

# The Social Network of Quasars

On behalf of the GAMA collaboration

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## Introduction

What mechanism triggers nuclear activity in galaxies? The traditional explanation is that gas and dust must be driven to the galaxy center and then accreted by the central supermassive black hole to fuel the AGN. Because this implies that angular momentum must be lost, one needs violent relaxation for which mergers are the preferred option. However, the correlation between mergers and AGN activity has been elusive. Several studies have found that (a) AGN hosts are **not** more morphologically disturbed than inactive galaxies and (b) galaxies in close pairs do **not** preferentially host AGNs again compared to samples of more isolated galaxies.

This poster summarizes a series of papers where we have explored the environment and star formation properties of AGNs using the dataset from the GAMA survey where we have extensive photometry (from 0.15 to 22 micron) and nearly complete spectroscopy, to which we add imaging from SDSS, PanStarrs and Subaru in the optical.

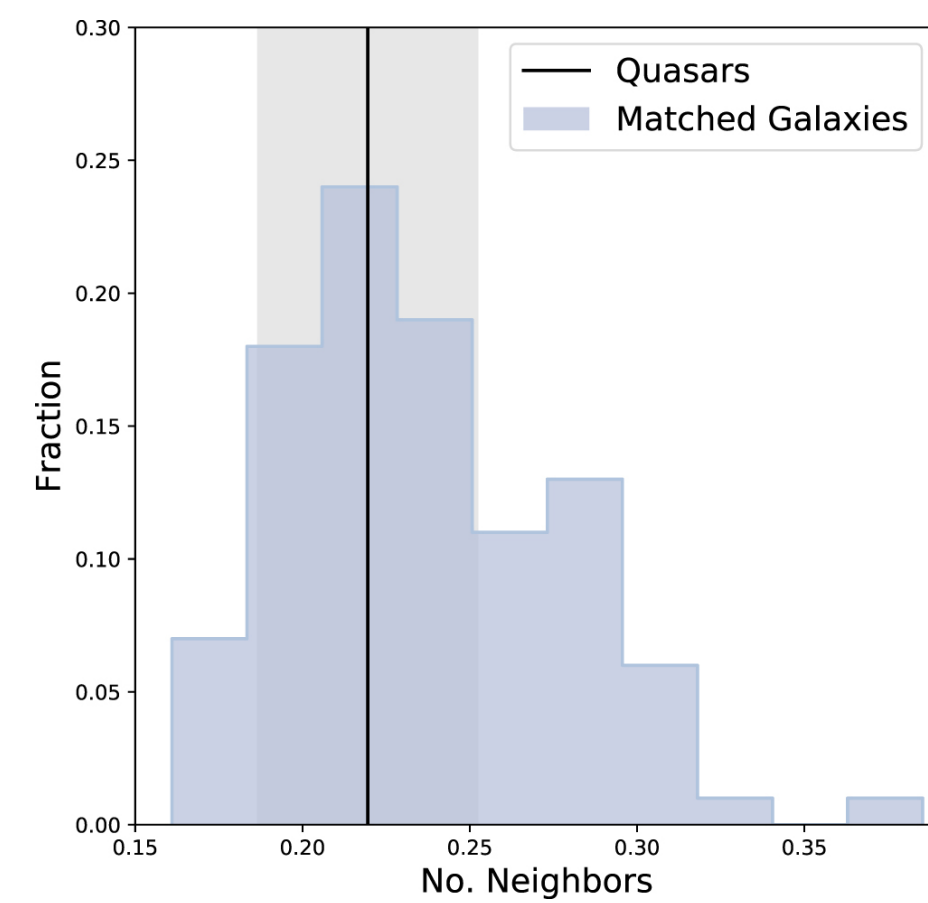
Quasars are identified objectively from Version 4 of the Large Quasar Astrometric Catalog where we require that these quasars lie within the three equatorial GAMA patches, have  $r < 19.8$  reflecting the completeness limit (99%) of GAMA spectroscopy and finally that they lie within  $3''$  of a GAMA galaxy so that they can be properly matched to GAMA galaxies

We also identify 200 samples of galaxies that do not show AGN activity but have the same redshift and stellar mass as the quasar sample to carry out a comparison of their properties

## Environment

We here show the dependence of AGN activity on the local environment. Quasars and matched galaxies have the same numbers of neighbors.

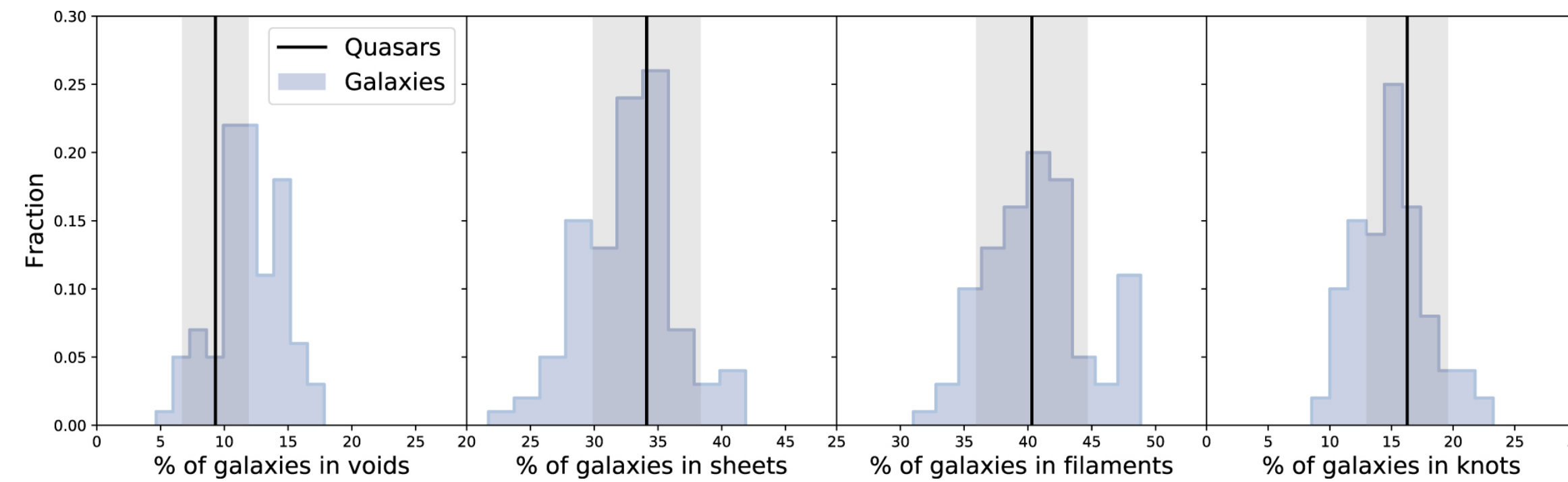
We can also show that there is no difference where we compare density enhancement parameters such as the number of galaxies in a cylinder or the distance to the fifth nearest neighbor



## Dependence on large scale structure

We use the stress tensor of the galaxy distribution to assign each galaxy to one of four broad large scale environments: voids, sheets, knots and filaments

We see no evidence that there is any strong dependence of AGN fraction on the broad LSS, which is comparable to the lack of detection of dependencies on local environments



## Stellar Populations

We use CIGALE and MAGPHYS to measure the star formation rates and star formation histories of AGN hosts and inactive galaxies

Our results show that

- AGN hosts lie on or slightly above the star forming main sequence
- Quiescent AGN hosts are rarer and underrepresented compared to normal galaxies
- Star formation in AGN hosts increased around 100 Myr ago presumably acting as the AGN trigger
- AGN hosts have always been star forming galaxies over the last 2Gyr

## Conclusions

Low redshift AGNs are not the product of mergers

AGN activity is triggered by secular processes, likely due to episodic star formation as is typical of spiral galaxies

E/S0 galaxies are actually less frequent among AGNs with Sa+Sb being the preferred host and Sc+ also being overrepresented

