Low-res Spectroscopic Follow-up of Eclipsing Binaries

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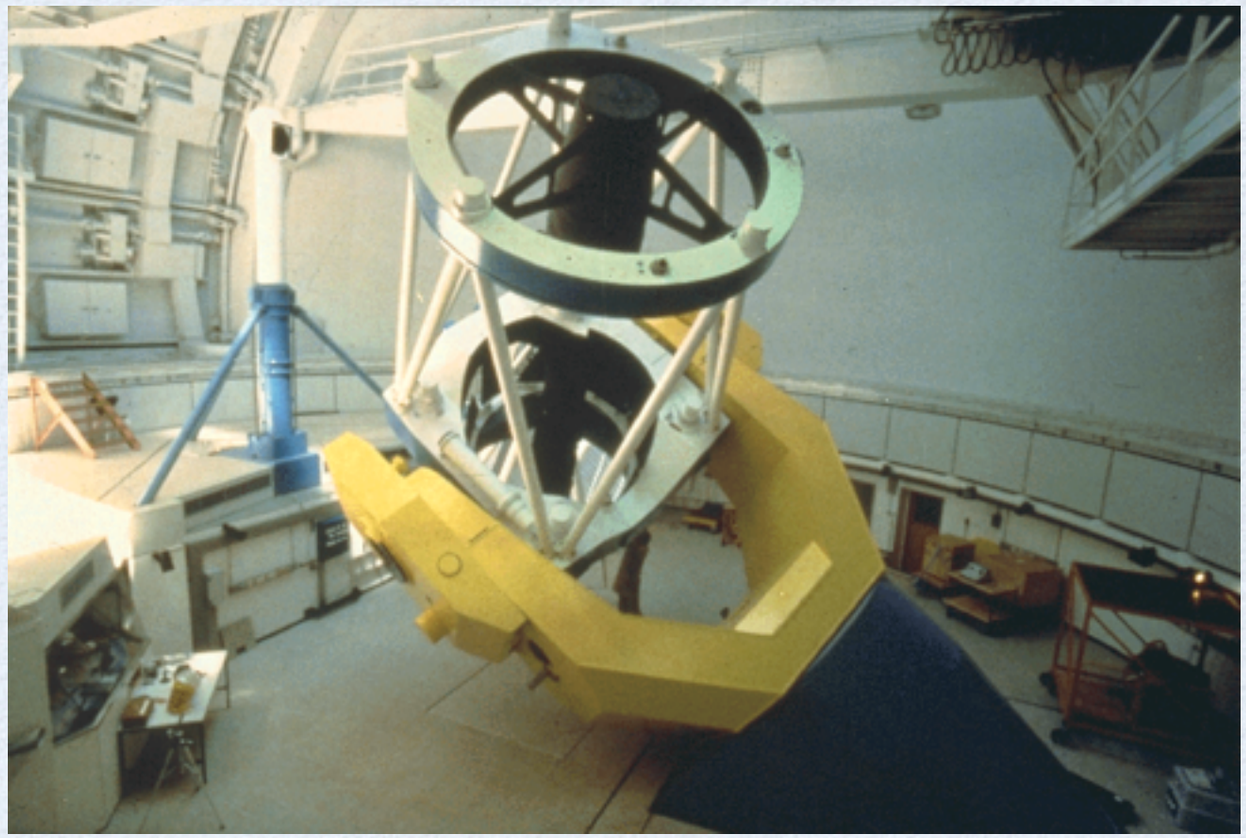
Outline

- Observations
- Reduction process
- Comparison between SpT determination with VOSA and The Hammer
- To come...

Observations

- 2.2-m telescope at Calar Alto
- CAFOS Spectrograph
- Low resolution spectroscopy R ~ 3000 (D = 0.204 nm/pix)
- Wavelength range: 5900-9000 Å
- 5 observing nights in August 2011



- Goal of the project: derive spectral type of the primary components

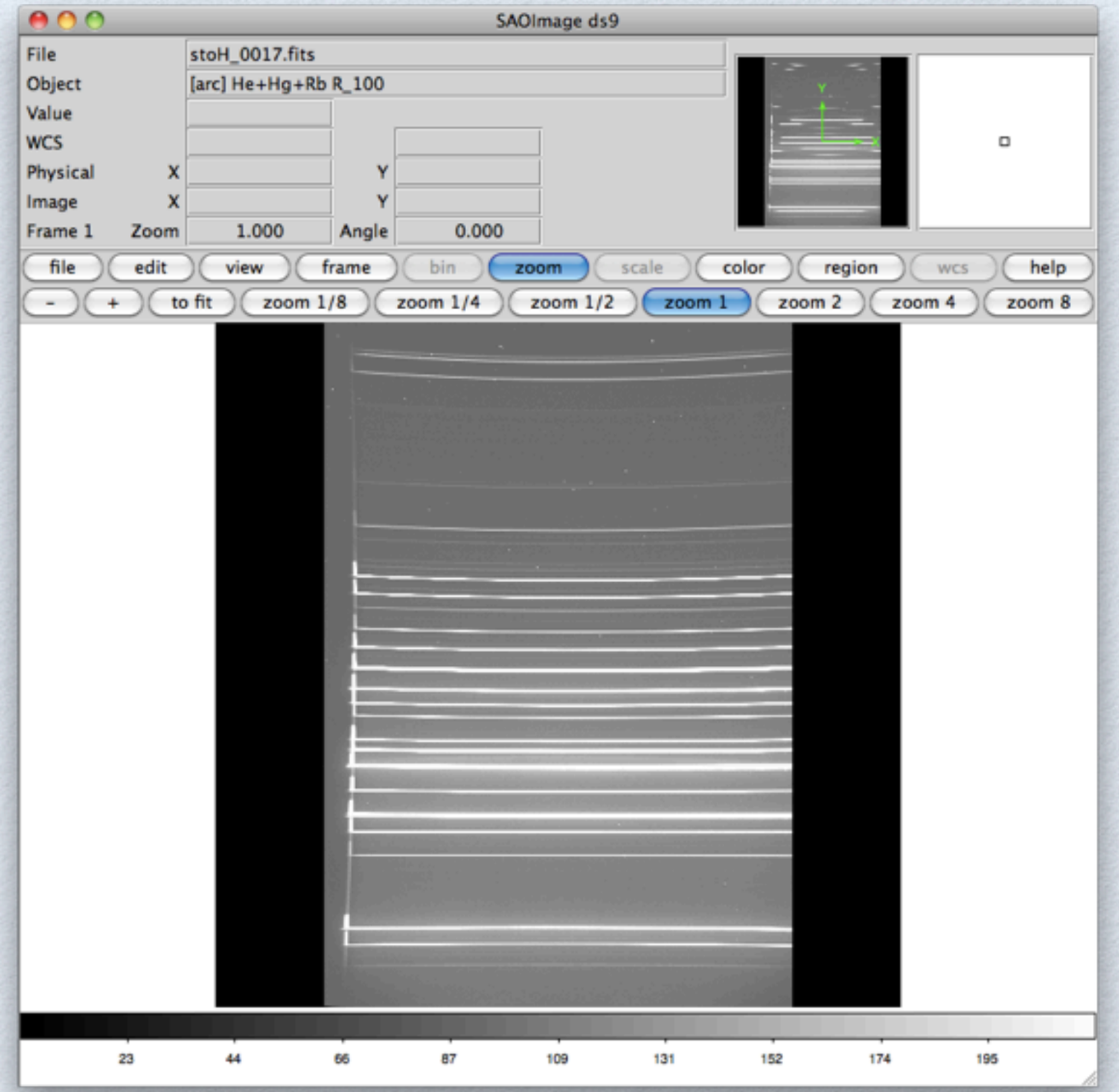
ID	Exp time	Date
19d_3_11359	600 s	2011-08-04
19d_2_09173	1200 s	2011-08-04
19a_4_04542	1800 s	2011-08-05
19d_4_06245	600 s	2011-08-05
19a_3_09001	180 s	2011-08-05
19d_1_09952	900 s	2011-08-05
19d_3_02216	900 s	2011-08-07
19f_1_07389	2x1800 s	2011-08-07
19d_2_09575	1200 s	2011-08-07
19a_2_10288	1800 s	2011-08-07

Only reduced objects presented on the log

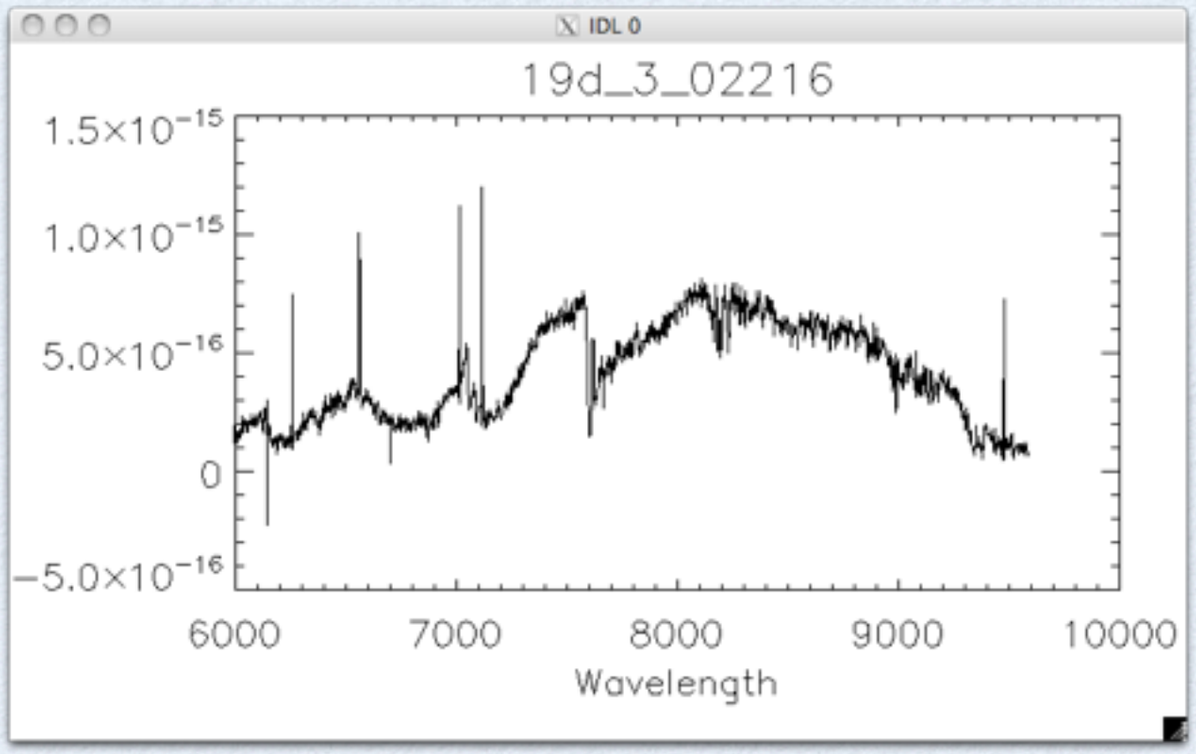
Reduction process

Raw images are strongly distorted for direct extraction of the spectrum;

First basic reduction procedures are applied: bias, flatfielding

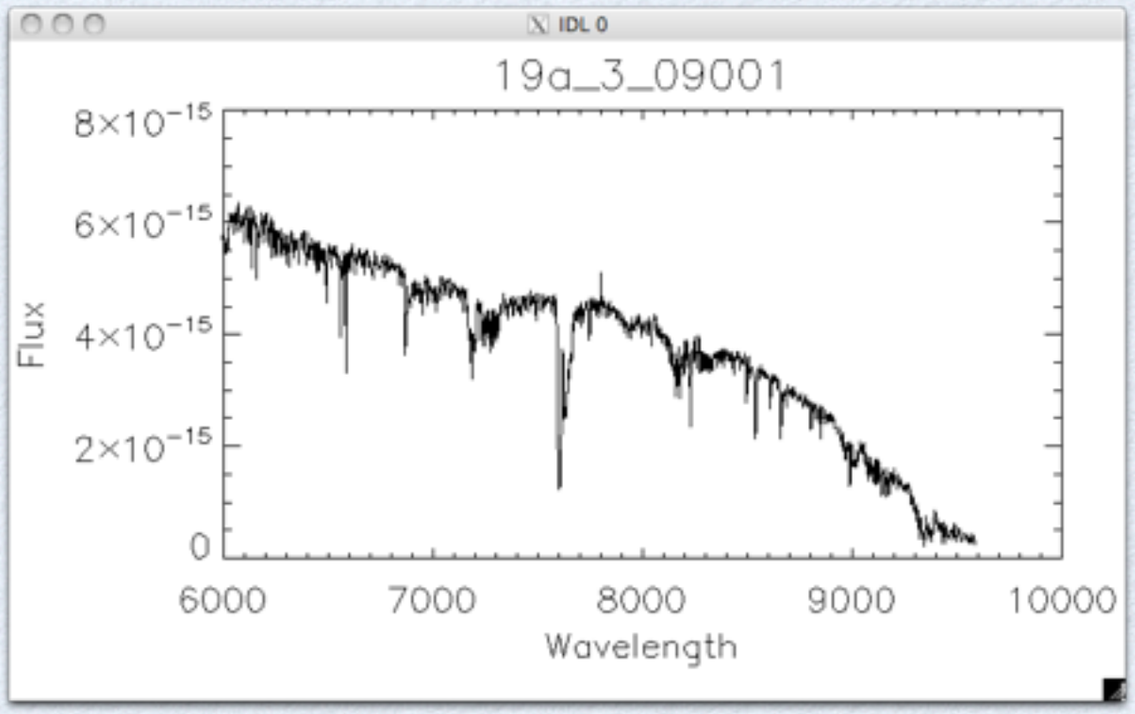


Reduction process



A pipeline has been developed to straighten and calibrate the 2D spectra and prepare them for extraction

Resulting spectrum is extracted with IRAF.apall and flux-calibrated with observed standards



Spectral Classification

- Two different methods used for the classification:
  - VOSA (VO SED Analyser, Bayo et al., 2008)
  - The Hammer (IDL Routine, Covey et al., 2007)

VOSA Results

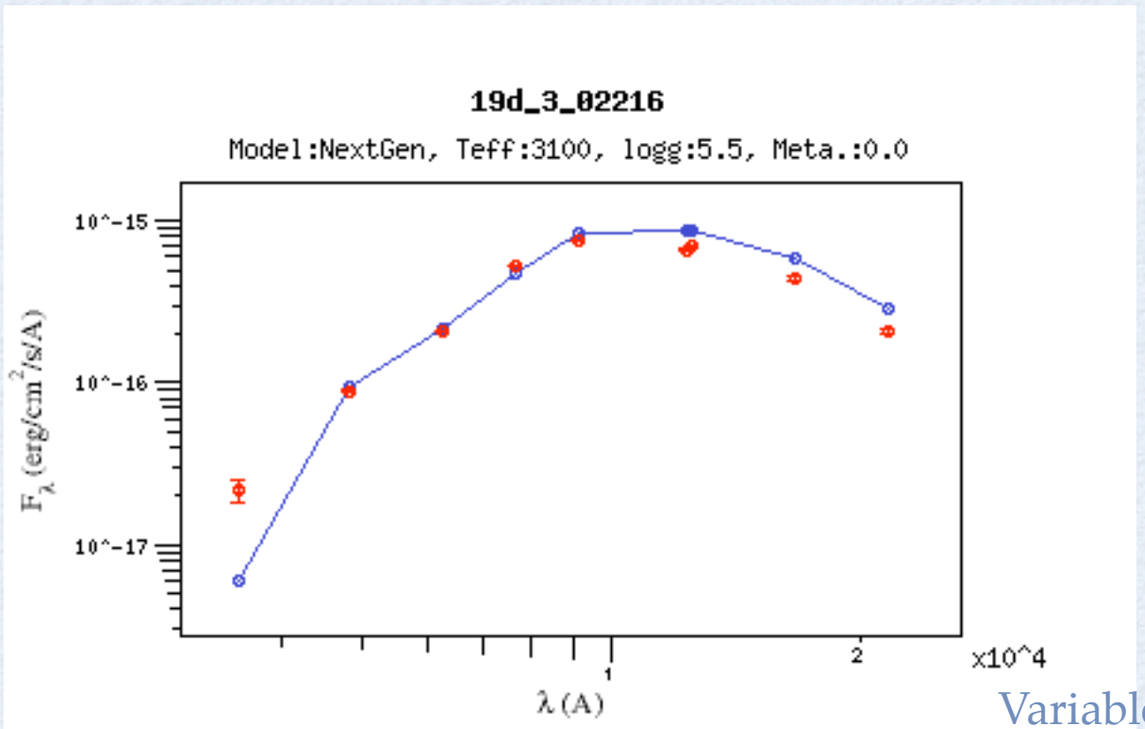
Model fit

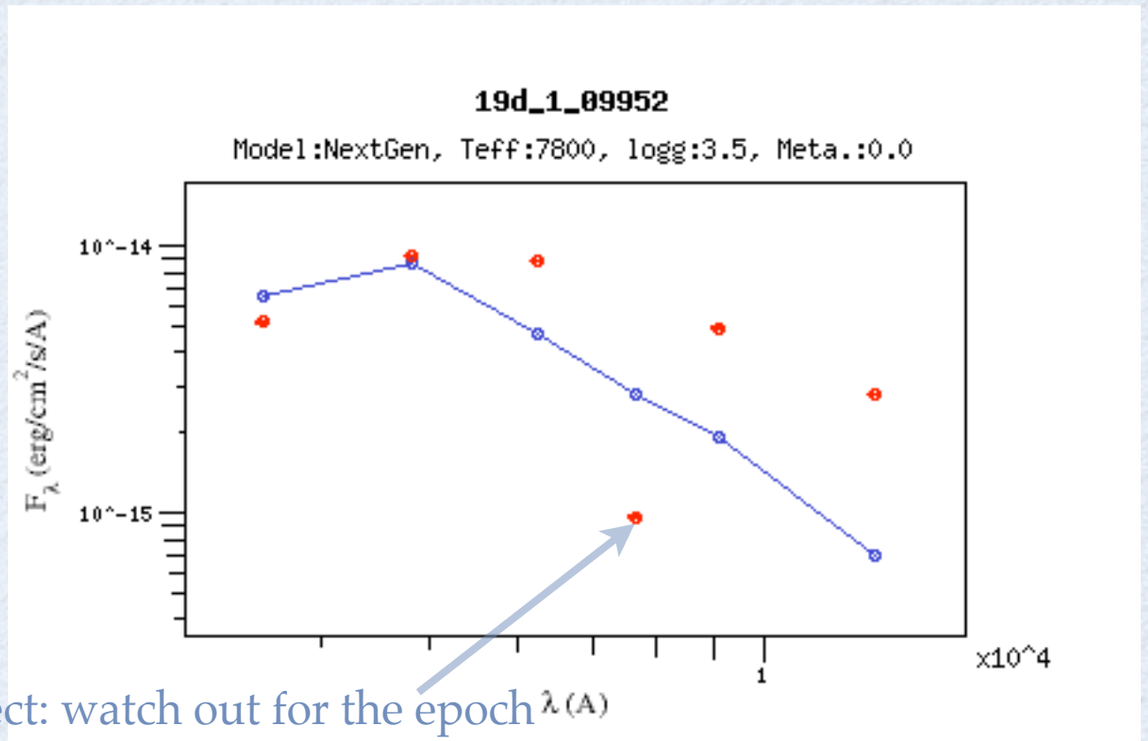
Bestfit
19a_2_10288
19a_3_09001
19d_1_09952
19d_3_02216
19d_3_11359
19d_4_06245

Best fit results

Hide graphs | Delete this fit

Object	RA	DEC	D (pc)	Model	T_{eff}	logg	Meta.	more	χ^2	M_d	F_{tot}	ΔF_{tot}	F_{obs}/F_{tot}	L_{bol}/L_{sun}	$\Delta L_{bol}/L_{sun}$	λ_{max}	N_{fit}/N_{tot}	Data VOtables
19a_2_10288	293.331917	36.295272	10.000	NextGen	4800	5.0	0.0	---	9.20e+1	5.46e-23	1.77e-12	5.48e-14	0.38	5.51e-6	1.71e-7	21590	9/9	Syn.Spec.
19a_3_09001	293.264708	36.770769	10.000	Kurucz	4750	4.50	0.00	---	9.70e+1	2.21e-21	6.36e-11	2.54e-13	0.29	1.98e-4	7.93e-7	21590	8/8	Syn.Spec.
19d_1_09952	293.975042	36.497697	10.000	NextGen	7800	3.5	0.0	---	3.12e+4	2.01e-24	4.47e-11	4.25e-14	0.24	1.39e-4	1.32e-7	12510	6/6	Syn.Spec.
19d_3_02216	294.461625	36.796783	10.000	NextGen	3100	5.5	0.0	---	2.17e+2	2.29e-21	1.10e-11	1.30e-13	0.31	3.43e-5	4.04e-7	21590	9/9	Syn.Spec.
19d_3_11359	294.623333	36.833739	10.000	NextGen	5600	5.5	0.0	---	7.26e+4	2.20e-23	1.22e-10	8.19e-13	0.31	3.82e-4	2.55e-6	21590	9/9	Syn.Spec.
19d_4_06245	293.885000	36.809386	10.000	Kurucz	4250	3.50	0.00	---	2.27e+2	1.85e-21	3.35e-11	1.65e-13	0.33	1.04e-4	5.15e-7	21590	9/9	Syn.Spec.



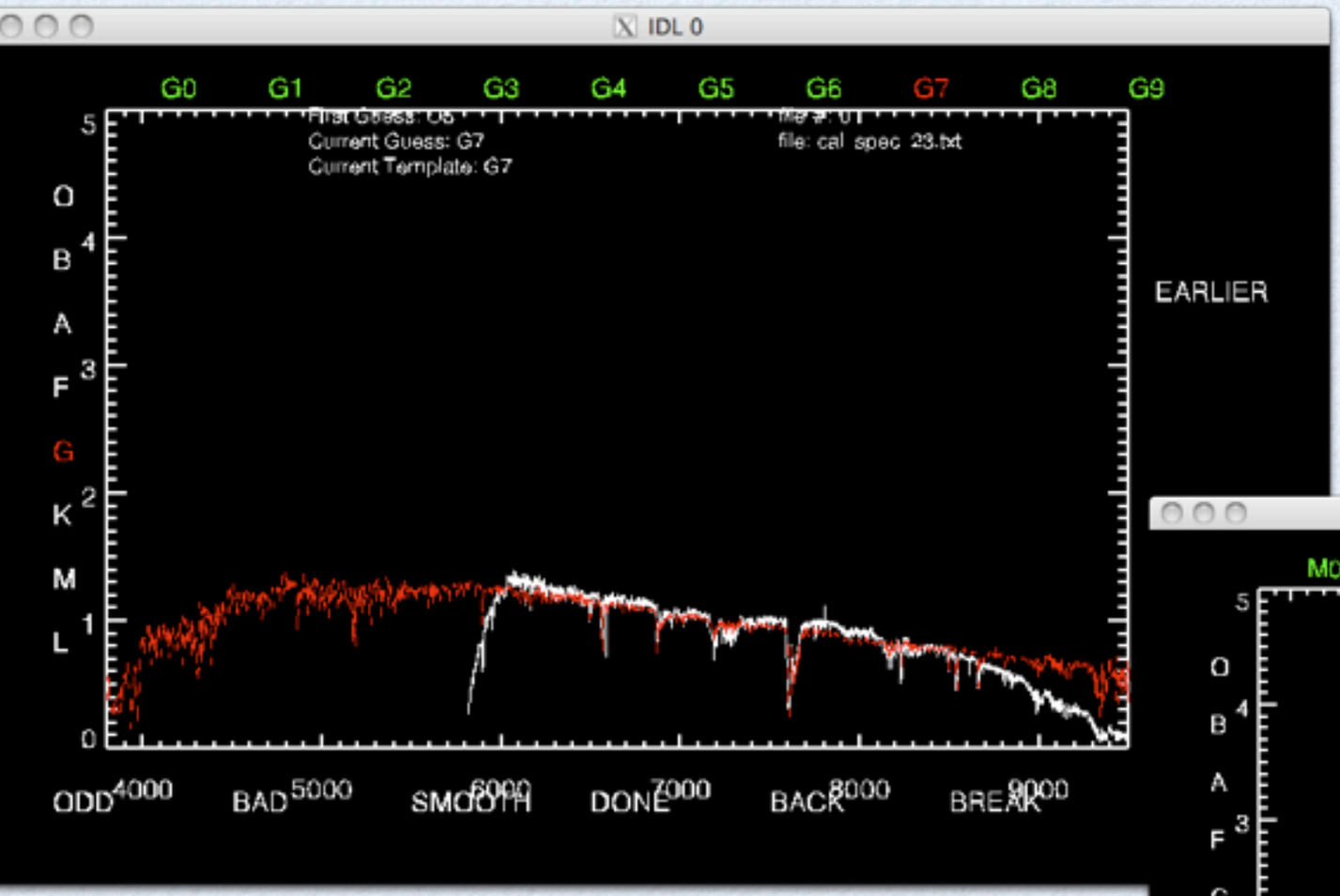


Variable object: watch out for the epoch

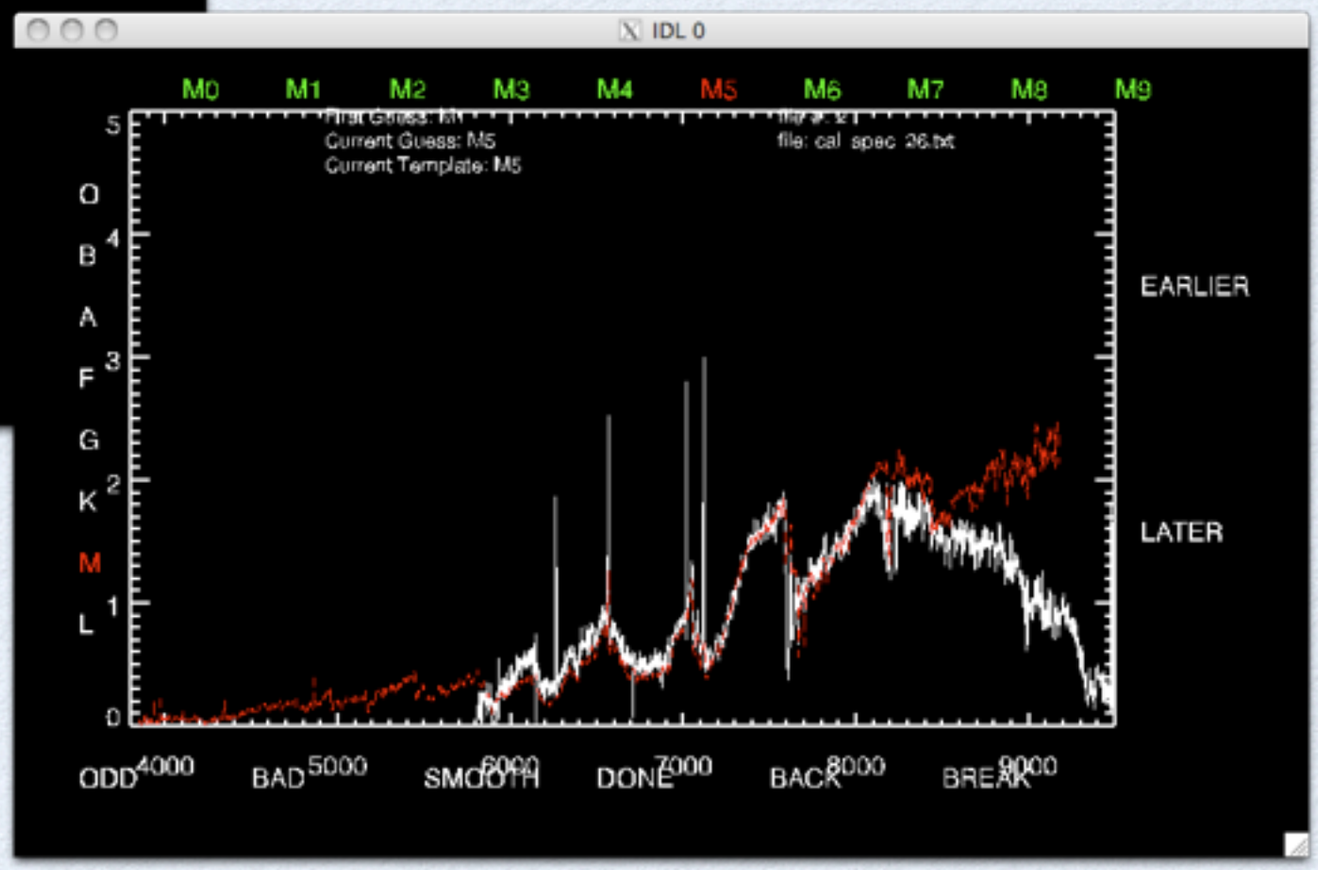
The Hammer

- The Hammer is an IDL spectral typing algorithm to classify spectra with targets spanning the MK spectral sequence;
- The user performs an eye-check of the best-fit template

The Hammer Results



19a_3_09001: G7



19d_3_02216: M5

Missing luminosity class of templates

Comparison

ID	VOSA	HAMMER
19d_3_11359	Teff: 5600 K	G6
19d_4_06245	Teff: 4250 K	A9
19a_3_09001	Teff: 4750 K	G7
19d_1_09952	Teff: 7800 K	F0
19d_3_02216	Teff: 3100 K	M5
19a_2_10288	Tef: 4800 K	G0

Discrepancies due to limited coverage of the templates provided with the Hammer (some classes only up to 7400 A)

To add to this...

- Reduce and analyse observed spectral templates with 2.2m/CAFOS for spectral class determination (to be coded with Patricia)
- Mining for flux measurements in the range 8300-9000 A for better flux calibration
- Three more nights due to be reduced and analysed