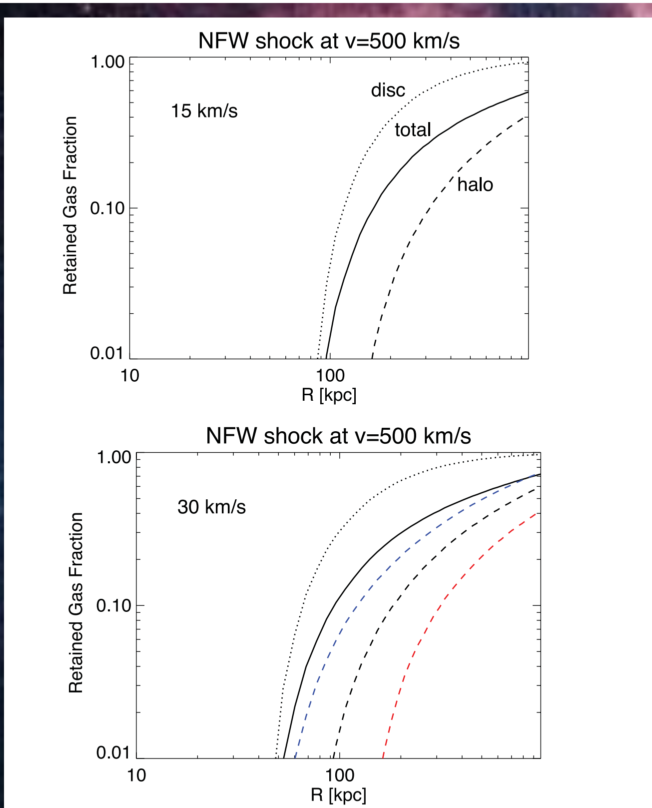
AGN VS. STAR FORMATION

POSTER SESSION 3
IMPACT

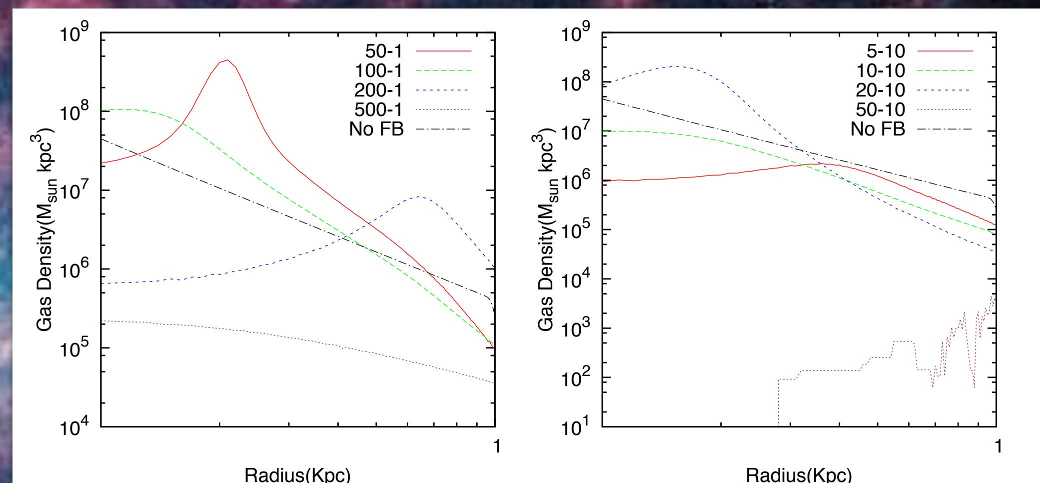
High Resolution Simulations of SN Feedback in Dwarf Spheroidals

Claire Cashmore (University of Leicester)
Mark Wilkinson & Sergei Nayakshin

Combine SN and external AGN feedback to remove all gas/produce the unique SFHs of present day local group dSphs.



Nayakshin & Wilkinson 2013



Gas density profiles of the dwarf galaxies after 500Myr. The left plots show single SN feedback events with 10^{51} erg, the right plot shows the combined events, where each event corresponds to 10^{52}erg, the numbers of events are described in the key.

Mass versus *environment* quenching in the SFR-M_* plane

Authors: L. Morselli, P. Popesso and the SF[2] team
laura.morselli@tum.de

Excellence Cluster Universe

The topic

One of the most fundamental correlations between the properties of galaxies in the local Universe is the so-called morphology-density relation: late type star forming galaxies favor low density regimes, while the cores of massive galaxy clusters are galaxy graveyards full of massive spheroidals dominated by old stellar populations. Much of the current debate centers on whether the relation arises early on during the formation of the object, or whether it is caused by environment-driven evolution. The most accredited models of galaxy formation advocate **Active Galactic Nuclei** (AGN) **feedback** as the main mechanism to drive the gas away and stop the growth of the galaxy and its central black hole (BH). Alternative candidates for quenching are those processes related to the environment, like, e.g. **ram pressure stripping** and **gas starvation**. Whatever is the process responsible of the SF quenching, it should leave a distinctive imprint in the distribution of galaxies in the SFR–stellar mass plane as a function of central BH mass and the environment, respectively. This project aims at studying these distributions to understand which of mass or environment quenching is more likely driving the evolution of a galaxy SF activity.

The central BH and host halo mass distributions in the SFR-M_* plane

The aim of this project is to test if the loss of gas supply that feed the galaxy central BH and the SF activity is due to the environment rather than the BH feedback itself. For this purpose, **we test if galaxies of a given stellar mass accrete at a different rate with respect to their central BH as a function of their environment**. For this purpose we need a reliable estimate of the galactic environment and of the central BH mass. The former is provided by the total mass of the dark matter host halo where the galaxies live. The latter is obtained by using the M_{BH}-σ relation. Both information are simultaneously available for the DR7 of the SDSS spectroscopic galaxy sample. Indeed Yang et al. (2011) provide an optically selected galaxy group and cluster sample together with an estimate of the host halo mass for a complete spectroscopic subsample of DR7 SDSS galaxies. Galaxy SFR, M* and σ are extracted from the MPA-JHU catalogs (Brinchmann et al. 2004). For the BH mass estimate we consider only galaxies with reliable velocity dispersion in the range 70-420 km/s and with spectra with <S/N> > 10. In order to reduce the effect of the disk rotation in the velocity dispersion estimate we select only galaxies with $r_e > r_{fib,SDSS}$ (r_e from the morphology catalog of Simard et al. 2011). The velocity dispersion is converted into the BH mass by using the Beifiori et al. (2012) scaling relation.

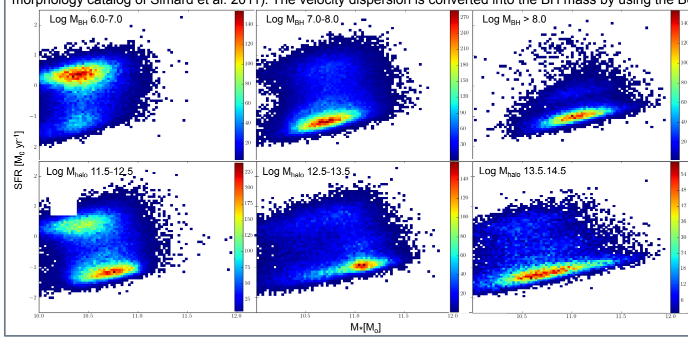


Figure 1 shows the distribution of galaxies in the SFR-M_* plane as a function of the M_{BH} (upper panel) and M_{halo} (lower panels). The most massive BHs are located in quiescent galaxies, while the star forming galaxy Main Sequence (MS, Elbaz et al. 2007) is dominated by galaxies hosting low mass central BHs. At the same time quiescent galaxies inhabit more massive halos at any stellar mass. To understand the relative importance of mass or environment quenching it is necessary to break this degeneracy.

Fig.1 : distribution of galaxies in the SFR – M_* plane. The upper panels show galaxies in three different bins of M_{BH}, while the lower panels show galaxies in three different bins of M_{halo}. The color bar in each panels indicate the number counts of galaxies.

In order to break the degeneracy between M_{BH} -M_{halo}-M_* in the SFR-M_* plane, we analyze the relation between the BH mass-stellar mass ratio M_{BH}/M_* as a function of the M_{halo} for passive and MS galaxies, respectively, to take into account the morphology dependence. *If M_{BH}/M_* does not show any dependence on the halo mass, this would imply that the galaxy stellar mass accretion co-evolve with the BH accretion. If M_{BH}/M_* depends on the environment, it means that galaxies accrete stellar mass, through SF activity or merging, with a different rate with respect to their central BH as a function of their environment.*

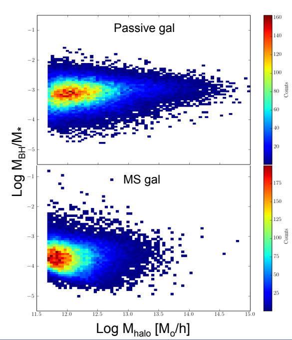


Fig.2 : M_{BH}/M_* ratio as a function of the halo mass. The upper panel refers to passive central galaxies, the lower one to MS central galaxies. A Spearman test confirms a positive correlation for the passive galaxies and a strong anti-correlation for the MS galaxies.

The analysis of the M_{BH}/M_{stell} ratio as a function of the halo mass for satellite and central galaxies shows that the positive correlation observed among the central passive galaxies holds for passive satellite galaxies. *This would imply that passive galaxies in more massive halos stop accreting mass even if their central BH keep on accreting*. Satellite SF galaxies are characterized by an opposite trend with respect to passive galaxies: in more massive halos galaxies accrete mass even if the central BH stop accreting. The trend is less clear for central SF galaxies.

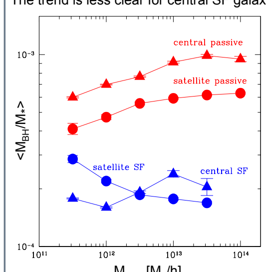


Fig.3 : mean M_{BH}/M_{stell} ratio as a function if the halo mass per passive (red) and MS (blue) central (triangles) and satellite (filled points) galaxy, respectively. MS galaxies are mainly spirals, thus the M_{BH}/M_{stell} ratio is lower than for elliptical galaxies.

References: *Beifiori, A. et al. 2012, MNRAS, 419, 2497 ; Brinchmann, J. et al. 2004, MNRAS, 351, 1151; Elbaz, D., Daddi, E., Le Borgne, D., et al. 2007, A&A, 468, 33; Dressler A., 1980, ApJ, 236, 351; Simard, L. et al. 2011, ApJS, 196, 11; Yang, X. et al. 2012 ApJ 752 41.*

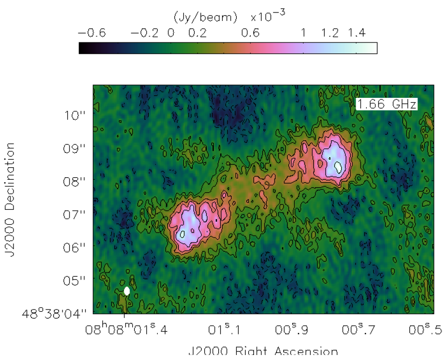
High resolution observations of SDSS J080800.99+483807.7 in the optical and radio domain

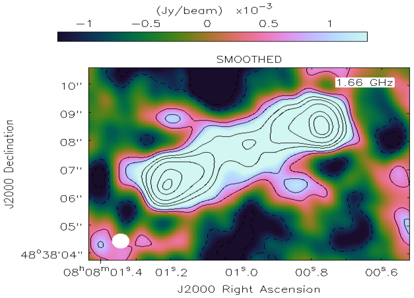
A possible example of jet-triggered star formation

By

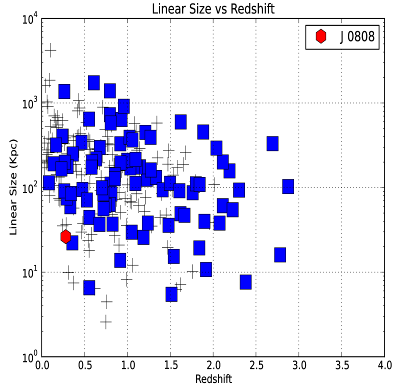
Yasir Ezzuldeen Rashed

Radio Image Of J0808

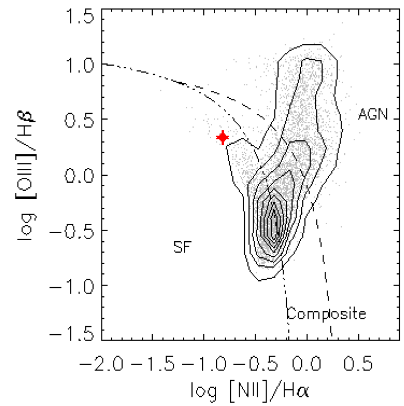




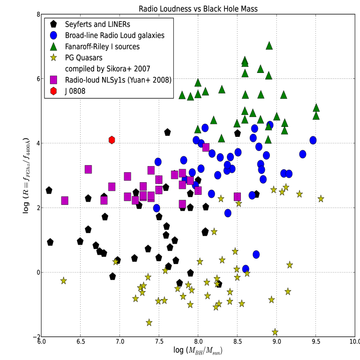
Linear size vs. Redshift



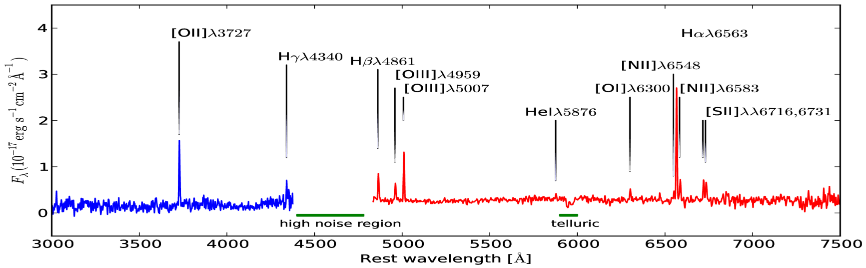
Diagnostic diagrams



Rido loudness vs. Black hole mass



Optical spectrum J0808



Conclusion

1. J0808 is a compact radio source with X-shaped signature.

2. J0808 is located in a low metallicity. This suggests either an early evolutionary stage or an overall low mass of the host galaxy. Additionally, the optical and infrared images of the host suggest that it is a compact early-type galaxy.

3. The widths of forbidden lines indicate a black hole mass of $\sim 10^{6.9}$ M⊙.

4. The radio data as well as the ratios of the emission lines show indications of strong star-forming activity. Furthermore, we estimate the SFR of J0808 via [OII] to be ~ 20 M⊙ yr−1 .

Durham Workshop
Yasir Ezzuldeen Rashed
Universität zu Köln
28/07/2014 to 01/08/2014

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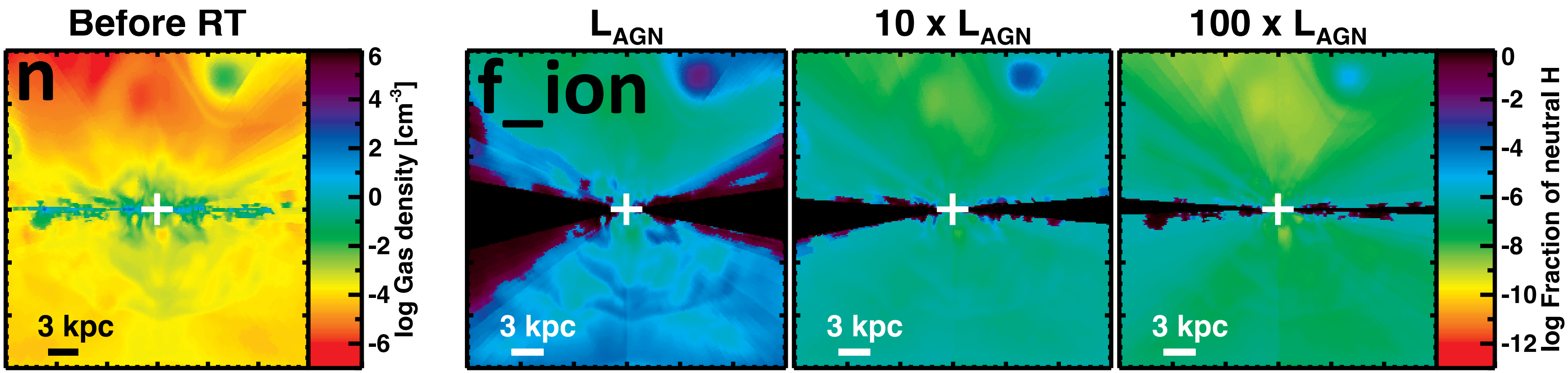
Thermal and radiative AGN feedback in high-z galaxies…

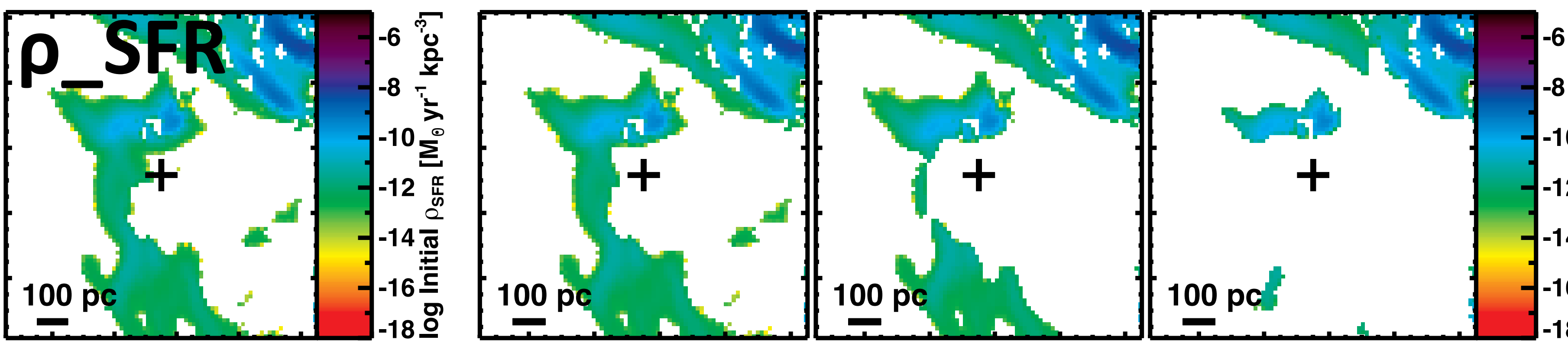


… mainly affect diffuse gas

L_AGN = 10^44.5 erg/s

Edge-on view

Face-on view – zoom in



… and have very little impact on the star-forming phase of the ISM.

SFR Reduction < 4%

Diffuse and extended star-forming regions around the AGN are suppressed, **but major contributors to the SFR are left unaffected.**

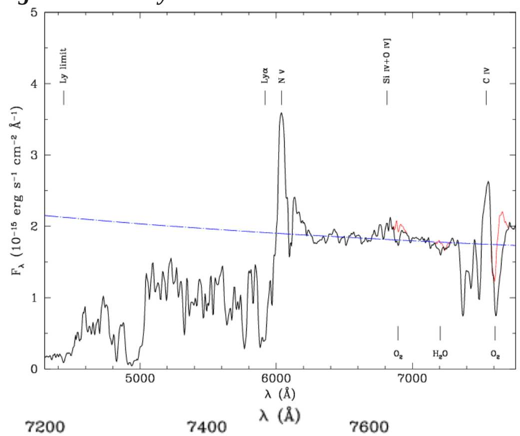
Orianne Roos, with S. Juneau, F. Bournaud and J. Gabor

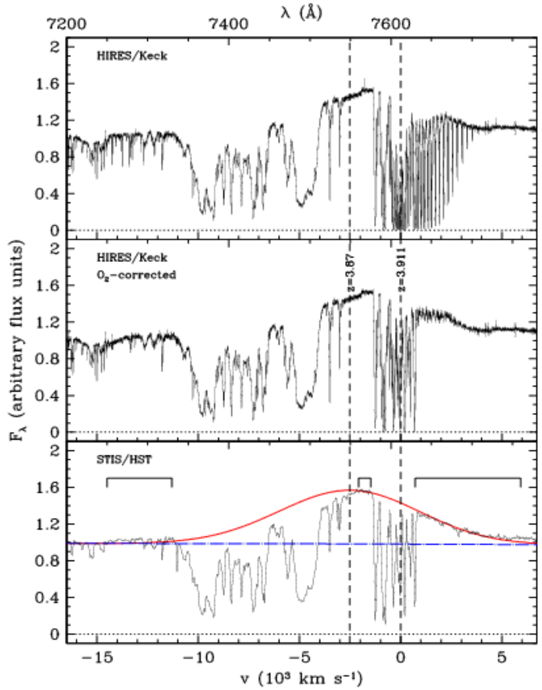
see **Roos et al. 2014, arXiv:1405.7971**

Absorption variability in the outflowing gas of the BAL quasar APM 08279+5255

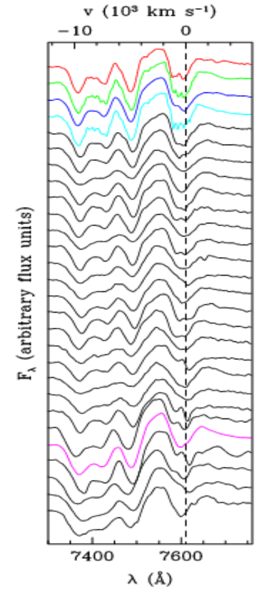
F.G. Saturni, D. Trevese, F. Vagnetti, M. Perna

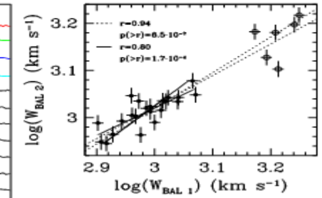
- ***We studied EW variability with time of the C IV BAL over 28 spectroscopic & 49 photometric epochs. Data collected at Asiago Observatory + literature.***

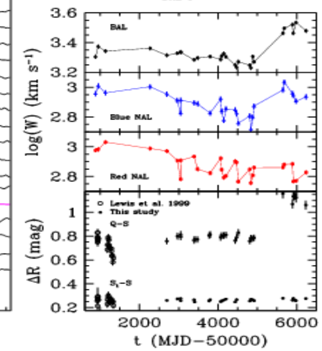


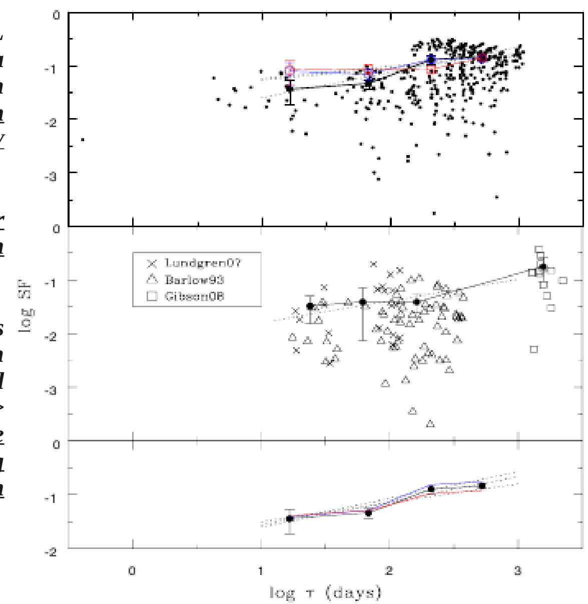


- ***First "monitoring" of single-object BAL variability (14 yr obs-frame => 2.85 yr rest-frame).***
- ***Spectra smoothed to same resolution and normalised to pseudo-continuum.***
- ***BAL region decomposed in 2 BAL troughs + 2 NAL systems.***
- ***Absorption shape extremely stable in time (σ_λ ~ 3 Å for both components) => wind structure remains stable.***
- ***Variations in EW for BAL troughs highly correlated.***
- ***Strong variation in BAL EW detected together with a major R-band flux variation => BAL variability driven by variations in the C IV photoionising continuum.***
- ***NAL unaffected => lower limit on NAL electron density of ~ 10^4 cm^{-3}.***
- ***SF analysis shows that this variability is similar to both ensemble BAL and typical QSO flux variability => photoionisation may be the most common driving mechanism, rather than changes in wind structure.***









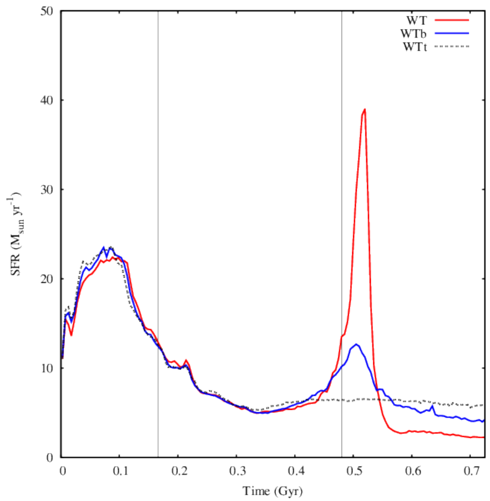
Influence of real vs numerical bulge mass on SFRs during major mergers

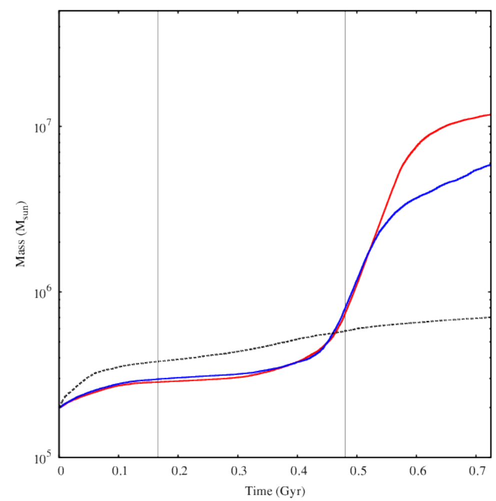
James Wurster & Rob Thacker

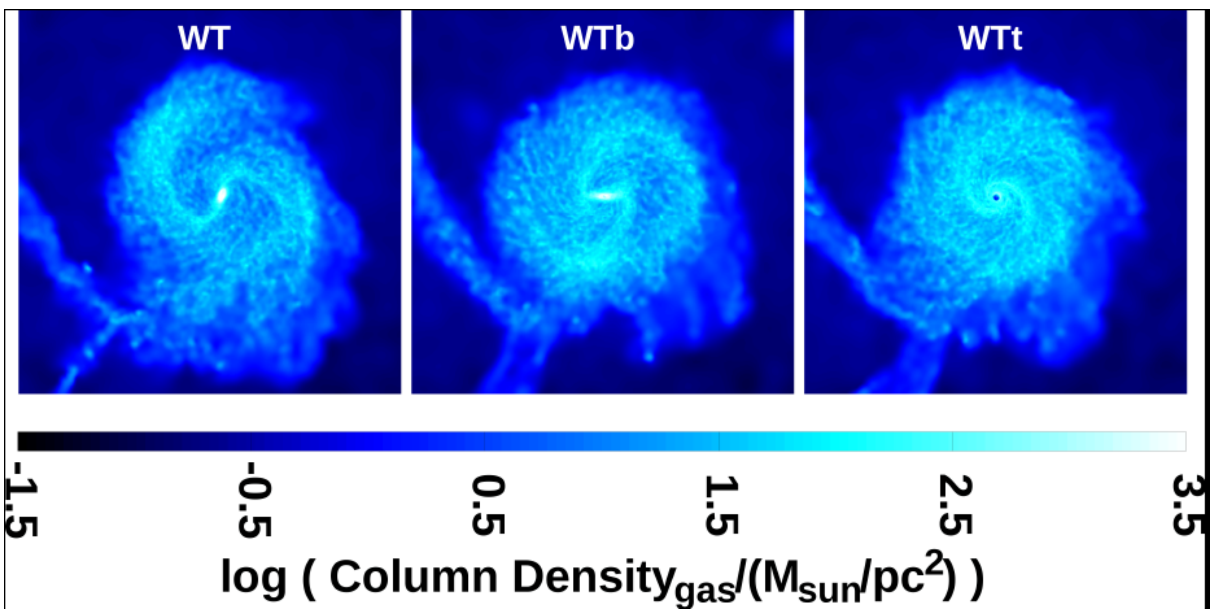
MONASH University

MoCA Monash Centre for Astrophysics

SAINT MARY'S UNIVERSITY SINCE 1802







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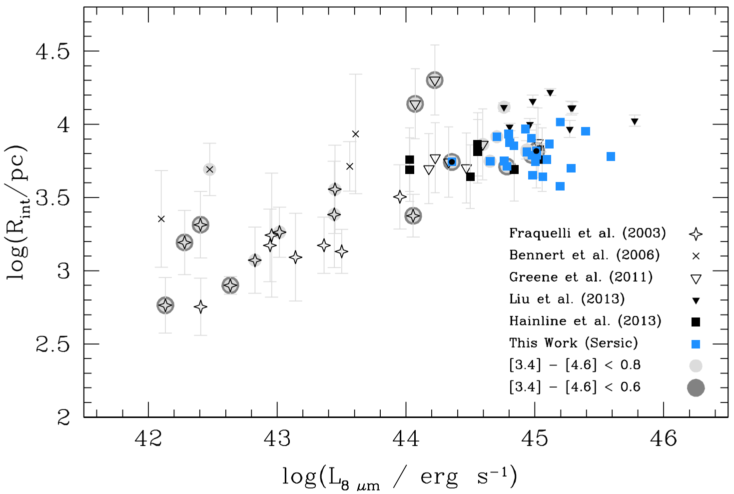
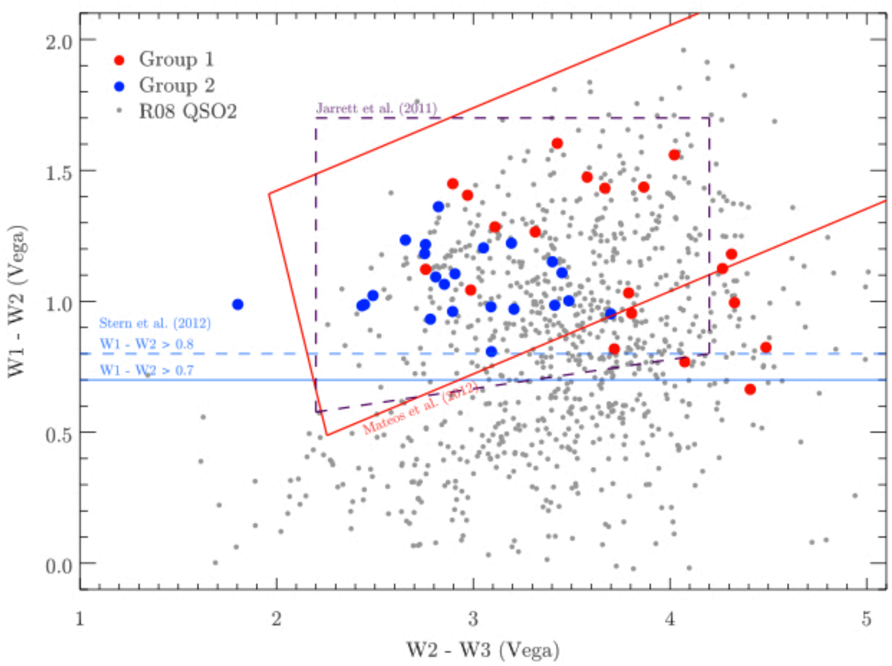


LET' S TALK ABOUT:

KPC-SCALE QUASAR NARROW-LINE REGIONS

MID-INFRARED SELECTED AGN



INTERESTED IN TALKING?

I' LL BE AT POSTER