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<u>Fragmented Brightest Galaxy Clusters</u>

   Deep sky object observations and their interactions with other objects is an important way to gain insight into our current universe and how it came to be. Studying fragmented Brightest Cluster Galaxies (BCGs) is an excellent way to possibly gain this insight. Fragmented BCGs are the brightest galaxies within a given galaxy cluster that contains multiple components, or other galaxies. We have done previous work on fragmented BCGs but much more work is required to be able to substantially reach our final goal. Through identifying and creating a standard to classify fragmented BCGs, we can hope to obtain better insight into galactic cannibalism, the environment of the early universe, and new modeling techniques for simulations.

   In our previous work to create a standard, we attempted to find possible candidates and create a sample of candidates with similar features. We had done work using two primary databases: Sloan Digital Sky Survey (SDSS) and NASA/IPAC Extragalactic Database (NED). Using this with Python coding and a database search language called SQL, we were able to cross reference the databases with samples of galaxy clusters that could potentially contain fragmented BCGs. We learned a few primary things from the collected data samples. Firstly, we learned that groups of fragmented BCGs of more than 3 or 4 was uncommon. We also recognized some flaws in SDSS and NED, such as missing redshift data of galaxies, which is necessary to confirm the reliability of deep sky objects. Another problem was distorted images taken from these databases due to not having flags in the SQL code to remove unfavorable data points. We were able to identify a few samples of potential fragmented BCG candidates from the current samples of galaxy clusters, however, more research is required to obtain a more reliable sample of fragmented BCG candidates.

   To extend this, we plan to cross reference our database searches with other samples of galaxy clusters. We plan to address the issue of redshift data by using other databases to confirm the galaxies. This, while including flags in our SQL code, will allow for much more reliable data samples. We plan on obtaining multi-wavelength data (primarily radio data and imaging) for our samples of fragmented BCGs. This can lead to a better understanding of galactic cannibalism. We had also previously done a full search through the SDSS database. However, due to time constraints, we were not able to revise our SQL code to appropriately accommodate the large selection of data. The problems when found in doing this search will be addressed again in an attempt to get a better sample of data from the whole database.

   Our ultimate goal is to create a standard of fragmented BCGs so they may be catalogued and further studied through other people and future projects. The starting date of this project would be around May 11th through July 13th, although may be extended.