

Fluorescence in Orion

understanding the hydrogen spectrum

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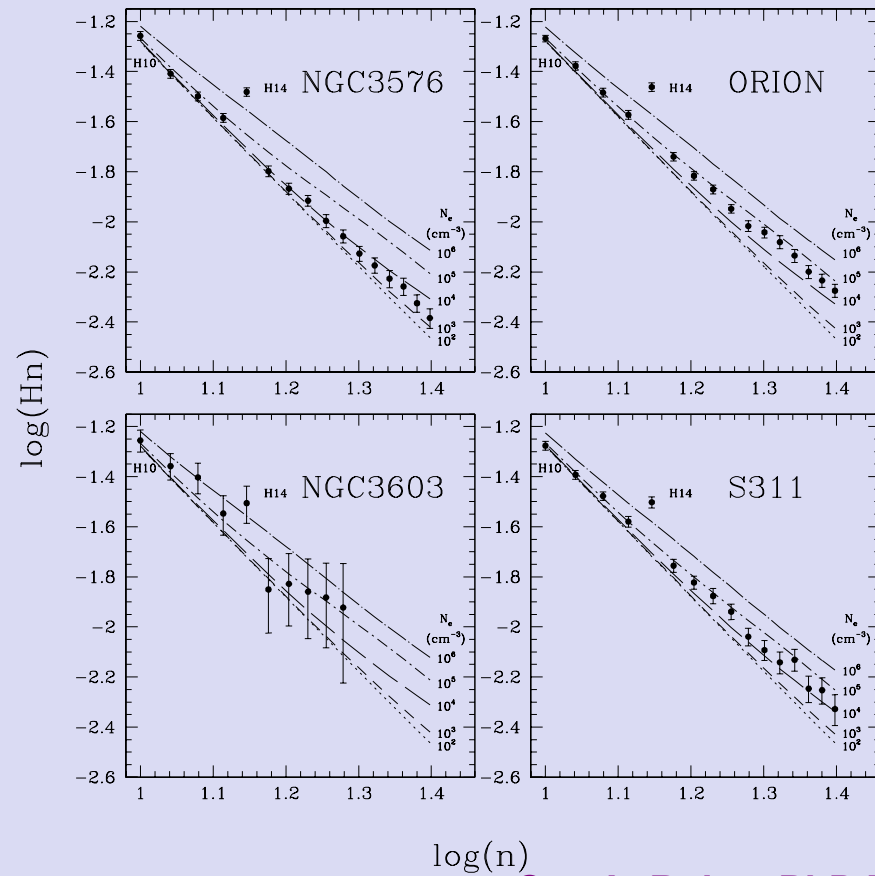


2nd NCAC Symposium
The Orion Nebula

Warsaw, 16-18 July 2012

Observational data point at deviations from case B behavior

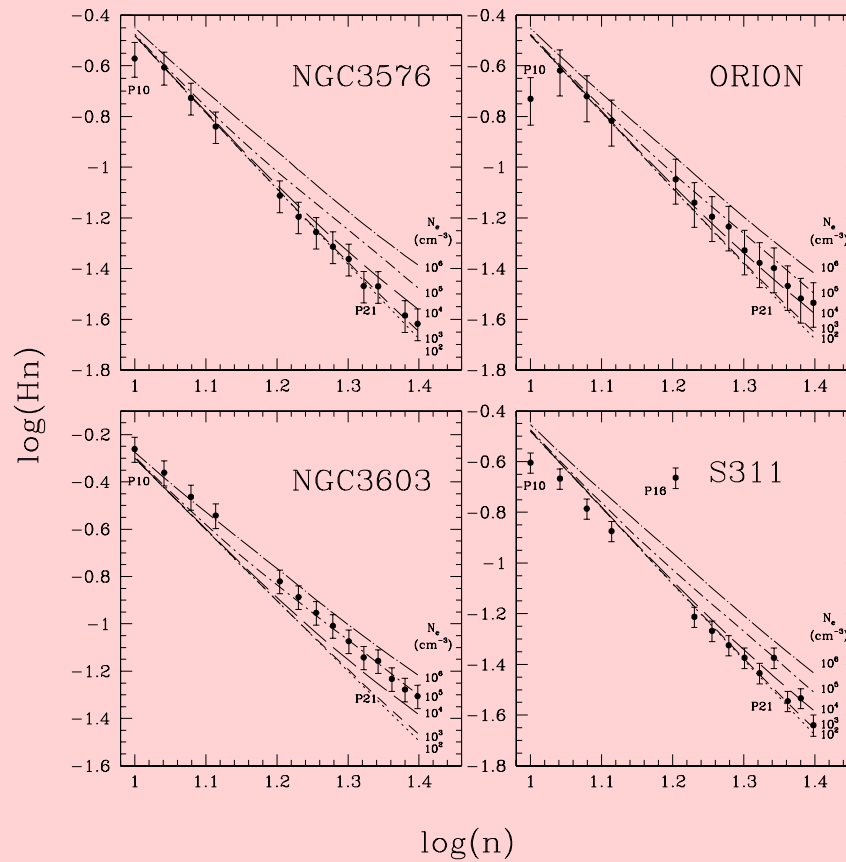
Balmer lines



García-Rojas, PhD Thesis (2006)

Observational data point at deviations from case B behavior

Paschen lines

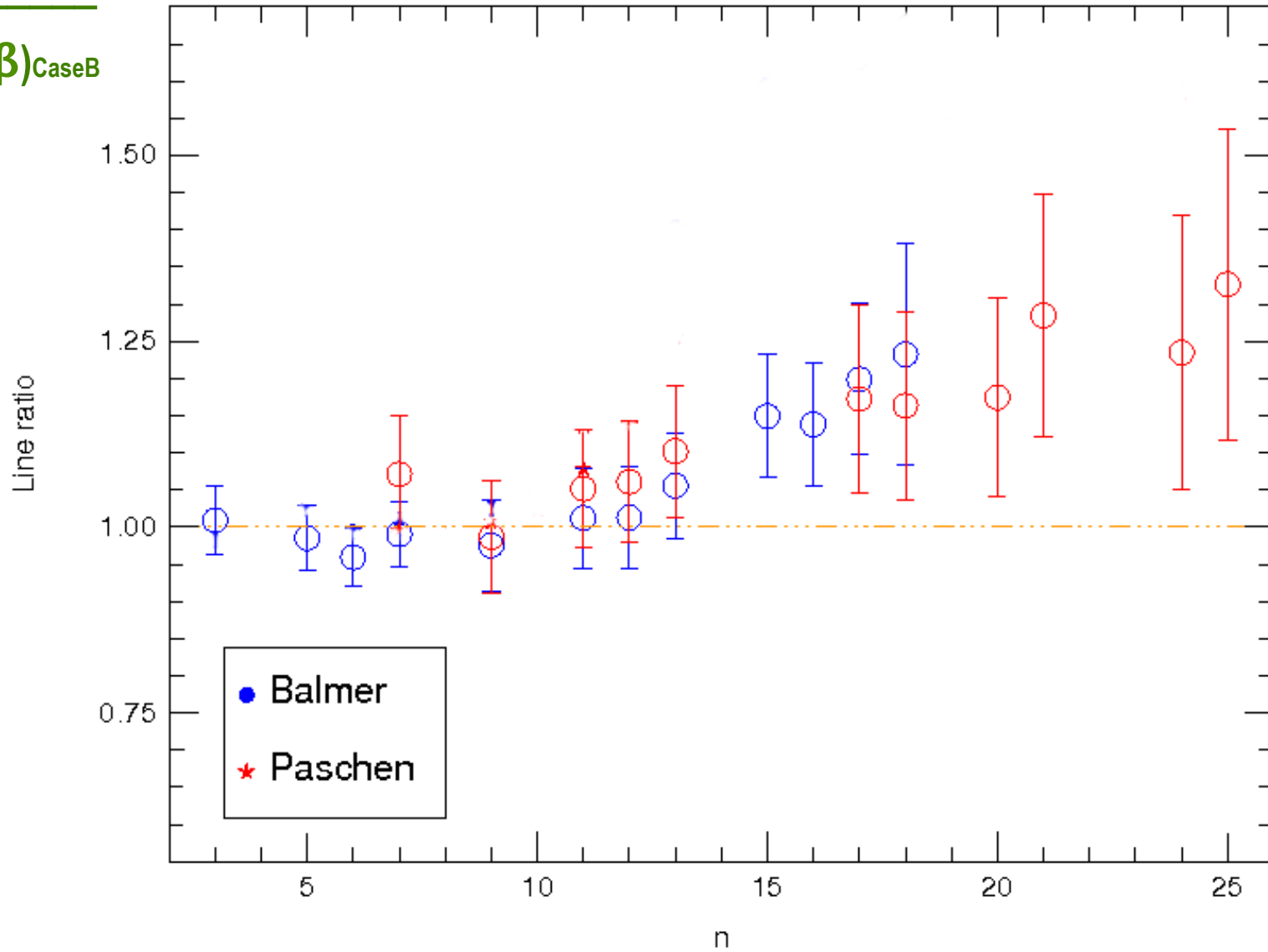


García-Rojas, PhD Thesis (2006)

$I(\lambda)/I(H\beta)$

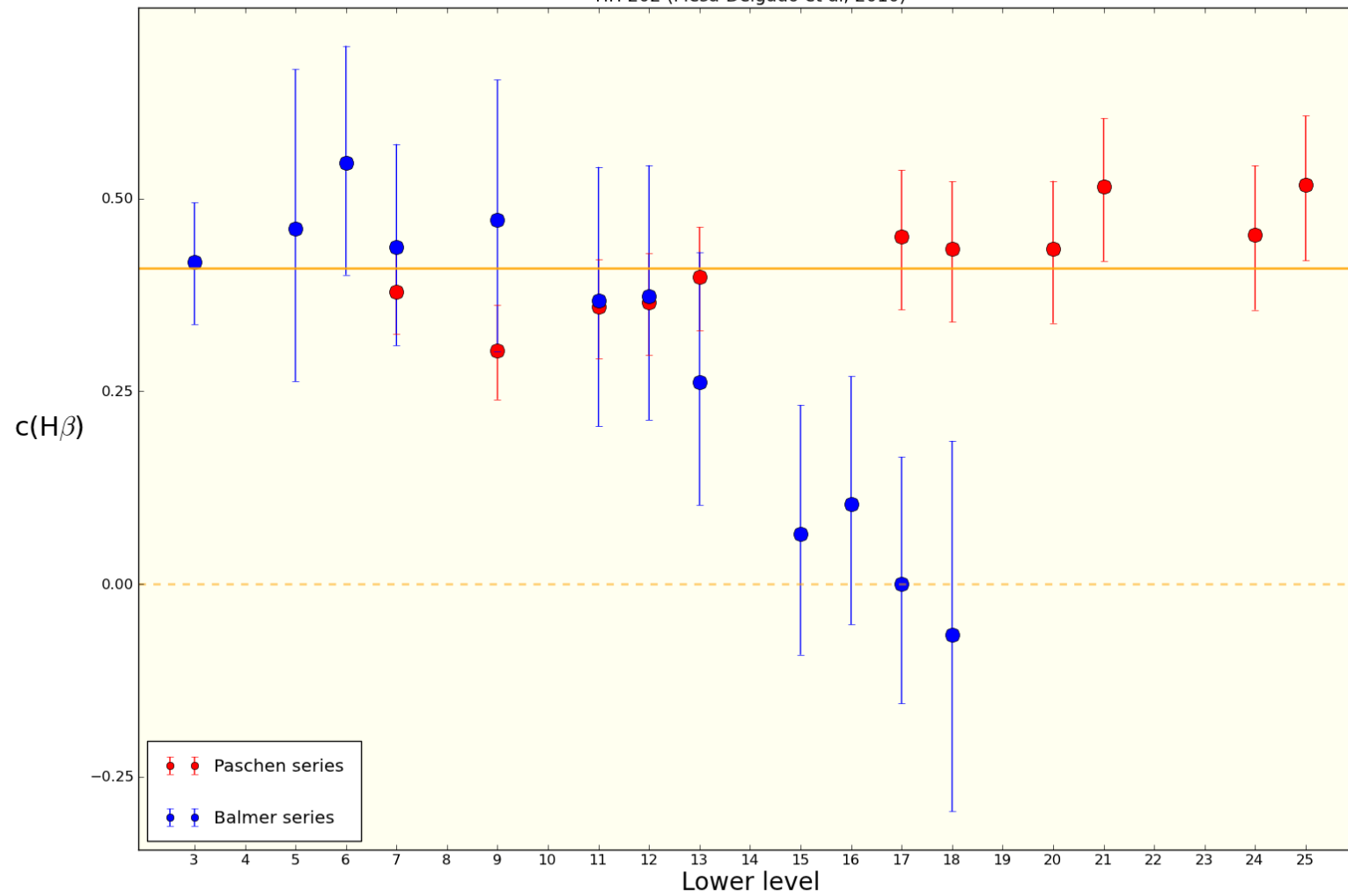
$I(\lambda)/I(H\beta)_{\text{CaseB}}$

HH202

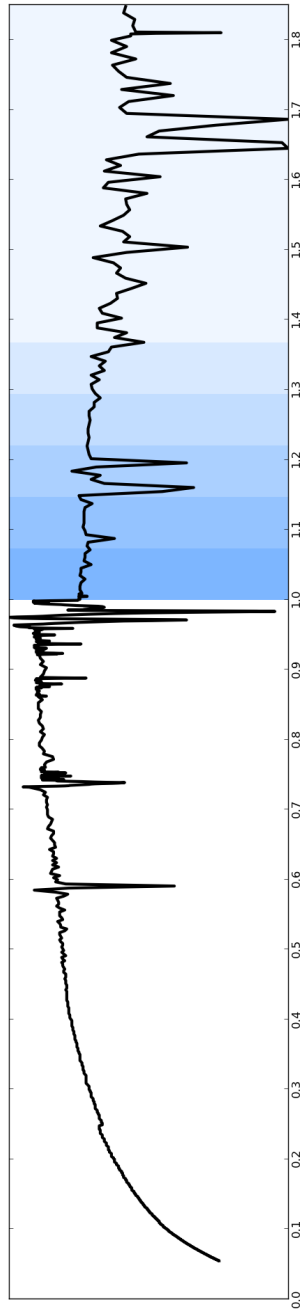


Mesa-Delgado et al 2009

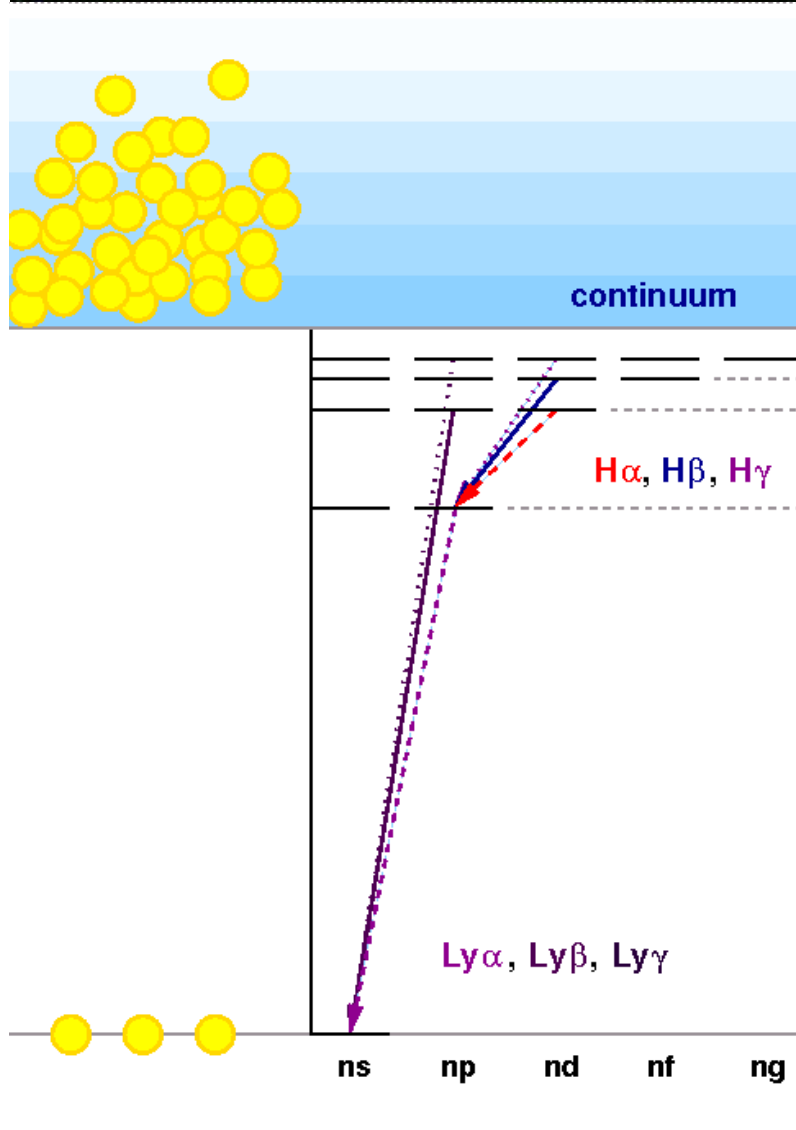
HH 202 (Mesa-Delgado et al, 2010)



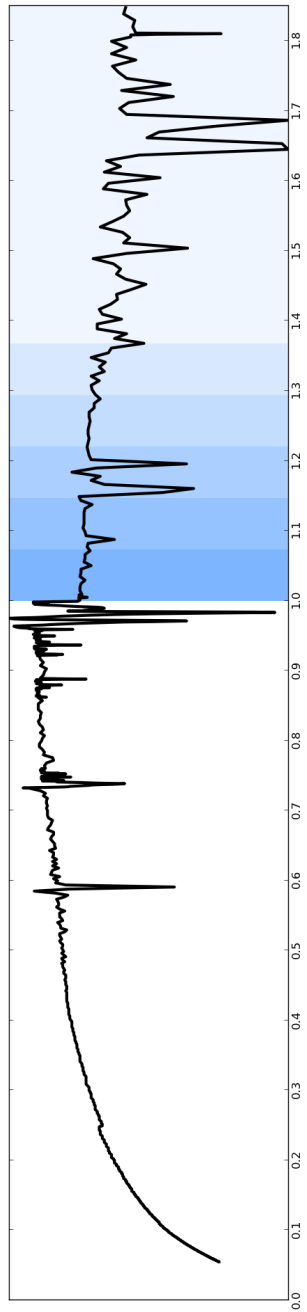
A brief review of nebular cases



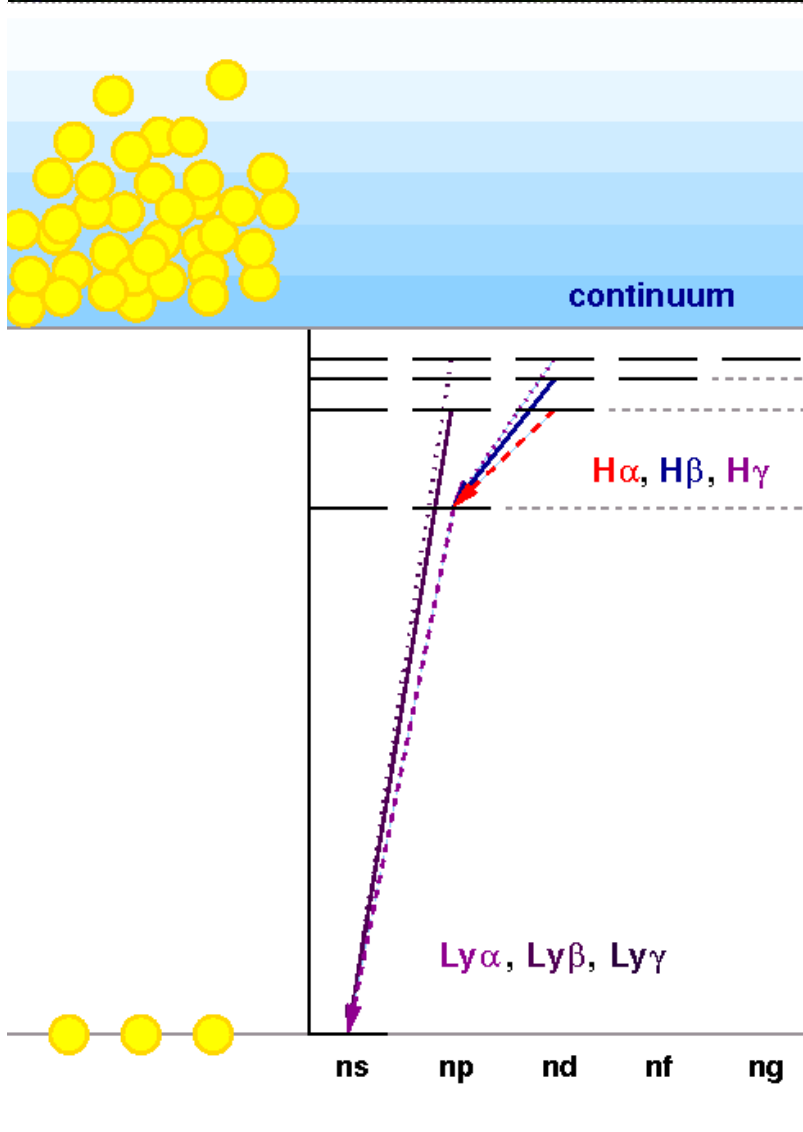
spectrum by
Simón -Díaz



A brief review of nebular cases



spectrum by
Simón -Díaz



case A:

Ly-photons escape

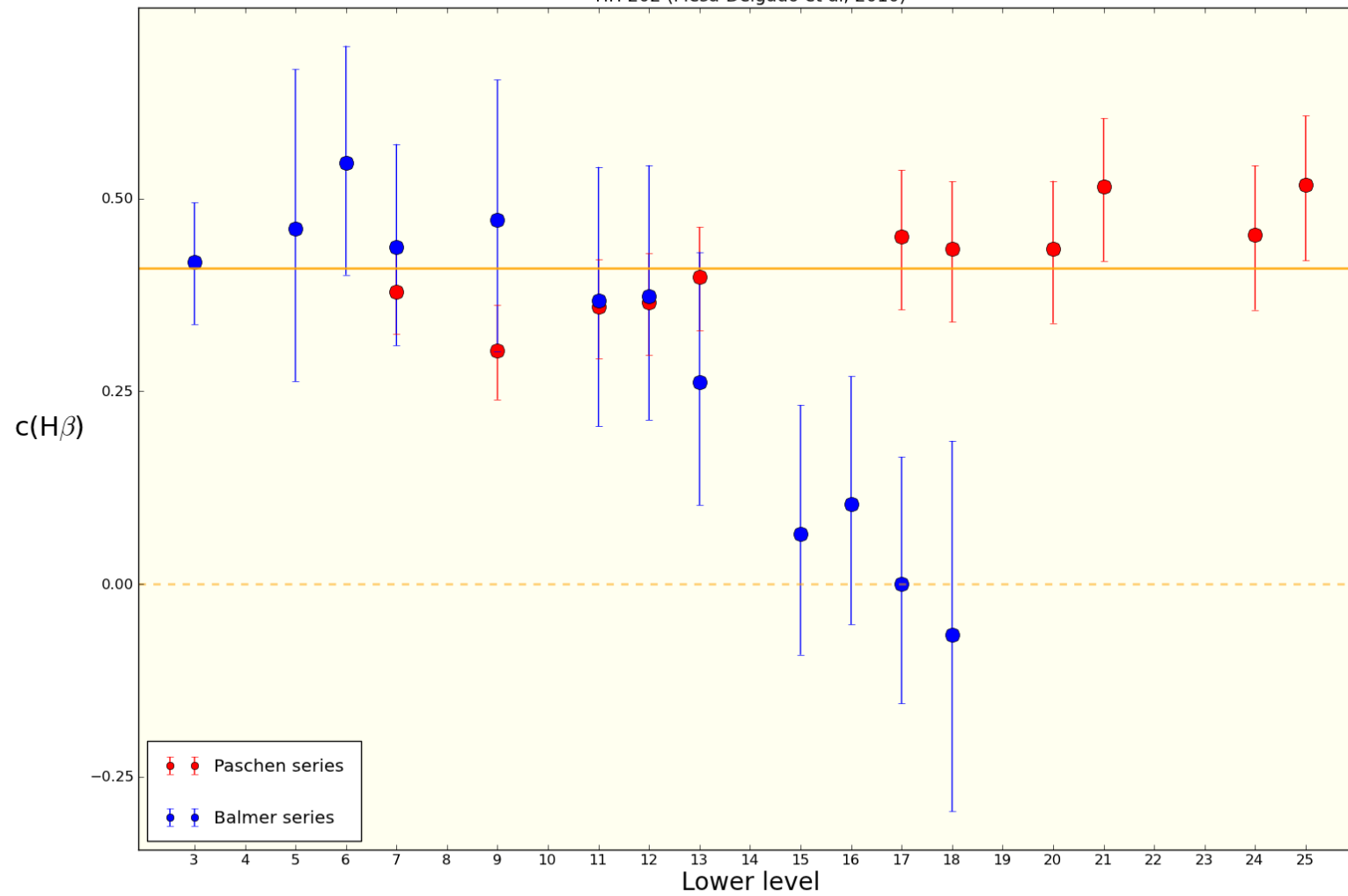


case B:

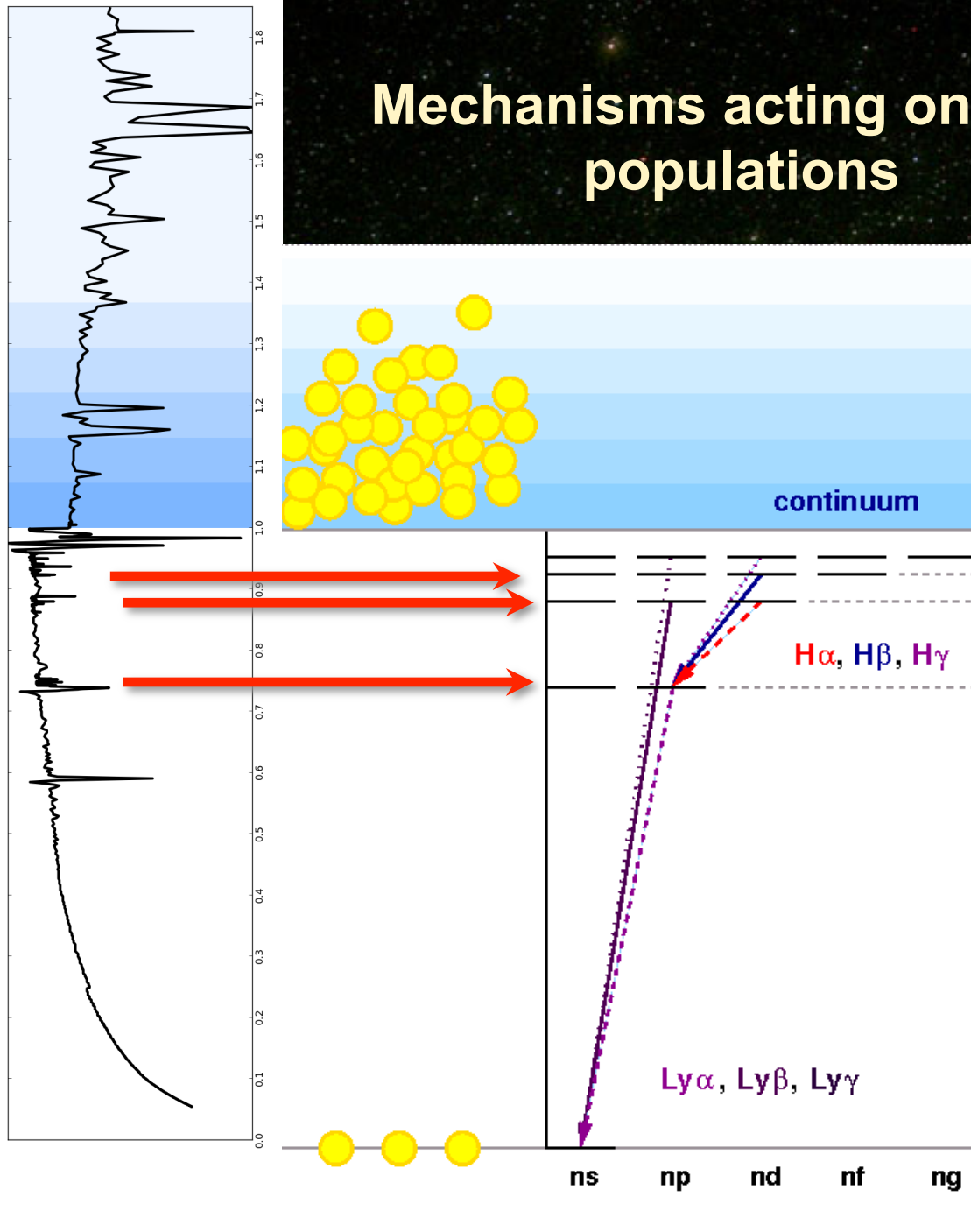
Ly-photons reabsorbed



HH 202 (Mesa-Delgado et al, 2010)



Mechanisms acting on level populations

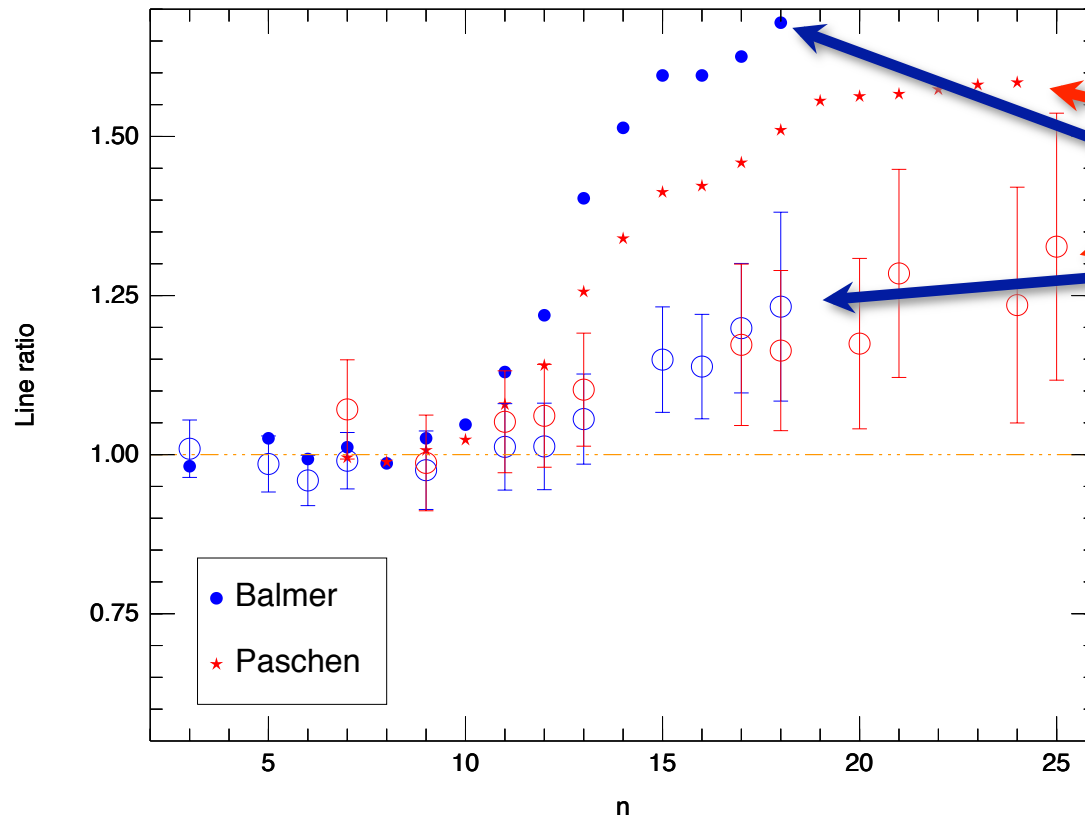


- Radiative cascade

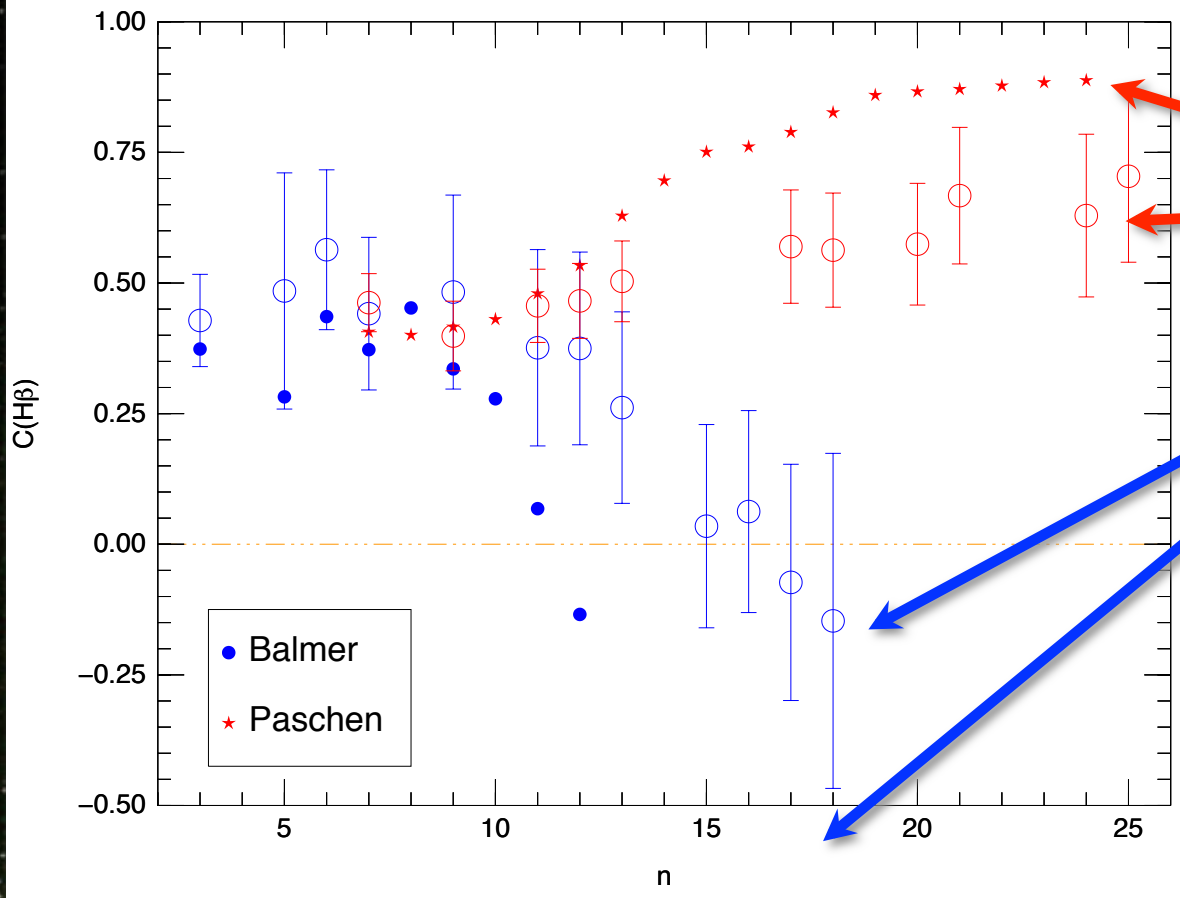
- Collisions $\left\{ \begin{array}{l} \text{E-changing} \\ \text{/-changing} \end{array} \right.$

- Absorption of stellar photons

Predicted H-line intensities in a standard Orion model

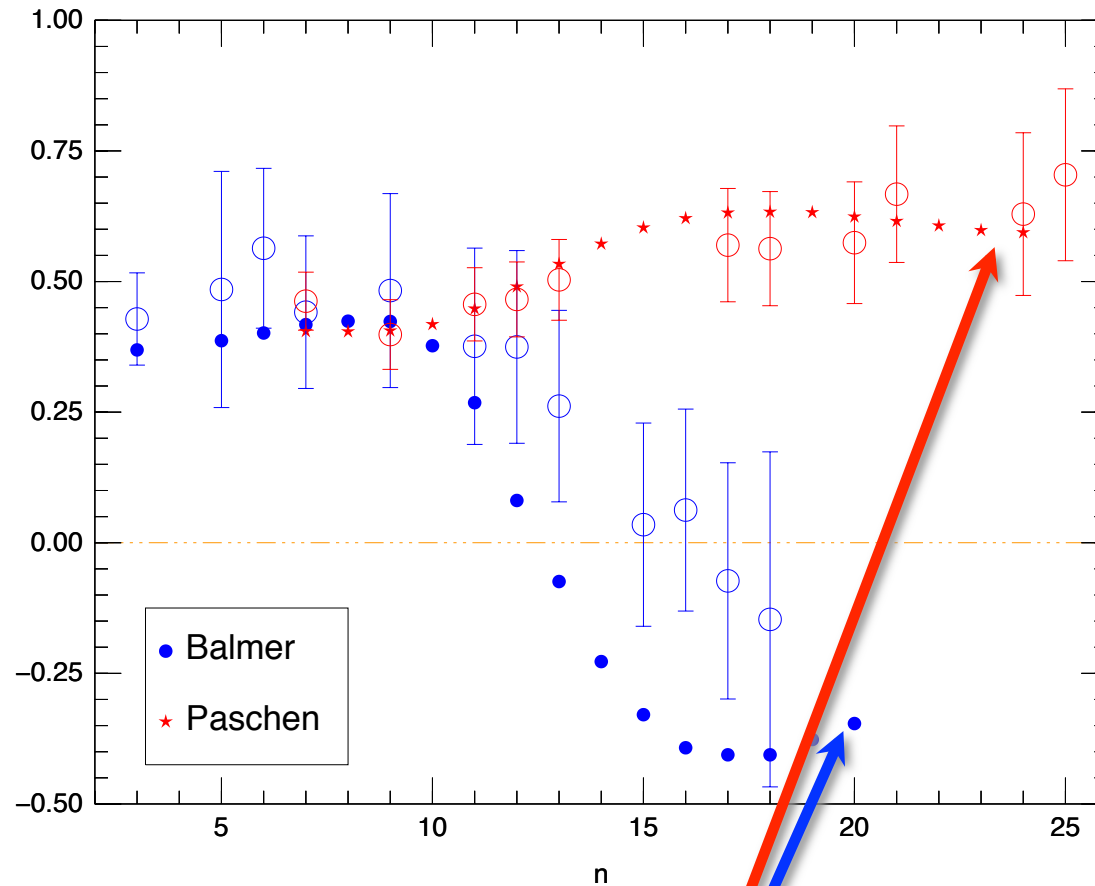
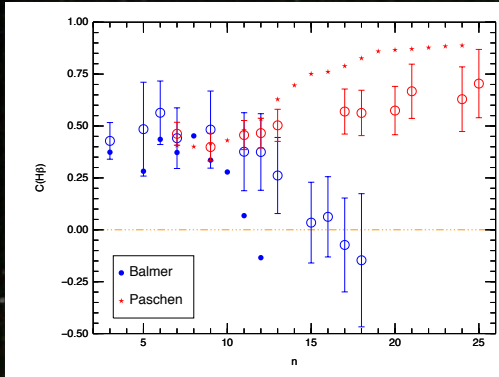


the model
outdoes
the data



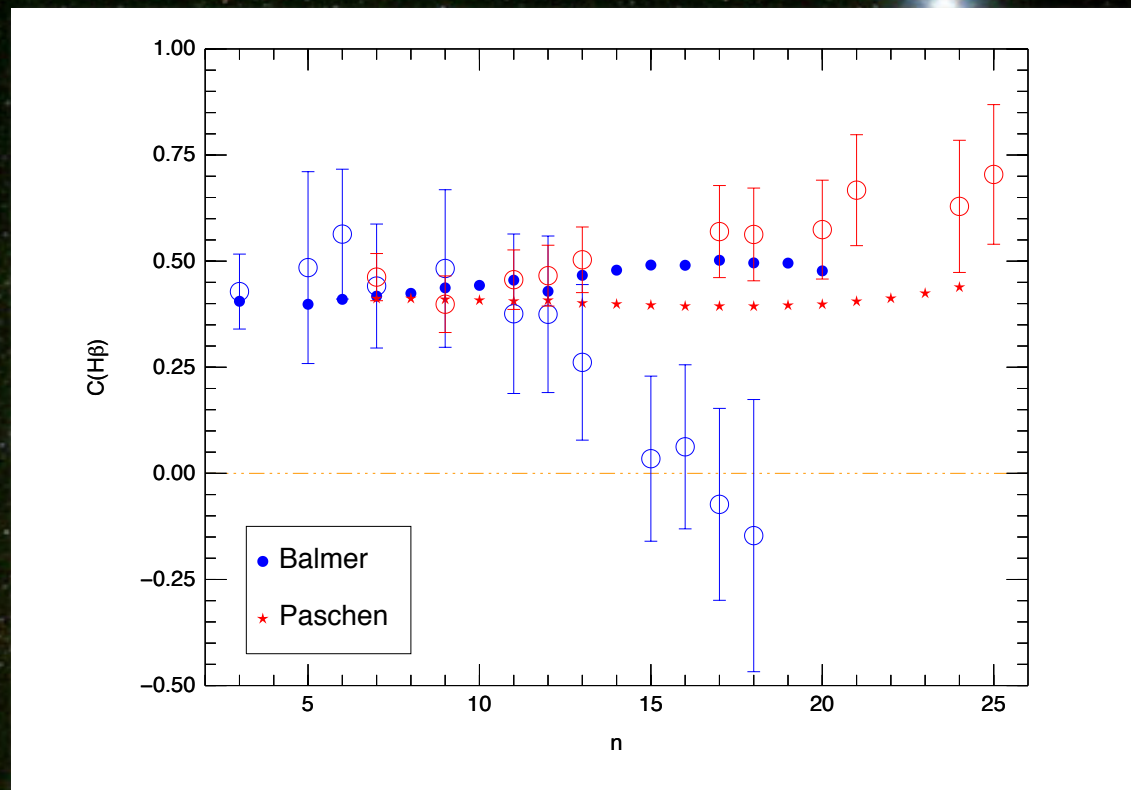
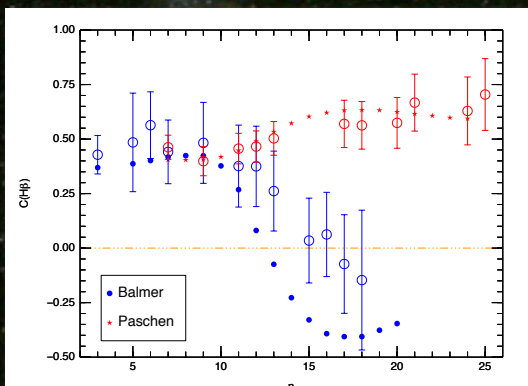
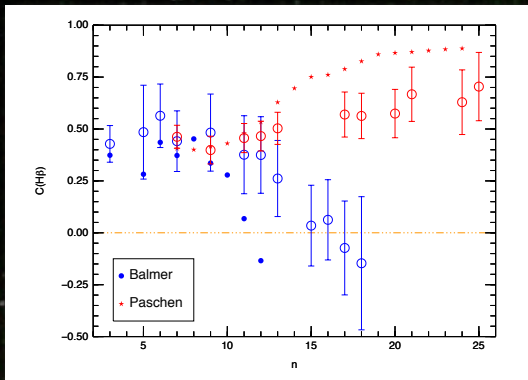
the model
outdoes
the data

What happens if we suppress fluorescent excitation?



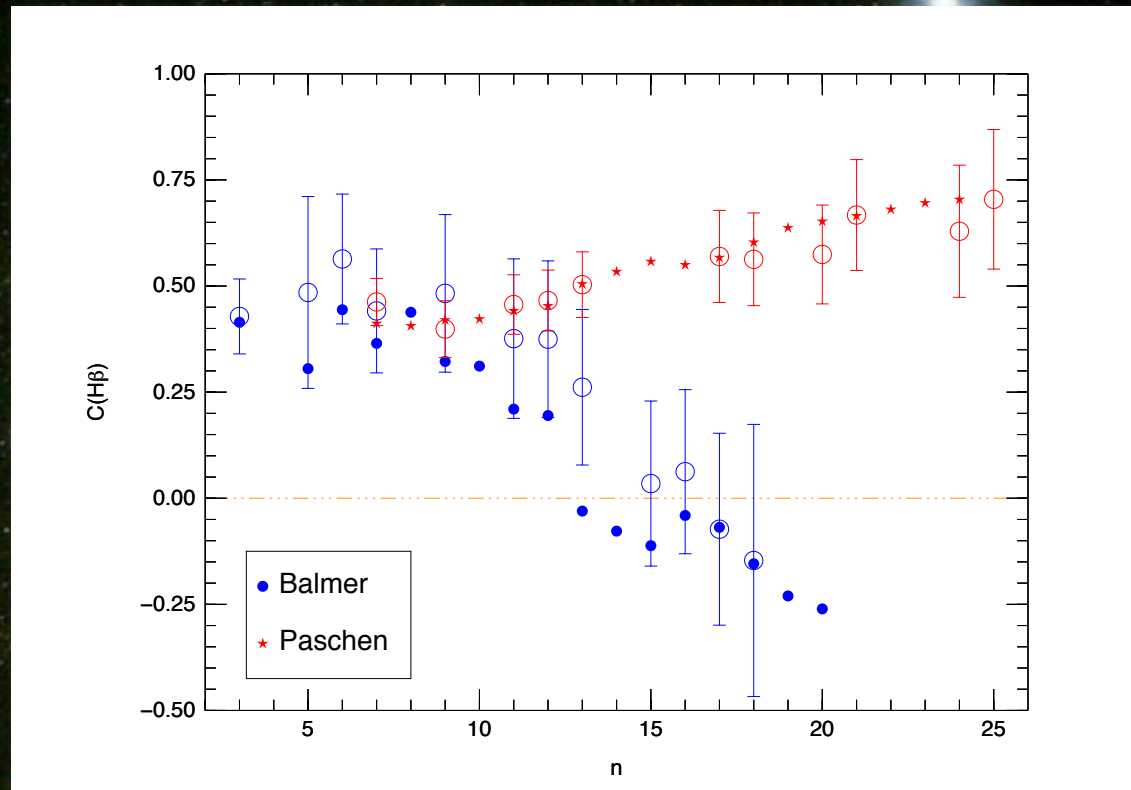
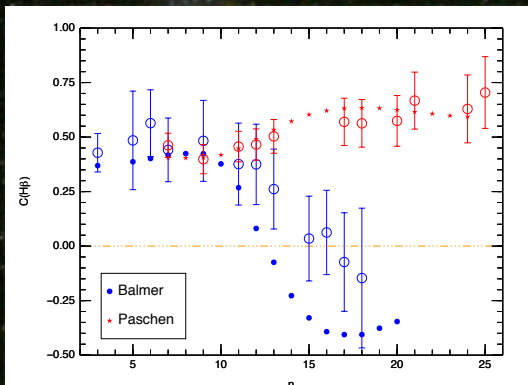
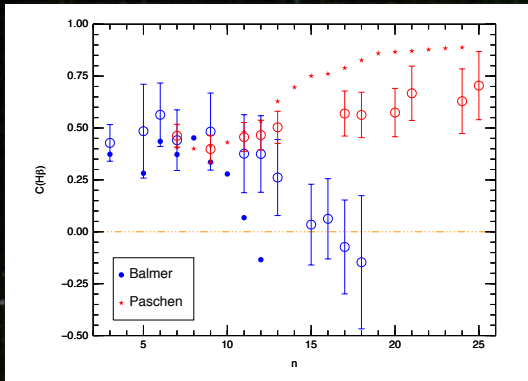
Still not case B!

Getting closer to case B: l-changing collisions suppressed



May it be a combined effect of **fluorescence** + **collisions**...?

Fluorescence beautifully explains the observed line ratios



... or is it the effect of **fluorescence** alone?

Correspondence between the features of the spectrum

Thank you!

