



¹ HYPERION

A Novel Approach to Observing the Reionization Global Signal



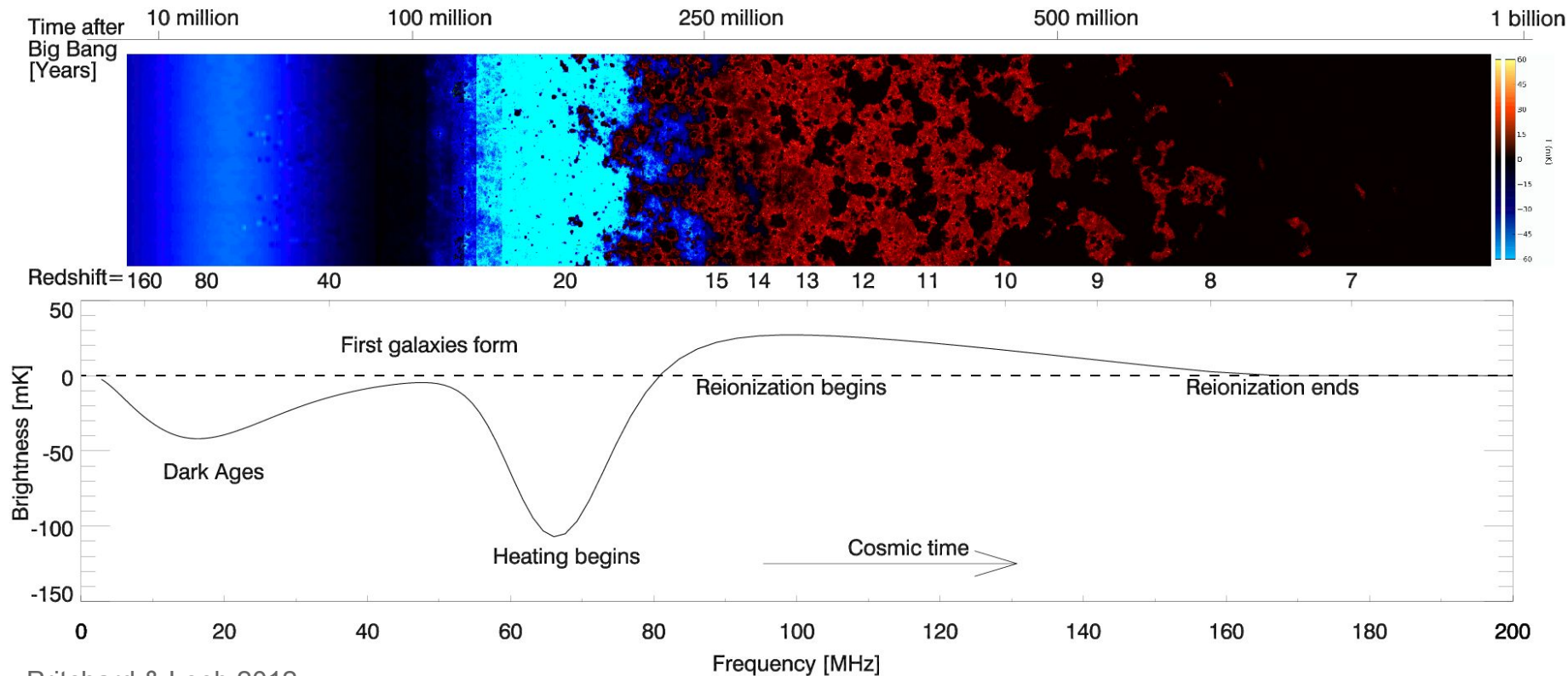
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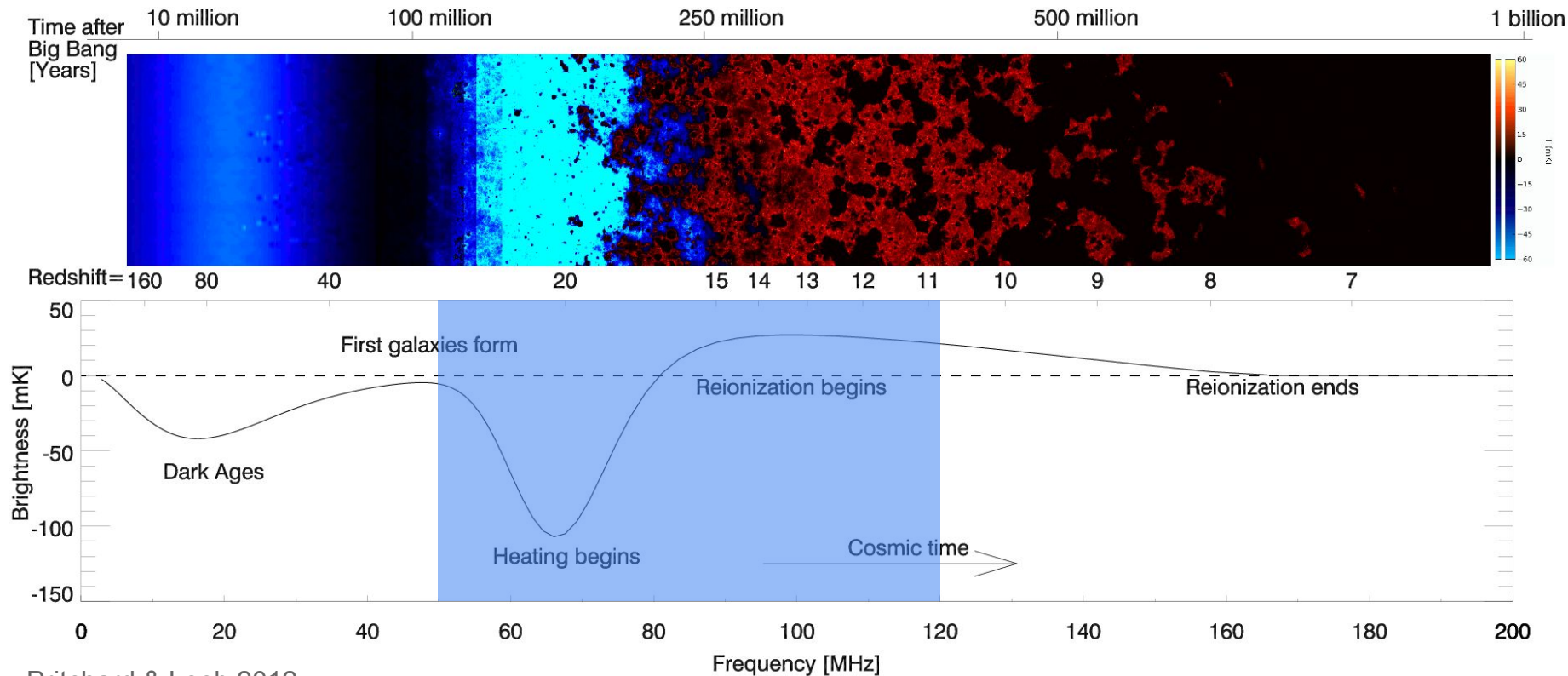
HYdrogen Probe for the Epoch of ReIONization

The Global Signal of Reionization

Our Current Understanding



Our Current Understanding



The Global Signal and Interferometry: Pros and Cons

Pros

- Enable us to better calibrate out instrumental effects, one of the main pitfalls of global signal experiments to date
- Increase sensitivity

Cons

- Technically an interferometer isn't sensitive to the monopole mode of the sky

**So how is
HYPERION
supposed to
work?**

Experimental Specifications

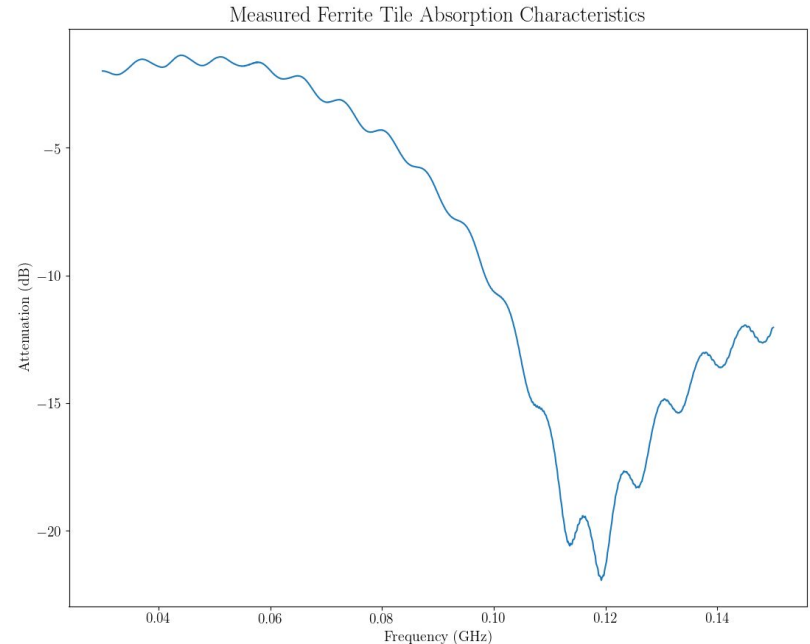
Absorptive elements between antennas:

- Artificially raise horizon to break monopole spatial symmetry
- Prevent cross-talk between antennas



Potential Absorber Materials

- Ferrite tiles -- most promising but pricey
- Pyramidal foam absorber -- expensive and underperforming
- ZoteFoam -- affordable but minimally absorptive



HYPERION

Simulation

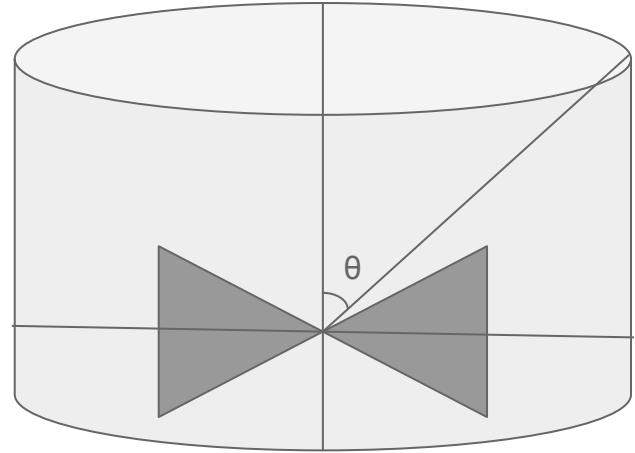
Results

Simulation Design

Make observation of monopole HealPix map at varying baselines, with and without absorber

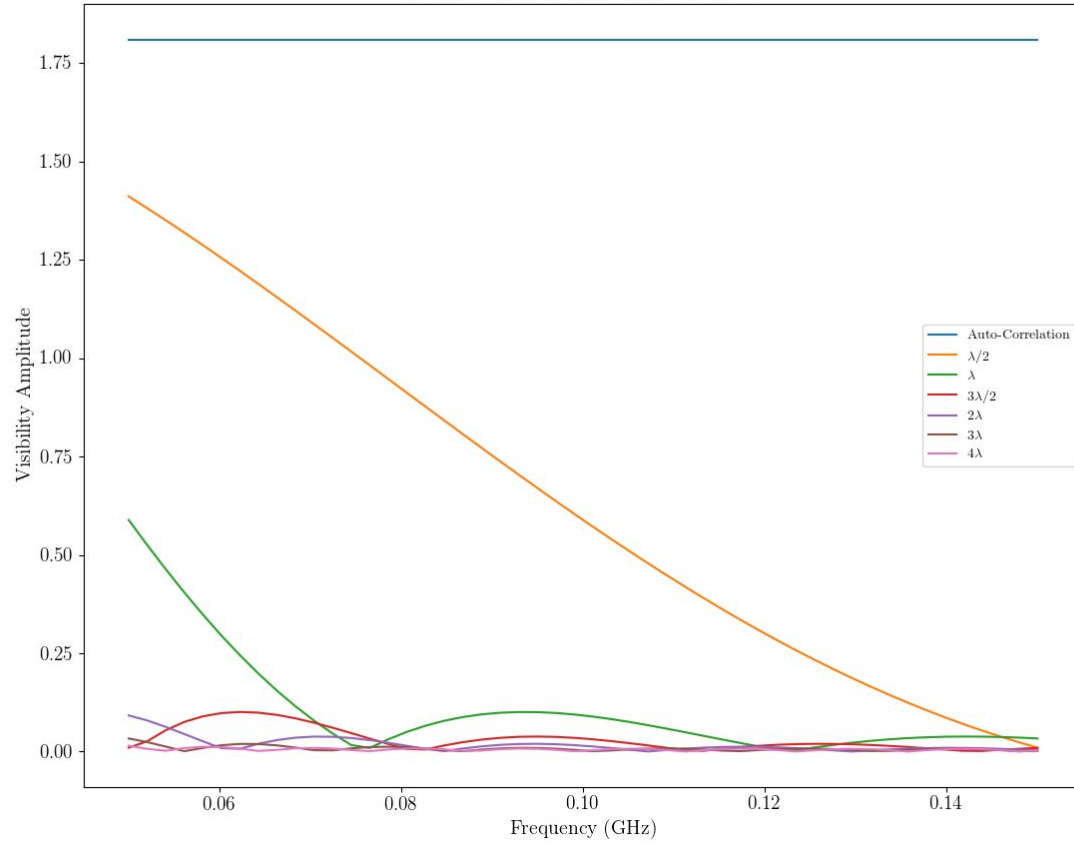
Absorber acts as attenuation term on the antenna beam

- Can control height of baffles and sharpness of transition between sky and absorber
- Can import frequency characteristics of various absorbers



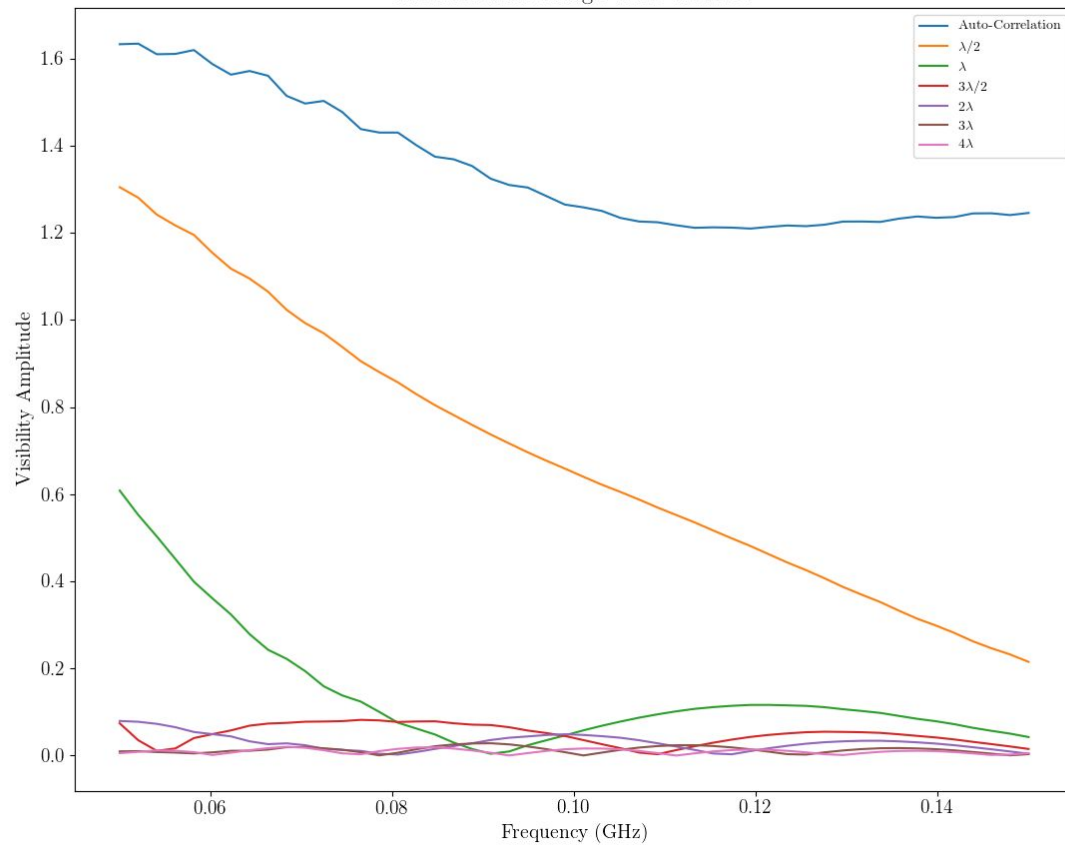
Monopole Sky without Absorber, Flat Brightness

Absorber Smoothing Factor 0.010000



Monopole Sky with Ferrite Absorber, Flat Brightness

Absorber Smoothing Factor 0.010000



Future Work

On the Horizon

- High frequency proof of concept for absorbers in array
- Further testing on absorber materials
 - Can we space ferrite tiles further apart and still get adequate sky attenuation?
 - Is there another cheaper material that performs well at these low frequencies that we could use in place of or in addition to the ferrite?
- Develop new data analysis tools to enable us to isolate the monopole term within our visibilities and calibrate out foregrounds
- Finalize instrumental design and deploy to low RFI site -- probably NW Colorado