LAMOST observations in the *K*2 fields: project and observation progress

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Abstract To complement the time-series observations of the *Kepler* space mission in the *K*2 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-*K*2 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 *K*2 campaigns, and may be extended to include later *K*2 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 *K*2 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. *K*2 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 *K*2 from 2014 to 2016 are shown in Figure 1.

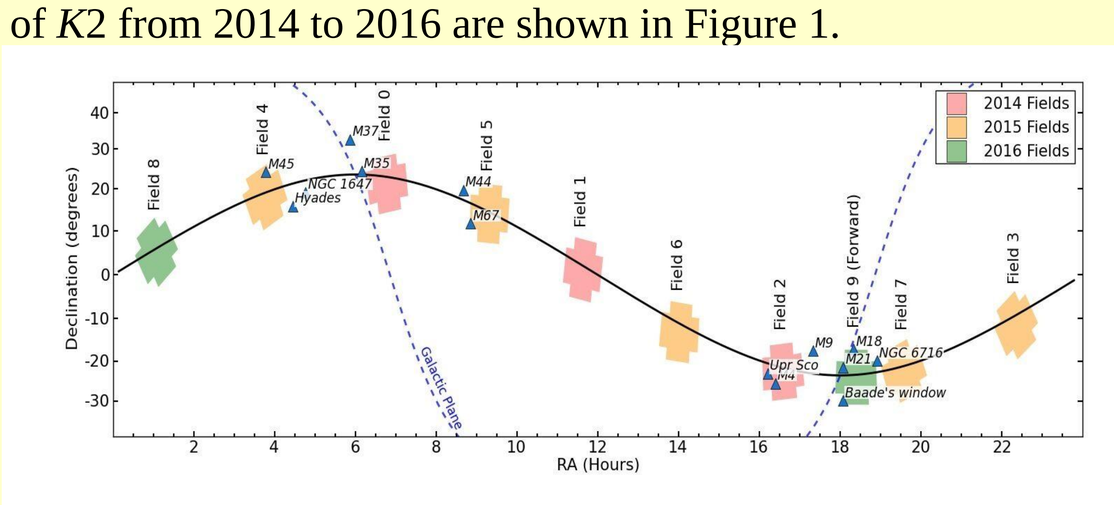

Fig.1 *K*2 fields from 2014 to 2016

In order to best exploit the *K*2 data, ground-based spectroscopic observations are needed to provide the atmospheric parameters for the large amount of stars in the *K*2 fields.

2. LAMOST and the LAMOST-*K*2 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 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 5° in diameter, equipped with 4000 fibers on the focal plane. The 16 fiber-fed spectrographs provide spectra of $R\approx1800$ for the spectral ranges of 370-900 nm (Su et al. 1998; Zhao et al. 2012). Figure 2 shows a picture of LAMOST.

Fig. 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 *K*2 fields efficiently. In September of 2015, our proposal of observing 6 available *K*2 fields (DEC>-10°) 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 ($T_{\rm eff}$, 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 *K*2 fields.

K2-field	R.A.(2000)	Dec.(2000)	Date	#	Spectra	Parameters
Field0	06h47m	+21h23m	2016/01-02	9	25833	18176
Field1	11h38m	-01h11m	2016/01-02	17	25752	14679
Field4	03h46m	+18h08m	2016/01-02	9	14566	10837
Field5	09h19m	+14h12m	2015/12 2016/01-02	12	29269	19658
Field6	14h01m	-13h16m	2016/01	1	813	259
Total			37	48	96233	63609
Unique					88694	59213
1x					81649	55061
2x					6554	3909
3x					488	242
4x					3	1

Table 1 Observation log and obtained data

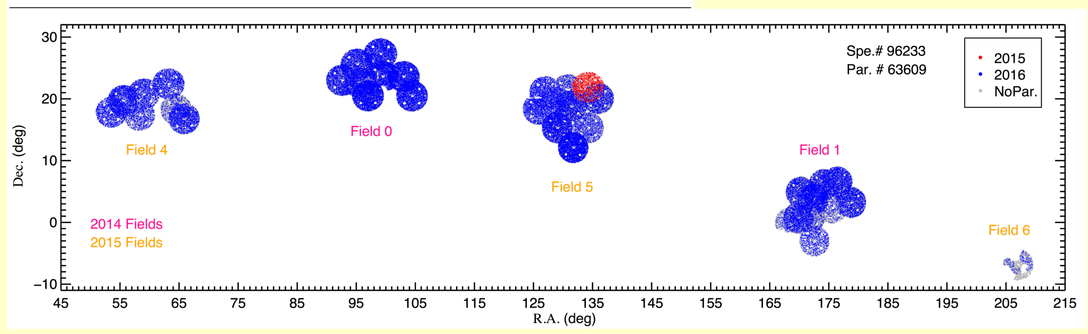

Fig. 3 Observed plates of LAMOST for 5 K2 fields

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.

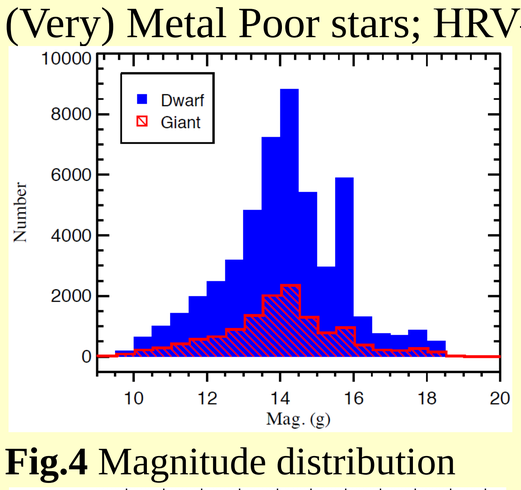

Fig.4 Magnitude distribution

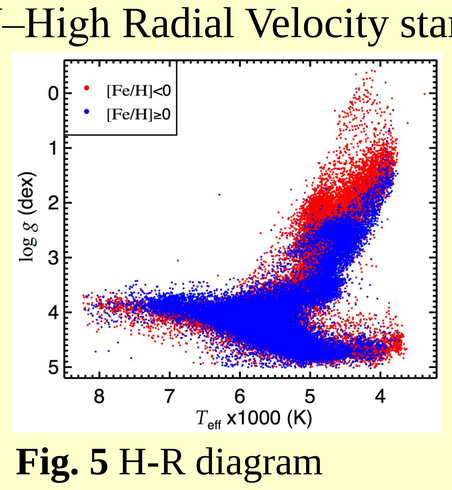

Fig. 5 H-R diagram

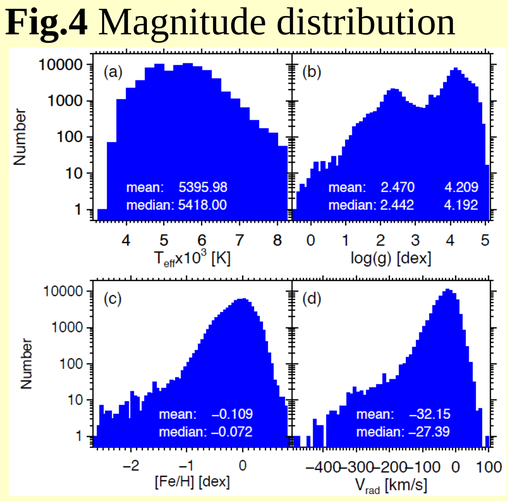

Fig. 6 Distribution of parameters

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

References

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