

# Emission line galaxy properties at high redshifts

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## Abstract

We present a model for emission line galaxy properties at high redshifts. We adopt a SFRD model proposed by Wyithe and Loeb (2012). The model accounts for major mergers and SN feedback effect on star formation. We calculate various physical properties within disc galaxies. We also incorporate the impact of turbulence on galactic disc which influence the physical properties. We use the model to calculate [OIII]5007 line luminosity and predicted flux ratio  $\log([OIII]/H\beta)$  and [OIII] luminosity function for JWST FRESCO survey.

## Introduction and method

- ❖ Emission lines originating from ELGs provide essential information about various aspects of galaxies like SFR, chemical enrichment, ionization parameter etc.
- ❖ High-z ELGs are significantly different from local one in terms of active star formation, mergers, metallicities and even morphology.
- ❖ We used a SFRD model originally proposed by Wyithe and Loeb 2012 in order to estimate properties of ELGs.
- ❖ The galactic disc considers three main assumptions:

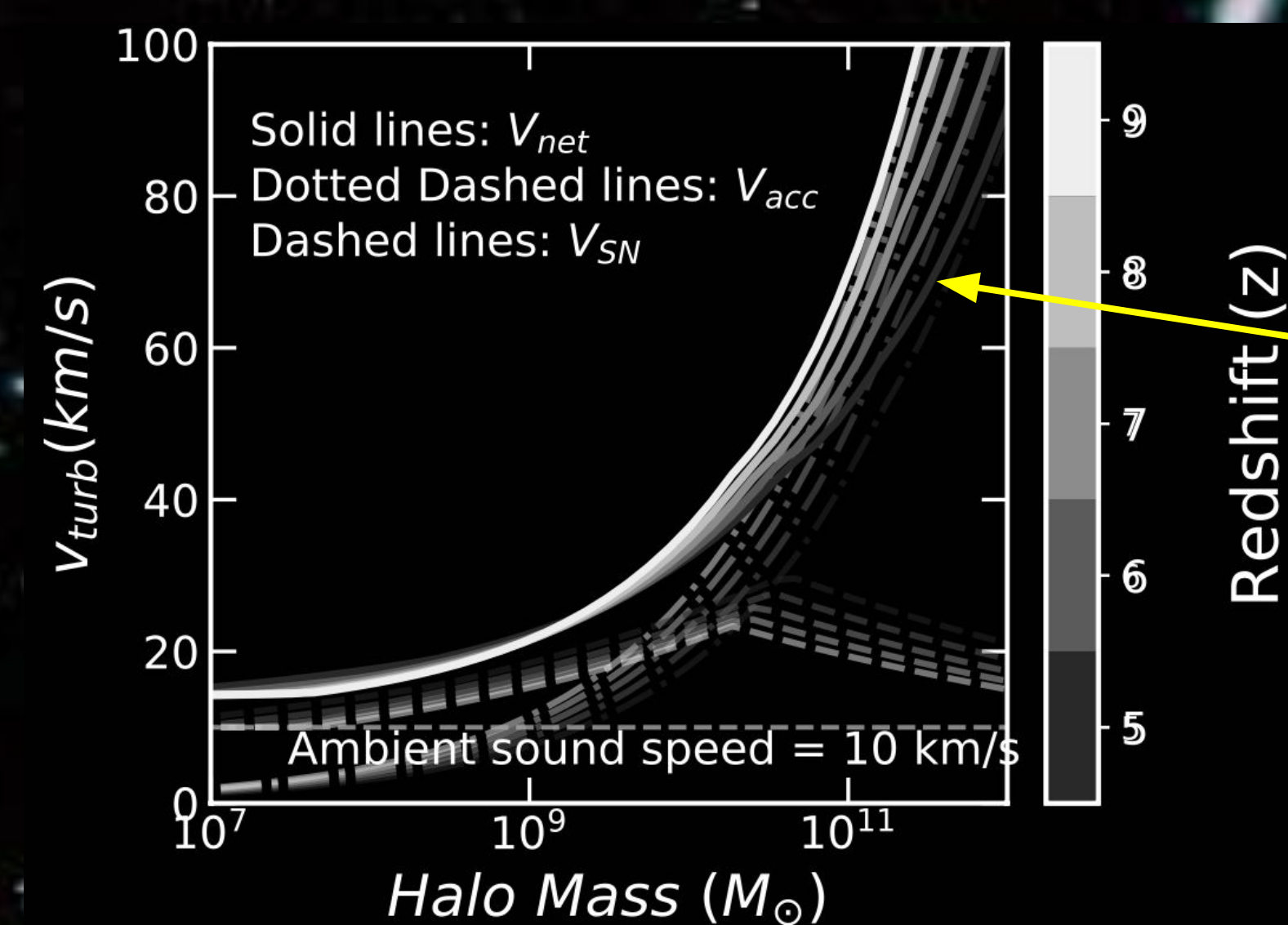
Vertically supported by hydrostatic equilibrium assuming gas at  $10^4$  K.

Disc undergoes major mergers which triggers the star formation.

SNe feedback alters the star formation efficiency in low mass galaxies.

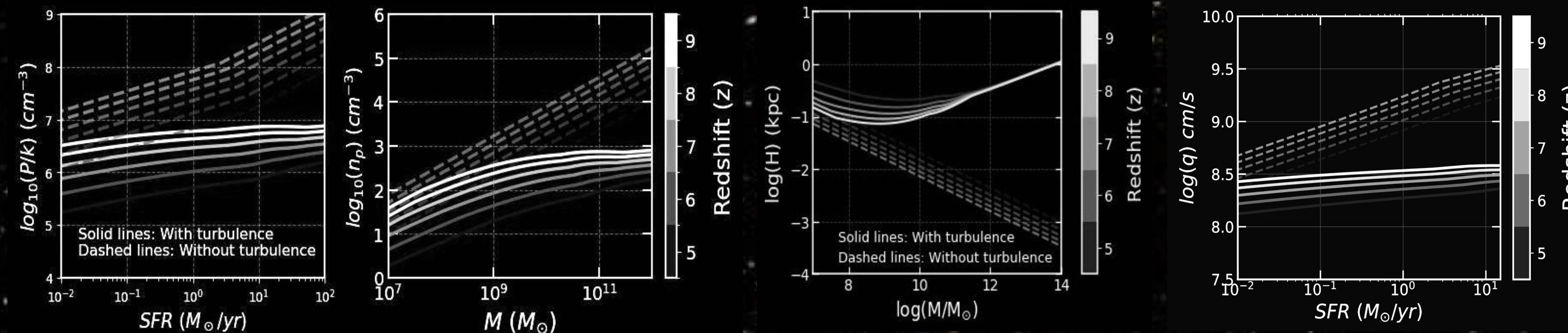
## Results

- We consider turbulence effect in our model driven by stellar feedback and accretion in order to incorporate variation in physical properties.

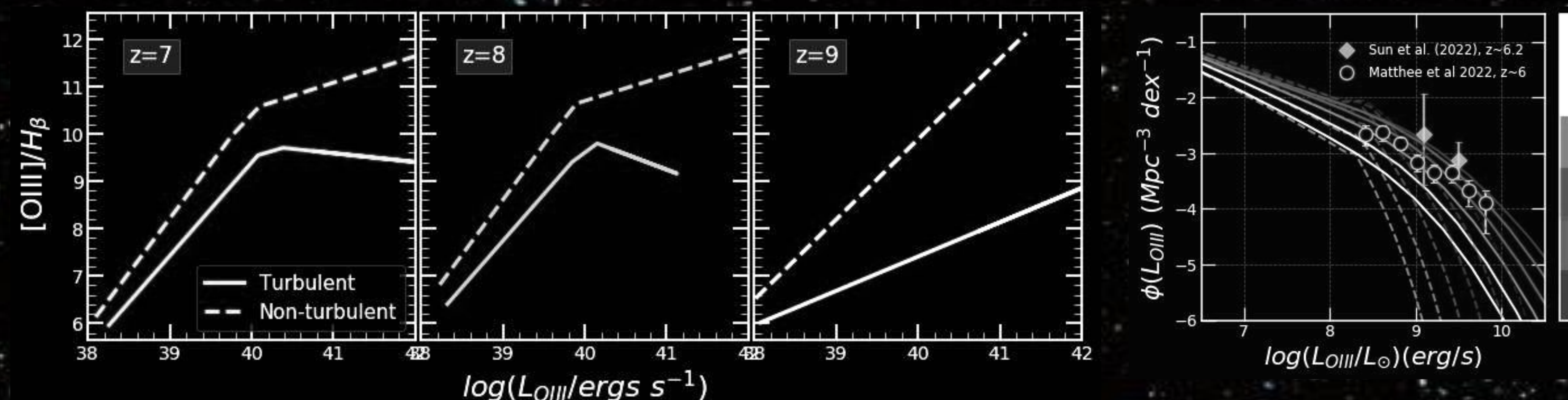


We consider net turbulent velocity (solid lines) resulting from two drivers (acc. and SN feedback) into consideration.

- The physical properties in turbulent and non-turbulent medium are significantly different from each other as shown by solid and dashed lines below.



## Flux ratio and luminosity function prediction for FRESCO survey



## Discussion

- ❖ Physical properties like number density, ionization parameter, pressure etc., show an evolution with redshift.
- ❖ These high-z galaxies are strongly influenced by turbulence within disc.
- ❖ We predict [OIII]/H $\beta$  flux ratio from Mappings 5.2v and is sensitive to galaxy properties like ionization parameter, metallicity, pressure, etc.
- ❖ We calculate [OIII] luminosity function and it's in good agreement with JWST findings.

## Conclusion

- ❖ We follow a complete analytic approach to interpret properties of emission line galaxies at high redshifts for JWST FRESCO survey.
- ❖ We derive physical properties of galactic disc and how they differ in turbulent and no-turbulent medium.
- ❖ We further extend the model to evaluate line luminosities of [OIII]5007 line and predicted the line ratio (OIII/H $\beta$ ) and corresponding LF.

## References

- 1.) Wyithe and Loeb(2013)
- 2.) Oesch et al.(2023){2023arXiv2304020260}
- 3.) Sutherland and Dopita 2017