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LAMOST observations in the *Kepler* field

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Abstract. We present results of observations of 22 664 stars in the *Kepler* field of view acquired with the Large Sky Area Multi-Object Fiber Spectroscopic Telescope (LAMOST) in the years 2011 – 2012, and provide a database of the atmospheric parameters derived from those data.

Keywords. stars: fundamental parameters, spectrographs: LAMOST, space vehicles: *Kepler*

1. Introduction

Since its launch on 7 March 2009, the NASA space telescope *Kepler* has been providing quasi-uninterrupted photometric time series of micro-magnitude precision. Because those data have been acquired in one filter (Kp) of a wide bandpass (400 – 850 nm), they do not contain information about the atmospheric parameters of the stars or the interstellar extinction. The Kepler Input Catalogue (KIC, Latham *et al.* 2005) which provides the values of the effective temperature ($T_{\rm eff}$), surface gravity ($\log g$), and metallicity ([Fe/H]) of stars in the *Kepler* field-of-view (FoV) is useful only for the solar-type stars; for stars which are hotter, cooler, or chemically peculiar, the precision of the KIC drops significantly (Brown *et al.* 2011). Moreover, for many stars in the KIC the atmospheric parameters are lacking. Therefore, the ground-based follow-up observations are a key element for ensuring a complete and exhaustive exploitation of the *Kepler* data.

2. Observations with LAMOST

LAMOST (Large Sky Area Multi-Object Fiber Spectroscopic Telescope) is a new instrument with 4000 optical fibres attached to a 4-m telescope at the Xinglong station of National Astronomical Observatories of China (Luo *et al.* 2012). We applied for the observing time on that facility in order to observe 14 subfields covering practically the entire *Kepler* FoV. Our aim was to derive atmospheric parameters of the programme stars in an efficient and homogeneous way.

Our list of targets consisted of around 250 MK standard stars, 7 000 stars requested for observations by the Kepler Asteroseismic Science Consortium (KASC), 150 000 stars from the list of the planet-search group (Batalha *et al.* 2010), and 1 000 000 other targets in the *Kepler* FoV.

During the first two years of realization of our LAMOST-Kepler project (2011 – 2012), we observed four subfields (see Fig. 1) and acquired 22 664 useful spectra which correspond to 21 112 different targets. The full list of stars which have been observed will

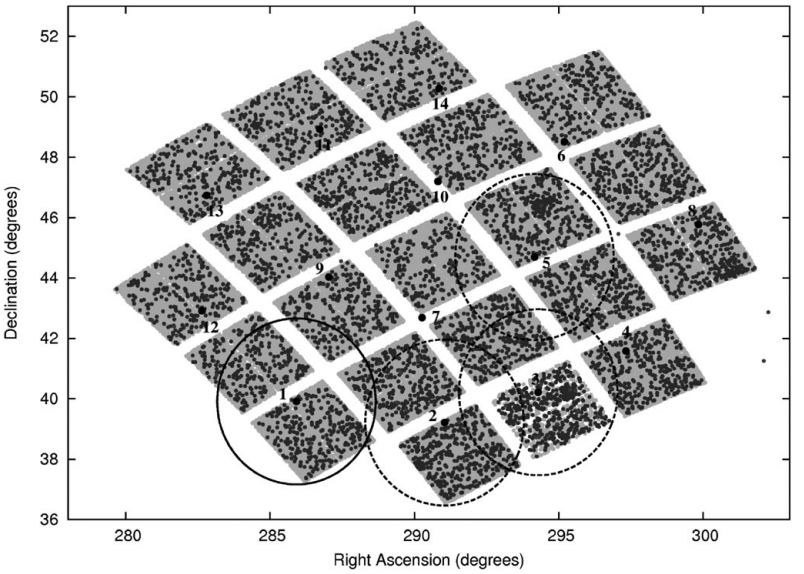

Figure 1. Distribution of our programme stars in the *Kepler* FoV. The centres of the 14 sub-fields selected for observations with LAMOST are indicated with dots labelled with numbers. The KASC targets are indicated with small black dots. The remaining targets which fill the *Kepler* FoV almost uniformly are indicated with grey dots. The sub-fields which have been observed in 2011 and 2012 are indicated with circles plotted with solid and dashed lines, respectively.

be made available by De Cat *et al.* (submitted). The spectra of 6420 stars which were observed in 2012 have been already analysed by means of the ROTFIT code (Frasca *et al.* 2003, 2006, Molenda-Żakowicz *et al.* 2013) and the IRAF software. The resulting values of $T_{\rm eff}$, $\log g$, [Fe/H], and the radial velocity of these stars will be published elsewhere.

We note that the LAMOST spectra, which include, e.g., the lithium line at 6700 Å and the Ca II H&K lines at 3968.5 and 3933.7 Å, can be used also for other types of the scientific research like detection of stars with unusual abundance of Li or a search for stars which show chromospheric activity.

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