The package : the Hugo converter, and it's journey

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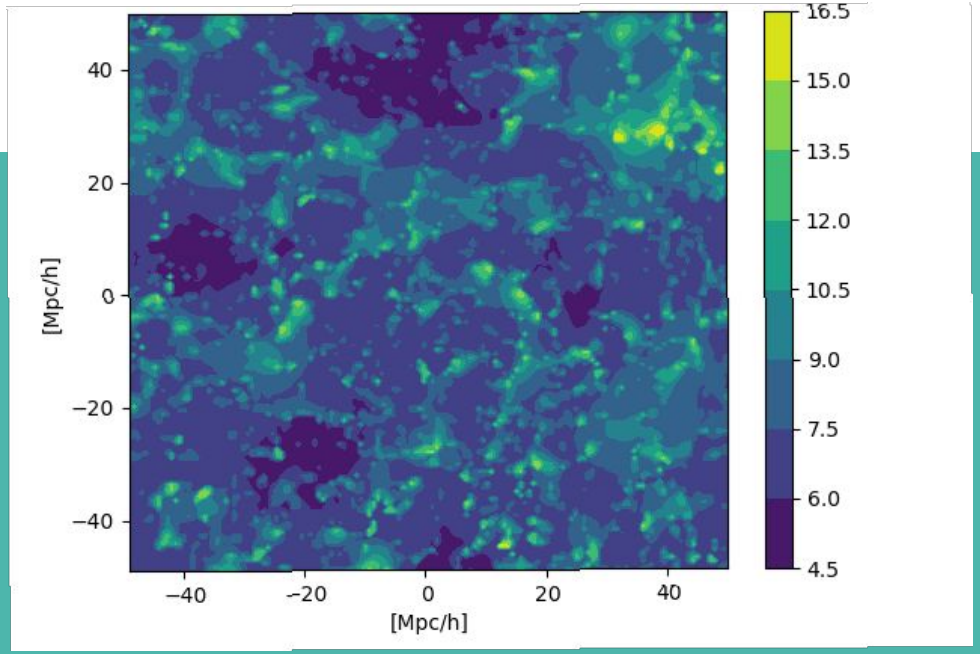
Presentation layout

1. Project overview and motivation
2. Philly news
3. Results obtains with the Hugo converter and James algorithm
4. Next steps
5. Hugo’s converter tutorial
6. A little on courage

The motivation



Quick refresher

21cmFAST

- Physically accurate
- Computes the redshift of reionization field INDEPENDANTLY from the density field
- Not computationally efficient for high resolutions

Z-reion

- Semi analytical model (purely math)
- Computes the redshift of reionization from the density field
- Computationally efficient for high resolutions

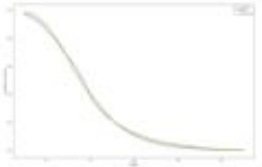
$$\tilde{\delta}_z(k) = b_{mz}(k)\tilde{\delta}_m(k),$$

$$b_{mz}(k) = \sqrt{\frac{P_{zz}(k)}{P_{mm}(k)}}.$$

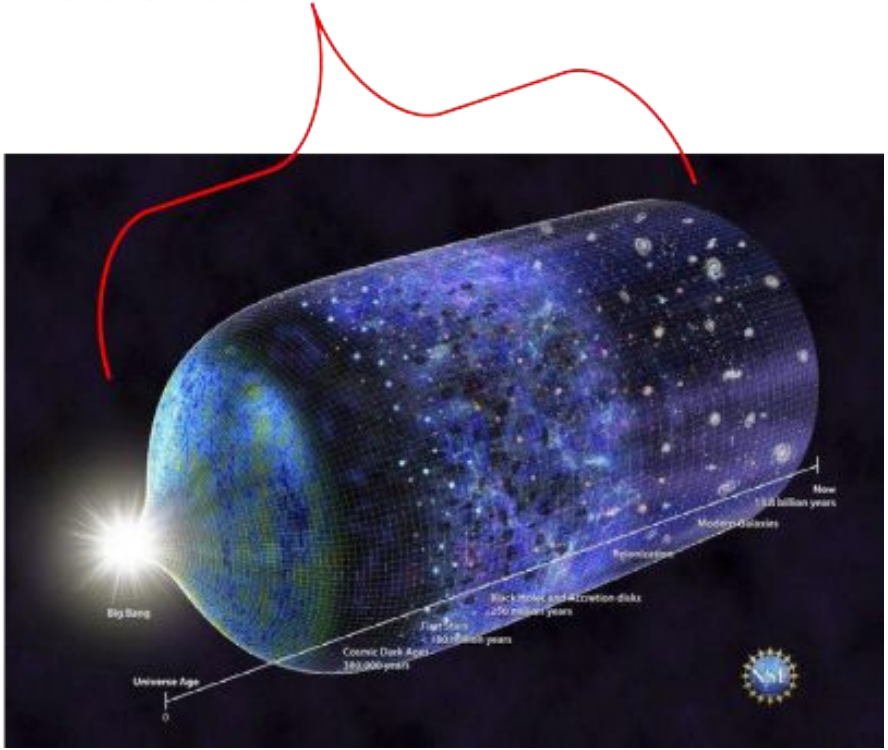
$$b_{mz}(k) = \frac{b_o}{(1 + k/k_o)^{\alpha}},$$


Hugo's converter
z-reion parameters
21cmFAST inputs

The Philly switch



- TAU (optical depth) parameter
- Need for a comparative study of the difference between James' code, 21cmFAST, and the Hugo converter
- Same ionization history with same power spectrum?

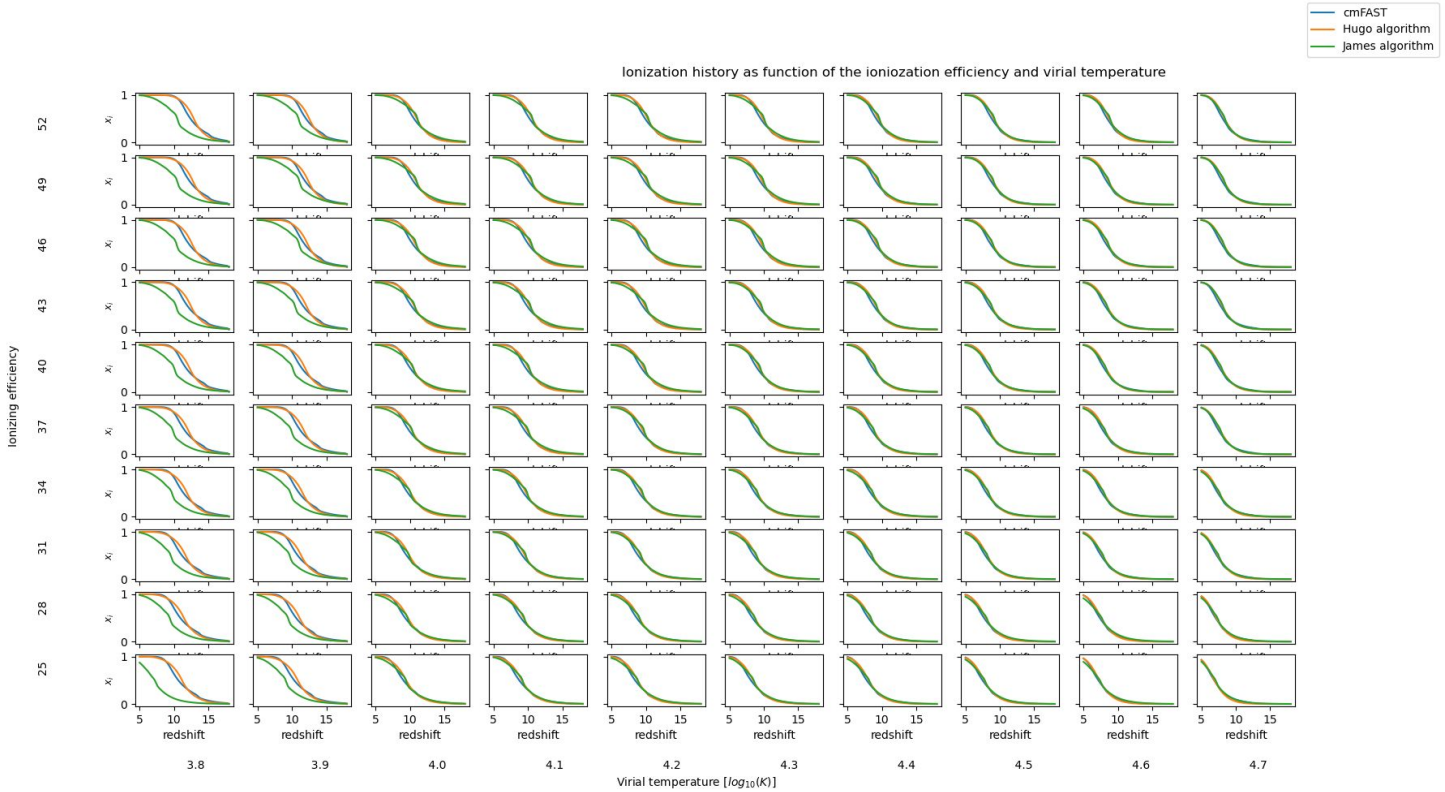


Recent goals

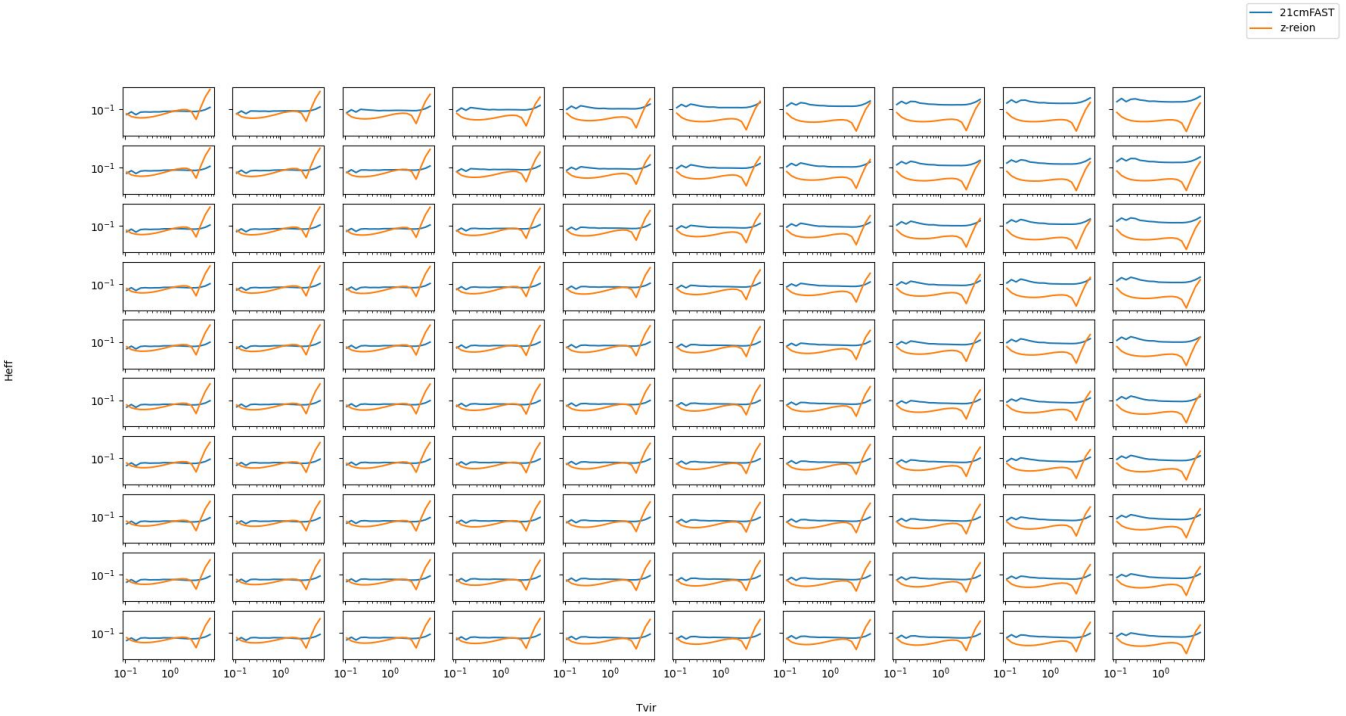
- Launch a big comparative study of 21cmFAST and z-reion (with both codes)
- Work in 2D parameter space

Recent Results

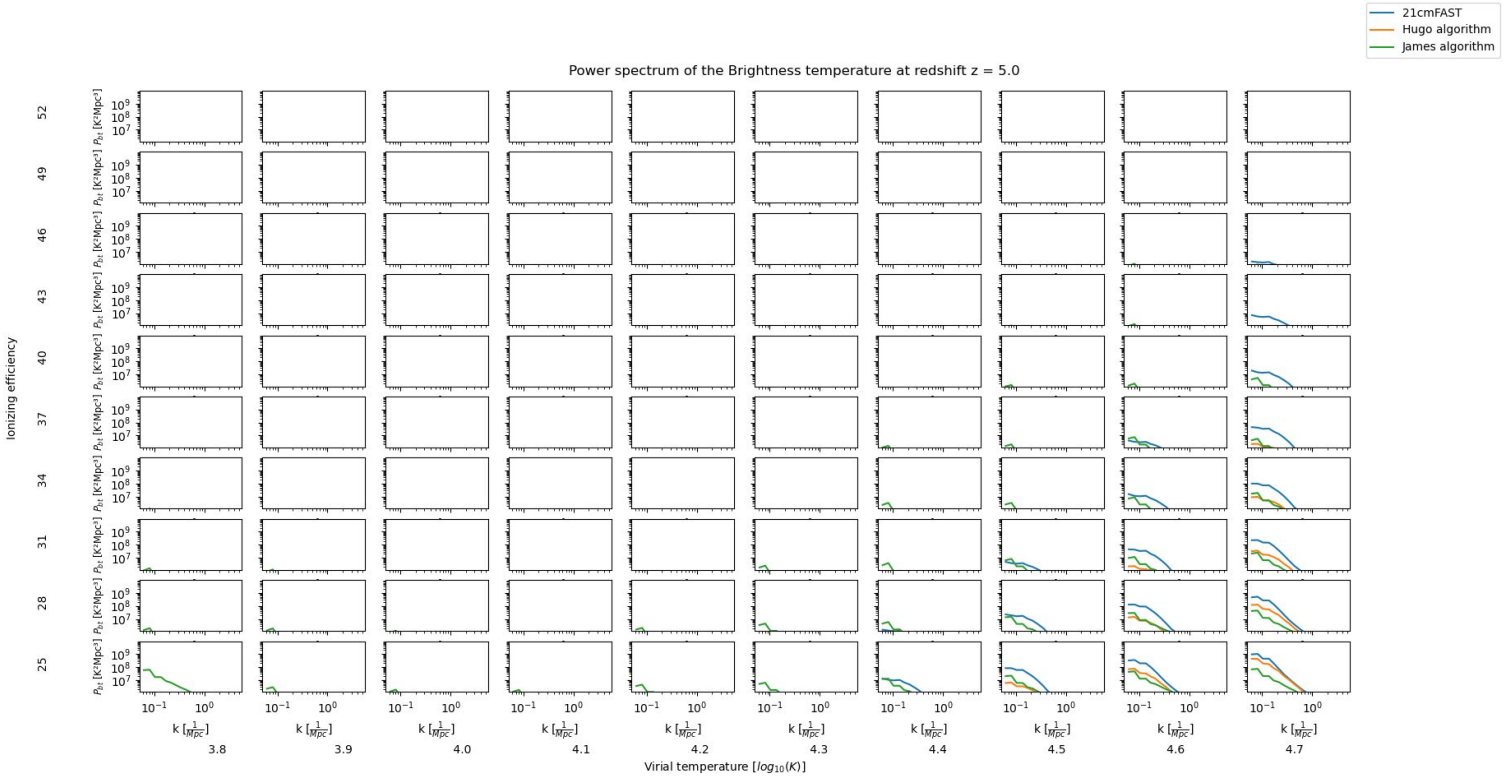
Ionization history



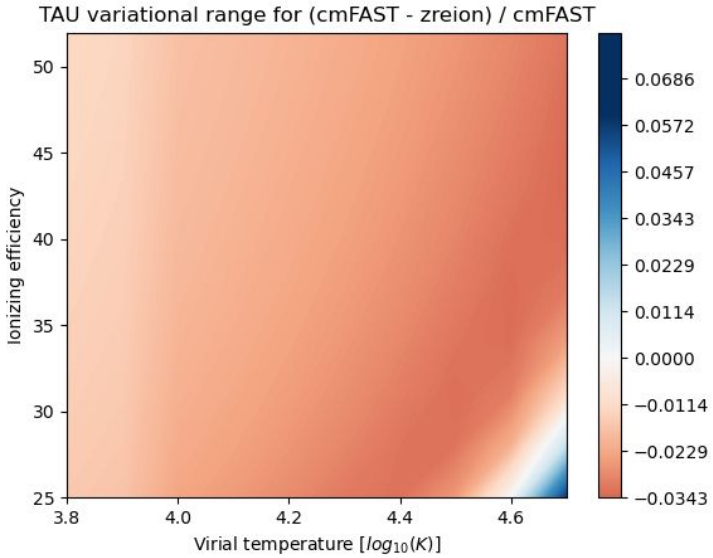
Power spectrum

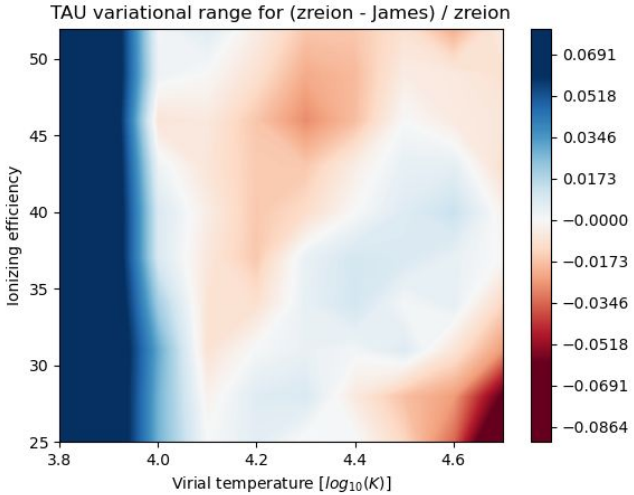


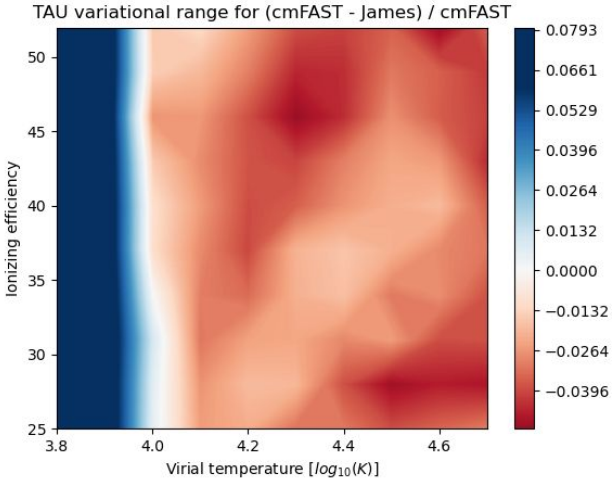
Brightness temperatures



TAU differences







Conclusions, what those this means?

- Very similar TAU (few percentage difference)
- Similar reionization history for similar Power spectrum
- Brightness temperature with discripenties at low ks, but concording on high ks
- Not getting worse with redshift.

Next steps

- Packaging pointed out many flaws and possible improvements
- Finish polishing, packaging and documenting all functions
- Create a bash script to install all the dependencies
- Write an article with James and Paul
- Verify if the same power spectrum can give the same ionization history

Tutorial Time!

A little on courage: The Kiaï

- Ancestral Japanese move
- Short shout
- Proven to grant hormones associated with courage and arousal (Holmes 2013)

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Further Documentation on the GIT HUB

https://github.com/hugo-baraer/EoR_research

Tabata

- 20 seconds of intensive exercice (stomping the ground)
- Activate your neural system, making you more alert and courageous

Thank you!

Hope you are ready for hours of fun with Hugo's converter