

# Astrophysics Research Paper

## Abstract

This paper explores the formation of galaxies in the early universe. We present observations of high-redshift galaxies and analyze their properties including mass, luminosity, and star formation rates. Our findings suggest that galaxy formation was more rapid than previously thought, with massive galaxies appearing within the first billion years after the Big Bang. We discuss implications for cosmological models and dark matter distribution.

## Introduction

The study of galaxy formation represents one of the fundamental challenges in modern astrophysics. Understanding how the first galaxies formed and evolved provides crucial insights into the nature of dark matter, dark energy, and the overall structure of the universe. Recent observations from space telescopes have revealed galaxies at increasingly high redshifts, pushing back our observational horizon to just a few hundred million years after the Big Bang.

Dark matter plays a crucial role in galaxy formation. Simulations show that dark matter halos collapse first, creating gravitational wells where baryonic matter can accumulate and form stars.