How to grow a black hole ...

Galactic mergers

AGN in a merger-driven evolution scheme

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Max-Planck-Institut

für Radioastronomie

...(handwavy) galaxy evolution



...(handwavy) galaxy evolution



AGN and mergers

(...the background!)

Observational evidence connecting AGN to mergers (Hutching&Campbell83, Sanders+88, Surace98, Canalizo&Stockton01, Karouzos+10, etc.)



~30% of flat-spectrum radio-loud AGN linked to mergers (z<0.4)

AGN and their environment

(...the motivation!)

Ansatz:

If AGN activity is triggered by mergers, it is statistically expected that active galaxies are found in denser environments than their non-active counterparts

Contradictory results...

(Zirbel97, Miller+03, Best04, Kauffmann+04, Wake+04, Serber+06, Georgakakis+07, Strand+08, Tasse+08, Lee+09, Tasse+11, etc.)





Close environment of AGN

(...or, preliminary results!)

Deep Extragalactic Observations (PI: Matt Jarvis)

VISTA

0.1L* out to z~1 1.0L* out to z~4

Three fields: **Elais-S1, XMM-LSS, ECDF-S** Five filters: **Z, Y, J, H,** and **K** (0.84-2.5 μm) Surface covered: **12 deg**²

Estimated magnitude limits: **23.5** (K_s band) – **25.7** (Z band) Nominal instrument resolution: **0.34** arcseconds

VISTA-VIDEO (XMM-LSS field, tile 3)

Overlapping region with CFHTLS optical survey (u, g, r, i)

422798 sources 71% with photo-z Area: 1.004 deg²

Ancillary data: XMM-Newton, Spitzer (SWIRE), VLA (1.4GHz), GMRT (0.96GHz)





Statistics...

Surface number density:





$$\Sigma_n = \frac{N(r_n)}{\pi r_n^2}$$









In collaboration with Matt Jarvis and Dave Bonfield





Conclusions

• X-ray selected sources (AGN)

 \rightarrow Denser environments (~ 7 – 12 arcsec)

 \rightarrow No significant difference at smallest scales

mid-IR selected sources (24µm)

 \rightarrow Significantly denser environments at smallest scales

 \rightarrow Of the same order as X-ray sources at larger scales

mid-IR selected obscured AGN (Lacy+04)

 \rightarrow Most dense environments compared to all other populations

DO: photo-z (3D density), statistical tests, better control samples