Discussion Topics

> How are AGN fueled?

Mergers

Stellar mass loss
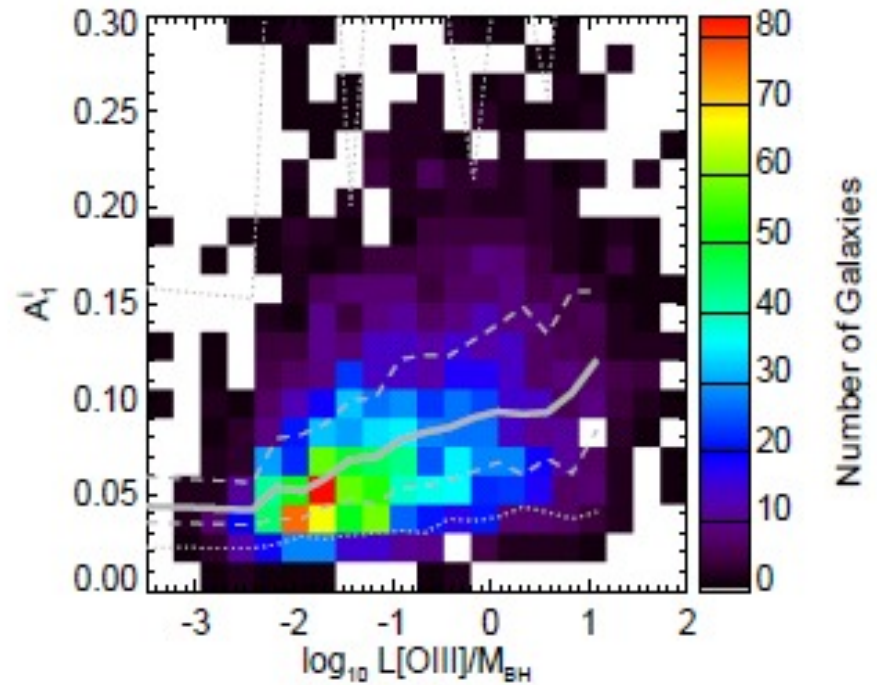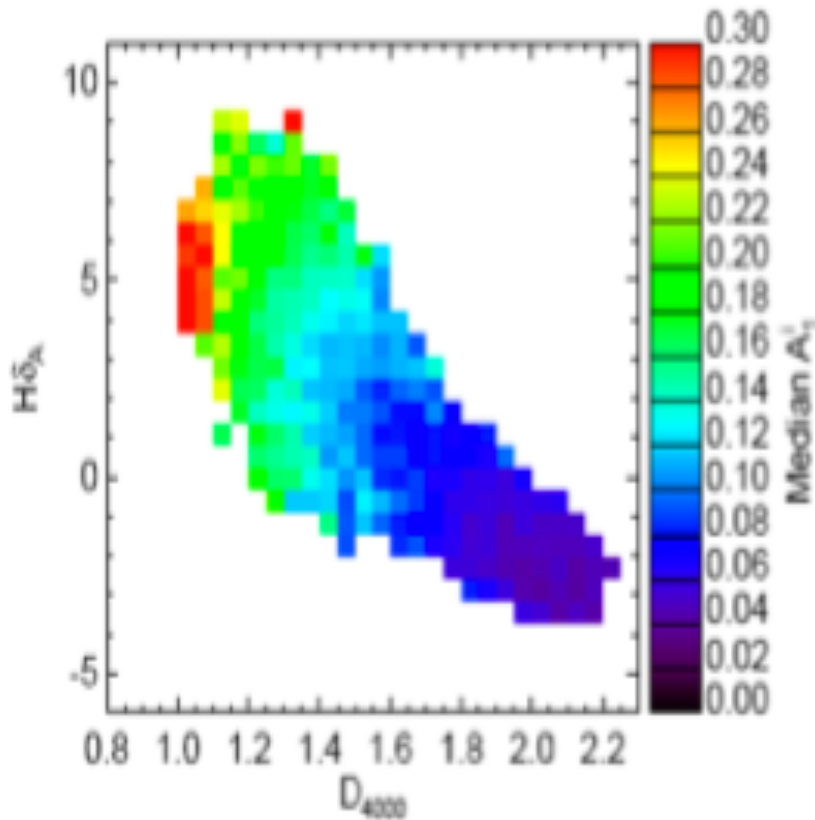
> What are the best local analogs to typical high-z SF galaxies?
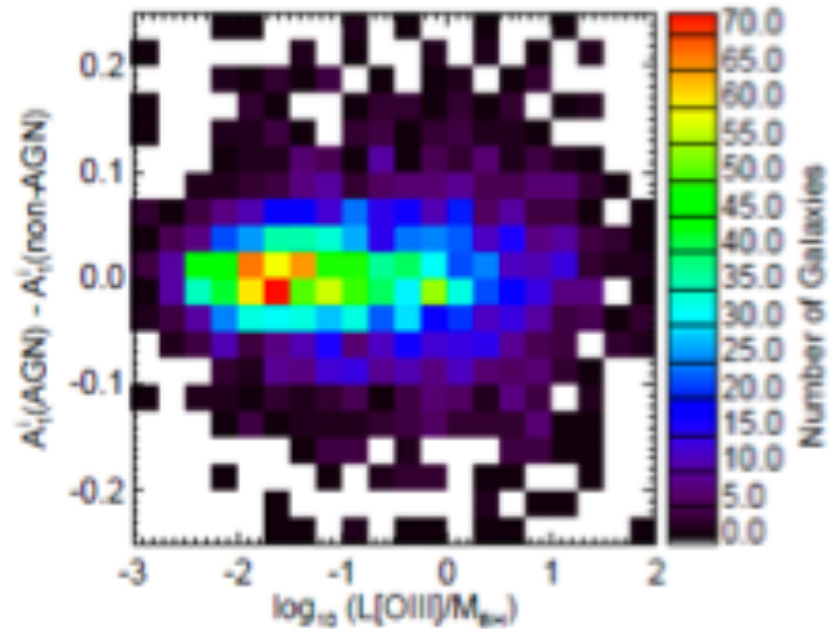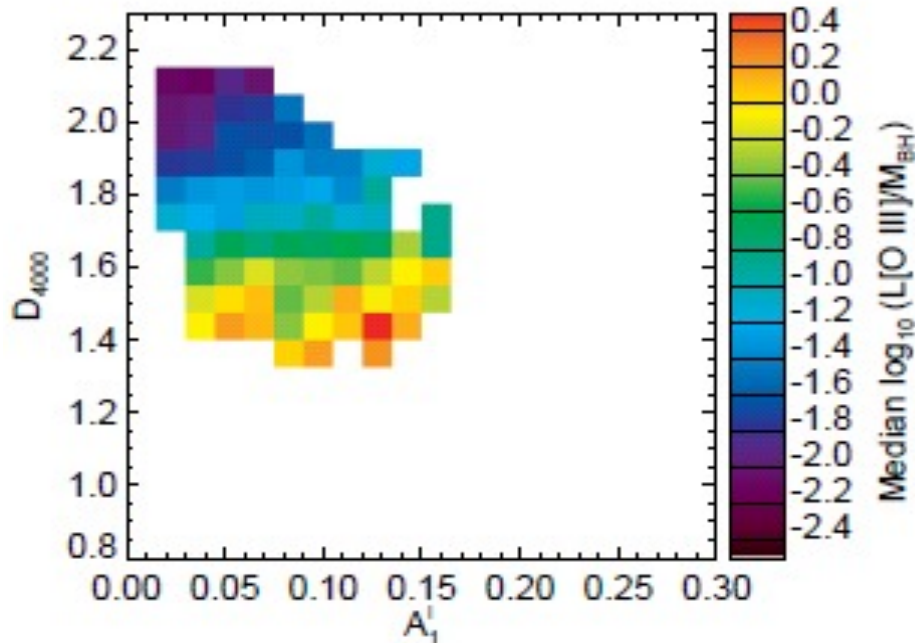
LIRGs & ULIRGs

Lyman Break Analogs

> Do we understand downsizing?

Mergers as a Trigger?

- Strong link between lopsidedness & young bulge
- Higher black hole growth = mildly lopsided galaxies

# Physical vs. Induced Correlations

> The primary correlations are between:

  1) lopsidedness and star-formation

  2) star formation and black hole growth

> The apparent correlation between lopsidedness and
  black hole growth is induced (not physical)

Close Companions: Same Result
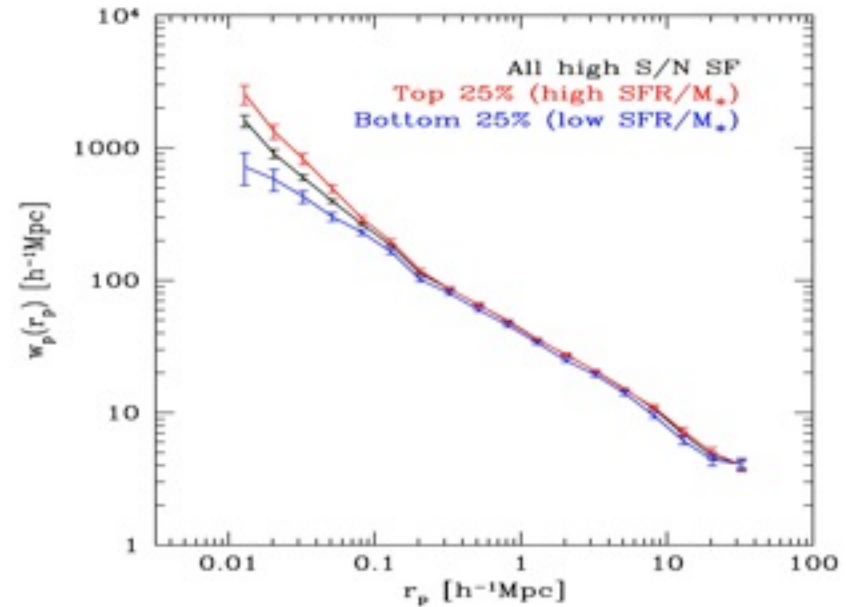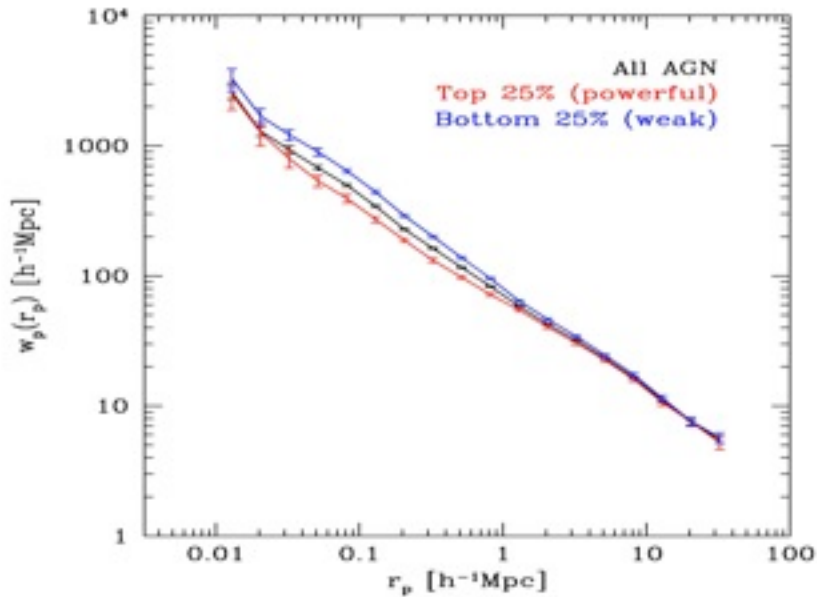
- Excess of close companions clear for starbursts
- No excess for AGN (Li et al. 2007)

WHICH BLACK HOLES ARE GROWING?
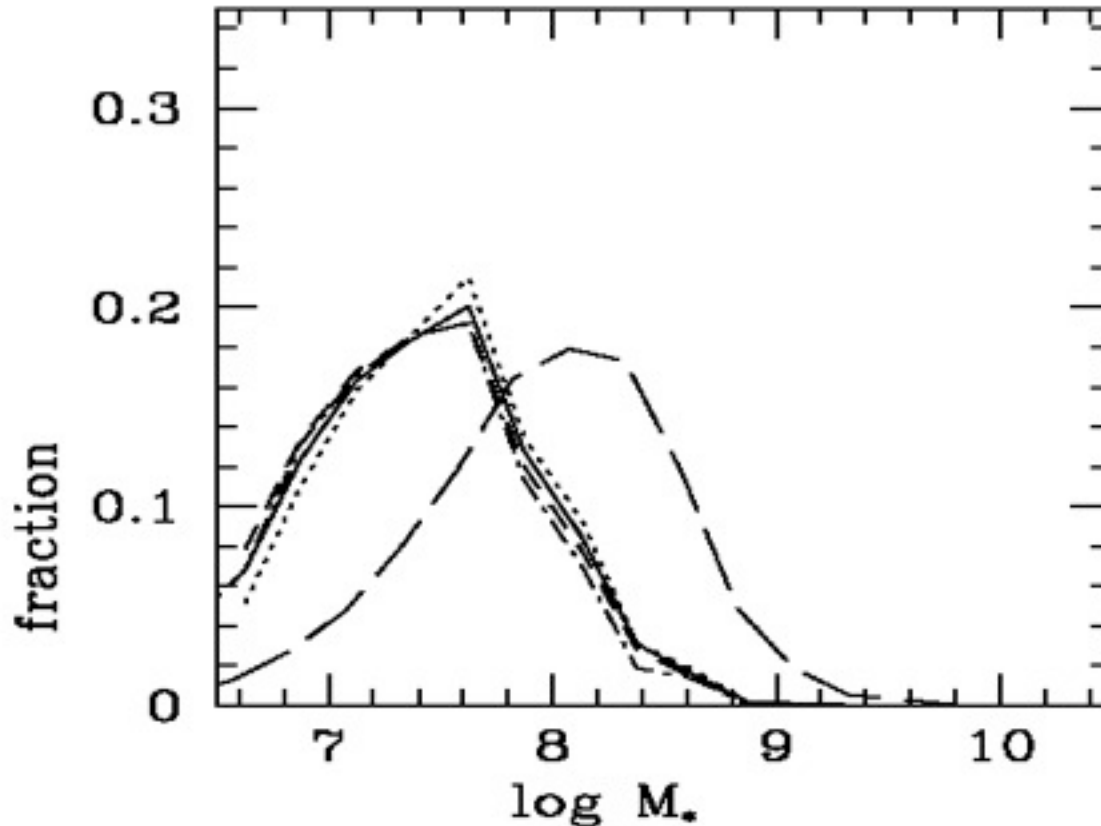
- Mass resides in the more massive black holes
- Growth dominated by less massive ones

The Local Galaxy "Landscape"

THE BIMODAL SDSS GALAXY POPULATION

Characteristic scales for transition from old to young:

- $M_* \sim 3 \times 10^{10}\ M_\odot$

- Low mass galaxies are young, high mass galaxies are old

- $\mu_* \sim 3 \times 10^8\ M_\odot/kpc^2$

- Low density galaxies are young, high density galaxies are old

- $C \sim 2.6$

- Low-concentration (late-type) galaxies are young

  High-concentration (early-type) galaxies are old

- Black Holes: the domain of massive, dense, high-concentration galaxies (big bulges)
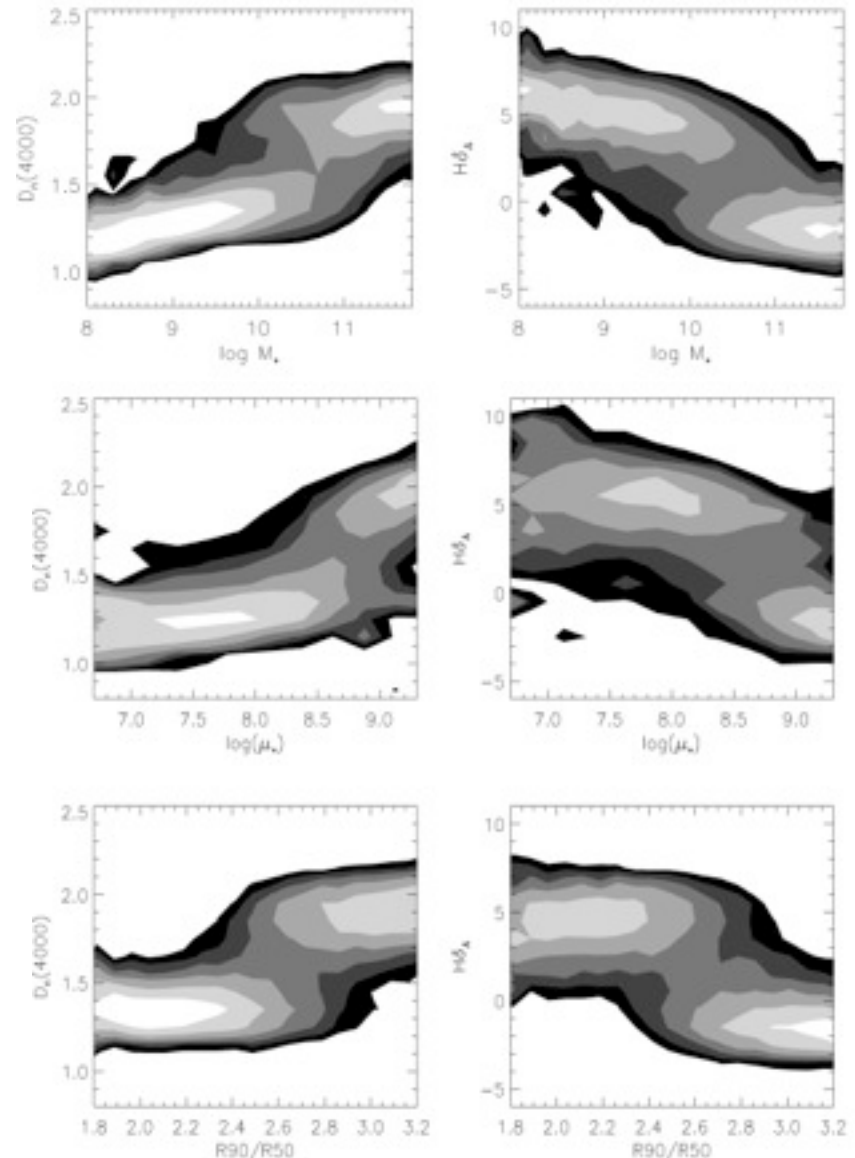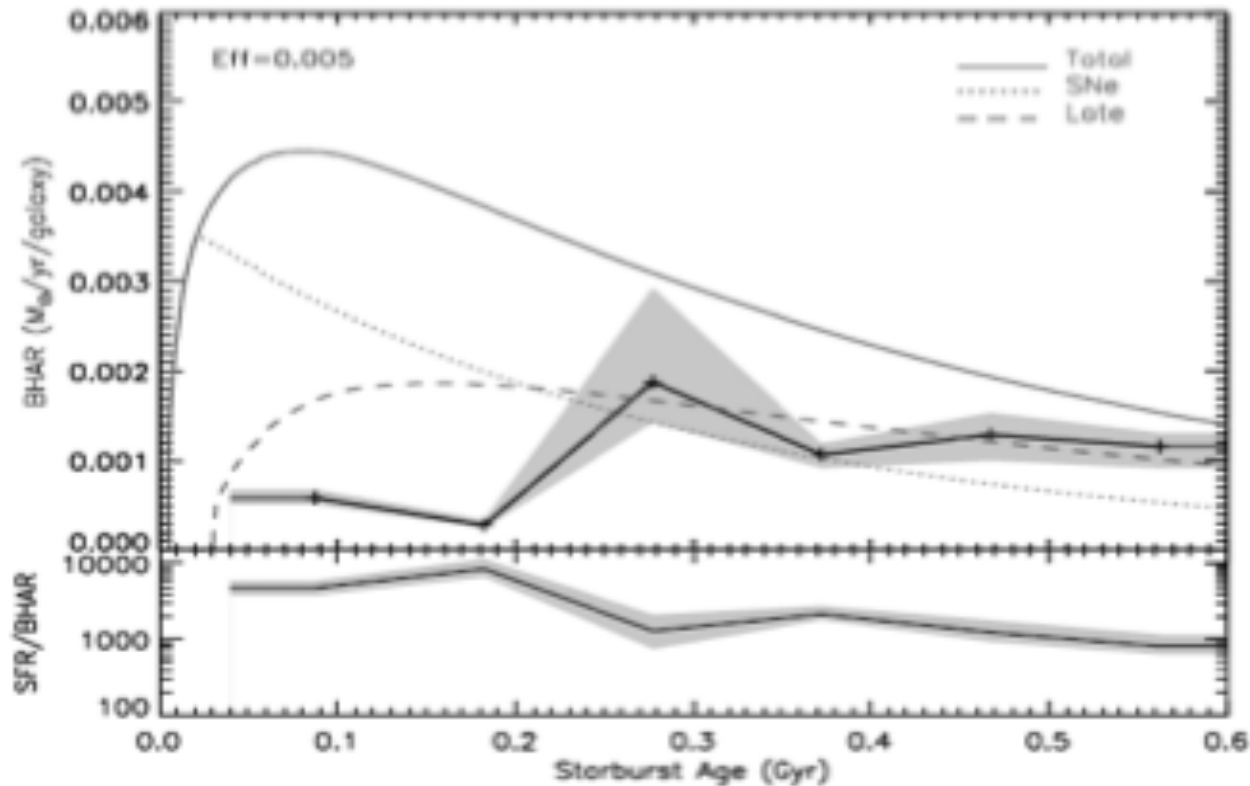
Stellar mass loss as fuel?
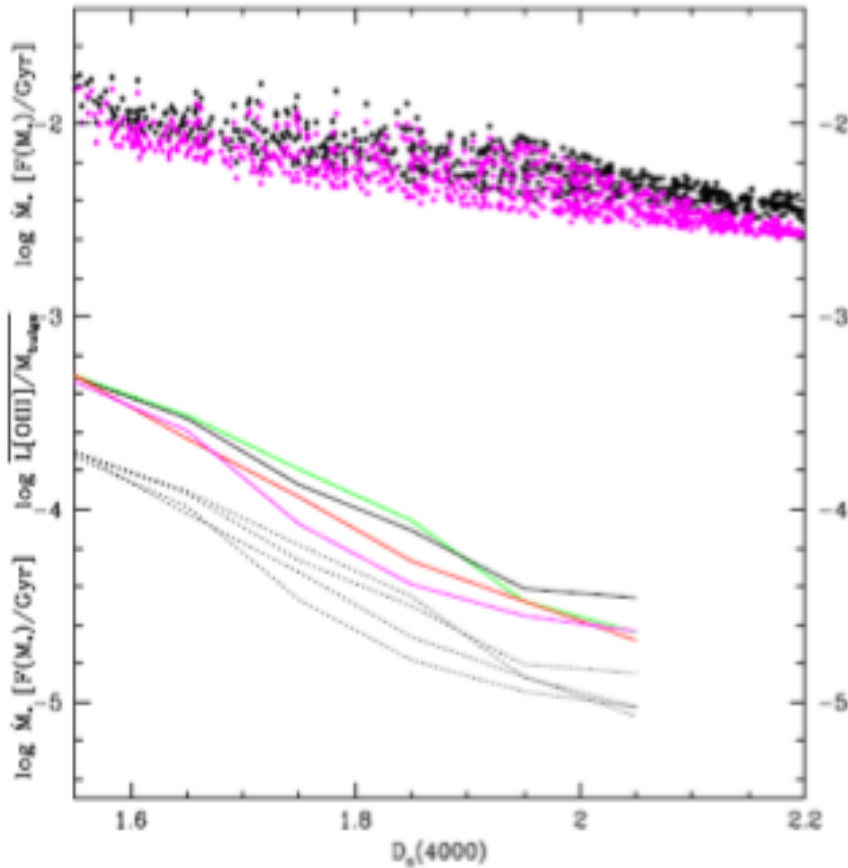
- The age-dependence of the black hole growth rate in this mode is consistent with the capture of about 0.5% of the mass lost by evolved stars in the bulge
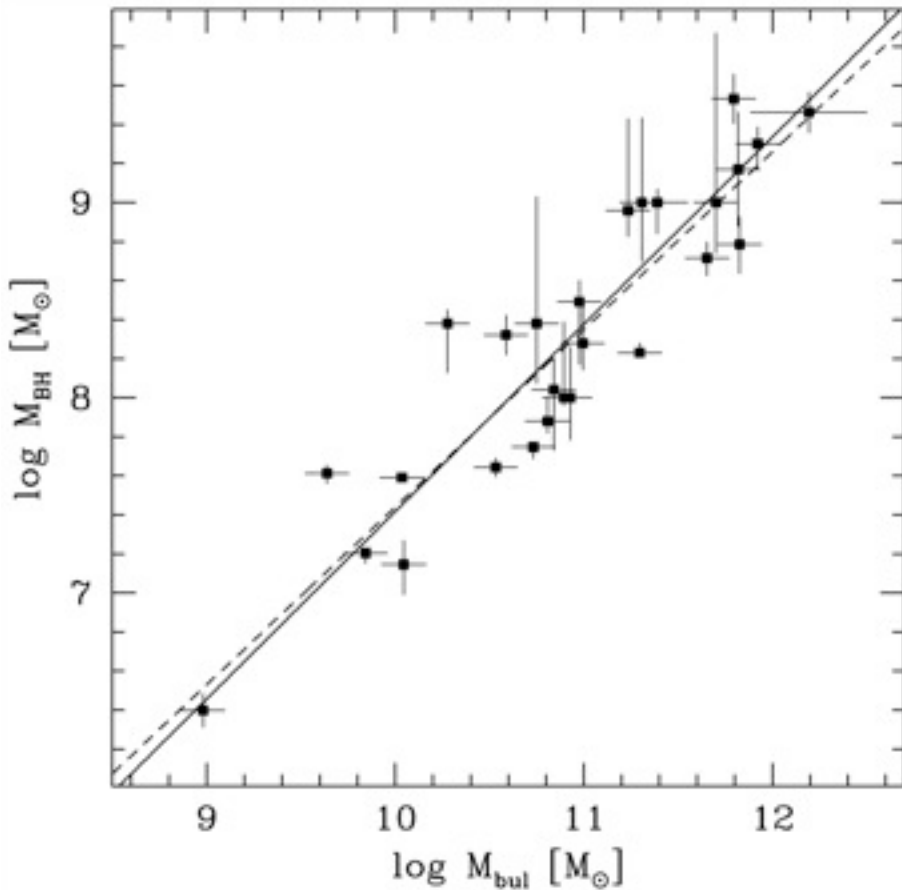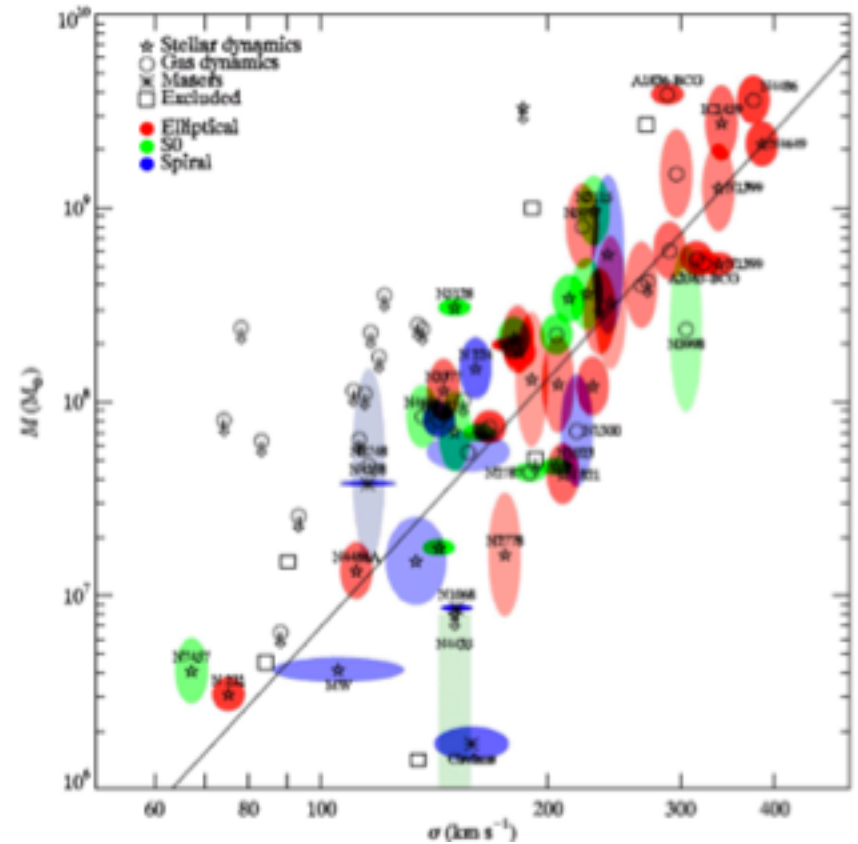
The Post-Starburst/AGN Connection

> The growth of BH tracks stellar mass loss, but only after the supernova-dominated phase ends

> BH growth limited by stellar feedback – Wild et al

> Implications for the M_BH vs. M_bulge relation

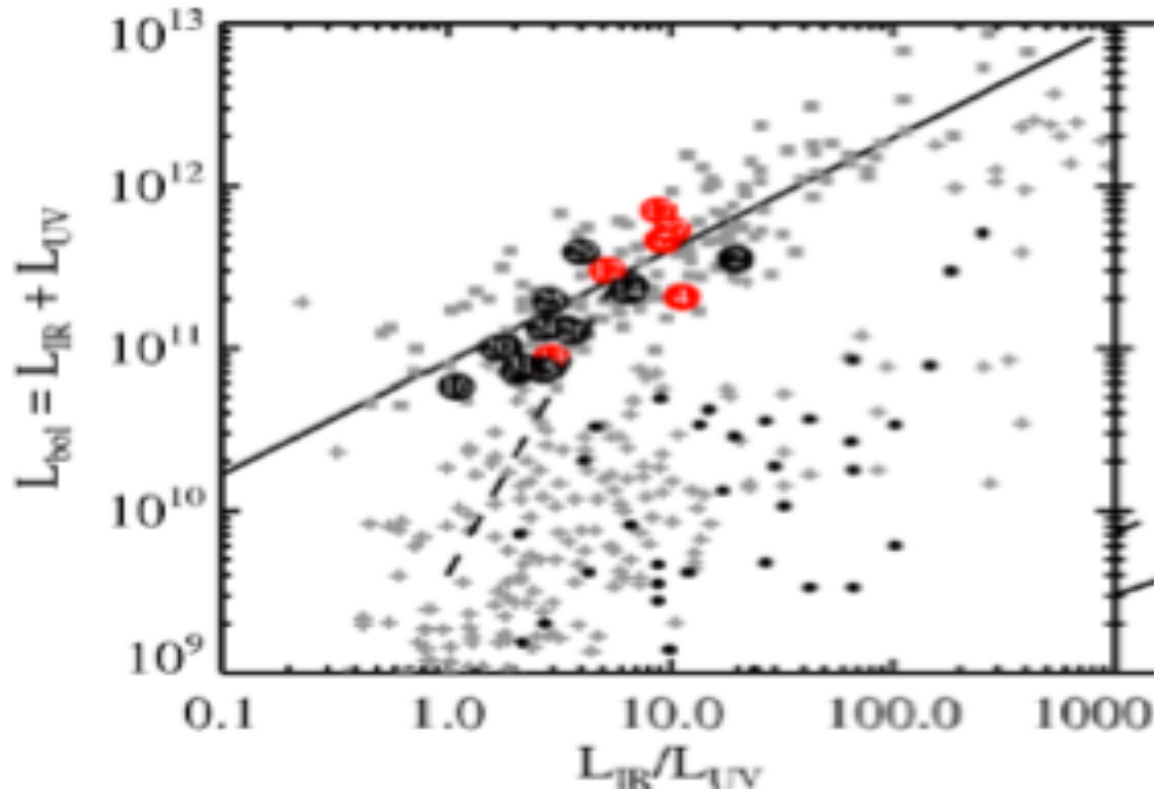# BLACK HOLE MASS STRONGLY LINKED TO BULGE PROPERTIES
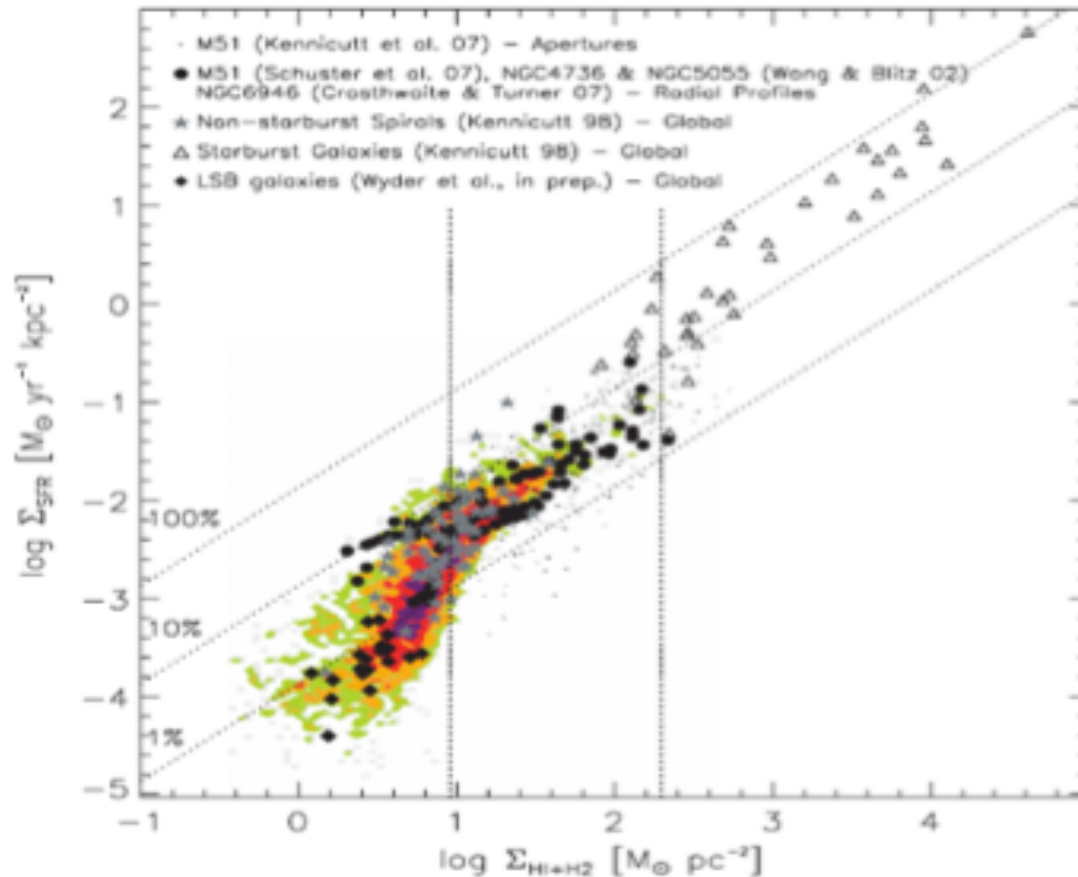

Marconi & Hunt

Gultekin et al.

What are the best analogs?

- Galaxies at high-z less extincted at fixed SFR
- Local ULIRGs & LIRGs may not be good analogs
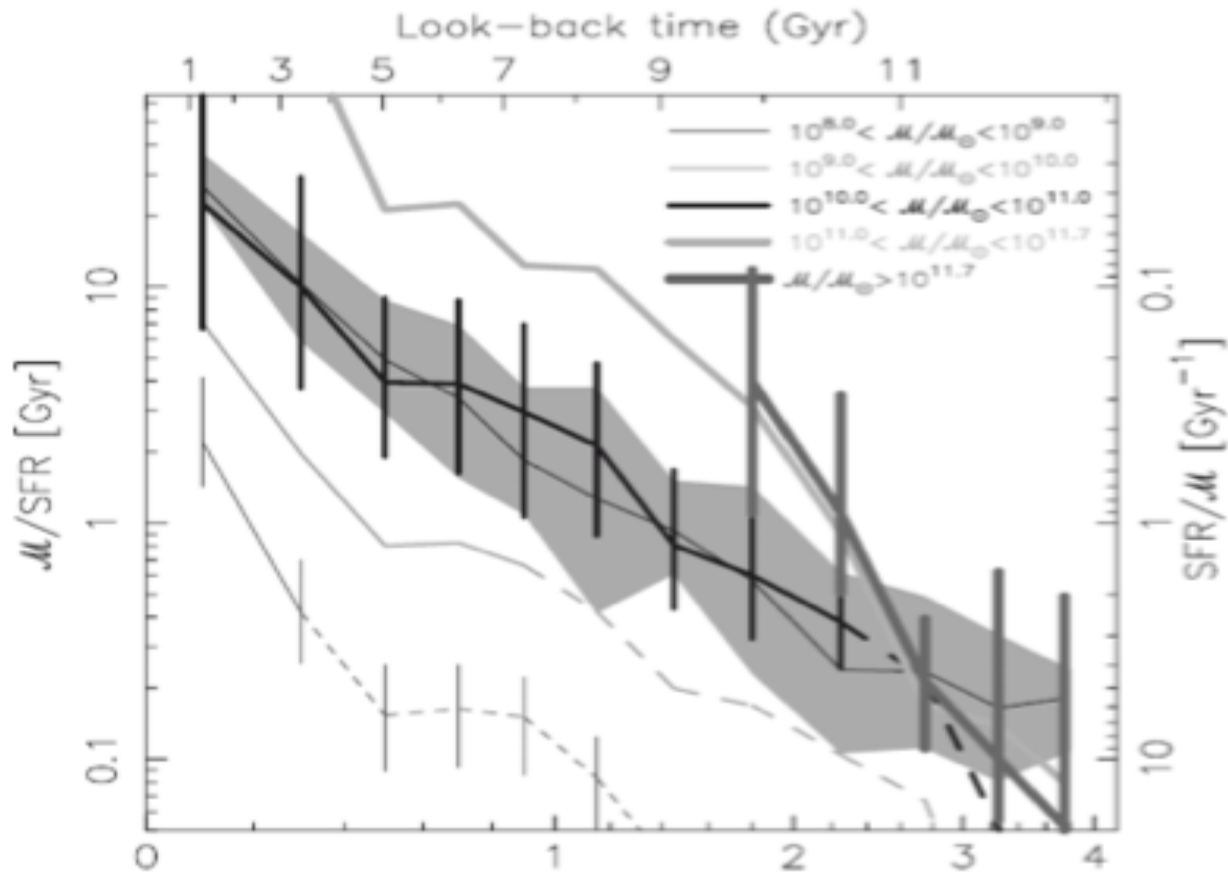- Lyman Break Analogs much better in this sense

Why is this?

THE SF LAW IN NEARBY GALAXIES ON SUB-KPC SCALES

- SFR/M ~ (N_gas x f_gas)^1/2
- High-z: higher gas-mass fractions allow lower N_gas for a given specific SFR implies lower N_dust
- High-z: Starbursts are larger at fixed SFR than at low-z

Downsizing Enigma

- Timing issue: how can mass-doubling time be much less than the Hubble time? Perez-Gonzalez