Tracing Baryons in the Warm Hot Intergalactic Medium using Broad Lyman-α Absorbers

Mid-Term 2

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Thesis Phase I : Recap

Recap

- The missing baryon problem
- BLAs : Way to probe WHIM
- Absorber towards PG 0003+158
- BLA survey : 28 BLA candidates

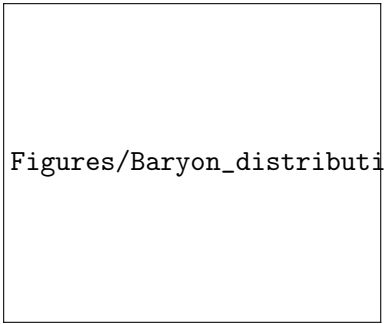

Figure 1: Baryon budget at $z \sim 0$.
Shull et al. (2012)

The BLA Survey

Insights

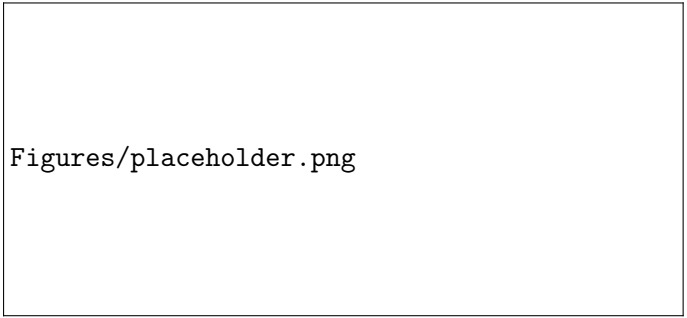

Figure 2: Distribution of H I column densities and Doppler parameters.

Insights

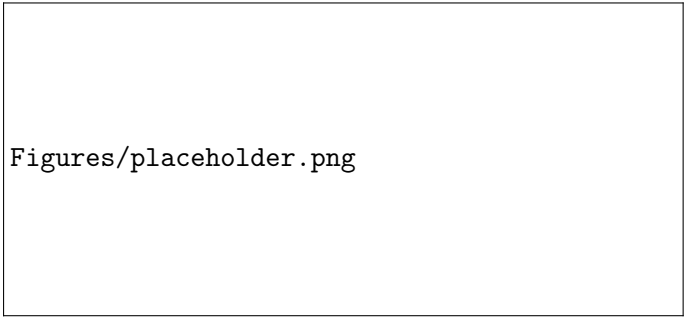

Figure 3: H I column density vs. Doppler parameter

Insights

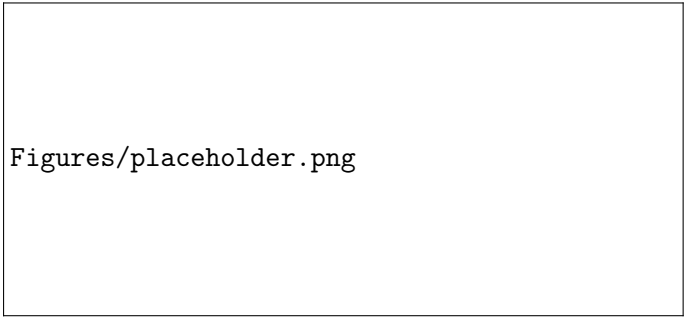

Figure 4: b(O VI) vs. b(H I)

Ionisation Modelling

Method

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- Grid of PI CLOUDY models : Density and Metallicity

Ref. : Acharya and Khaire (2021)

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- Grid of PI CLOUDY models : Density and Metallicity
- log (n_H/cm^{-3}) : -5 to 1 in steps of 0.02
- log $(Z/Z\odot)$: -3 to 2 in steps of 0.05
- Solution : Model that best predicts the observed column densities

Ref. : Acharya and Khaire (2021)

Scaling approximation

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- 2d CLOUDY models : computationally expensive

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- 2d CLOUDY models : computationally expensive
- Scale column density with metallcity
- $\mathrm{N}(n_H, Z) = \mathrm{N}(n_H, Z_0) + \log(Z/Z_0)$
- $Z_0 = 0.1 Z\odot$

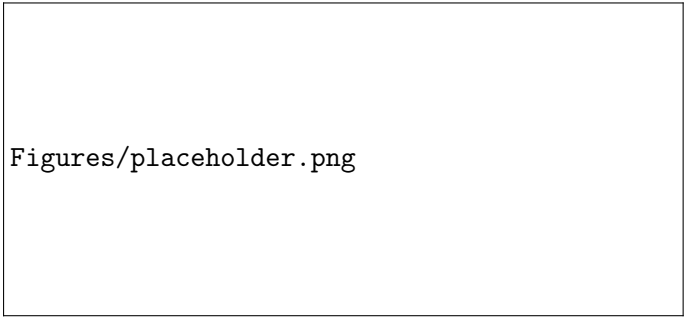

Figure 5: Column density of ion vs. Hydrogen densities at various metallcities

Results

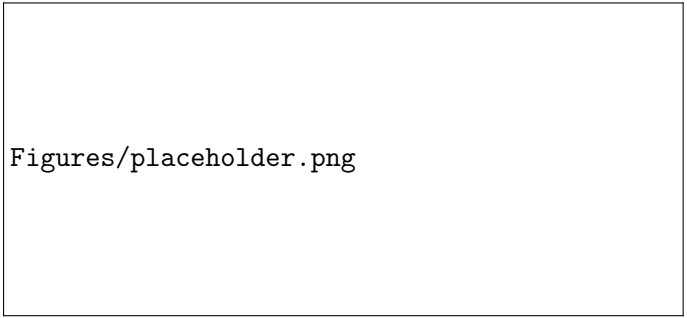

Figure 6: Distribution of no. of metal ions in the absorber systems

Results

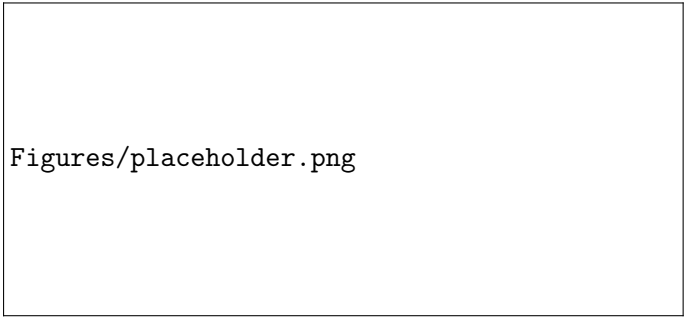

Figure 7: Distribution of no. of metal ions in the absorber systems

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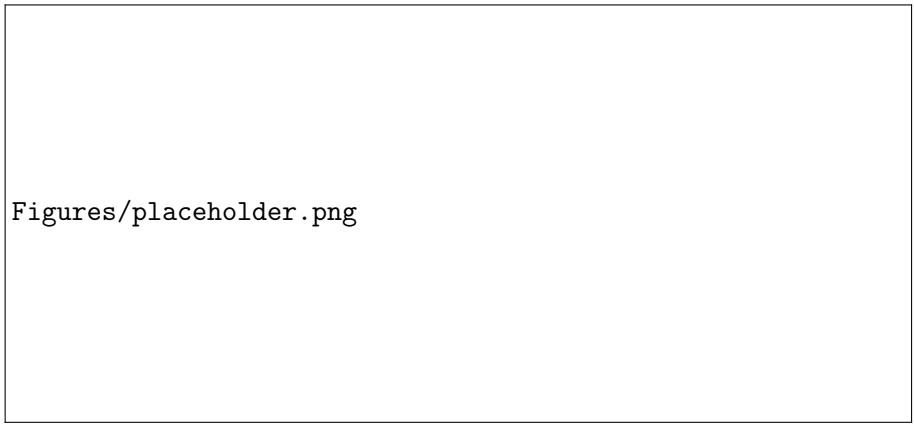

Figure 8: System plot of the absorber system towards LOS of

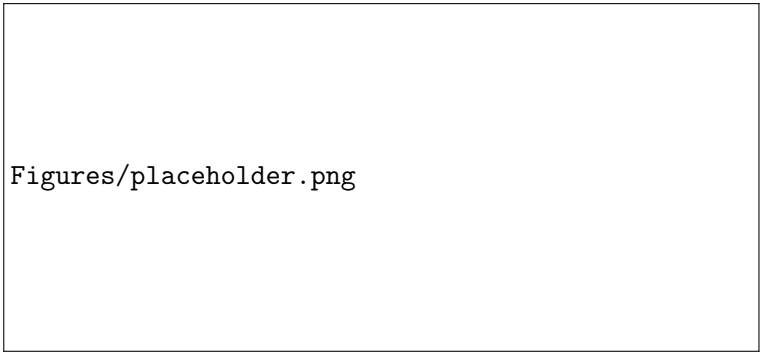

Figure 9: Observed and predicted column densities of the ions.

References

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