Paper ID: 47968
student

IAF SYMPOSIUM ON FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS (A7)
Science Goals and Drivers for Future Exoplanet, Space Astronomy, Physics, and Outer Solar System Science Missions (2)

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DARK MATTER IN DWARF SPHEROIDAL GALAXIES

Abstract

The ΛCDM model is known as the standard model of Big Bang Cosmology, where ΛCDM is the cosmological constant and CDM is 'cold dark matter'. Computer simulations have been made using the ΛCDM model showing the evolution of the universe, from a short time after the big bang to now, providing an almost accurate representation on large scales. However, there are some discrepancies for small galaxies which put the ΛCDM model into question. One problem is the 'Missing Satellite Problem', this predicts that there should be more dwarf galaxies than actually observed. The 'Core-Cusp problem' where computer simulations predict a 'cusp' of rising dark matter density within the centre of dwarf galaxies whereas observations show a flat one.

The problems with ΛCDM on small scales might indicate a major revision, either by modifying the properties of dark matter (such as Warm dark matter or self-interacting dark matter) or more radically such as a modification of general relativity. Using Python, I took analytic formulae for dark matter profiles and calculated rotation curves for dwarf galaxies. By doing this we can start investigating explanations for the discrepancies within the ΛCDM model and gain a deeper understanding into dwarf galaxies.