LAMOST observations in the K2 fields: project and observation progress

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Abstract. To complement the time-series observations of the Kepler space mission in the K2 fields, spectroscopic observations for hundreds of thousands of stars in these fields are hugely important. LAMOST, a Chinese 4-meter class telescope equipped with 4000 fibers on the focal plane, is an ideal facility to fulfill this task. The LAMOST-K2 project was approved in the autumn of 2015 and observations commenced during the 2015-2016 winter season. The project will initially cover 6 of the first 10 observed K2 campaigns, and may be extended to include later K2 campaigns. We describe the project and introduce the current progress of observation with this poster presentation.

1 Motivation

After the failure of the *Kepler* spacecraft for continuously monitoring the original *Kepler* field in May 2013, the *K2* mission enables continued scientific observations for a series of sequential observing “campaigns” of fields distributed around the ecliptic plane. Each campaign is limited to a duration of approximately 80 days. *K2* became fully operational in June 2014 and is expected to continue operating until 2017 or 2018 (<http://keplerscience.arc.nasa.gov/objectives.html>). The fields of *K2* from 2014 to 2016 are shown in Figure 1.

Figure 1: *K2* fields from 2014 to 2016

In order to best exploit the *K2* data, ground-based spectroscopic observations are needed to provide the atmospheric parameters for the large amount of stars in the *K2* fields.

2 LAMOST and the LAMOST-*K2* Project

The Large Sky Area Multi-Object Fiber Spectroscopic Telescope (LAMOST), as one of the National Major Scientific Projects undertaken by the Chinese Academy of

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Science, is a special quasi-meridian reflecting Schmidt telescope located in Xinglong Station of national Astronomical Observatory, China. It is a 4-m class telescope with the field of view of 5deg in diameter, equipped with 4000 fibers on the focal plane. The 16 fiber-fed spectrographs provide spectra of $R=1800$ for the spectral ranges of 370-900 nm (Su et al. 1998; Zhao et al. 2012). Figure 2 shows a picture of LAMOST.

Figure 2: The LAMOST telescope.

With the powerful capacity of spectra acquisition for a large amount of targets simultaneously, LAMOST becomes an ideal facility of observing the available *K2* fields efficiently. In September of 2015, our proposal of observing 6 available *K2* fields ($\text{DEC} > -10^\circ$) with LAMOST was approved by the LAMOST Science Committee. The observations were commenced December 30 of 2015.

3 Observations and Stellar Parameter Calculation

Table 1 lists the observation log and the obtained data. The LASP pipeline (Luo et al. 2015) was applied to calculate the radial velocity and the stellar parameters (T_{eff} , $\log g$, $[Fe/H]$). The latter were calibrated following the formulae 1-6 of Ren et al. (2016) for the dwarf and giant stars, respectively. Figure 3 shows the observed plates of LAMOST for 5 K2 fields.

Table 1: Observation log and obtained data

K2-field	Date	#	Spectra	Parameters
Field0	2016/01-02	9	25833	18176
Field1	2016/01-02	17	25752	14679
Field4	2016/01-02	9	14566	10837
Field5	2015/12	12	29269	19658
	2016/01-02			
Field6	2016/01	1	813	259
Total		48	96233	63609
Unique			88694	59213
1×			81649	55061
2×			6554	3909
3×			488	242
4×			3	1

Figure 3: Observed plates of LAMOST for 5 K2 fields.

4 Parameter Analysis

The distribution of magnitude of the observed stars is plotted in Figure 4. In Figure 5, the H-R diagram is shown for the observed targets. Figure 6 shows the distribution of the parameters while Table 2 lists the particular stars: (V)MP - (Very) Metal Poor stars; HRV - High Radial Velocity stars.

Figure 4: Magnitude distribution.

Figure 5: H-R diagram.

References

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Figure 6: Distribution of parameters.

Table 2: Particular stars.

Field	MP	VMP	HRV
Field0	72	11	4
Field1	927	93	18
Field4	63	6	4
Field5	259	22	11
Field6	3	1	0