

Resolving BAL Quasar Outflows: Outflow Cloud Properties Using Voigt Profile Fitting of C IV Absorption Lines

Presented by

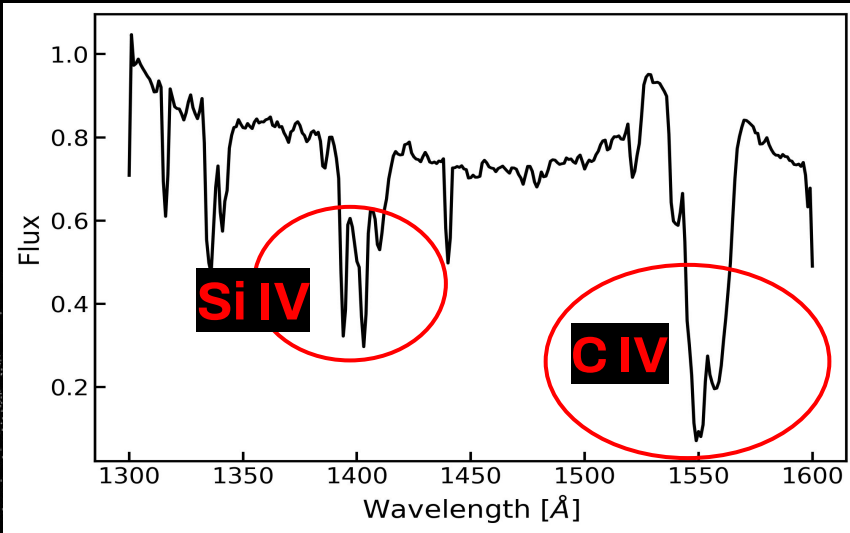
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Broad Absorption Line (BAL) quasars



BAL quasars provide direct evidence of **energetic outflows** from quasars.

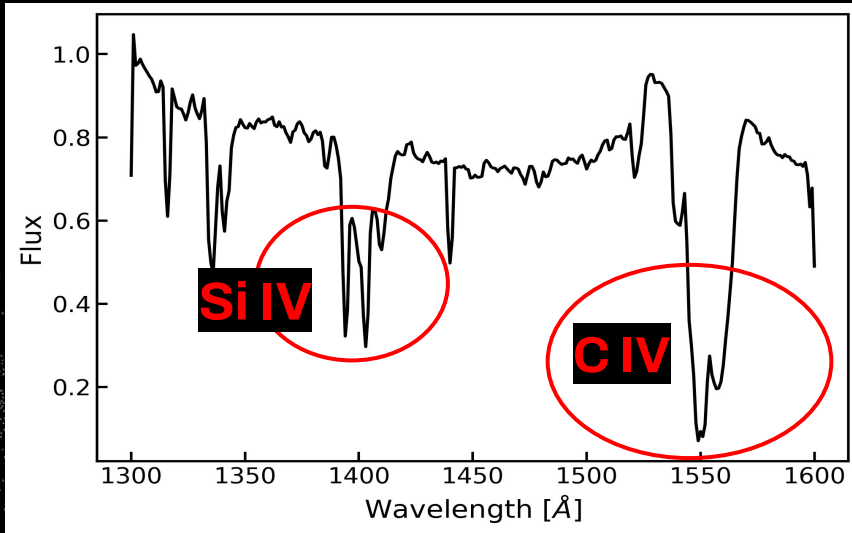


Characterized by **broad, blue-shifted absorption features**, most prominently in high-ionization lines such as C IV $\lambda\lambda$ 1548,1550 and Si IV $\lambda\lambda$ 1393,1402.

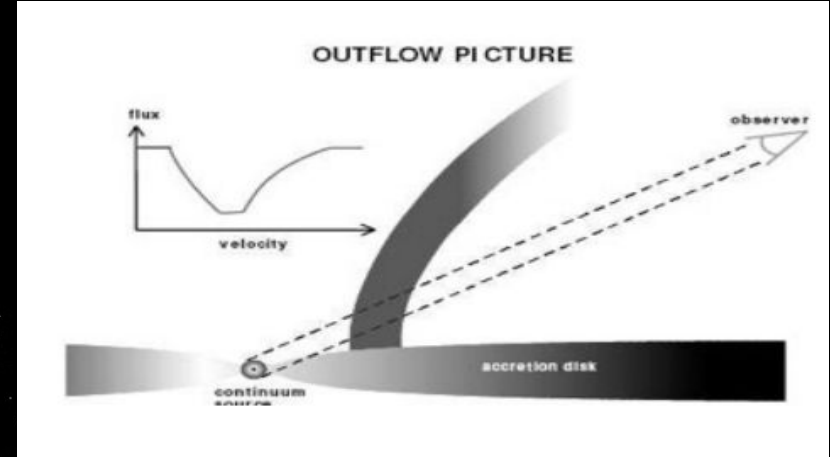


Constitute about **10–20%** of the quasar population.

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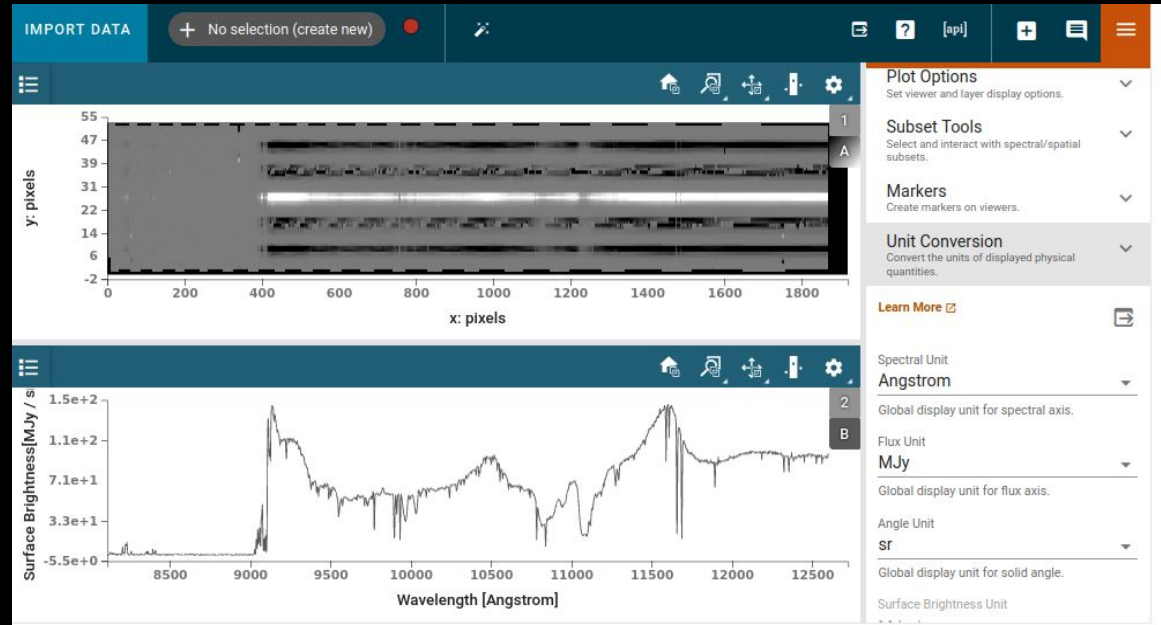
UHS J0439+1634

Observation details:

- $z = 6.521$
- Mode: FS
- Date: 24 Jan 2023
- PID: 1222
- PA [deg]: 210.8

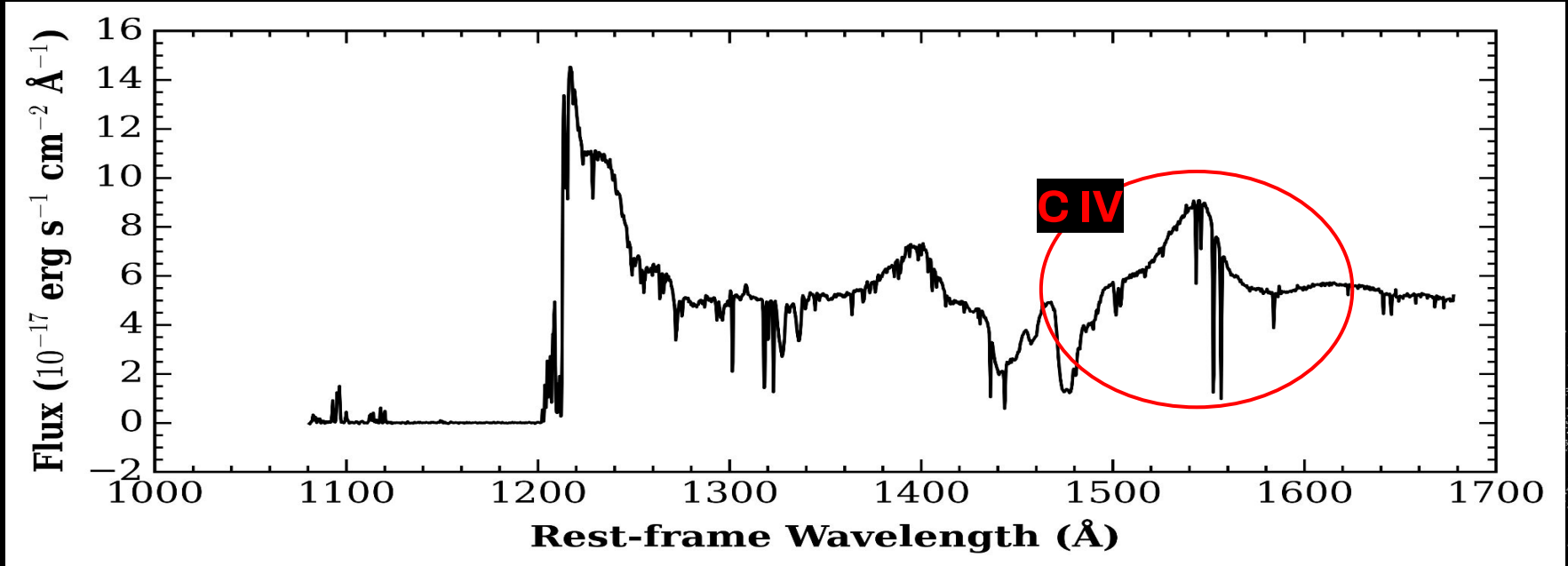
(L. Christensen et al. 2023)

NIRSpec fixed slit and 1D spectrum from Band III data ($\lambda > 31160 \text{ \AA}$) of UHS J0439+1634.



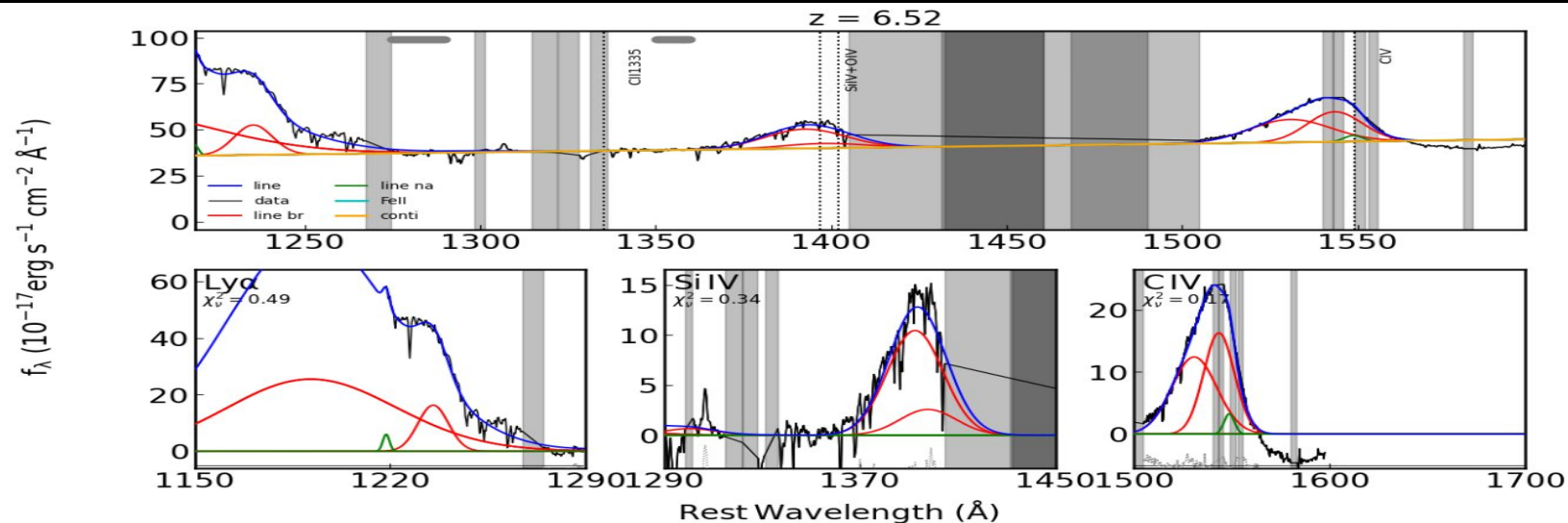
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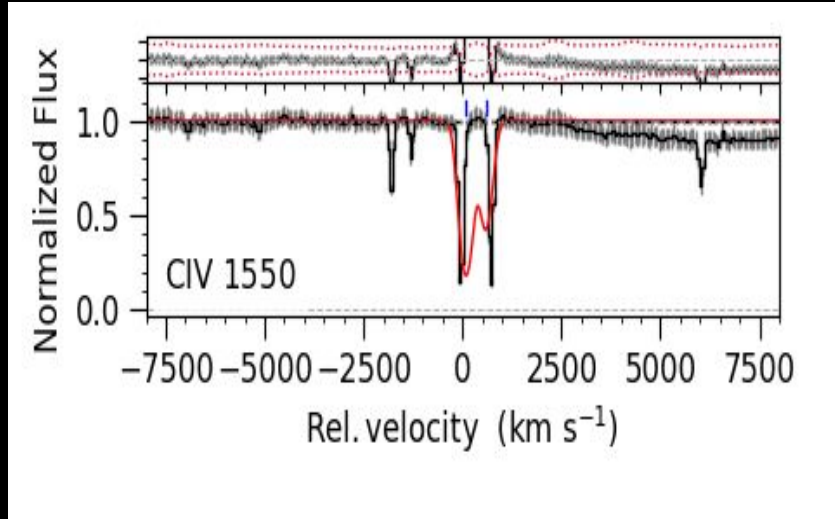
Continuum normalization of UHS J0439+1634 using PyQSOFit

- The emission lines are then fitted using Gaussian profiles.
- The continuum is modeled using several components, including a power-law, polynomial, Fe II emission, and the Balmer continuum, with the fit performed in line-free windows.



Voigt Profile Fitting

- Voigt Fit by J. K. Krogager (Krogager 2018)
- Each component is described by its redshift (or velocity relative to the systemic redshift), the Doppler parameter b , and the logarithm of the column density.



Voigt Profile Fitting

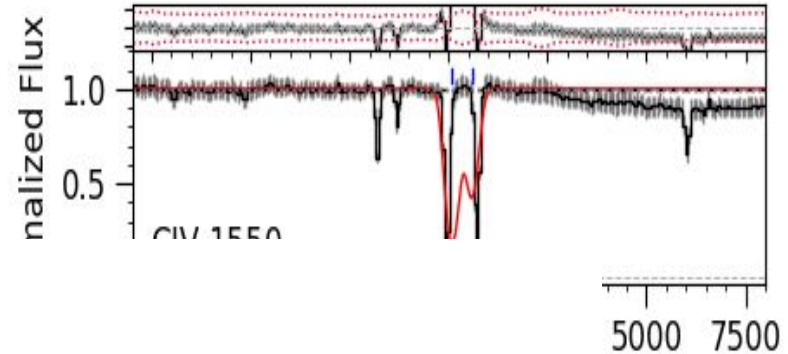
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Best fit parameters:

	b	$\log(N)$
CIV 1548, 1550		
$v = +585.8 \pm 14.3$	200.15 ± 24.70	14.9182 ± 0.0350

Total Column Densities:

$\log N(\text{CIV}) = 14.917 \pm 0.035$



Thank You!