

Detecting Dwarf Galaxies Around NGC 55

(General Abstract)

Jonah Medoff

Abstract

Dwarf galaxies are the most ancient, chemically pristine, and dark-matter-dominated galaxies in the Universe, and according to the Λ CDM cosmological model, these galaxies exist orbiting larger “host” galaxies, like our Milky Way. We wish to learn more about these types of galaxies, as they can reveal information regarding the formation of the first galaxies to exist, the evolution of larger host galaxies, and the abundance and distribution of dark matter. Searches for dwarf galaxies around the Milky Way have yielded dozens of discoveries within the last 20 years. Conversely, the satellite populations around smaller, low-mass host galaxies are poorly understood from both a theoretical and observational perspective. In order to improve our understanding of the satellite populations of low-mass galaxies, the DECam Local Volume Exploration (DELVE) – DEEP Survey is performing a search for satellites around the isolated, low-mass galaxy, NGC 55. As part of our search for dwarfs around this host, we wish to determine how well we can actually detect dwarf galaxies given the limitations of our data. To do this, we inject artificial dwarf galaxies into our data set and attempt to recover them using a dwarf-search algorithm. The fraction of dwarfs that we can recover as a function of dwarf size and luminosity gives us our dwarf detection sensitivity. Our results demonstrate that we are most sensitive to large, bright dwarf galaxies, and our sensitivity begins to decrease as dwarfs become too faint or too dense. Furthermore, this sensitivity tells us exactly what types of dwarfs we should be able to detect when searching for dwarf galaxies in the real DELVE-DEEP data. Ultimately, our goal is to characterize the complete dwarf satellite population of NGC 55, which would be the first time such a measurement has been performed for a low-mass galaxy.