

Title

A new perspective on Reionization: proof-of-concept neutral gas imaging of a blueberry galaxy

Abstract

How cosmic Reionization proceeded is a key question of modern astrophysics. We now have access to an unprecedented census of the sources that drove Reionization during the first billion years of the Universe, thanks to JWST observations. Unfortunately, high- z observations leave out a crucial parameter necessary to fully understand Reionization: they cannot directly determine the escape fraction of ionizing radiation from objects at this period. Observations and simulations alike indicate that bursty, low mass galaxies are the likely dominant sources of the photons that caused Reionization. Ultimately however, the distribution of HI gas around these galaxies determines whether ionizing radiation can escape from them. Yet, the HI geometry in the galaxy population that reionized the Universe is unknown. Here, we propose a MeerKAT proof-of-concept observation of the 21cm line in one carefully selected blueberry galaxy, part of the local galaxy population the most similar to that responsible for the Epoch of Reionization at $z = 6$. This observation will allow investigations of the HI morphology in a galaxy alike those that reionized the Universe. It will demonstrate the feasibility of observations targeting the 21cm line in this galaxy population, and show important ways in which MeerKAT and the SKA can reveal the physics behind the Epoch of Reionization.