

Observing HI in the Reionization Epoch Analog Galaxy Haro11

Abstract

Understanding the way the reionization of the Universe proceeded is a major challenge of modern cosmology. Low mass galaxies are one of the favored candidate sources, contributing to reionization through Lyman Continuum (LyC) ionizing radiation produced by massive stars. However the processes controlling the transfer of LyC radiation through the neutral gas in the interstellar and circumgalactic medium are still not fully constrained.

We propose a deep MeerKAT 21cm HI line observation of Haro11, a local blue compact galaxy that is analogous in properties to galaxies observed in the early Universe. Haro11 is the closest LyC leaking galaxy and one of the only two detected in HI. Because of that, it has been recognized as a special laboratory for observational studies of the physics at play in early Universe galaxies. The neutral ISM of Haro11, which is crucial to LyC radiation transfer, has never been imaged before, leaving the question of the mechanisms allowing the ionizing radiation to escape the galaxy unanswered. This observation would allow for the mapping and morpho-kinematics of the hydrogen gas in Haro11 to be derived for the first time. Comparing the HI distribution to the ionized gas maps would enable a full picture of the physical processes allowing for LyC escape in this galaxy. These measurements would constitute a crucial step to understand the ways in which low mass galaxies could have contributed to the reionization of the Universe.