Exploring a Nearby Habitable World
.... Orbiting an M-dwarf star

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This talk will discuss:

The landscape of extrasolar planets
.....and detection techniques

Some history

How to find and characterize a habitable world
.....using transits.
Most of the > 450 exoplanets have been detected *using* radial velocities...

...an *indirect* detection: light from the planet is not measured
Summary of the known exoplanets

Deming & Seager review in Nature 462, 301 (2009)

Also, Seager & Deming ARAA (2010)
Exploit transits to characterize SuperEarth Atmospheres...

Direct detection of light from the planet

Can we characterize the atmosphere of a SuperEarth using transits...? A habitable one??

Measure size of transiting planet, see radiation from star transmitted through the planet's atmosphere

Gravitational tug of unseen planets alters transit times
Transit data immediately yield the planet's bulk properties - mass (0.69 M$_J$) and radius (1.35 R$_J$)

Can we characterize the atmosphere?

Charbonneau, Brown, Collier-Cameron, Deming, Richardson, Wiedemann, and others struggled towards ground-based detection.