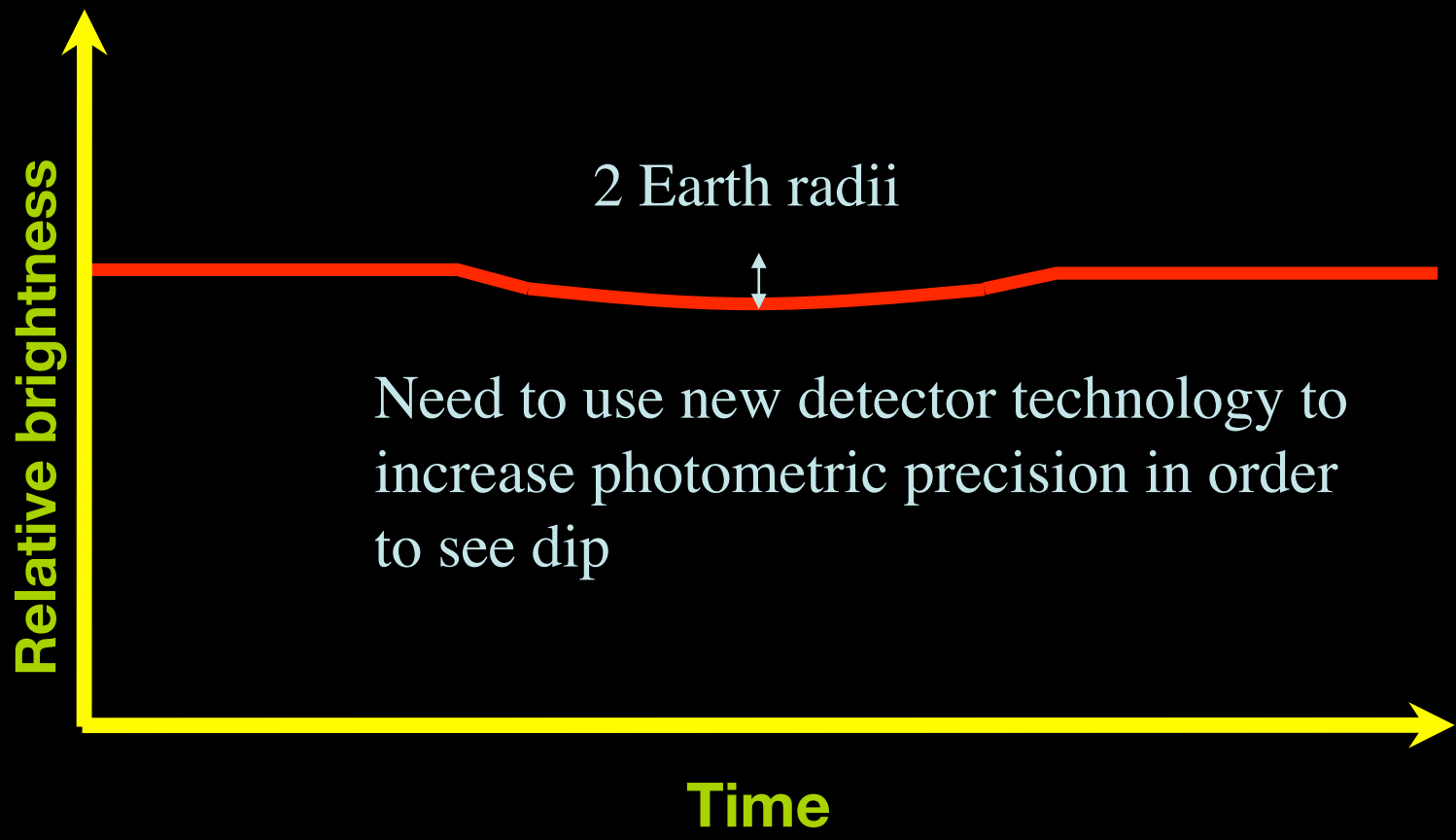
So far, the only examples have been detected by Doppler surveys, so we have no mass or radius measurments


Transits provide
absolute mass and
radius measurements
Inclination
gives mass
Depth
Gives
radius
Relative brightness
Time

Most known transits are deep and relatively easy to detect

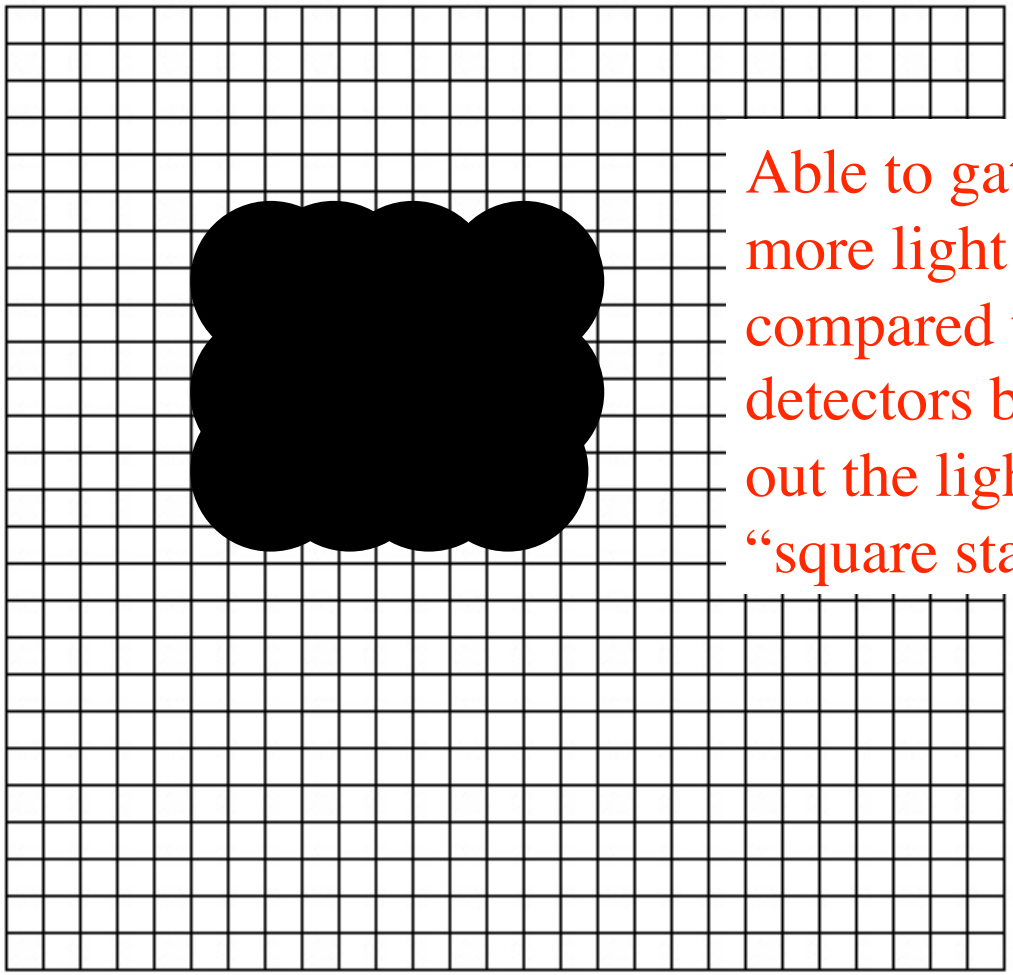


The transits of super-Earths are very shallow and hard to detect

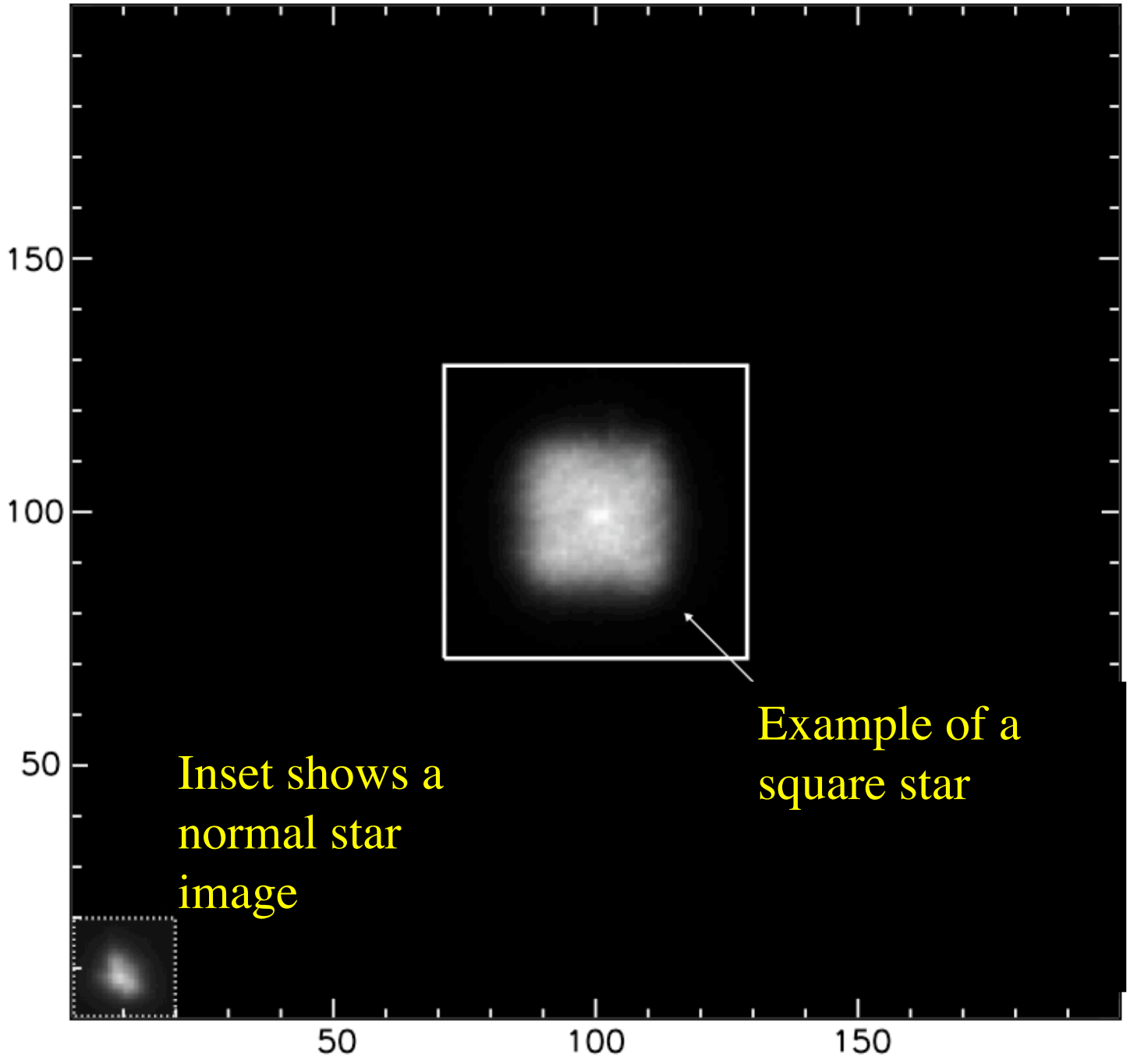


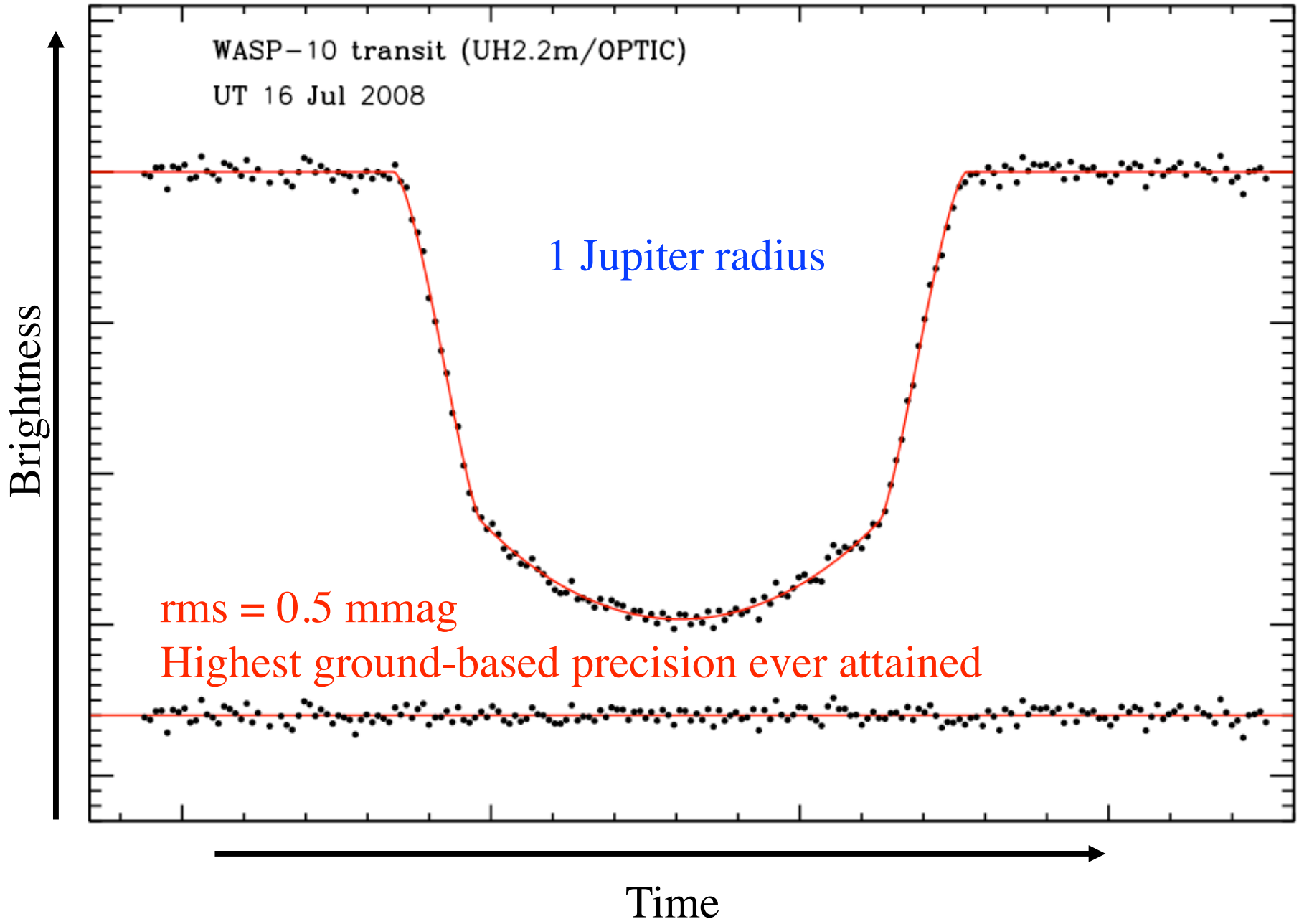

Need to use new detector technology to increase photometric precision in order to see dip

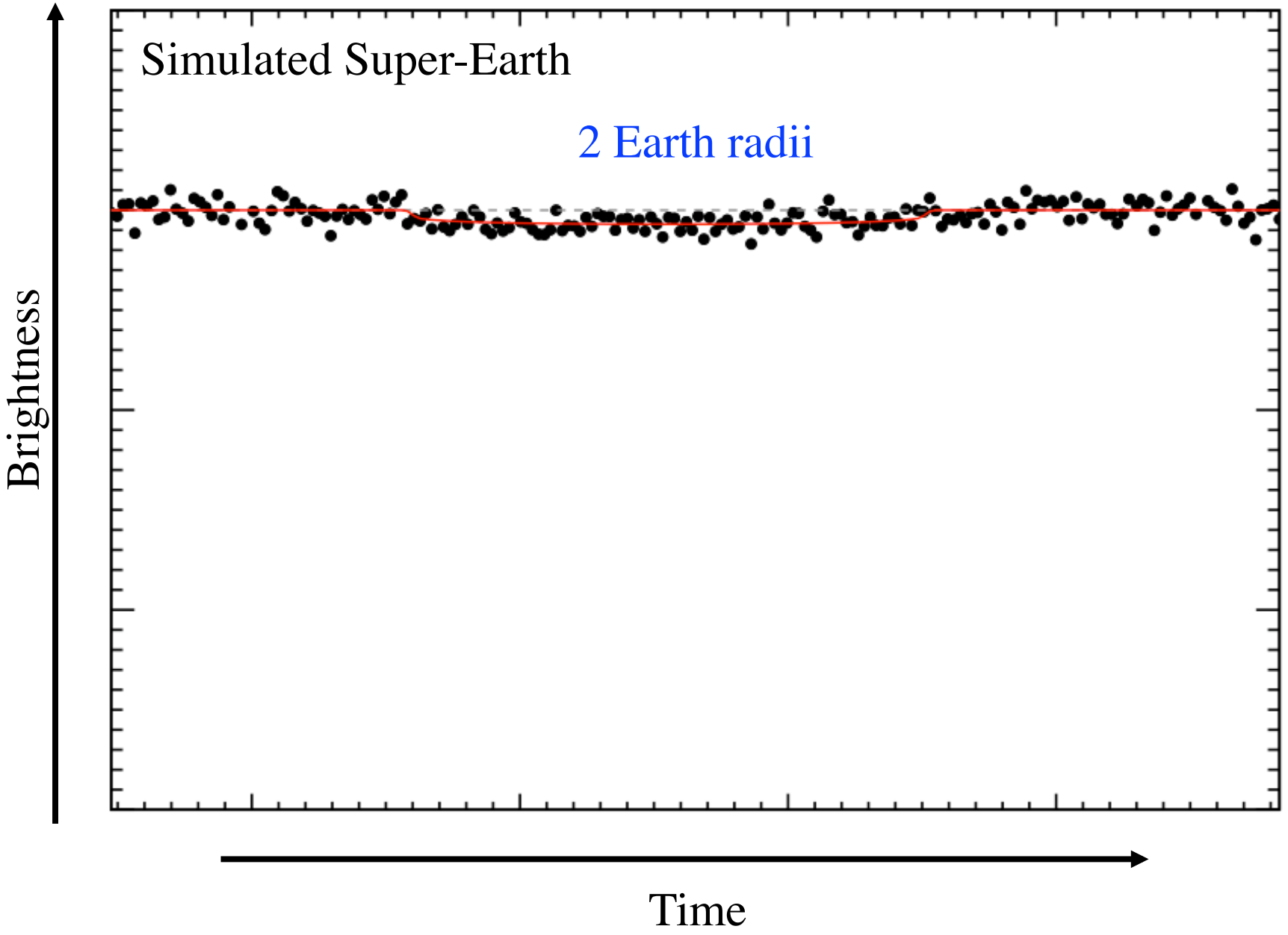
# Orthogonal Transfer Arrays

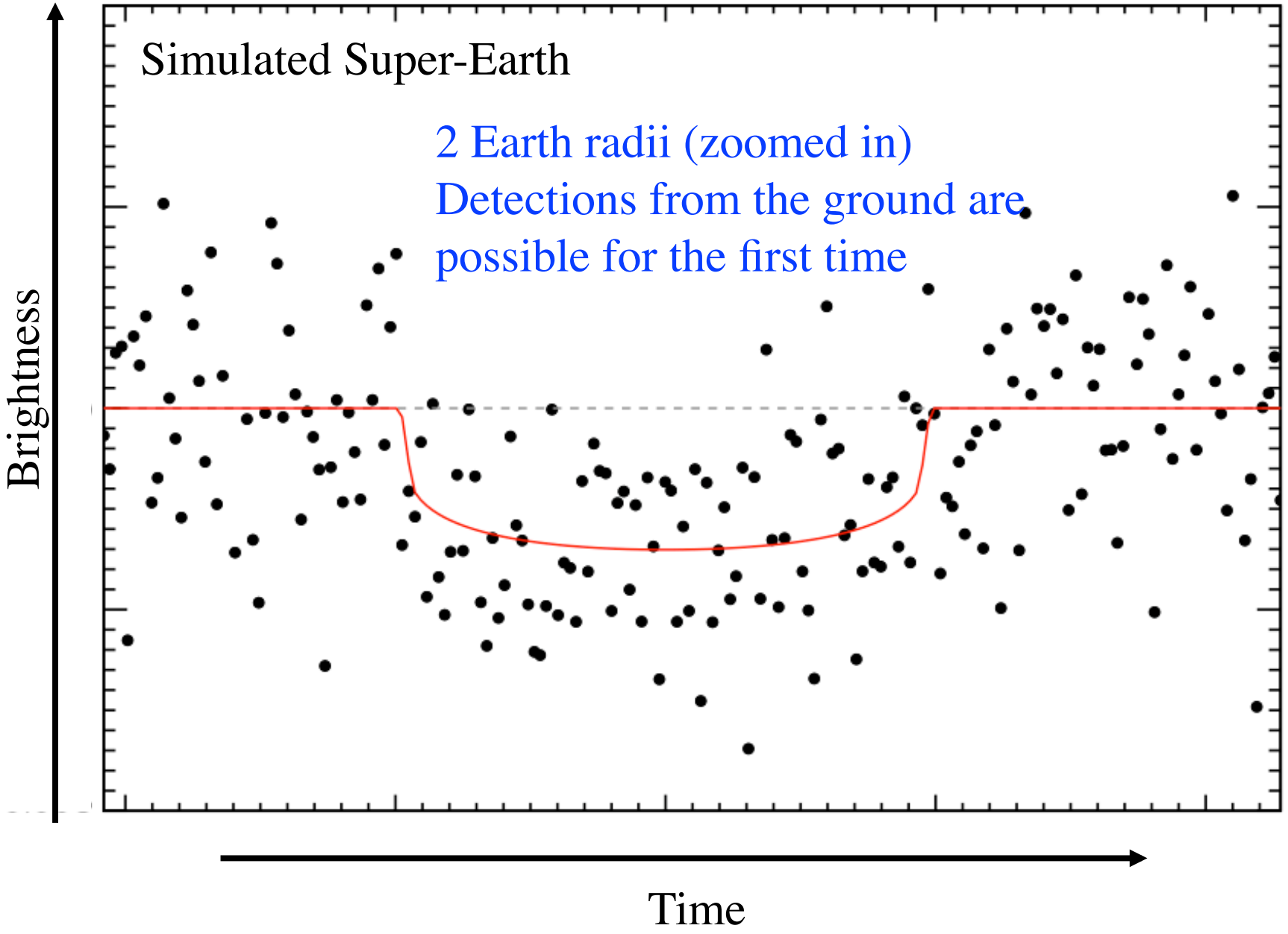


Able to gather 10x more light per exposure compared to traditional detectors by spreading out the light to form a "square star"


150
100
50
50
100
150
Example of a square star
Inset shows a normal star image


WASP−10 transit (UH2.2m/OPTIC)
UT 16 Jul 2008
1 Jupiter radius
rms = 0.5 mmag
Highest ground-based precision ever attained
Brightness
Time


Simulated Super-Earth
2 Earth radii
Brightness
Time


Simulated Super-Earth
2 Earth radii (zoomed in)
Detections from the ground are possible for the first time
Brightness
Time