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First light: the rise of galaxies in the first billion years

Abstract

Galaxy formation in the first billion years mark a time of great upheaval in our cosmic history: the first sources of light in the Universe, these galaxies ended the 'cosmic dark ages' and produced the first photons that could break apart the hydrogen atoms suffusing all of space starting the process of cosmic reionization. At the forefront of astronomical research, the past few years have seen cutting-edge instruments provide tantalising glimpses of such galaxies chaotically assembling in an infant Universe. I will show how this data has provided an unprecedented opportunity to pin down the reionization state of the Universe as we enter the era of 21 cm cosmology, understand the physical properties of early galaxies, and study the key physics driving their formation and evolution. Finally, I will try to show how, as the earliest building blocks, these galaxies can be used as testbeds for the nature of dark matter itself.