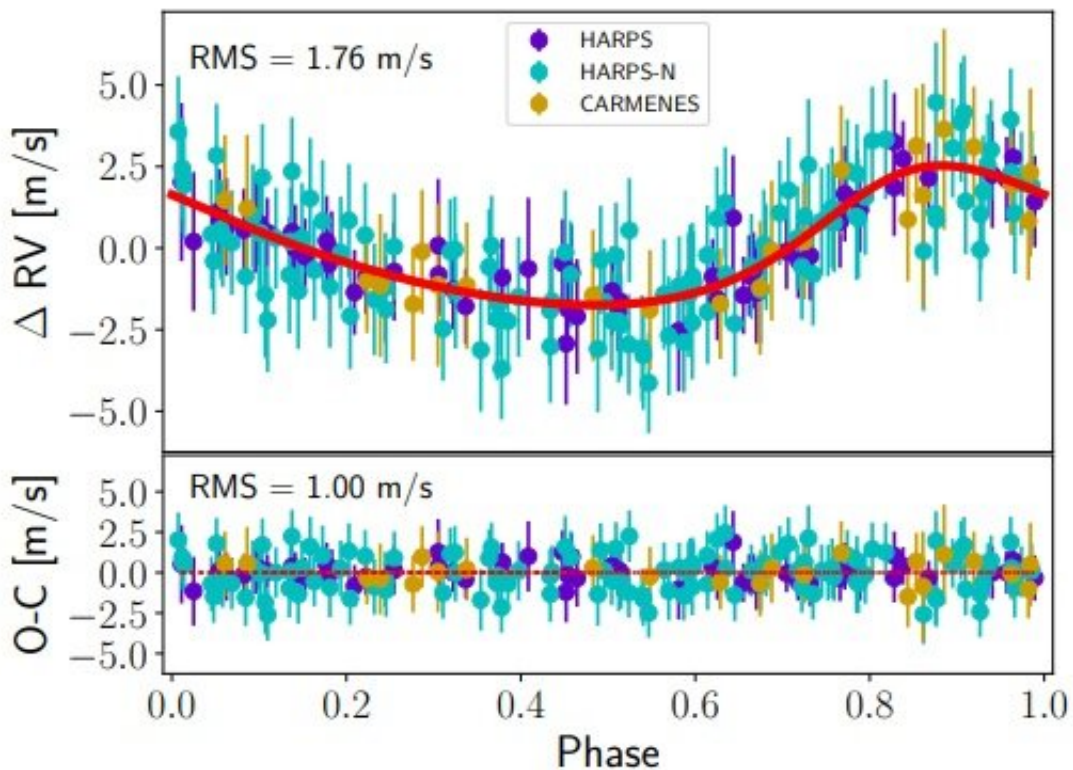


Astronomers detect new super-Earth exoplanet orbiting nearby star

February 24 2021, by Tomasz Nowakowski



Phase-folded curve of the RV time-series using the GJ 740 b orbital period after subtracting the long-term signal and the rotation period. The jitter terms of each spectrograph have been added to the original RV errors. The red solid line represents the planetary model. Bottom: Residuals after subtracting the model. Credit: Toledo-Adr3n et al., 2021.

Using the radial velocity (RV) technique, astronomers have discovered a

new super-Earth alien world as part of the HADES and CARMENES programs. The newfound exoplanet, designated GJ 740 b, orbits a bright star some 36 light-years away and is at least three times more massive than the Earth. The finding is reported in a paper published February 18 on the arXiv pre-print server.

Thanks to the radial velocity (RV) technique, over 600 exoplanets have been detected so far and 116 of them have been found around M dwarfs. The HARPS-n red Dwarf Exoplanet Survey (HADES) and Calar Alto high-Resolution search for M dwarfs with Exoearths with Near-infrared and optical Echelle Spectrographs (CARMENES) projects have been crucial in the search for new alien worlds orbiting these most common [stars](#) in our galaxy.

Now, a team of astronomers led by Borja Toledo-Adr3n of the University of La Laguna, Spain, reports the detection of another exoworld around a nearby M dwarf known as GJ 740. HADES RV program monitored GJ 740 using the HARPS-N spectrograph installed at the 3.6m Telescopio Nazionale Galileo (TNG) in the Roque de los Muchachos Observatory, Spain. Moreover, spectra of this M dwarf were acquired with the CARMENES spectrograph at the Calar Alto Observatory overlapping the epoch during which the HARPS-N observations were carried out.

"Our analysis of the 129 HARPS-N, 57 HARPS, and 32 CARMENES spectra of GJ 740 taken over 11 years shows the presence of a super-Earth orbiting the star," the researchers wrote in the paper.

The observations found a planet with a mass of at least 2.96 Earth masses, orbiting its host every 2.377 days, at a distance of about 0.029 AU from it, therefore located out of the system's habitable zone. The equilibrium temperature of GJ 740 b was calculated to be 829 K.

Given that the radius of GJ 740 b is unknown, the composition of this planet is yet to be determined. However, its mass and short orbital period suggest that it is a rocky object.

The host star GJ 740 is a bright high-proper-motion star of spectral type M1V. It has a radius of about 0.56 solar radii and a mass of some 0.58 [solar masses](#). The star's rotational period was estimated to be approximately 35.56 days, while its effective temperature is at a level of 3,913 K.

The data suggests that the system may host another planet, more massive and at wider separation from the host than GJ 740 b. The astronomers assume that this potential alien world is around 100 times more massive than the Earth and orbits the parent star every 9.3 years.

"The RV time-series exhibits a possibly periodic longterm signal which might be related to a Saturn-mass planet of about 100 Earth masses," the authors of the paper concluded.

More information: A super-Earth on a close-in orbit around the M1V star GJ 740, arXiv:2102.09441 [astro-ph.EP] arxiv.org/abs/2102.09441

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