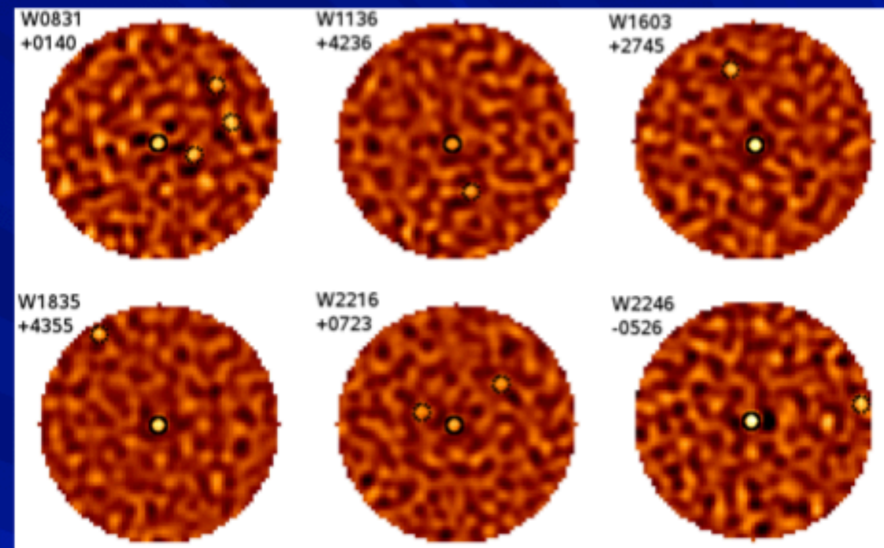
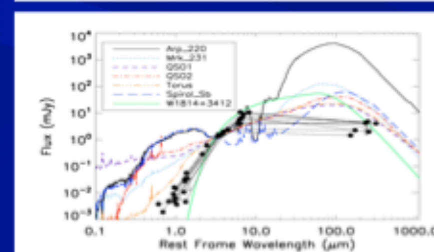
AGN VS. STAR FORMATION

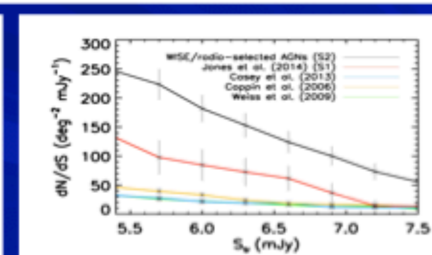
POSTER SESSION 1
"EVIDENCE"

The Overdense environments of SMGs around WISE-selected AGNs – Suzy Jones

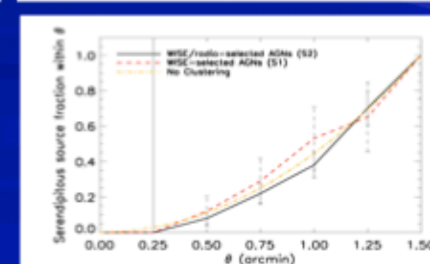
- Mid-IR WISE AGN selection
  - WISE colours (S1; Eisenhardt)
  - WISE & radio (S2: Lonsdale)
- SCUBA2 (and Herschel) adds host/edge of AGN SED
  - They're "U/Hy/mega-luminous"
  - They're mid-IR/submm "hot"
- Within ~1Mpc, several times more SMGs than in a blank field. No angular clustering!
  - Not all in "cluster", but most surely must be!
  - Have SMG not WISE-like SEDs
  - Over 100 found
- Timescale implications?
- Filament-scale structure?







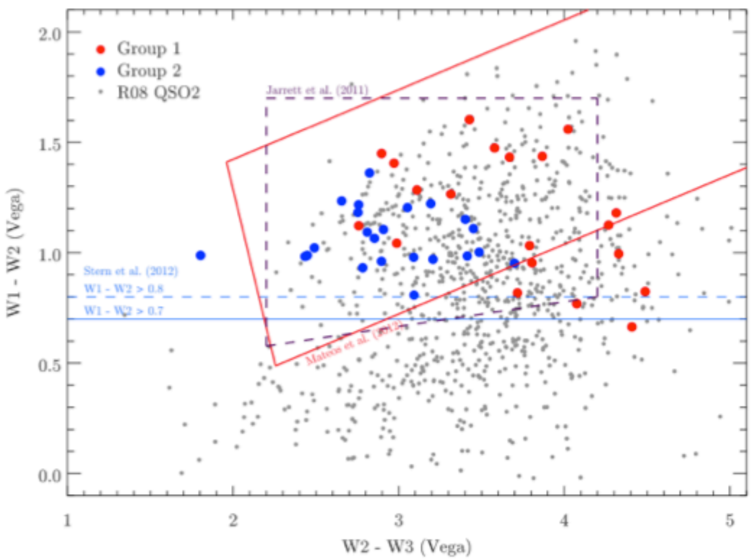
See poster
See MNRAS 443 146



Modeling Obscured Quasar SEDs with Linear Least Squares Fitting

Christopher M. Carroll, Ryan C. Hickox, Kevin N. Hainline

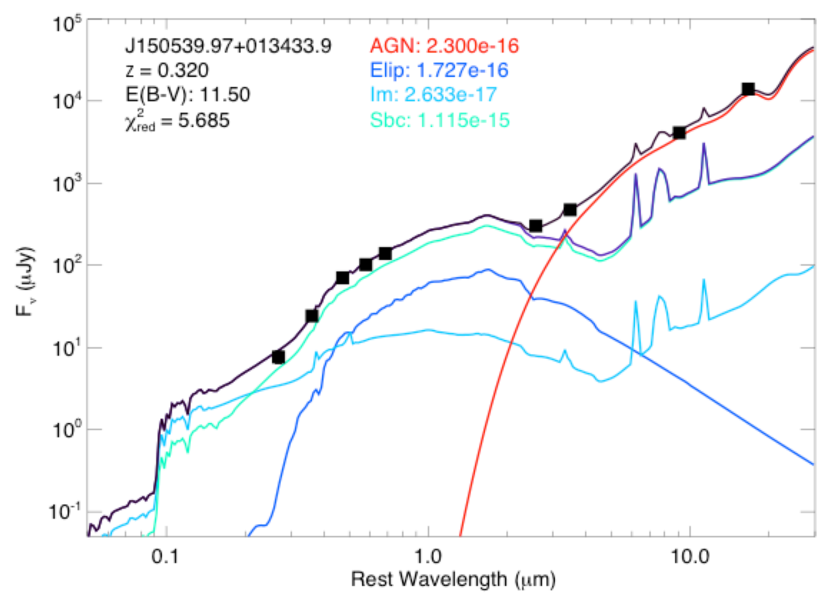
Dartmouth



Hainline et al. (2014b)

Accurately model obscured quasars

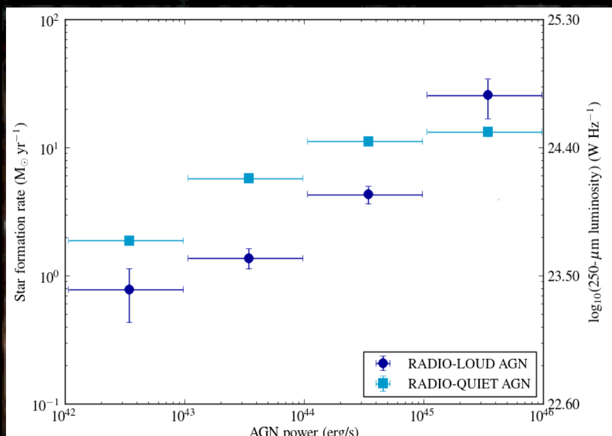
- sample of 45 SDSS-WISE matched galaxies
- mid-IR color cuts [3.4]-[4.6]>0.7
- 7 ≥ [22] ≥ 6.5 to ensure AGN contribution

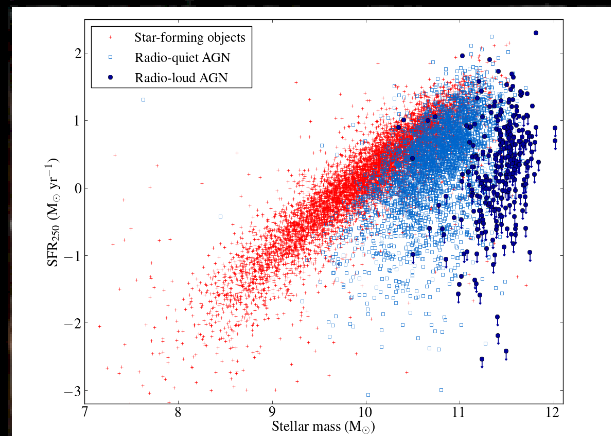


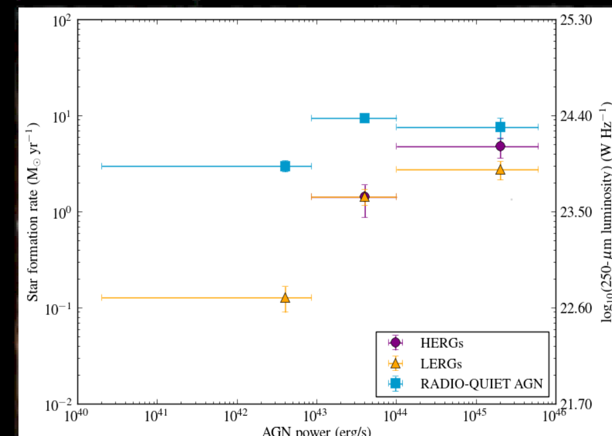
Design for speed > large data sets

- use extinction corrected templates to span redshift parameter space
- use the quasar luminosity function weight our χ^2
- calculate photometric redshift

Gülay Gürkan
Martin J. Hardcastle
Matt J. Jarvis & H-ATLAS Collab.
University of Hertfordshire



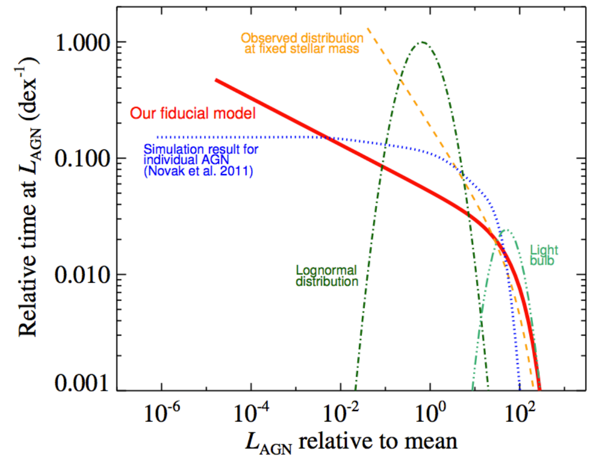




-Synchronized growth of black holes and their host galaxies.
-RQ AGN have higher SFRs/SSFRs than HERGs and LERGs. Even mass matched samples present the same picture.
-BH of low power-AGN are growing slower and that of high-power AGN are growing faster than the standard M_{BH}-M_{bulge} relation.

Testing the star formation-AGN connection with SDSS

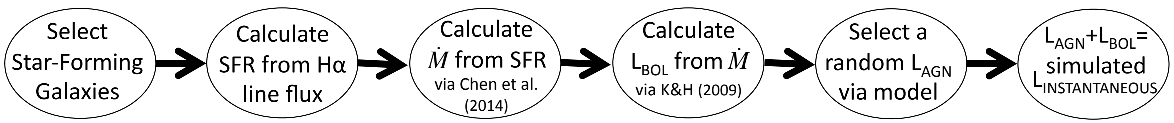
Mackenzie L. Jones and Ryan C. Hickox

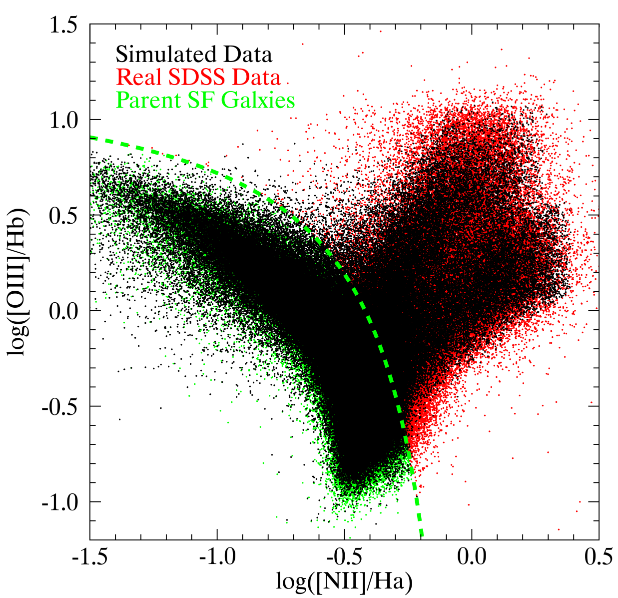


AGN Luminosity Model Based On:

- Tight relationship between star formation and AGN activity
- Short term AGN variability over a wide dynamic range

We test this using SDSS:





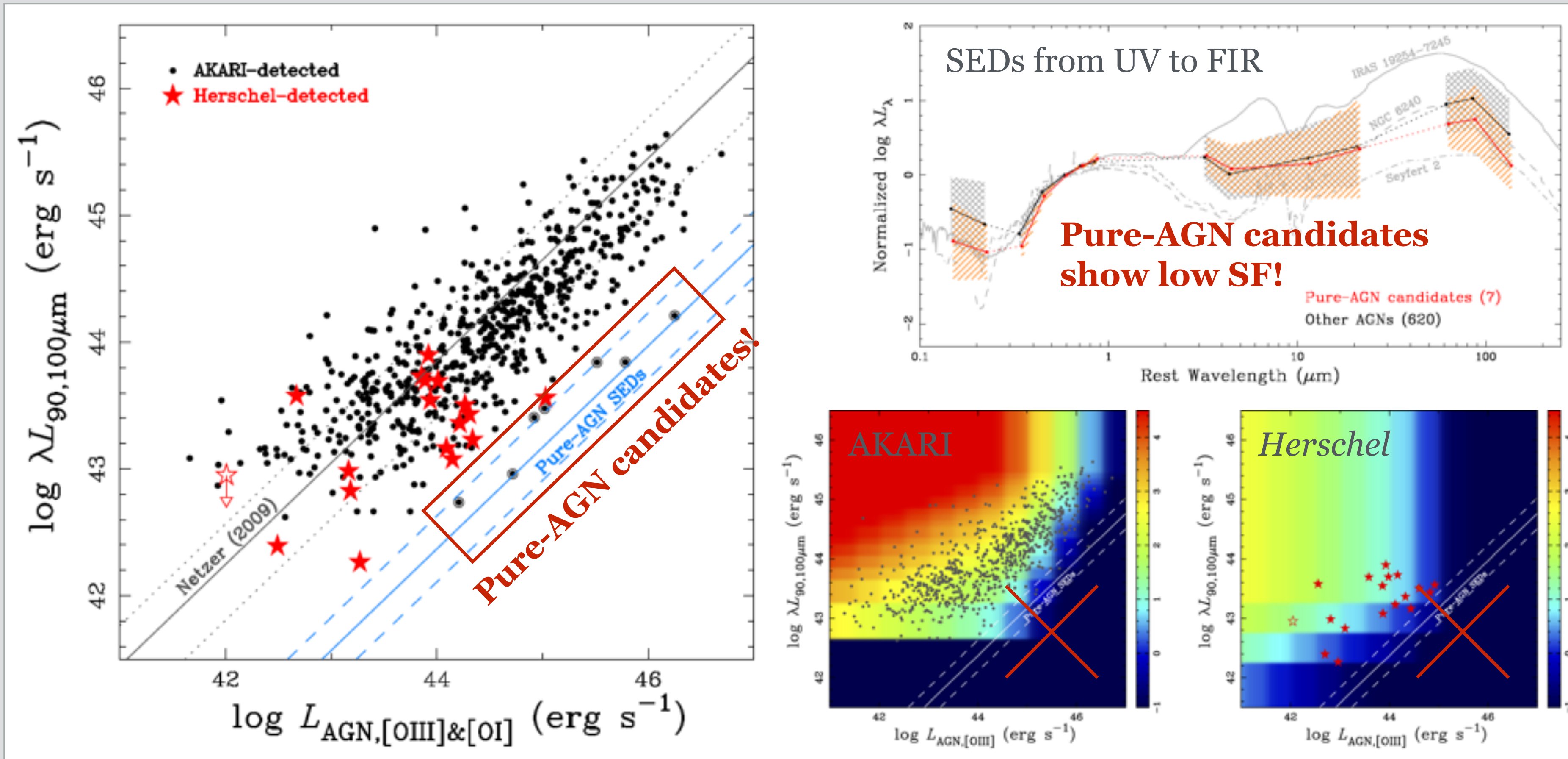
Compare the Simulated Population to Observed Galaxies via:

- Emission Line Excitation (Left)
- Eddington Ratio
- Color-Mass Space

Comparing AGN and SF Luminosities of Local Active Galaxies using Multi-Wavelength Data

Kenta Matsuoka (Seoul National Univ./Kyoto Univ.) and Jong-Hak Woo

We investigated a relation between AGN and FIR luminosities of SDSS type-2 AGNs at $0.01 < z < 0.22$, detected with AKARI (90 μm) and *Herschel* (100 μm).



Pure-AGN candidates (low- or no-SF AGNs) could be a crucial sample for understanding the AGN-SF connection. However, it would be impossible to find them because of the limitations of the current data...

Matsuoka & Woo 2014, submitted to ApJ

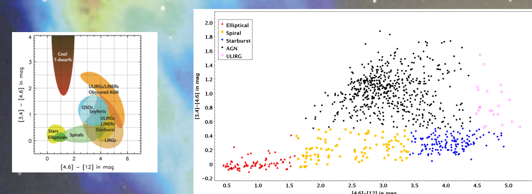
Radio-loud AGN through the eyes of 3XMM, WISE and FIRST/NVSS

Beatriz Mingo[1], Andrew Blain[1], Francisco Carrera[2], Martin Hardcastle[3], Silvia Mateos[2], Simon Rosen[1], Gordon Stewart[1], Mike Watson[1]
1: University of Leicester (UK); 2: Instituto de Fisica de Cantabria (CSIC-UC, Spain); 3: University of Hertfordshire (UK)

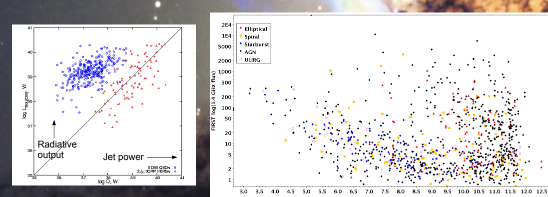
ARCHES University of Leicester

Although radio-loud AGN only constitute 10-20% of the sources we observe, evidence suggests that most, if not all AGN, have undergone a radio-loud phase. It is in this phase that the AGN most dramatically affects its environment (see e.g Bower et al. 2006 MNRAS 370 645; Croton et al. 2006 MNRAS 365 11). This is particularly relevant for low-power sources, including Seyferts, where the AGN can deposit up to 10^6 supernovae worth of energy into the ISM of the host galaxy in the span of a few million years, with the potential to dramatically affect the dynamics and star formation rate of the host (see e.g Croston et al. 2008 ApJ 688 190; Mingo et al. 2011 ApJ 731 21; Mingo et al. 2012 ApJ 758 95).

Radio-loud AGN are also fundamental to understand accretion, as it is not yet clear what regulates jet production. Although we know that the jet and radiative output of an AGN must be related by accretion, the wide scatter in radiative output observed for a given jet power, and vice versa, suggest that there must be an intervening mechanism mediating between the two (see e.g. Mingo et al 2014 MNRAS 440 269).



Left: WISE c/c diagram from Lake et al. (2012, AJ 143 7), illustrating the expected colours (from synthetic SEDs) for different sources.
Right: WISE c/c diagram for our selected sample, with qualitative classifications derived from the diagram on the left.



Left: Diagram from Mingo et al. (2014, MNRAS 440 269), illustrating the scatter in bolometric luminosity for a given jet power (and vice versa) in the 2Jy and 3CRR sources, and a sample of SDSS-selected QSOs.
Right: FIRST integrated flux versus WISE 12 micron magnitude for our selected sample. Sources where star formation is predominant (most of the "starburst" objects in the plot, as well as some of the "spiral" objects) appear to follow the SF radio/mid-IR correlation, which appears as a diagonal branch on the lower left of the plot. Sources where the AGN is dominant (the "AGN" and "elliptical" objects in the plot, as well as some "spiral" objects) show a wide range of radio fluxes for a given mid-IR magnitude, as expected from the diagram on the left, and appear as a cluster (elongated upwards) on the right of the plot.

Results and future work

In our preliminary results we observe clear trends in the AGN radio/X-ray, radio/mid-IR and mid-IR/X-ray correlations. We observe similar results for the expected SF correlations, allowing us to disentangle both contributions for different populations in our sample.

We also observe the expected scatter in the jet/radiative output that clearly points towards a mediating mechanism that regulates the jet, and we are able to identify a group of X-ray and mid-IR faint, radio-bright sources which are most likely LINER-like (ADAF).

Our next steps involve the combination of FIRST and NVSS to maximise the number of sources in the sample, for which we will also collapse individual FIRST objects that are components of a larger source. We will implement statistical completeness and reliability cuts to deal with multiple matches and contaminants.

We will then cross-match the resulting sample with SDSS, to obtain optical classifications, redshifts, and black hole masses for the largest possible number of sources. This will allow us to estimate bolometric luminosities across the entire sample, and determine any systematics. We also aim to add SUMSS radio data to include sources from the Southern hemisphere to the sample.

The sample

The ARCHES project (http://www.arches-fp7.eu/) is an EU/FP7 collaboration between five institutions (University of Leicester, Universidad de Cantabria, Universite de Strasbourg, Instituto Nacional de Tecnica Aeroespacial, and Leibniz Institut für Astrophysik Potsdam). ARCHES aims to produce well-characterised multi-wavelength data for large samples of sources drawn from the 3XMM serendipitous source catalogue.

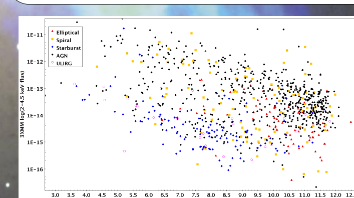
In this context, we have selected a sample that combines radio (FIRST/NVSS), mid-IR (WISE) and X-rays (3XMM), to characterise a large sample (~1000 sources) of radio-loud AGN and star forming galaxies.

The initial cross-correlation was established using the 3XMM coordinates as reference, matching WISE sources within a 5" radius, and FIRST sources within 15". On an initial approach, all dubious or multiple matches were removed. We also excluded sources at low Galactic declination (BII<20) and those that looked extended in X-rays, to avoid nearby galaxies and clusters. Additional quality constraints were imposed for 3XMM (DET_ML>10), WISE (S/N>5 for the first three bands) and FIRST (sidelobe probability <0.1)

The presence of radio emission allows us to cleanly select both AGN and star forming objects, discriminating against the far more numerous, "passive" galaxies. We are selecting fainter AGN where the host colours dominate in the c/c WISE plot, and the fainter, soft X-ray emission might not pass the luminosity and hardness ratio cuts commonly required in X-ray selected samples.

Star formation also produces radio emission, albeit at a much fainter level. This allows us to select a population of nearby star forming galaxies, and explore the correlations for both star formation and AGN activity in the three selected bands.

We use the mid-IR data allow us to best constrain the AGN luminosity or SF rate, and the X-ray selection allows us to probe deeper, and with less bias on terms of line classification, than an optically selected sample would do, while simultaneously allowing us to study the soft X-ray/ radio core luminosity correlation.



3XMM 2-4.5 keV flux versus WISE 12 micron magnitude for our selected sample. AGN-dominated and SF-dominated sources appear on two clearly distinct branches (top for AG, bottom for SF, as expected from their lower expected flux in this X-ray band). Objects with spiral galaxy mid-IR colours (probably radio-loud Seyferts) bridge the gap between both populations. Most of the objects with elliptical colours are systematically fainter in both bands; these objects are likely to harbour LINER-like (ADAF) sources.

X-rays in Seyfert 2 Galaxies: Disentangling Nuclear Activity and Star Formation

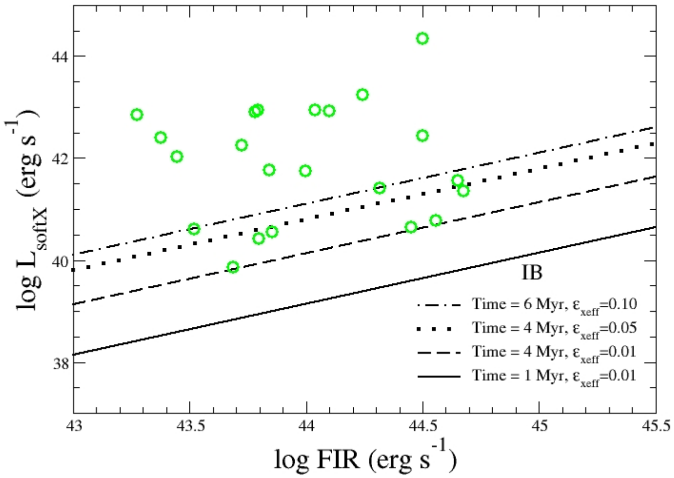
Héctor Otí-Floranes & Elena Jiménez-Bailón
Instituto de Astronomía (UNAM), Ensenada, Mexico

Instituto de Astronomía

A7

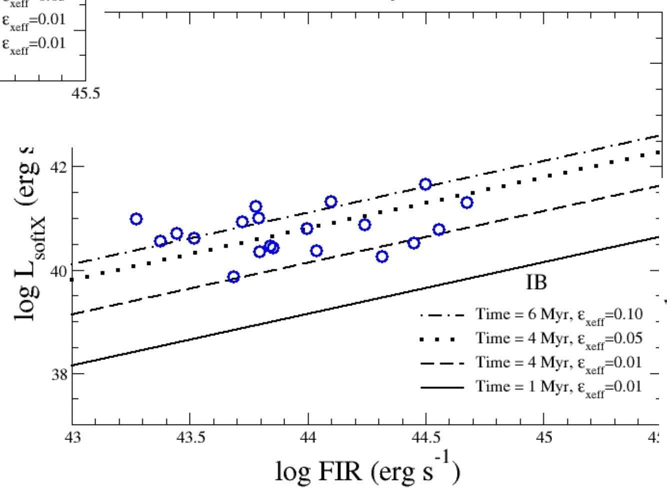
Star formation — *AGN*

ABS_MW * (**HP** + **PL** + ... + ABS * (**PL** + **Fe_LINE** +...))

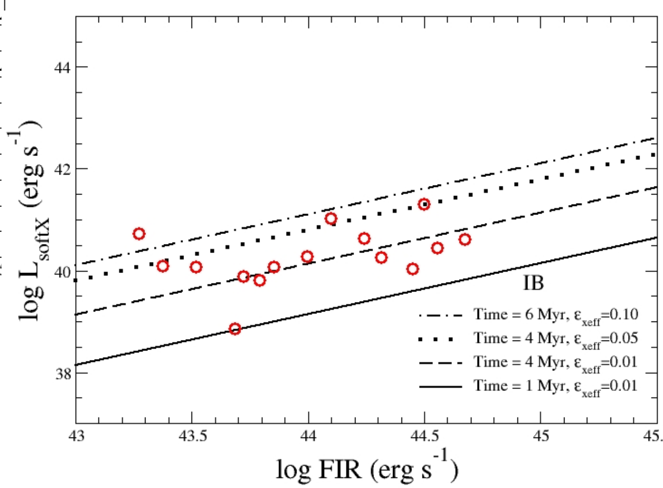


QUESTION: *Can we recover the star formation activity in Seyfert 2 galaxies through X-ray spectral analysis?*

ABS_MW * (**HP** + **PL** + ...)



ABS_MW * (**HP** + ...)



ACTUALLY, WE CAN!

… both in soft and hard X-rays!

Fireworks in the early Universe (A8)

WHAT/WHY?

Infrared SEDs: quantify SFR.

WHICH?

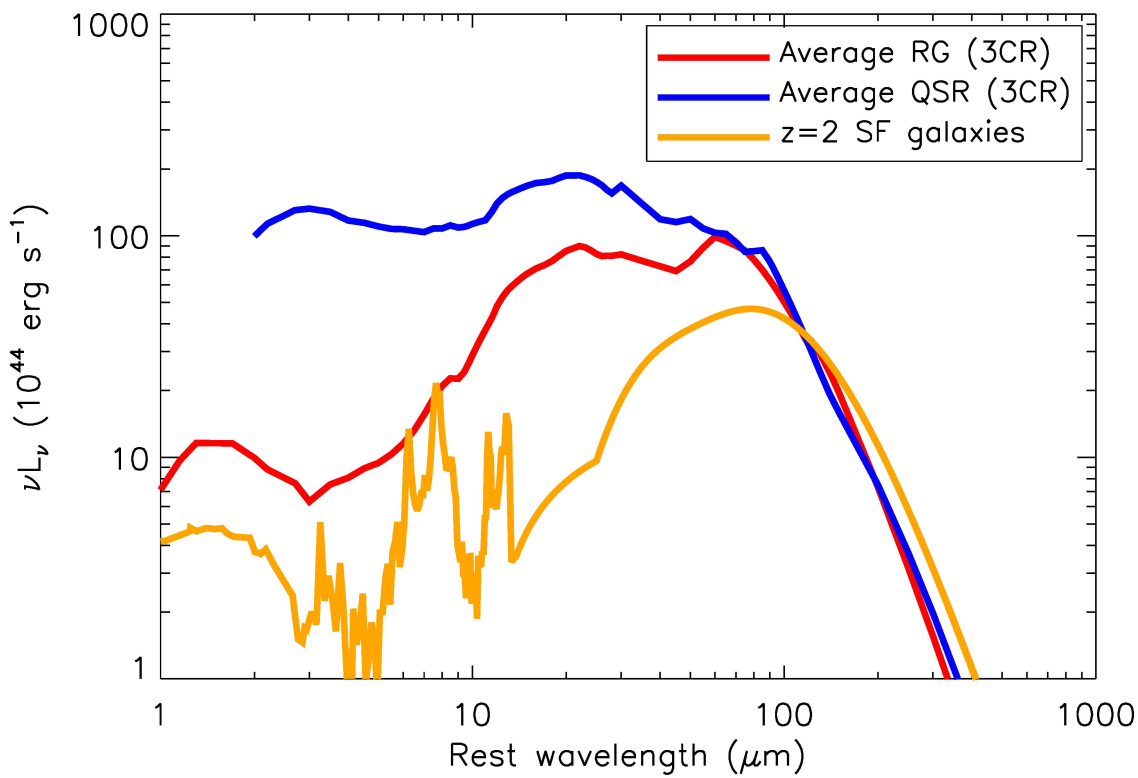
1 < *z* < 2.5 3CR RGs and QSRs.

RESULTS:

Huge SFRs --> yes

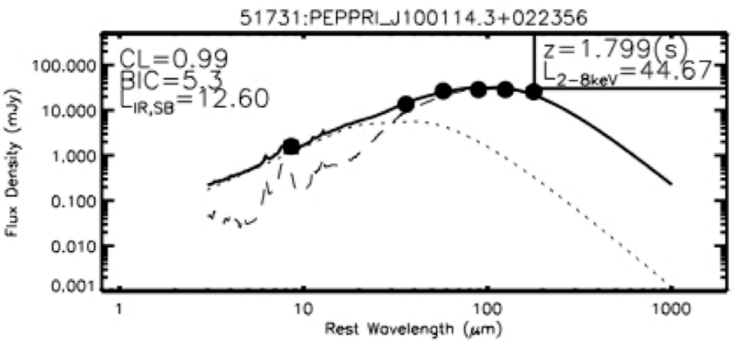
Quenching --> no

Unification --> yes.

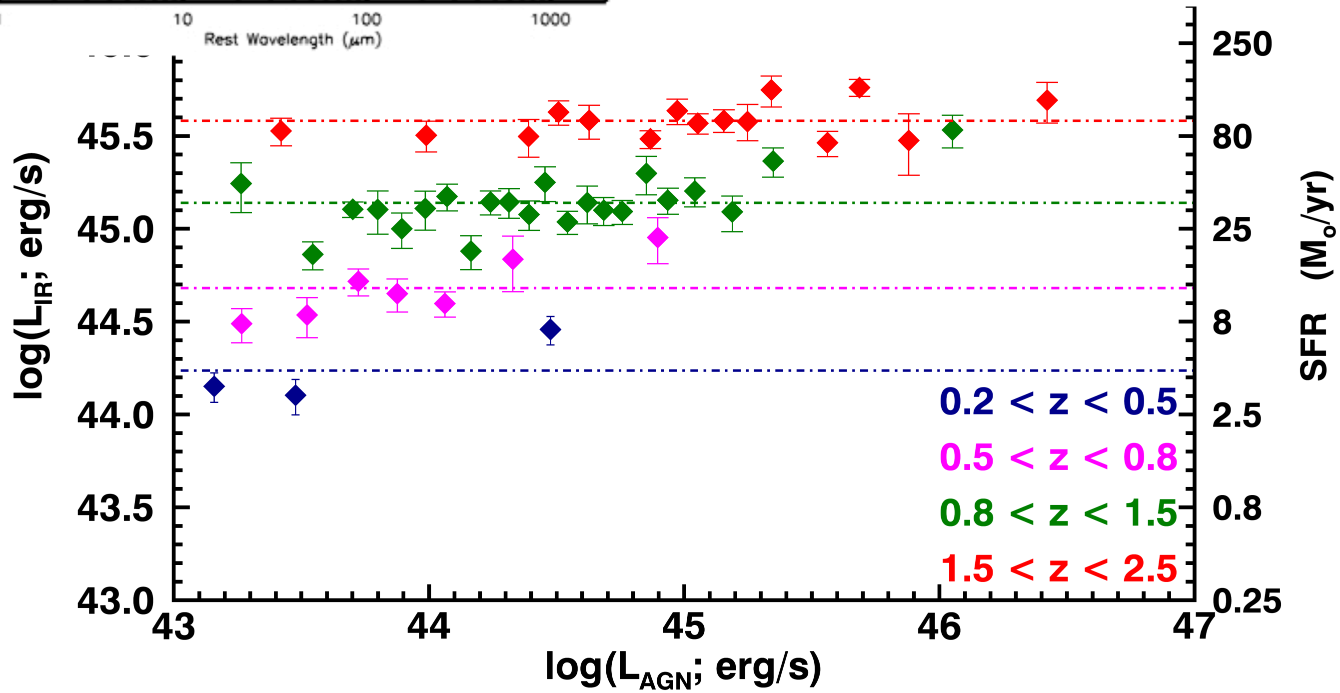


Pece Podigachoski

Constraining the SFRs of galaxies hosting an AGN: Is SFR dependent on AGN power?



Individual SED fitting to 8 - 500μm photometry for **2182 X-ray detected AGN**



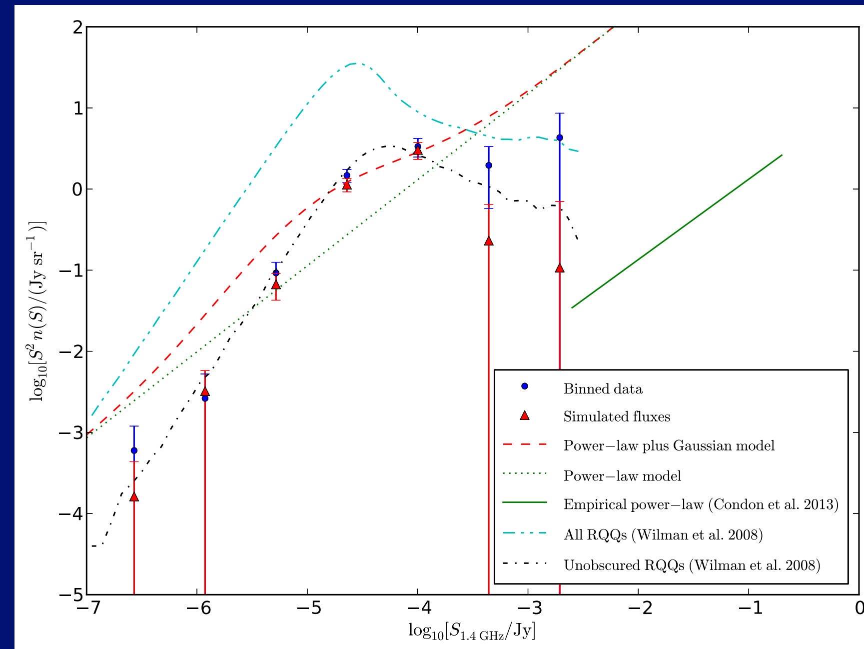
Flora Stanley, C.M. Harrison, D.M. Alexander

A10

Radio-Quiet Quasars in the VIDEO Survey: Evidence for AGN-powered radio emission below 1 mJy

Sarah V. White[1*], Matt J. Jarvis[1,2], Boris Häußler[1,3], Natasha Maddox[4], Paul C. Hewett[5]

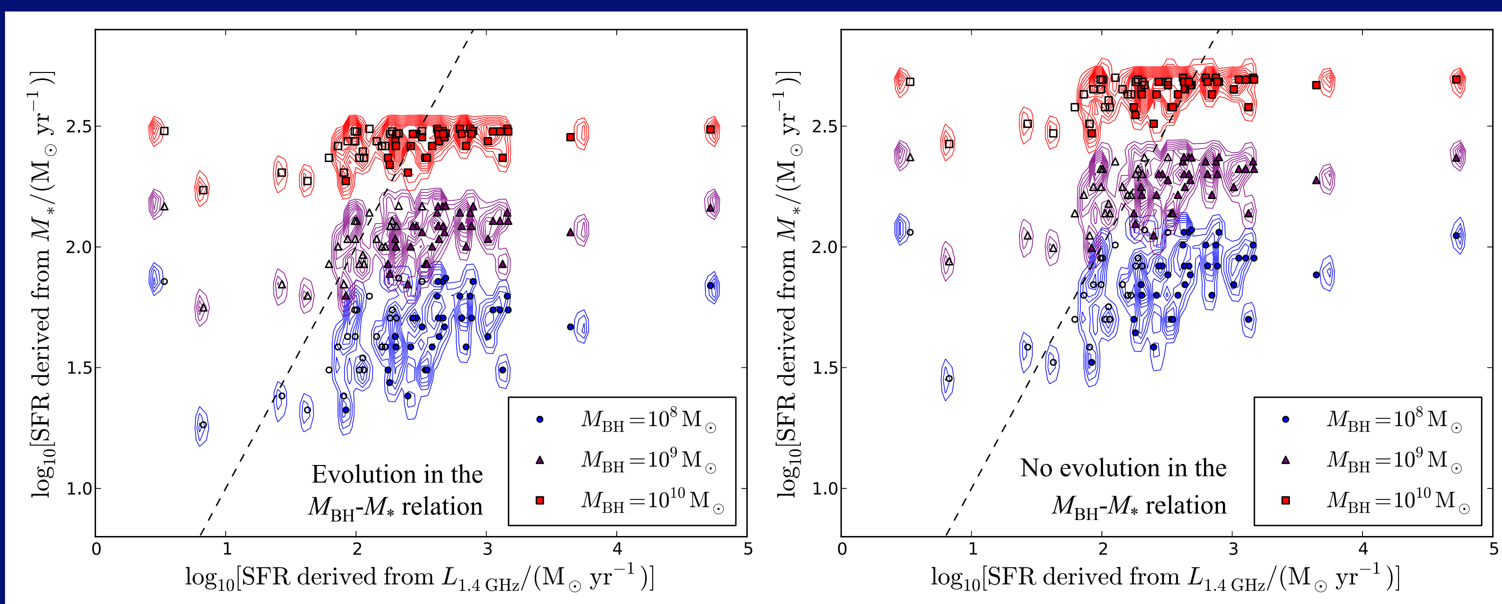
[1] University of Oxford, [2] University of Western Cape, [3] University of Hertfordshire, [4] University of Cape Town, [5] Institute of Astronomy, Cambridge



Emerging population ➔ Kimball et al. 2011 and Condon et al. 2013 (SF origin)

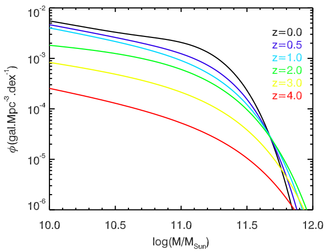
Our number counts agree with Wilman et al. 2008 (AGN origin)

2 SFR estimates ➔ BH accretion is still significant



Modelling the UV and IR galaxy properties across cosmic times

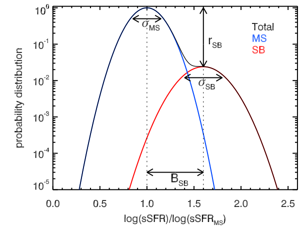
Mass functions



Ilbert et al. 2013

⊗

sSFR distribution



Sargent et al. 2012

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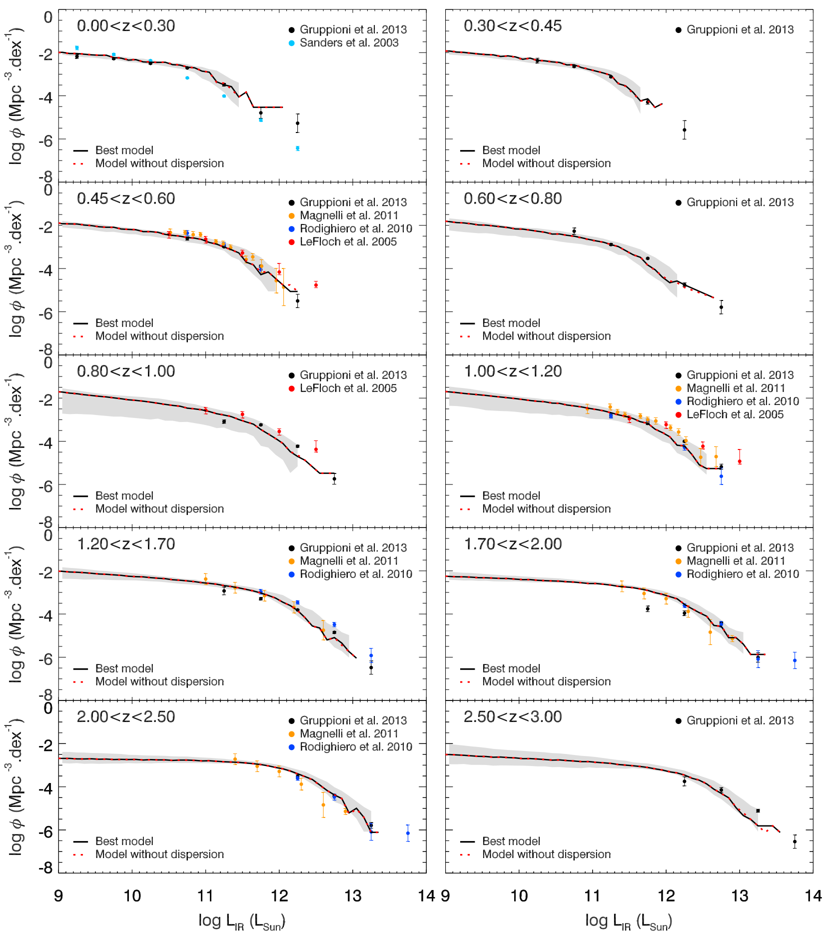
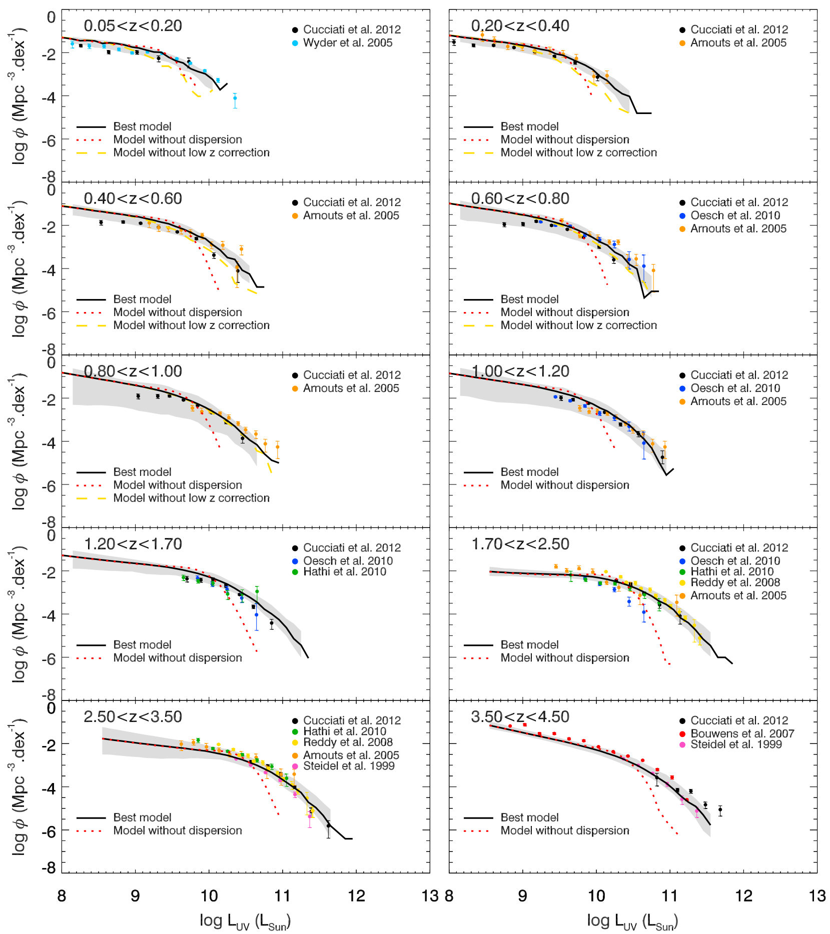
Attenuation relation

IRX = f(M$_{star}$)

Heinis et al.2013



IR luminosity function



UV luminosity function

Bernhard et al. 2014

2SFM model: Béthermin et al. 2012 & Sargent et al. 2012