Spectral typing of CoRoT targets with the low-resolution Nasmyth spectrograph at the Tautenburg 2m telescope

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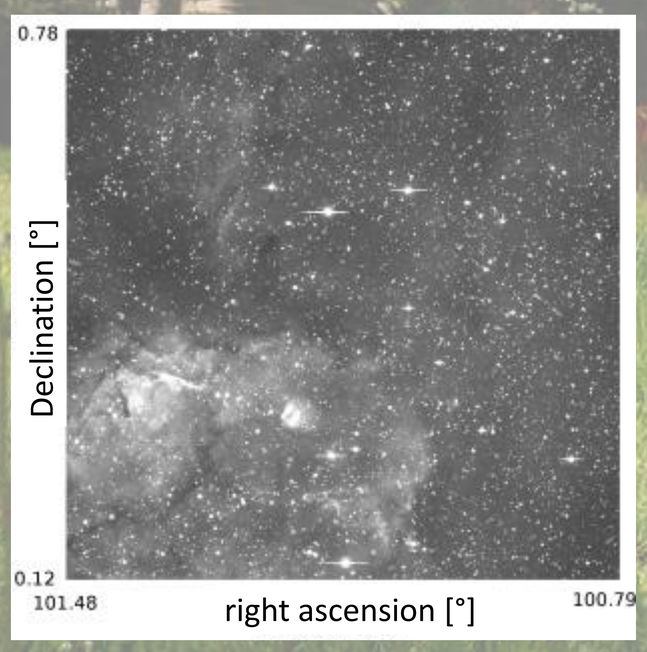
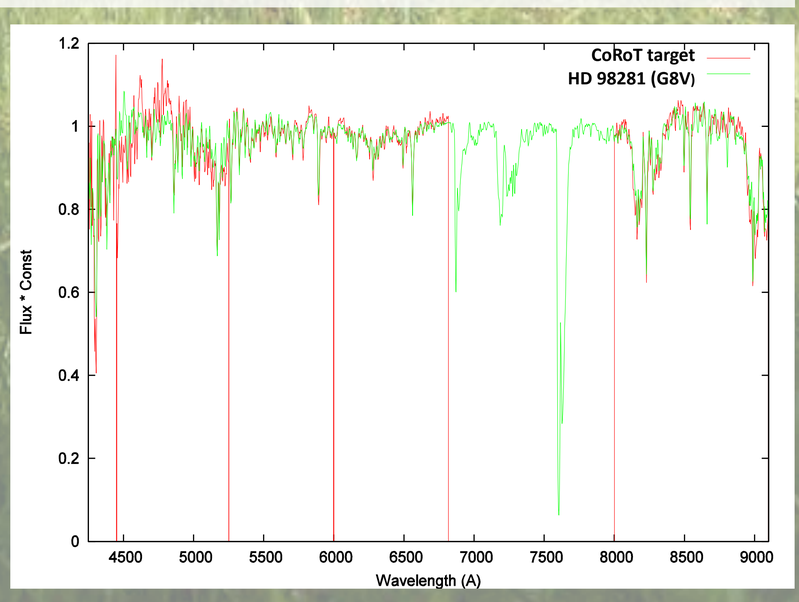
Abstract: We present results obtained with the low-resolution spectrograph (R≈1,000) at the Nasmyth focus of the 2m telescope in Tautenburg (Germany).
Low-resolution spectroscopy plays an important role in the follow-up of transiting planet candidates. These are detected in CoRoT light curves but ground-based radial-velocity measurements are required in order to find the mass of a candidate. These measurements are costly so that only the most promising candidates can be considered. Yet, the light curve alone does not tell us whether it is produced by a planet around a Sun-like star or a low-mass star in orbit around a giant star. Therefore, some knowledge on the parent star is needed beforehand. A first idea of the spectral type of the host star is available from photometry but this information needs to be refined by ground-based low-resolution spectroscopy.
The Nasmyth spectrograph is efficiently used on a regular basis for CoRoT follow-up. Several tens of CoRoT candidates have already been classified. Additional CoRoT targets were observed to study young stars and flare activity in CoRoT fields.

The spectrograph: We used the long-slit spectrograph installed at the Nasmyth focus of the 2m Alfred-Jensch telescope in Tautenburg (Germany). It is designed to observe faint objects at low dispersion and offers five different grisms for different wavelength regimes and spectral resolutions (R=580-2,140). CoRoT objects have been observed since several years. Mostly, the V200 grism has been used covering the full visible wavelength range at a resolution of about 1,000. This mode allows one to achieve a signal-to-noise ratio of 50 after an exposure time of one hour for an object with *V*=15mag. Until 2011, sky lines have been used to obtain wavelength solutions. Arc lamps have been applied since 2012.



CoRoT follow-up: The Nasmyth spectra contributed to the detection of CoRoT planets, e.g. CoRoT-11b (Gandolfi et al., 2010). In 2011-2013, 33 CoRoT targets in 16 center and anti-center fields were classified successfully, covering spectral types B9 to K2.5 and luminosity classes III to V down to *V*=15.9mag. The stars are classified by comparing the spectrum to a suitable grid of templates and adopting the spectral type and physical parameters of the best-matching template spectrum (Gandolfi et al., 2008; Sebastian et al., 2012). The figure below shows a match of a G8V template to the Nasmyth spectrum of a CoRoT target. A new template catalogue based on bright nearby stars has been compiled with the Nasmyth spectrograph from 2012 on (Ammler-von Eiff et al., 2012) and is being used for classification.



CoRoT science: In addition to the CoRoT follow-up, other studies on CoRoT targets benefit from the Nasmyth spectrograph:
In order to search for planets of early-tpe stars (Sebastian et al. 2012), we used the spectrograph to classify early-type stars in the CoRoT fields. A significant part of LRa01 is covered by the star-forming region Sh 2-284 (figure above; Hα image taken by B. Stecklum with the Schmidt camera of the 2m telescope) which contains several hundred candidates of young stellar objects (Puga et al. 2009). Some of those were observed by CoRoT. Using the spectrograph, we looked for signs of activity in some B type stars in this region.
Given the high sensitivity of CoRoT's three-colour-photometric capabilities, 111 stars were discovered which show significant flare activity (Drabent & Guenther, 2013, in prep.). Follow-up observations with the Tautenburg low-resolution Nasmyth spectrograph allowed us to specify the spectral type of a couple of those flare stars with a particular interest.

References: Ammler-von Eiff et al. (2012, „Quantitative stellar classification with low-resolution spectroscopy", IAU Symp. 293); Drabent & Guenther (2013, in prep.); Gandolfi et al. (2008, ApJ 687, 1303); Gandolfi et al. (2010 , A&A 524, A55); Puga et al. (2009, A&A 503, 107); Sebastian et al. (2012, A&A 541, A34)

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