Webb Space Telescope detects atmosphere on Exoplanet 55 Cancri e

Researchers using the James Webb Space Telescope may have found evidence of atmospheric gases surrounding 55 Cancri e, a rocky exoplanet located 41 light-years away from Earth. This discovery is considered to be the best evidence to date for the existence of a rocky planet atmosphere outside our Solar System.

Renyu Hu from NASA's Jet Propulsion Laboratory (JPL) is the lead author of a paper published in Nature. "Webb is pushing the frontiers of exoplanet characterisation to rocky planets," Hu said. "It is truly enabling a new type of science."

55 Cancri e is classified as a super-Earth, with a diameter almost twice that of Earth and slightly greater density. It orbits so close to its star, that its surface is likely to be molten, a bubbling ocean of magma. The planet is also likely to be tidally locked, with a dayside that faces the star at all times and a nightside in perpetual darkness.

Despite numerous observations since it was discovered to transit in 2011, the question of whether or not 55 Cancri e has an atmosphere remains unanswered. Unlike gas-giant atmospheres, thinner and denser atmospheres surrounding rocky planets have remained elusive.

To distinguish between the possibility of the planet having an atmosphere or just a tenuous shroud of vaporized rock, researchers used Webb's NIRCam and MIRI to measure 4- to 12-micron infrared light coming from the planet. Although Webb cannot capture a direct image of 55 Cancri e, it can measure subtle changes in the light from the whole system as the planet orbits the star.

The team was able to calculate the amount of various wavelengths of infrared light coming from the planet's dayside. This method, known as secondary eclipse spectroscopy, is similar to that used by other research teams to search for atmospheres on rocky exoplanets.The first indication that 55 Cancri e could have a substantial atmosphere came from temperature measurements based on its thermal emission. If the planet is covered in dark molten rock with a thin veil of vaporized rock or has no atmosphere, the dayside should be around 2,200 degrees Celsius. Instead, the MIRI data showed a relatively low temperature of about 1,540 degrees Celsius. This indicates that energy is distributed from the dayside to the night-side, most likely by a volatile-rich atmosphere. - *TECH EXPLORIST*