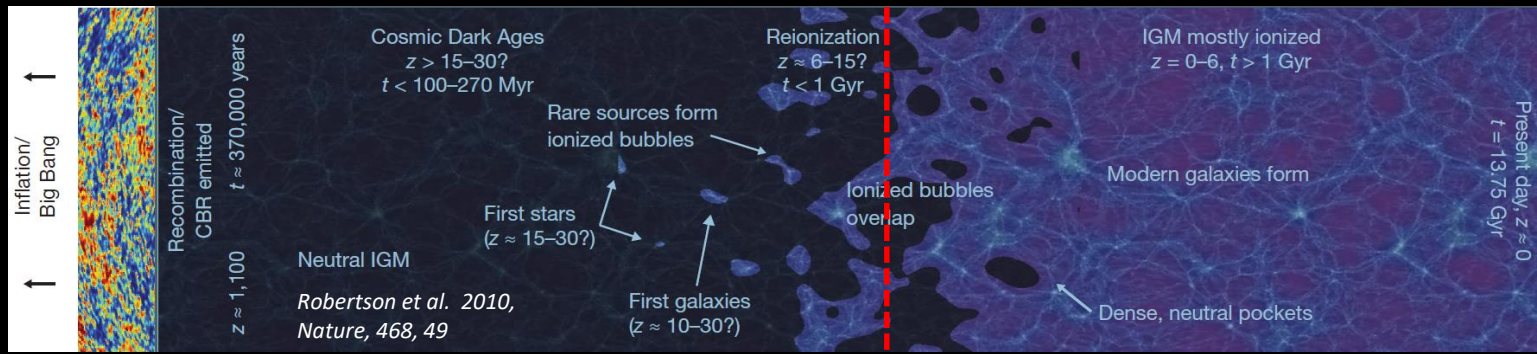
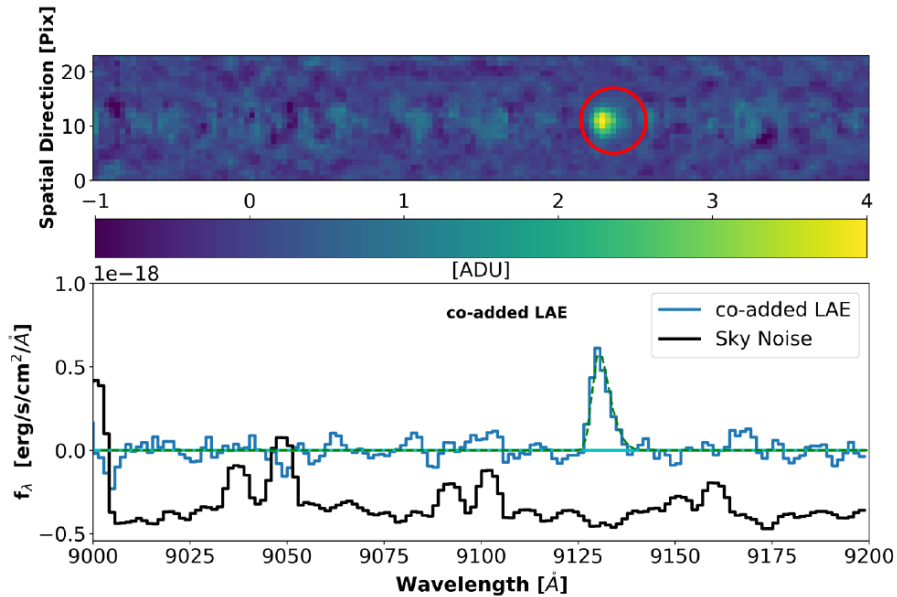


Reionization of the Primordial Universe



Location in space-time of the protocluster

We have detected a proto-cluster of Lyman α emitting galaxies at redshift $z \sim 6.5$ (12.8 Gyr back in time). For the 10 sources we have spectroscopically confirmed, we have determined their Lyman α photon luminosities as well as their intrinsic ionising photon fluxes. We find that the sources in the proto-cluster produce sufficient Lyman continuum photons to ionise a very large bubble around them in the Intergalactic Medium. We conclude that there are sufficient ionising photons to not only ionise the volume occupied by the whole proto-cluster, but even a larger ionised super-bubble that increases its volume with time.

Therefore we claim that we have discovered a large ionised bubble such as those that through percolation completed the re-ionization of the Universe by $z \sim 6$, when it was only ~ 1 Gyr old (~ 1.000 millions of years).

J.M. Rodríguez Espinosa, J.M. Mas-Hesse, E. Salvador-Solé, et al., 2020, MNRAS (in press) astro-ph: <https://arxiv.org/abs/2003.05859> - DOI: <https://doi.org/10.1093/mnras/laaa045>

Credit: IAC, CAB (INTA-CSIC), Universidad de Barcelona, University of Florida, Universidad Complutense, CEFCa.

Top panel: 2D averaged spectral image of all galaxies in the sample, showing the prominent Lyman alpha emission. **Medium:** Corresponding 1D spectrum. **Bottom:** Evolution of the ionization along the Intergalactic Medium around the star forming protocluster detected at $z \sim 6.5$. **Top right:** Sketch showing the process of reionization of the Universe.

