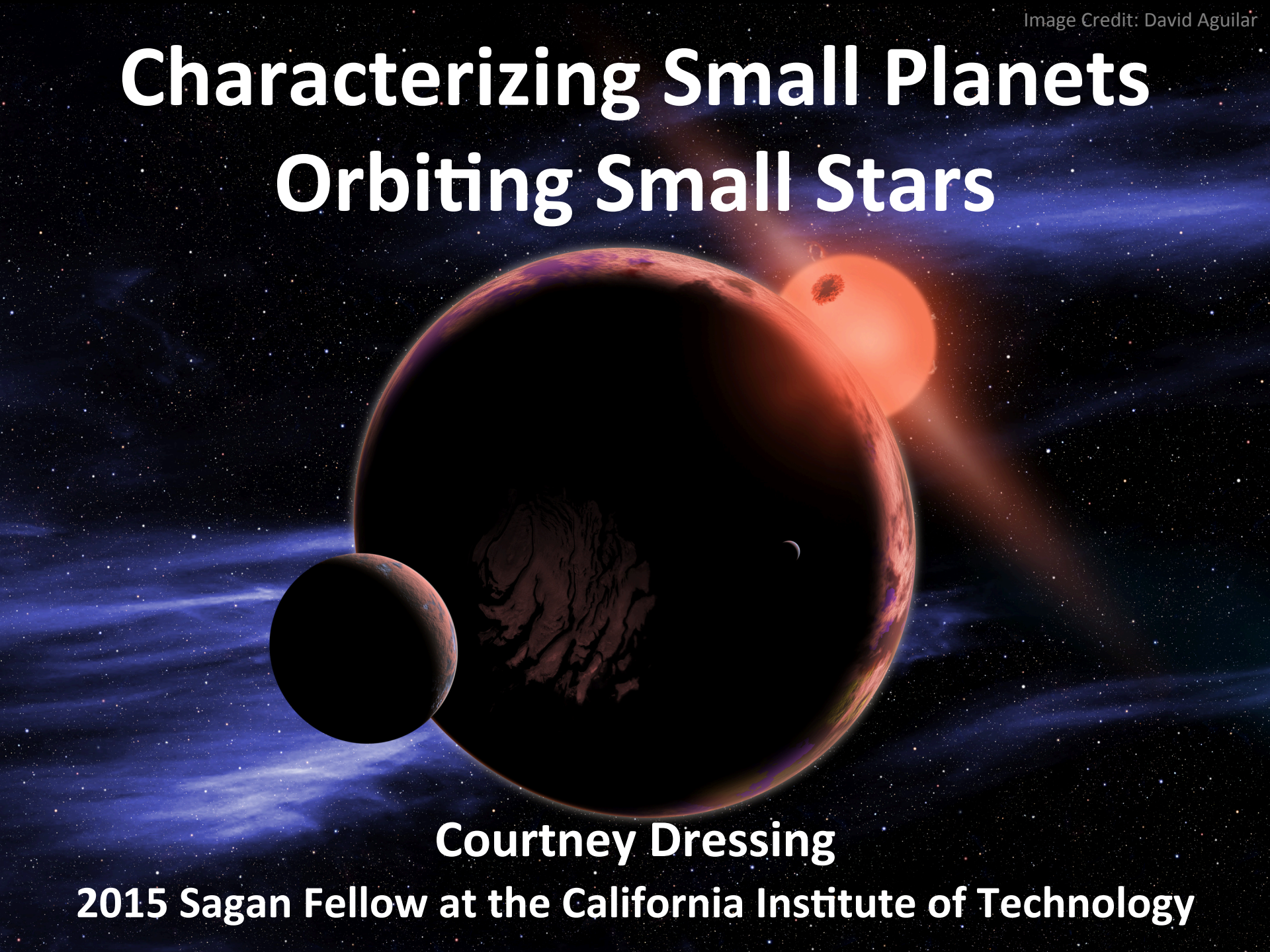

Characterizing Small Planets Orbiting Small Stars

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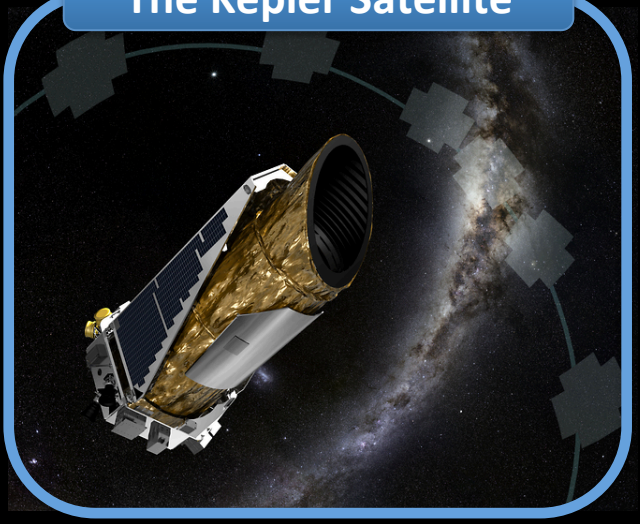
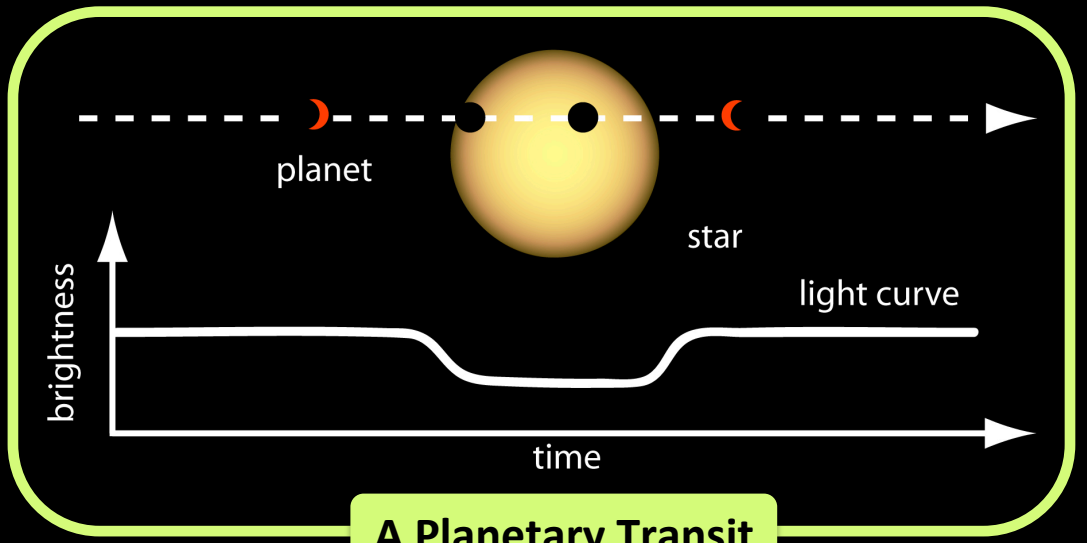
2015 Sagan Fellow at the California Institute of Technology

The Search for Planets with K2

The ***NASA K2 mission*** is using the Kepler satellite to look for planets orbiting thousands of stars. K2 is expected to ***find hundreds of planets.***

The Kepler Satellite

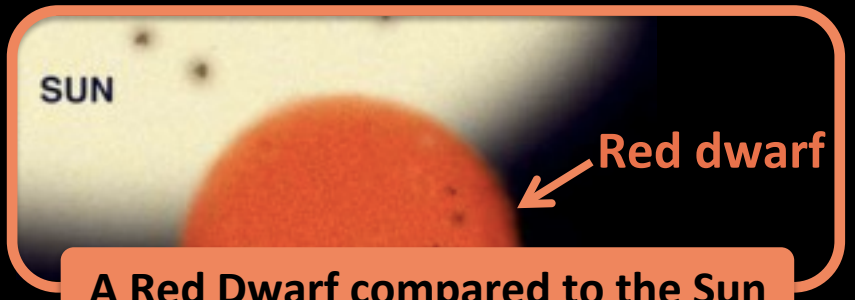




A Planetary Transit

Some planets periodically pass in front of their host stars and cause them to appear dimmer because the planet blocks some of their light. These events are called ***transits.***

Many of the planets found by K2 will orbit small stars known as ***red dwarfs***. These stars are 10-50% the size of the sun and make up 75% of the stars in the galaxy.



A Red Dwarf compared to the Sun

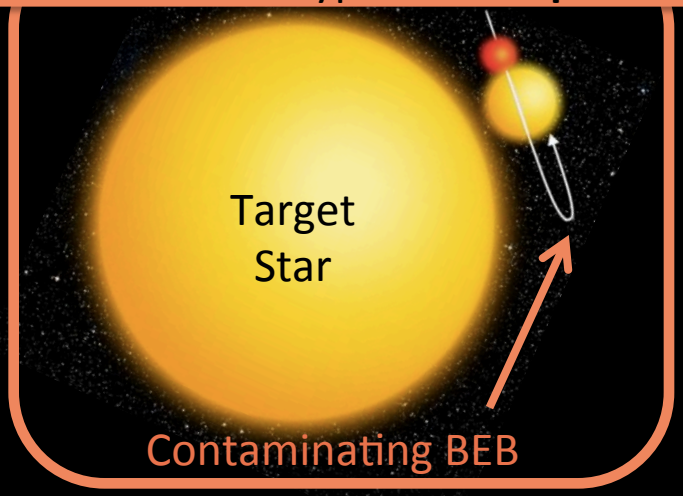
Image Credits: NASA & Gemini Observatory/Jon Lomberg

My Plans as a Sagan Fellow

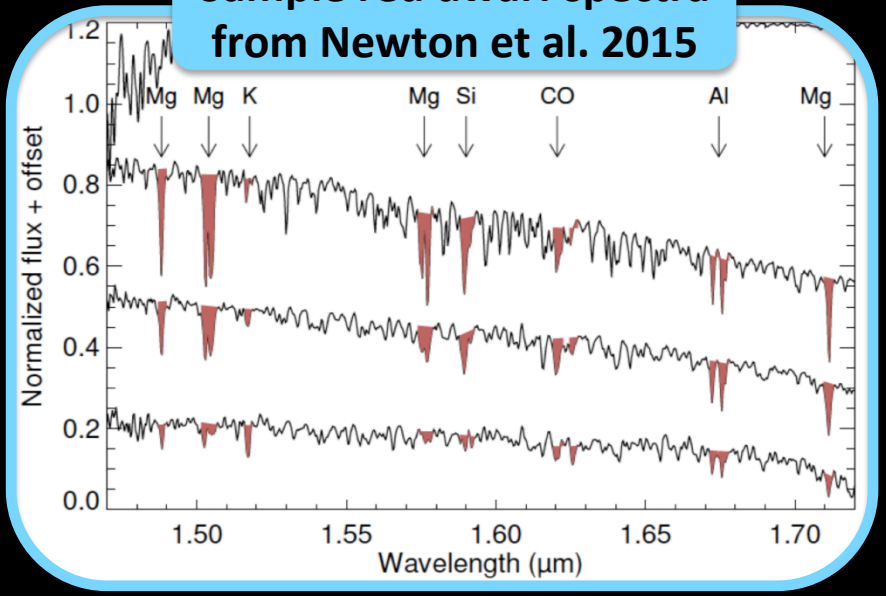
Project 1: Unmask False Positives Masquerading as Planet Candidates

Some putative planets might actually be astrophysical false positives. I will **inspect K2 light curves** and **obtain follow-up observations** (spectra & adaptive optics images) to **distinguish between false positives and real planets.**

Background eclipsing binaries (BEBs) are a common type of **false positive**



Sample red dwarf spectra from Newton et al. 2015



Project 2: Characterize red dwarfs hosting small planets

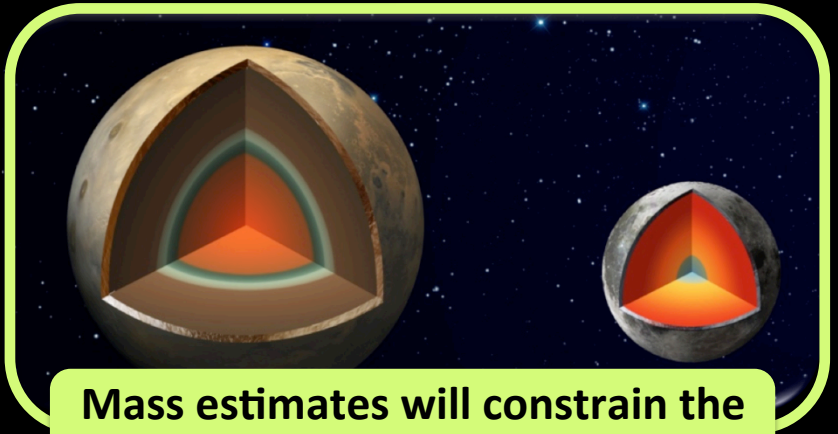
The size and mass of a planet is measured relative to the host star. I will **obtain near-infrared spectra** to determine the sizes and temperatures of low-mass stars observed by K2. These measurements are crucial to **determine which planets could be habitable.**

Image Credit: NASA

My Plans as a Sagan Fellow

Project 3: Measure the masses of small planets

Planets larger than the Earth and smaller than Neptune seem to be the most common type of planet in the galaxy, but their compositions are largely unknown. I will **obtain radial velocity observations of small planets** in order to constrain their masses and **determine which small planets might be rocky like the Earth.**



Mass estimates will constrain the compositions of small planets

Project 4: Investigate links between stellar and planetary properties

Kepler revealed that most larger red dwarfs host planets, but what about the smallest red dwarfs? I will use K2 data to **investigate how the frequency and properties of planets** orbiting red dwarfs **correlate with host star mass and metallicity.**

Artist's rendition of planets orbiting the small red dwarf KOI-961

Image Credits: NASA/JPL-Caltech