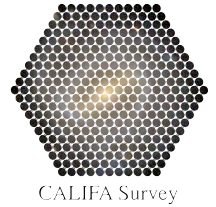


LINER-like emission in galaxies

not AGN powered

Robert Singh¹, Glenn van de Ven¹, Knud Jahnke¹ & the CALIFA Collaboration

¹Max Planck Institute for Astronomy - Heidelberg



Motivation

Low Ionisation Nuclear Emission Line galaxies (LINERs), first defined by Heckman in 1980, constitute a special class of galaxies and are often referred to as low-luminosity AGNs. Their spectra exhibit the defining strong low-ionisation line emission in their centres which immediately ruled out the possibility of being powered by young hot stars from ongoing star-formation.

As the source for ionisation low-luminosity AGNs have been widely accepted, with a potential contribution by shocks.

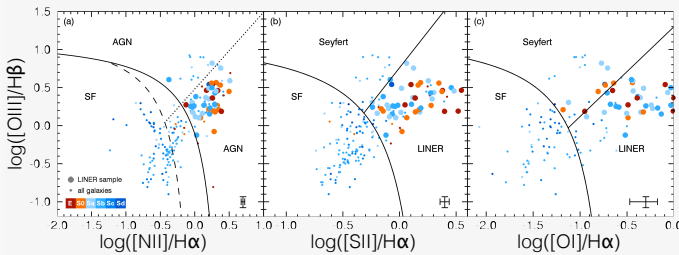
We investigate whether this picture is actually true. LINERs not driven by AGN would simplify the AGN zoo and allow a much better modelling of physics and mechanisms involved in accretion onto black holes.

LINERs in the CALIFA survey

We present a study of 48 galaxies across a range of morphological types, all hosting LINER-like emission. The data come from the CALIFA survey (Sánchez et al. 2012) and comprise spatially-resolved spectra, allowing to map the emission line ratios of the ionised gas.

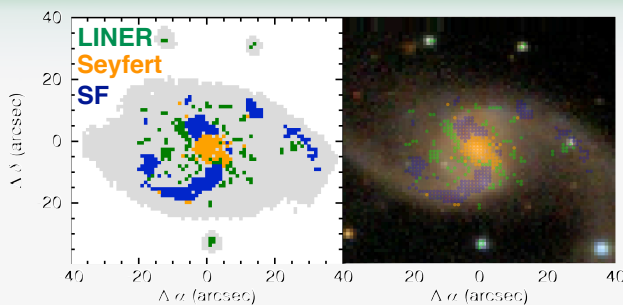
The CALIFA survey is the first ongoing integral-field spectroscopic survey of a diameter selected ($45'' < D_{25} < 80''$) sample of up to 600 galaxies in the local universe ($0.005 < z < 0.03$) of all Hubble types.

We find that LINER-like emission in most objects (despite „nuclear“ in its name) covers all regions of the galaxies, aside from those where star-formation dominates the emission, with surface brightness profiles that are incompatible with ionisation by a central point source.



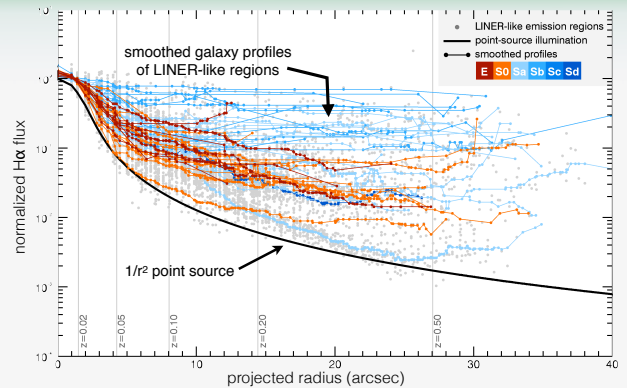
Selection of the 48 LINER galaxies from the first 257 object CALIFA sample. Galaxies are colour-coded by morphological type. Small dots represent non-LINER galaxies in CALIFA.

LINER-like emission regions

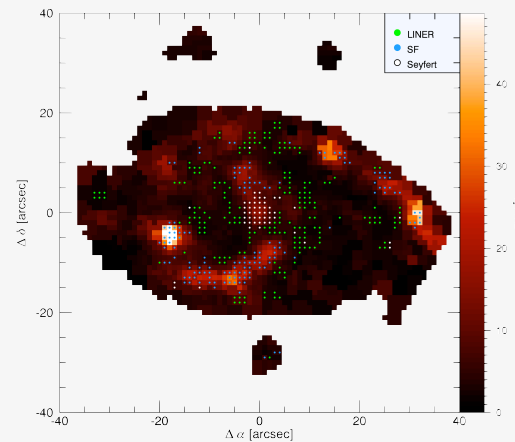


BPT map with an overlay of these regions onto the colour-composite image from the SDSS, reveals how LINER-like emission is spatially extended except when dominated by Seyfert-like emission in the centre or by star-formation-like emission in spiral arms or the disk.

Results



The coloured curves are normalised and smoothed radial surface brightness profiles of the H α emission line flux from the LINER-like emission regions of our 48 LINER galaxies, compared to a PSF convolved $1/r^2$ point-source illumination profile in black. Beyond the inner few arcsec a significant excess of up to two orders of magnitude above the expectation from point-source ionisation is present for all LINER galaxies. The vertical grey lines illustrate the radial extent covered by a putative 3"-diameter SDSS aperture when an average CALIFA galaxy, would be placed at the indicated higher redshifts.



Example map of one Seyfert galaxy, with extended LINER emission between the SF dominated spiral arms, showing the precise spatial correlation of LINER spaxels with low H α equivalent width and spaxels of star-formation with a higher equivalent width.

Conclusion

Instead of low-luminosity AGN the omnipresent hot post-AGB stars are the best explanation for powering extended LINER-like emission. Consequences: **(1)** LINER signatures are not a good tool to finding AGN. **(2)** Every galaxy should have LINER-like signatures, unless the post-AGB radiation field is locally overpowered by either UV radiation from young hot stars or AGN. **(3)** „LINERs“ are not a class defined by a property (line ratios), but the absence of ongoing star formation and strong AGN.

Contact

Robert Singh
Max Planck Institute for Astronomy

Web: www.mpa.de/~singh
Mail: singh@mpia.de

