

Chromospheric activity of late-type stars based on Guoshoujing Telescope

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Abstract. We introduced our preliminary results of chromospheric activity of late-type stars based on the stellar spectrum of the pilot survey of the Large Sky Area Multi-object Fiber Spectroscopic Telescope (LAMOST, also called Guo Shou Jing telescope). We have found 1151 active M stars from 17471 M samples using the chromospheric active indicator of the H α line.

Keywords. stars: late-type, stars: activity, stars: chromospheres, stars: flare, stars: low-mass.

1. Introduction

Late-type stars with thick convective zones and rapid rotation exhibit magnetic activity phenomena, such as plage and flare in the chromosphere. Chromospheric activity produce fill-in or emission in the chromospheric active indicators of the Ca II H & K, He I D3, Na I D1 D2, Mg I b triplet lines, H α , H β and other Balmer lines, and Ca II IRT lines (Montes 2004; Zhang 2011; etc). We intend to research the common properties of the chromospheric activity on the basis of a large samples of late-type stars with different stellar parameters available from the survey of the Guoshoujing telescope. In the end, we want to obtain the precise relations of age-chromospheric activity-stellar parameters (such as rotational velocity, spectral type, chemical abundances, ...).

2. Chromospheric activity based on Guo Shou Jing telescope

Guo Shou Jing Telescope (Cui *et al.* 2012; Zhao *et al.* 2012) provides a wonderful chance to study chromospheric activity of late type stars (Zhang 2011). We have selected K7 and M stars (V2.3.3) from the LAMOST pilot survey (Luo *et al.* 2012) in the disk (Chen *et al.* 2012) and anti-center of the Milky Way (Deng *et al.* 2012) in Oct. Nov. Dec 2011, and Mar. 2012. Then, we visually inspected all candidates and manually assigned spectral types using the Hammer program (Hawley *et al.* 2002; West *et al.* 2004). Meanwhile, the chromospheric equivalent width of the H α line was measured using the Hammer program, which was made by integrating over the specific line region (8Å wide centered on H α) and subtracting off the mean flux calculated from two adjacent continuum regions. The criteria similar to one of West *et al.* (2011) is used to classify the activity. We have found 1151 active M stars from 17471 samples. Spectra for active M 0-7 samples are displayed in Fig. 1. Fig. 2 (left) shows the fraction of stars that are active as a function of spectral type for LAMOST, and LAMOST+SDSS data. The results are consistent with result for M0-M6 stars (West *et al.* 2011). Two of them are also observed with 2.16m telescope at the Xinglong station of the National Astronomical Observatories of China (Fig. 2 right).

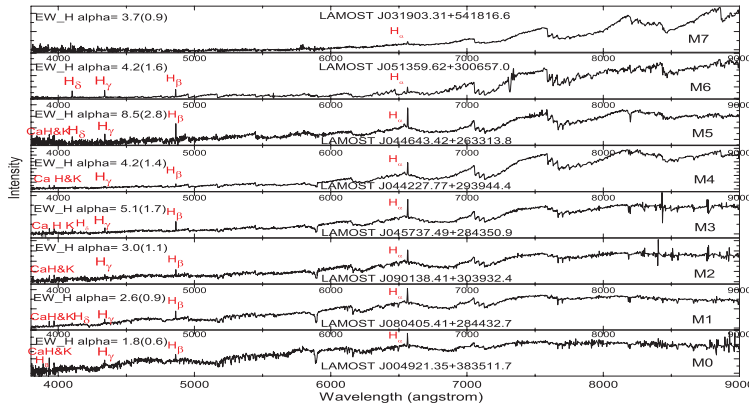


Figure 1. Spectra of the active M0-M7 stars from the LAMOST pilot survey.

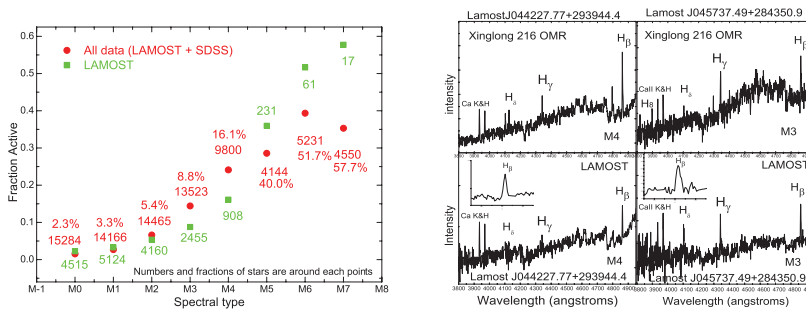


Figure 2. The fraction of active with spectral type for LAMOST (see online supplementary material Table 1 & 2), and LAMOST+SDSS data (left); Two active spectra using 2.16m telescope and LAMOST, NAOC (right).

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Supplementary materials and methods

The Supplementary material referred to in this article can be found at <http://dx.doi.org/10.1017/S174392131300255X>

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