The AGN feedback process at work: does it suppress the star formation rate in local quasars?

Barbara Balmaverde

Universitá di Firenze
Dipartimento di Fisica e Astronomia

balmaverd@arcetri.inaf.it

Coll: **Alessandro Marconi**

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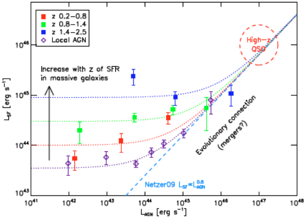
Aim of the work:

Many theoretical models predict that AGN powerful outflows (commonly observed) are able to sweep away the gas and stop the star formation in the host galaxy.
From an observational point of view, there is strong connection between SFR and AGN luminosity.



Netzer et al. 2009; Shao et al. 2010 (see also Lutz et al.2010, Mullaney et al. 2012, Rovilos et al. 2012, Page et al. 2012, Harrison et al. 2012, Rosario et al. 2012)

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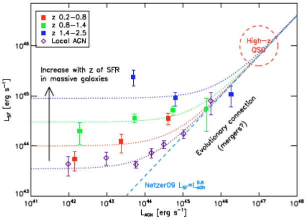

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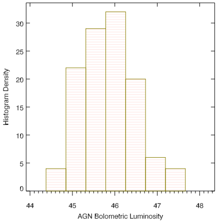
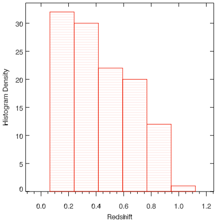
- **Our aim is to explore the connection (if there is) between ionized gas outflows (probed by disturbed [OIII] line profile) and the star formation rate of the galaxies in a sample of local quasars observed by Herschel.**

The sample

THE SAMPLE: 226 quasars luminous unobscured (type 1) quasars from the qso catalogues of SDSS7 and SDSS10 with $z < 1.0$ observed in infrared by HERSCHEL.



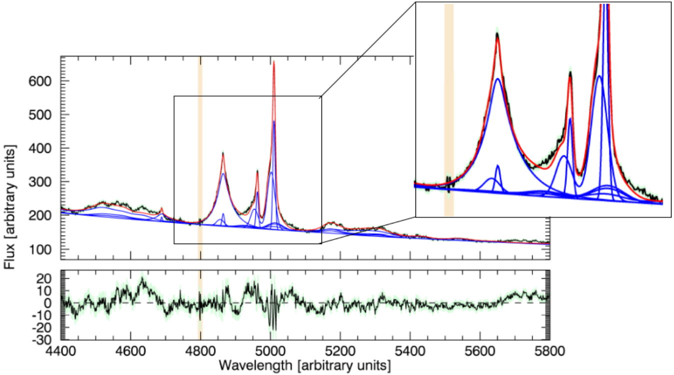
AGN bolometric luminosity



Redshift

Fit to the optical lines

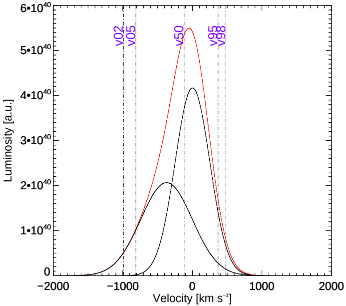
The [OIII] line is a good diagnostic of outflows at large scale.
The [OIII] line generally reveals complex motion in the NLR (e.g. Broad blue wings...)



Fit to the optical lines

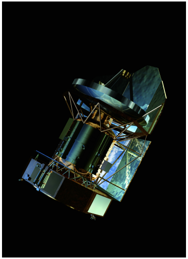
We fit the line with a broad and a narrow component, but to characterize the outflow we adopt a non parametric definition for the velocity. For example:

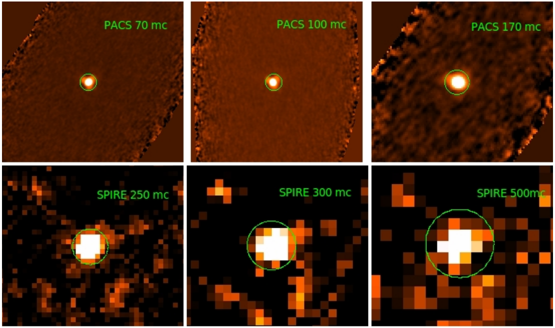
- **Broad Offset** $\mathrm{velocity} = \frac{v05+v95}{2}$ **(e.g. Harrison et al.2014)**
- **Max projected** $\mathrm{velocity} = \mathrm{vel98} - \mathrm{vel02}$
- **Velocity Reference: the [OII] emission line trace the quiet gas on large scale.**



QSO infrared luminosities

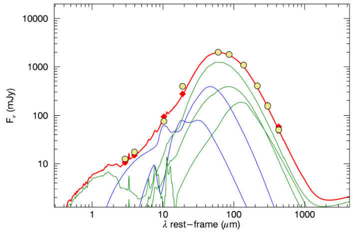
Herschel observe in the optimal wavelength range to measure the “cold” emission of the dust heated by young stars.





The star formation rate

Disantangle the contribution from the AGN and from star-forming regions is not easy, expecially for powerful Type 1 quasars. We rely on clumpy torus templates by Nenkova et al. 2008 and starburst templates by Charlot&Elbaz 2001.



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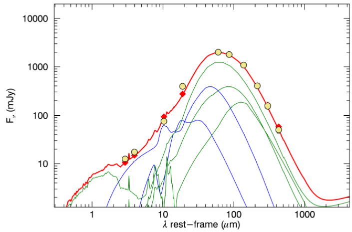

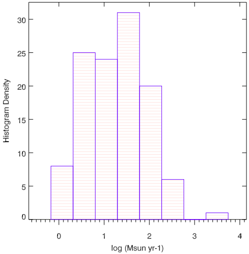

$$SFR_{\rm FIR}(M_\odot\, yr^{-1}) = (4.5\times 10^{-44})\, L_{\rm FIR}\, erg\, s^{-1}$$

Kennicutt et al. 1998

What we found?

We divided our sample in two groups: the first one is composed by star-burst dominated objects, for which the starburst luminosity component dominates the total infrared (8-1000 μm) luminosity ($L_{SB}/L_{tot} > 0.5$) and the second group is composed by AGN dominated objects ($L_{SB}/L_{tot} < 0.5$).

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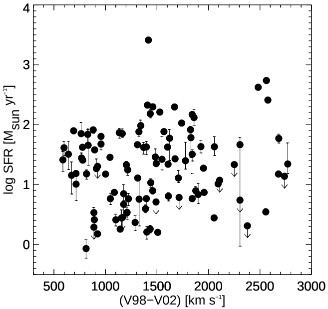

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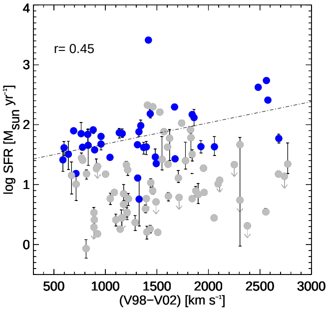

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- **Positive and negative feedback effects are mixed.**
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