WIDE-FIELD INFRARED SURVEY TELESCOPE
ASTROPHYSICS • DARK ENERGY • EXOPLANETS

WFIRST: Science in the Solar System

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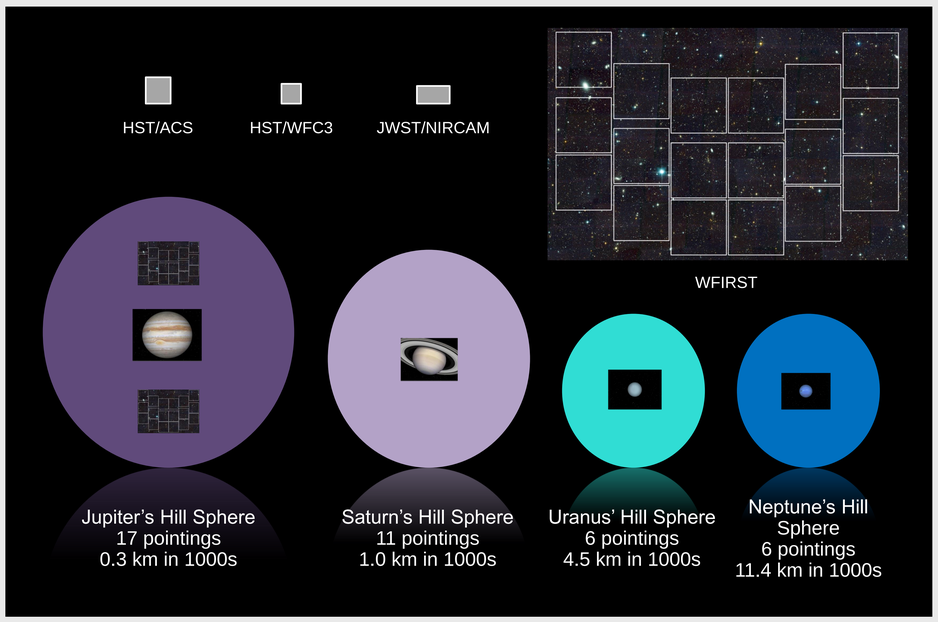
The WFIRST Mission

WFIRST is NASA's next great observatory, designed to complement the capabilities of Hubble, Spitzer, and the James Webb Space Telescopes and LSST. It is the first telescope to combine the strengths of NASA's flagship missions (high throughput and high-resolution imaging) with the strengths of our most powerful ground-based surveys (wide field of view). WFIRST is slated to launch in the mid 2020s.

WFIRST Field of View

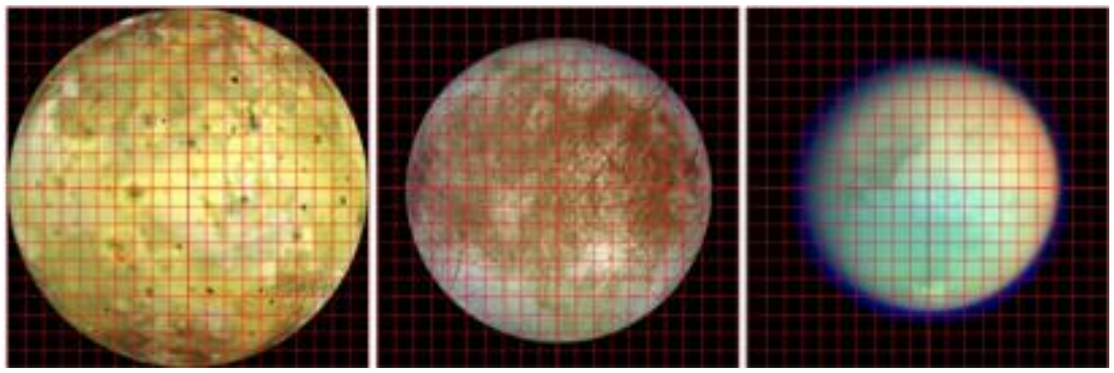
WFIRST offers sensitivity comparable to Hubble and 0.11" resolution over a 0.28 sq deg field of view that is 100x the field of Hubble's visible cameras. WFIRST is also equipped with a high-performance coronagraph that will be capable of suppressing star-light by factors of up to a billion to 1, to directly discover and characterize exoplanets. The mission is designed to enable cutting edge astrophysics through Guest Observer and Guest Investigator programs.



Above: WFIRST/WFI FOV compared to the FOVs of other instruments on HST and JWST. Each of the 18 individual white boxes represents one detector in the WFI FOV. The WFI can cover the entirety of the giant planet Hill spheres in 6-17 separate pointings to observe irregular satellites.

Potential Science Programs

- Support for Planetary Missions in the 2030's
- Time-domain studies of the Giant Planets
- Evaluation of temporal changes of satellites
- Serendipitous detection of small bodies in surveys
- Conduct the deepest inventory of distant comets yet
- Determine the population of small KBOs
- Characterization of deposits from subsurface oceans



Above: The IFC pixel size can be either 0.05" or 0.10", depending on the image slicer chosen. For a pixel size of 0.5", 380, 278, and 206 pixels will cover the full disks of Io, Europa, and Titan, respectively, for the maximum angular diameter of each object (when the object is within WFIRST's field of regard between solar elongation angles of 54° and 126°).

Exploiting the Guest Investigator Programs

The Guest Investigator (GI) program will provide access to data from the WFIRST astrophysics surveys to the larger astronomical community. These surveys could be used for the detection and study of main belt asteroids, Jupiter Trojans, and comets. For example, an unmodified microlensing survey could detect KBOs down to a V~30.2; this equates to objects ~11 km in diameter. Satellites within 10 mas (~0.1 pixel) could be identified around primaries with a maximum V~25.0, resulting in a significant increase in the total number of known KBO binary systems (~80 are currently known) and thus an increase in known system masses.

Some augmentations to the mission will vastly improve the scientific return for Solar System observations including: Moving Target Tracking, a K-band filter (**poster 355.17 on Thurs.**), and a target-of-opportunity program.

For a more comprehensive look at the science cases, see the WFIRST Solar System Working Group (SSWG) whitepaper online at:
https://arxiv.org/abs/1709.02763

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