[구SS-11] Using Light Travel Time Effect to Detect Circumbinary Planets with Ground-Based Telescopes

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In the past few years, two-planet circumbinary systems (e.g., HW Vir, NN Ser, DP Leo and HU Aqr) have been detected around short-period eclipsing binaries using ground-based telescopes. The existence of these planets has been inferred by interpreting the O-C variations of the mid-eclipse times. We have tested the orbital stability of these systems and propose to use Light Travel Time Effect (LITE) to detect such circumbinary planets from the ground. We generated synthetically the LITE signal of a two-planet circumbinary system with the aim to apply an analytic LITE model to recover the underlying synthetic system. To mimic a degree of realism inherent to ground-based observations, we added to the synthetic LITE data white noise with a Gaussian distribution and sampled the synthetic LITE signal randomly.

We successfully recovered the original system demonstrating that two-planet circumbinary systems can be detected using ground-based telescopes, provided the timing measurements of the mid-eclipses are sufficiently accurate and the observing baseline is long enough to ensure a sufficient coverage of all involved periods. We used HU Aqr as a test system and applied our model to its proposed planetary bodies considering near-circular orbits. We present the results of our calculations and discuss the LITE-detectability of a HU Aqr-like system.

[포SS-12] A planetary lensing feature in caustic-crossing high-magnification microlensing events

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Current microlensing follow-up observations focus on high-magnification events because of the high efficiency of planet detection. However, central perturbations of high-magnification events caused by a planet can also be produced by a very close or a very wide binary companion, and the two kinds of central perturbations are not generally distinguished without time consuming detailed modeling (a planet-binary degeneracy). Hence, it is important to resolve the planet-binary degeneracy that occurs in high-magnification events. In this paper, we investigate caustic-crossing high-magnification events caused by a planet and a wide binary companion. From this study, we find that because of the different magnification excess patterns inside the central caustics induced by the planet and the binary companion, the light curves of the caustic-crossing planetary-lensing events exhibit a feature that is discriminated from those of the caustic-crossing binary-lensing events, and the feature can be used to immediately distinguish between the planetary and binary companions.