

Search for extrasolar Earth-like planets in the habitable zone using InfraRed Doppler and the Subaru

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Planetary systems around low-mass stars are attractive targets to search for Earth-mass planets in the habitable zone because Doppler signals caused by the planets are relatively large and the habitable zone of the low-mass stars is located at close-in orbits. For the advantages, we have a plan to conduct a planet search program of low-mass stars by the Doppler method using a new InfraRed Doppler (IRD) instrument to search for Earth-like planets. IRD to be mounted on the Subaru telescope in 2015 is composed of a very stable near-infrared high dispersion echelle spectrograph and a laser-frequency comb as a wavelength calibrator of the radial velocity measurements. The main goals of the program are to detect Earth-mass planets in the habitable zone and to understand statistical properties, formation and habitability of extrasolar Earth-mass planets around low-mass stars.

We performed a survey simulation of our planet search program using IRD and the Subaru telescope and estimate expected numbers of detectable planets around low-mass stars based on the results of theoretical population synthesis. In this simulation, we expect more than 50 planets including the more than 30 Earth-mass planets and 10 Earth-mass planets in the habitable zone on a suitable survey plan. And we would detect some transiting planets in the habitable zone, which can characterize planetary atmosphere and may discuss the habitability of the planets by making follow-up observations.

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