
An extended emulator for the Ly- α Forest 1D flux power spectrum

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Overview

Lyman- α forest

Project motivation

Method: weighting functions

Results

Conclusions



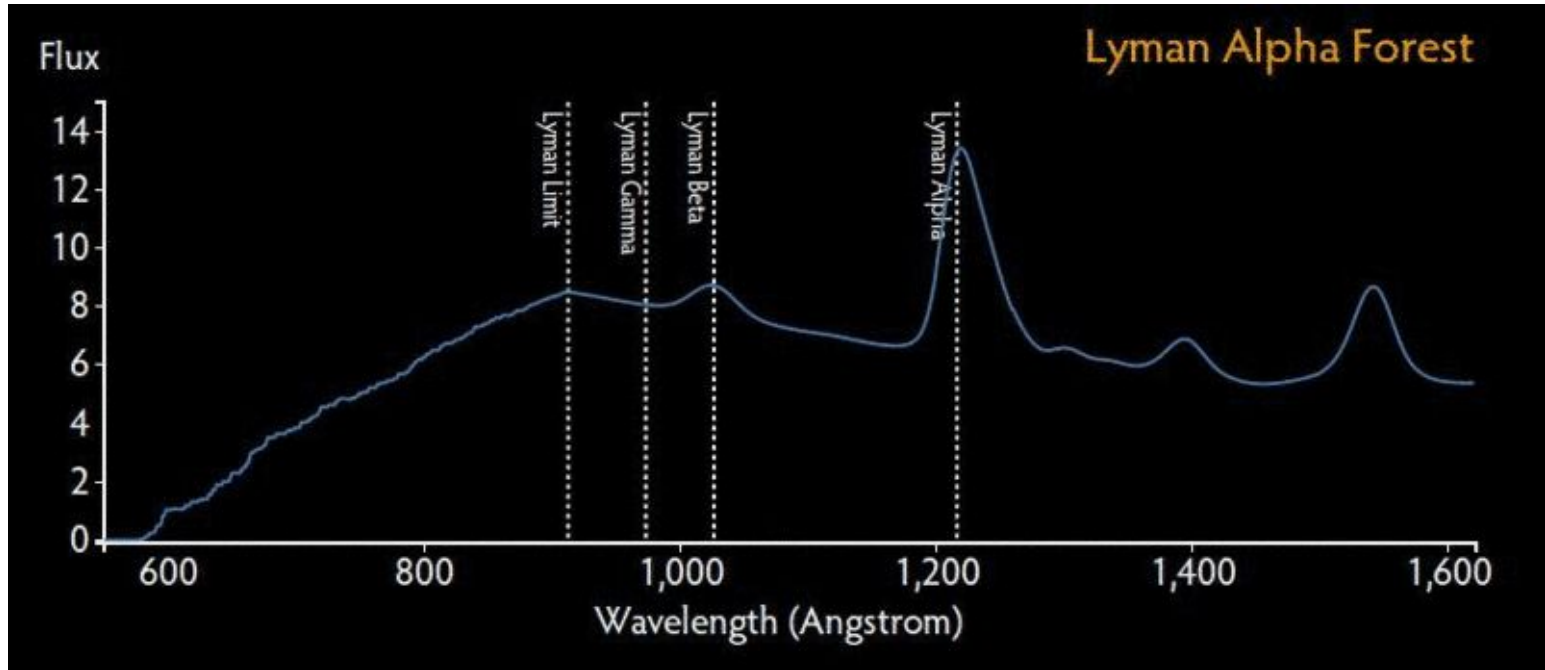
Lyman- α Forest

- **Lyman series:** Series of energies required to excite an electron in Hydrogen from $n=1$ to $n \geq 2$.
- **Lyman- α :** Transition between $n=1$ and $n=2$ ($\lambda=1216 \text{ \AA}$).
- Information about the universe:
 - Amount of neutral Hydrogen in universe.
 - Expansion of the universe

Lyman- α forest: series of absorption lines in spectra of quasars.



Lyman- α Forest



(Wikipedia)

Project motivation

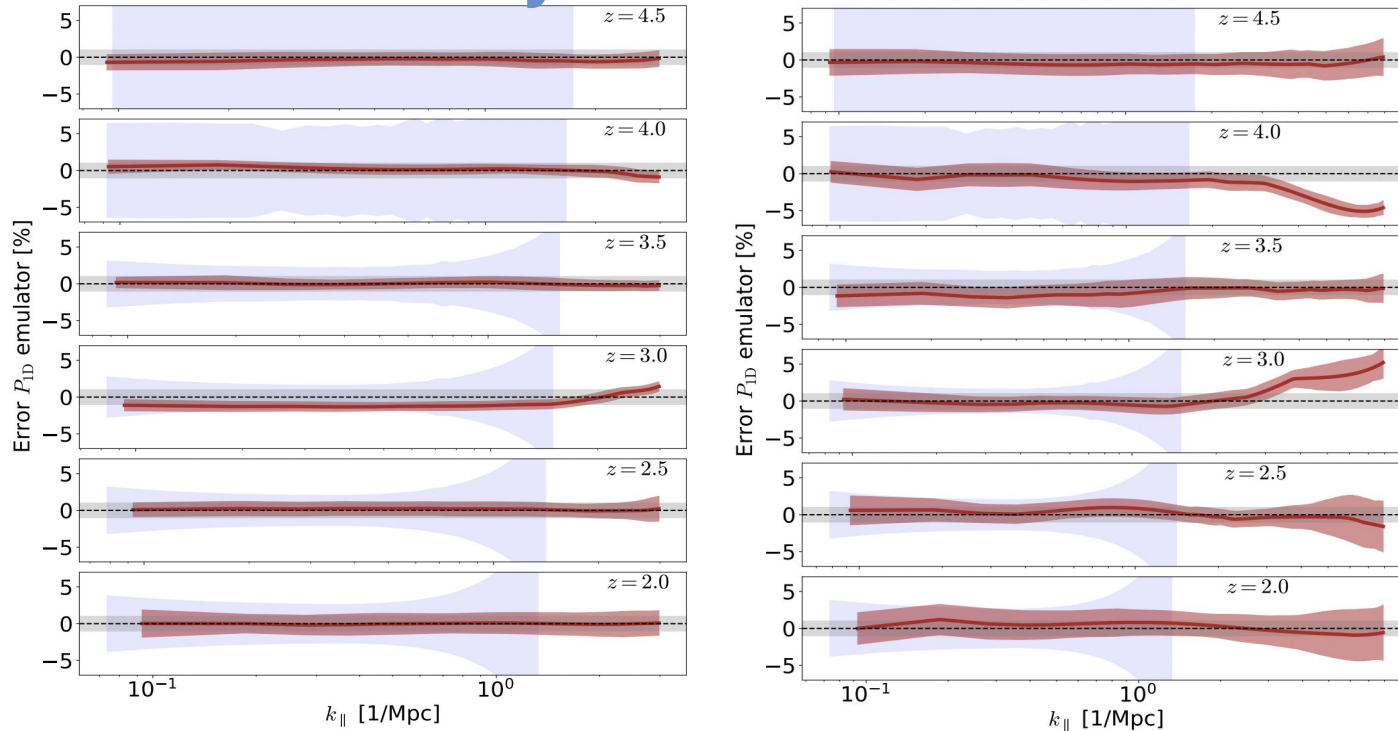
Interpreting data from Ly- α Forest requires modelling of thermal and ionization states of IGM

Impossible to run a simulation for every point in parameter space

Require interpolation techniques:
Neural-network architecture based emulator



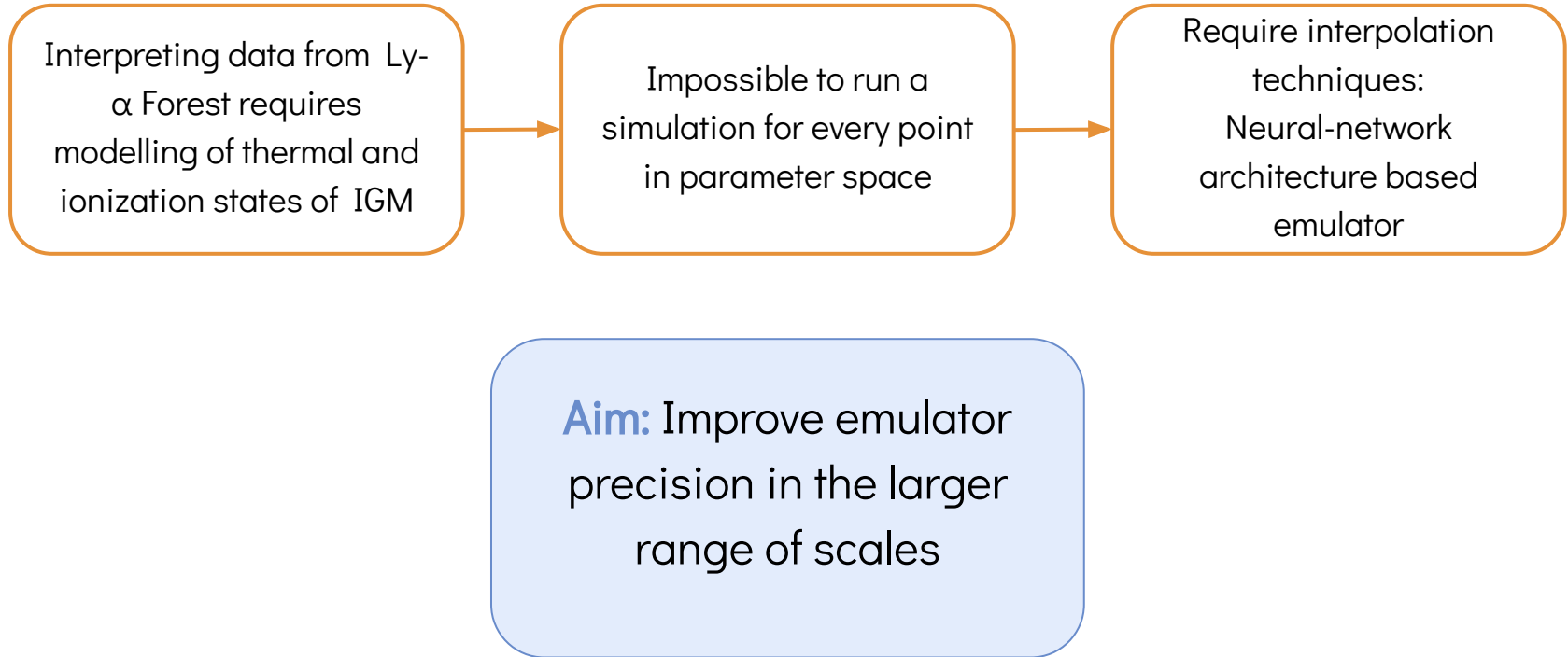
Project motivation



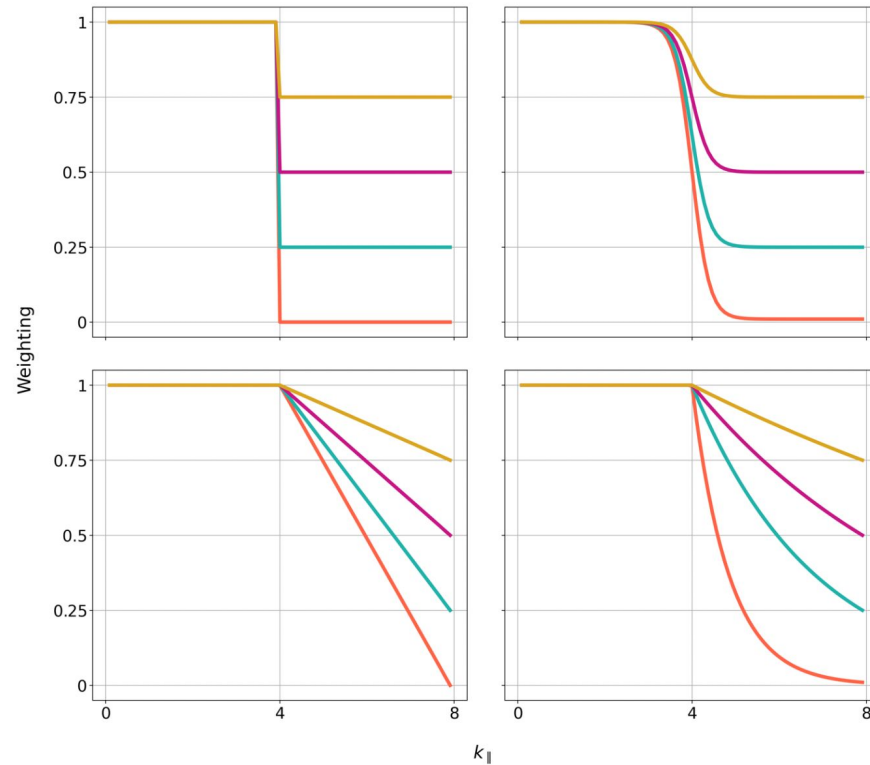
Cabayol-Garcia, L., Chaves-Montero, J., Font-Ribera, A., & Pedersen, C. (2023). A neural network emulator for the Lyman- α forest 1D flux power spectrum. *Monthly Notices of the Royal Astronomical Society*, 525(3), 3499-3515.



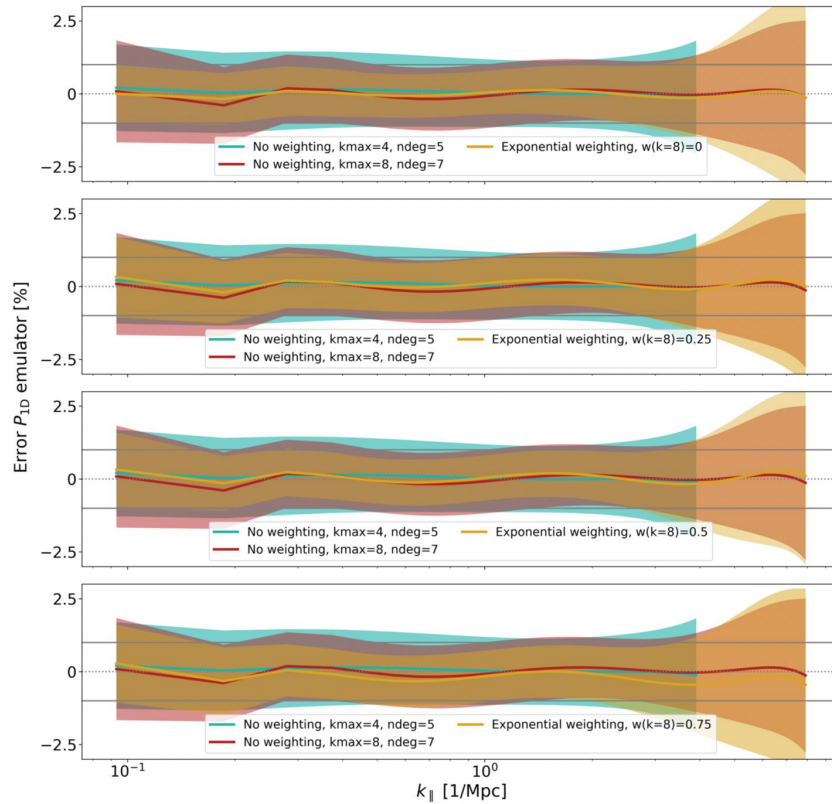
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Method: Weighting functions



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