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Revisiting the Milky Way Open Clusters with 50BiN

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Abstract. 50BiN (50cm Binocular Network) is a Chinese initiative to perform studies of stellar variability. It has been designed as an add-on project of Chinese participation of SONG (Stellar Observations Network Group). The plan is to have a small photometry telescope installed at every SONG node in the northern hemisphere. The first 50BiN telescope has been successfully installed at the Delingha site on the Qinghai-Tibetan Plateau. A long time-baseline high duty cycle photometry of large FOV will be offered by 50BiN. We are obliged to any suggestions and contributions to 50BiN in terms of scientific provisions.

Key words. instrumentation: miscellaneous – binaries: eclipsing – stars: variables: general

1. Introduction

The 50cm Binocular Network (50BiN) is a global network for time-domain, multi-channel photometric observations (Deng et al. 2013). A long time-baseline high duty cycle photometry of large FOV will be offered by 50BiN, which covers the primary science goals in the following areas:

(*a*) Photometry of a sample of OCs, determining their fundamental physical parameters in a uniform way;
(*b*) Time domain study of variable objects in selected OCs: long time base-line, high cadence and high duty cycle, high precision photometric observations;
- A complete survey of stellar variability along the main sequence (e.g., Cep, Scu & Dor) in selected OCs;
- A complete survey of small and large amplitude red variables along the RGBs of selected OCs;
- A complete survey of eclipsing binaries in selected clusters, including looking for the transit of exoplanet systems;
- Looking for flare type variabilities in selected clusters;

(*c*) Time domain study of selected field areas.

The first 50BiN telescope was installed at the Delingha Station of the Purple Mountain Observatory in 2013, while the site qualification started actually in 2009 when China joined SONG. China spans a huge range in longitude, and for identifying a suitable site for SONG project the most important issues are the general weather pattern (in terms of good observing nights per year) and the existence of supporting infrastructure, since the project budget is limited. Tian et al. (2016) presents in details about the site selection criteria and the conditions of Delingha. Figure 1. gives the frequency distribution of DIMM seeing from 2010 to 2012 at Delingha site.

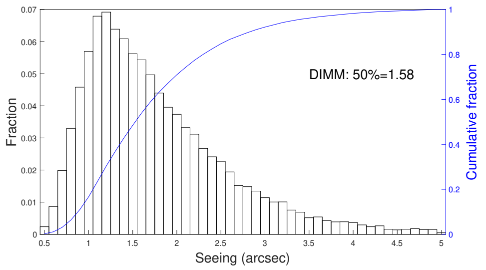

Fig. 1. Frequency distribution of DIMM seeing from 2010 to 2012 at Delingha site (see more details in Tian et al. 2016).

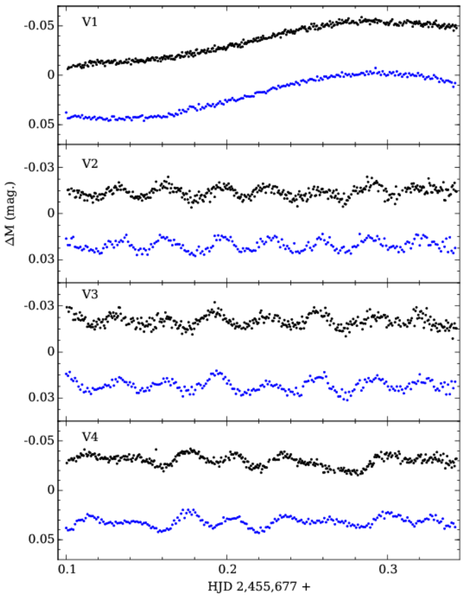

Fig. 2. Examples of the original real-time $B-$ and $V-$band light curves of 4 variable stars (see more details in Figure 3. in Wang et al. 2015).

50BiN prototype telescope is a binocular equatorial mount system. It is contributed by the CWNU (China West Normal University). Two parallel camera systems are used so that the simultaneous photometry in two channels can be established. The FOV of 20 arcmin makes it suitable for most galactic OCs. In the commissioning period from 2013 December to 2015 March, 7 open clusters were selected to examine the performance and capacity of the 50BiN telescope, a large number of CCD frames in Johnson *B* and *V* bands were collected, and a series of outputs have been achieved (Zhang et al. 2014a,b; Wang et al. 2015).

Figure 2. shows the light curves of 4, out of 12, newly discovered variable stars in NGC 2301 (Wang et al. 2015), based on the time-series photometric observations with 50BiN.

2. Conclusions

50BiN is a Chinese initiative that originated from common research interests of the whole stellar physics community in the country. We are obliged to consider any suggestions and contributions to 50BiN in terms of scientific provisions. Any type of participation in the program will be highly appreciated.

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References

Deng, L., et al. 2013, in Astrophysics from Antarctica, eds. M.G. Burton, X. Cui, N.F.H. Tothill (Cambridge Univ. Press, Cambridge), IAU Symp. 288, 318
Tian, J. F., et al. 2016, PASP, 128, 105003
Wang, K., et a. 2015, AJ, 150, 161
Zhang, X. B., et al. 2014a, AJ, 148, 40
Zhang, X. B., et al. 2014b, AJ, 148, 106