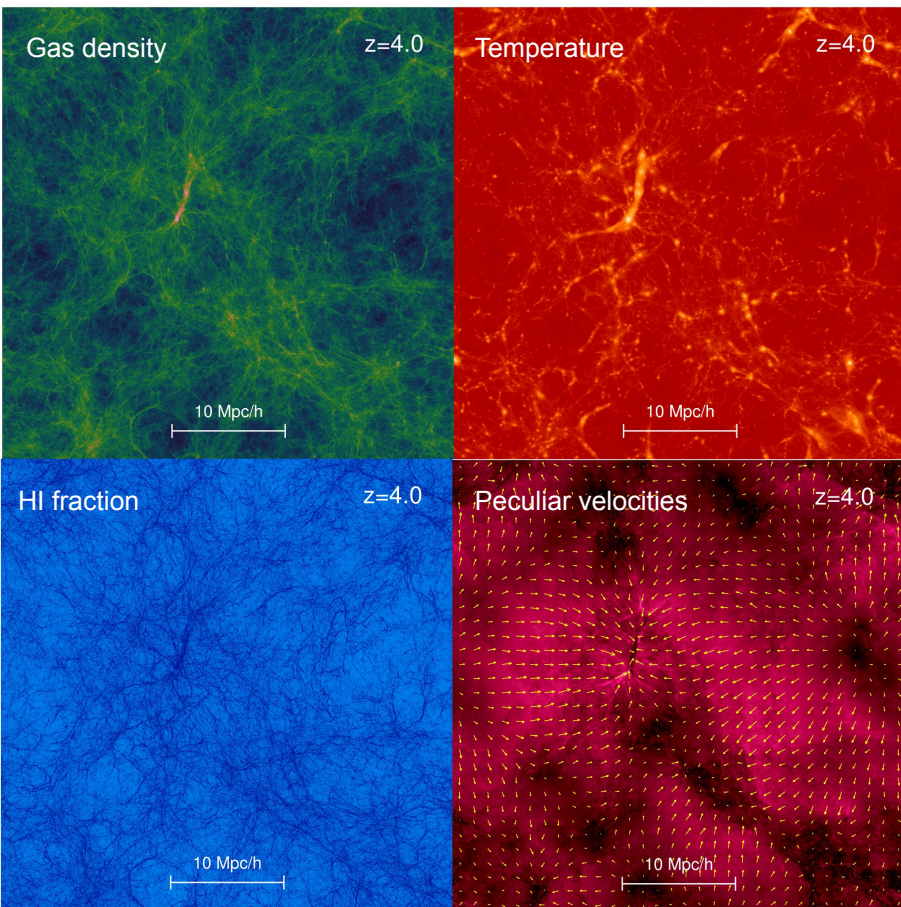
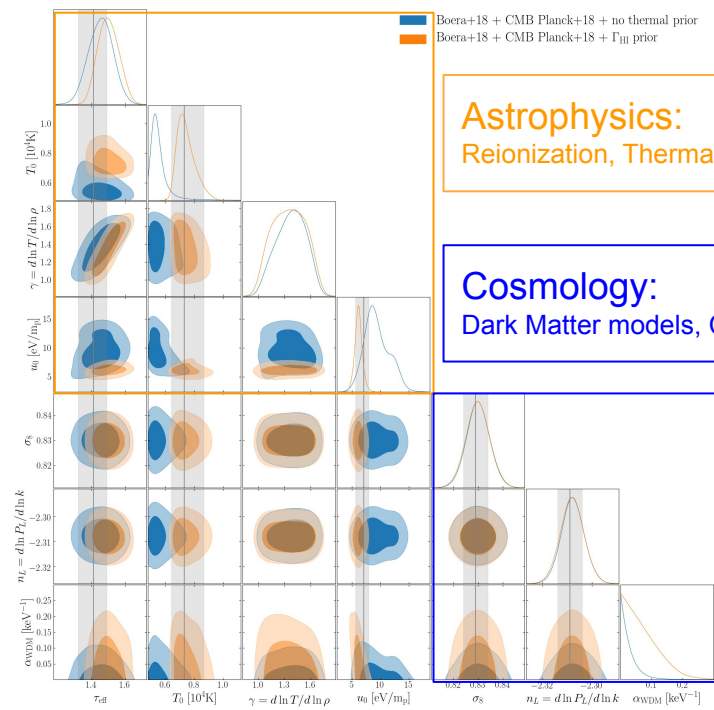


High-redshift Cosmic Web



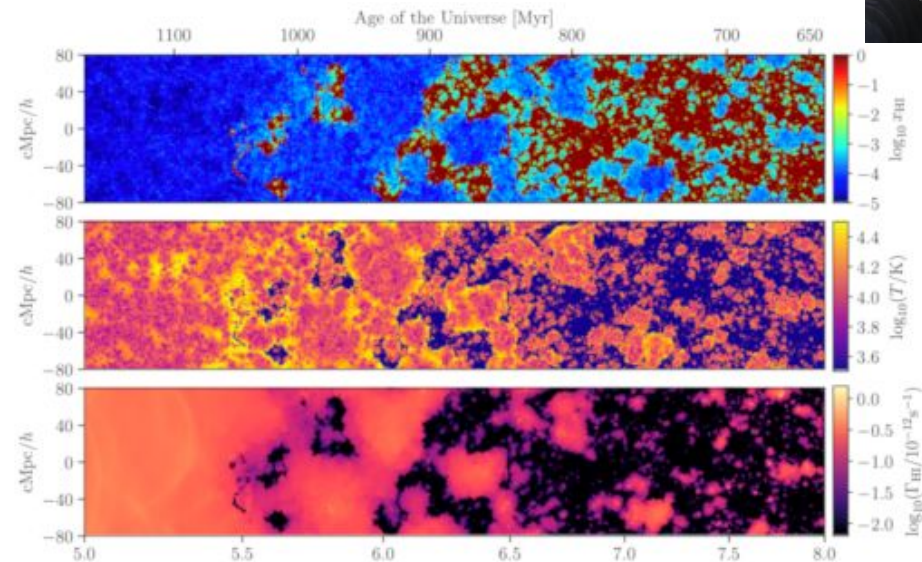
Martin Haehnelt, Vid Iršič, Shikhar Asthana, Yuxuan Yuan, Laura Keating, Margherita Molaro, Prakash GaiKWad, Girish Kulkarni, Ewald Puchwein, George Becker, James Bolton, Matteo Viel



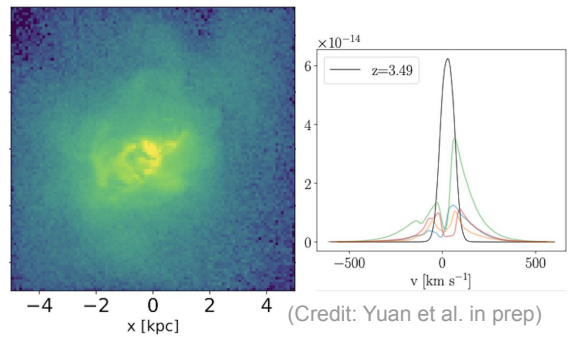
Astrophysics:
Reionization, Thermal history

Cosmology:
Dark Matter models, CDM clustering

Simulations of Reionization



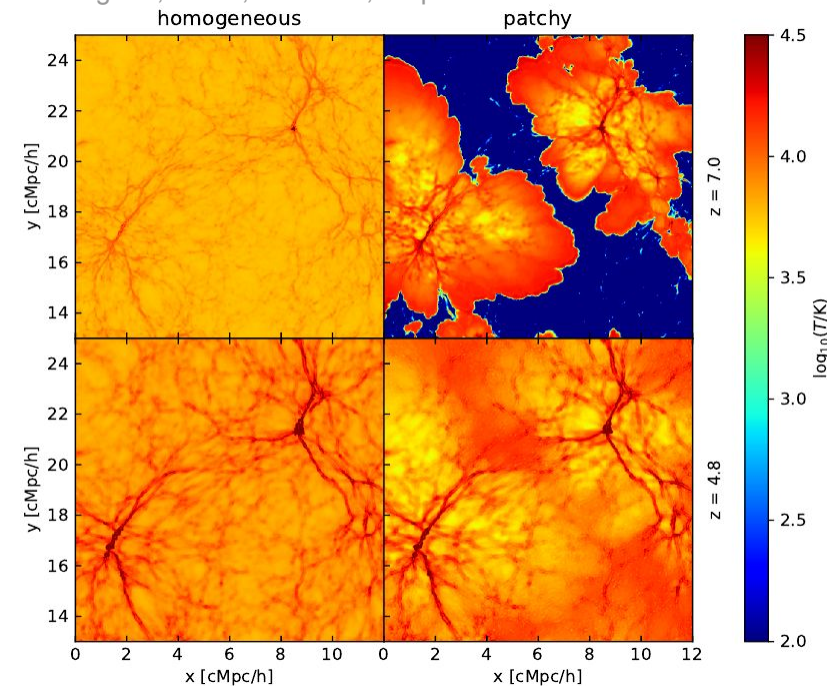
(Credit: Kulkarni et al. 2018)



(Credit: Yuan et al. in prep)

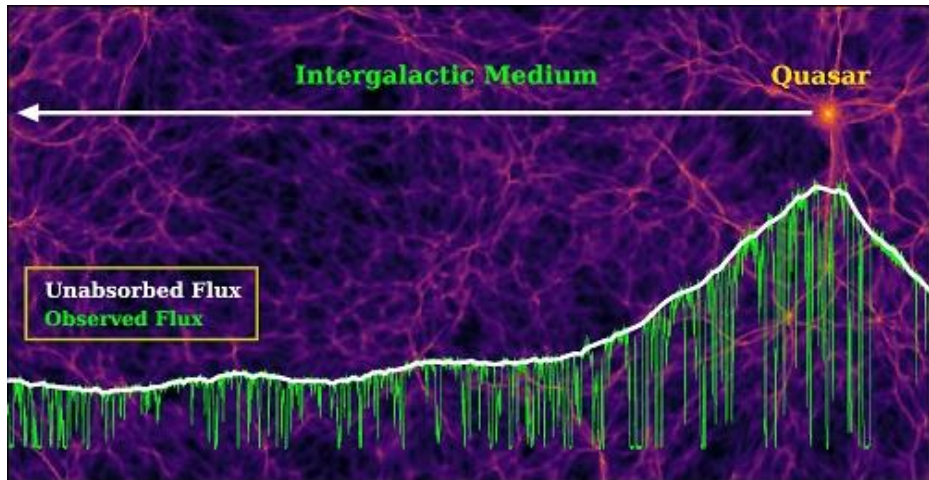
Hydro + RT: Sherwood suite

Codes: Gadget-3, ATON, RASCAS, Arepo

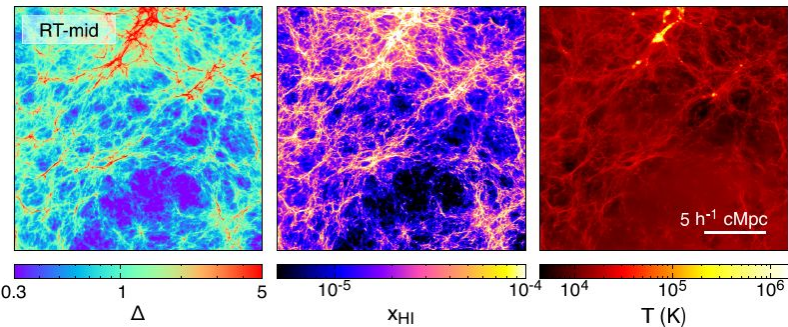


(Credit: Puchwein et al. 2018)

Thermal history of the Intergalactic medium



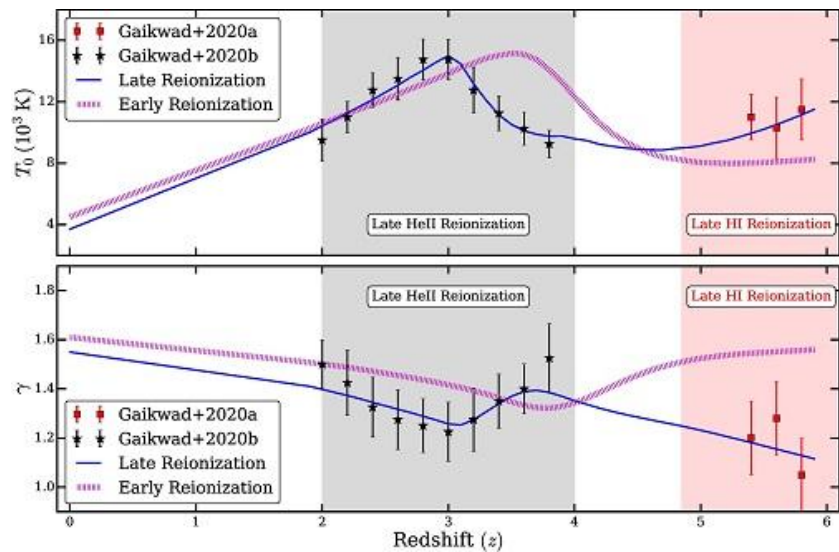
(Credit: Gaikwad et al. 2022a)



(Credit: Molaro et al. 2021)

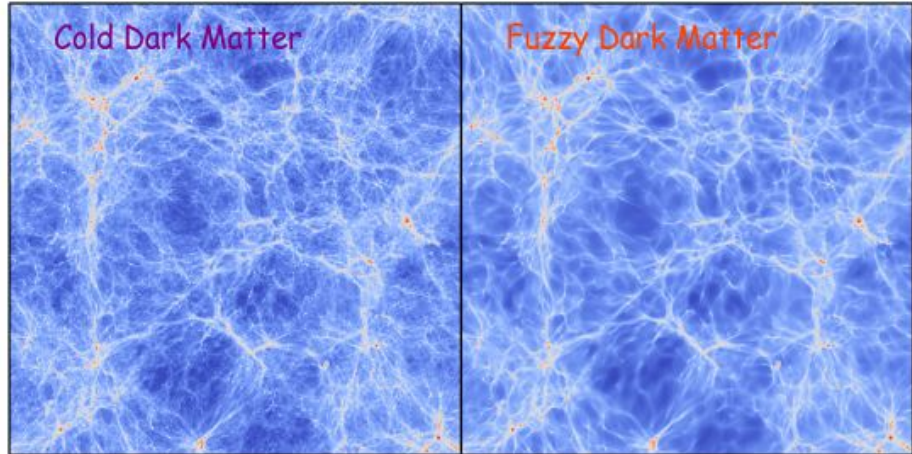
Comparing simulation models to observations of the Lyman-alpha forest

Quasar spectra data: VLT/UVES, Keck/HIRES, VLT/XSHOOTER



(Credit: Gaikwad et al. 2022b)

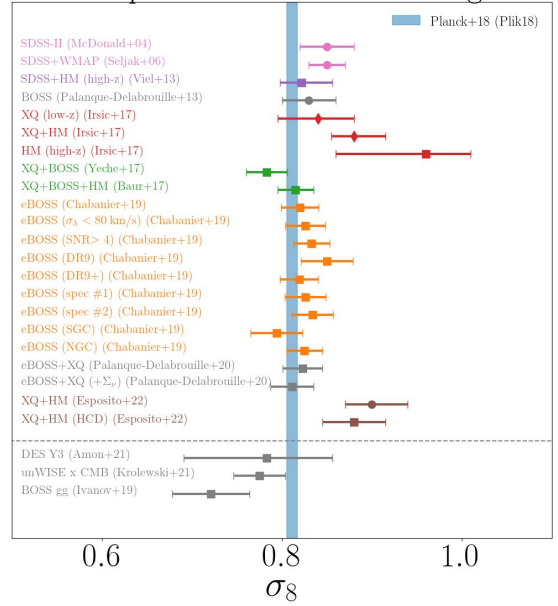
Cosmology & Fundamental Physics



Bayesian Inference of Cosmological parameters

Dark Matter models, Amplitude of matter clustering, running of the spectral index, sum of the neutrino masses

Amplitude of matter clustering



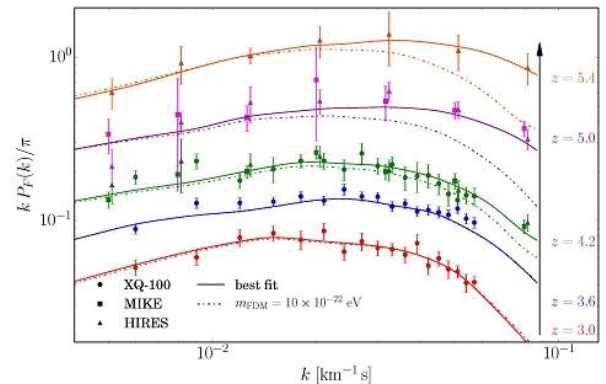
Large Spectroscopic Surveys:
DESI, WEAVE



U.S. Department of Energy Office of Science



(Credit: Iršič et al. 2017ab)



Large-Scale Structure ← High Redshift Cosmic Web → Galaxy Formation

- Lyman-alpha forest Perturbation Theory [**Ciaran McCulluch**, Zvonimir Vlah]
- 3D Lyman-alpha forest and CMB-lensing x Lya [**Roger de Belsunce**, George Efstathiou, Blake Sherwin]
- Baryonic Feedback [**Petar Dimitrov**, **Ewan Chamberlain**, **Leah Bigwood**, Sergio Martin-Alvarez, Sophie Koudmani, Zvonimir Vlah, Alex Amon, Martin Bourne, Anthony Challinor, Debora Sijacki]
- BH accretion and Superradiance [**Adithya Nandakumar**, Ricarda Beckmann, Anastasia Fialkov]

