

Lyman Werner feedback and its impact on reionization

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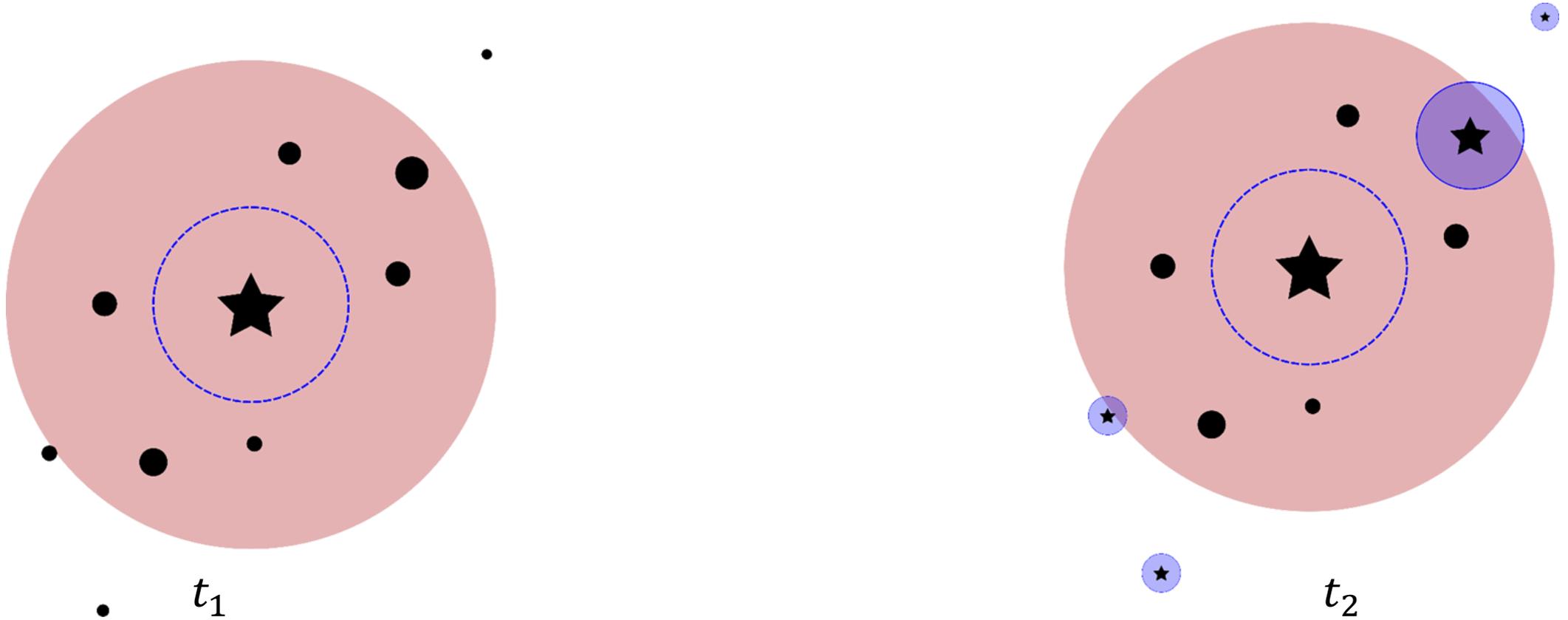
Lyman Werner (LW) radiation

- Photons with energies between 11.5 and 13.6 eV.
- $H_2 + \gamma_{LW} \rightarrow 2H$.
- Less $H_2 \rightarrow$ less star formation at high redshifts.

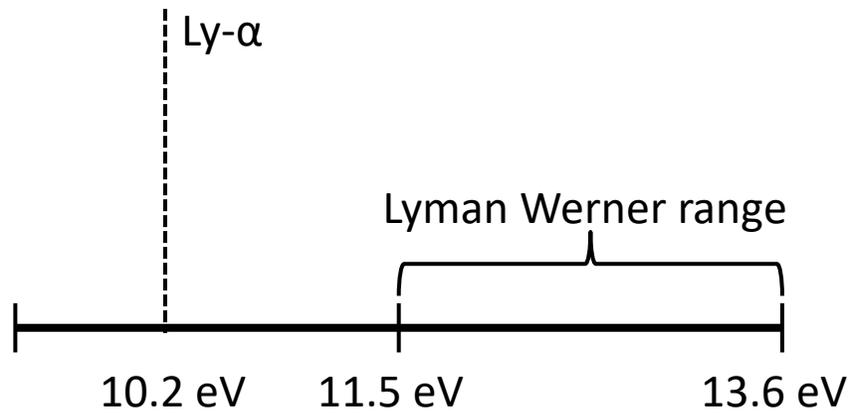
Impact on reionization



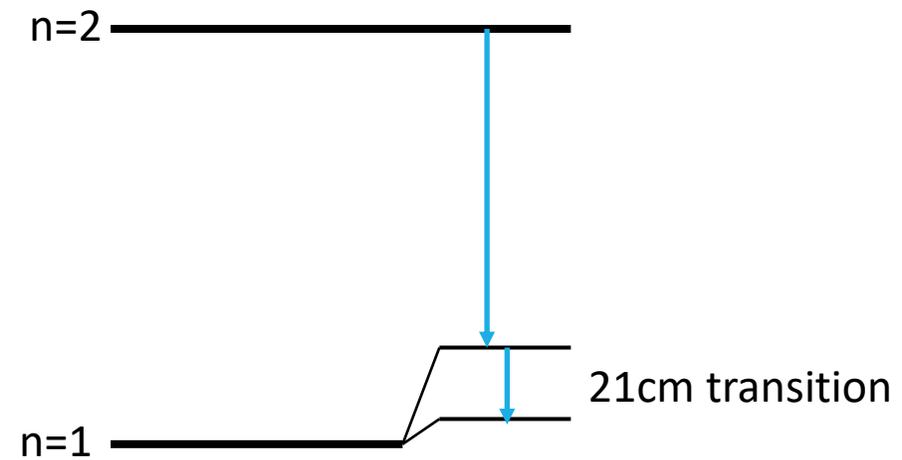
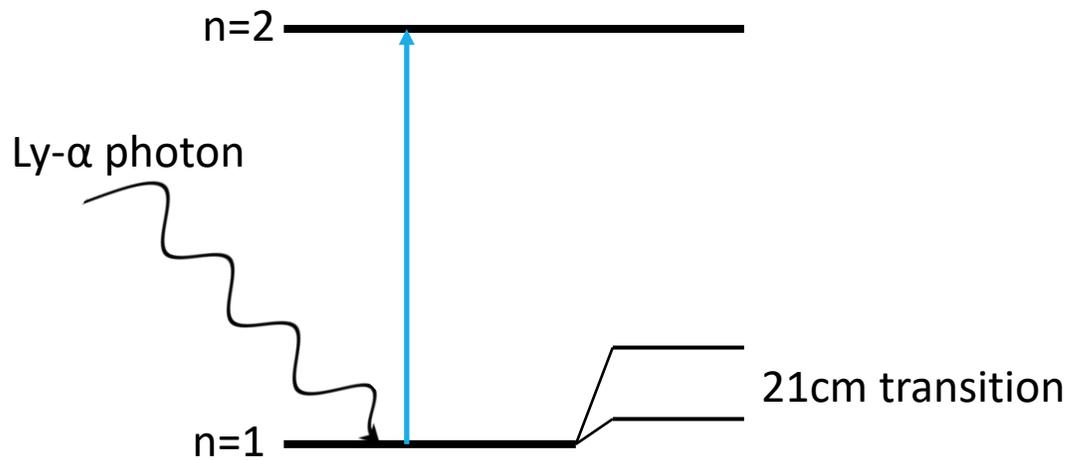
Impact on reionization



Impact on 21cm: Ly- α coupling



Impact on 21cm: Wouthuysen-Field effect



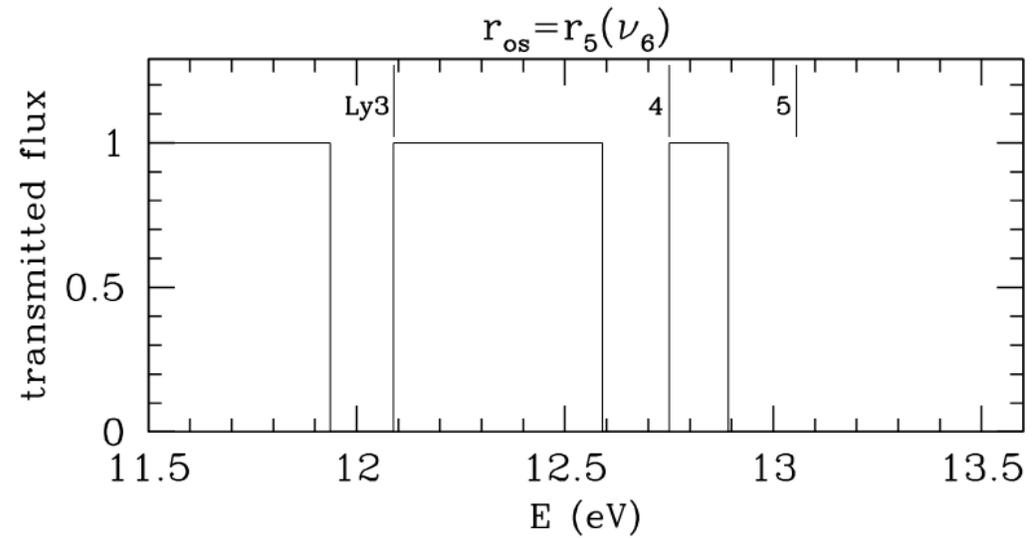
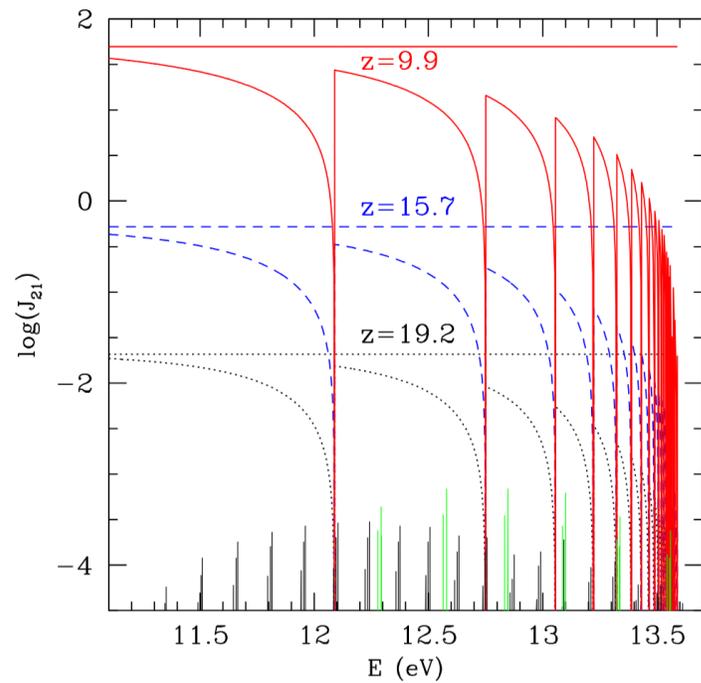
Detectability of 21cm signal

$$\delta T_b \approx (27\text{mK})x_{H1}(1 + \delta)\frac{T_S - T_{CMB}}{T_S}$$

Impact on the 21cm signal

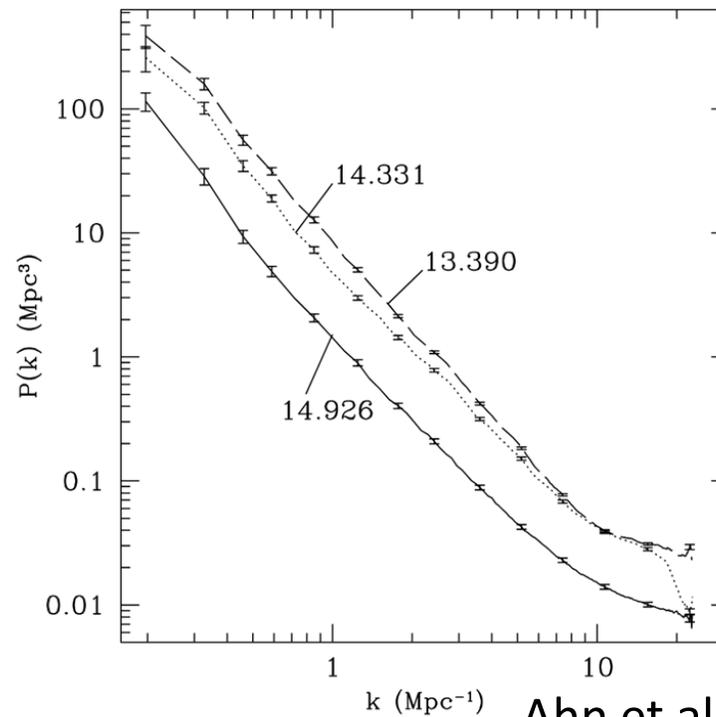
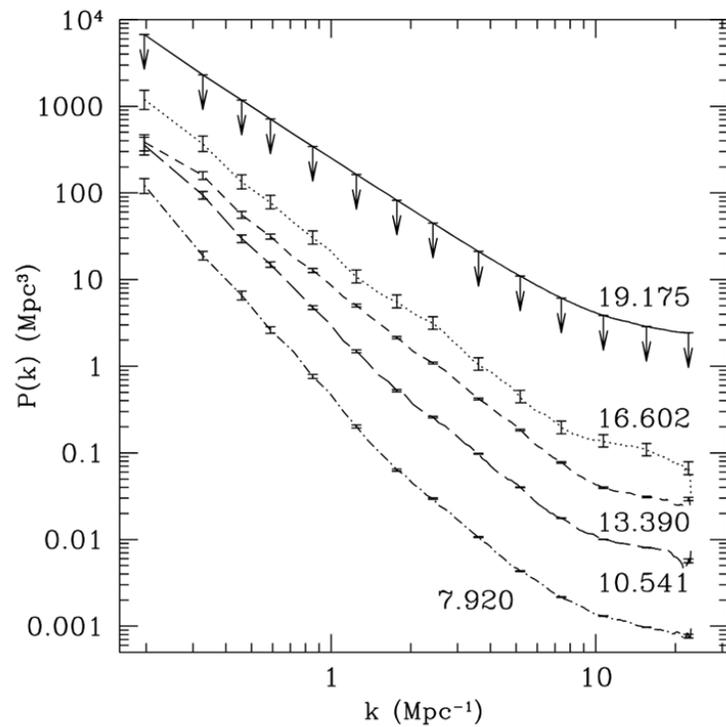
- Spatial fluctuations in star formation correlated with LW fluctuations.
- Ly- α coupling.
- SKA uniquely positioned to probe this.

Inhomogeneous background



Ahn et al. 2009

Size of the fluctuations

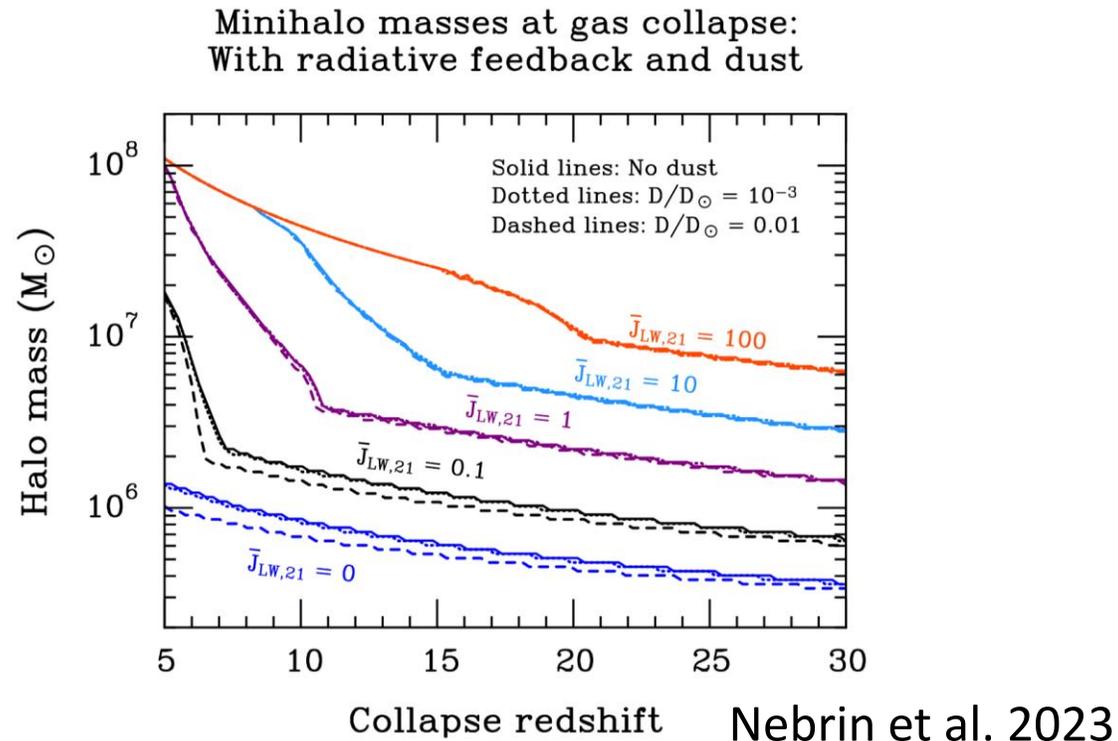


Ahn et al. 2009

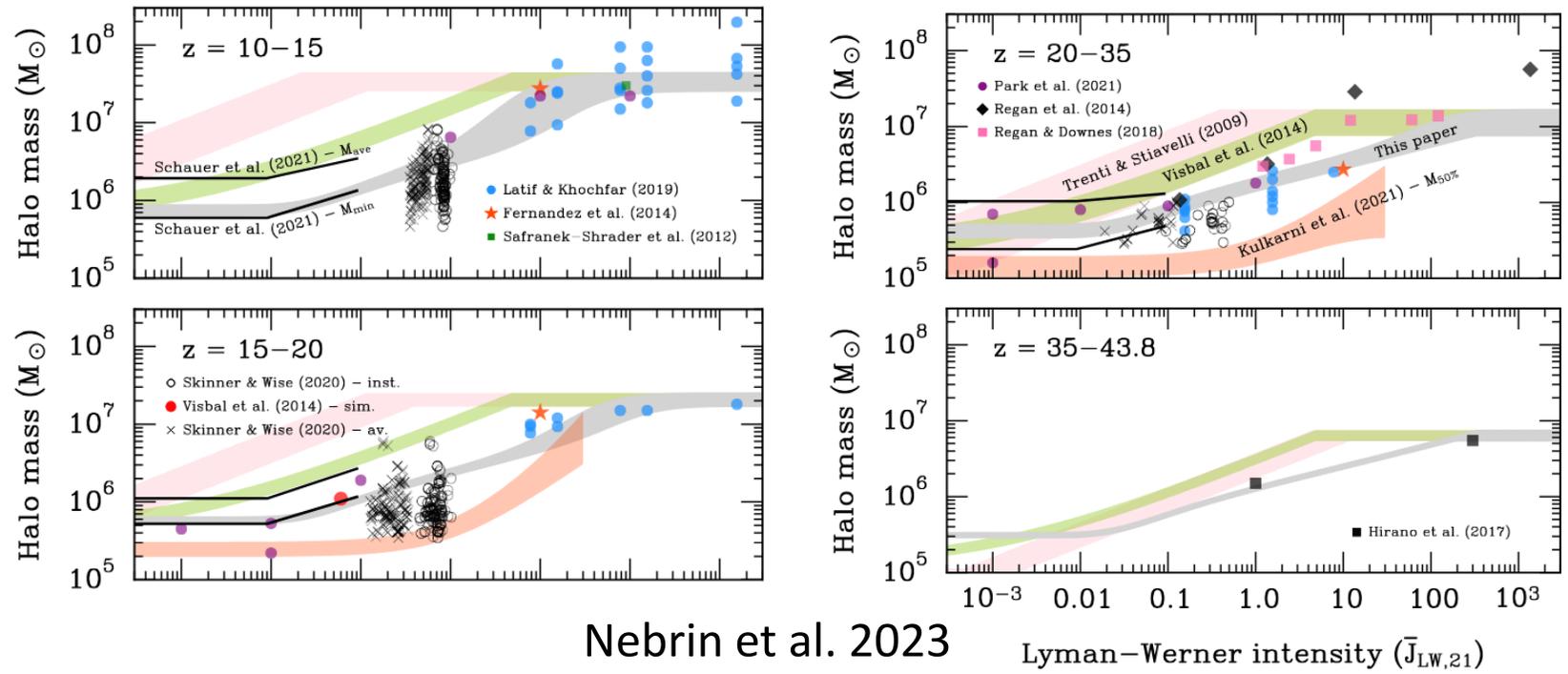
The aim of my project

- Implement inhomogeneous LW transport.
- Combine it with reionization simulation, pyC2Ray.
- Get observational signatures: 21cm power spectrum.

Motivation: star formation



Motivation: star formation

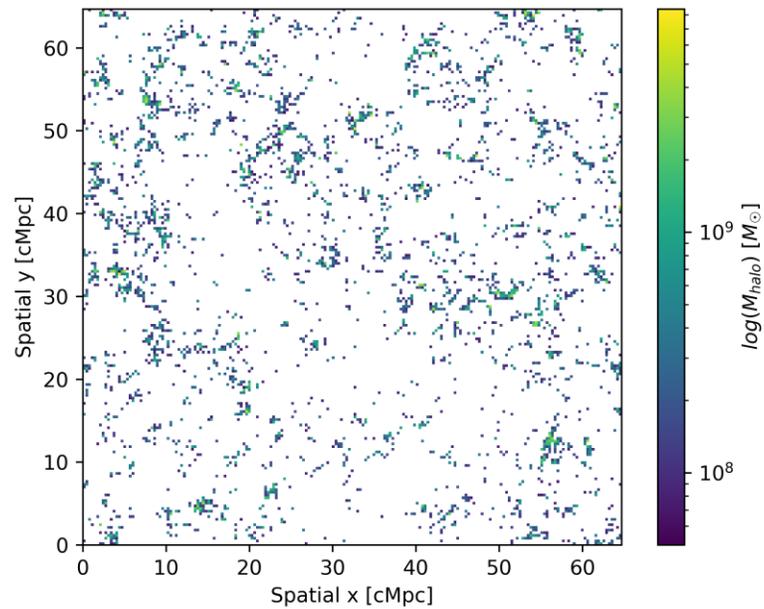


Nebrin et al. 2023

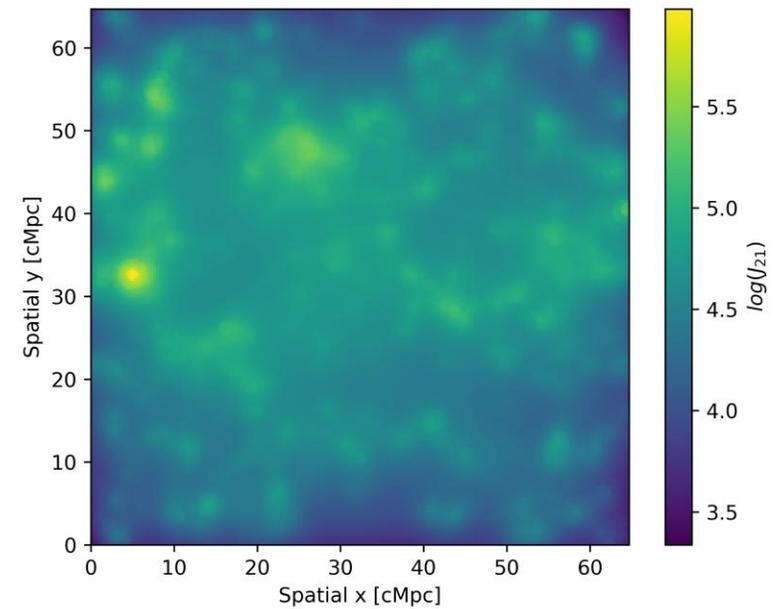
Lyman-Werner intensity ($\bar{J}_{LW,21}$)

Preliminary results

Halo distribution



Lyman Werner background



Thank you!
