

## COMMISSION 1

## GALAXY AT THE EPOCH OF REIONIZATION

*GALAXIES*  
*DE LA REIONISATION*

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## COMMISSION J.3 WORKING GROUPS

### ANNUAL REPORT 2021-2022

#### 1. Introduction

The commission Galaxies at the Epoch of Reionization (C.J3) commission is a commission under Division J, Galaxies and Cosmology.

The epoch of reionization is the transition from a universe filled with relatively cold neutral hydrogen to a universe filled with hot ionized gas. This transformation ended about a billion years after the Big Bang. The reionization of the Universe itself is due to the emission of ionized photons by the first population of stars and galaxies that formed a few hundred years after the Big Bang.

This commission is interested by the formation of galaxies during and after reionization, and in particular the effect of the latter on the formation of stars in these galaxies. In the standard hierarchical formation, small galaxies form, grow and merge to form larger galaxies. This model helps to explain the diversity of shapes and blocks observed in galaxies today. In this context, reionization occurs early in the history of galaxy formation. Despite its brevity, the reionization left an imprint in the general history of the formation and early evolution of the galaxies.

A number of facilities are able to constrain the characteristics of galaxies at the epoch of reionization, from the ground-based 10-m class telescopes and the Hubble space telescope in the rest-frame ultraviolet and optical. In the rest-frame far-infrared and sub-millimeter, ALMA, NOEMA are key facilities.

However, during the present triennial, the new-comer is the James Webb Space Telescope (JWST). JWST started to revolutionize our knowledge of galaxies at the epoch of reionization and even earlier, at  $z > 10$ .

#### 2. Scientific Meetings

A number of meetings closely related on galaxies at the epoch of reionization have been held in 2022: - January 2022: Galaxies and Quasars through Cosmic Times (online)

- March 2022: Sazerac 21cm 2022 (online)
- June 2022: EAS Meeting Symposium S1: The Universe at the reionization epoch

### 3. Prospects and Recommendations

During this first term of Commission J.1, we have virtually met and discussed the possibility to propose an IAU proposal on Galaxies at the epoch or reionization. **Although we did not manage to actually submit a proposal, such a proposal is envisioned for next year.**

In addition to this, we clearly see that we are now entering a time where more and more data will be available. This is especially true with the advent and the first data coming from JWST. One of the interesting results from JWST was that several candidate galaxies at  $z > 10$  have been identified. However, none is spectroscopically confirmed, yet. Confirming, or not, that (a relatively) large number of massive galaxies exists at  $z > 10$  certainly is a crucial objective within the context of this commission.

Beside this potential large number of galaxies at  $z > 10$ , JWST provided very high photometric and even spectroscopic data at  $z > 5$ , opening up the epoch of reionization to detailed analyses that were only possible at low redshifts before.

**We will follow in 2022 the new results coming from JWST. However, beyond JWST, we would like to foster works that make use of the synergy between JWST and the other powerful capabilities in rest-frame optical and rest-frame far-infrared. Of course, this objective is already in the mind of astronomers studying galaxies at the epoch of reionization. How we could amplify this trend is a reflection that we should seriously consider in our commission.**

Denis Burgarella  
*President of the Commission*