Modeling the Stellar Properties of the Fossils of the First Galaxies

H. Paul, S. Weerasooriya, M. Bovill

Texas Christian University

Abstract

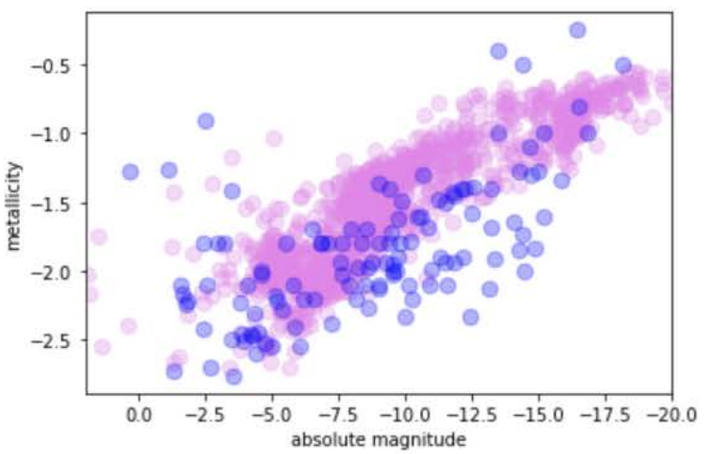
During the first billion years after the Big Bang the first, faint, galaxies formed. With luminosities less than one millionth that of our Milky Way galaxy, they are too faint to be observed by even our most advanced telescopes. A fraction of these first galaxies are preserved as ultra-faint dwarf galaxies in the local universe. These ultra-faint dwarfs are the fossils of the first galaxies. Therefore, we can study the faintest satellites of the Milky Way and learn about the formation and evolution of the first galaxies using galactic paleontology. We know that the stellar properties of the faintest Milky Way satellites match the stellar properties of galaxies formed in high resolution hydrodynamic simulations of the first billion years. We also know that the semi-analytic model Galacticus can reproduce the stellar properties of the faintest Milky Way dwarfs in the modern epoch. In this work, we determine whether Galacticus is also able to match the high resolution simulations of the first billion years.

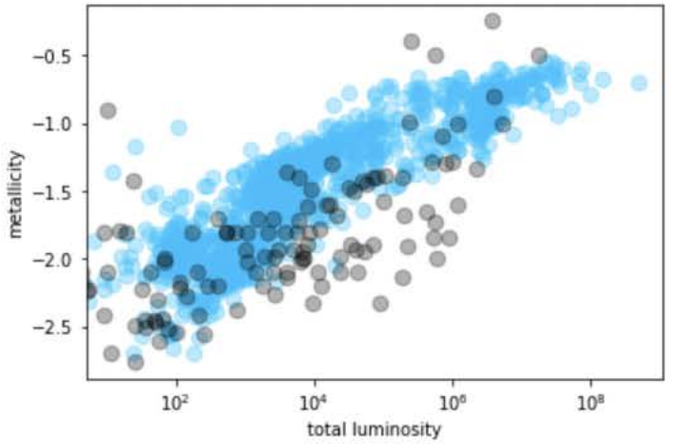
Introduction

- Galacticus reproduces the stellar properties of the faintest Milky Way Dwarf satellites today.
- The stellar properties of the faintest Milky Way Dwarf satellites match the stellar properties of galaxies formed in high resolution hydrodynamic simulations of the first billion years.
- Can Galacticus match the high resolution simulations of the first billion years?

Action

- Match the graphs produced by Galacticus for the first billion years to those obtained by the high resolution simulations of the first billion years.





Conclusion

- As the graphs show conclusive evidence of matching. Galacticus does match the high resolution simulations of the first billion years.

Future Directions