Thesis Plan

This brief document will be a plan of my thesis. All I plan to have in it is the general structure, some notes on what goes in each part and maybe some incredibly rough (for now) deadlines. This is being considered on the day of the 29/09/2023, and will be updated very likely.

Envisioned Structure

1. Introduction
   1. Interaction and the Relationship with Galaxy Evolution
      1. Galaxy Interaction as a Driver of Star Formation
   2. Galaxy Interaction in the Cosmological Context
   3. Simulations of Galaxy Interaction
      1. General
      2. PySPAM
   4. Statistically Constraining Physical Parameters in a System
      1. Basic Physical Parameters of Galaxy Evolution
      2. Measurement via SED Fitting
      3. Bayesian Statistics & MCMC
      4. Previous Examples
      5. Degeneracies and Inaccuracies
   5. Interacting Galaxy Identification
      1. By Citizen Scientists
      2. By Machine Learning
      3. System Limitations
      4. Rest Frame Limitations
   6. Large Samples of Interacting Galaxies
      1. Using Citizen Scientists
      2. With Machine Learning
2. Chapter 1: Galaxy Zoo Mergers & Constraining Interaction
   1. Introduction
   2. The New APySPAM
   3. Combining with MCMC
   4. Constraining Galaxy Zoo: Mergers
   5. The Observational Case
   6. Conclusion
3. Chapter 2: Creating A Large Sample of Interacting Galaxies
   1. Introduction
   2. The Data
   3. Utilising a Convolutional Neural Network
   4. Creating the Training Set
   5. Diagnostics
   6. Results & Discussion
   7. Conclusion
4. Chapter 3: Galaxy Interaction in COSMOS
   1. Introduction
   2. Data
      1. The O’Ryan+23 Catalogue
      2. The COSMOS2020 Catalogue
   3. Galaxy Classification
      1. Into Stage
      2. Aside on AGN Classification
   4. Results and Discussion
      1. Star Formation with Stage
      2. AGN Activity with Stage
      3. Controlling for Environment
      4. Limitations of Approach
   5. Conclusion
5. Conclusion
   1. Software for Statistical Constraint
   2. Creating Large Samples with Machine Learning
   3. Applying Large Catalogues: Prospects
   4. Applying Large Catalogues: Current Limitations
   5. Future Work

Plans + Deadlines

Ok, so, for here let’s work backwards.