

# **Voigt profile fitting results**

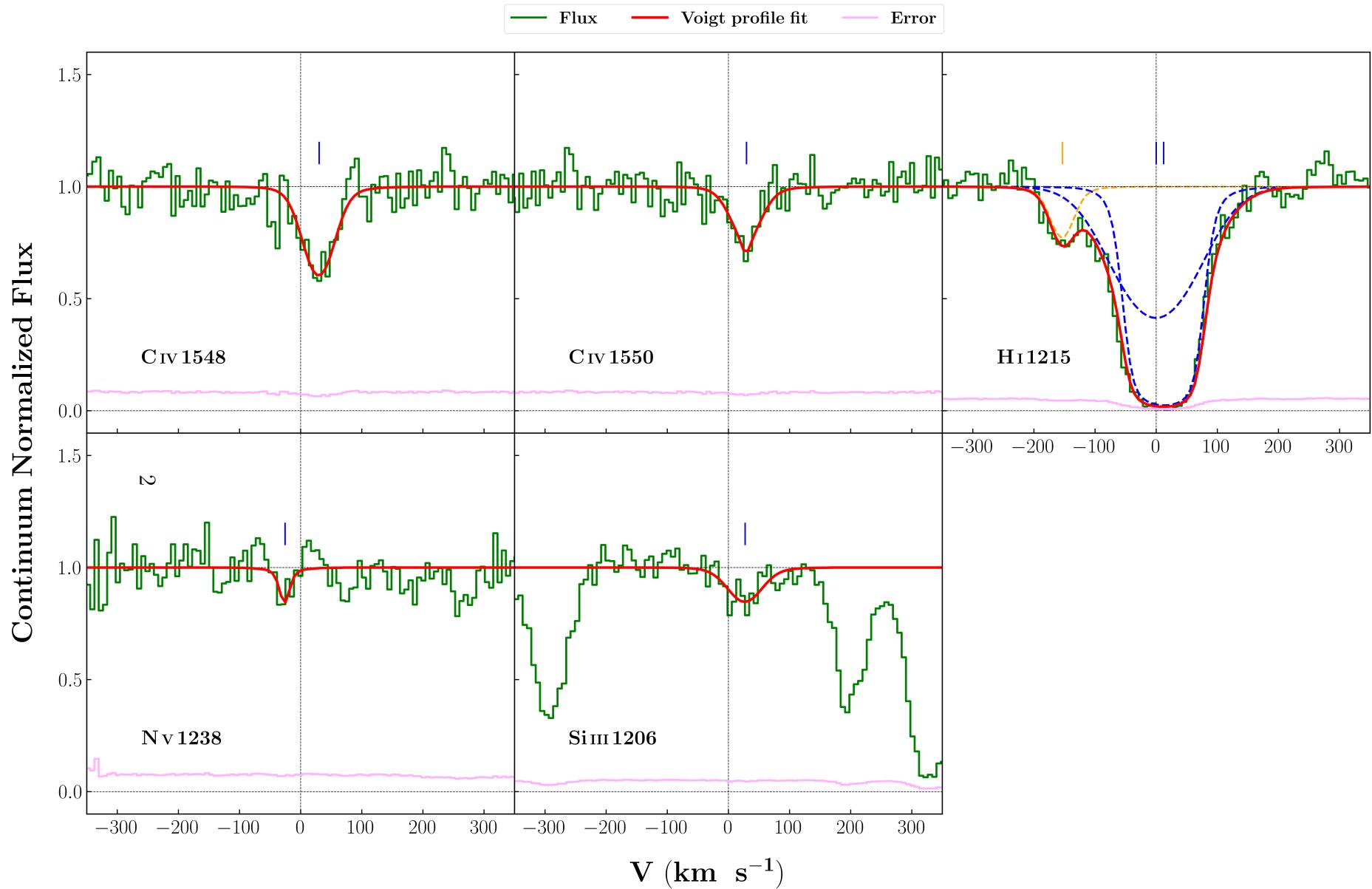
## Non O VI absorbers

April 22, 2024

## System plots

- Velocity taken to be 0 at  $z_{abs}$  given on the title of the plots
- Blue dashed curves are the individual components and orange dashed curves are the contamination

HE0056 – 3622 ( $z_{\text{abs}} = 0.043265$ )



<b>Ion</b>	<b>v (km s<sup>-1</sup>)</b>	<b>b (km s<sup>-1</sup>)</b>	<b>log [N cm<sup>-2</sup>]</b>
Si III	27 ± 6	34 ± 9	12.37 ± 0.07
N V	-26 ± 4	1 ± 8	13.42 ± 0.46
C IV	30 ± 2	31 ± 0	13.64 ± 0.03
H I	0 ± 3	85 ± 6	14.02 ± 0.07
H I	12 ± 1	32 ± 4	15.3 ± 0.1

## Comments

SiIII :

Good fit. Little broad b ~ 33 km/s

NV :

Good fit. Very narrow line b ~ 1 km/s. So very large errors. Errors got from freezing the parameters. NV 1242 is non detection.

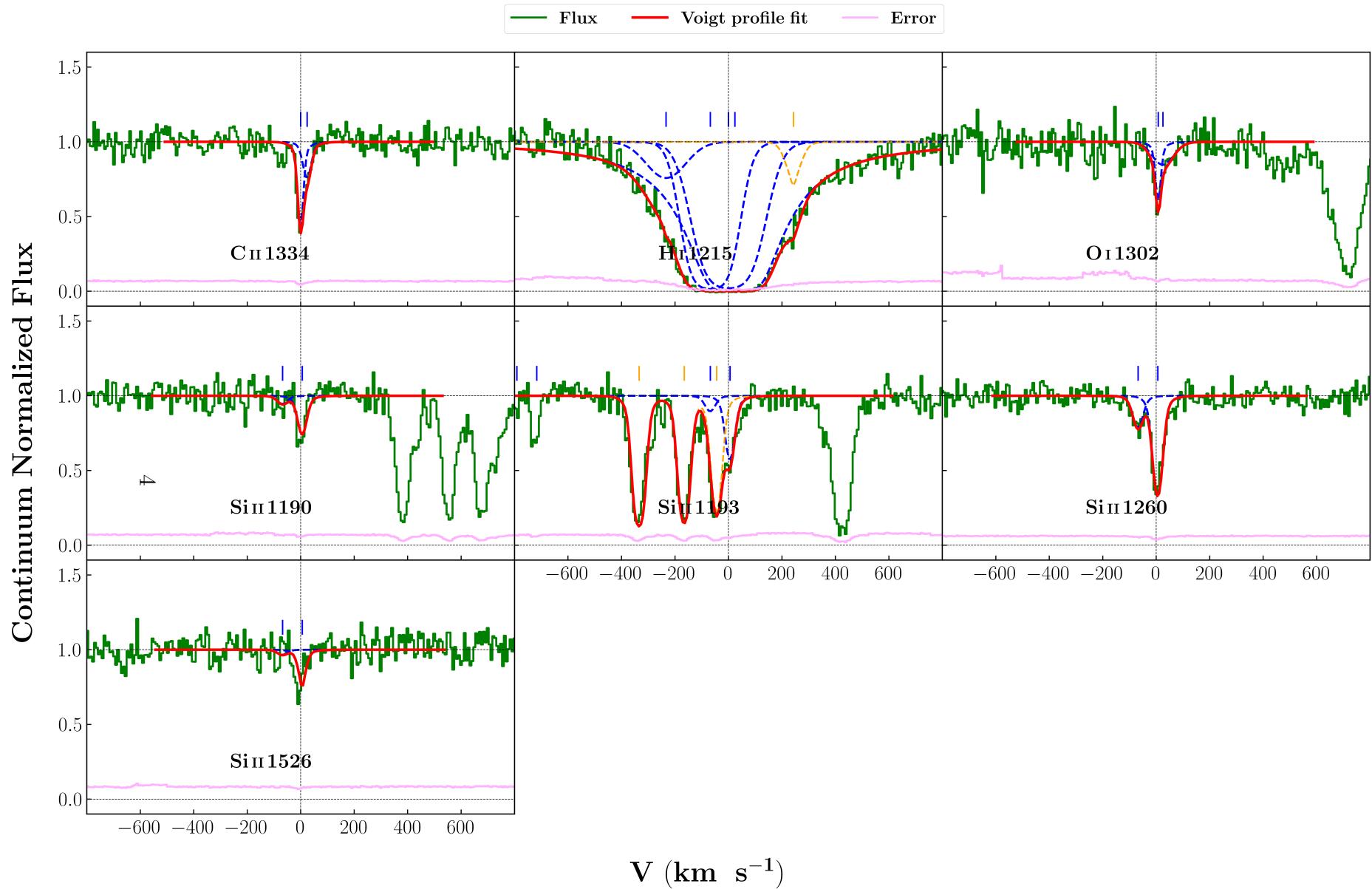
CIV :

Nice fit. A little hint of two component, but couldn't fit 2. Currently fitted with 1.

H I :

Nice fit. Contaminated from NV 1242 from z=0.020021. Saturated, other transitions are not covered in COS. Fitted with two components.

PG1216 + 069 ( $z_{\text{abs}} = 0.006328$ )



<b>Ion</b>	<b>v (km s<sup>-1</sup>)</b>	<b>b (km s<sup>-1</sup>)</b>	<b>log [N cm<sup>-2</sup>]</b>
O I	8 ± 2	7 ± 5	14.07 ± 0.16
O I	25 ± 12	50 ± 13	14.0 ± 0.11
C II	0 ± 3	7 ± 5	13.98 ± 0.08
C II	24 ± 19	17 ± 6	13.43 ± 0.09
Si II	-68 ± 4	21 ± 6	12.51 ± 0.06
Si II	6 ± 1	18 ± 0	13.2 ± 0.02
H I	-233 ± 110	95 ± 15	13.56 ± 0.06
H I	-68 ± 0	81 ± 8	14.76 ± 0.12
H I	0 ± 0	106 ± 15	14.79 ± 0.08
H I	24 ± 0	20 ± 12	19.09 ± 0.03

## Comments

O I :

Good fit. Fitted with 2 comp. large b value for comp II b ~ 50 km/s.

C II :

Good fit. Fitted with 2 comp. Unknown contamination on left.

Si II :

Good fit. Fitted with 2 comp. Used Si II 1526, 1260 and 1190 to fit.

Used only Si II 1260 to fit the first component, as it's not much prominent in others.

Si II 1193 contaminated from galactic NI 1199 and 1200 lines so excluded from fit

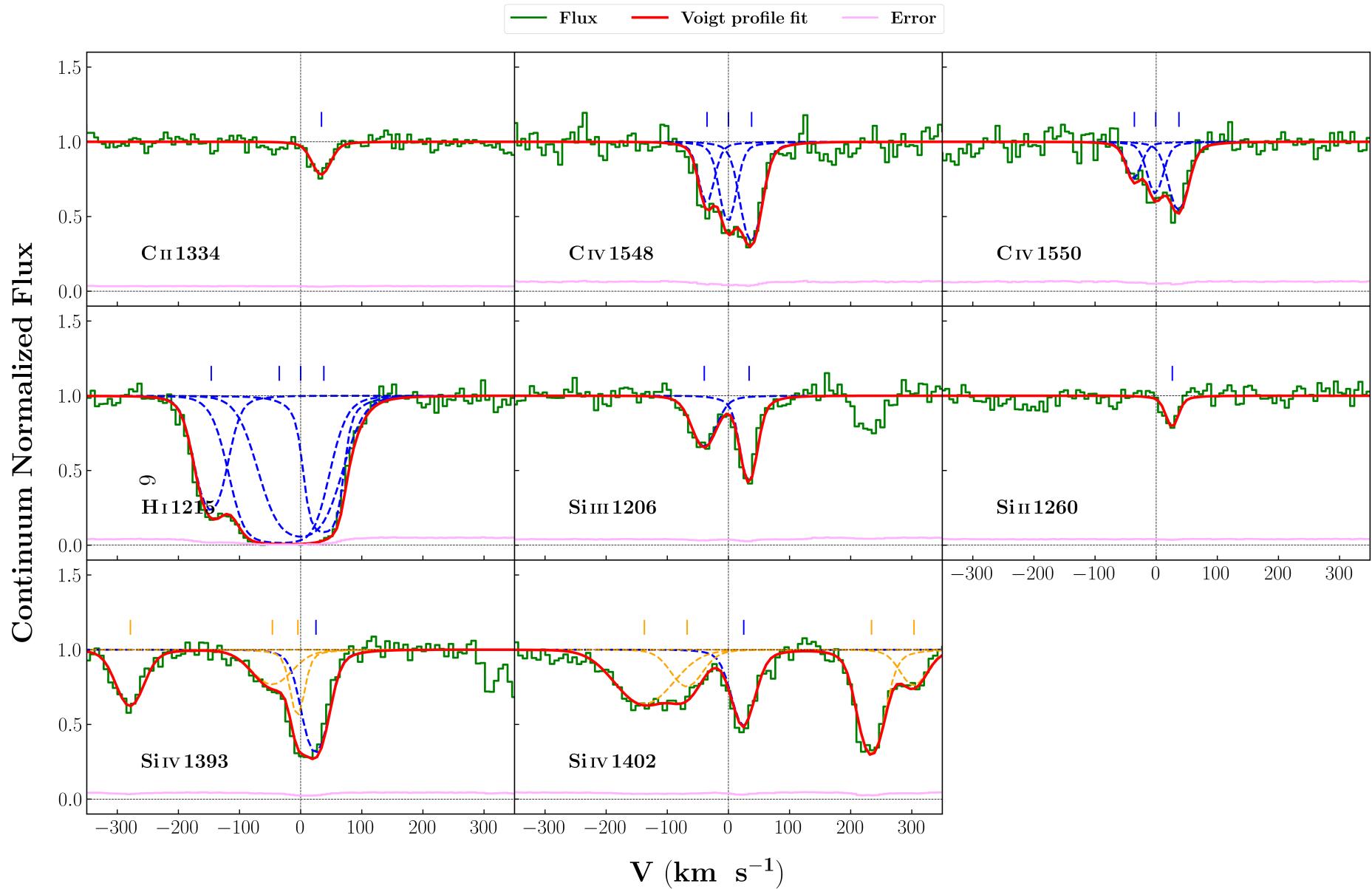
Si II 1304 contaminated from geocoronal Lyα emission.

H I :

Average fit. Fitted with 4 comp, redshift of two comp fixed from C II fit and one from Si III fit. Contaminated with O VI 1038 (self-identified) from z=0.179960, and hint of O VI 1032 is also there at the same redshift.

However, left wing still couldn't be fitted.

### 3C263 ( $z_{\text{abs}} = 0.063397$ )



Ion	v (km s <sup>-1</sup> )	b (km s <sup>-1</sup> )	log [N cm <sup>-2</sup> ]
Si II	26 ± 2	8 ± 4	12.29 ± 0.06
Si III	-39 ± 1	21 ± 2	12.64 ± 0.03
Si III	34 ± 1	12 ± 1	12.91 ± 0.04
Si IV	25 ± 1	22 ± 0	13.57 ± 0.02
C IV	-35 ± 1	12 ± 3	13.42 ± 0.06
C IV	0 ± 2	13 ± 3	13.63 ± 0.06
C IV	38 ± 2	17 ± 2	13.86 ± 0.04
C II	34 ± 2	17 ± 3	13.37 ± 0.04
H I	-146 ± 2	25 ± 2	13.87 ± 0.04
H I	-35 ± 0	50 ± 6	14.88 ± 0.12
H I	0 ± 0	54 ± 6	14.42 ± 0.2
H I	38 ± 0	12 ± 3	16.46 ± 0.13

## Comments

SiII :

Good fit.

SiIII :

Nice fit. Fitted with 2 comp. Has HI 937 on right, currently not fitted.

SiIV :

Good fit.

SiIV 1393 : contaminated by Ly $\alpha$  from z=0.218048, 0.218991 and 0.219161

SiIV 1402 : contaminated by Ly $\beta$  from z=0.453629 and 0.453969, CIII 977 from z=0.527982 and 0.528336

CIV :

Nice fit. Fitted with 3 comp.

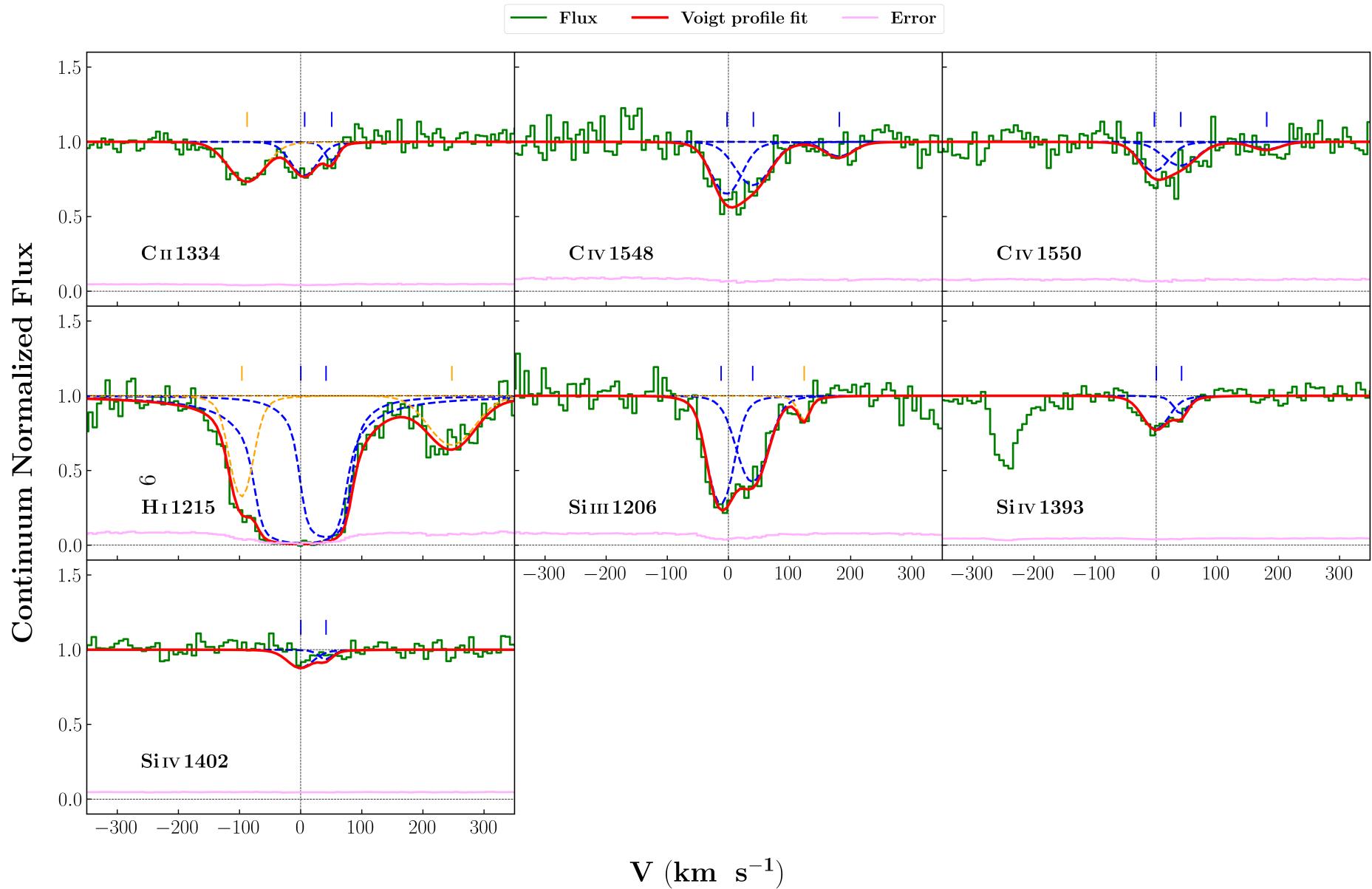
CII :

Good fit. CII 1036 is out of coverage.

HI :

Nice fit. Fitted with 4 components. Redshift of the three components in the saturated part are fixed from CIII 977 line.

PG1222 + 216 ( $z_{\text{abs}} = 0.054479$ )



<b>Ion</b>	<b>v (km s<sup>-1</sup>)</b>	<b>b (km s<sup>-1</sup>)</b>	<b>log [N cm<sup>-2</sup>]</b>
Si III	-12 ± 3	20 ± 3	13.19 ± 0.05
Si III	40 ± 5	27 ± 5	13.04 ± 0.07
Si IV	0 ± 1	25 ± 8	12.89 ± 0.08
Si IV	41 ± 4	10 ± 7	12.39 ± 0.13
C IV	-2 ± 1	29 ± 6	13.55 ± 0.1
C IV	41 ± 8	34 ± 6	13.5 ± 0.11
C IV	182 ± 10	26 ± 15	12.86 ± 0.15
C II	7 ± 4	26 ± 6	13.51 ± 0.07
C II	51 ± 4	10 ± 6	12.98 ± 0.09
H I	-12 ± 23	74 ± 11	14.08 ± 0.15
H I	5 ± 4	24 ± 3	17.91 ± 0.15
H I	0 ± 0	23 ± 1	17.9 ± 0.14
H I	41 ± 0	13 ± 2	17.22 ± 0.19

In table last two rows are from fits without BLA (fixed redshift). Look comments

### Comments

#### SiIII :

Nice fit. Fitted with 2 comp. Contaminated with HI 923.

#### SiIV :

Good fit. Fitted with two components. SiIV 1402 comp 2 is weak. Lines need to be shifted. Not shifted while fitting

#### CIV :

Good fit. Fitted with 3 comp. The right side feature shows a possibility of further substructure, tried fitting it with 2 comp also, fits were not much better, so going with 1 comp.

#### CII :

Nice fit. CII 1036 is not covered. Fitted with 2 comp. Contaminated by OVI 1032 from  $z=0.363300$

HI :

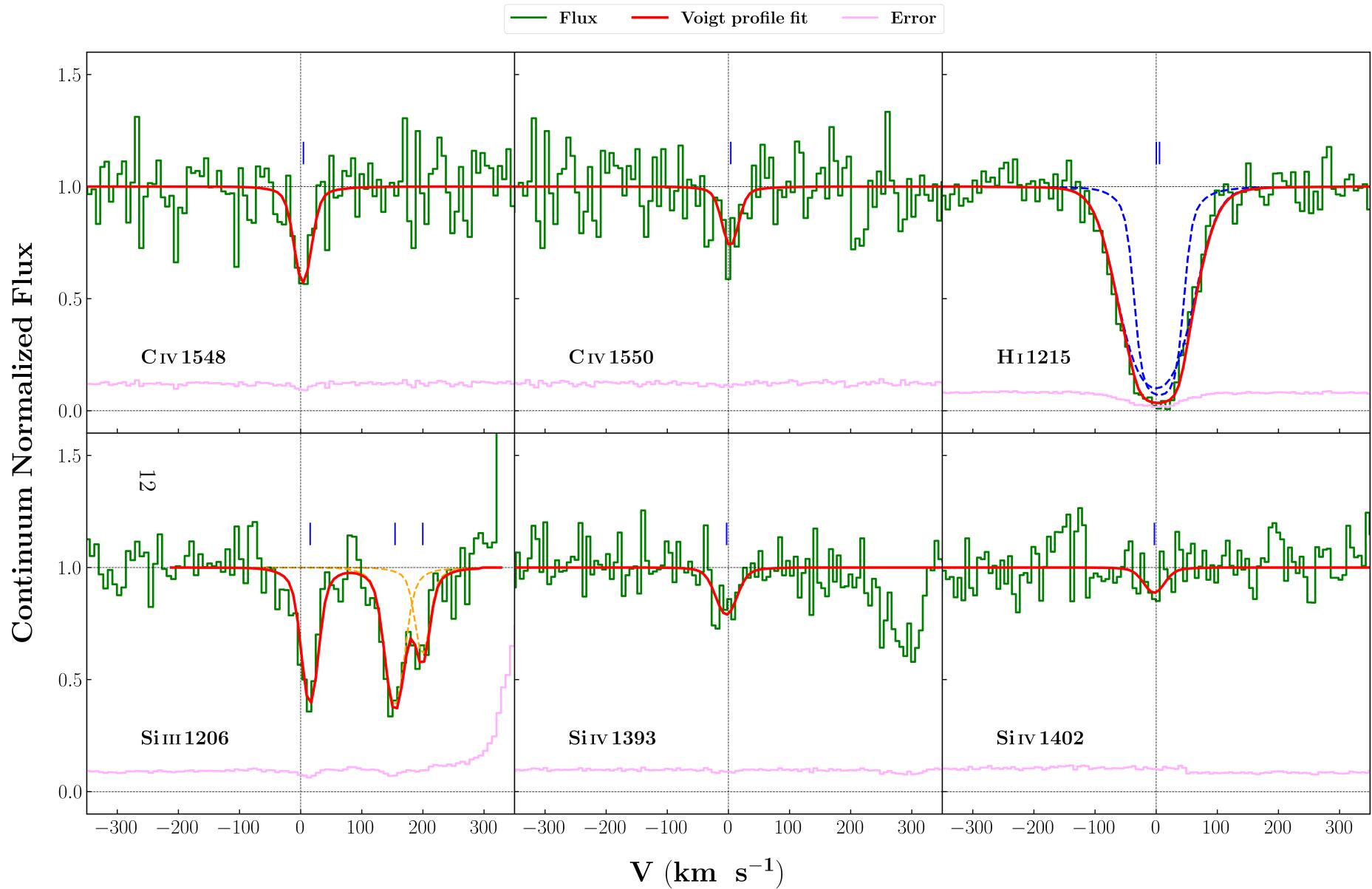
Good fit. Contaminated from OVI 1032 from  $z=0.241833$  on left and HI 930 from  $z=0.378411$  on right.

Fitted with two comp. One comp has high col density of  $\sim 17.9$

Fitted with redshift fixed from SiIV also, in this case we don't get BLA but narrow lines with high col densities of  $\sim 17.9$  and 17.2

In VPfit\_chunks, files are those fits which had BLA

RXJ0439.6 – 5311 ( $z_{\text{abs}} = 0.005568$ )



<b>Ion</b>	<b>v (km s<sup>-1</sup>)</b>	<b>b (km s<sup>-1</sup>)</b>	<b>log [N cm<sup>-2</sup>]</b>
Si III	16 ± 1	11 ± 3	13.01 ± 0.12
Si IV	-3 ± 4	20 ± 6	12.77 ± 0.08
C IV	4 ± 3	13 ± 5	13.5 ± 0.07
H I	0 ± 2	53 ± 6	14.3 ± 0.09
H I	5 ± 3	15 ± 6	16.11 ± 0.26

## Comments

SiIII :

Nice fit. Near geo coronal Lyman emission. Contaminated with CIII 977 from z=0.242393 and z=0.242580.

Had to change nchext to 5 in VPsetup.

SiIV :

Not much strong line. Fitted only SiIV 1393 line, SiIV 1402 seems to be non-detection.

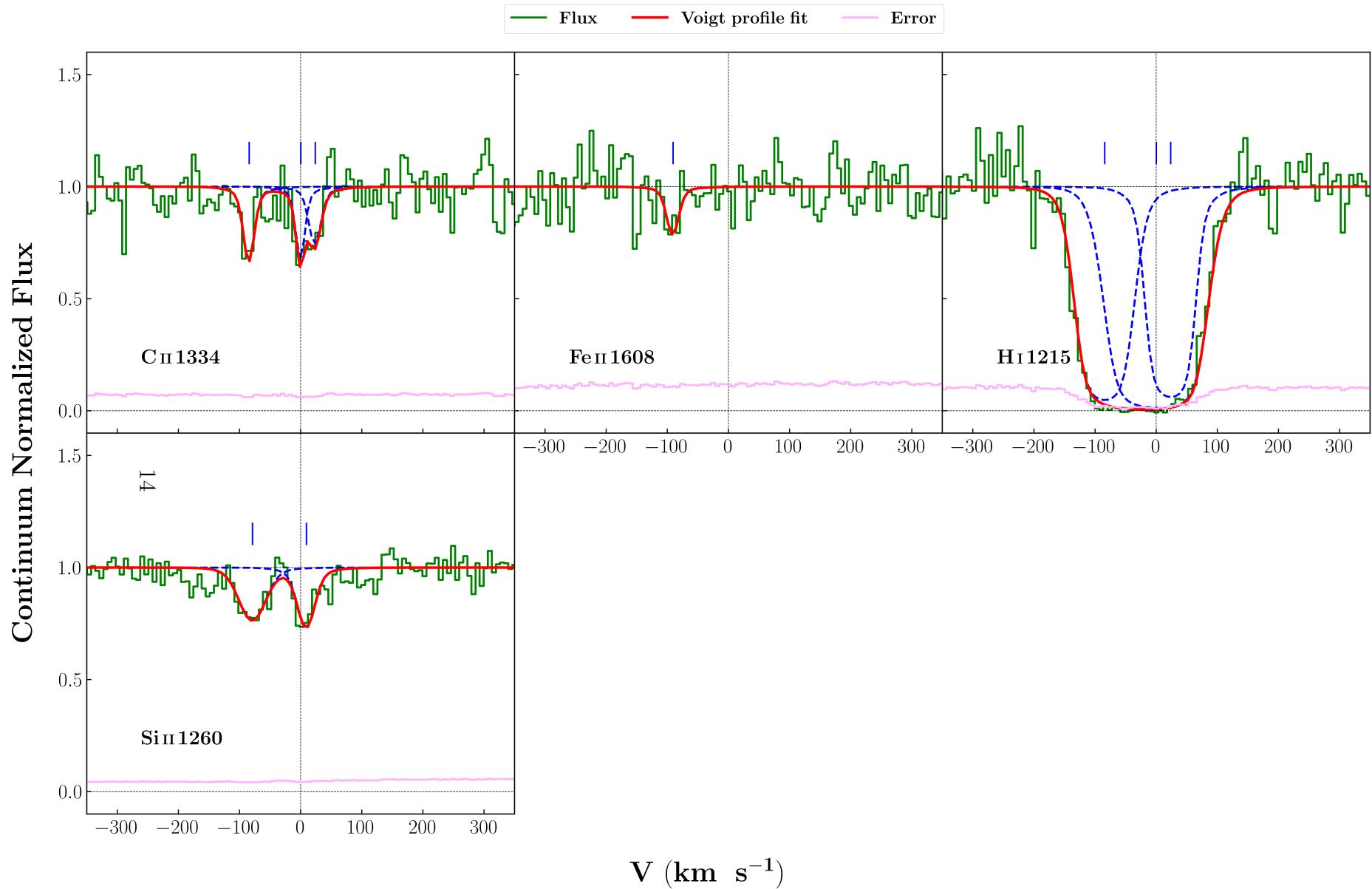
CIV :

Good fit.

HI :

Good fit. Fitted with two comp, which are very close.

UKS0242 – 724 ( $z_{\text{abs}} = 0.063850$ )



<b>Ion</b>	<b>v (km s<sup>-1</sup>)</b>	<b>b (km s<sup>-1</sup>)</b>	<b>log [N cm<sup>-2</sup>]</b>
Fe II	-90 ± 4	9 ± 9	13.49 ± 0.14
C II	-84 ± 2	7 ± 5	13.46 ± 0.11
C II	0 ± 3	3 ± 7	13.55 ± 0.16
C II	24 ± 5	9 ± 6	13.32 ± 0.1
Si II	-78 ± 3	25 ± 5	12.6 ± 0.05
Si II	10 ± 2	15 ± 4	12.52 ± 0.06
H I	-84 ± 0	30 ± 5	14.61 ± 0.06
H I	0 ± 0	46 ± 6	15.17 ± 0.1
H I	24 ± 0	19 ± 6	15.34 ± 1.33

## Comments

FeII :

Good fit. Continuum is not defined much clearly around the line.

CII :

Good fit. Fitted with 3 comp

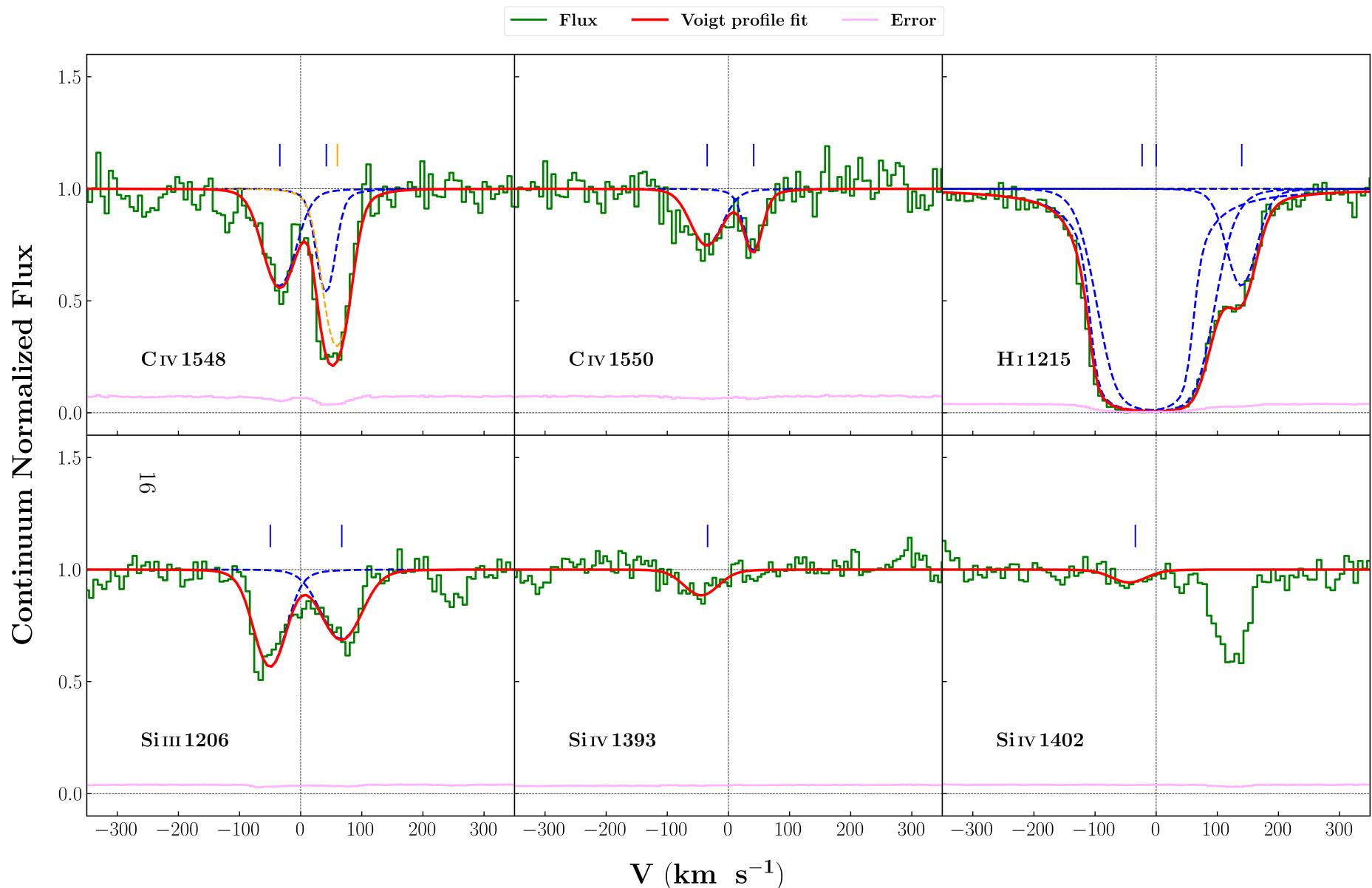
SiII :

Good fit. Fitted with 2 comp

HI :

Good fit. Fixed redshift from CII fit, large error in col density of 3rd comp  
 $\sim 1.3$  dex

PG1259 + 593 ( $z_{\text{abs}} = 0.046284$ )



<b>Ion</b>	<b>v (km s<sup>-1</sup>)</b>	<b>b (km s<sup>-1</sup>)</b>	<b>log [N cm<sup>-2</sup>]</b>
C IV	-34 ± 2	31 ± 3	13.7 ± 0.03
C IV	42 ± 2	16 ± 3	13.56 ± 0.05
Si IV	-43 ± 4	35 ± 6	12.67 ± 0.05
Si III	-50 ± 2	29 ± 3	12.87 ± 0.03
Si III	67 ± 3	40 ± 5	12.78 ± 0.04
H I	-590 ± 8	47 ± 12	12.79 ± 0.08
H I	-23 ± 7	26 ± 3	17.79 ± 0.07
H I	0 ± 5	61 ± 7	14.86 ± 0.06
H I	140 ± 3	27 ± 4	13.43 ± 0.07

## Comments

CIV :

Nice fit. Fitted with 2 comp. CIV 1548 is contaminated from Ly $\alpha$  from z=0.332751

Unknown contamination on left in CIV 1548

SiIV :

Good fit. Weak line. SiIV 1402 contaminated by Ly $\beta$  from z=0.431499, currently not fitted.

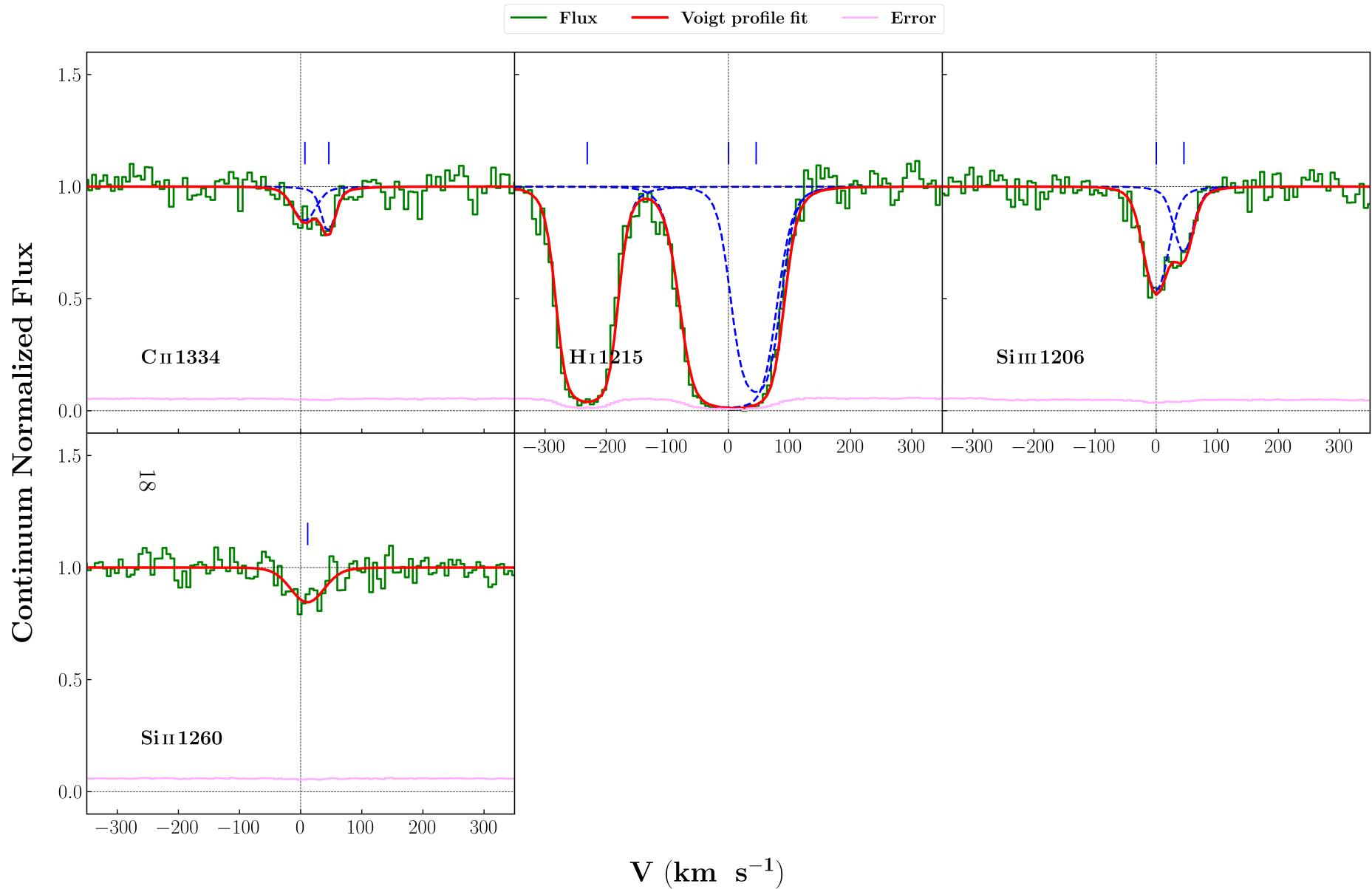
SiIII :

Average fit. Fitted with two comp. First component looks asymmetric, tried fitting it with one more comp but couldn't be fitted nicely.

HI :

Nice fit. Fitted with 4 comp. Fitted one comp on outside on left. Main profile is fitted with 3 comp.

PKS1302 – 102 ( $z_{\text{abs}} = 0.094839$ )



<b>Ion</b>	<b>v (km s<sup>-1</sup>)</b>	<b>b (km s<sup>-1</sup>)</b>	<b>log [N cm<sup>-2</sup>]</b>
Si III	0 ± 2	22 ± 3	12.82 ± 0.04
Si III	45 ± 3	16 ± 4	12.48 ± 0.08
Si II	11 ± 5	34 ± 7	12.48 ± 0.06
C II	7 ± 8	21 ± 8	13.27 ± 0.09
C II	46 ± 4	10 ± 5	13.25 ± 0.09
H I	-229 ± 1	29 ± 2	14.81 ± 0.14
H I	0 ± 0	46 ± 2	14.96 ± 0.1
H I	45 ± 0	31 ± 4	14.25 ± 0.14

## Comments

SiIII :

Nice fit. Fitted with two comp.

SiII :

Good fit. Tried fitting two comp alos, but didn't get good fit.

CII :

Nice fit. Fitted with 2 comp.

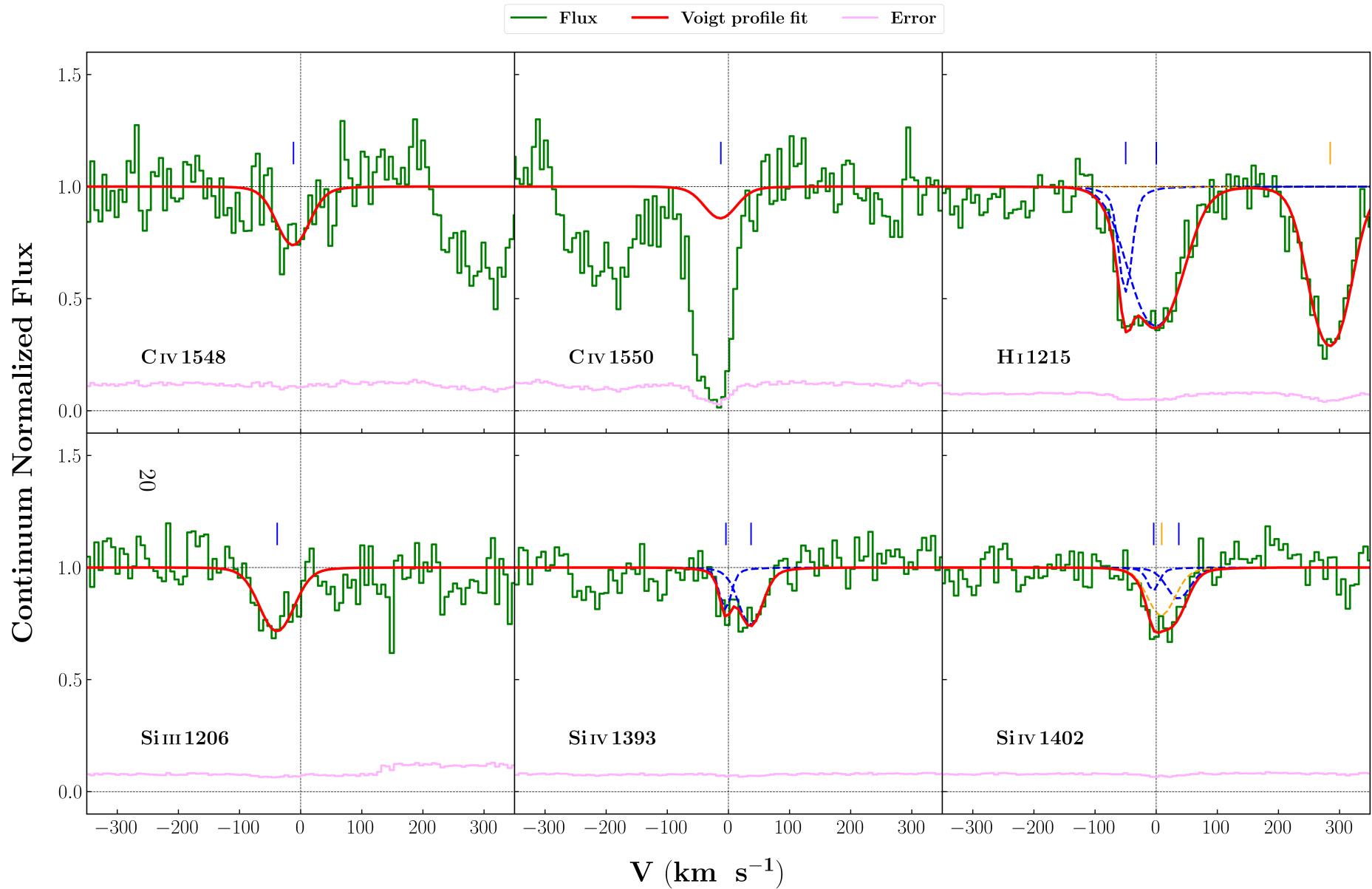
HI :

Nice fit. Fitted with 3 comp. Fixed the redshifts of two comp from SiIII fit.

NOTE :

OVI 1038 is just covered a little, but since its on the edge, spectra is not good there.

# 3C57 ( $z_{\text{abs}} = 0.077430$ )



Ion	v (km s <sup>-1</sup> )	b (km s <sup>-1</sup> )	log [N cm <sup>-2</sup> ]
C IV	-12 ± 6	32 ± 9	13.43 ± 0.08
Si IV	-4 ± 4	7 ± 6	12.54 ± 0.09
Si IV	37 ± 4	22 ± 6	12.92 ± 0.07
Si III	-38 ± 5	34 ± 7	12.67 ± 0.06
H I	-50 ± 2	8 ± 4	13.3 ± 0.08
H I	0 ± 4	50 ± 4	13.86 ± 0.04

## Comments

CIV :

CIV 1550 is contaminated with galactic AlII 1670 in the core and by Ly $\alpha$  from z=0.373570 on left . So used only CIV 1548 to fit.

NV :

Both 1238 and 1242 couldn't be fitted together. NV 1238 is contaminated from galactic CII 1334 line and NV 1242 is contaminated from CIII 977 from z=0.369949 and possibly from Fe II 1144 from z=0.169577.  
just fitting NV 1242 doesn't fit 1238 at all.

SiIV :

Good fit. Fitted with 2 comp. SiIV 1402 is contaminated with FeII 1144 from z=0.320102 (self identified), without which the fit of SiIV 1402 was not good and expected.

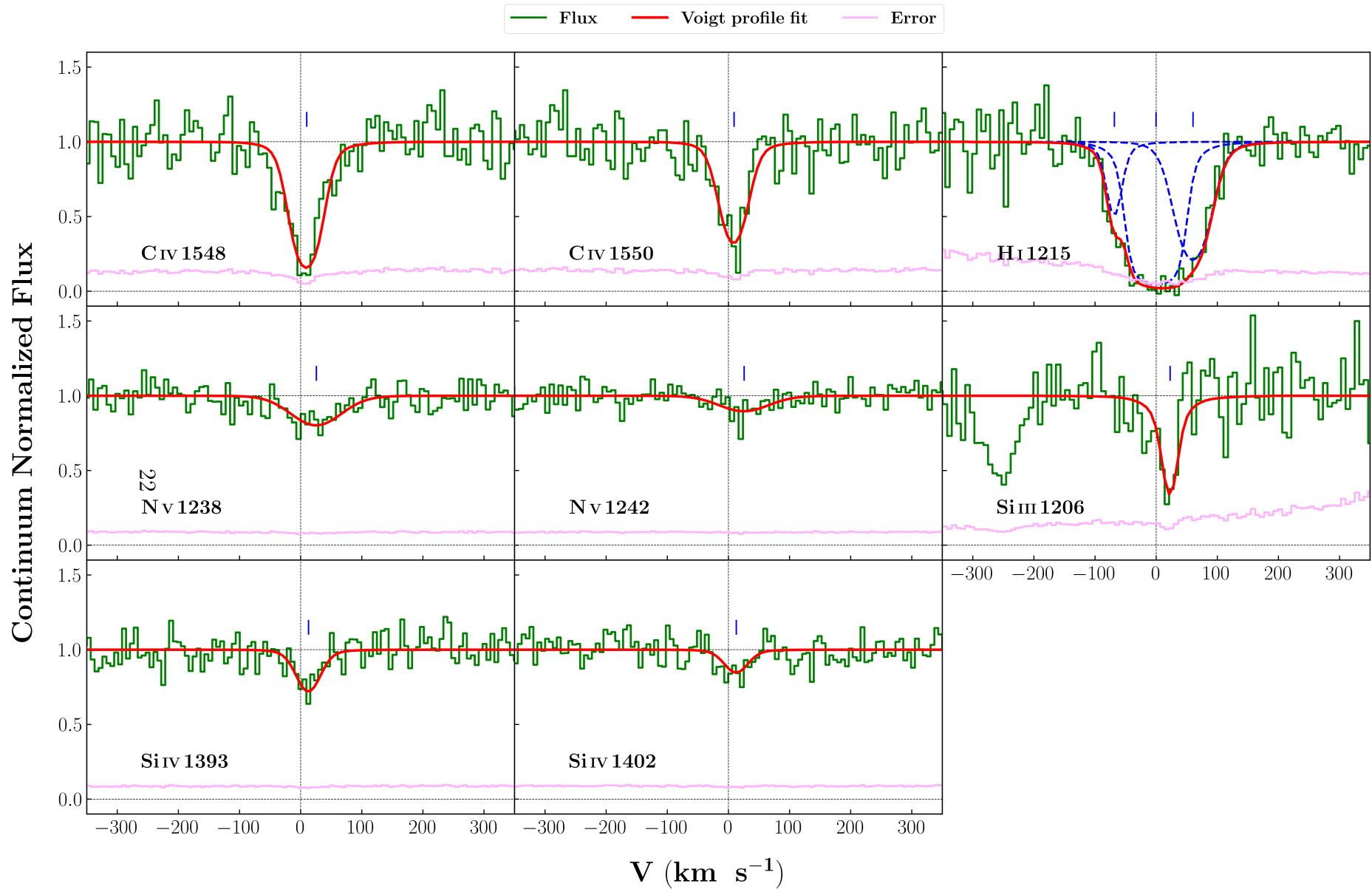
SiIII :

Good fit.

HI :

Good fit. Fitted with 2 comp. Contaminated by Ly $\beta$  from z=0.278165 on right.

PMNJ1103 – 2329 ( $z_{\text{abs}} = 0.003934$ )



<b>Ion</b>	<b>v (km s<sup>-1</sup>)</b>	<b>b (km s<sup>-1</sup>)</b>	<b>log [N cm<sup>-2</sup>]</b>
Si III	23 ± 3	4 ± 3	15.02 ± 0.22
Si IV	13 ± 3	23 ± 5	12.96 ± 0.06
N V	22 ± 5	52 ± 8	13.65 ± 0.05
C IV	10 ± 1	24 ± 2	14.26 ± 0.04
H I	-68 ± 6	10 ± 7	13.37 ± 0.09
H I	0 ± 12	19 ± 2	16.29 ± 0.19
H I	60 ± 27	28 ± 4	13.95 ± 0.05

## Comments

SiIII :

Good fit. Narrow line b ~ 4 km/s, error in col density calculated from chi-sq, otherwise was 0.26

Has OVI 1032 contamination on left from z=0.172768

SiIV :

Nice fit.

CIV :

Good fit. CIV 1548 seems to have some unidentified contamination on the wings.

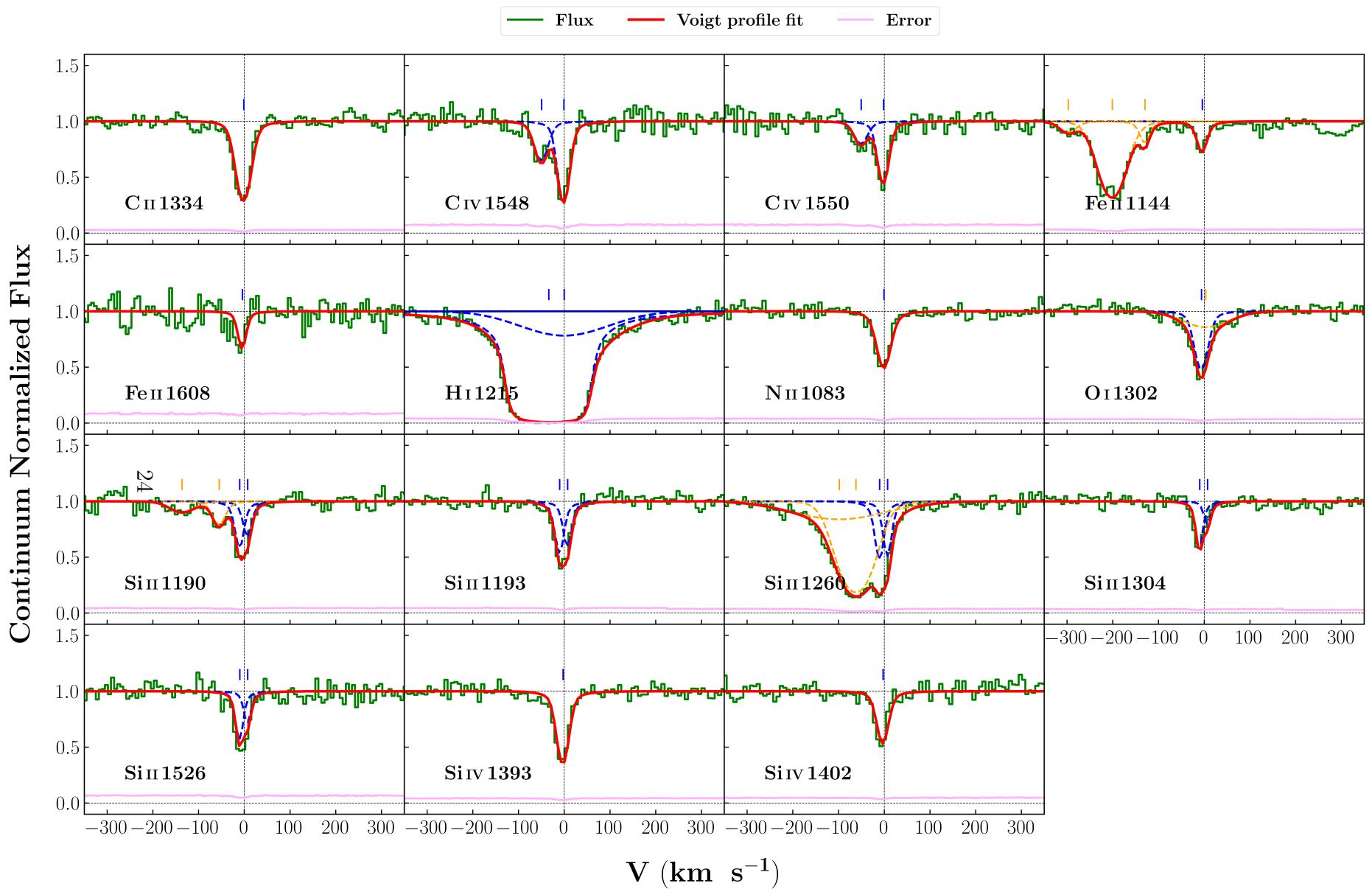
NV :

Good fit. Large b ~ 52 km/s.

HI :

Good fit. Fitted with 3 comp. None of them are BLA.

PHL1811 ( $z_{\text{abs}} = 0.080928$ )



<b>Ion</b>	<b>v (km s<sup>-1</sup>)</b>	<b>b (km s<sup>-1</sup>)</b>	<b>log [N cm<sup>-2</sup>]</b>
O I	-6 ± 1	15 ± 2	14.29 ± 0.05
C II	-1 ± 1	16 ± 1	14.15 ± 0.02
N II	-1 ± 1	13 ± 1	14.06 ± 0.03
C IV	-49 ± 2	16 ± 3	13.38 ± 0.04
C IV	-1 ± 1	11 ± 1	13.93 ± 0.04
Si IV	-2 ± 1	11 ± 1	13.46 ± 0.03
Fe II	-4 ± 1	7 ± 3	13.7 ± 0.07
Si II	-10 ± 1	3 ± 1	14.24 ± 0.07
Si II	7 ± 1	4 ± 1	13.33 ± 0.08
H I	-875 ± 1	32 ± 1	14.6 ± 0.06
H I	-528 ± 0	30 ± 2	15.38 ± 0.05
H I	-34 ± 1	29 ± 1	18.02 ± 0.11
H I	0 ± 19	126 ± 23	13.62 ± 0.07

## Comments

O I :

Good fit. Contaminated with Ly $\alpha$  from z=0.157852. There is some unknown contamination on the right also.

C II :

Nice fit. Fitted with single comp. Could be fitted with 2 also, which fits the right wing well, but b is small  $\sim 3$  km/s for one of the comp.

N II :

Nice fit.

C IV :

Nice fit. Fitted with 2 comp

Si II :

Good fit. When fitting with single comp, all lines couldn't be fitted together. Only 1526 and 1304 could be fitted together, and the doublet 1190 and 1193

could be fitted together alone. Then fitted two comp, then all line scould be fitted together but b values are small for both comp  $b \sim 3,4$  km/s.

SiII 1260 contaminated frm Lya from  $z=0.120353$  and  $0.120489$  so excluded from fit.

SiII 1190 is contaminated from Lya from  $z=0.057991$  and  $0.058278$

SiII 1526 could be possibly contaminated from SiIV 1402 from  $z \sim 0.176543$ .

SiIV :

Nice fit.

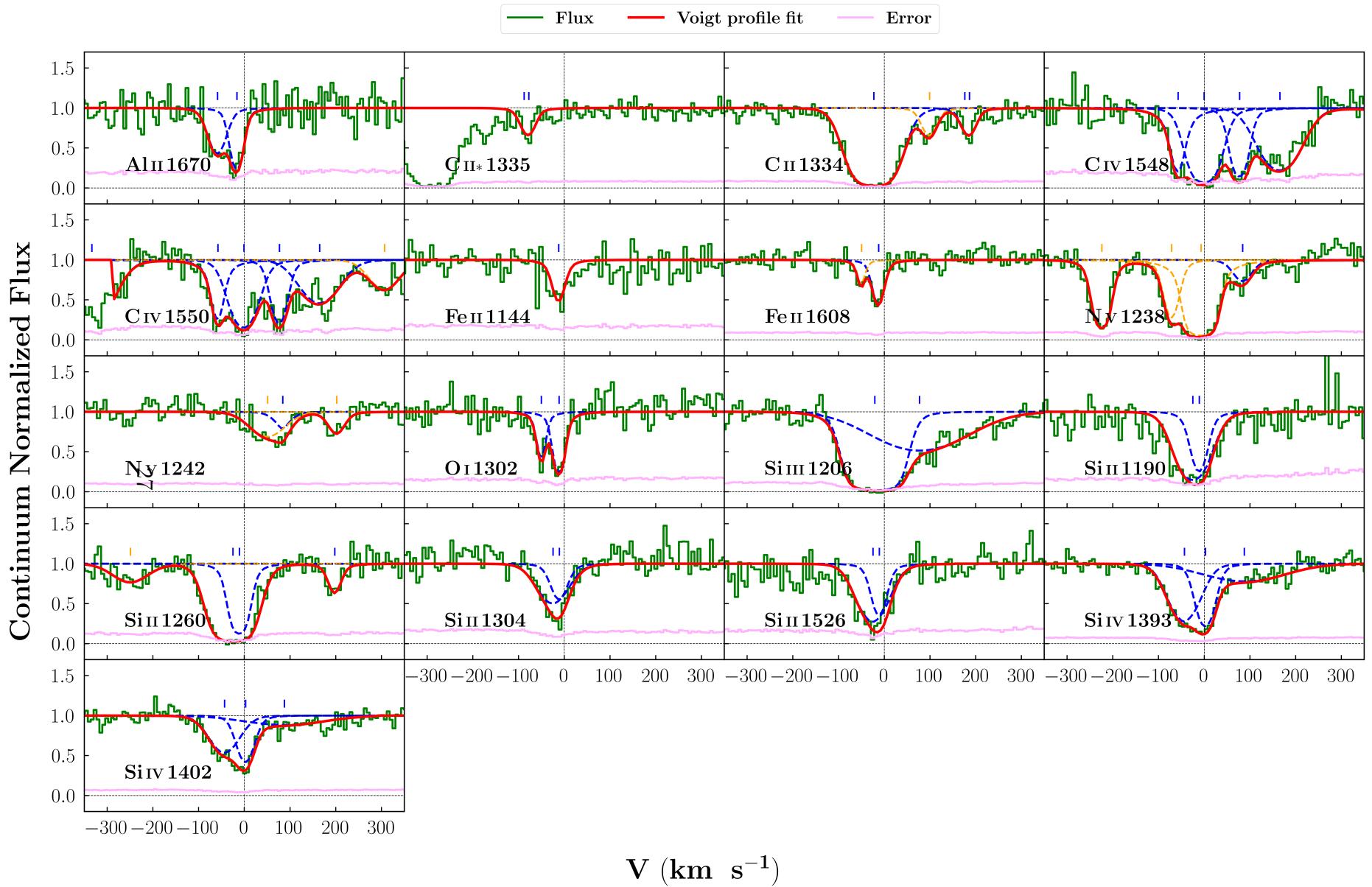
FeII :

Good fit. FeII 1144 contaminated with OVI 1038 from  $z=0.191547, 0.191930, 0.192214$

HI :

Good fit. Fitted with 4 comp, two single comp profiles and one 2 comp profile. Getting large  $b \sim 126$  km/s for one of the comp.

PG0832 + 251 ( $z_{\text{abs}} = 0.017505$ )



<b>Ion</b>	<b>v (km s<sup>-1</sup>)</b>	<b>b (km s<sup>-1</sup>)</b>	<b>log [N cm<sup>-2</sup>]</b>
l <sub>II</sub>	-58 ± 7	21 ± 6	12.76 ± 0.08
l <sub>II</sub>	-16 ± 4	12 ± 4	13.04 ± 0.11
O <sub>I</sub>	-50 ± 2	4 ± 2	15.28 ± 0.41
O <sub>I</sub>	-11 ± 1	7 ± 3	15.76 ± 0.28
Fe <sub>II</sub>	-12 ± 1	12 ± 3	14.16 ± 0.07
Si <sub>IV</sub>	-43 ± 8	39 ± 6	13.72 ± 0.1
Si <sub>IV</sub>	3 ± 3	21 ± 3	13.68 ± 0.11
Si <sub>IV</sub>	88 ± 1	120 ± 15	13.46 ± 0.05
C <sub>IV</sub>	-57 ± 2	4 ± 1	17.26 ± 0.12
C <sub>IV</sub>	0 ± 3	31 ± 3	14.59 ± 0.08
C <sub>IV</sub>	78 ± 1	15 ± 3	14.45 ± 0.07
C <sub>IV</sub>	166 ± 3	51 ± 4	14.31 ± 0.03
Si <sub>II</sub>	-25 ± 1	38 ± 2	14.29 ± 0.06
Si <sub>II</sub>	-11 ± 4	15 ± 2	14.02 ± 0.13
Si <sub>II</sub>	198 ± 4	13 ± 7	12.7 ± 0.09
Si <sub>III</sub>	-21 ± 2	38 ± 7	14.67 ± 0.06
Si <sub>III</sub>	77 ± 17	130 ± 14	13.48 ± 0.07
N <sub>V</sub>	84 ± 6	23 ± 7	13.53 ± 0.08
C <sub>II</sub>	-23 ± 1	43 ± 3	15.2 ± 0.1
C <sub>II</sub> *	-78 ± 3	10 ± 0	13.7 ± 0.08

## Comments

AlIII :

Good fit. Fitted with 2 comp. Danforth has given just one comp, clearly a two comp structure is there, could not find any other possible contamination, so fitted two comp.

OI :

Good fit. Fitted with 2 comp. Same issue of 1 comp vs 2 comp as for AlIII

FeII :

Good fit. FeII 1608 is contaminated from NV 1242 (self identified) from

$z=0.316648$ . Fe II 1144 also seems to be contaminated from some unknown contamination.

SiIV :

Good fit. Fitted with 3 comp. Third component is very broad  $b \sim 120$  km/s.

CIV :

Good fit. Fitted with 4 comp. Lot of substructure, maybe even further is possible. CIV 1550 is contaminated with Ly $\alpha$  from  $z=0.299318$ .

SiII :

Good fit. Fitted with 2 comp. SiII 1260 is fitted with 3 comp, third comp is not there in other lines.

SiII 1193 is contaminated from geocornal Ly $\alpha$  emission so excluded from fit.

SiII 1260 is contaminated from Ly $\alpha$  from  $z=0.054086$

SiIII :

Average fit. Fitted with 2 comp, one comp is very broad  $b \sim 130$  km/s.

NV :

Average fit : Highly contaminated

NV 1238 contaminated with galactic SiII 1260 lines (2 comp) and galactic SII 1259.

NV 1242 contaminated with Ly $\beta$  from  $z=0.233056$  and Ly $\alpha$  from  $z=0.040917$ .

CII :

Average fit. Contaminated with OI from  $z=0.043138$ .

CII\* 1335 doublet is also there from  $z=0.017241$ . Currently saved as 2nd comp of the line.

HI :