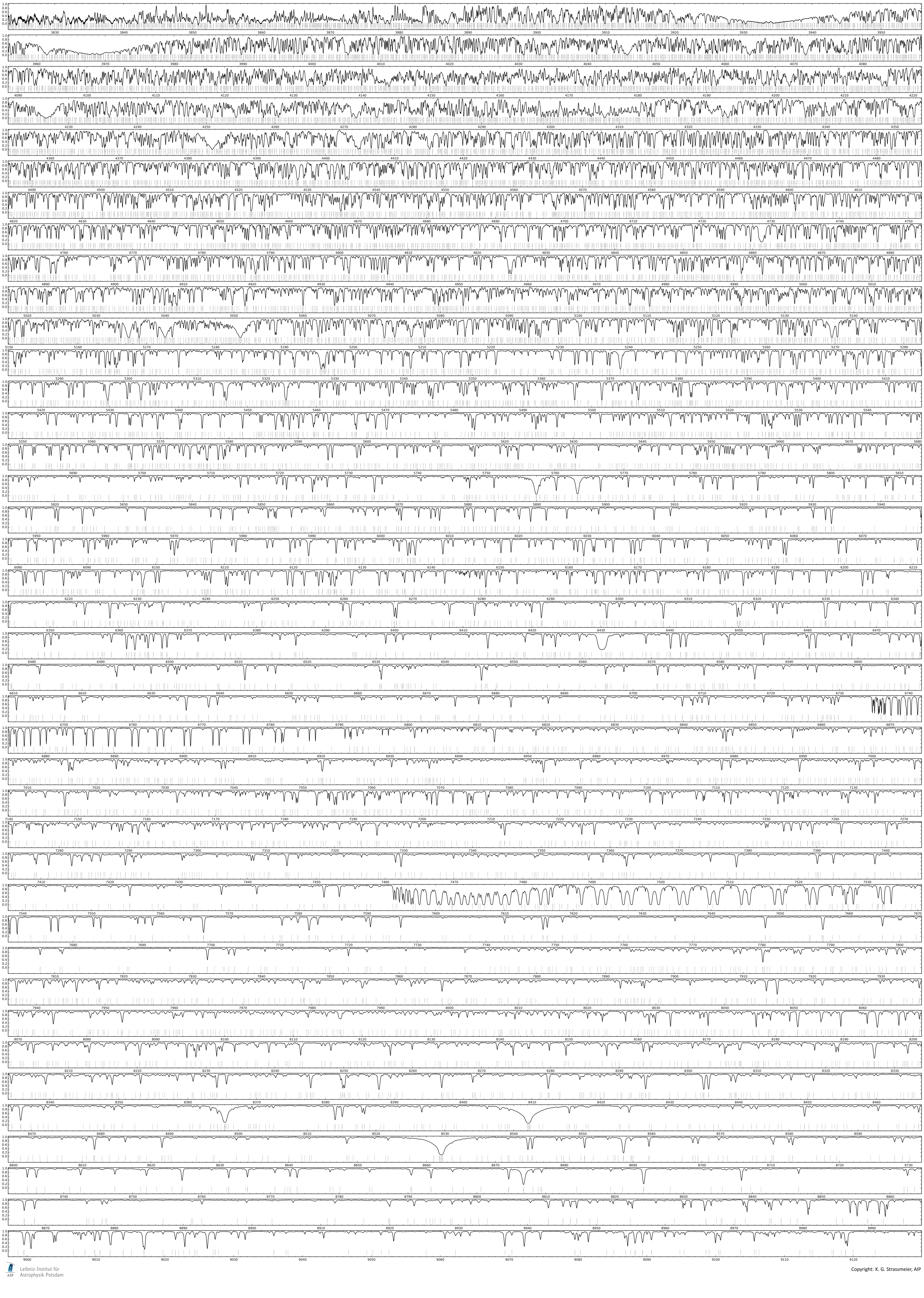
The fingerprint of a star: Arcturus = α Boo

Arcturus (= α Bootis = HD124897) is a prototypical cool red giant of spectral classification K1.5III with a surface temperature of 4290 Kelvin, i.e., 1500 degrees cooler than the Sun but 25x larger. This poster shows the optical spectrum of Arcturus obtained with the Potsdam Echelle Polarimetric and Spectroscopic Instrument (PEPSI) of the Large Binocular Telescope (LBT). It plots the normalized intensity as a function of wavelength λ in Angströms (1 Å = 0.1 nm) from the top left corner to the bottom right corner. The PEPSI spectrum covers the wavelengths between 3820 Å (top left) and 9130 Å (bottom right) with an average spectral resolution of R = $\lambda/\Delta\lambda$ = 220,000 or approximately 1.4 km/s. Its average dispersion is 0.007 Å/pixel. The full spectrum is stitched together from six separate spectra in six different wavelength regions. Each wavelength region has its own cross disperser (CD) of which two of them are always exposed simultaneously. The wavelengths for CD-I (3820-4265 Å) and CD-VI (7419-9130 Å) were obtained with the LBT, the others with the much smaller Vatican Advanced Technology Telescope (VATT) and a 450m long fiber to PEPSI at the LBT. The achieved signal-to-noise (S/N) ratio varies with wavelength because CD-III (4800-5441 Å) was employed for only four short VATT exposures while CD-VI included nine LBT exposures (exposure time with the LBT was 3 sec, with the VATT 4 min for similar S/N ratio). At wavelengths longer than $\approx$4000 Å the photon noise is not noticeable anymore, S/N ratio is peaking near 4,000:1 at 700 nm. The individual exposures took in total 10 minutes and were obtained on April 5, 2015. A subset of spectral absorption lines is identified in the graphics and marked with dashes beneath the spectrum. The annotation indicates the chemical element (e.g., Fe for iron), the ionization state (I for a neutral line, II for an ionized line), and the wavelength in Angström. Note that the annotation text appears darker the stronger the line. The line identifications and the wavelengths were taken from the Vienna Atomic Line Database. The original spectrum has been published in Astronomy & Astrophysics (Strassmeier, K. G., Ilyin, I., & Weber, M. 2017, A&A). For further details and for spectra of other stars see https://pepsi.aip.de/.



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