CHE stars – as the source of photoionization and C IV emission in dwarf galaxies

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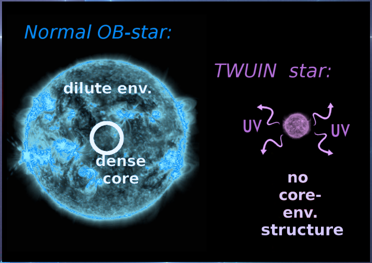

Royal Observatory, Edinburgh, UK
14th May 2019

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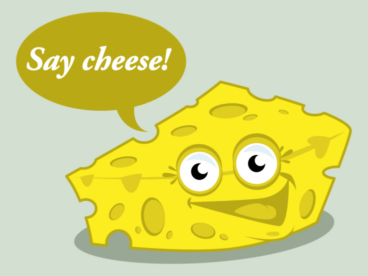

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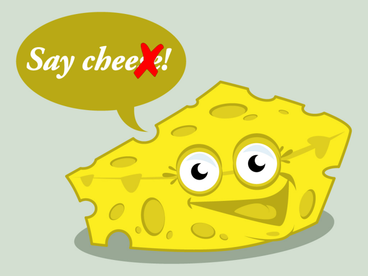

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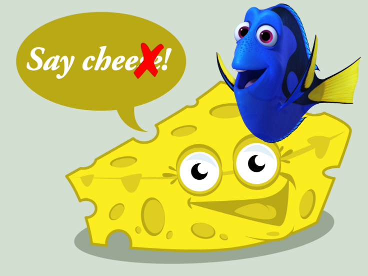

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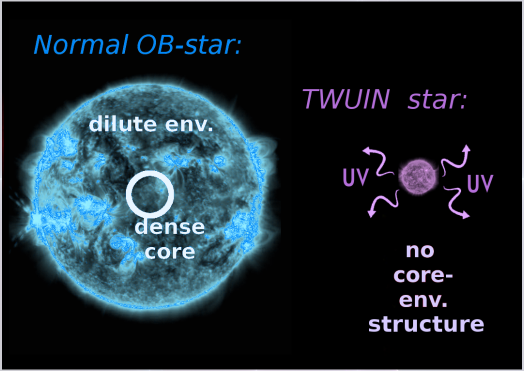
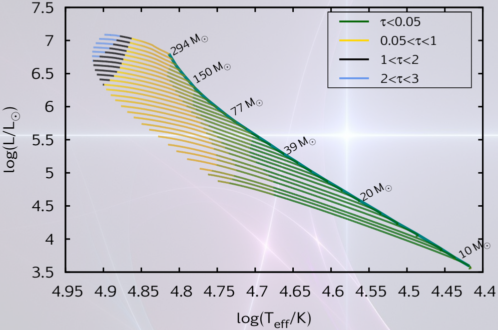
Chem.hom.evolving stars



Transparent
Wind UV-INtense
≈
Chemically-
Homogeneously
Evolving

Szécsi & Langer et al. (2015) *A&A* 581, A15 – Paper I
Kubátová & Szécsi et al. (2019) *A&A* 623, A8 – Paper II
Szécsi & Kubátová et al., subm. *A&A* – Paper III?

Transparent wind?



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$$\tau(R) = \frac{\kappa \dot{M}}{4\pi R (v_\infty - v_0)} \ln \frac{v_\infty}{v_0}$$

Langer (1989) *A&A* 210, 93
Szécsi & Langer et al. (2015) *A&A* 581, A15 – Paper I

Transparent wind?

$Q(\mathrm{He\,II})^{observed} = 1.33\mathrm{e}50\ \gamma/\mathrm{s}$ I Zwicky 18 *(Kehrig et al. 2015)*

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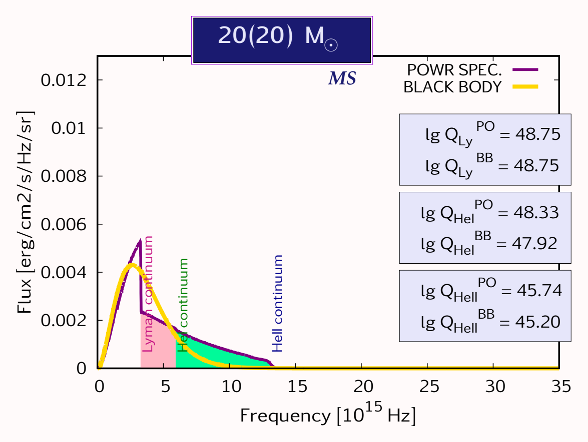
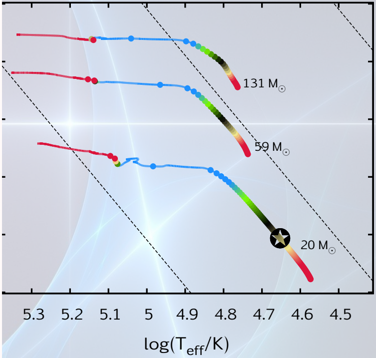
Szécsi & Langer et al. (2015) *A&A* 581, A15 – Paper I

PoWR spectra of CHE stars...

(Kubátová & Szécsi et al. 2019
A&A 623, A8 – Paper II)

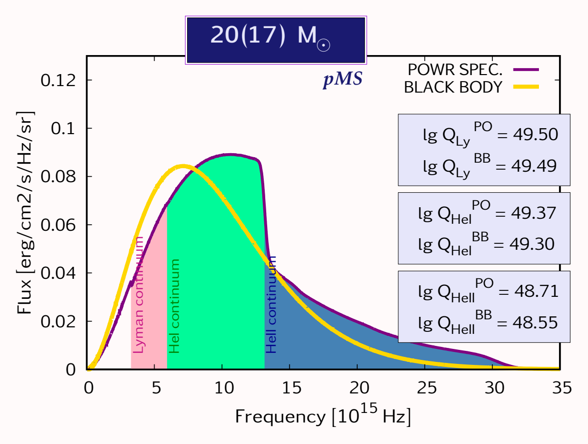
PoWR spectra vs. BB

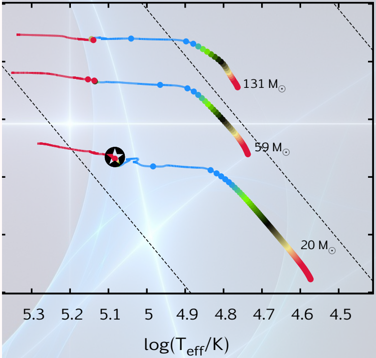




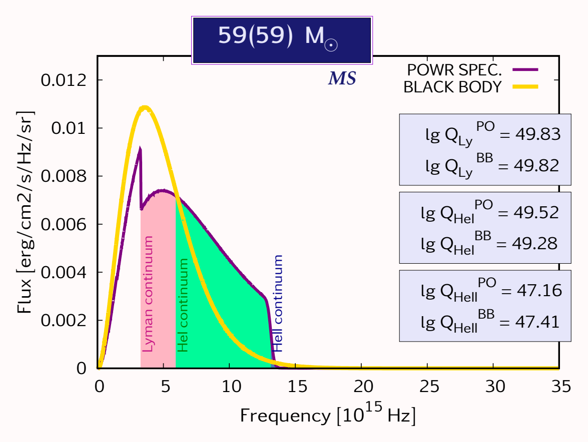
PoWR spectra vs. BB

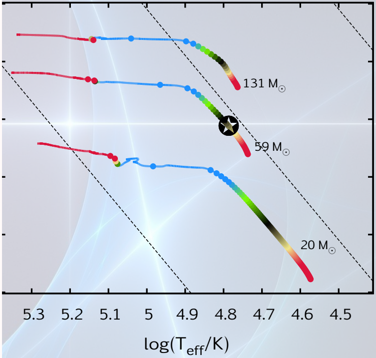
Dorottya Szécsi:
CHE stars –
ionization & carbon emission





PoWR spectra vs. BB





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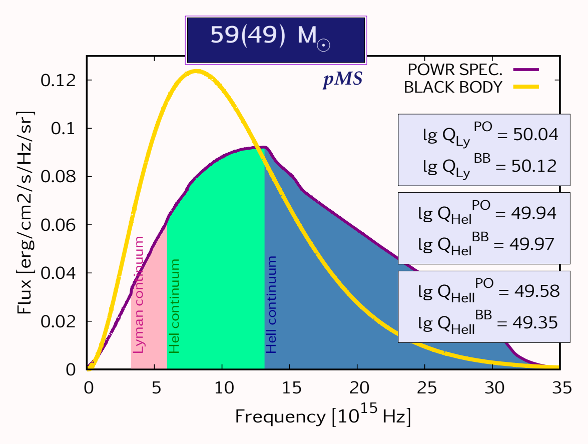

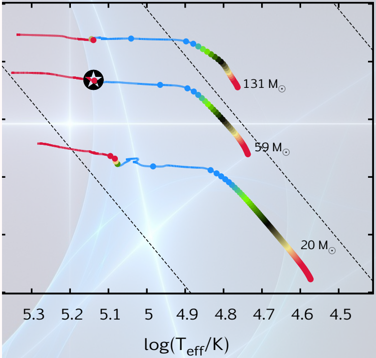

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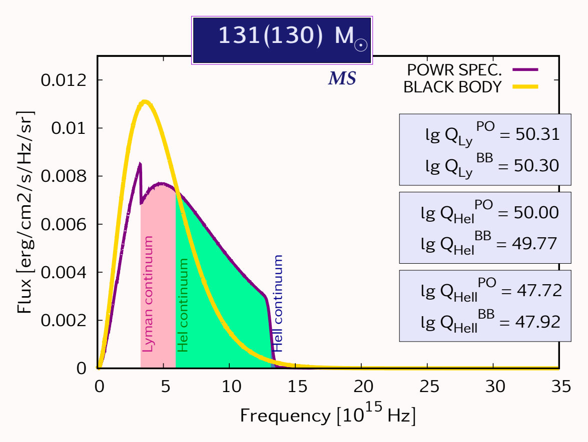

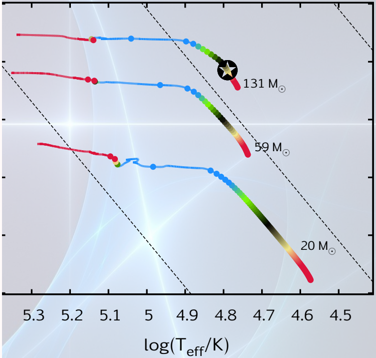

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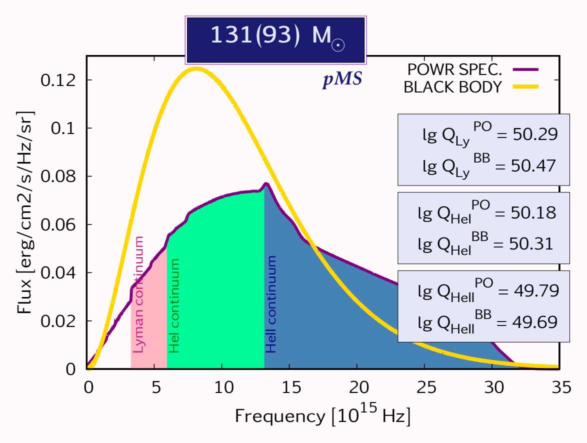

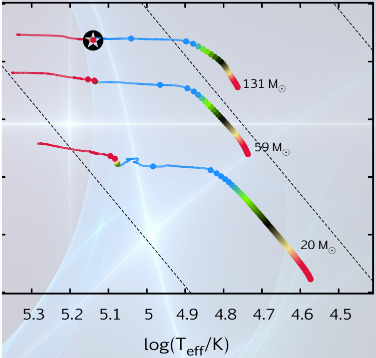

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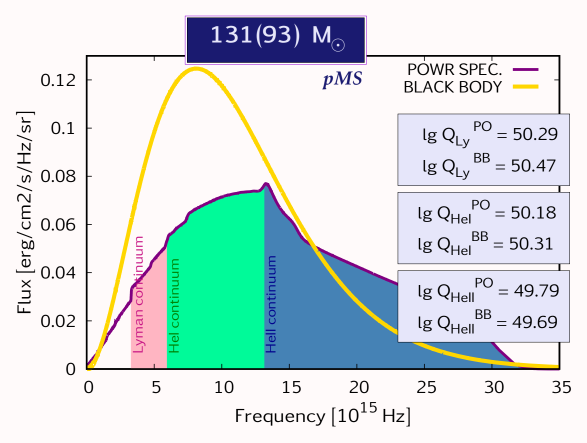

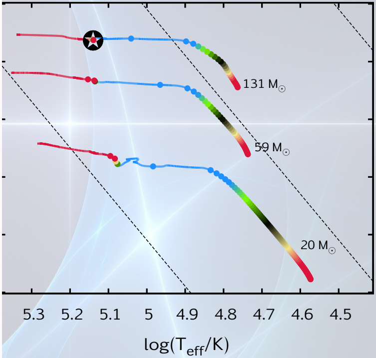

PoWR spectra vs. BB

- Szécsi & Langer et al. (2015):
  - correcting T_{eff} for wind optical depth τ
  - Black Body (!)
  - using only Main Sequence phases
  - Salpeter IMF with $M_{up} = 500\ M_{\odot}$
  - 20% of stars evolve with CHE
- $Q(\text{He II})^{synt.pop.} = 1.60\text{e}50\ \gamma/\text{s}$

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- *This work:*
  - PoWR SED

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- *This work:*
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  - including post-MS
  - $M_{\text{up}} = 150\ M_\odot$

I Zwicky 18 *(Kehrig et al. 2015)* $Q(\text{He II})^{observed} = 1.33e50\ \gamma/s$

PoWR spectra vs. BB

- Szécsi & Langer et al. (2015):
  - correcting T_{eff} for wind optical depth τ
  - Black Body (!)
  - using only Main Sequence phases
  - Salpeter IMF with $M_{up} = 500\ M_\odot$
  - 20% of stars evolve with CHE
- $Q(\text{He II})^{synt.pop.} = 1.60e50\ \gamma/s$

- *This work:*
  - PoWR SED
  - including post-MS
  - $M_{up} = 150\ M_\odot$
  - 10% CHE

I Zwicky 18 *(Kehrig et al. 2015)* $Q(\text{He II})^{observed} = 1.33e50\ \gamma/s$

PoWR spectra vs. BB

- Szécsi & Langer et al. (2015):
    - correcting T_{eff} for wind optical depth τ
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    - using only Main Sequence phases
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    - 20% of stars evolve with CHE
- $Q(\text{He II})^{synt.pop.} = 1.60e50\ \gamma/s$

- *This work:*
    - PoWR SED
    - including post-MS
    - $M_{up} = 150\ M_\odot$
    - 10% CHE
- $Q(\text{He II})^{syn.pop.} = 1.92e50\ \gamma/s$

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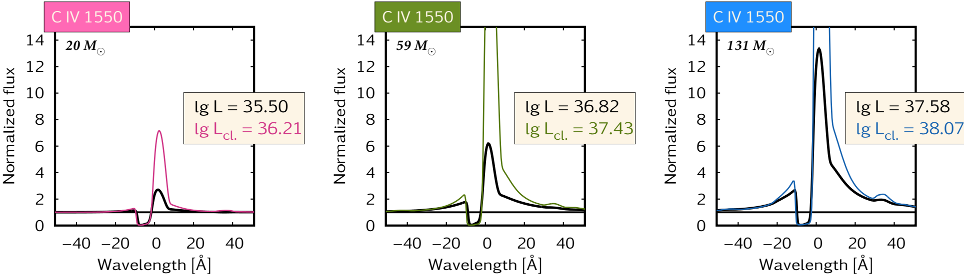
C IV λ1550 Å line lum.^{observed} = 4.67e37 erg/s

(Brown et al. 2002)

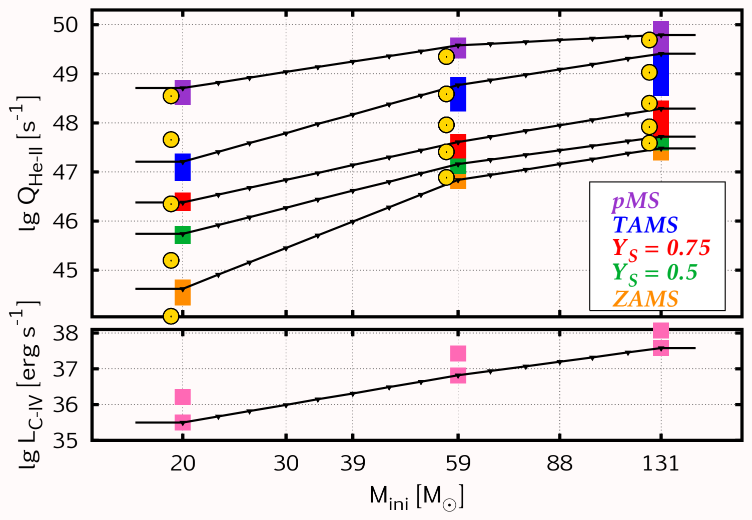
$^{synt.pop.}$ = 4.42e37 erg/s

This work

Line luminosities in C IV $\lambda 1550$ Å



Interpolation



HRD with τ-corrected T_{eff}

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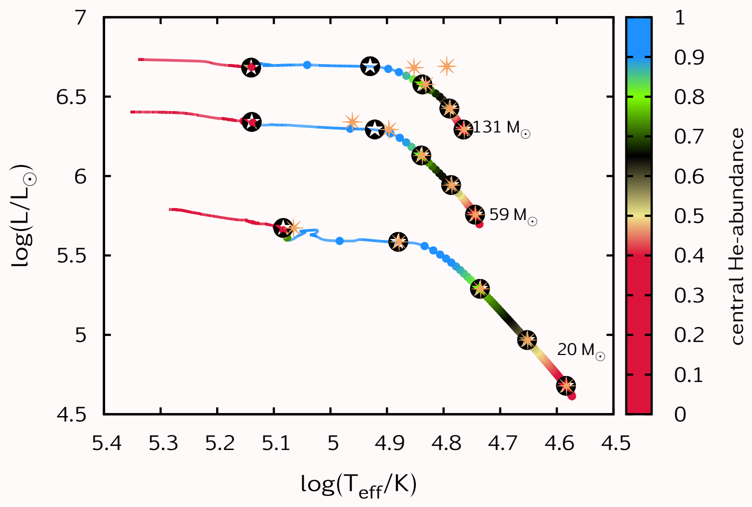
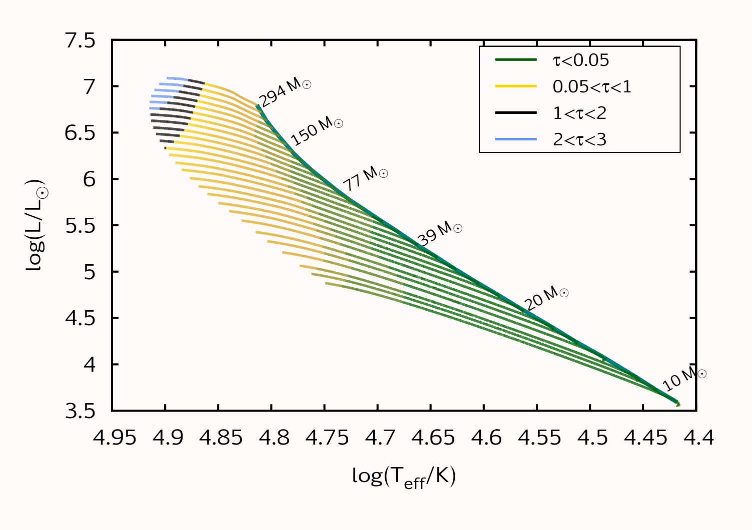
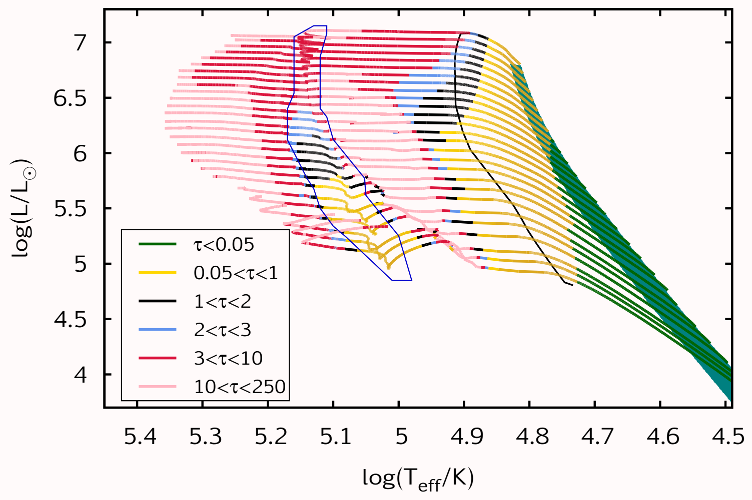


HRD with only MS evolution



HRD with post-MS evolution



HRD with post-MS evolution