Temperatures in Low State AM CVn systems

Bart Buijs

Supervisor: Paul Groot

Department of Astrophysics
Radboud University Nijmegen

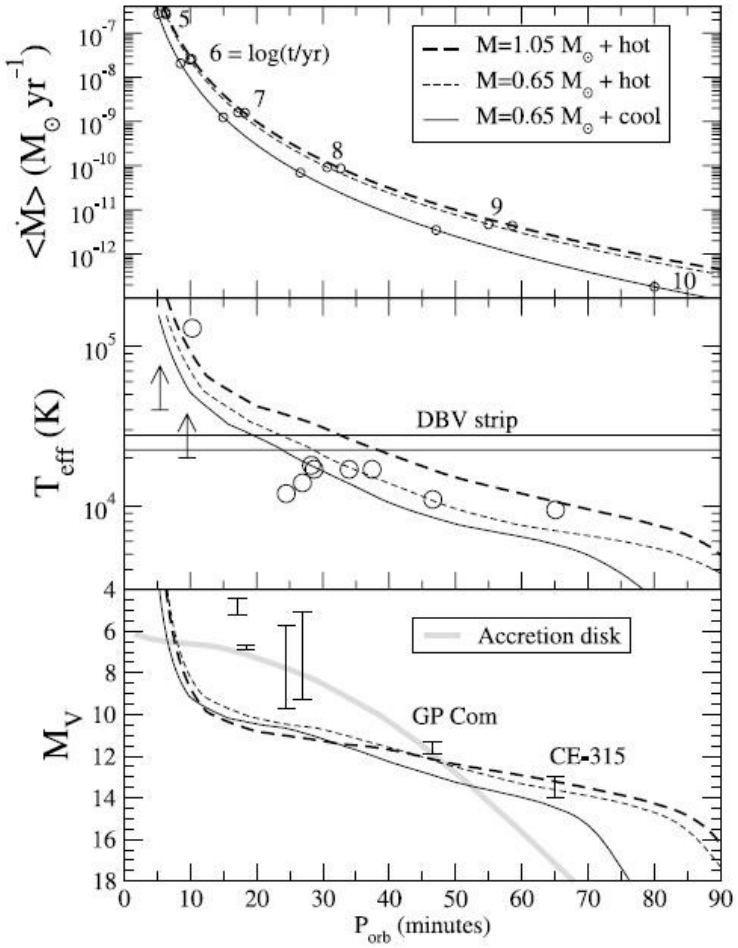
Question

What can the temperature of the accretor in an AM CVn system tell us about the donor and the formation channel?

Contents

1. Accretor reheating
2. Fitting Koester DB models
3. Fitting DB + BB models
4. Results
5. Conclusions

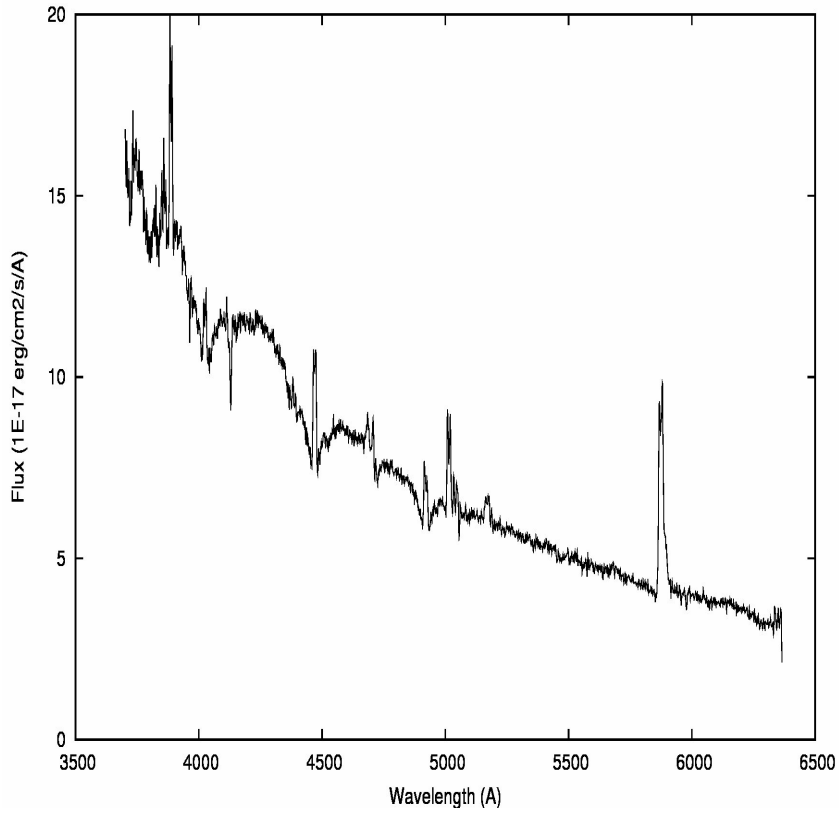
Accretor reheating



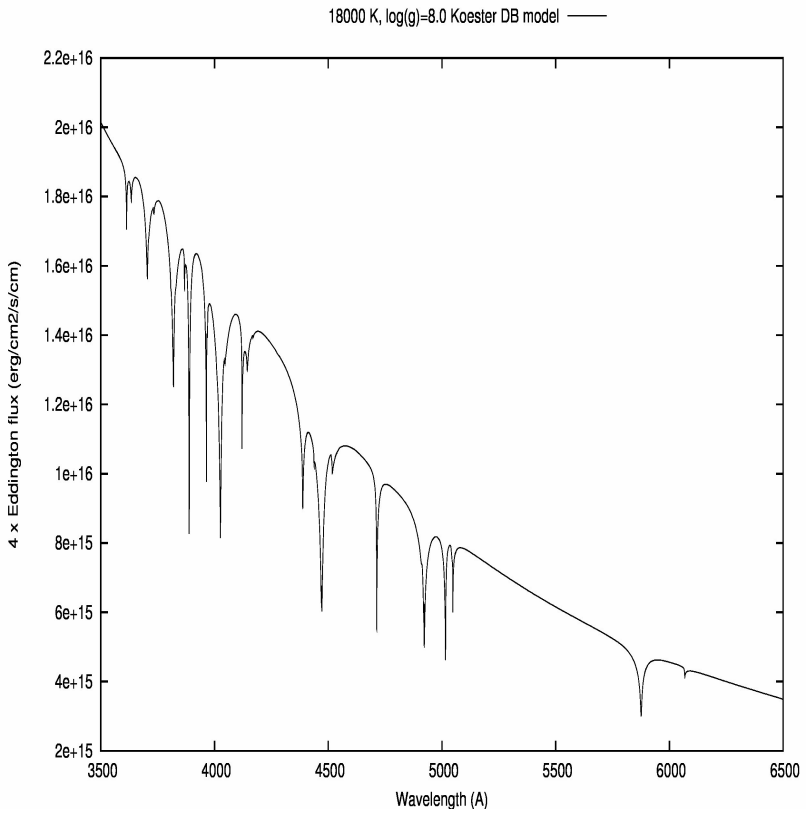
Bildsten et al. 2006

Fitting Koester DB models

Example: SDSS J1240 Porb = 37.8 min



Average spectrum from Roelofs et al. 2005



Koester DB model

Fitting Koester DB models

We take a grid of Koester DB with:

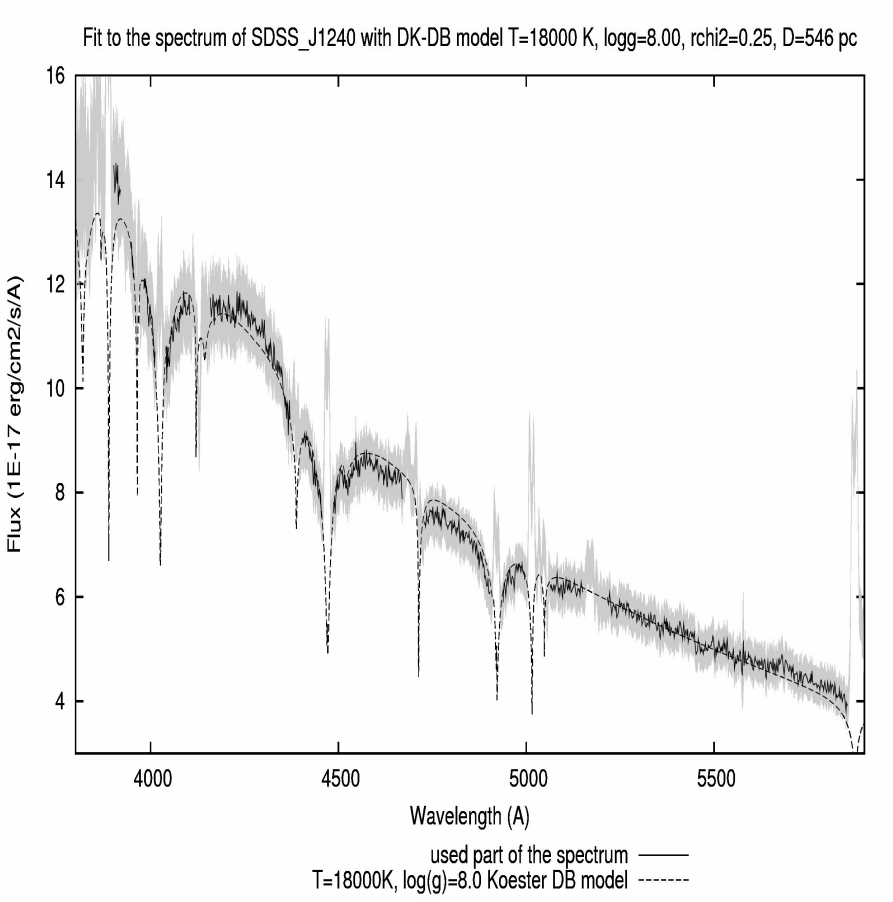
10 000 K < Tdb < 50 000,

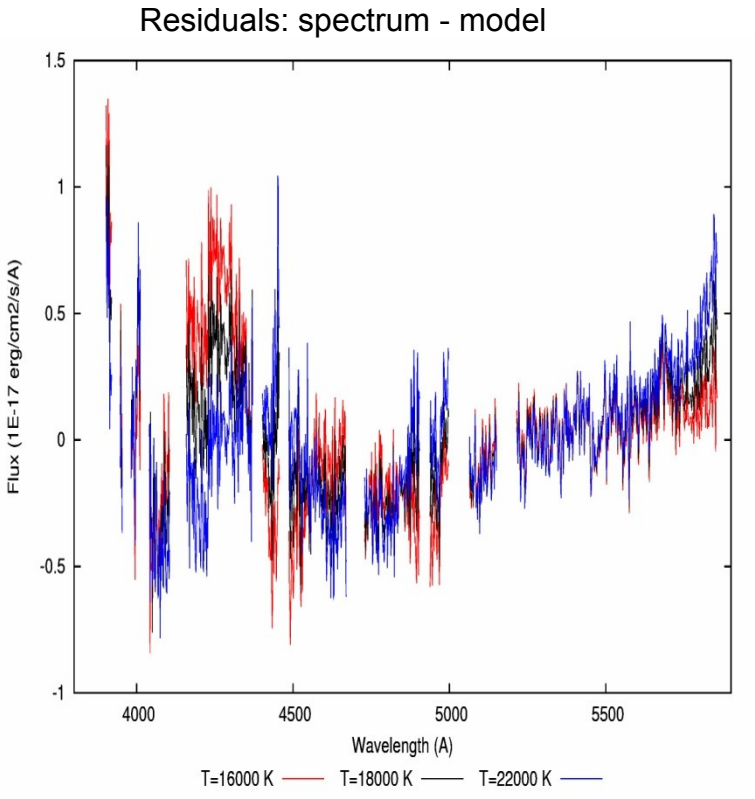
Log(g) = 7.5 or 8.0 or 8.5,

take Rwd = 0.0123 Rsun ,

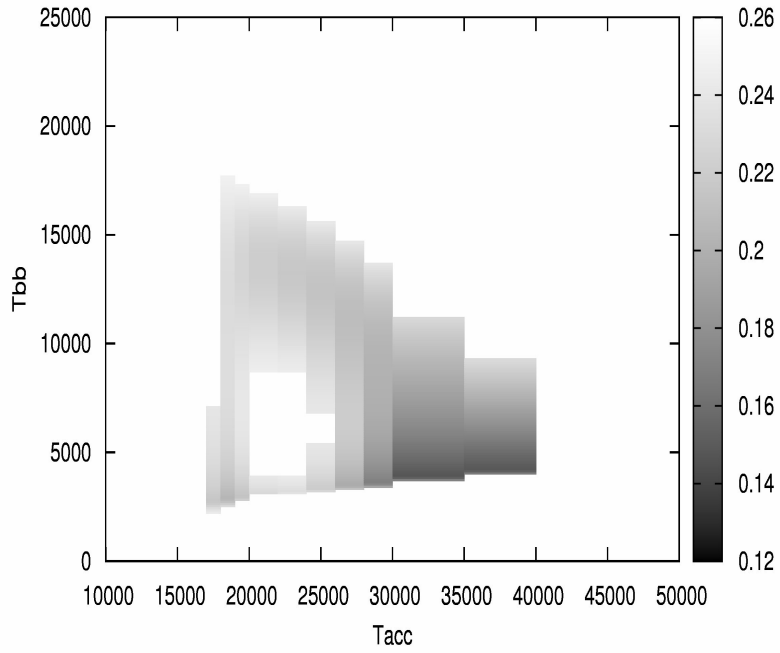
and use D as free parameter.

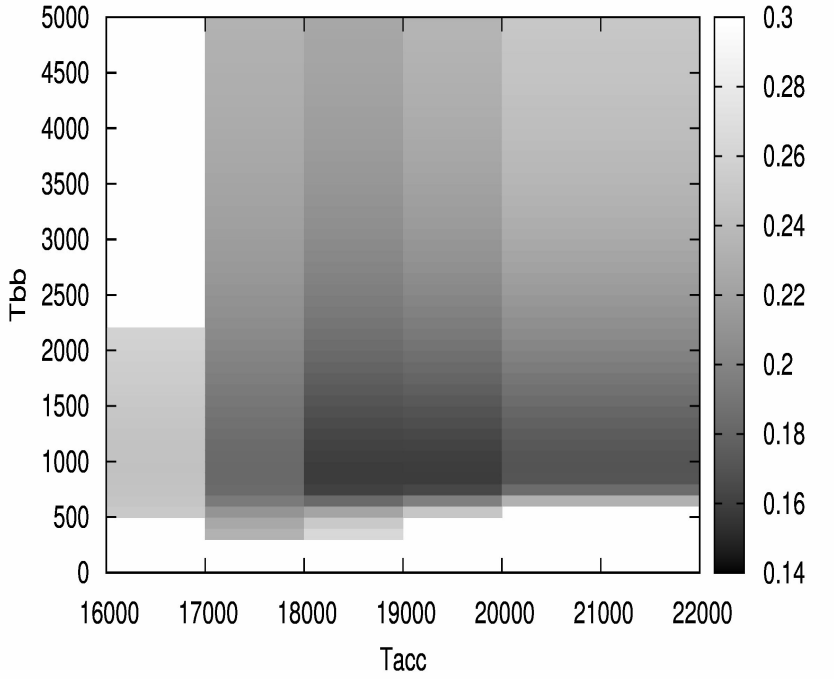
Fitting Koester DB models





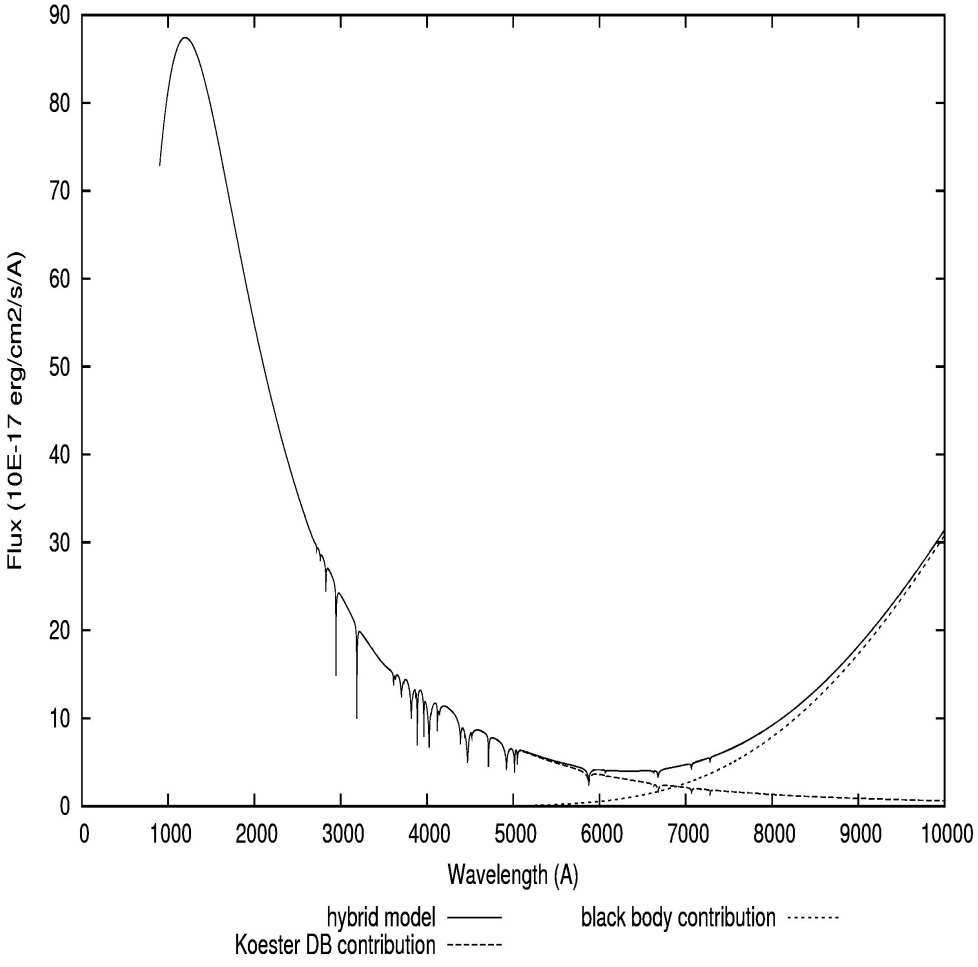
Fitting DB + BB models



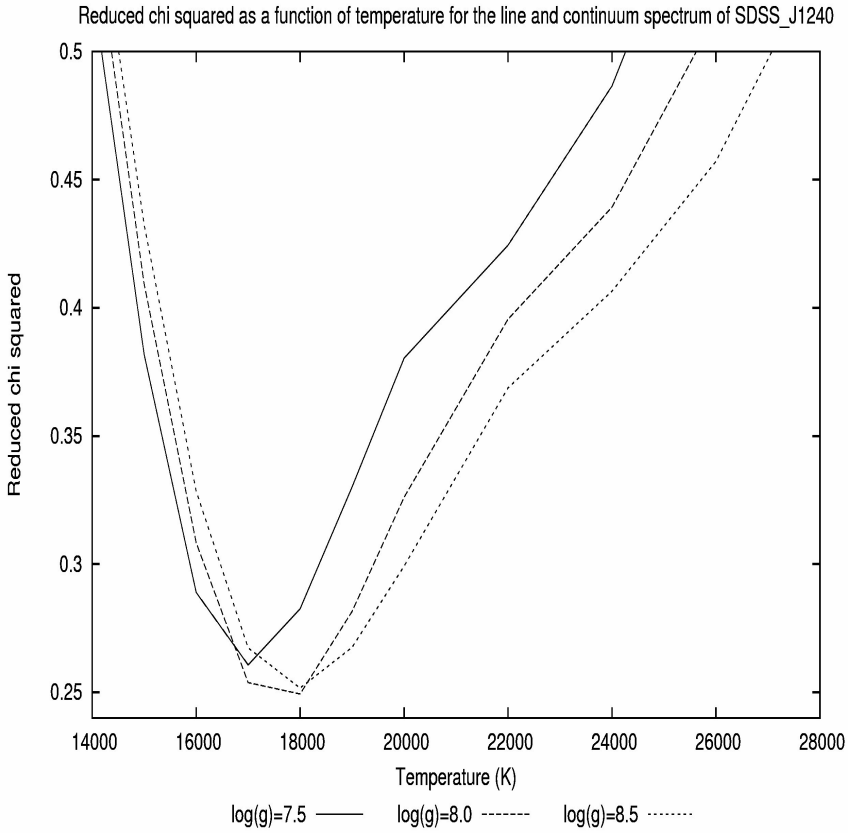


New parameters: 500 < Tbb < 5000, 1E-3*Awd < Abb < Arl1

Fitting DB + BB models



Results: SDSS J1240

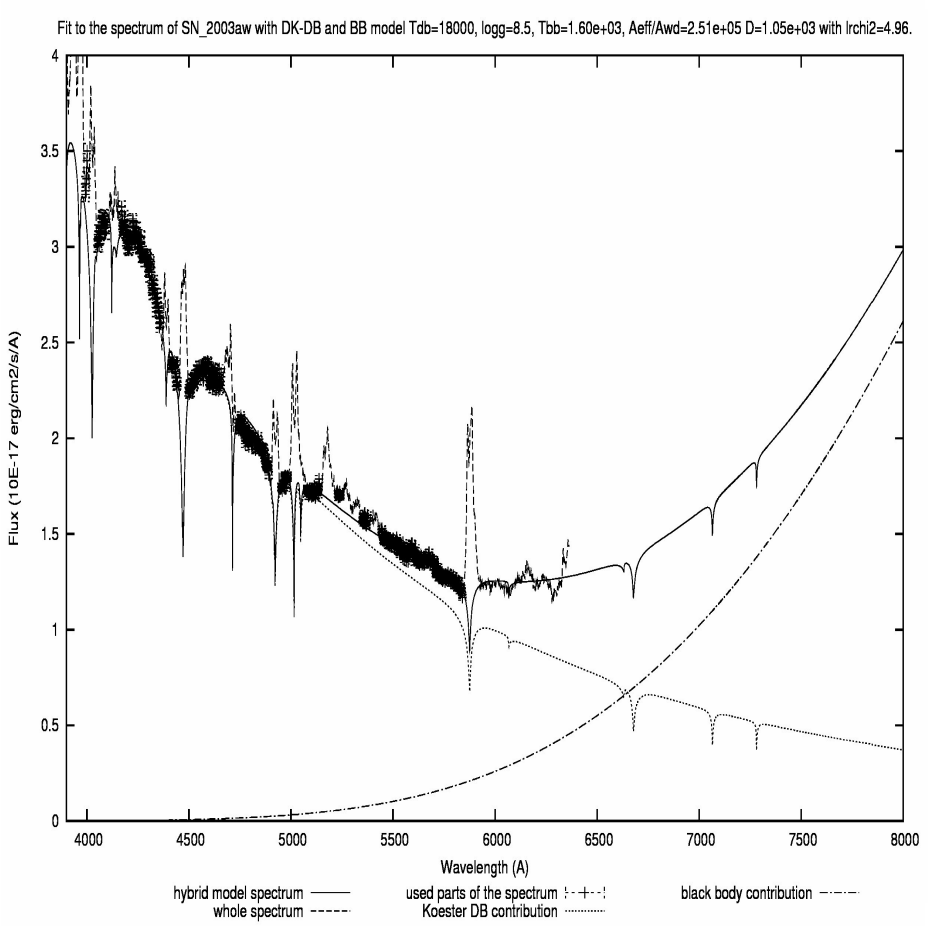


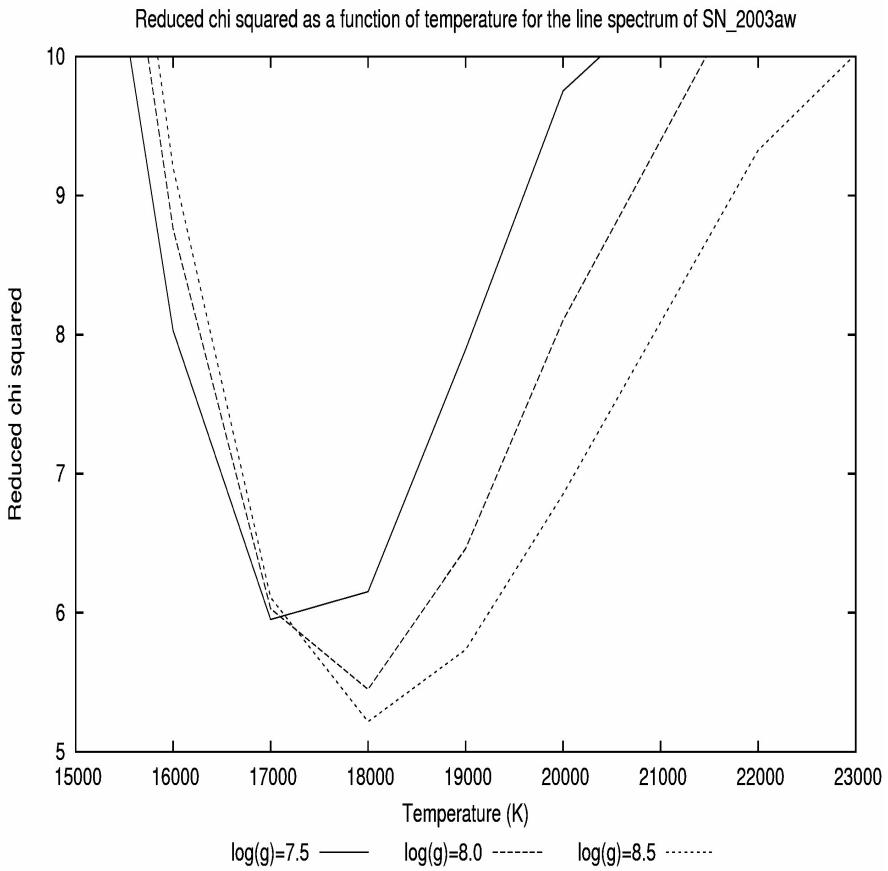
Best fit: T = 18 000K, log(g) = 8.0, D = 546 pc

16 000 K < T < 22 000 K, log(g) ≥ 8.0, D=546 ±107

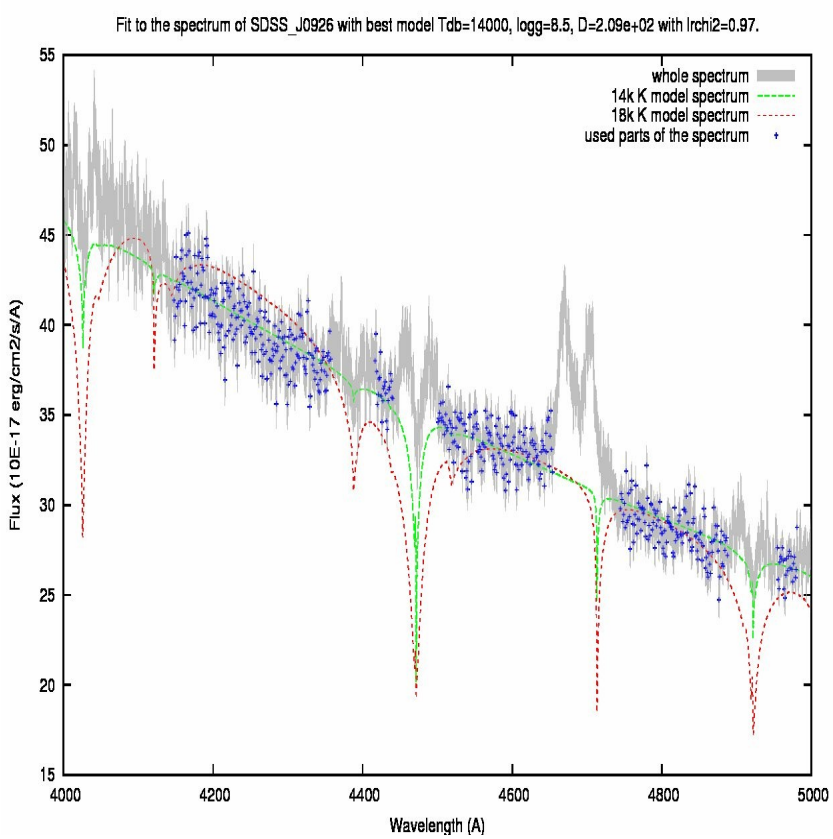
Results: SN 2003aw

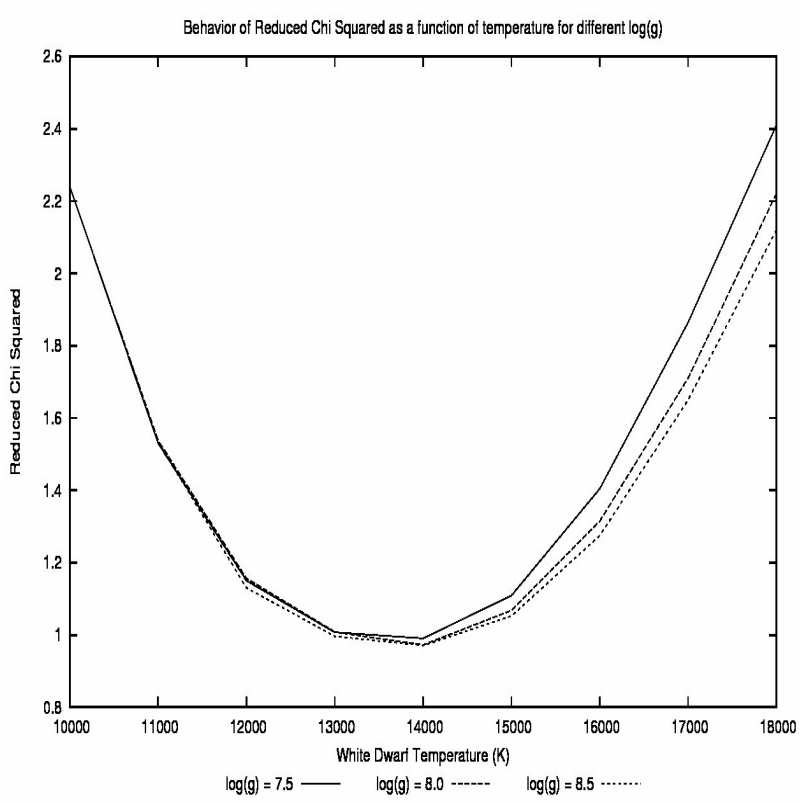
Spectrum from Roelofs et al. 2006





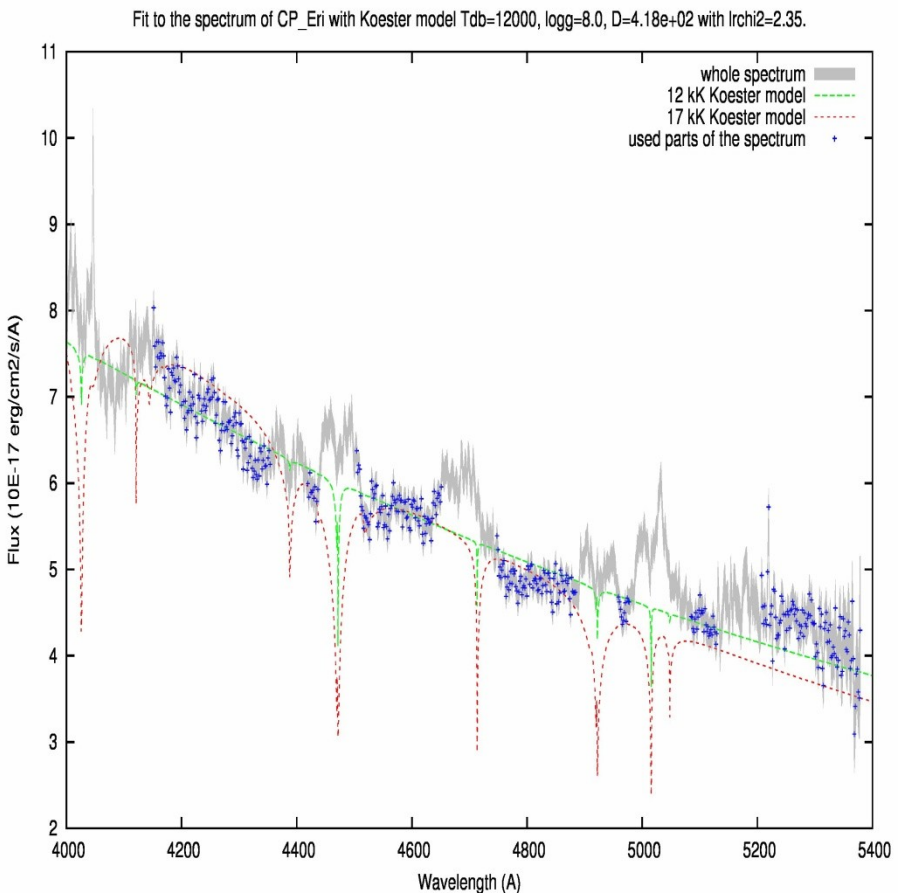
Results: SDSS J0926

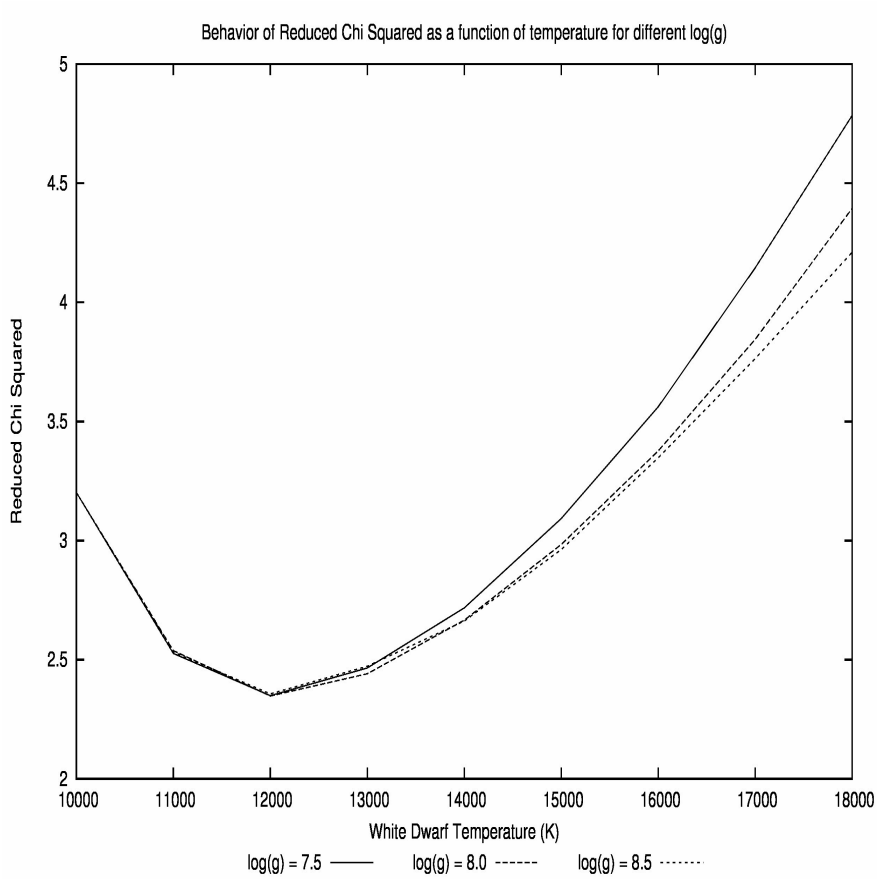




Results: CP Eri

Spectrum from Marsh





Results: overview

(Tlit from Bildsten et al. 2006)

System name	P (min)	T lit (kK)	Spectrum from	T (kK)	Log (g)	D (pc)
V 803 Cen	26.9	14	-	?	?	?
SDSS J0926	28.3	18	SDSS	14	?	208 ± 89
CP Eri	28.4	17	Marsh	12	≤ 8.0	419 ± 130
SN 2003aw	33.8	17	Roelofs	18	≥ 8.0	1047± 183
SDSS J0129	?	-	SDSS	≥ 13	?	?
2QZ J1427	?	-	Woudt	13	≤ 8.0	325 ± 141
SDSS J1240	37.4	17	Roelofs	18	≥ 8.0	546 ± 107
SDSS J1208	?	-	SDSS	12	?	297 ± 160
SDSS J1411	46.0	-	SDSS	15	≥ 8.0	430 ± 84
SDSS J1552	56.2	-	SDSS	13	?	662 ± 353

Conclusions

Uncertainties on temperatures are too high to draw strong conclusions about the accretion history, i.e. the donor entropy/formation channel, but

SDSS J0926 and CP Eri look relatively cold and light → WD channel ?

SDSS J1240 and SN2003 aw relatively hot and heavy → He Star channel ?

Hotter accretors look heavier as well

Quality of spectra too low to fit DB + BB credibly

To find a trace of the donor from a multicomponent fit we need wider (say 300 – 1900 nm) intermediate resolution spectra → X-shooter !