CAFE. A new Fiber Fed Spectrograph for Calar Alto Observatory

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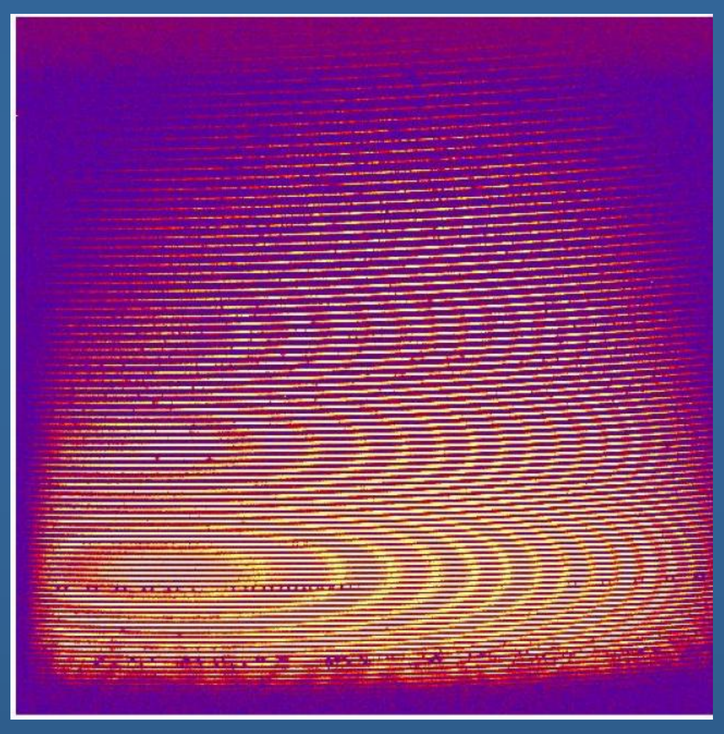
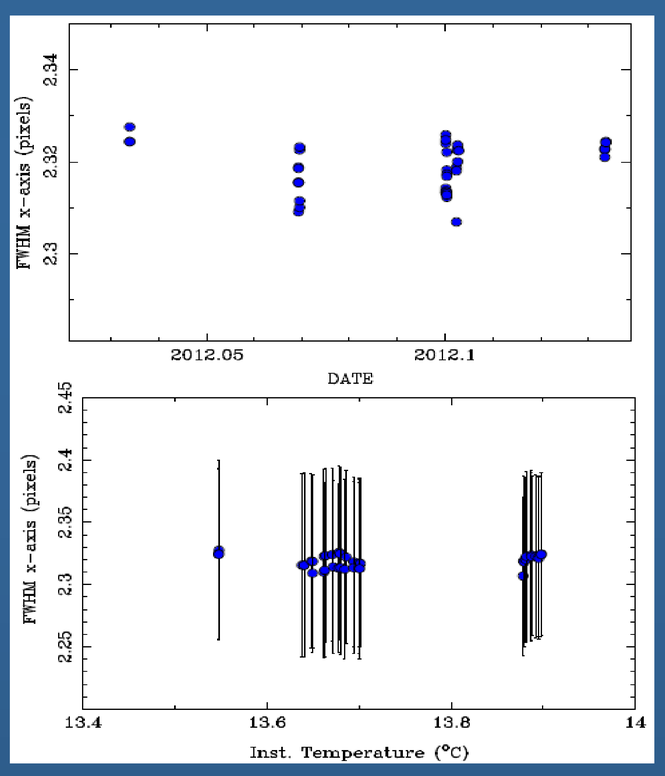
The Calar Alto Fiber-fed Echelle spectrograph is a high-resolution echelle spectrograph at the 2.2m Telescope of the Calar Alto observatory designed to replace FOCES. FOCES is a property of the Munich University Observatory, and it was removed from Calar Alto in 2010. The instrument comprised a substantial fraction of the telescope time , and due to that, it was decided to build an improved replacement, called CAFE.

The figure shows a view of an CAFE spectrograph with the cabinet opened. The internal optical elements can be watched on the optical bench. The upper size is as straight as a die to avoid any small apertures that can break the thermal isolation. Because of that, the upper part has to be lift up with the help of a tackle.

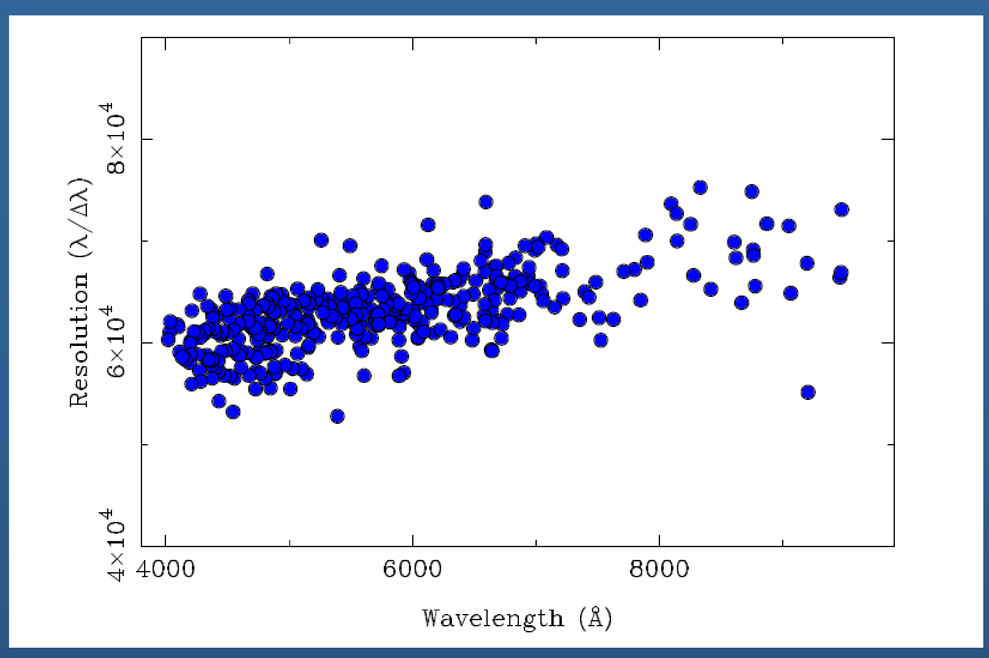
Basic features	
Design	Echelle spectrograph (2009-2011)
Telescope	Calar Alto 2.2m
Resolution	62000±5000
Wavelength range	3960-9500A
Sensitibity	SNR~ 30 mag 14.5 (2700s)
Telescope module	
Calibration lamps	Hal and ThaAr
Aperture	2.4 arcseconds
Optical Fiber	
Type	Polymicro BP100140170
Length: 17.5m	17.5m
Inner protection	ETFE-Kevlar strainrelief
Outer Protection	Stainless steel tube
Micro-lenses	N-F2, both ends
Spectrograph	
Optical bench	2400x1200x203mm
Entrance slit width	100 microns
Grating	31.6g/mm BA = 63.9°
Collimators	OAP1 λ/20 Fl=60.0” D=10.0” OAD = 7.0”
	OAP2 λ/20 Fl=60.0” D=10.0” OAD = 9.0”
Prisms	LF5, Deviation angle 33°
Camera	F#/3
CCD	IKON-L DZ936 back illuminated
Pneumatic isolators	Newport I-200



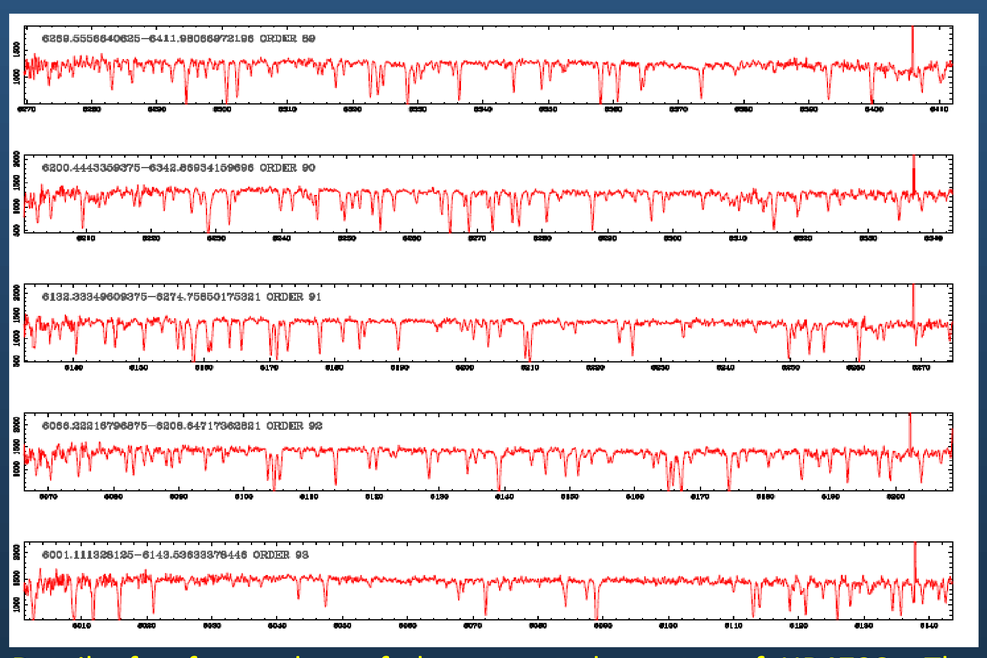
Raw data of the first science frame taken with CAFE, on the star HR4728.. The orders are displayed from red, at the bottom, to blue, a the top. For each order, the wavelength range runs from blue, at the left, to red, at the right.



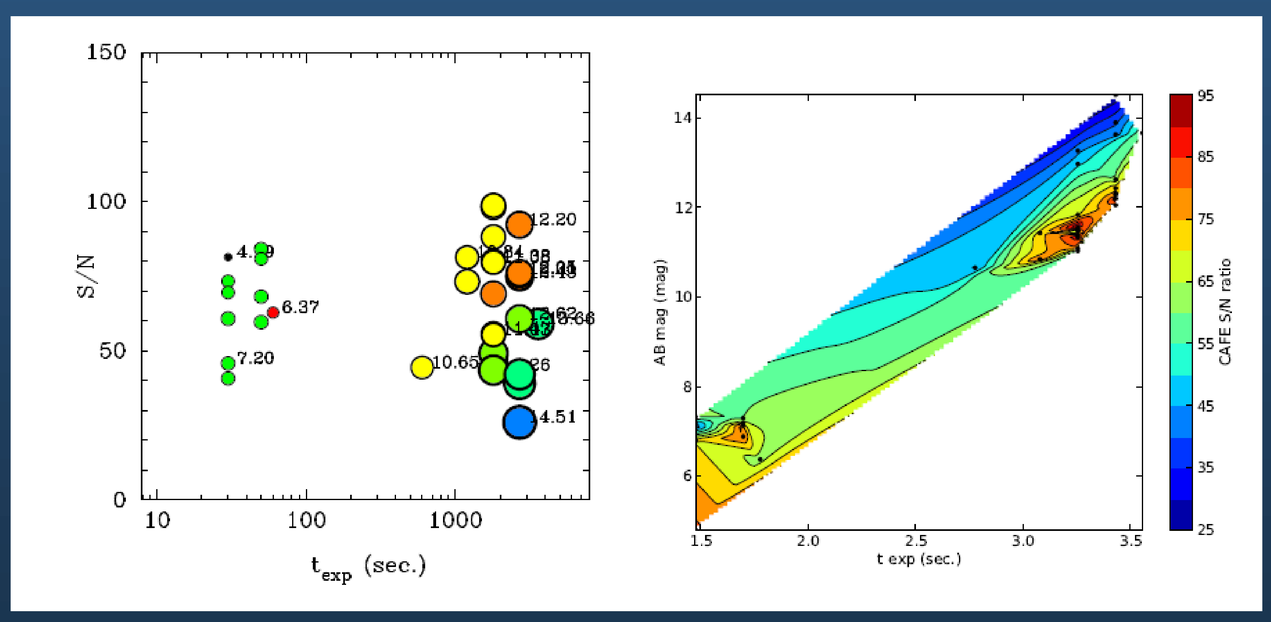
Stability of the spectral resolution. Upper panel shows the distribution of the average FWHM of the ARC emission lines along the dispersion axis for the different ARC frames. Right panel shows a similar distribution along the internal temperature of the instrument, measured with four temp. sensors.



CAFE: Wavelength resolution derived from the estimation of the FWHM of the identified ARC emission lines in the dispersion axis.



Detail of a few orders of the extracted spectra of HR4728,. The actual pipeline of CAFE has been foreseen to allow the observer to make a quick&dirty reduction, visualize the data, and estimate the S/N of the data acquired at the telescope



CAFE: Results from the analysis of the S/N. Left panel shows the distribution of the S/N along the exposure time, for the different observed objects. Color/size of the plotted symbols indicate the brightness of the considered object. Right panel shows the S/N distribution as a function of the brightness and the exposure time.

More info: http://www.caha.es/CAHA/Instruments/CAFE/index.html