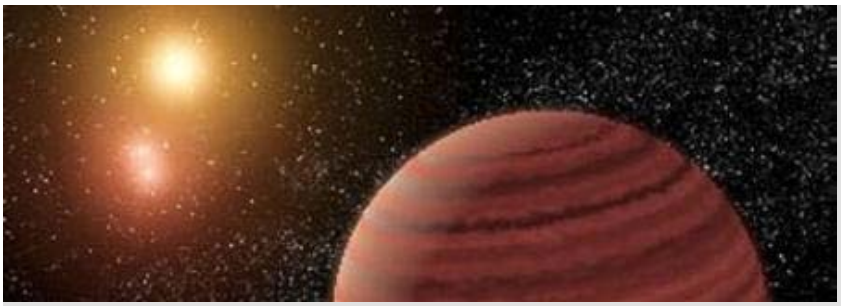
# Backward Orbit in a Binary System

Based on a *University of Texas at Arlington* news release





New Planets
Posted: 10/03/10

Summary: A new study could broaden the search for planets in other solar systems by changing the way we think about orbiting bodies. The findings could increase the opportunities for the discovery of new planets.

## UT Arlington Astronomers Take Fresh Look at Previously Suggested Planet

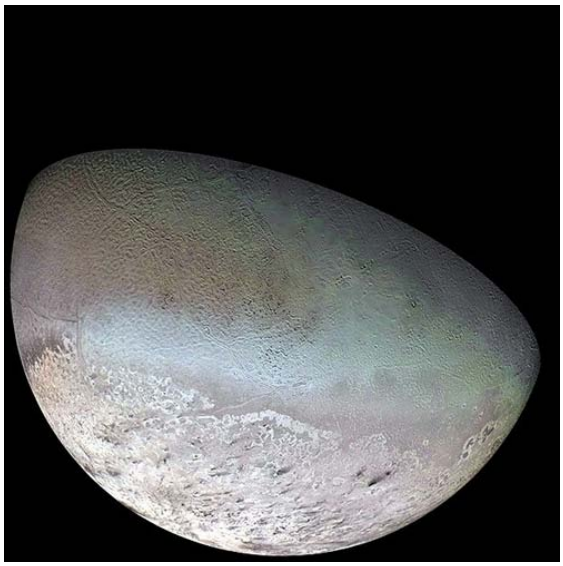
Work by a team of University of Texas at Arlington astronomers could significantly broaden astrophysicists' search for planets in other solar systems by changing the way they think about the orbiting bodies.

If correct, the findings could increase the opportunities for the discovery of new planets in candidate systems.

The paper by Manfred Cuntz, UT Arlington associate professor of physics, and Jason Eberle, a doctoral candidate from UT Arlington, was published Oct. 1 in the American Astronomical Society's *Astrophysical Journal Letters*. "On the reality of the suggested planet in the Nu Octantis System" is already available online (http://iopscience.iop.org/2041-8205/721/2/L168).

In the paper, the two scientists explore the possible existence of a proposed planet in a binary star system 69 light-years, or 400 trillion miles, from Earth.

Based on six years of data, observers have suggested a planet may exist in the Nu Octantis system, a star system visible only from the southern half of the globe, particularly from Antarctica. The observing technique is based on radial velocity variations or RV readings of the orbiting planet's effect on its host star -- a slight wobble created by the planet's pull. Surprisingly, the planet of the system seemed to be outside of the commonly accepted zone where such an orbit could exist without disruption from the gravitational force of the second star in the binary system, Cuntz said.



Retrograde orbits are previously unknown in extrasolar planetary systems, but such orbits do occur in the Solar System. Triton, the largest moon of Neptune, circles the planet in a retrograde orbit. Credit: *NASA*

Eberle and Cuntz examined the data by performing detailed time-dependent simulations of orbital stability. They concluded there is a

significant chance that the planet is indeed able to exist but in a retrograde orbit. A retrograde orbit means the planet is orbiting the primary star in a different direction compared to the orbit of the secondary star. This would allow for a wider area of orbital stability, the study says.

Such an orbit is previously unheard of for a planet in an extrasolar planetary system, but this type of orbit occurs for some moons of planets in our Solar System. If confirmed, the existence of such a planet would significantly enhance the search for planets in multiple stellar systems, including the search for those that could potentially support life, according to Cuntz.

Artist's photo concept of a sunset on a planet in a binary star system. Binary star systems are not uncommon in the solar neighborhood. Credit: *NASA/JPL-Caltech*

"If our theoretical studies turn out to be applicable to the Nu Octantis system, they will provide evidence for the first case of a planet in a retrograde orbit in a stellar binary system," said Cuntz. Previously, retrograde planetary orbits have been detected for planets around single stars in regard to the stellar rotational axis.

The research team's findings are likely to gain attention, according to another expert in the field. "The results of Eberle and Cuntz are important for the big hot topic of astronomy, namely extrasolar planets, and especially interesting for the dynamics of planets in double stars," said Rudolf Dvorak, a professor at the Institute for Astronomy at the University of Vienna. "Note that in the solar neighborhood more than 60 percent of the stars are not single."

Cuntz and Eberle's study says there is still a slim chance that the suggested planet is in a prograde orbit, traveling in the same direction as the primary star's partner star. This is highly unlikely, as it would require detailed assumptions concerning the orbital parameters of the planet.

The existence of a planet in Nu Octantis was first suggested by a research team led by David Ramm of the Department of Physics and Astronomy at the University of Canterbury in New Zealand.

## Related Stories

Astrobiology Roadmap Goal 1: Habitable Planets

First Potentially Habitable Exoplanet Found
A Dusty, Cloudy ExoPlanet
Seven-Planet System Discovered
A New Way to Find Earths