[구ST-03] Detection of planetary signals in extremely weak central perturbation microlensing events via next-generation ground-based surveys

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Even though current microlensing follow-up observations focus on high-magnification events due to the high efficiency of planet detection, it is very difficult to do a confident detection of planets in high-magnification events with extremely weak central perturbations (i.e., the fractional deviation is $\delta \lesssim$ 0.02). For the confident detection of planets in the extremely weak central perturbation events, it is needed both the high cadence monitoring and the high photometric accuracy. A next-generation ground-based observation project, KMTNet (Korea Microlensing Telescope Network), satisfies both the conditions. Here we investigate how well planets in high-magnification events with extremely weak central perturbations are detected by KMTNet. First, we determine the probability of occurrence of events with $\delta \leq 0.02$. From this, we find that for $\lesssim$ $100 M_E$ planets in the separation of 0.2 AU $\lesssim d \lesssim$ 20 AU, events with $\delta \leq 0.02$ occur with a frequency of more than 70%, in which d is the projected planet-star separation. Second, we estimate the efficiency of detecting planetary signals in the events with $\delta \leq 0.02$ via KMTNet. We find that for main-sequence and subgiant source stars, $\gtrsim 1 M_E$ planets can be detected more than 50% in a certain range that has the efficiency of $\geq$ 10% and changes with the planet mass.

[구ST-04] The Young Open Cluster NGC 1893 in the Outer Galaxy

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We present a $UBVI$ and Hα photometric study of the young open cluster NGC 1893 in the outer Galaxy as part of "Sejong Open cluster Survey (SOS)" project. Using the properties of early-type stars in the photometric diagrams 65 early-type members were selected. More than 120 Hα emission stars and candidates were found by Hα photometry. Together with the published young stellar object catalogue and X-ray source list for this cluster, a total of 837 pre-main sequence (PMS) stars were identified in our photometric data. We obtained the mean reddening of $<E(B-V)> = 0.56 \pm 0.08$ mag from the $(U-B, B-V)$ diagram and confirmed the normal reddening law $(R_V = 3.1)$ toward NGC 1893 based on color excess ratios from optical to mid-infrared wavelengths. The zero-age main sequence fitting to the reddening-corrected color-magnitude diagrams gives a distance modulus of $V_0 - M_V = 12.8 \pm 0.1$. The age of the cluster inferred from stellar evolution models is about 1-2 Myr. We also found the Salpeter/Kroupa type initial mass function for this cluster. Finally, the mass accretion rate of 80 PMS stars with UV excess emission was estimated for the stars with masses from 0.6 $M_\odot$ to 5 $M_\odot$.