

Cool main sequence binaries: status and plans

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BinaMlcS::Cool Meeting

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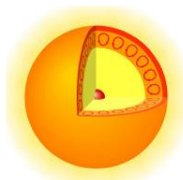
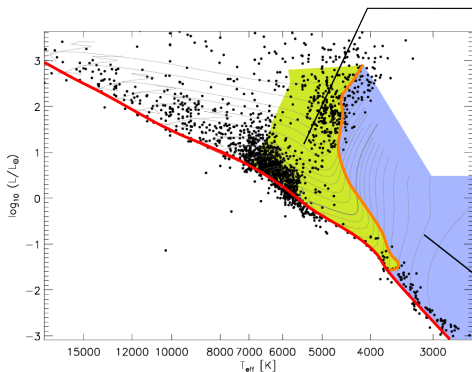
Outline

- 1 Magnetic interactions in cool binary stars
- 2 Cool MS Observations
- 3 Summary

Outline

- 1** Magnetic interactions in cool binary stars
 - Tidal effects on dynamo action
 - Magnetospheric interaction
- 2 Cool MS Observations
- 3 Summary

Dynamo action



Adapted from *Reiners (2007)*

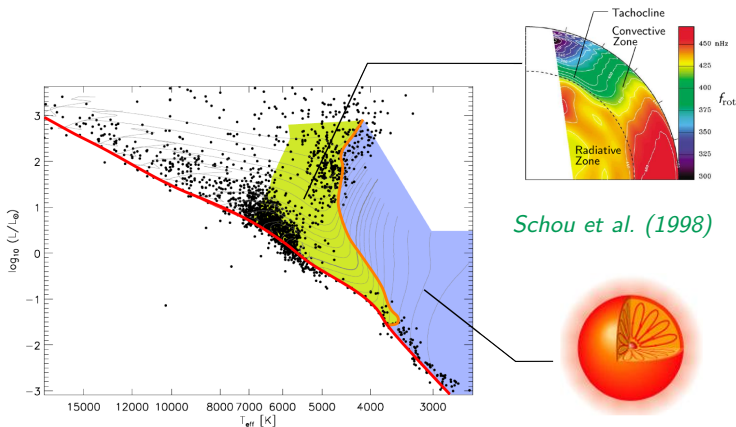
Tidal flows

- How affect dynamo action in CZ?
- Dynamo-capable in RZ?

Differential rotation profile

- DR \Rightarrow Ω -effect
- DR profile? / **B** generation?

Dynamo action



Adapted from *Reiners (2007)*

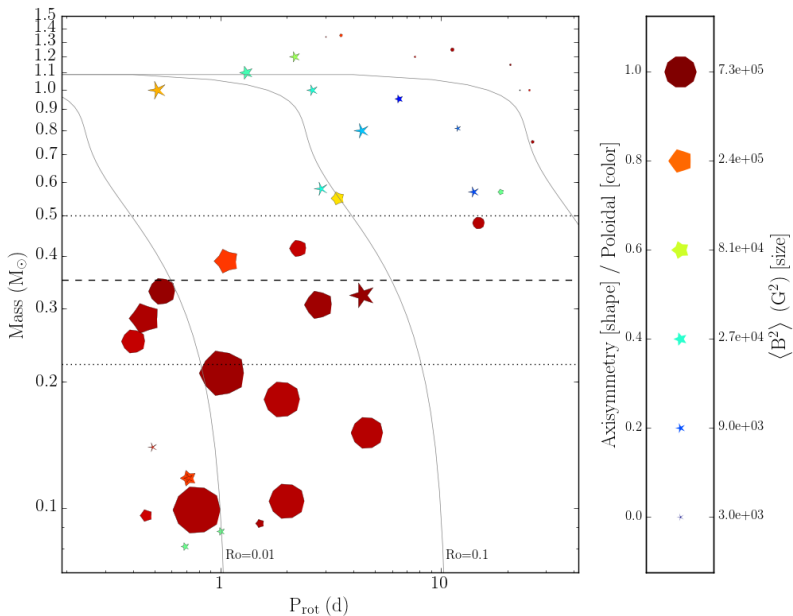
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Differential rotation profile

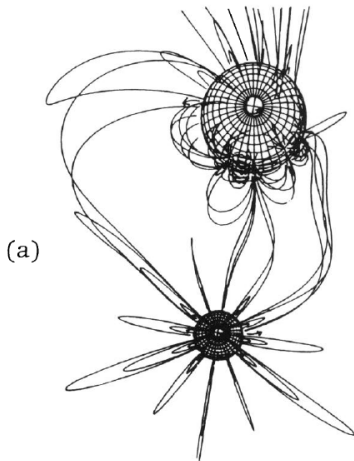
- DR \Rightarrow Ω -effect
- DR profile? / **B** generation?

Dynamo action



Magnetospheric interaction

- \neq isolated stars
- Connected field lines
- Processes affected
 - Stellar winds / AM evolution
 - Chromospheric / coronal activity
- How non-synchronized systems differ from synchronized ones?
- Interplay with latitudinal differential rotation?

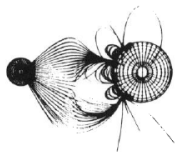


Uchida (1986)

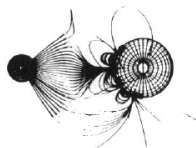
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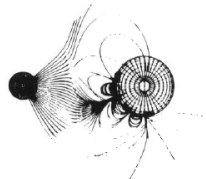
(b)



(c)



(d)



Uchida (1986)

Outline

1 Magnetic interactions in cool binary stars

2 Cool MS Observations

- MS BY Dra systems: partly convective
- MS BY Dra systems: fully convective

3 Summary

Partly-convective BY Dra systems: 1st results

■ BY Dra (CFHT 13A) / OU Gem (TBL 14B)

- K4V+K7.5V / K3V+K5V
- $P_{\text{orb}} = 5.98$ d; $e = 0.3$ / 6,99 d; $e=0,145$

• 20 / 10 spectra

➔ detection on both component

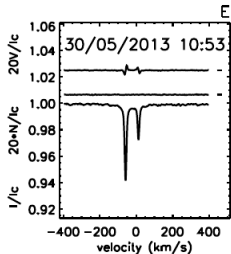
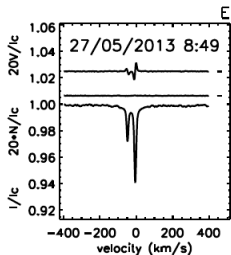
➔ Simple (dipolar?) fields / toroidal fields

■ ER Vul (TBL 13B+CFHT 15A)

- G0V+G5V
- $P_{\text{orb}} = 0.70$ d; $e = 0.0$ (EB)
- 7 + 17 spectra ✓

■ σ^2 CrB (TBL 14A)

- F9V+G0V
- $P_{\text{orb}} = 1.14$ d; $e = 0.0$
- 1+32 spectra ✓



Examples of BY Dra LSD spectra

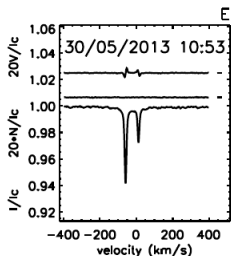
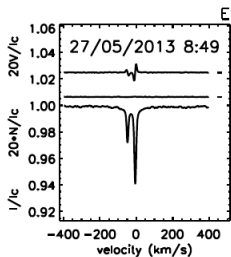
Partly-convective BY Dra systems: future plans

■ BY Dra

- $P_{\text{orb}} = 5.98$ d; $e = 0.3$
- ➡ 2nd observing epoch?
- ➡ Circular orbit K dwarf (KZ And)?

■ σ^2 CrB (TBL 14A)

- $P_{\text{orb}} = 1.14$ d; $e = 0.0$
- ➡ 2nd observing epoch?

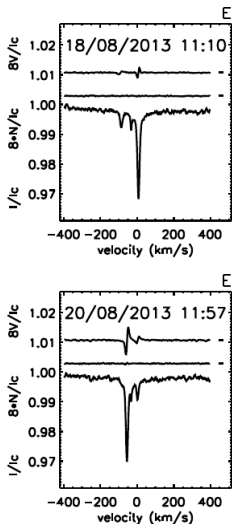


Examples of BY Dra LSD spectra

Fully-convective BY Dra systems: 1st results

- EBs: YY Gem, GJ 2069A (pre-Binamics)
- GJ 815A (CFH 13B)
 - M2V+M4V
 - $P_{\text{orb}} = 3.28$ d; $e = 0.0$
 - 20 spectra collected over 15 n ✓
 - ➔ Simple (dipolar?) fields
- GJ 375 (HARPS P92)
 - M3.5V+M3.5V
 - $P_{\text{orb}} = 1.88$ d; $e = 0.0$ ✓
- GJ 735 (CFH 14A)
 - M3.5V+M3.5V
 - $P_{\text{orb}} = 10.3$ d; $e = 0.2$
 - 23 spectra collected ✓
- GJ 867A (CFH 14B)
 - M1-2V+M1-2V
 - $P_{\text{orb}} = 4.08$ d; $e = 0.01$
 - 21 spectra ✓

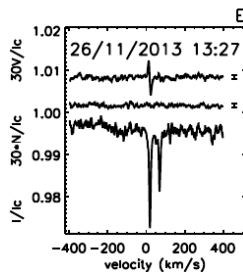
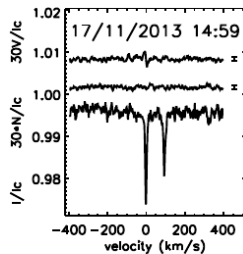
Julien Morin



Examples of GJ 815 AB LSD spectra

Fully-convective BY Dra systems: future plans

- GJ 268A
 - M5V+M5V
 - $P_{\text{orb}} = 10.4$ d; $e = 0.34$
 - ➔ Full monitoring ongoing
- Role of binarity in dynamo bistability?



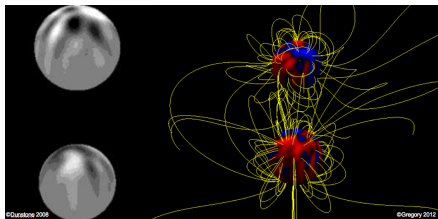
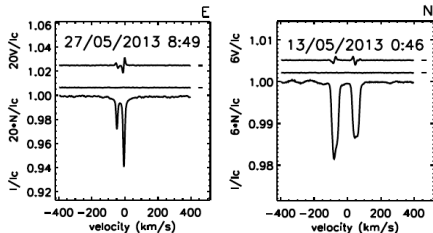
Examples of GJ 268 A LSD spectra

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Summary

- cool TC strategy
 - Dense monitoring
 - ZDI + DR modelling
 - Field extrapolation
 - Activity modulation
- 8 systems monitored so far
- 1 system ongoing
- Final additions to the sample?
- Systems for 2nd epoch?



Summary

