

CM Dra spectrum analysis: first results

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CM Dra – classical low-mass double-lined eclipsing binary

- ICRS coord. (ep=2000) :
16 34 20 +57 09 43
- Distance 14.5 pc
- Mag V - 12.90
- Proper motions mas/yr: -1109 1203
high proper motion!
- Spectral type of components: M4.5
- $M(1) = 0.23 M_{\text{sun}}$; $M(2) = 0.21 M_{\text{sun}}$



Orbit and components

- $P = 1.268$ day
- $a = 3.76 R_{\text{sun}}$
- $M(2)/M(1) = 0.9267$
- Spectral type: M4.5
- $e = 0.00051$!!!
- Apsidal motion
- $M(1) = 0.23 M_{\text{sun}}$; $M(2) = 0.21 M_{\text{sun}}$
- $R(1) = 0.25 R_{\text{sun}}$; $R(2) = 0.23 R_{\text{sun}}$
- $\log g(1) = 5.00$; $\log g(2) = 5.00$
- $T_{\text{eff}}(1) = 3100$; $T_{\text{eff}}(2) = 3100$
- Age 4.1 Gyear (Main Sequence)
- Metal poor $-1 < [M/H] < -0.6$
- Chromospherically active (spots)

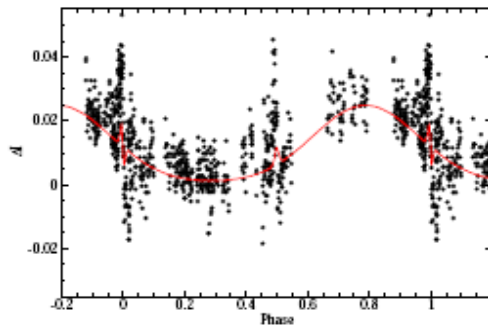


Fig. 2.— Differential effect of star spots on the I-band light curve of Lacy (1977). The solid line represents the model described in the text.

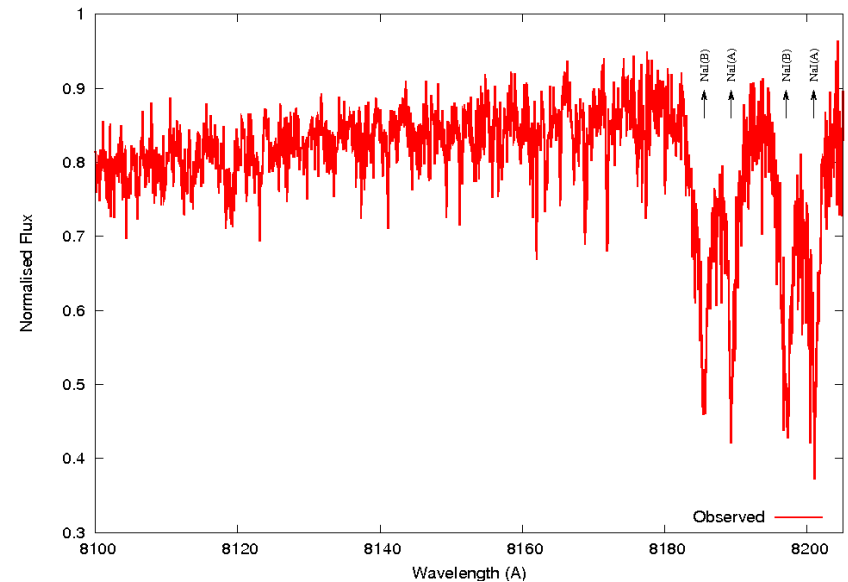
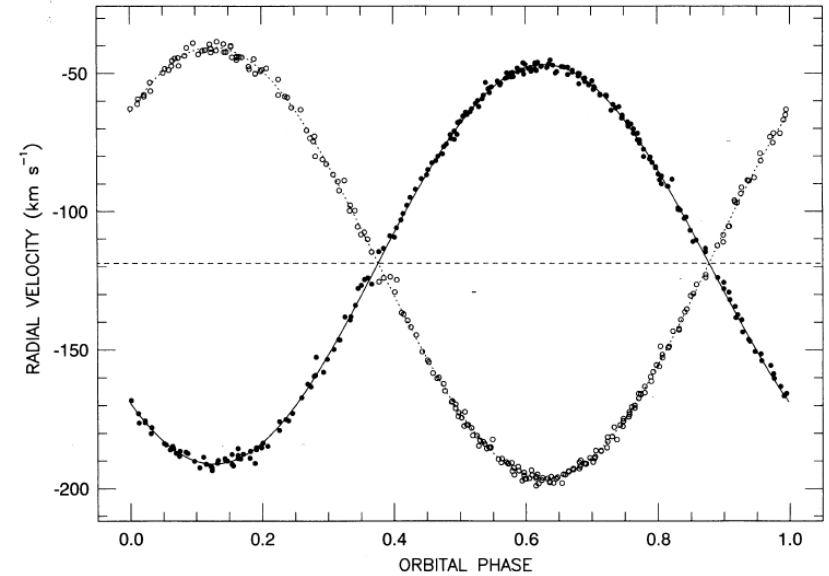
- 2009ApJ...691.1400M - Astrophys. J., 691, 1400-1411
MORALES J.C. et.al.

Features

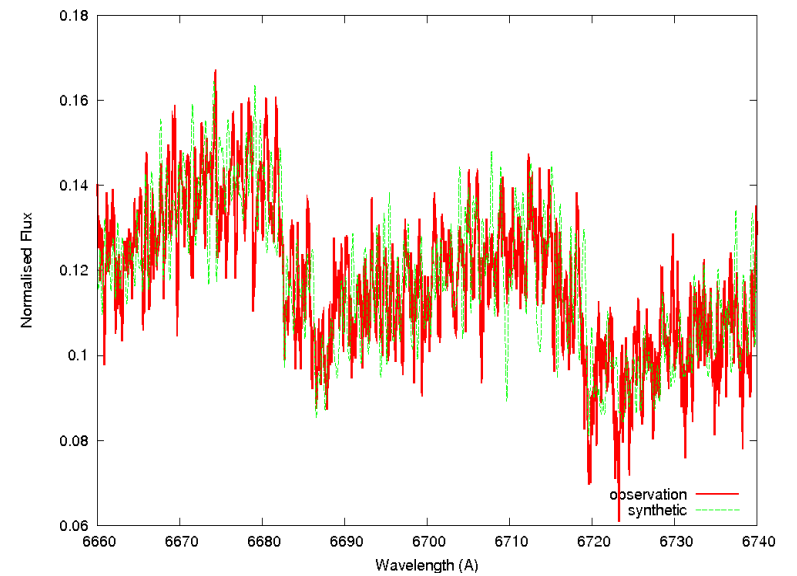
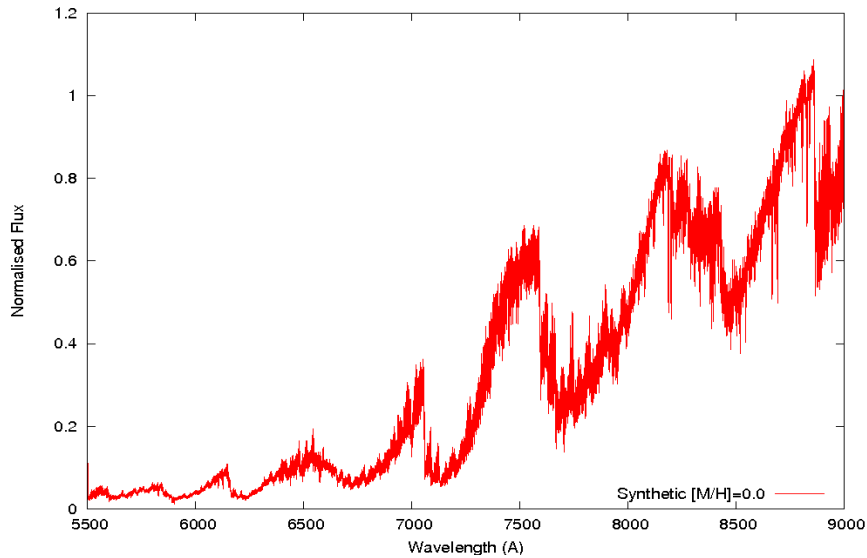
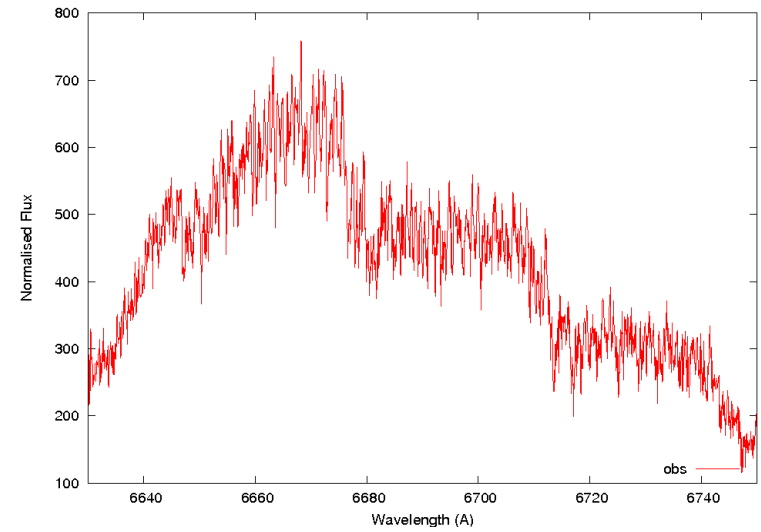
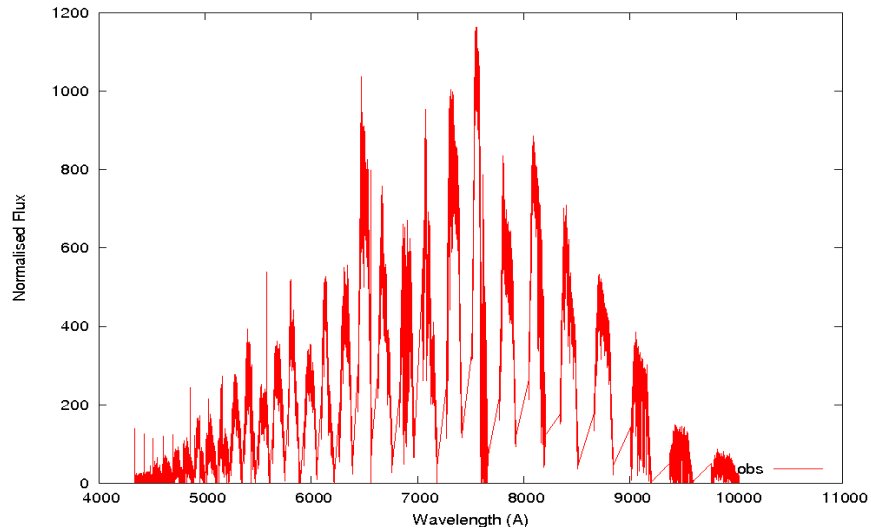
- Apsidal motion, $e \neq 0$ - third body? (or tidal interaction)
- Spots,
 - - Magnetic field?
 - Tidal interaction?
 - Overheated atmosphere by the second component?

Observations

- the 4.2-m William Herschel Telescope using the Echelle high-resolution spectrograph (UES)
- 20 May 1997 - 16 echelle spectra of CM Dra
- $R = 45000$
- 4500-10000 Å
- Phasa of observations 0.14-0.36
- $V_{\text{rad}} - 100 \text{ km/s}$



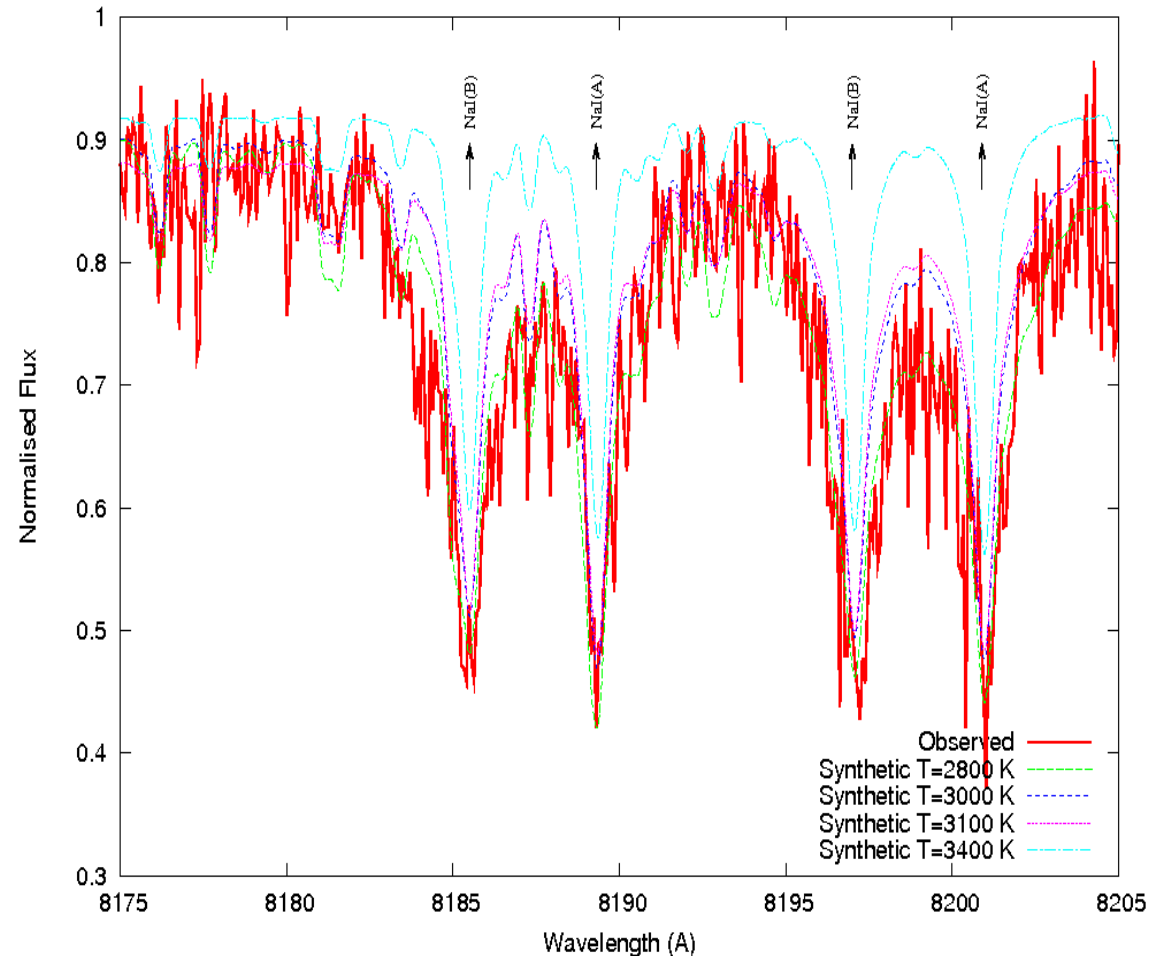
Continuum



Atmosphere models of components

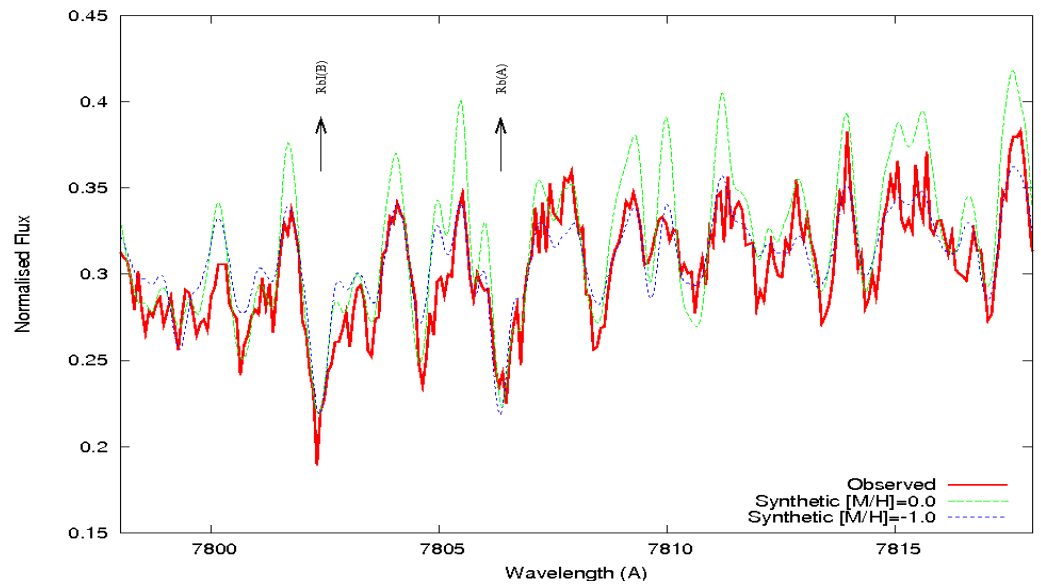
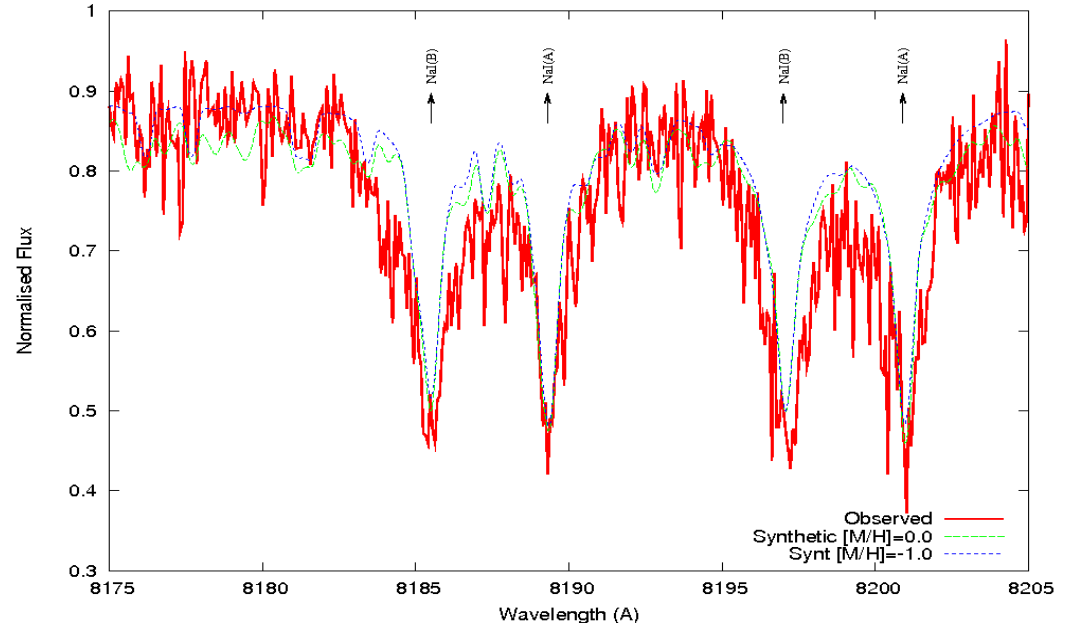
TiO by Plez 1998
NextGen models
1999

- $T_{\text{eff}} = 2800$
- $T_{\text{eff}} = 3000$
- $T_{\text{eff}} = 3100$
- $T_{\text{eff}} = 3400$
- $v_{\text{sin}(i)} = 10 \text{ km/s}$
- $v_{\text{turb}} = 3.0 \text{ km/s}$



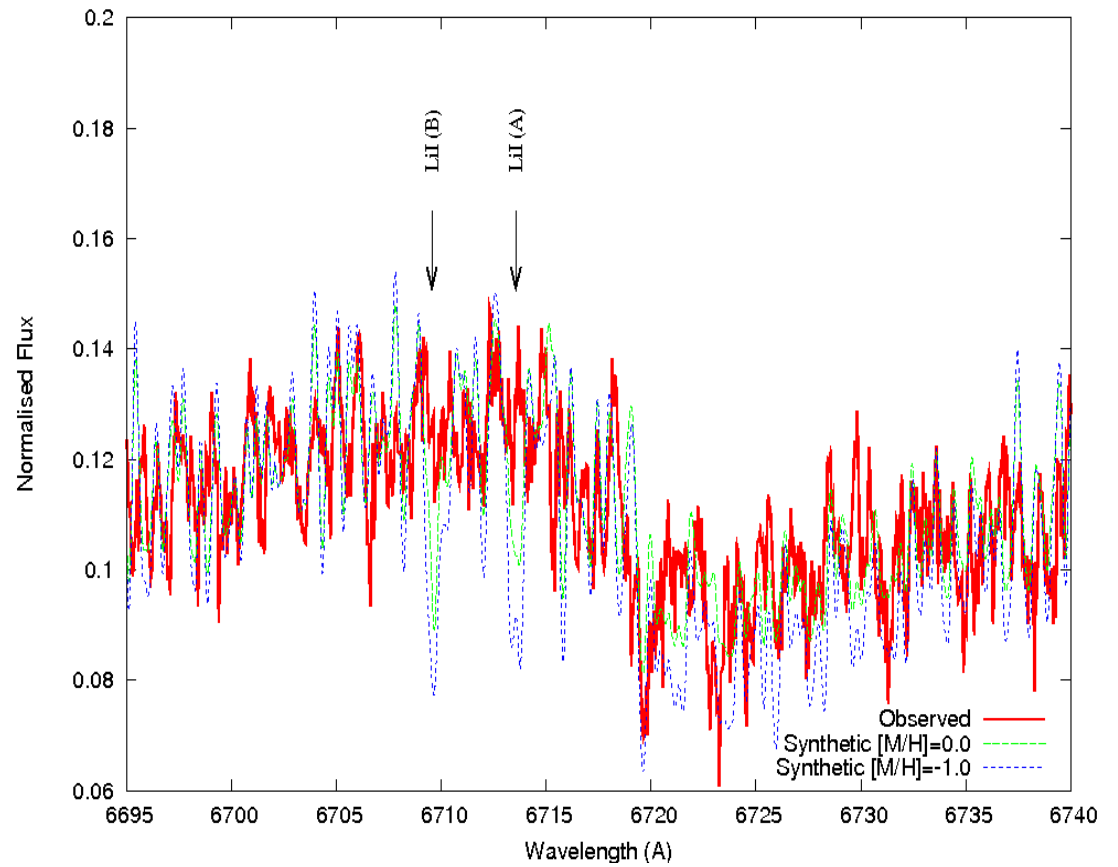
[M/H]

- Na
- Rb
- [M/H] = 0.0
- [M/H] = -1.0



Li I

- No Li I



First results

- $T = 2800 - 3100$
- $[M/H] = -0.5 - 1.0$

Our main goal in nearest future is to obtain abundances of metals in atmospheres of CM Dra components.

Thank you!