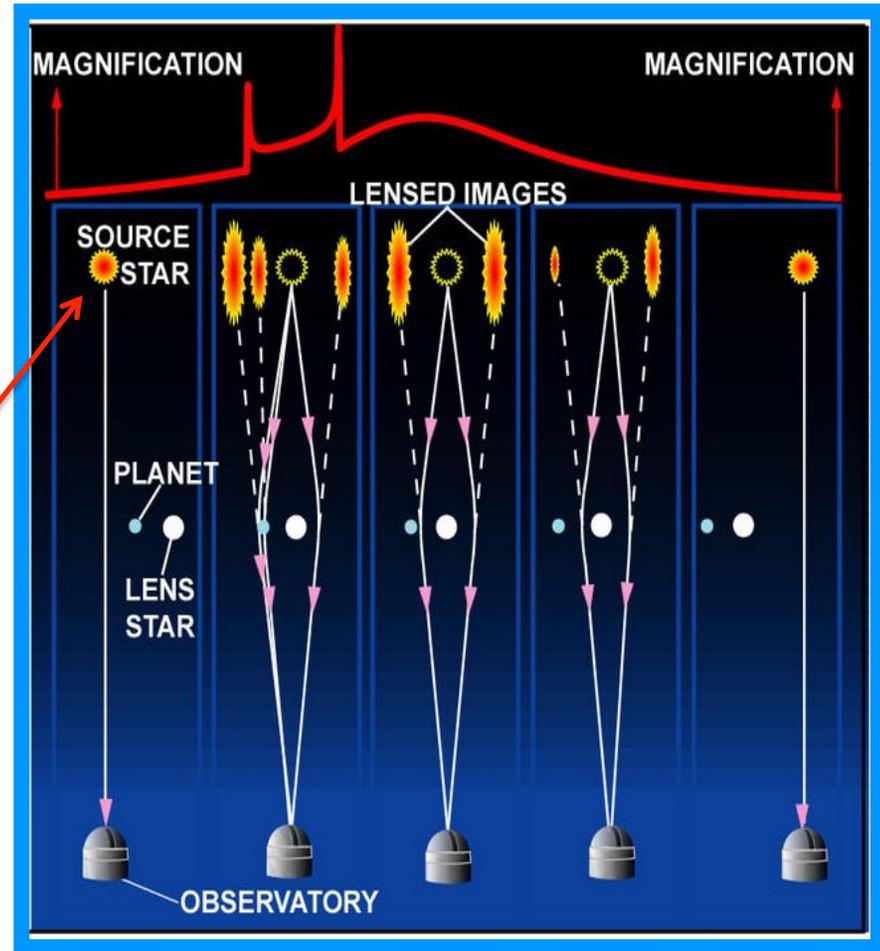
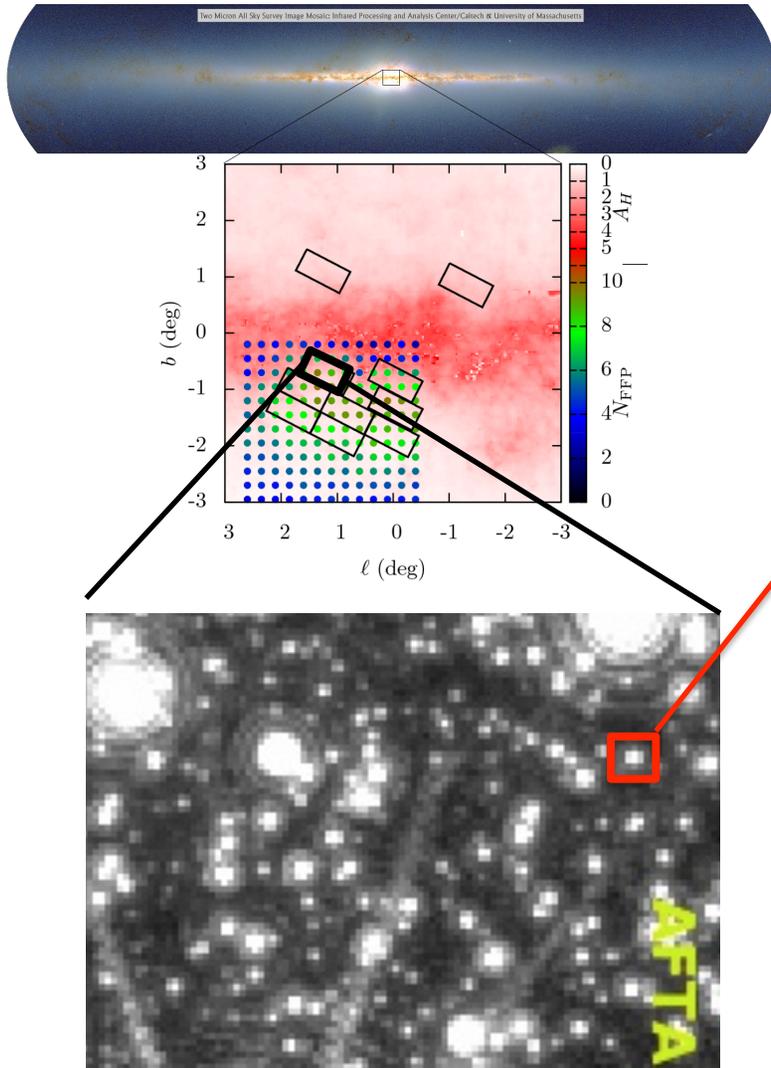
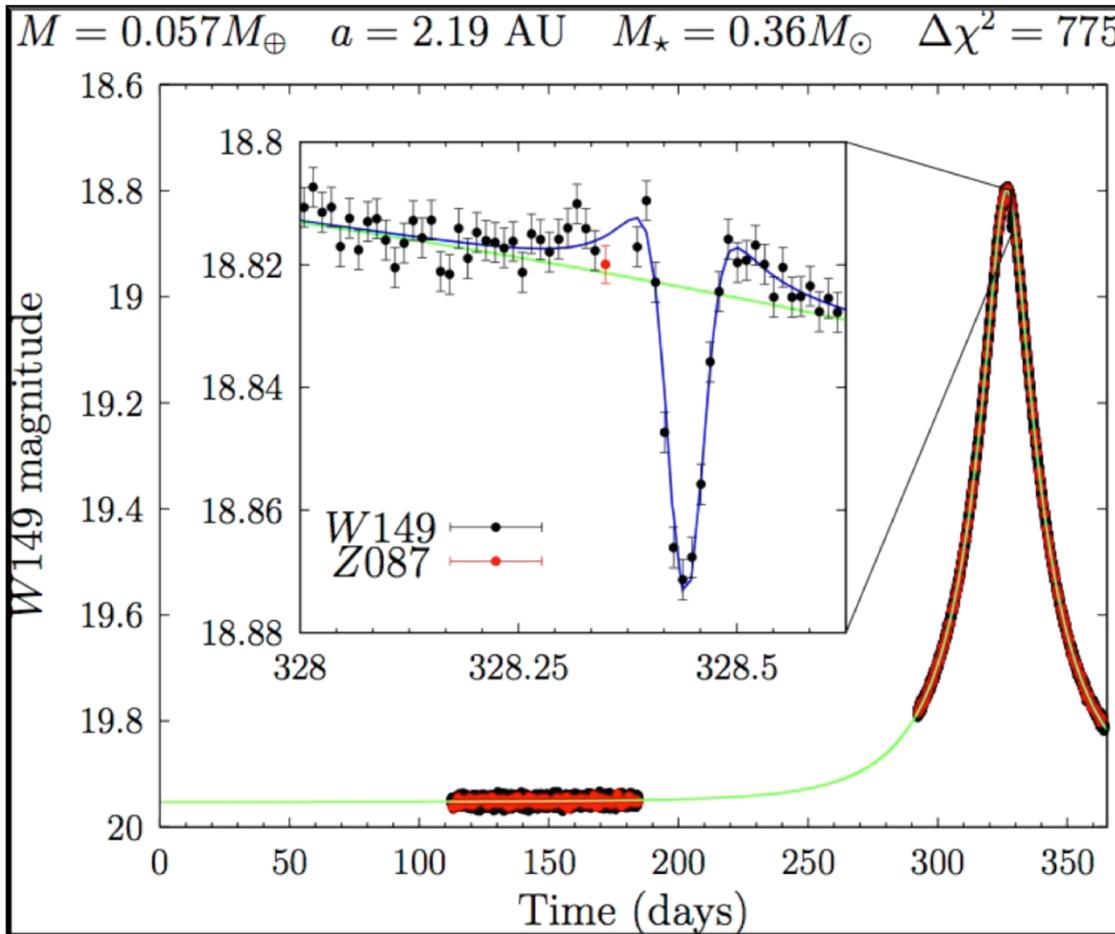


Detecting Planets with a Microlensing Survey

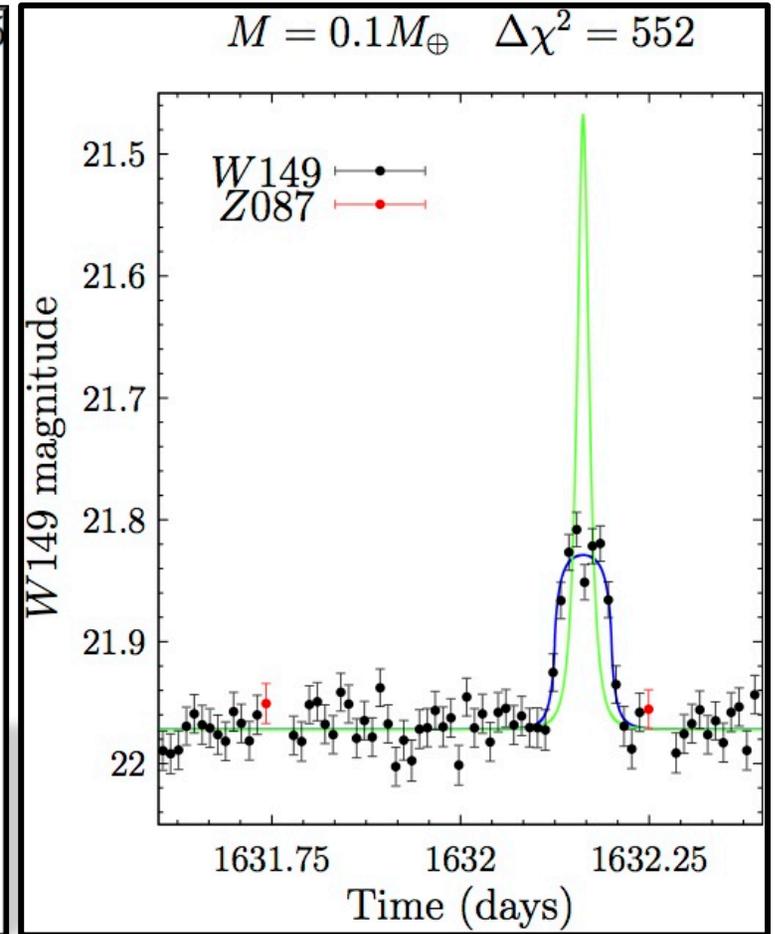




Exquisite Sensitivity to Low Mass, Cold, and Free Floating Planets



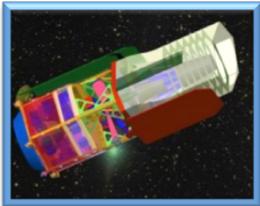
Mercury at 2.2 AU
(~28 sigma)



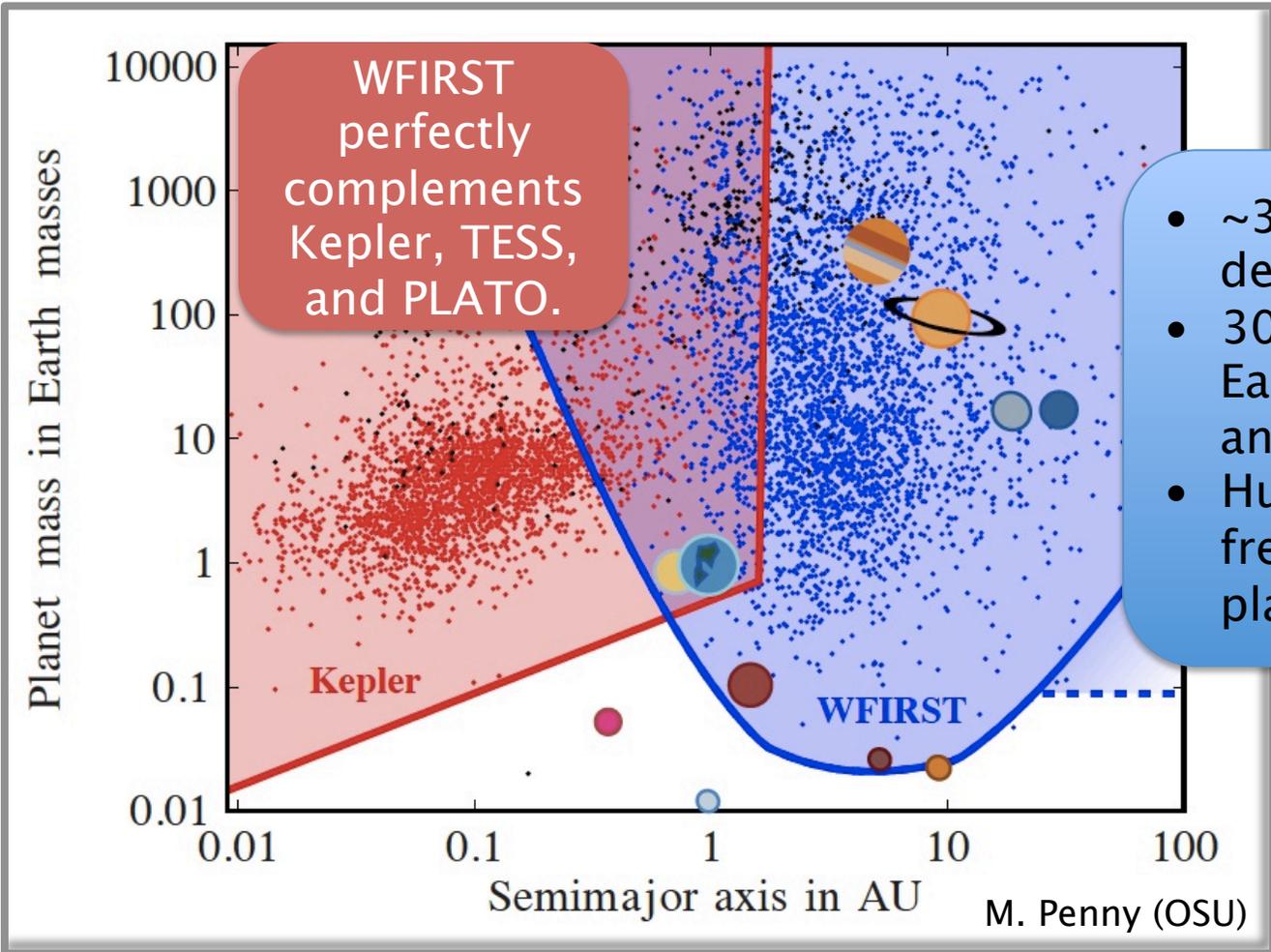
Free floating Mars
(~23 sigma)



Completing the Statistical Census of Exoplanets



Combined with space-based transit surveys, WFIRST completes the statistical census of planetary systems in the Galaxy.





Exoplanet Science Enabled by WFIRST-AFTA



- Dramatically improved sensitivity and yield.
 - Enables the detection of planets of a hundred times less massive than can be detected from the ground.
 - Orders of magnitude improvement in planet detection rate.
 - Allows the detection of unexpected and unusual systems.
- Detailed characterization of detected planetary system.
 - The high angular resolution, stable, and well-characterized imaging allows for very precise photometry and astrometry of the stars.
 - Routine measurements of the masses and distances to the planets and their host stars.
 - Measurement of the Galactic distribution of planets.
- Extraordinarily rich dataset.
 - >40,000 images of >100 million stars
 - Auxilliary science potential: >100,000 transiting planets, parallaxes and proper motions of 100 million stars, ??

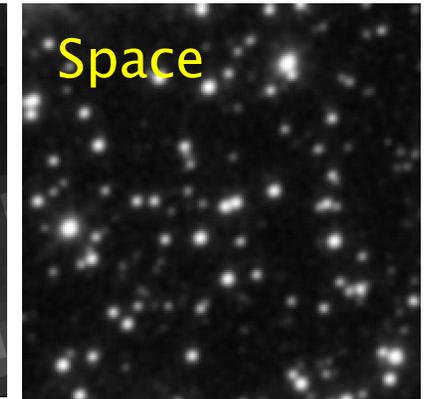
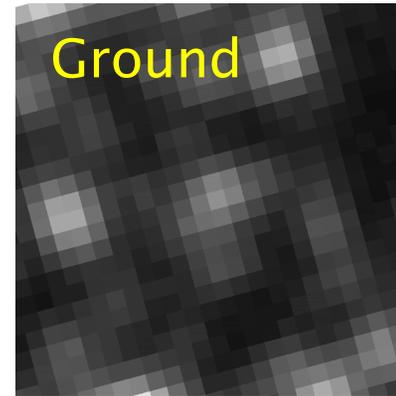


Back-Up Slides.

Why a Space Mission is Required.



- Infrared.
 - More extinguished fields.
 - Smaller sources.
- Resolution.
 - Low-magnification events.
 - Isolate light from the lens star.
- Visibility.
 - Complete coverage.
- Smaller systematics.
 - Better characterization.
 - Robust quantification of sensitivities.

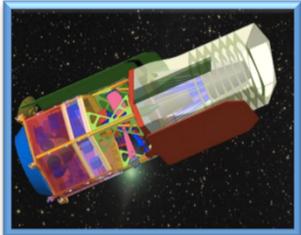


The field of microlensing event
MACHO 96-BLG-5
(Bennett & Rhie 2002)

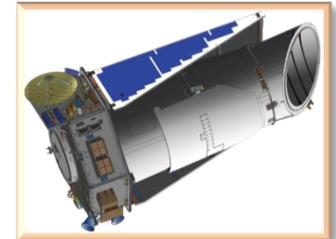
Science enabled from space: sub-Earth mass planets, habitable zone planets, free-floating Earth-mass planets, mass measurements.



Exoplanet Demographics with WFIRST.

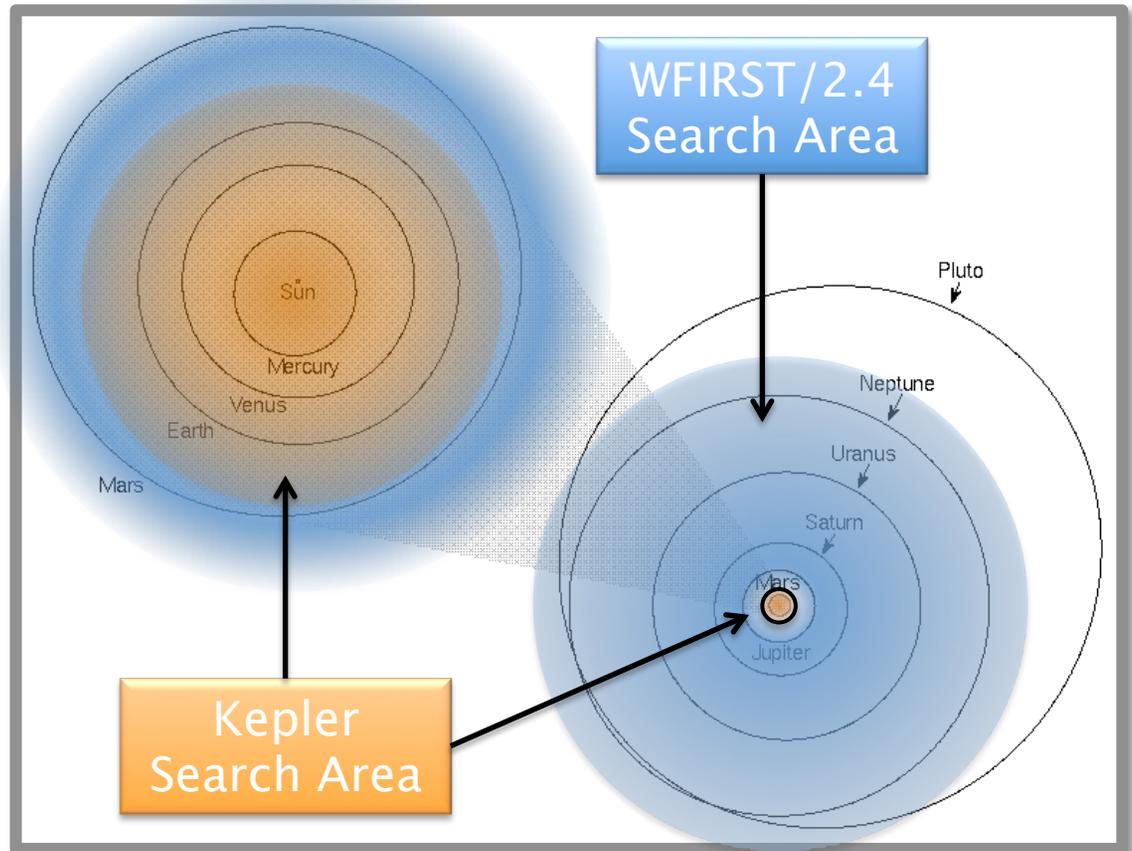


Together, Kepler and WFIRST complete the statistical census of planetary systems in the Galaxy.



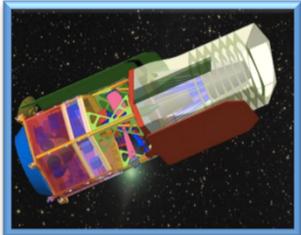
WFIRST will:

- Detect 2800 planets, with orbits from the habitable zone outward, and masses down to a few times the mass of the Moon.
- Have some sensitivity to “outer” habitable zone planets (Mars-like orbits).
- Be sensitive to analogs of all the solar systems planets except Mercury.
- Measure the abundance of free-floating planets in the Galaxy with masses down to the mass of Mars
- Characterize the majority of host systems.

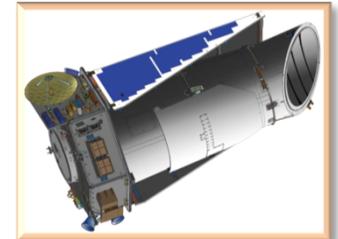




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