THE MORPHOLOGY OF DUAL ACTIVE GALACTIC NUCLEI

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OVERVIEW

- We are interested in determining the morphology of Dual Active Galactic Nuclei (AGN) because:
  - Develop a better understanding of how Dual AGN are formed
  - Improve the likelihood of observing Dual AGN within certain parameters.

GENERAL MORPHOLOGY

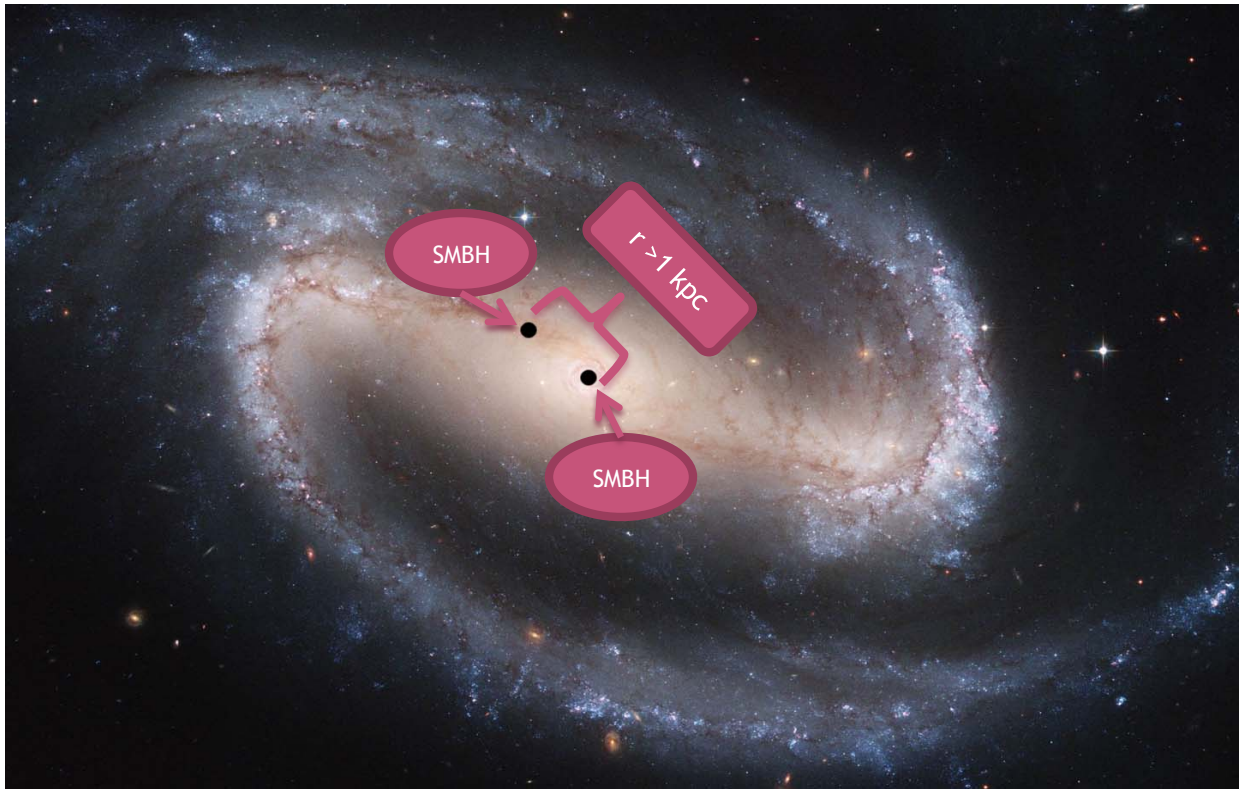
Mergers:
- High SFR
- Irregular morphology
- Gas dispersion

Spiral:
- High SFR
- No recent major collisions
- Gas & dust rich
- Young stars

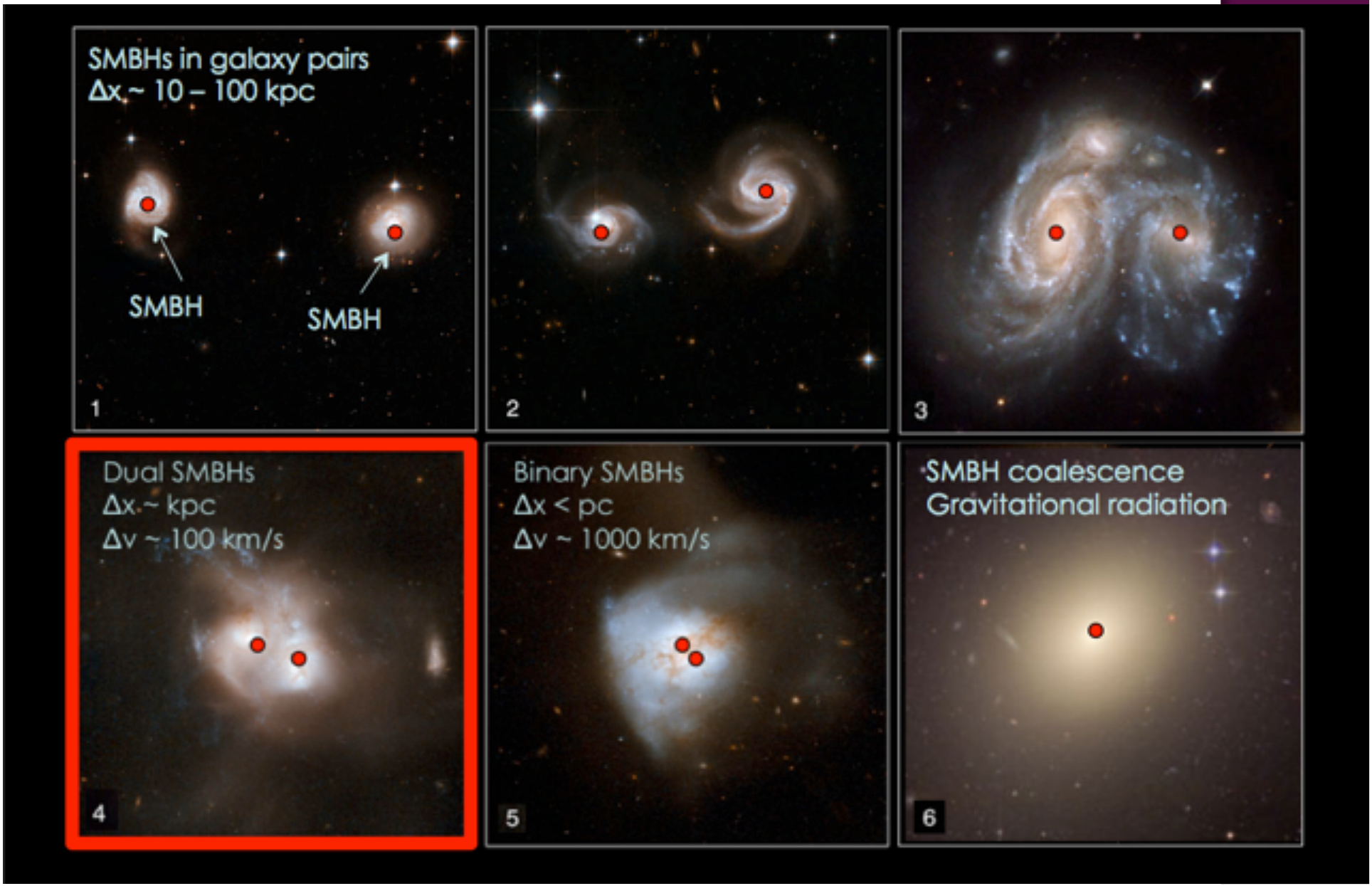
Elliptical:
- Low SFR
- Little to no gas & dust
- Older stars
- Merger remnant

WHAT ARE DUAL AGN

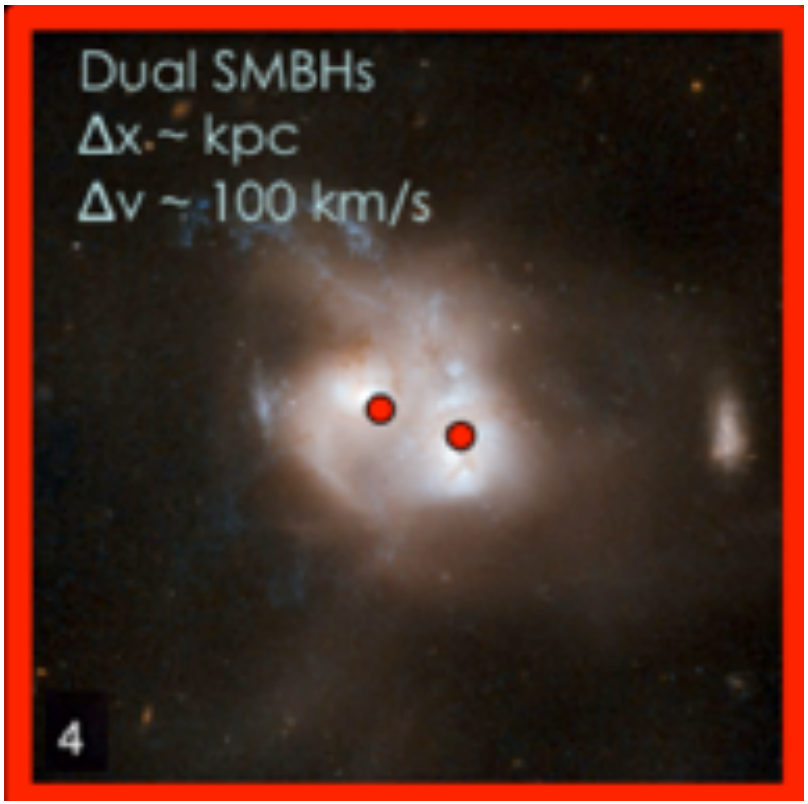
- Dual AGN are galaxies that have two actively feeding supermassive black holes (SMBHs).
  - Typical separations range from pcs to kpcs
    - My research looks at Dual AGN ≥1 kpc
      - Easier to visually observe



HOW ARE DUAL AGN FORMED?



MAIN QUESTION



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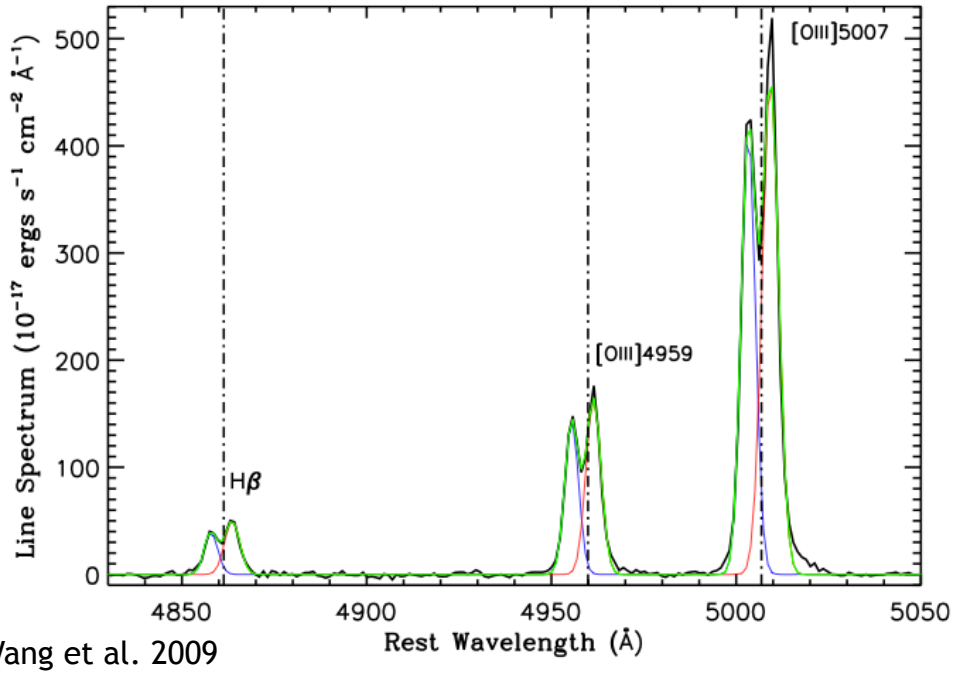
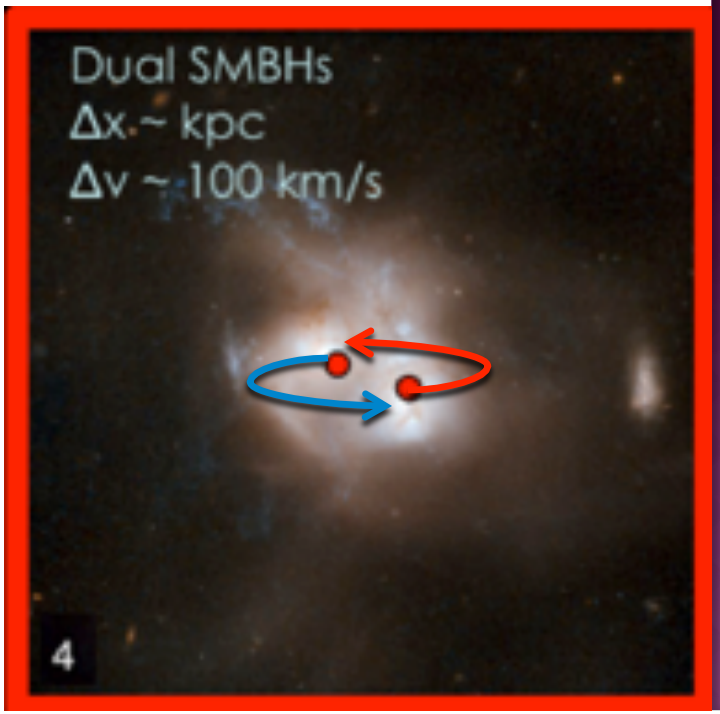
MAIN SAMPLE

- What are Double-Peaked AGN?
  - AGN with a double peaked OIII signature
  - Strong indicator of Dual AGN
- Sample of 340 DPAGN in Sloan Digital Sky Survey

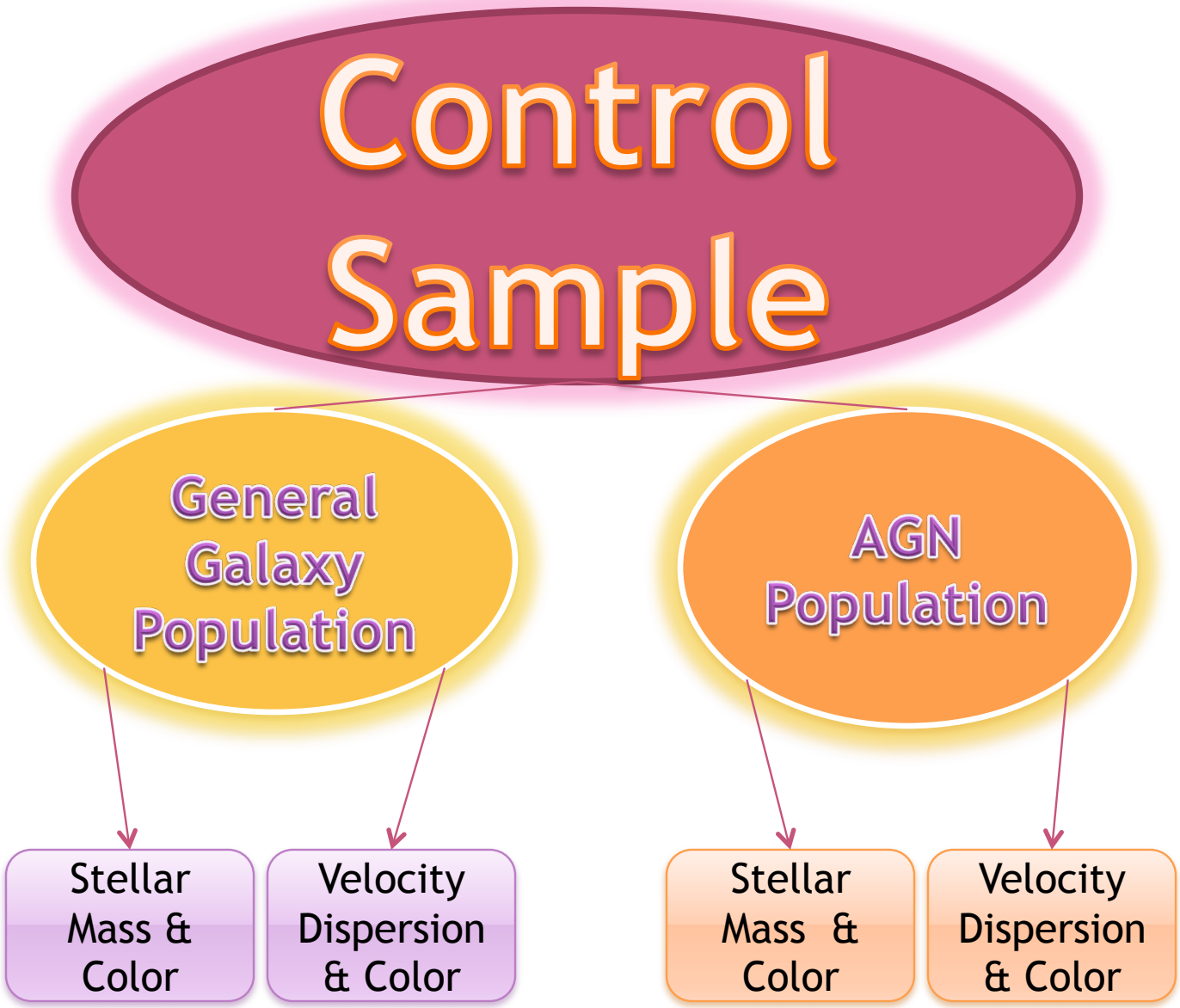


Wang et al. 2009



WHAT IS GALAXY ZOO?
HOW DOES IT WORK?

- Galaxy Zoo is an online catalog of nearly 1 million galaxies
  - classified by over 250,000 Citizen Scientists.
    - Three Basic Morphologies:
      - Spiral, Elliptical, and Merger
  - on average, each galaxy classified 60 different times (to ensure accuracy and precision).



The four control samples look at similar galactic properties within ± 5 % range for each Dual AGN candidate

RESULTS

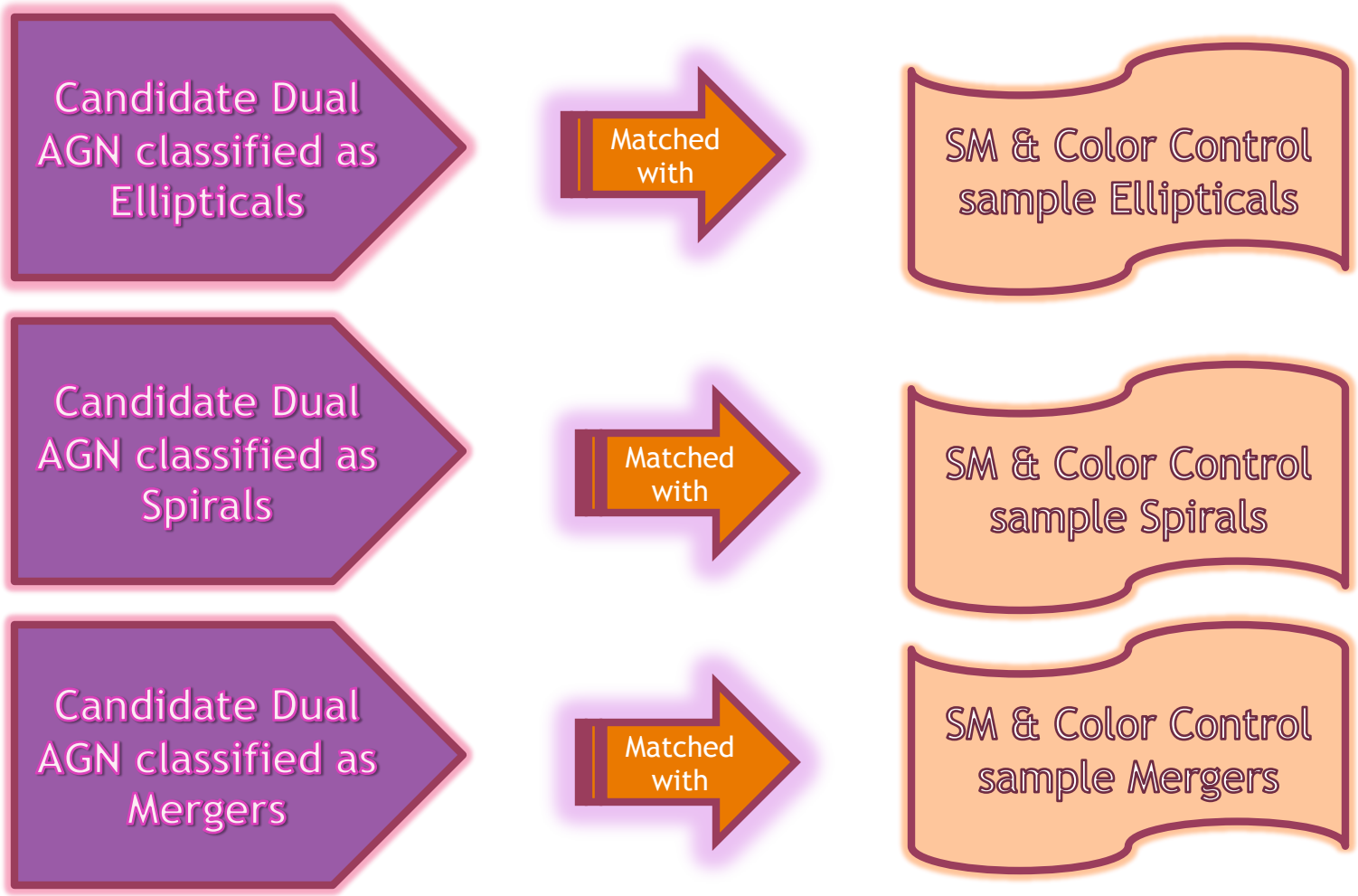
Morphologies of Candidate Dual AGN

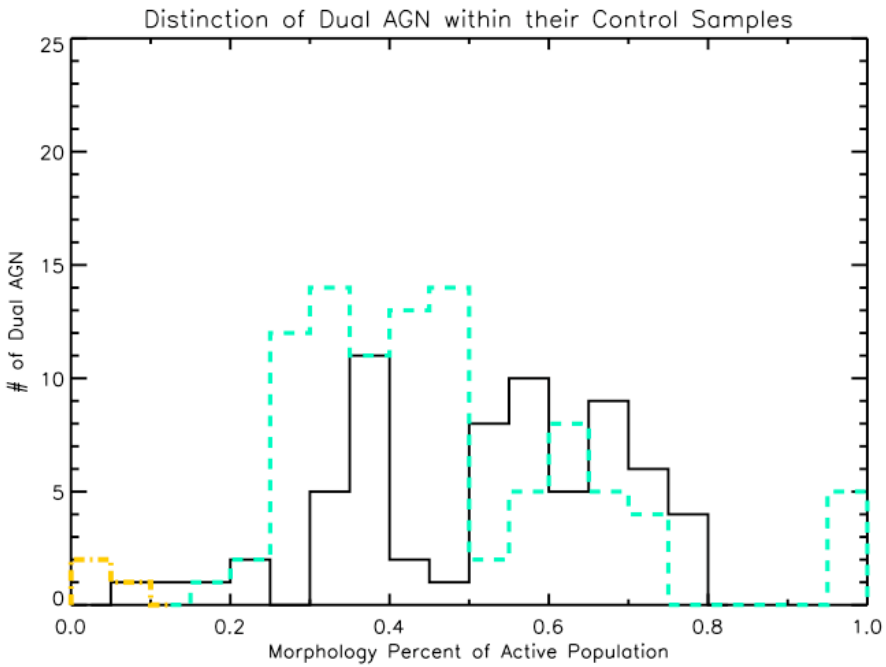
- ~56% Elliptical
- ~43% Spiral
- ~1% Merger

Morphologies of Matched AGN Sample

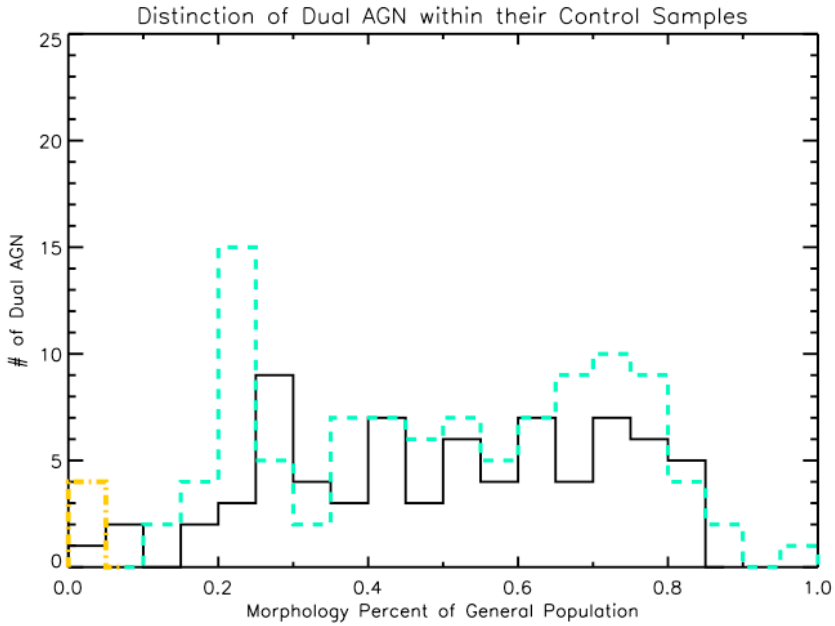
- ~45% Elliptical
- ~55% Spiral

MORE RESULTS





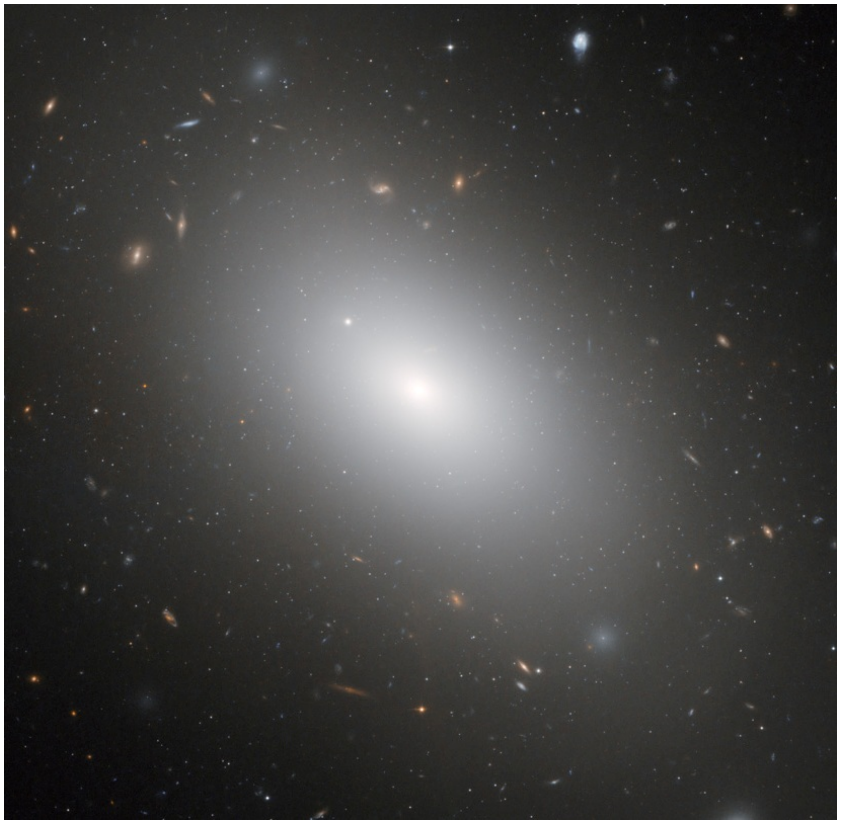
Looks at Stellar Mass AGN Control Group



Looks at Stellar Mass General Pop. Control Group

CONCLUSION

- Overall, candidate Dual AGN prefer an elliptical morphology. This suggests that dual AGN form through galaxy mergers.



FUTURE WORK & APPLICATIONS

- Future Work: Other Morphology Measurements
  - Sérsic Index
  - Automated Bayesian Classification
  - Concentration (Per90/Per40)

- Future Applications:
  - SMBH growth
  - Better understanding of galaxy evolution