Modeling the
NGC 5548 UV Spectrum
during the 2014 Reverberation Campaign

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Goals for New Data Products

- Obtain an emission model for all 171(+6) spectra from 2013—2014.

- Produce absorption-corrected, deblended emission-line profiles vs. time.

- Measure the broad absorption strengths in Lyα, N V, Si IV, and C IV vs. time.

- Measure absorption strengths in all six narrow absorption components in as many species as possible vs. time.

The Model (1)

- The model is basically as described in Kaastra et al. (2014) and additions for the reverberation campaign as described in Paper 1 (de Rosa et al. 2015).

- 97 components; 53 free parameters; 123 "tuned" parameters (from fits to the mean spectrum); ~11,600 pts.

- Five Gaussian emission components for the most prominent emission lines (Lyα, N V, Si IV, C IV, and He II):
  - Narrow (~280 km s^{-1})
  - Intermediate (~800 km s^{-1})
  - Broad (~3000 km s^{-1})
  - Medium Broad (~8500 km s^{-1})
  - Very Broad (~18,000 km s^{-1})

{ These remain fixed in flux, width and position.

The C IV Profile in NGC 5548

Kaastra+14
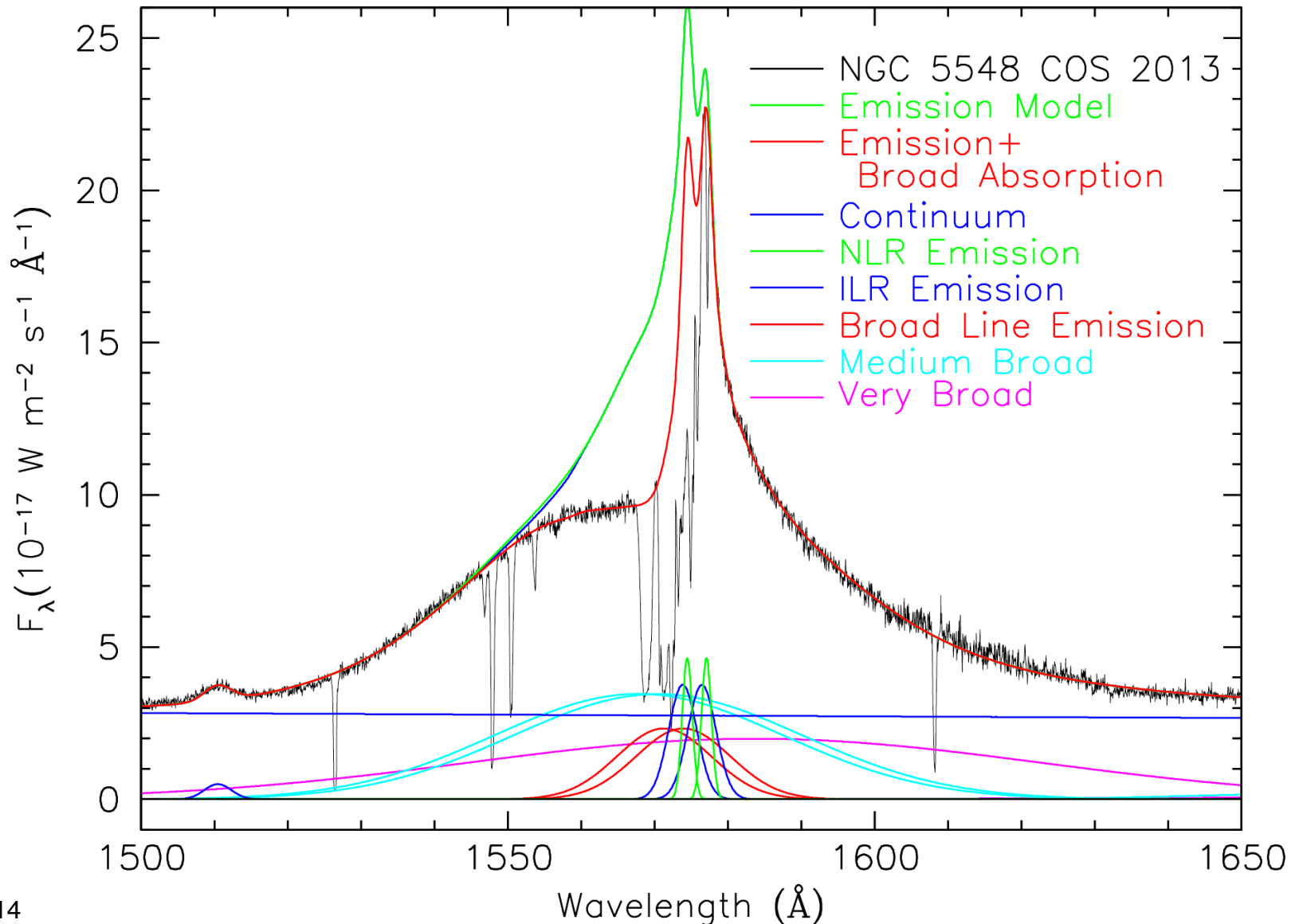
The Model (2)

- Continuum is a reddened power law, $f_\lambda \sim \lambda^{-\alpha}$, with extinction fixed at E(B−V)=0.017, and foreground damped Galactic Lyα absorption with $N_H = 1.45 \times 10^{20}$.

- Broad absorption is an asymmetric Gaussian in negative flux with the blue wing broader than the red wing. (The broad absorption is assumed to absorb all components with equal covering fraction except the NLR and the ILR.)

- Weak, blended Fe II emission is included as the Wills et al. (1985) model using a 4000 km s^{-1} FWHM.

The Full Spectral Model for NGC 5548

Kaastra+14
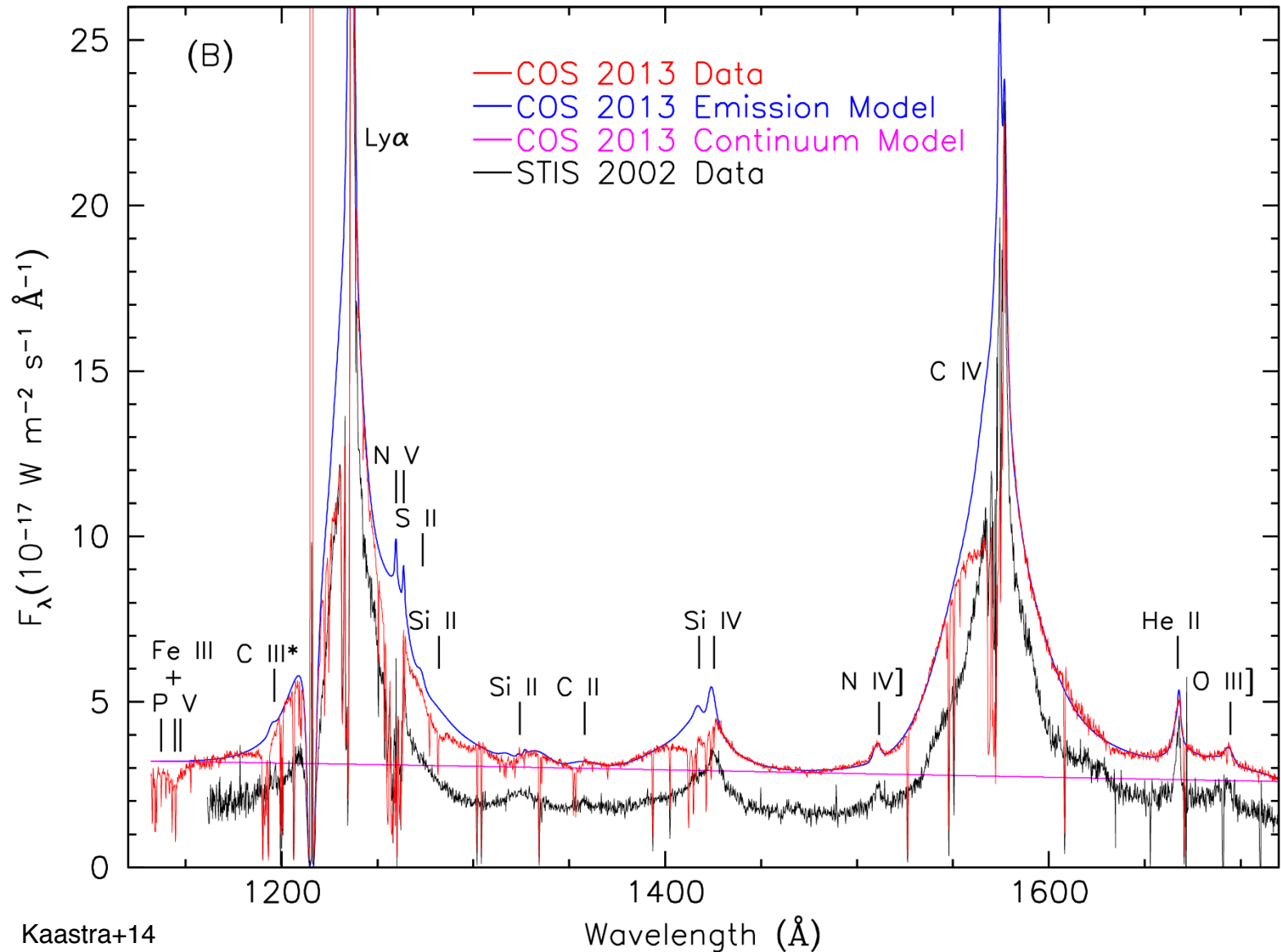
Details of the NGC 5548 Spectral Model
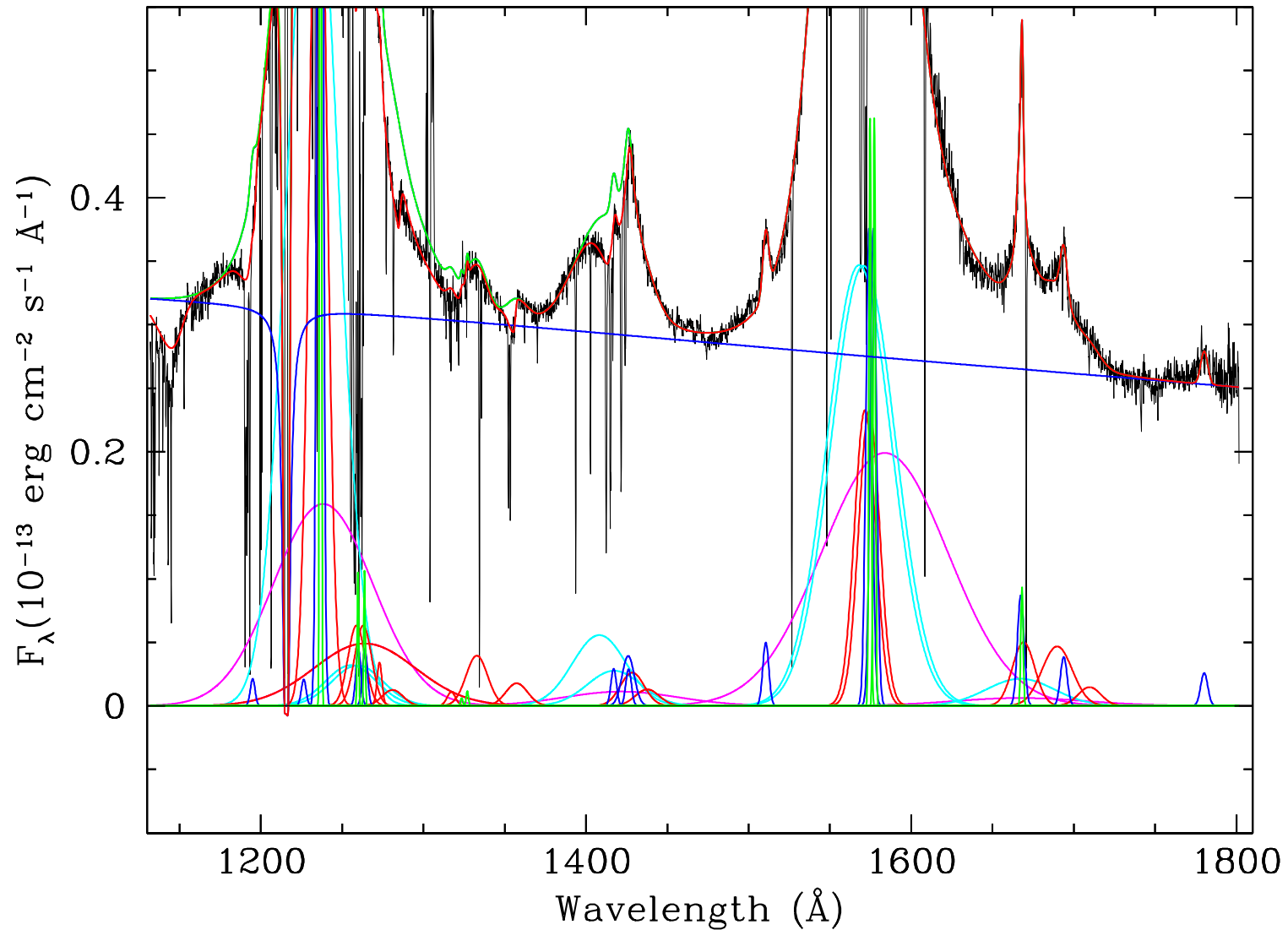
The Products (1)

- Power-law normalization and index vs. time.
- Lyα, N V, Si IV, C IV, and He II total fluxes vs. time.
- Fluxes vs. time for some weaker features, e.g., Lyα red bump, C IV red and blue bumps.
- Lyα, N V, Si IV, and C IV broad absorption EWs and maximum covering factors (assuming saturation) vs. time.
- Narrow absorption EWs vs. time
- The emission spectrum at all wavelengths corrected for all intervening absorption vs. time.

The Products (2)

- The rms spectrum corrected for absorption (both broad and narrow).

- Cross-correlation lags for the deblended total line fluxes (as in Paper 1).

- Velocity slices of the Lyα, N V, Si IV, C IV, and He II emission-line profiles vs. time (analogous to those in Paper 1), plus their cross-correlation lags.