OBSERVATIONS OF SELECTED STANDARD STARS IN NARROW-BAND FILTERS FROM THE AS VIDOJEVICA

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Abstract. We present the results of the observations of selected standard stars in Astrodon narrow-band Hα, [SII] and red continuum filters by the 1.4m Milanković telescope at the AS Vidojevica. The telescope time was granted through the instrumental proposal aimed at testing the narrow-band filters and the observations were carried out in August 2019. The standard stars selected were: BD+33d2642, BD+28d4211, BD+25d4655, GD248, G93-48 and LDS749B. Based on these observations, we give the estimated transformation coefficients for absolute calibration.

Observations and data reduction

Observations were carried out on August 5, 2019 at AS Vidojevica. We used 1.4m Milanković telescope (Vince et al. 2018, Samurović et al. 2018) equipped with Andor iKon-L 936 CCD camera, and narrow-band filters:
- Astrodon FWHM = 5 nm Hα Round 400085 50 mm dia, 656.3 nm
- Astrodon FWHM = 5 nm SII Round 400044 50 mm dia, 671.6 nm
- Astrodon FWHM = 5 nm Red Continuum Round 400200 50 mm dia, 645 nm.

The standard stars selected were: BD+33d2642, BD+28d4211, BD+25d4655, GD248, G93-48 and LDS749B. Standard reduction was performed over fits images (flatfield correction, dark frame substraction), after which correction for atmospheric extinction was applied (Figs. 1-3). We have chosen to fit all filters with a single extinction coefficient and obtained $k = 0.157 \pm 0.006$.

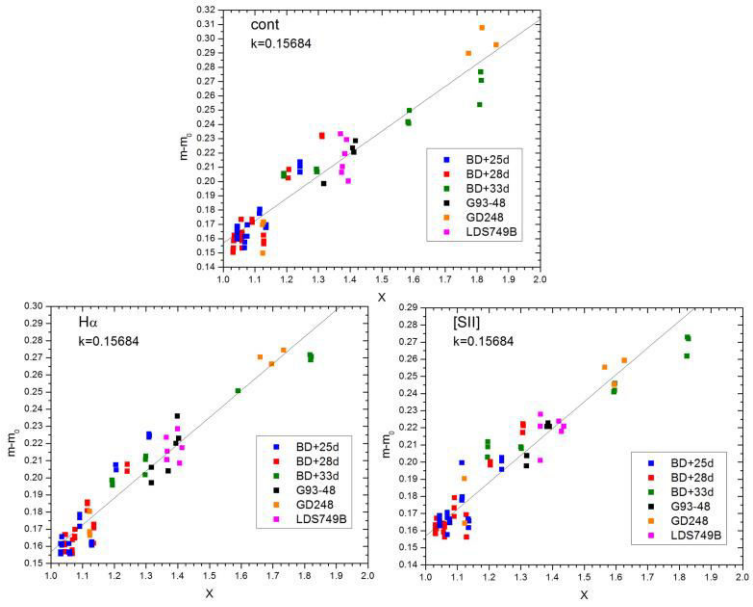

Fig.1-3. Correction for atmospheric extinction. *X*-axis represents airmass factor.

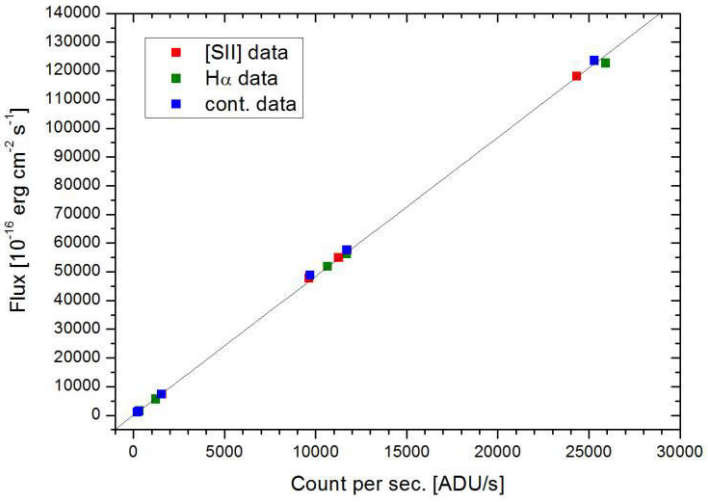

Fig.4. Absolute calibration.

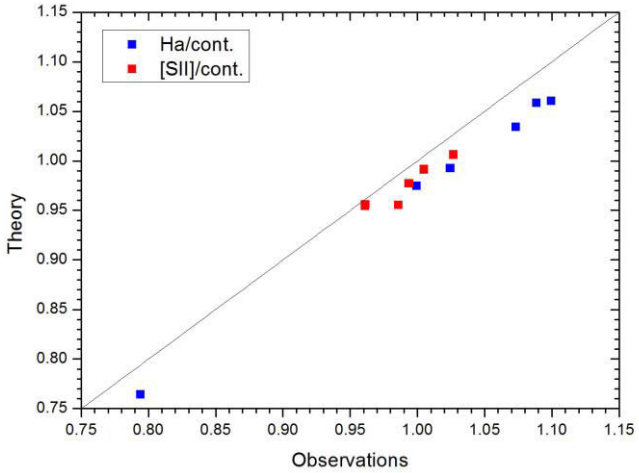

Fig.5. "Theoretical" vs. observed Hα/cont. and [SII]/cont. ratios.

Absolute calibration

We used filter transparences provided by Astrodon and spectrophotometric data for standard stars at ESO site, to calculate stellar fluxes in physical units (10^{-16} erg/s/cm^2), in order to compare them with measured fluxes (total counts per sec). Although the data in all filters taken together can be well fitted (Fig. 4) with a linear fit with slope $K/QE = 4.84 \pm 0.02$, when fitted separately we find $K/QE(H\alpha) = 4.76 \pm 0.02$, $K/QE([SII]) = 4.87 \pm 0.02$, and $K/QE(cont) = 4.91 \pm 0.03$. This small systematic difference can be seen on Fig. 5, which shows "theoretical" vs. observed Hα/cont. and [SII]/cont. ratios. Although quantum efficiency should be slightly different for the three narrow-band filters, it is not likely that the shift is due to *QE*.

We need more standard star measurements, and laboratory measurement of filter transparency curves, to draw firmer conclusions and to obtain better estimation of absolute calibration coefficients.

References

ESO - https://www.eso.org/sci/observing/tools/standards/spectra.html
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