Evaluating the Proportionality Constant between Recessional Velocity and Distance from Earth of 18 Selected Galaxies and the Relationship to Hubble's Constant

Pardonner, Davy

This experiment evaluates the proportionality constant between 18 selected galaxies' distances and recessional velocities from earth. Then, compares that constant to the current accepted value of Hubble's Constant; these selected galaxies represent the majority of all galaxies. The collection of the raw data used computer programs to analyze digital images and spectra. The digital images of the nebulae were used to determine their distance away from earth, and the digital spectrographs of Calcium absorption and Hydrogen a emission lines were used to determine their recessional velocity. The calculations for the 5 trials were then done by hand (checked by Microsoft excel) and the final products of both distance and velocity were obtained, resulting in a distance vs. recessional velocity graph that was evaluated for a proportionality constant. That constant was then compared to the most recent value of the Hubble Constant and it was determined that, when evaluated, the constant found was within 19% percent of the current accepted value of the Hubble Constant. Not only was Edwin Hubble's proposed relationship between these variables supported by the data, but it provided more evidence for the theory of an expanding universe. As an aspiring astrophysicist, I have always been fascinated with cosmology; for this project, I needed a subject that intrigued me as much as it was accessible. By this I mean that the data was attainable with the equipment available to me, and the mathematics involved were not past my level of learning and ability to understand. Hubble's Law and the surrounding theory has all these qualities, allows for ample discussion and a thorough investigation of the subject, and is still partially shrouded with mystery which is why I was drawn to it.

Awards Won: