

## Indian astronomers contributed to discovery of new planetary system

By T V Venkateswaran

Jaipur, March 7 (Indian Science Wire): The discovery of a new planetary system, which recently created waves globally, is a cause of celebration for Indian astronomers too.

The astonishing discovery of seven Earth-like rocky planetary system in the habitable zone, perhaps host to alien life around a 'ultracool dwarfs' nearly forty light years away, made by NASA has surprised all. Now it emerges that it was made possible with a helping hand from India's Himalayan Chandra Telescope (HCT) at Hanle in Ladakh.

While bulk of the data for the study came from the robotic 0.6-meter telescope at La Silla Observatory in Chile known as TRAPPIST (TRAnsiting Planets and PlanetIsimals Small Telescope), data from UKIRT in Hawaii, the Very Large Telescope in Chile, and the Himalayan Chandra Telescope in India provided crucial data to fix the orbital period and thus the mass and density of the planets.

This was revealed by Prof G. C. Anupama of Indian Institute of Astrophysics at the annual meeting of the Astronomical Society of India which opened here on Monday. Indian contribution was in the form of the crucial 'light curve' which led to the estimation of the orbital period of one of the planets.

Sujan K Sengupta, Associate Professor Indian Institute of Astrophysics, says "this shows the potential of the HCT to discover exoplanets, including Earth-like planets orbiting distant stars."

In every orbit, the planets eclipse the host star and obstruct part of it from the telescopes observing from Earth. By carefully measuring the variation in the brightness of a host star, astronomers can infer the presence of planets orbiting the host star.

Of the seven planets orbiting the TRAPPIST-1 dwarf star, named sequentially from b to h, the closest planet TRAPPIST -b was initially estimated to go around the dwarf star in breakneck speed of 3.5 days. Devendra K. Sahu of the Indian Institute of Astrophysics, Bengaluru using the Himalayan Chandra Telescope on 18 November 2015 took 104 exposures, each of 20 seconds around the predicted eclipse time. The decisive observation made at HCT gave the correct period of 1.5 days for the closest planet.

All the seven planets of the TRAPPIST-1 are in 'habitable zone', the region around the host star that is warm enough for the water to exist in the liquid state. In our solar system, only Earth and Mars are in the habitable zone.

The M8-class red dwarf star TRAPPIST-1 is about 80 times the mass of Jupiter and is 11% of the diameter of the sun and emits only 5% of the Sun's luminosity. However, as the planets are orbiting close to the host star they receive the right amount of radiation placing them in the 'habitable zone'. Researchers estimate that "the inner two planets receive four times and two times the irradiation of Earth, respectively, placing them close to the inner edge of the habitable zone of the star", while the third planet is perhaps receiving radiation equal to that of Earth.

While the planetary system is too far, it would take about 40 years to reach it even if one travel at the speed of light, studying such planets would provide insights into the evolution of life on Earth and perhaps take us closer to the answer to the perennial question “are we alone in the universe?”

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