Using ML to infer accreted mass fractions of central galaxies

Project Proposal

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Group 7

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- Idea: To calculate the ex-situ stellar mass accreted onto the central galaxies using a simulation of Galaxy formation based on Physical laws.

- Relevant Papers: Rui Shi et. al. , A machine learning approach to infer the accreted stellar mass fractions of central galaxies in the TNG100 simulation, *Monthly Notices of the Royal Astronomical Society*, Volume 515, Issue 3, September 2022, Pages 3938–3955, https://doi.org/10.1093/mnras/stac1541

- DataSet: TNG100 (To learn the technique), TNG300/TNG50(To apply the learnt technique and get better results), and SIMBA (If we get access to it)

- Baseline: Random Forest (RF) ML

- Expected Results: Get better accuracy in predicting accreted mass using the physically observable features of the galaxies.

- Work Distribution: Work is divided into three parts: (a) Literature Review (b) Reproducing the original results (c) Following up with the advancements.

- Midway Goals: We aim to complete part (a) and (b) till midterm.

- Highly ambitious goals: The original dataset has values for the black holes and their formation as well. The physics behind the accretion of mass into black holes, however, is slightly different from that of central galaxies. Hence, if time persists, we shall try to infer the accreted mass on black holes as well. Otherwise, it would be an open question for others.