

P313a Two Unique Planetary Systems around Giant Stars Discovered by Okayama Planet Search Program

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We report the detection of two unique planetary systems around giant stars. HD 184010 is K0 type and located at beginning of the red-giant branch and harbors a trio of giant planets. It has a mass of $1.35M_{\odot}$, a radius of $4.86R_{\odot}$, and a surface gravity $\log g$ of 3.18. The planetary system is composed of three giant planets in a compact configuration with orbital periods of 286.6, 484.3, 836.4 d respectively. The dynamical stability analysis reveals that the planets should have near-circular orbits and could remain stable in a time scale of Gyr. HD 167768 is a G8 type giant star with a mass of $1.08M_{\odot}$, a radius of $9.70R_{\odot}$, a metallicity of $[\text{Fe}/\text{H}] = -0.67$, and a surface gravity of $\log g = 2.50$. The planet orbiting HD 167768 is a warm Jupiter, having a period of 20.6532 d, a minimum mass of $0.85 M_{\text{J}}$, and an orbital semimajor axis of 0.1512 au. This planet has one of the shortest orbital periods among those ever found around deeply evolved stars ($\log g < 3.5$) using radial velocity methods. The equilibrium temperature of the planet is 1874 K, as high as a hot Jupiter. We also calculated the orbital evolution of HD 167768 b and found that the planet will be engulfed within ~ 0.15 Gyr.