

# **New Horizons Pluto Payload Ready For Flight, Exciting Science Campaign**

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The science payload for NASA's New Horizons mission completed its last major preparations for flight last week. The probe will be the first to visit Pluto and its moon, Charon.

The compact New Horizons spacecraft carries a payload of seven science instruments for examining the geology, composition, surface, temperature and atmospheric structure of the planet and its moon.

Flybys of one or more of the icy objects in the Kuiper Belt may be scheduled thereafter, during a mission extension.

Southwest Research Institute (SwRI) led the development of the science payload, which recently completed a series of spacecraft environmental tests in Maryland at NASA's Goddard Space Flight Center and the Johns Hopkins University Applied Physics Laboratory (APL), where the instruments were also integrated with the spacecraft.

"Although the hard work on the instrument development and testing is over, the work never stops," says New Horizons Science Payload Manager William C. Gibson, assistant vice president of the SwRI Space Science and Engineering Division. "We'll only stop worrying once we've achieved full mission success, but we're thrilled that the payload is ready for flight."

The New Horizons payload is incredibly power efficient, with the instruments collectively drawing only about 28 watts. The payload

consists of three optical instruments, two plasma instruments, a dust sensor and a radio science receiver/radiometer. The individual instruments and their principal investigators (PI) are:

Alice, an ultraviolet imaging spectrometer that will probe the atmospheric composition and structure of Pluto. (Led by SwRI; PI Dr. Alan Stern)

Ralph, a visible and infrared camera that will obtain high-resolution color maps and surface composition maps of the surfaces of Pluto and Charon. (Led by Ball Aerospace and SwRI; PI Dr. Alan Stern)

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SWAP, or Solar Wind Around Pluto — will measure charged particles from the solar wind near Pluto to determine whether it has a magnetosphere and how fast its atmosphere is escaping.

PEPSSI, or Pluto Energetic Particle Spectrometer Science Investigation — will search for neutral atoms that escape the planet's atmosphere and subsequently become charged by their interaction with the solar wind.

SDC, or Student Dust Counter — will count and measure the masses of dust particles along the spacecraft's entire trajectory, covering regions of interplanetary space never before sampled.

REX, or Radio Science Experiment — a circuit board containing sophisticated electronics that has been integrated with the spacecraft's radio telecommunications system, will study Pluto's atmospheric structure, surface thermal properties, and make measurements of the mass of Pluto and Charon and KBOs.

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"The New Horizons payload is a remarkably compact, but powerful suite of instruments that will revolutionize our knowledge of Pluto, its large moon Charon and bodies farther out in the Kuiper Belt," comments Stern, New Horizons principal investigator. "Hold on to your hats -- this payload is going to provide a ringside seat as New Horizons explores the deep outer solar system."

As was planned since the design phase, following thermal vacuum testing at Goddard this summer, a pair of channel electron multiplier detectors on the SWAP instrument was replaced last month with a new and pristine set -- crucial for optimal operation of the instrument.

In addition, thermal insulating material was installed between PEPSSI and the spacecraft. These two instruments were then re-integrated with the spacecraft the week of Oct. 3, resulting in a payload fully configured for flight.

Now at the NASA Kennedy Space Center in Florida, the spacecraft will be moved to the launch pad in December, at which time the science team will perform "aliveness" tests to verify the instruments communicate properly with spacecraft computers. Pending final launch approval, liftoff is scheduled for Jan. 11, 2006, aboard an Atlas V rocket.

Beginning about one month after launch, the various instruments will be turned on to begin testing and ensure they and their power supplies are operating properly. Instrument calibrations are planned throughout the early and middle portions of 2006, in anticipation of the mission's early-2007 Jupiter flyby on the way to Pluto.

"We'll get a good deal of new science at Jupiter and an opportunity to

rehearse for the Pluto encounter," says Gibson.

During the almost 10-year voyage to Pluto, the instruments will be checked out every year. Also during the cruise, observations taken by the various instruments will be sent back to Earth.

Perhaps most notably, the Student Dust Counter will operate continuously during the cruise to Pluto, tracing out the distribution of dust particles across our solar system. New Horizons could reach Pluto and Charon as early as July 2015.

New Horizons is the first mission in NASA's New Frontiers program. APL manages the mission and will operate the spacecraft for the NASA Science Mission Directorate. SwRI will lead the New Horizons science and mission teams from the Tombaugh Science Operations Center located at SwRI facilities in Boulder, Colo.

Planet Pluto is the largest member of the Kuiper Belt. Objects in the Kuiper Belt have never been exposed to the higher temperatures and radiation levels of the inner solar system, and are therefore expected to provide a valuable window into the early evolution of our solar system.

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