Expanding atmosphere models for SSS

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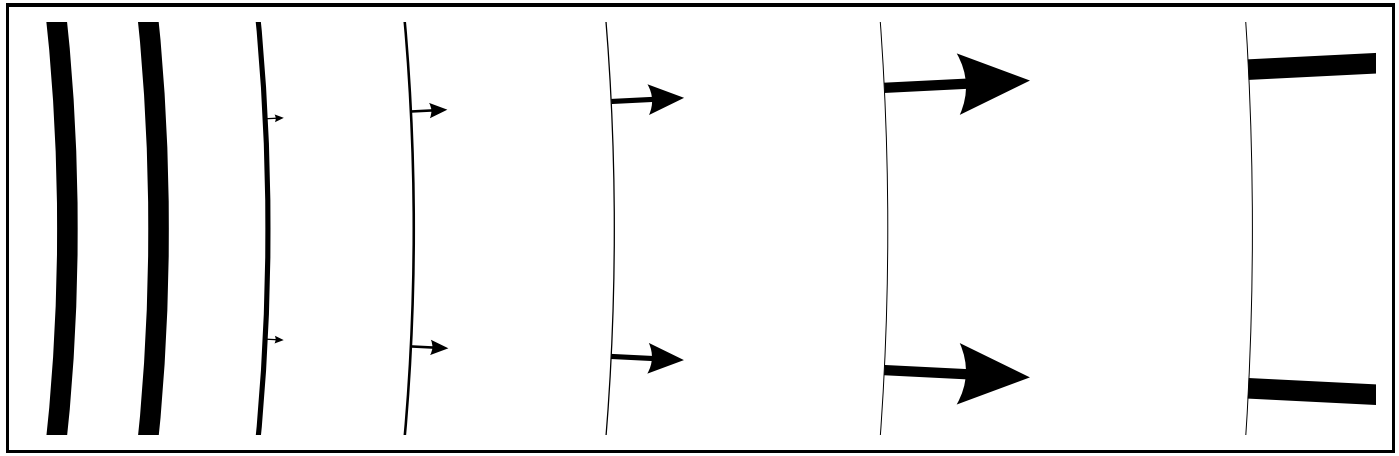
May 12, 2009



Main Collaborators

- Peter Hauschildt (Hamburg)
- Sebastian Knop (Hamburg)
- Ed Baron (U. of Oklahoma)
- Jan-Uwe Ness (ESAC, Madrid)

Outline

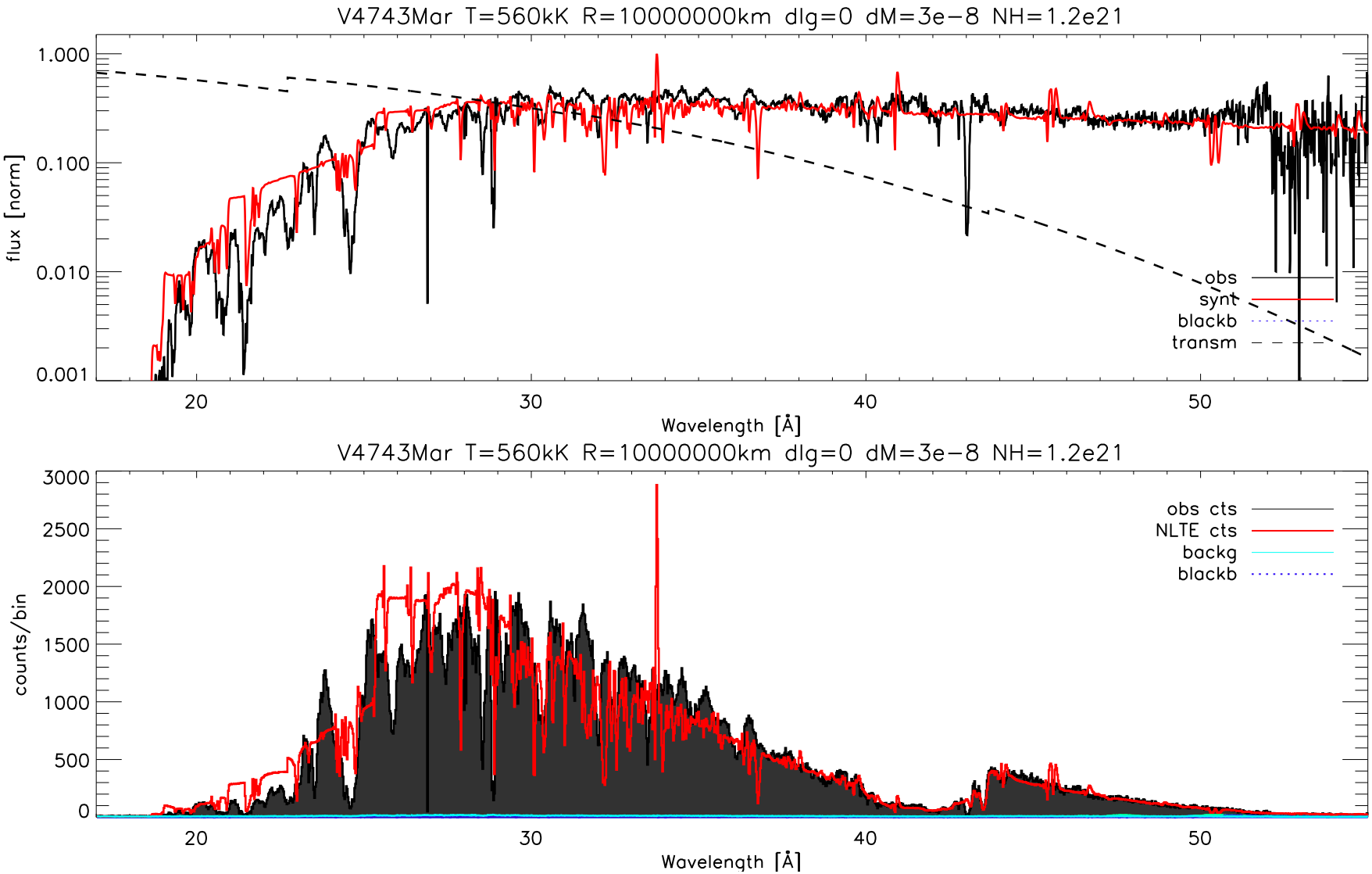
PHOENIX

General-purpose stellar atmosphere code

- radiative transfer $\longrightarrow$ operator splitting
- NLTE
- 1D spherical symmetric
- expanding media

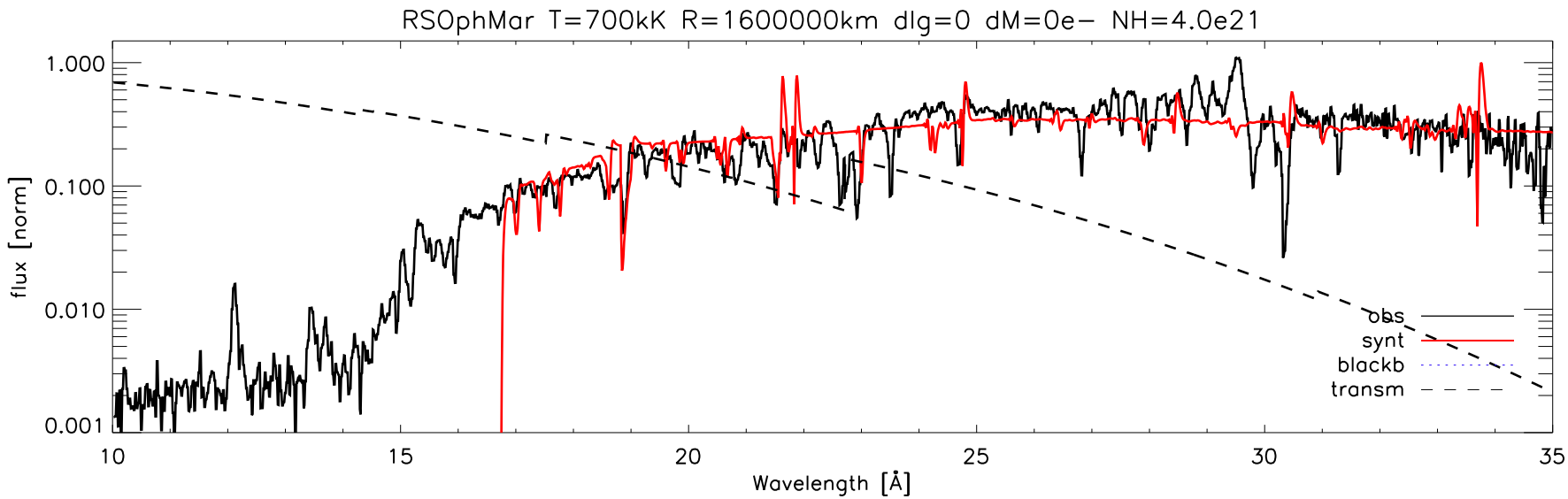
[Hauschildt & Baron 1998]

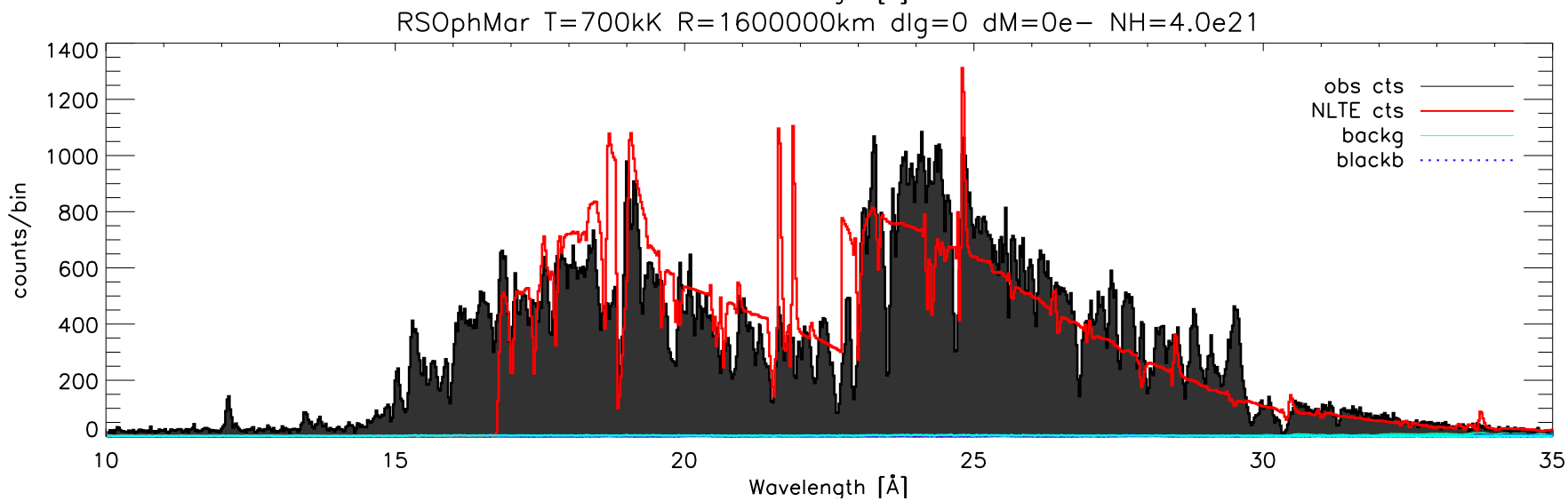
Previous SSS work with PHOENIX



[Petz et al. 2005]

Old models to new data





Improvements to the models

New physics:

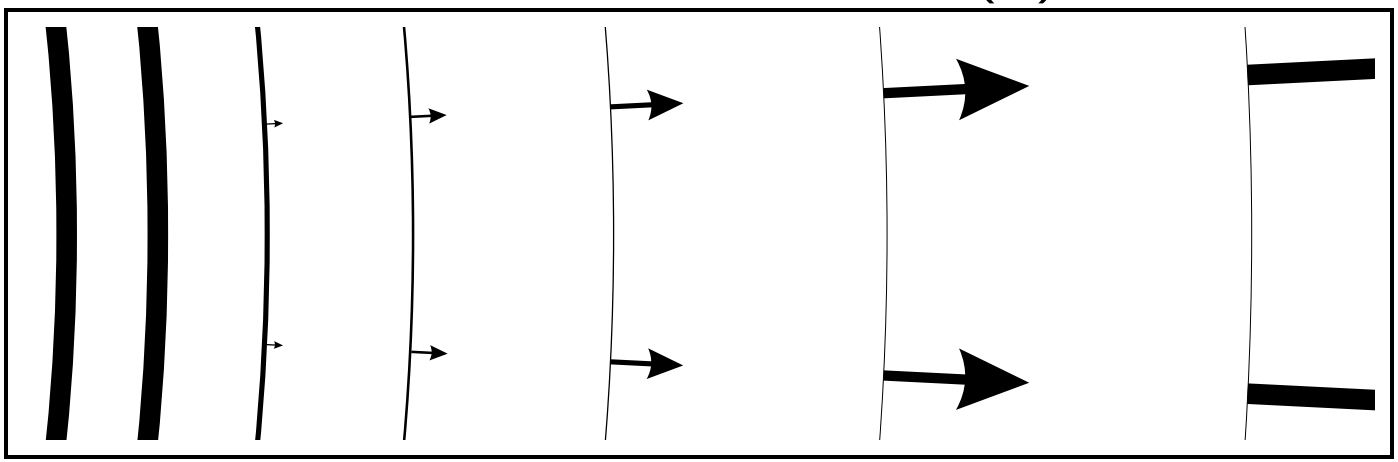
1. reimplementation of NLTE: rates, opacities, rate matrix solver
2. new temperature correction method
3. new handling of broad lines
4. new (hybrid-)atmosphere construction

-. pure NLTE opacities

Faster: factor 15-45 !!

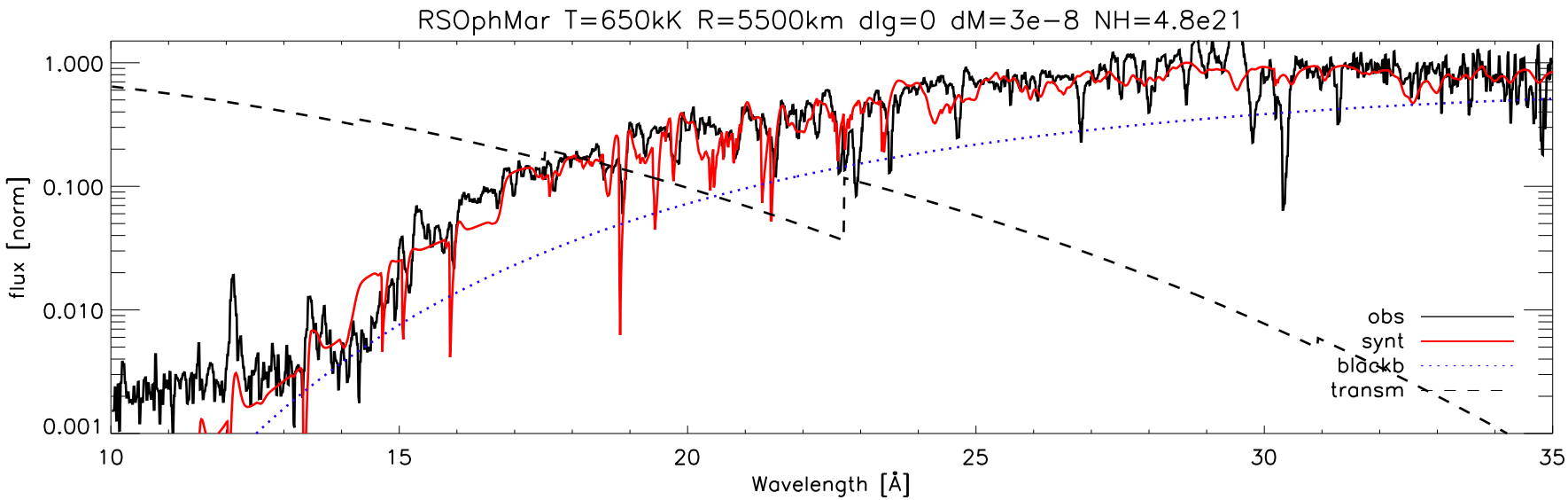
Characteristics of the models

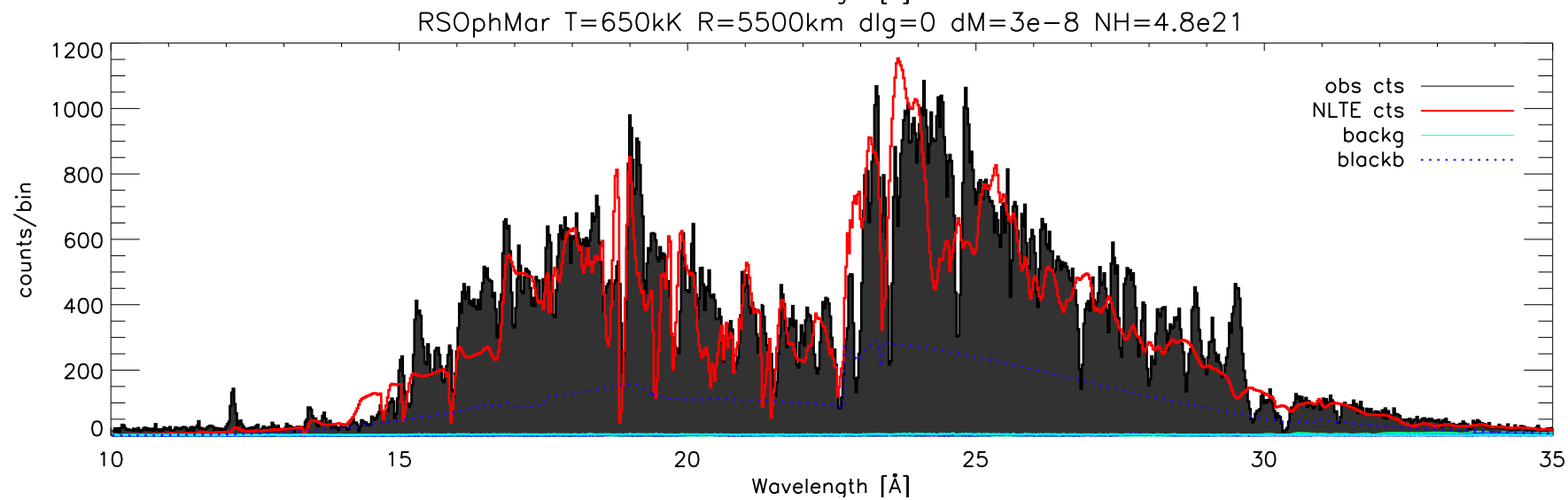
- hydrostatic core: $T_{\rm eff}, \log g$
- expanding envelope: $\dot{M}, v_\infty, v(r)$



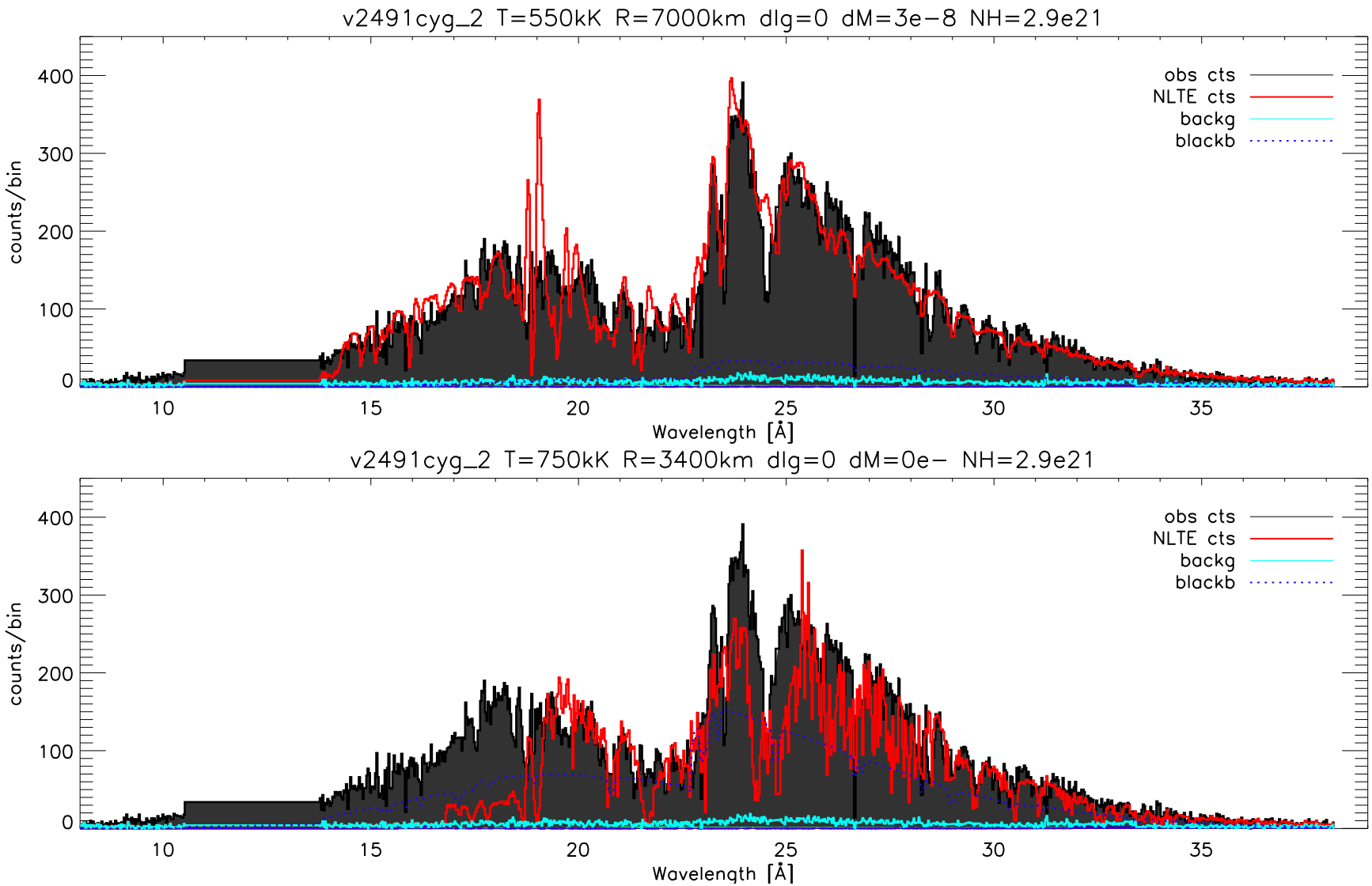
- solar abundances:
  H He CNO Ne Al Mg Si S Ar Ca Fe
- Nr. independent levels: 7500
- Nr. independent lines: 150,000

First results with new models

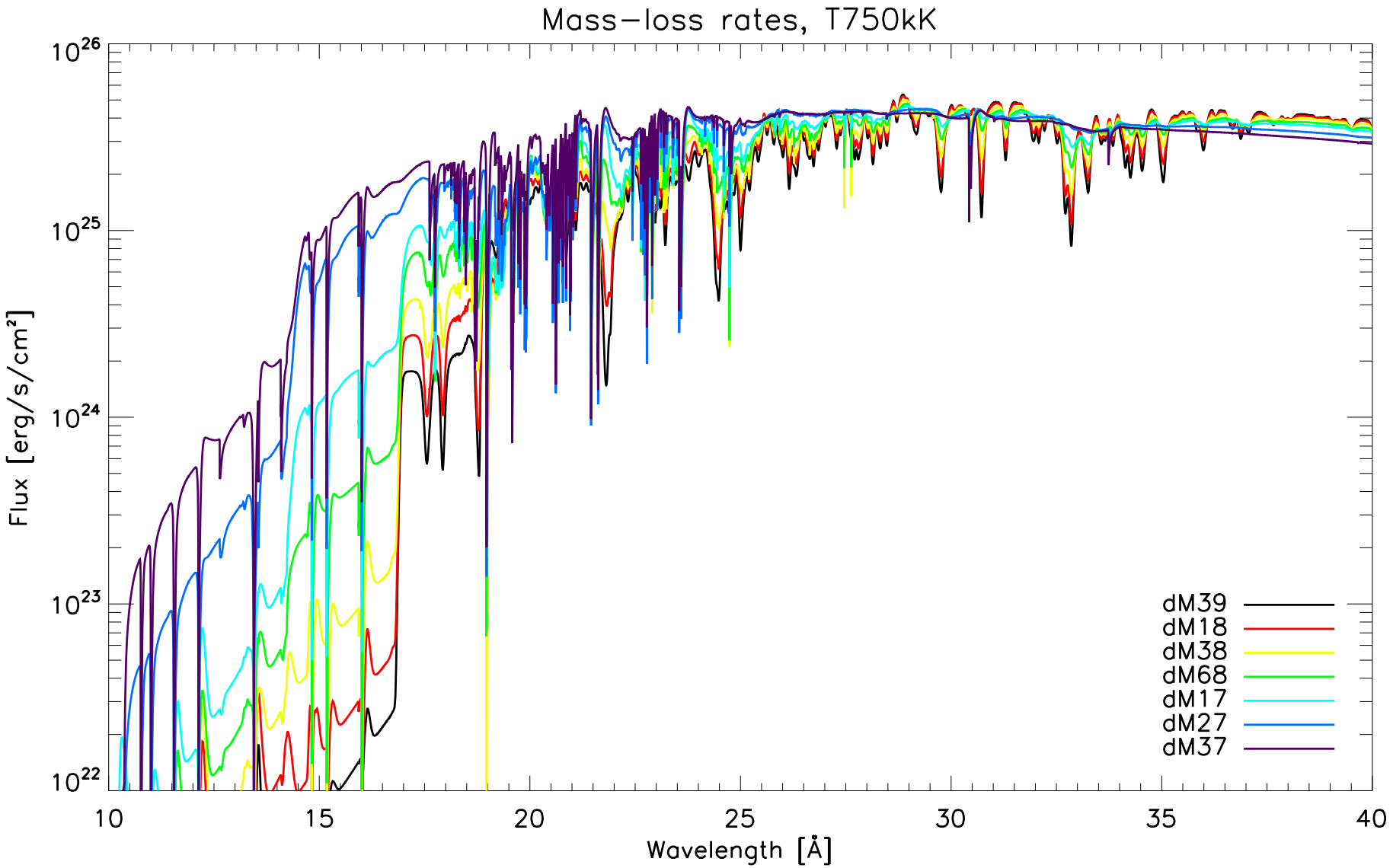




First results with new models



Spectrum sensitive to atmosph structure



Future work...

Theory:

- statistics of perturbed energy levels: Boltzmann?
- line profiles

Praxice:

- atomic data
- abundance analysis
- fit 1D atmospheric structures $[T, \rho, ...](r)$

Future work...

Find out the nature of SSS :-)