

# YOUNG ASTRONOMERS NEWSLETTER

## INDIAN SPACE AGENCY LOSES CONTACT WITH MOON LANDER MINUTES BEFORE TOUCHDOWN

The Indian lunar mission called Chandrayaan-2 lost communication with its Earth home base just minutes before touching down near the Moon's south pole. Unfortunately, communication was lost on September 7 just as landing maneuvers were going on at an altitude of about 2 km above the lunar surface.

The Chandrayaan-2 mission consisted of three components: an orbiter, a lander and a rover. The latter was nested within the lander. The orbiter is currently functioning well, and its cameras spotted the lander on the surface. The lander appears to be intact, although it is in a tilted orientation.

The Indian space agency (ISRO) Will use the orbiter to attempt to make contact with the lander. This can take place over 14 days while solar power alignment is favorable. NASA/JPL is also assisting in these attempts. [[gulfnews.com/world/asia/india](http://gulfnews.com/world/asia/india)].

(Editor's note: As of Sept. 24, the Indian Space Agency has not been able to make contact with the crashed lander.)

## WATER DETECTED IN ATMOSPHERE OF DISTANT PLANET

British and Canadian astronomy groups independently announced the discovery of a planet which has water vapor in its atmosphere. This is the first discovery of atmospheric water on an extra-solar planetary body which resides in a habitable zone (able to support life).

The planet is labeled K2-18b and it orbits a small, red star (K2-18) located in the constellation Leo.

The planet-star system is at a distance of 111 light-years from Earth. The planet is about two times the diameter of Earth and it orbits its "Sun" every 33 days.

The star to planet distance and the heat output of the star indicate that the temperature on the planet should be able to maintain liquid water, a necessary ingredient for life, as we know it. The planet is very close to its star, nevertheless, the star is a cool red dwarf. So, the balance of distance and star temperature puts K2-18b within the habitable zone. It is quite possible that the planet experiences snow or rainfall.

The identification of atmospheric water came from the examination of spectra obtained by the Hubble Space Telescope, Spitzer Telescope and the Kepler Telescope. Calculation of the temperature of the planet's atmosphere gives an average value of 265 Kelvin, which is about 18 degrees Fahrenheit.

The research groups which made the discovery were at the University College, London and the Université de Montréal. More study of the atmosphere of K2-18b will take place as new space telescopes, such as the James Webb Telescope are put into service [[bbc.com/news/science-environment-49648746](http://bbc.com/news/science-environment-49648746) and [cnet.com/news/water-found](http://cnet.com/news/water-found)].

## NASA ANNOUNCES A NEW MISSION TO SATURN'S MOON TITAN

NASA has announced that it will begin preparations for another mission to Titan, the largest moon of Saturn. The head of the mission team will be Elizabeth Turtle of Johns Hopkins University. Launch of the spacecraft is scheduled to take place in 2026, with the journey to the ringed planet taking about eight years.

Once on the planet, the spacecraft will convert to an eight-rotor maneuverable drone, called Dragonfly, that will be directed from

### **Titan mission, cont.**

Earth to take dozens of excursions to examine the atmosphere and surface liquids and solids.

Particular attention will be given to craters which have a complex mixture of water and organic compounds, which are surmised to have prebiotic potential.

Being a flying craft, Dragonfly will be able to cover much greater distance than the wheeled rovers used on Mars.

Onboard instruments include cameras, mass spectrometer and gamma-ray spectrometer. Surface-based instruments include a seismometer and wind and temperature sensors. The Titan exploration is expected to last 2.7 years. [Sky & Tel., Oct.,2019]

### **THE INSIGHT MARS LANDER IS STRUGGLING TO GET ITS DIGGING PROBE TO MAKE HEADWAY**

NASA's Mars lander called InSight, has been on the red planet since November of 2018. Its mission is to study the geologic interior of the planet. It has deployed all its instruments and cameras and made initial efforts to dig its heat-sensing probe into the martian crust. But the digger, nicknamed "the mole" very quickly encountered an obstacle. Or, perhaps a non-obstacle. At first, it was assumed that the digger ran into a rock. But, after photographing and shifting the digging arm, it is now proposed that the digging spike is not getting the needed leverage against the walls of the hole. The soft, sandy surrounding soil keeps the digger from getting the "push" that it needs for each digging stroke.

The last information from the mission team tells us that the robotic arm's scoop is being used to compact the dirt near the hole and hopefully make the surrounding soil more firm. Readers who may want to get the current weather on Mars can go to: <https://mars.nasa.gov/insight/weather>. [Astronomy, Oct., 2019].

### **COSMOLOGISTS STILL CAN'T SETTLE ON A VALUE FOR THE EXPANSION RATE OF THE UNIVERSE**

A meeting in July of astronomers and physicists failed to produce a firm value for the expansion rate of the universe.

The meeting took place at the Kavli Institute for theoretical physics at the University of California, Santa Barbara. Different methods were presented which were used for the calculation of the Hubble constant,  $H_0$  which gives the speed of universe expansion as a function of distance.

Edwin Hubble paired the distances to galaxies and their red-shift velocities to show in 1929 that the farther out one looks in the universe, the greater is the rate of travel of stars and galaxies. The universe is expanding.

So, to check the Hubble relationship, one has to determine both the speed and the distance of the galaxy. Speed measurement is relatively straight-forward via the Doppler, red-shift of light given off. But distance measurement is more difficult. This is what is putting the scatter in the  $H_0$  values. The Kavli meeting centered around various new methods for measuring cosmic distances.

Using the cosmic microwave background measurements, the Planck satellite obtained an expansion rate of 67.4 km/s/Mpc (Mpc = mega parsecs; Mpc =  $3.3 \times 10^6$  light years). Other methods used energy values from quasars or supernovas to fix distances. Several of these methods are new and were presented at the meeting. These, all give values that are greater than the Planck number. They range from 69.8 to 74.0 km/s/Mpc. Since each of the newly established methods can be confidently defended, we are left with a range of possibilities, with no dominant value we can hang our hat on. So, we are still left adrift with no certainty about important cosmic numbers, such as the age of the universe. [Sci. News, Sept. 14, 2019].

