



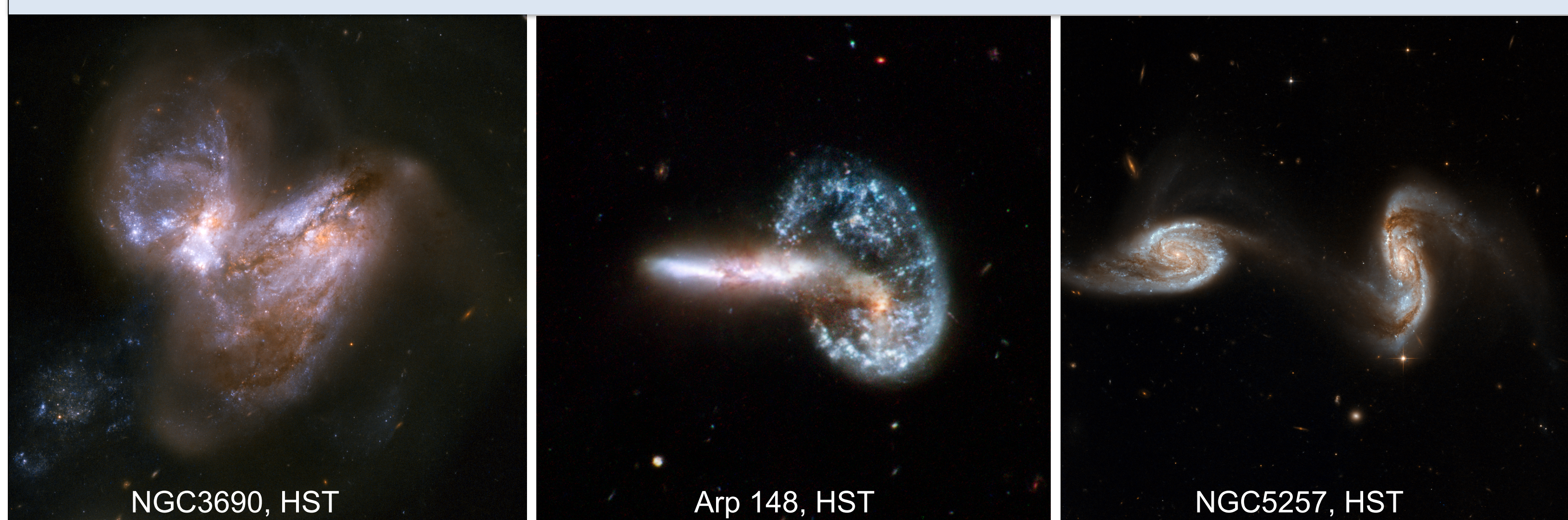
# Spectral Energy Distribution Analysis of WISE-Selected Obscured AGNs in Major Mergers from the SDSS

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## MOTIVATION

In merger simulations, encounters between gas-rich galaxies can drive gas to the centers of the interacting and merging systems triggering star formation (SF) and active galactic nuclei (AGN). Intense SF can cause dust obscuration, making the use of a broad range of wavelengths necessary to properly quantify star production and super-massive black hole growth in these important evolutionary systems.

## WESTON ET AL. 2017 SAMPLE DESCRIPTION



- Comprehensive sample of 130 merging galaxies, 1069 interacting galaxy pairs, and 42,642 control galaxies visually selected from SDSS, with WISE All-Sky data
- Stellar mass  $M_{\text{star}} > 2 \times 10^{10} M_{\odot}$  based on Bell et al. (2003) stellar M/L ratios
- Nearby universe ( $z \leq 0.08$ )

## KEY RESULT: WISE AGNS IN MERGING & INTERACTING GALAXIES

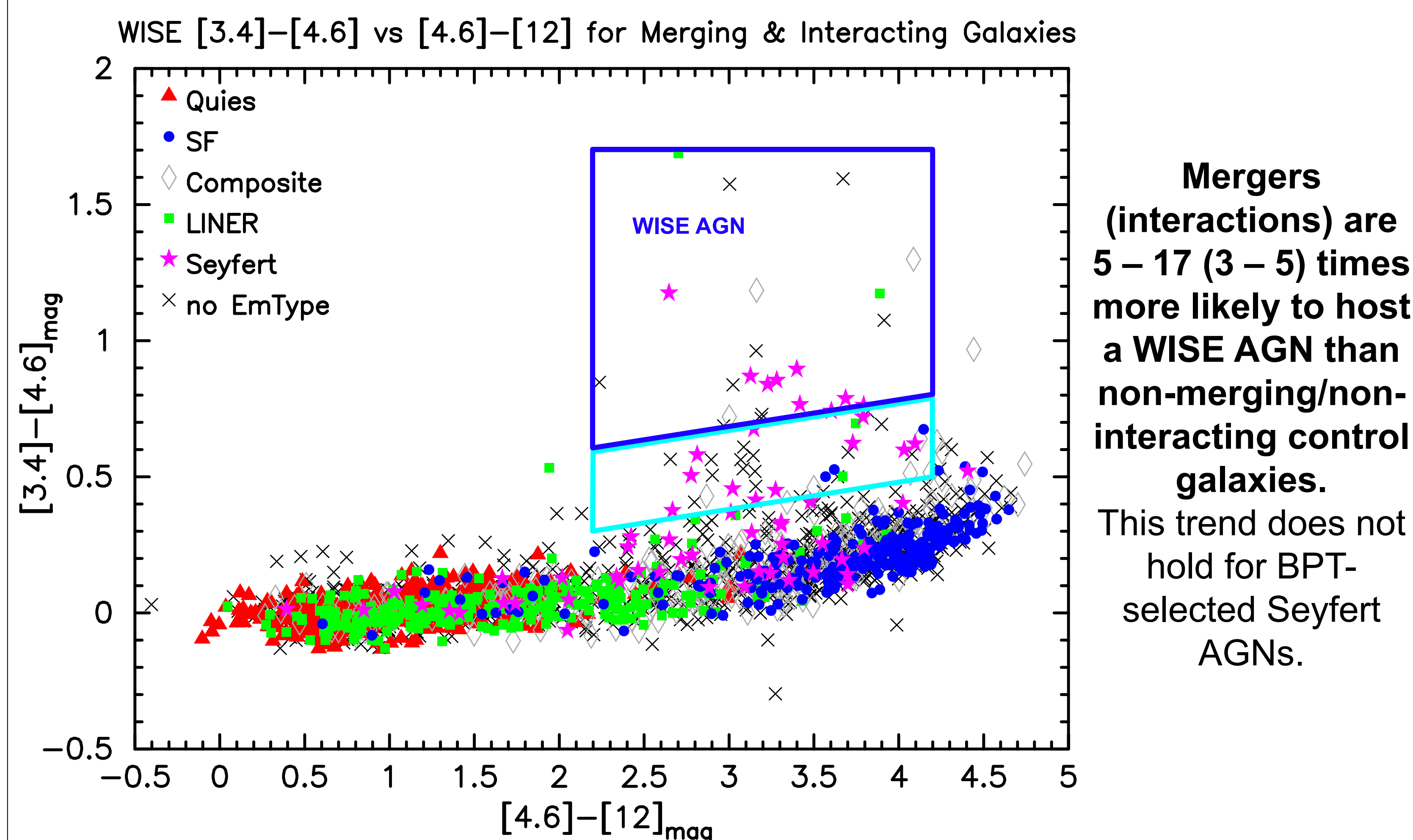
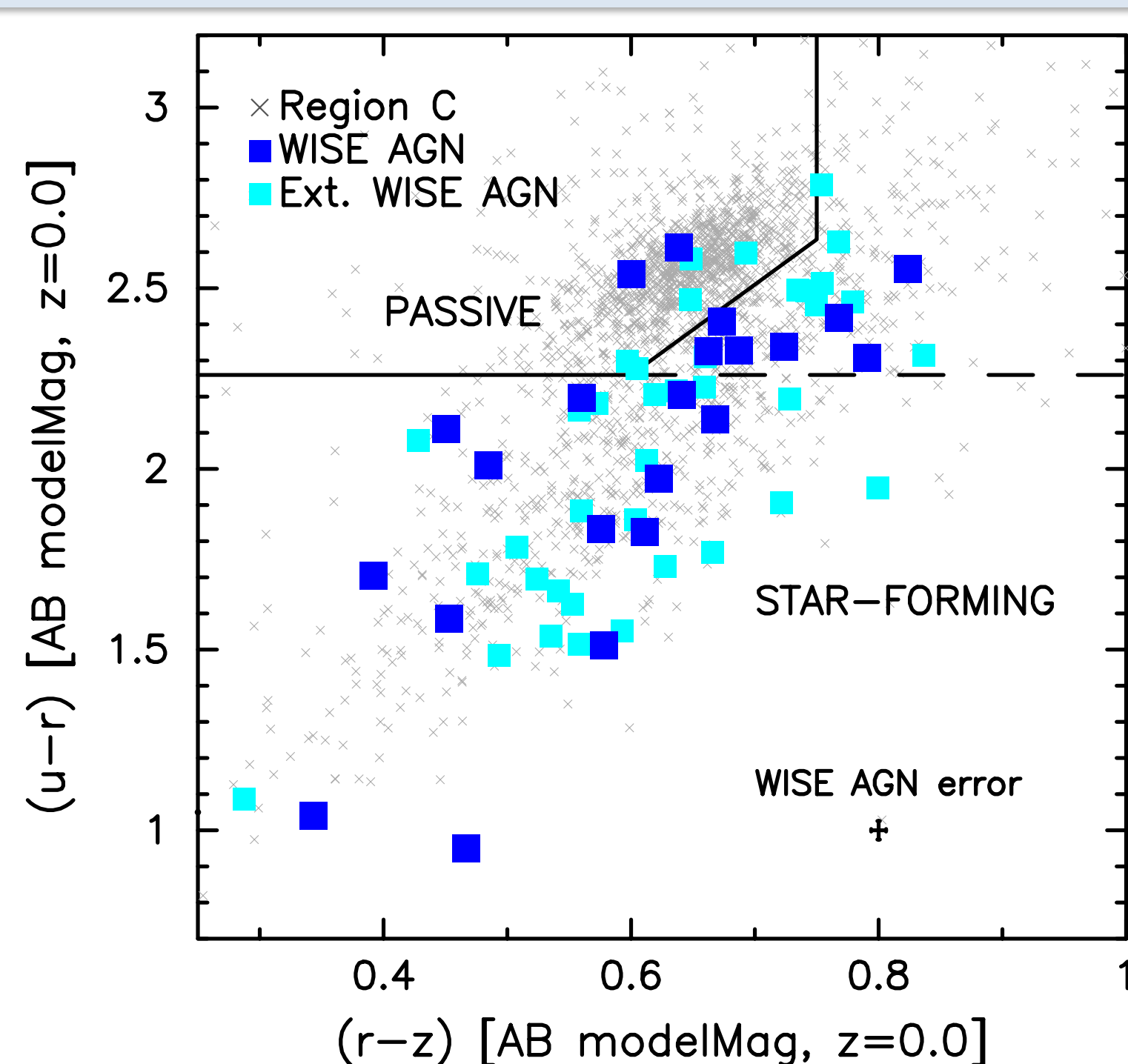


FIG. 1 – WISE [3.4]-[4.6] vs. [4.6]-[12] color-color diagram for merging and interacting galaxies. Blue box represents the WISE AGN cut from Jarrett et al. (2011), and cyan box represents the Extended WISE AGN cut by Weston et al. (2017). Spectroscopic emission types are based on MPA-JHU emission-line fluxes measured from the SDSS fiber spectra (Kauffman et al. 2003, Brinchmann et al. 2004) and described in detail in McIntosh et al. (2014) as follows: SF (pure star-forming), Composite, LINER and Seyfert galaxies are determined using the criteria of Kauffmann et al. (2003) and Schawinski et al. (2007) for galaxies with emission detected in the 4 lines of the standard BPT (Baldwin et al. 1981) diagram; quiescent galaxies lack detectable emission in all 4 BPT lines; galaxies marked as "No EmType" have no spectroscopic information.

## KEY RESULT: WISE AGNS AND STAR FORMATION

**73 – 99% of merging and interacting WISE AGNs are found in an optically star forming galaxy of star forming pair. This trend holds for control WISE AGNs.**

FIG. 2 – SDSS (u-r) vs. (r-z) color plot for merging and interacting galaxies. Mergers and interactions identified as WISE AGNs (as defined by Fig. 1) are shown as blue squares, and Extended WISE AGNs as cyan squares. Grey points indicate merging and interacting galaxies that do not host a WISE AGN (approximately half of these systems are found in the star-forming region). SDSS Model magnitudes are in the AB system and extinction and K-corrected ( $z=0.0$ ), as done in McIntosh et al. (2014). The grey line from Holden et al. (2012) is the boundary between passive and star forming systems.



## ONGOING ANALYSIS

We will use spectral energy distribution (SED) analysis to answer the following specific research questions:

- Do all merging galaxies host an AGN that contributes significantly to the IR energy output (20% of the total IR light or more), regardless of optical emission type?
- Do mergers identified as Seyfert or dusty AGNs by Weston et al. (2017) host more SF or AGN activity than those classified as non-AGNs?
- Are previously selected AGNs in mergers different than those in non-merging galaxies?
- Does the amount of AGN activity found through SED analysis scale with the [OIII] luminosity (a proxy for AGN power) of the host galaxy?

## ONGOING ANALYSIS: SEDS OF WISE AGNS

**97% (33/34) of WISE AGNs do host an infrared AGN (shown as a purple template in the SEDs below), using AGNfitter (Calistro Rivera et al., 2016).** We will continue this analysis for 193 total WISE AGNs selected in Weston et al. (2017), and the remaining 125 mergers that do not host a WISE AGN.

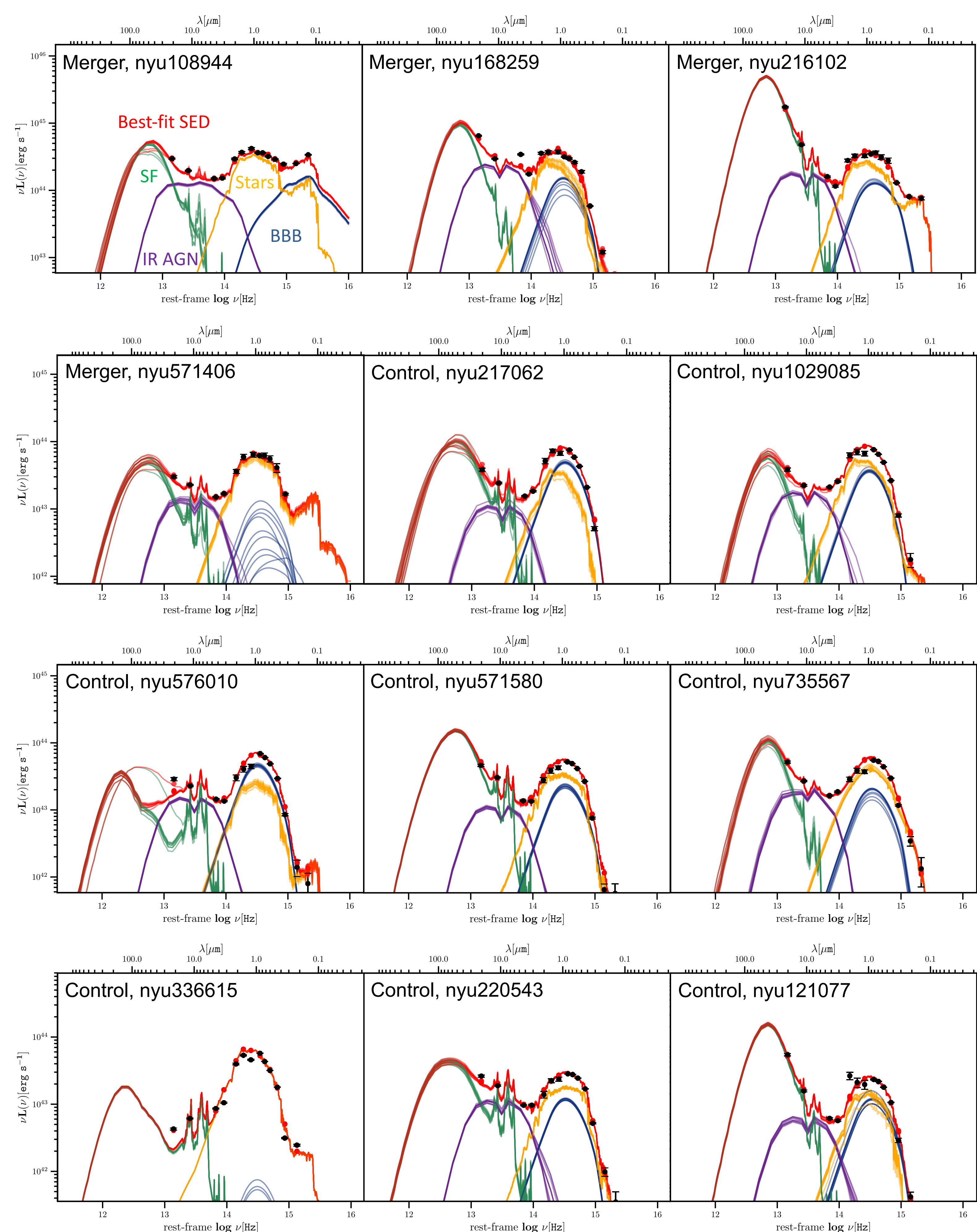


FIG. 3 – SEDs of WISE AGNs, generated using the AGNfitter SED-fitting code (Calistro Rivera et al. 2016). Each plot shows ten of the possible best-fit SEDs in red, with corresponding best-fit templates as follows: infrared AGN contribution in purple, big blue bump (unobscured AGN) in blue, stellar population in orange, and SF in green. The black points are the input data points from GALEX, 2MASS, SDSS, and AllWISE. Red points are the points that align with the best-fit SED.

Questions or Suggestions? Please email [mew9bc@mail.umkc.edu](mailto:mew9bc@mail.umkc.edu)

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D.H.M., M.E.W. acknowledge support from NASA under Astrophysics Data Analysis (ADAP) award No. NNX13AE96G and the Missouri Space Grant Consortium.