• Background
• HATLAS-GAMA AGN
• Multi-stage fuelling
• AGN covering factor
activity vs stellar mass

see Heckman and Best 2014 review and refs therein

- $M_H \propto M^*$

- $\text{Prob(AGN)} \propto M^*$
activity vs star formation

see Heckman and Best 2014 review and refs therein

• activity linked to SF but...

• slow dependence
• clearer near the middle than globally
• better connected to recent SF rather than current SF
SF/activity vs dynamical disturbance

- interactions linked to SF
- but no additional link to activity
- ditto mergers

- only 10% of star formation linked to mergers
- most by "cosmic web" accretion
- likewise most activity driven by "secular" processes

see Heckman and Best 2014 review and refs therein
• Herschel ATLAS      FIR
   +GAMA/SDSS        spectra
   +UKIDSS/SDSS      phot

• z<0.38 7433 galaxies

GANDALF==> line fluxes, BPT classification

MagPhys ==>SED modelling
M*, age, SFR

Normal galaxies not LIRGs
FIR mixture of cirrus and SF

Mayo thesis
2560 em.line gals

2090 SF
normal range, not LIRGs

178 S1+S2
preferentially high SF
OIII dominated by AGN

234 LINER
preferentially weak SF
AGN preferentially in bigger gals
LINERS in older gals
LINERS in lower SF gals

black=all     blue=S12     red=LINER     green=S12+ highlum LINER
multi-stage fuelling
• 1Mpc → 10kpc       mergers/cosmic web accretion
• 10kpc → 100pc       bars, interactions, instabilities
• 100pc → 1pc         turbulence/radial shreds
• 1pc     → 10^{12}m   viscosity
• $1\text{Mpc} \rightarrow 10\text{kpc}$ mergers/cosmic web accretion
• $10\text{kpc} \rightarrow 100\text{pc}$ bars, interactions, instabilities
• $100\text{pc} \rightarrow 1\text{pc}$ turbulence/radial shreds
• $1\text{pc} \rightarrow 10^{12}\text{m}$ viscosity

BH aligned

random directions

expect pc scale warp transition

this is the obscuring torus
• warped disc makes it easier for AGN to heat distant gas

• revives idea that most submm galaxies may be obscured AGN?
AGN covering factor
Warped disc predicts overall covering factor = 0.5

quasar covering factor = 0.35
WISE+UKIDSS+SDSS SEDs for 9,112 quasars

Fit three components
BBB=fixed template
hot dust=single BB
torus=Nenkova08 models

wide variety of SEDs
hot/cool dust varies
as well as IR/opt-UV

Roseboom et al 2012
Roseboom et al. 2012

Richards (2006) Spitzer sample

Tilted disc prediction (LE10)

With selection limit correction

Covering factor distribution

Log Gaussian
luminosity dependence

warped disc predicts covering factor independent of luminosity

opt/IR/radio : yes
X-ray : no

why are they different?
Partial covering

Mayo thesis 2013

Intrinsic

5% covered
$N_H = 1 \times 10^{22}$

95% covered
$N_H = 2 \times 10^{24}$

Net spectrum looks Compton thin!
effect on lum.fn and obscured fraction

Mayo and Lawrence 2013
Mayo and Lawrence 2013

Always roughly:
1/3 clear
1/3 buried
1/3 partially covered

31% clear
48% buried (99.9%)
7% at 25% covered
14% at 94% covered