

Session: [B4A-3] S3 : Stars, Exoplanets and Stellar Systems

Date: August 21, 2014 (Thursday)

Time: 11:00~12:30

Room: Room C (Room 104)

Chair: Daniel Bayliss (Australian National University)

[B4A-3-1]

11:00~11:20

[Invited] High Time Resolution Astrophysics: New Results from the Thai 2.4m Telescope with ULTRASPEC

Puji Irawati (National Astronomical Research Institute of Thailand, Thailand), Andrea Richichi, Vik Dhillon, Thomas R. Marsh, Agnieszka Slowikowska, and Boonrucksar Soonthornthum

The recently inaugurated Thai National Observatory (TNO) is equipped with a 2.4m Ritchey-Chretien telescope and the high-speed versatile ULTRASPEC camera. This new facility is located at 2457m elevation on Doi Inthanon, 100 km from the city of Chiang Mai. ULTRASPEC is a visitor instrument, built by a Consortium of UK institutes, which will be available at TNO initially until mid 2015, and possibly for longer. This instrument employs a low-noise, frame-transfer EMCCD designed for observation of faint objects and for high time resolution astrophysics. We present some of the results obtained in the first observing cycle (November 2013 – April 2014), focusing particularly on fast photometry data. A highly flexible scheme of sub-array readout allows us to reach a time resolution as fast as 400Hz. This method is suitable to follow fast phenomena such as lunar occultations. The seconds to sub-second resolution is ideal to observe the brightness variability in close binaries (flickering and Light Travel Time) or transit of exoplanets, while longer exposures offer a superb image quality over the 300-1000nm range. We also outline the opportunities for observations in Cycle 2, for which proposals are due in summer 2014.

[B4A-3-2]

11:20~11:35

Searching for and Characterization of Galactic Open Clusters

Wen-Ping Chen (National Central University, Taiwan) and Chien-Cheng Lin

Stars are formed in groups out of molecular clouds. Star clusters serve as laboratories to test stellar evolutionary models, and to study dynamical interactions among member stars, and with Galactic environments. While some hundreds of thousand open clusters are expected on the Galactic disk, so far only a few thousands have been catalogued, all in the solar neighborhood, with a fraction of which are characterized with cluster parameters and member lists. The incompleteness of the open cluster sample is largely due to the extinction in the disk and also due to the lack of systematic search in sky surveys covering sufficient volume in space. Here we report on a pilot program to identify stellar density enhancements toward the Galactic anti-center using the Pan-STARRS 1 data. An analysis pipeline has been devised to find a cluster candidate, and derive its size, shape, number of members, distance, age, and reddening. We report the methodology, showcase a few candidate clusters that we found, and present how our study improves significantly the Galactic open cluster sample.

[B4A-3-3]

11:35~11:50

Relative Age Measurements of the Metal-Poor Globular Clusters M53 and M92

Dong-Hwan Cho (Kyungpook National University, Korea), Hyun-II Sung, Sang-Gak Lee, and Tae Seog Yoon

CCD photometric observations of the globular cluster (GC), M53 (NGC 5024), were performed using the 1.8 m telescope at the Bohyun Optical Astronomy Observatory on the same nights (April 2002 and May 2003) as the observations of the GC M92 (NGC 6341) reported by Cho and Lee using the same instrumental setup.

The data for M53 was reduced using the same method for reducing the data for M92 by Cho and Lee, including preprocessing, point-spread function fitting photometry, and standardization etc. to provide accurate relative age measurements of GCs M53 and M92. Therefore, GCs M53 and M92 were on the same photometric system defined by Landolt, and the photometry of GCs M53 and M92 was tied together as closely as possible. After the complete photometric reduction steps, the V versus B-V, V versus V-I, and V versus B-I color-magnitude diagrams (CMDs) of GC M53 were produced to derive the accurate relative ages of the GCs M53 and M92 and derive the various characteristics of the CMDs of M53 in future analysis. From the present analysis, the relative ages of GCs M53 and M92 were derived using the $\Delta(B-V)$ method reported by Vandenberg et al. The relative age of GC M53 was found to be 1.6 ± 0.85 Gyr younger than that of GC M92 if the absolute age of M92 is taken to be 14 Gyr. This relative age difference between GCs M53 and M92 caused slight differences in the horizontal-branch morphology of these two GCs. In addition, the confirmation of the results of the present analysis is being tried with the accurate and homogeneous VI photometric data of the GCs M53 and M92 by the ACS/WFC aboard the Hubble Space Telescope.

[B4A-3-4]

11:50~12:05

Characterization of Faint Photometric and Kinematic Members in the Open Cluster NGC752

Chung-Kai Huang (National Central University, Taiwan), Chien-Cheng Lin, Pei-Yi Chen, A-Li Luo, and Wen-Ping Chen

Open Clusters play an important role in studying stellar evolution, as well as the formation and evolution of the Galactic disk. Identification of member stars in a star cluster is the first step to derive the fundamental physical parameters of the cluster, such as the distance, age, size, spatial distribution, reddening, and metallicity. As a pilot program to identify and study low-mass members in open clusters, perhaps extending to substellar objects in nearby clusters, we present the analysis of NGC752 by using the PPMXL proper motion and Pan-STARRS photometric data to characterize the members near the hydrogen burning stellar masses. Some bright stars have been measured radial velocities by the LAMOST, rendering further constraints on membership determination. The secure member list allows us to quantify the dynamical evolutionary history such as mass segregation and stellar evaporation of the cluster.

Poster Session

12:05~12:30

Chair: Daniel Bayliss (Australian National University)