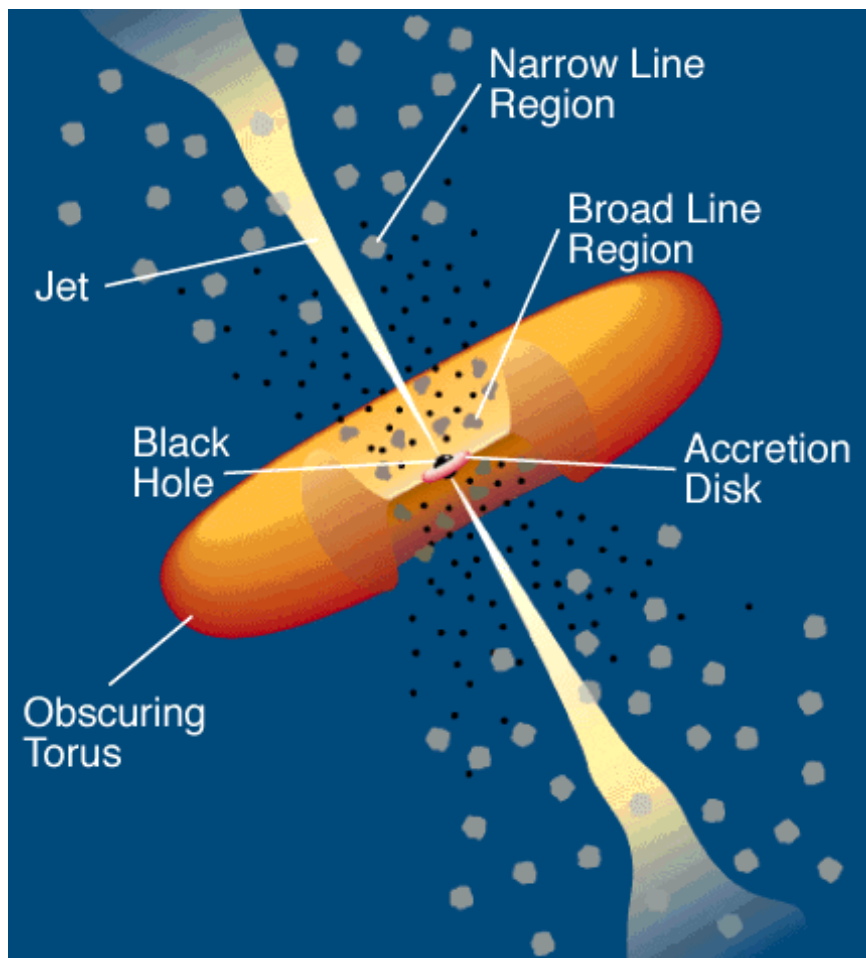


# Comparing metallicity correlations in nearby non-AGN and AGN-host galaxies

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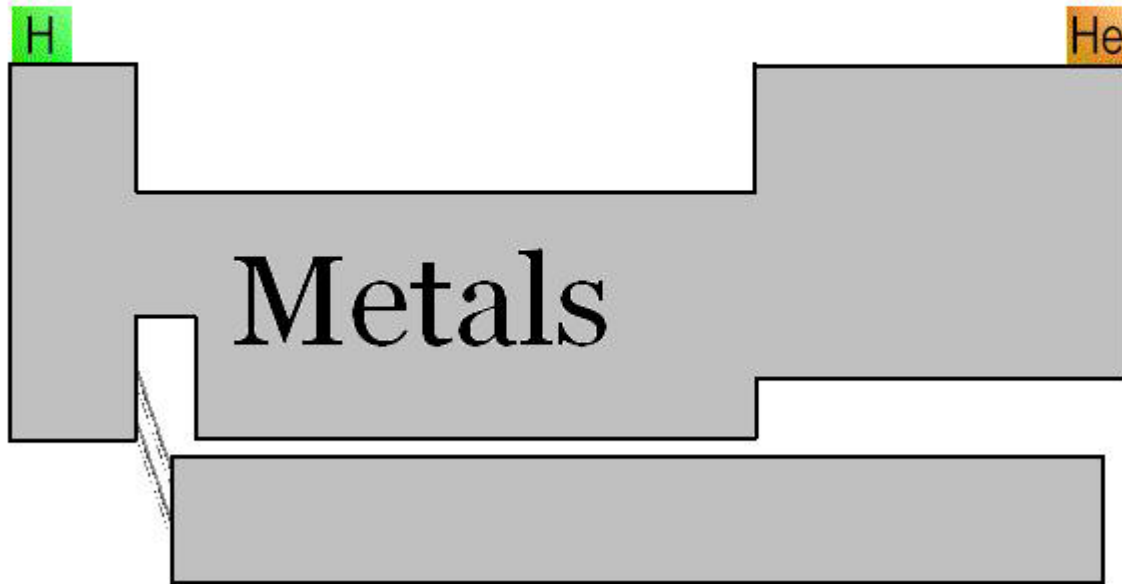
**Active Galactic Nuclei (AGNi) are supermassive black holes (SMBH) at the center of galaxies that are actively accreting matter.**

**Theorized to change the evolution of the galaxy**

**Emission ranging from gamma rays to radio are due to the infall of material into the SMBH**



## The Astronomers' Periodic Table of Elements

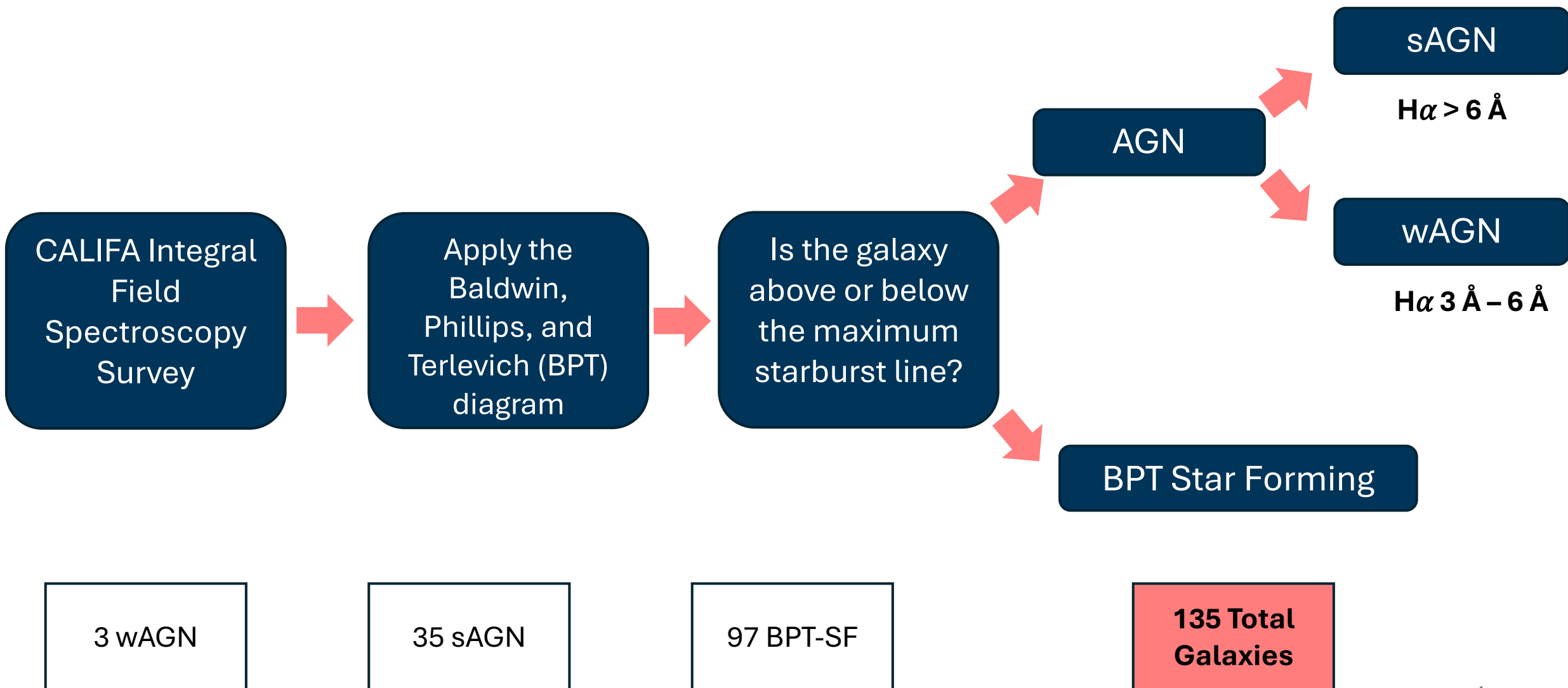


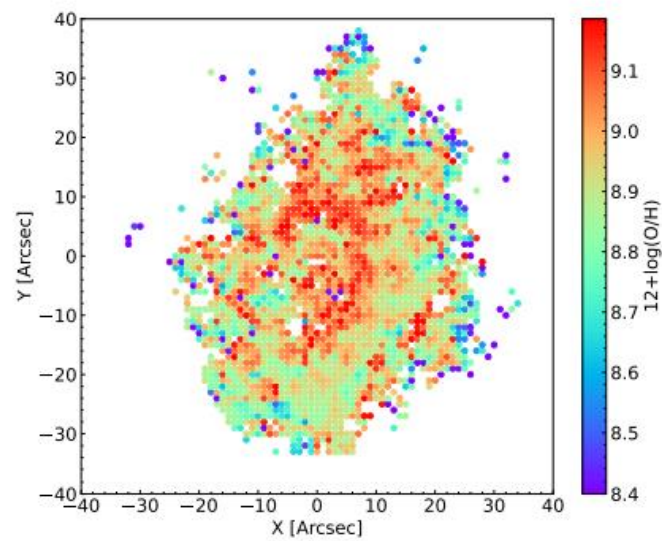
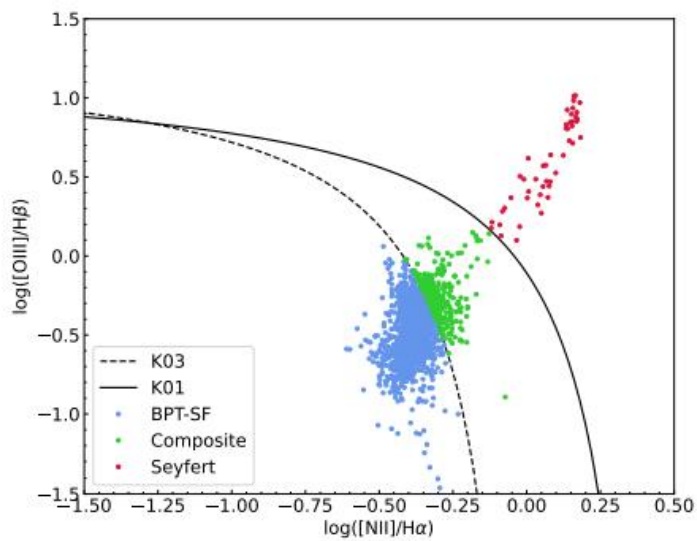
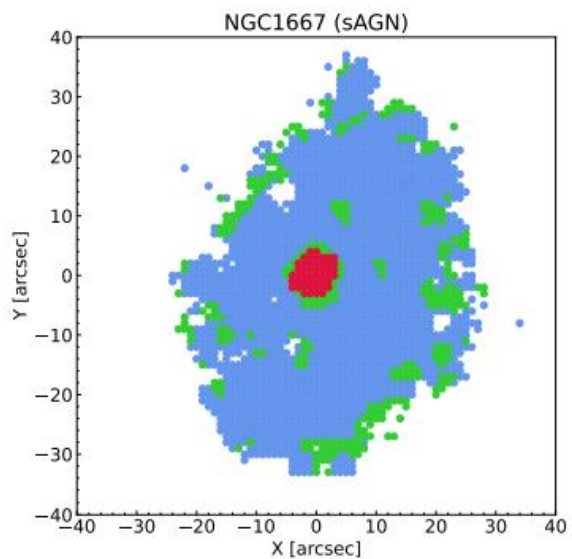
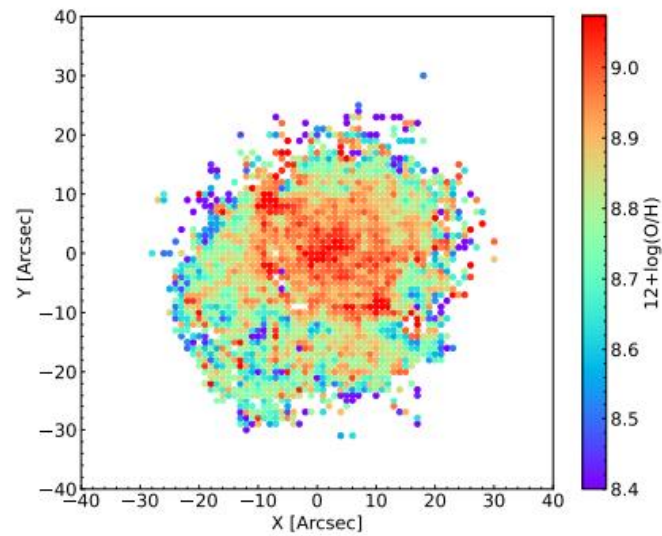
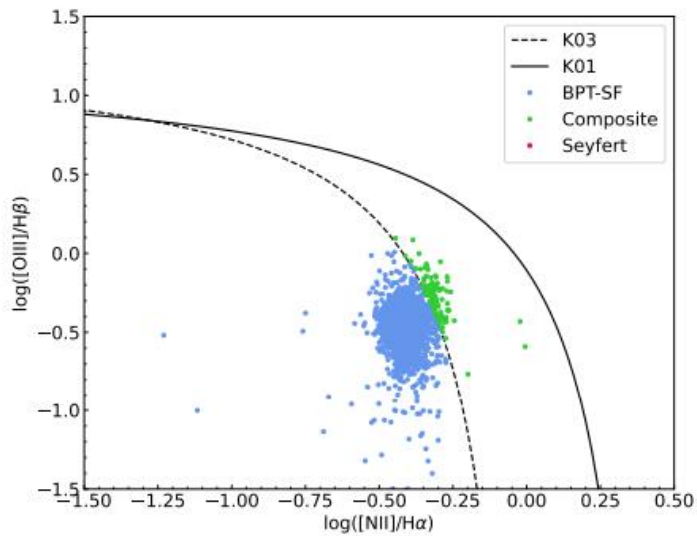
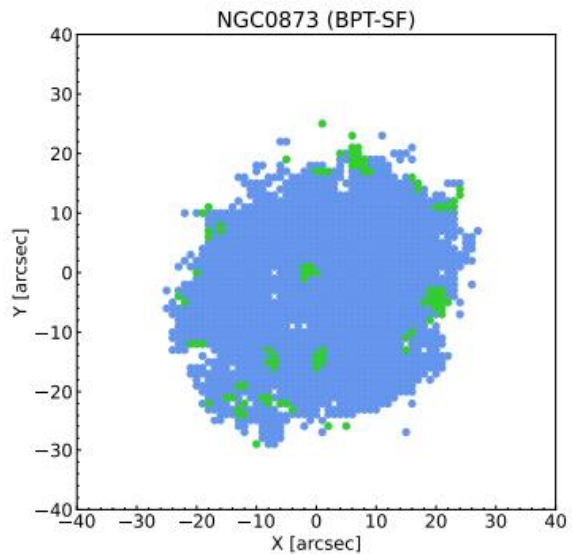
astronomytrek.com

**Metallicity** is describing the amount of “**metal**” there is in an object.

It’s usually represented by a **ratio** of the **metals** and **nonmetals**  
I.e. Fe/H

Metals are produced from **stellar evolution** are spread out by **supernova explosions and winds**







## NebulaBayes

$$p(\theta|D, M') = \frac{p(\theta|M') p(D|M', \theta)}{p(D|M')}$$

The posterior  $p(\theta|D, M')$  combines prior knowledge and the likelihood of observed data under model  $M'$  to estimate the probability of parameter values, normalized to ensure proper probability distribution.

**Used to calculate metallicity accounting for AGN**

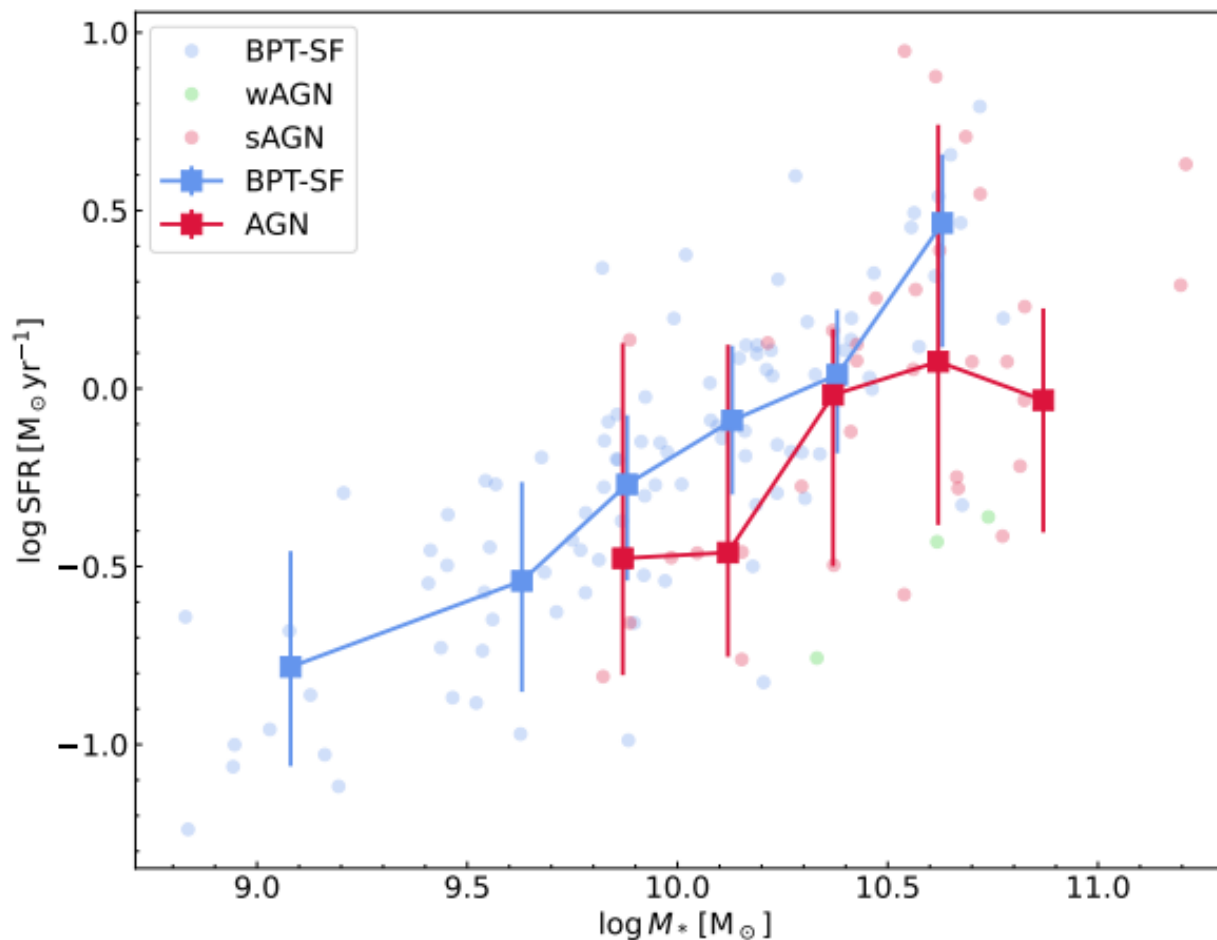
Adam D. Thomas et al 2018 ApJ 856 89

## Two Point Function

$$\xi(\mathbf{r}) = \frac{\langle Z'(\mathbf{r} + \mathbf{r}') Z'(\mathbf{r}') \rangle}{\langle Z'(\mathbf{r}')^2 \rangle}$$

This measures the metallicity values over two different reference points

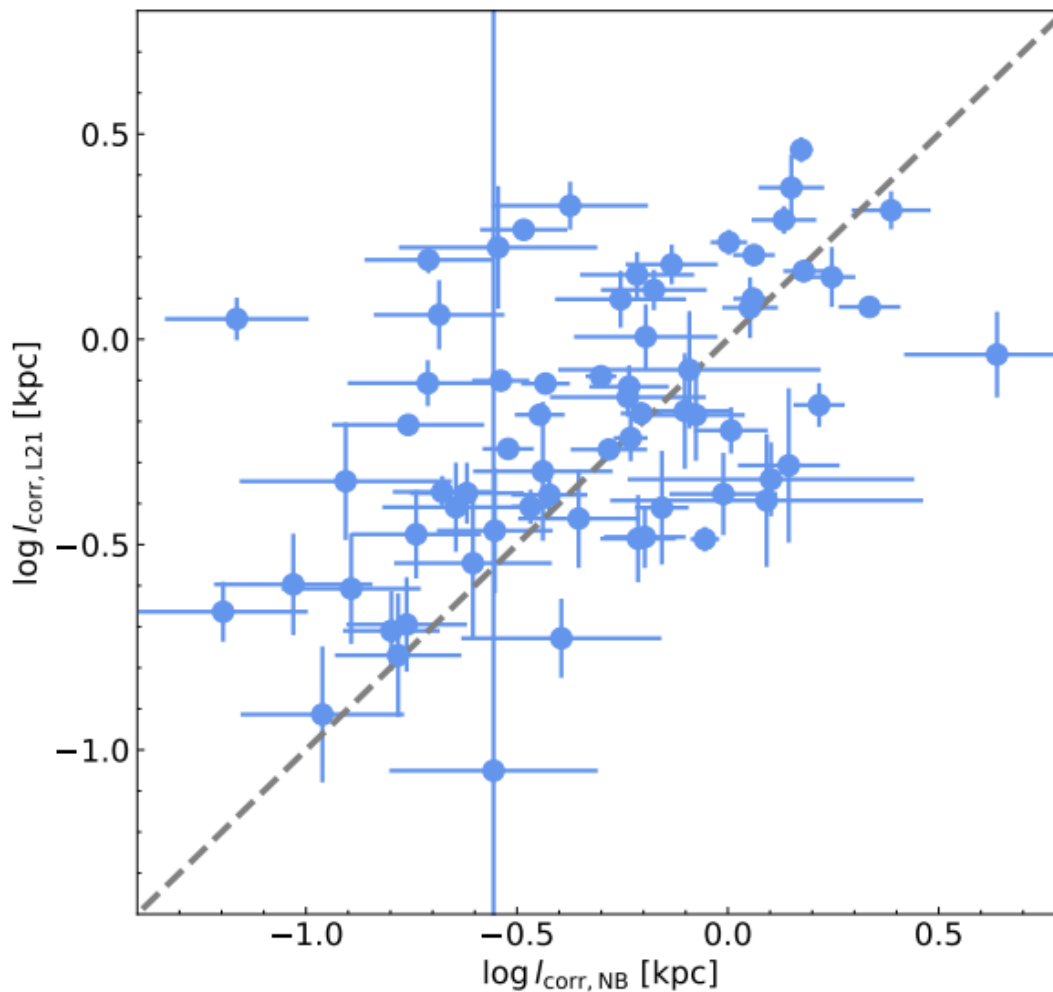
Correlation length gives us how the metal is dispersed



The SFR tends to be lower for AGN host galaxies

$1\sigma$  uncertainty from the median

**AGN-host galaxies have lower SFR at fixed stellar mass compared to BPT-SF galaxies.**

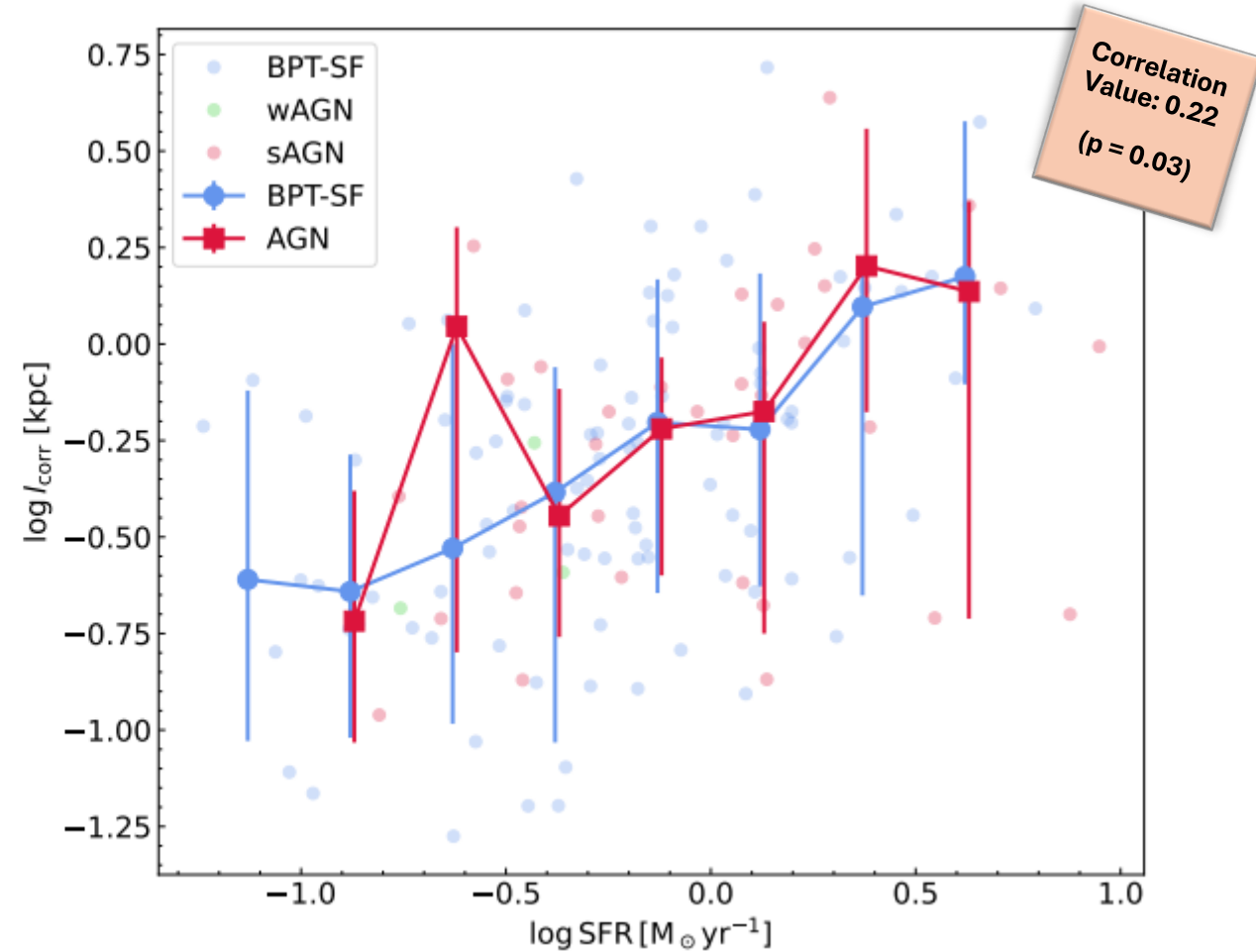
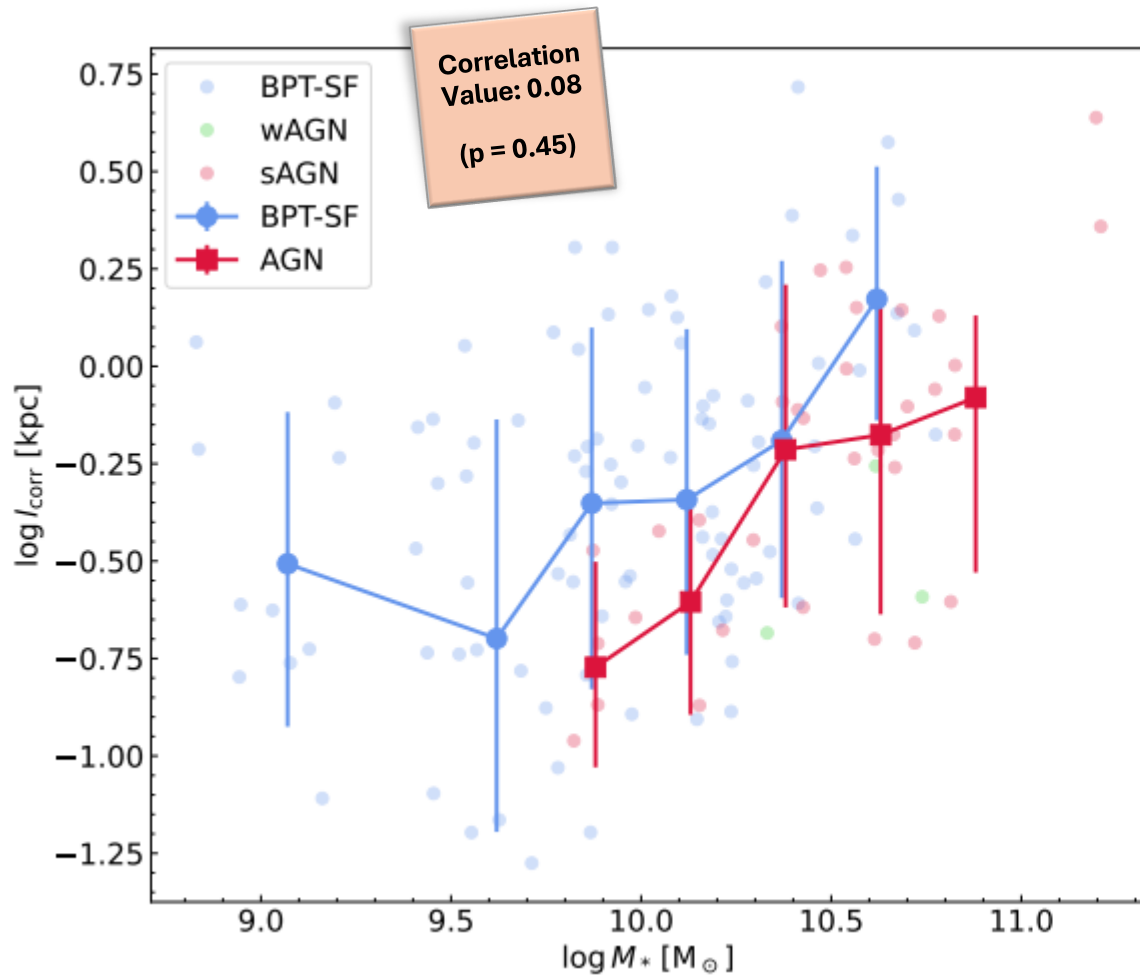


A pearson coefficient of 0.51

The error bars are from the 16<sup>th</sup> and 84<sup>th</sup> percentile

**A general agreement that the calculated correlation length using the NebulaBayes method agrees with the correlation lengths done in a previous study.**





SFR is more fundamental than stellar mass in determining the metallicity correlation length and AGN galaxies have shorter correlation lengths primarily due to their lower SFR rather than any direct AGN impact on metal mixing.



AGN-host galaxies have **lower SFR**, resulting in less effective metal mixing and localized metallicity enrichment

**Star formation rate** is more **fundamental** than **stellar mass** in determining **metallicity distribution**

**Partial Correlations Values with Correlation Length:**  
**SFR : 0.22 (p = 0.03) | Stellar Mass: 0.08 (p = 0.45)**

AGN activity **indirectly** affects metallicity by **suppressing star formation** leading to **shorter correlation lengths**