[구ST-01] 5-body dynamics in the Kepler-47 exoplanetary system: Predicting stable orbits of a third circumbinary planet

Tobias Cornelius Hinse
Korea Astronomy & Space Science Institute (KASI), Daejeon, Republic of Korea

Kepler-47 is the first multi-body circumbinary planetary system detected by the Kepler space telescope. The two planets were detected by the transit method. In the discovery paper the authors report about the presence of an additional transit-like signal in their dataset which cannot be explained by a four-body (binary + 2 planets) system. Therefore it is likely that the unexplained signal could be due to a third planet. In this talk I will present recent results from a dynamical investigation of the five-body system (binary + 3 planets). We have applied the MEGNO technique to detect regions of quasi- or near quasi-periodic orbits of a hypothetical third planet. Quasi-periodic regions exists for a third planet and the long-term stability has been tested. Although the existence of a third planet is most likely to be confirmed from transit photometry we calculate transit-timing variation (TTV) signals due to the third planet which also can be used to infer its presence.

[박ST-02] Flare and Starspot-induced Variabilities of Red Dwarf Stars in the Open Cluster M37: Photometric Study on Magnetic Activity

Seo-Won Chang
Department of Astronomy, Yonsei University

Flare and rotational variabilities induced by stellar activity are important for studying the effect of magnetic fields on the evolution of red dwarf stars. The level and frequency of magnetic activity in these stars have a different aspect at every moment of the observations due to the effect of age-rotation relation. The use of both tracers is thus essential to have a relatively homogeneous set of stellar activity data for statistical studies. The archival light curves and imaging data of the open cluster M37 taken by MMT 6.5m telescope were used for this work. In order to achieve much more accurate photometric precisions and also to make the most efficient use of the data, the entire imaging database were re-analyzed with our new time-series photometry technique and carefully calibration procedures. Based on the new light curves, we study, for the first time, a variety of aspects of those two variabilities in red dwarfs and their relation to magnetic activity. In this talk, we present all observational evidences that support the idea that the strength of magnetic activity is closely connected with the rotation rate of a star and its evolutionary status (age-activity-rotation paradigm). In conclusion, we suggest future directions to improve our understanding of stellar activity in cool stars with photometric time-series data.