Physics, and Astronomy

Research Plan- The Probability of Galaxy Merging Given Redshift, Stellar Mass and Morphology

Rationale

Galaxy Merging is an occurrence of two galaxies combining together in a series of three stages ( separation, interaction and approaching post-merger) that results in the creation of one larger galaxy of a different morphology. Merging is observed in two methods, one through the use of images taken with telescopes (Ex; Hubble, Sloan Digital Sky Survey) of galaxies that are within a merge at the time of the imageing, the other through simulations of galaxies that are merging or thought to be in the beginning stages of merging. Using images of merging is not always entirely effective as they only capture one moment of a merger and can be easily misinterpreted. Simulations provide a full merger, however they are only predictions of real circumstances and their accuracy can be questioned. Simulations, however, provide a better method of observing merging, therefore need to be improved. Through the use of predicting mergers with probability, then comparing them to a simulator can better verify results and improve overall accuracy. Further, accuracy in studying galaxy mergers remains of great importance to galaxy study as it allows for improved study on galaxy evolution, which is a vital factor in understanding the universe.

Research Question

What is the probability a galaxy at will merge given its redshift, stellar mass and morphology?

Hypothesis

Galaxy merging will have a higher probability at higher redshifts, with spiral galaxies or galaxies with a similar morphology and with higher stellar masses.

Procedure

Data from phase one of the research will be downloaded for use in stage two, including how often galaxies merge at specific redshifts and morphologies

All needed formulas for conditional probability will be downloaded

Stellar masses impact on galaxy merging will be found to be used for incorporating more givens for better accuracy

This will be done through sorting the masses in numerical order then observing which mass range occurs the most

How often galaxies merge at specific stellar masses will be found

Stellar mass will be split into three ranges, small, average, and large

The probabilities of merging with galaxies within the smallest stellar mass ranges will be studied first

The probability of galaxies merging at different redshifts given that they are specific morphology and stellar mass will be found

In order to do this, each redshift range will be looked at and studied with each morphology merging pair groups and the smallest stellar mass range merging with all mass ranges

The probability of galaxies merging at different morphologies given that they are at a specific redshift range and stellar mass

In order to do this, each morphology pairs group type (Ex: spiral merging with spiral, elliptical merging with spiral etc.) will be studied with each redshift range and the smallest stellar mass range merging with all mass ranges

The probability of galaxies merging in the smallest mass range given that they are merging at a specific redshift range and morphology

In order to do this, the merging galaxies in the smallest mass range merging with all three mass ranges will be studied with each redshift range and each morphology merging pair group

Galaxies in the average mass group will be looked at next

The probability of galaxies merging at different redshifts given that they are specific morphology and stellar mass will be found

In order to do this, each redshift range will be looked at and studied with each morphology merging pair groups and the average stellar mass range merging with all mass ranges

The probability of galaxies merging at different morphologies given that they are at a specific redshift range and stellar mass

In order to do this, each morphology pairs group type (Ex: spiral merging with spiral, elliptical merging with spiral etc.) will be studied with each redshift range and the average stellar mass range merging with all mass ranges

The probability of galaxies merging in the average mass range given that they are merging at a specific redshift range and morphology

In order to do this, the merging galaxies in the average mass range merging with all three mass ranges will be studied with each redshift range and each morphology merging pair group

Galaxies within the large mass range where looked at last

The probability of galaxies merging at different redshifts given that they are specific morphology and stellar mass will be found

In order to do this, each redshift range will be looked at and studied with each morphology merging pair groups and the large stellar mass range merging with all mass ranges

The probability of galaxies merging at different morphologies given that they are at a specific redshift range and stellar mass

In order to do this, each morphology pairs group type (Ex: spiral merging with spiral, elliptical merging with spiral etc.) will be studied with each redshift range and the large stellar mass range merging with all mass ranges

The probability of galaxies merging in the large mass range given that they are merging at a specific redshift range and morphology

In order to do this, the merging galaxies in the large mass range merging with all three mass ranges will be studied with each redshift range and each morphology merging pair group

Results will be looked at overall to find the most probable scenario and circumstances for galaxy merging

Results will be compared to the results of simulated research to find if that research depicts similar findings

Risk and Safety

Due to all research being conducted at home and on a computer, there are no safety risks.

Bibliography

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