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**SIMULATIONS OF EMISSION LINES FROM THE NARROW LINE REGION IN SEYFERT GALAXIES**

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General Abstract

One of the biggest questions in astronomy and astrophysics is “How do galaxies form?” Because of the large time scales involved in the formation of galaxies, the only way to learn about the formation of galaxies is through studying galaxies outside the Milky Way by observation and simulation. In the late 20th century astronomers began observing and investigating galaxies that contain supermassive black holes in their center that produce more light than all of the stars within the galaxy. These galaxies host active galactic nuclei (AGN). An active galactic nucleus is divided into several regions, based mainly on the distance from the central black hole. One of the outermost regions of an AGN galaxy is the narrow line region, ranging from 10 to 100 parsecs in size. To model this region, scientists use emission line ratio diagrams and compute a curve that recreates the Spectral Energy Distribution (SED) of the narrow line region. The SED is parametrized using spectral indices, which determine the slopes in different areas of the curve. The aim of this research is to synthesize a regression model with data from previous research that will compute all the spectral indices based on one index. Using the program Cloudy, the model will produce a set of emission lines that we compare to observational data to determine its efficacy.