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

See thermal radiation from planet disappear & reappear
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