Studying Planets Around Massive Stars

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Science Question:

Do planets orbiting stars more massive than the Sun form and evolve differently than planets around Sun-like stars? Do they have the potential for habitability? Because massive stars are often seismically active, their planets have been difficult to study.

Findings:

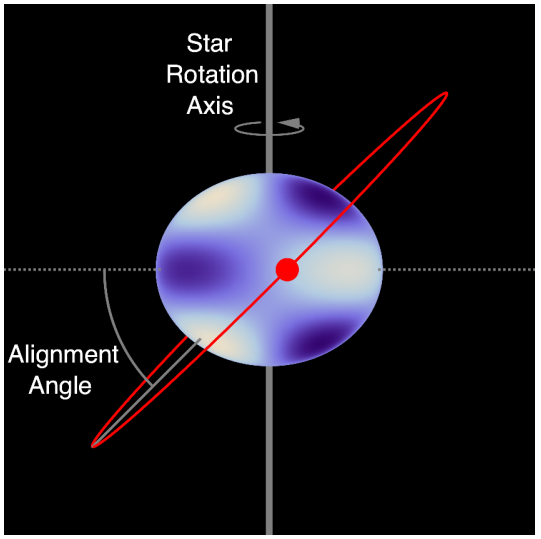
During formation, planets orbiting high-mass stars commonly tilt out of alignment with the star's axis of rotation. The authors revealed this tilting process by developing a new way to model a planet's orbit using its host star's seismic activity. They tested the approach on Kepler Object of Interest 976 and found that its orbit is tilted by over 30 degrees, which is unlike anything seen in our solar system.

Impact:

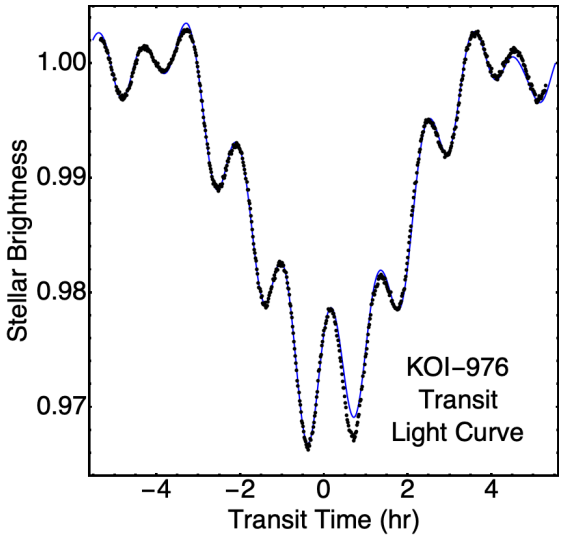
The results of this project establish a new approach for testing planet formation theory around stars more massive than the Sun. Using data from missions like Kepler or TESS, this approach can tell us about a planet's formation history by measuring the geometry of its orbit.

Why it matters:

Both observation and theory tell us that planets orbiting high-mass stars evolved very differently than those in our solar system, and they remain largely unexplored places in the search for life beyond Earth. Further study could reveal their potential for habitability.



Above, KOI-976 in a misaligned orbit transiting a seismically active star. Below, the result is a very unusual transit, or dip in the star's brightness as the planet passes in front of it.



Ahlers, John P. (NASA GSFC & USRA), Jason W. Barnes (University of Idaho), and Samuel A. Myers (University of Idaho). "Dealing With δ-Scuti Variables: Transit Light Curve Analysis of Planets Orbiting Rapidly-Rotating, Seismically Active A/F Stars." Accepted for publication in The Astronomical Journal.