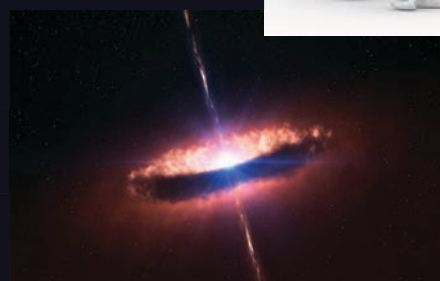




**CAN**



**FUEL**



**EDMOND CHEUNG**

**JONATHAN TRUMP**

**DALE KOCEVSKI**

**ERIC BELL**

**LIA ATHANASSOULA**

**DAVID KOO**

**SANDRA FABER**

**JEROME FANG**

**GALAXY ZOO**

**Santa Cruz  
Galaxy  
Workshop**

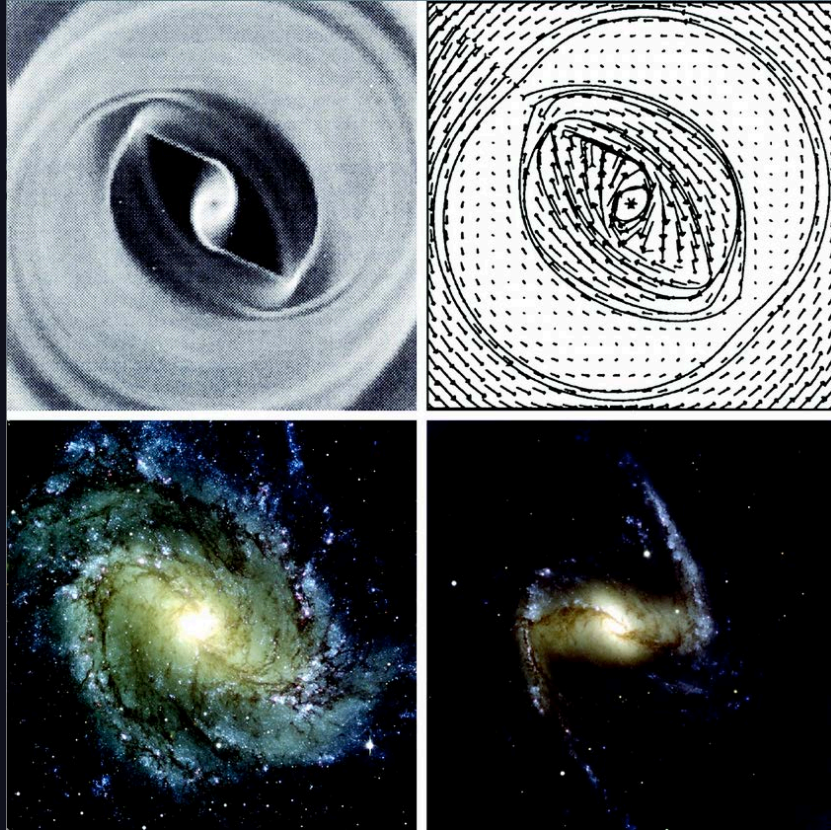
**August 12, 2014**

# How would bars fuel AGN?

**STEPHEN THREW AN ASTRONAUT INTO A BLACK HOLE**



ATHANASSOULA 1992; KORMENDY & KENNICUTT 2004

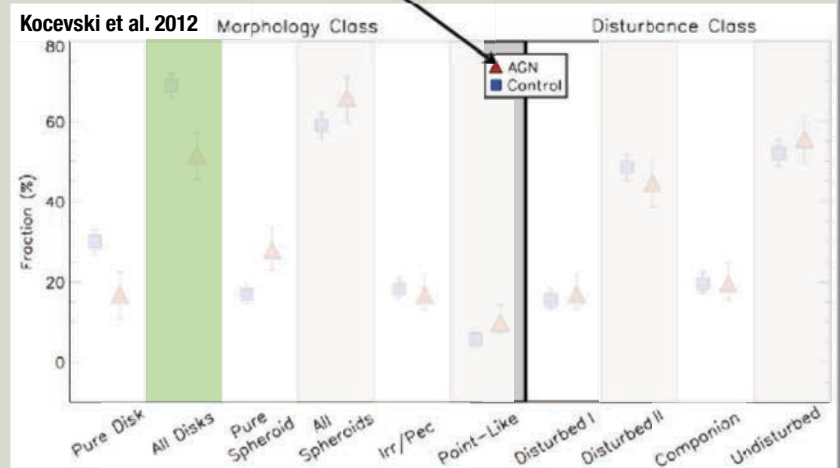
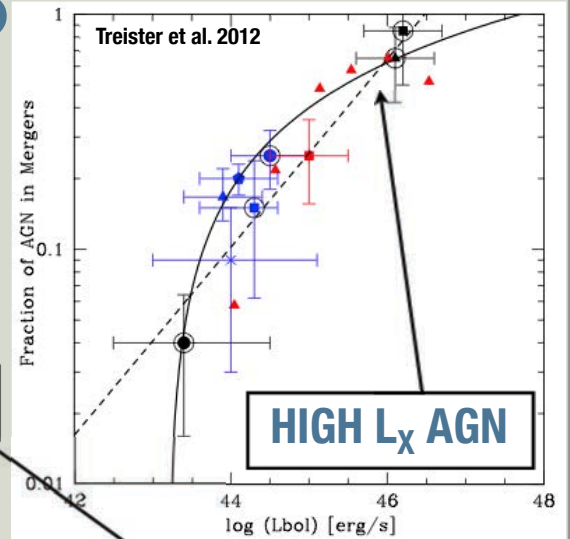


gas is shocked at bar  
ridgeline where it loses

# What fuels AGN?

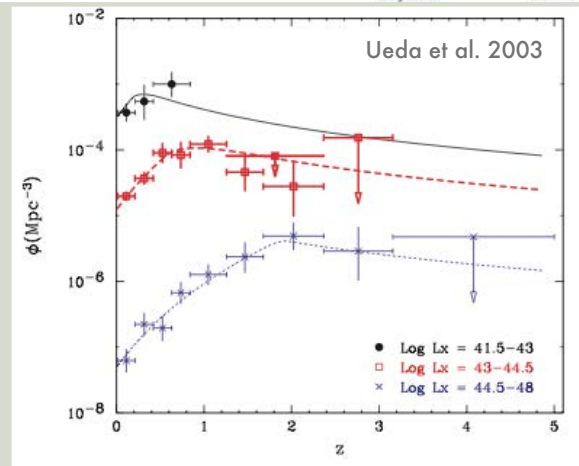
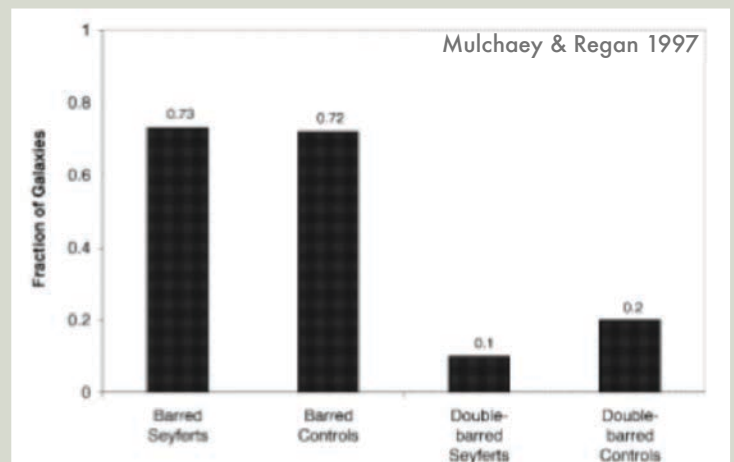
- Major mergers trigger most luminous AGN
- Low/intermediate luminosity AGN must be triggered by a process that doesn't destroy disks
- Bar-driven secular evolution?

**MODERATE  $L_x$  AGN**



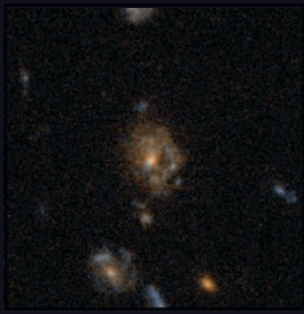
# Do bars fuel AGN?

- No excess of bars in AGN hosts
  - but all previous works are at  $z \sim 0$
  - more AGN at  $z > 0$
- Is there an excess of bars in AGN hosts at  $z > 0$ ?

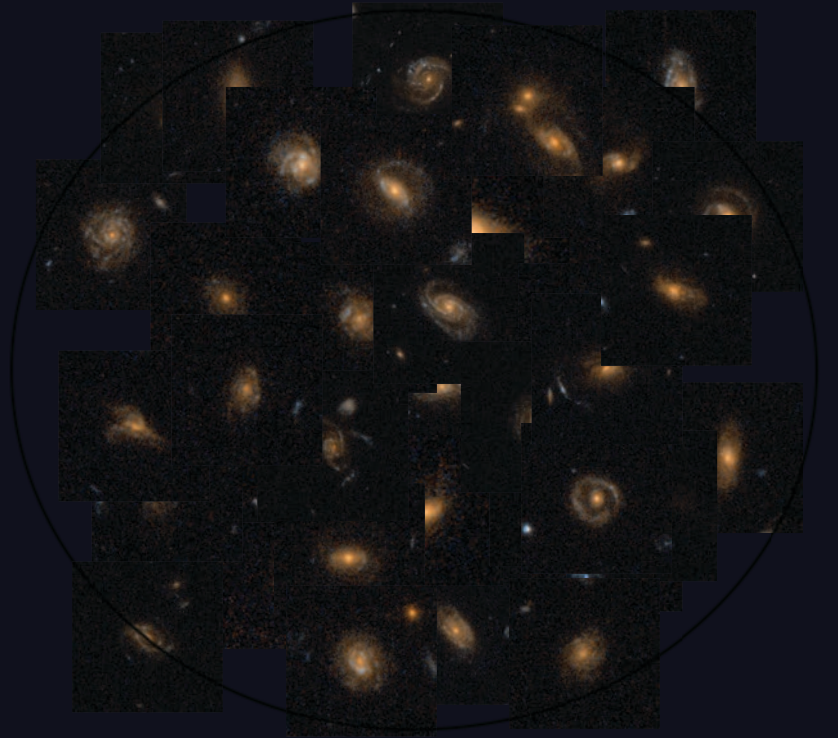


# AGN-Control Samples

- Create moderate  $L_X$  AGN sample  
( $10^{42} \text{ erg s}^{-1} < L_X < 10^{44} \text{ erg s}^{-1}$ )
  - *Chandra* data in AEGIS, COSMOS, and GOODS-S
  - $0.2 < z < 1.0$
- Create non-AGN, matched, control sample
  - $M^*$ , rest-frame color, Sérsic index, half-light

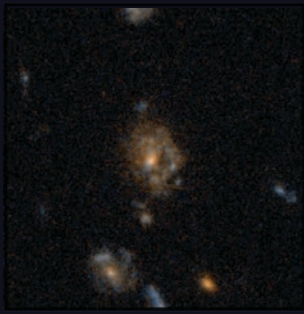


**AGN**

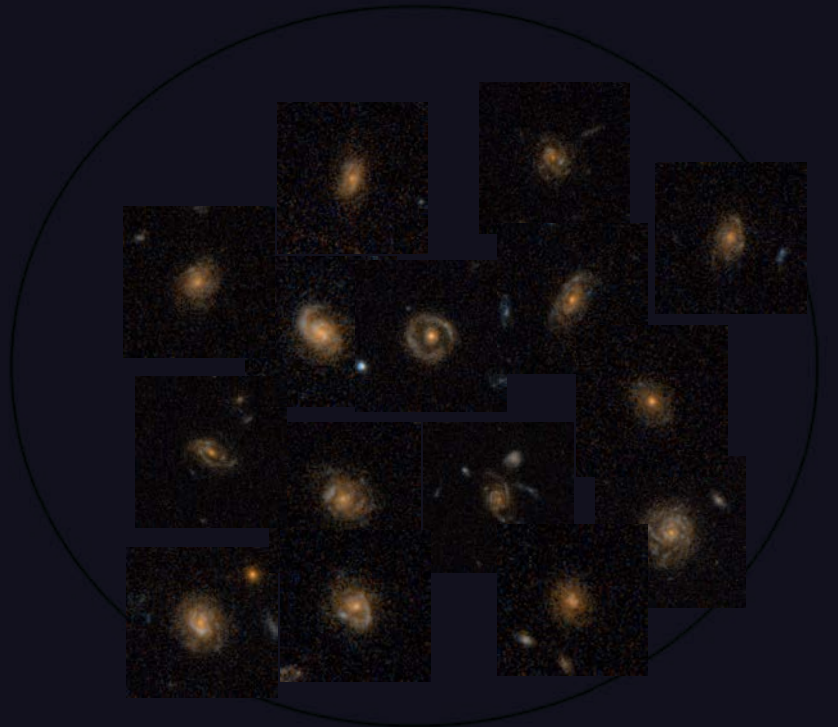


**CONTROLS**

**CONTROL SAMPLE THAT IS WITHIN 2-3X AGN'S  
MASS, COLOR, SÉRSIC, SIZE, AND REDSHIFT**



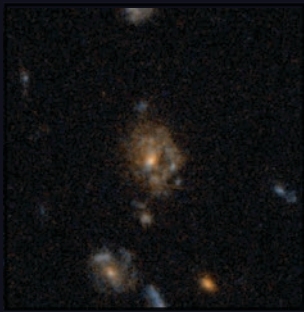
**AGN**



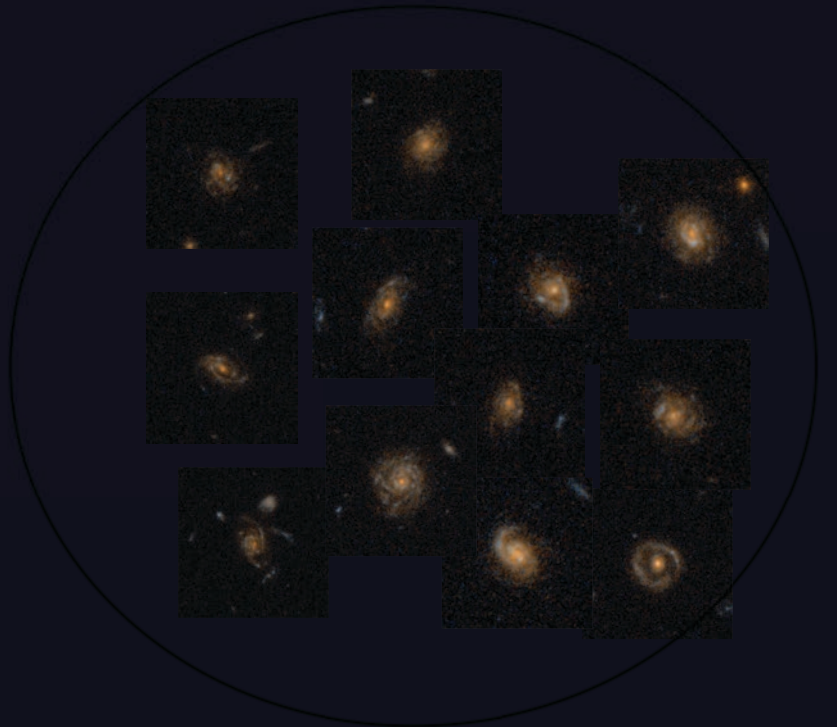
**CONTROLS**

**15 BEST MATCHED TO AGN'S REDSHIFT**



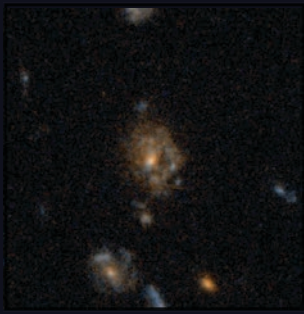


**AGN**

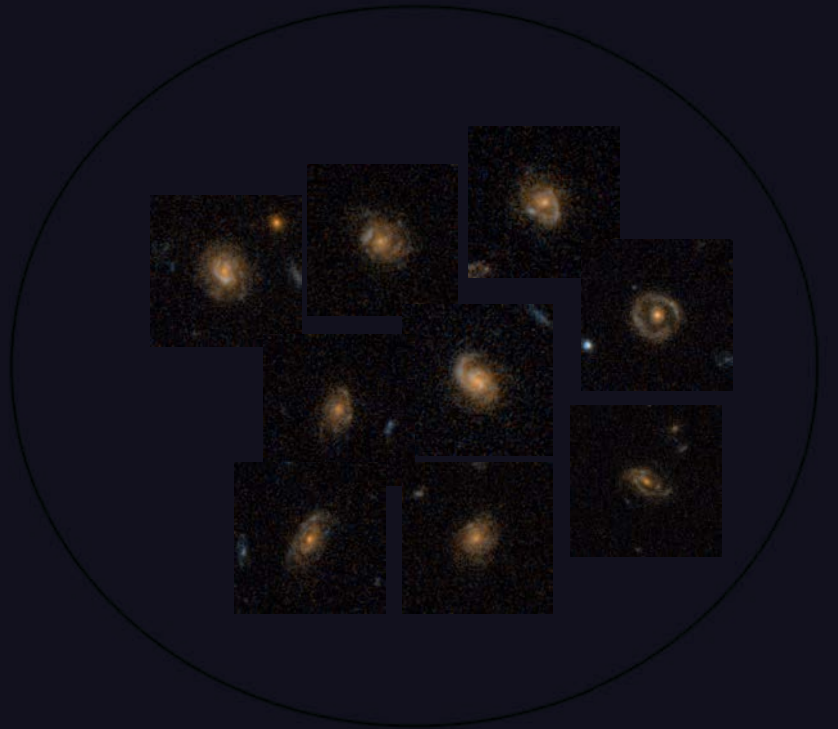


**CONTROLS**

**12 BEST MATCHED TO AGN'S COLOR**

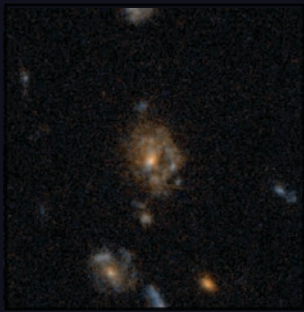


**AGN**

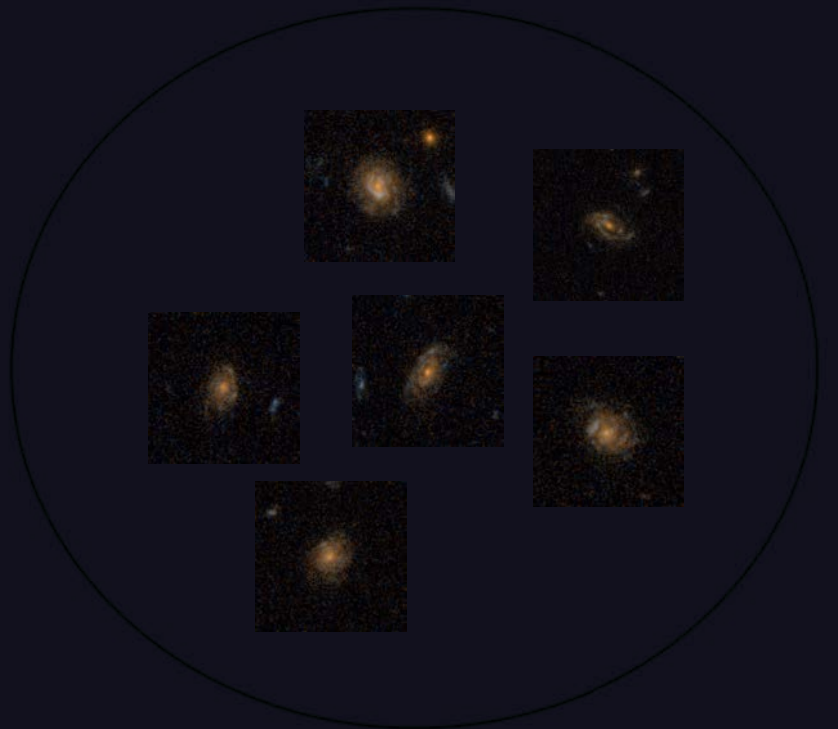


**CONTROLS**

**9 BEST MATCHED TO AGN'S SÉRSIC INDEX**

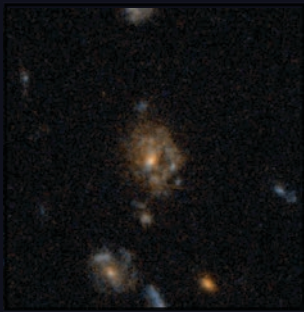


**AGN**

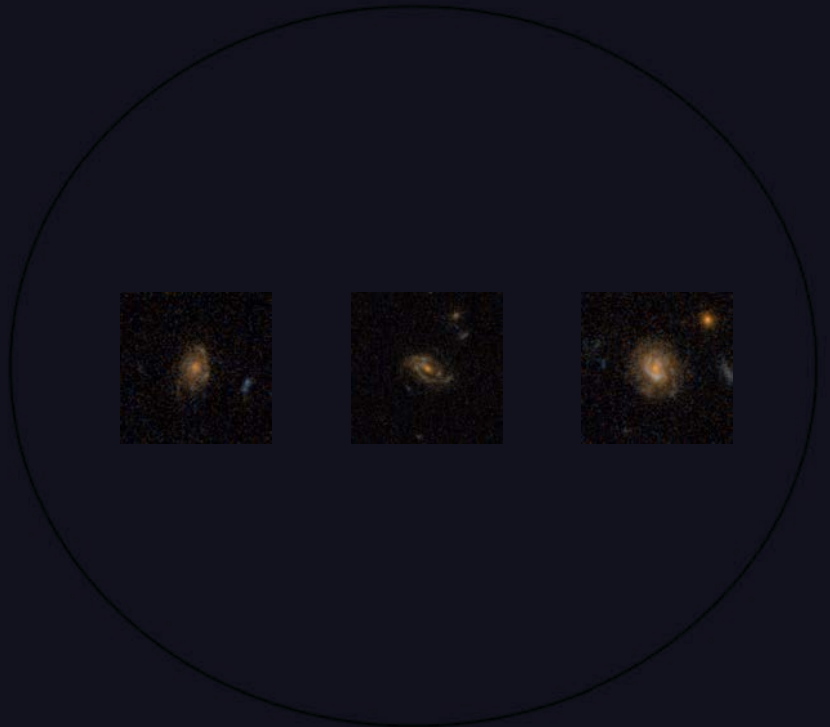


**CONTROLS**

**6 BEST MATCHED TO AGN'S HALF-LIGHT RADIUS**

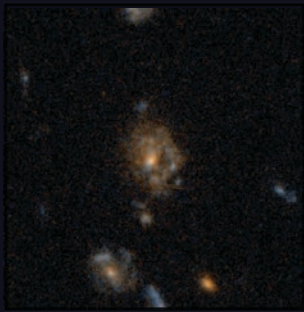


**AGN**

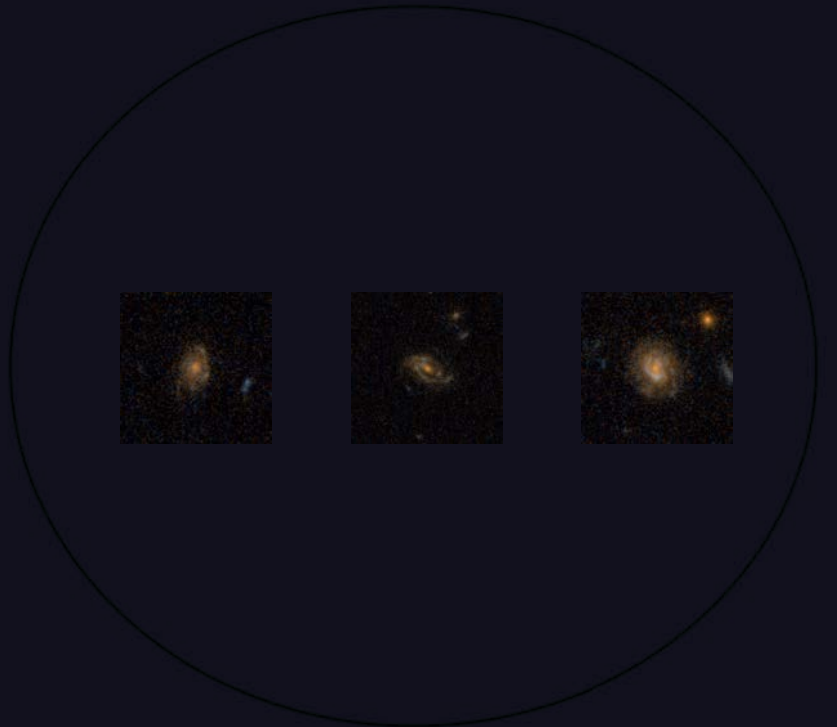


**CONTROLS**

**3 BEST MATCHED TO AGN'S STELLAR MASS**

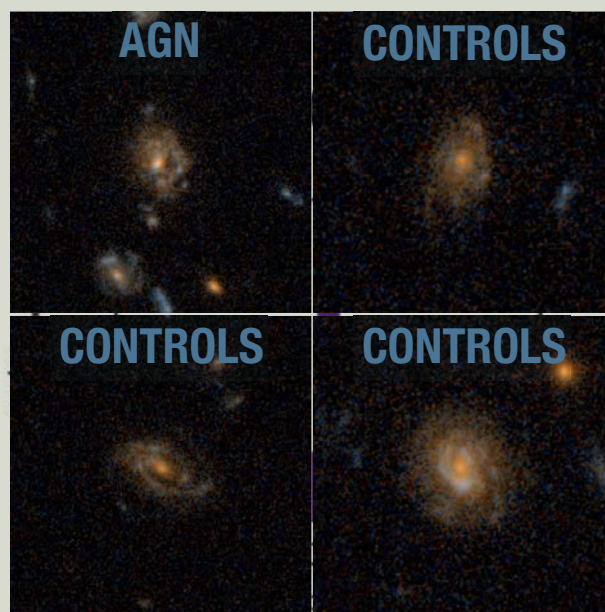


**AGN**



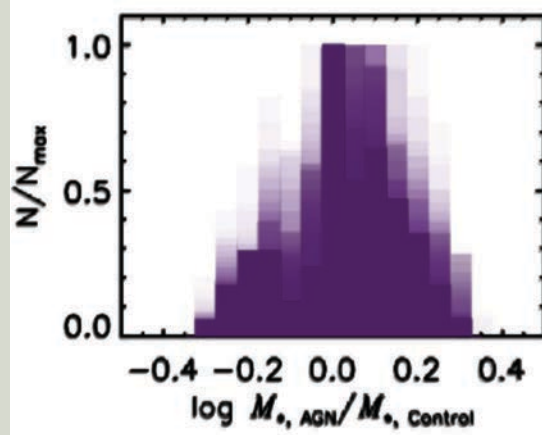
**CONTROLS**

**EXAMPLE AGN-CONTROL SET**



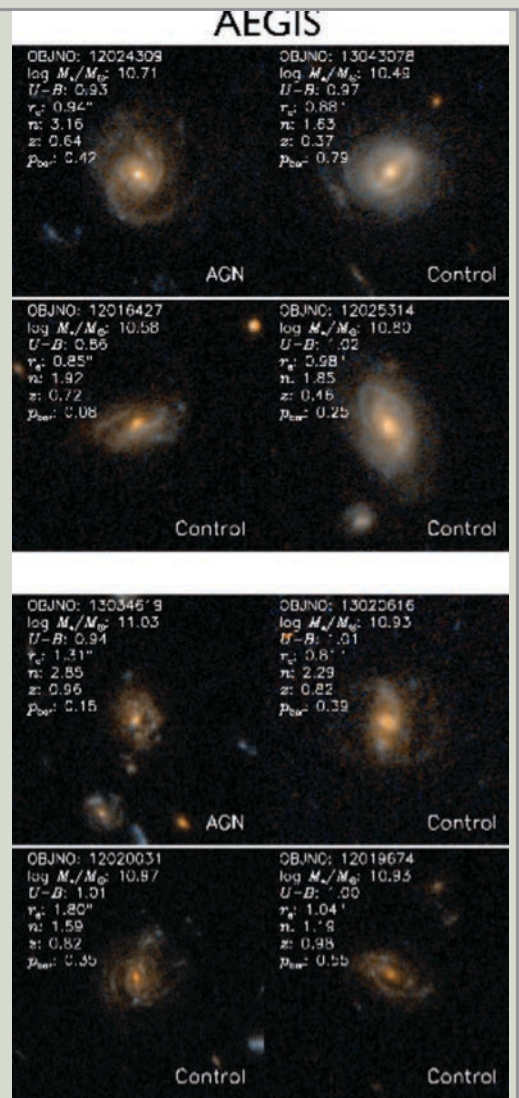
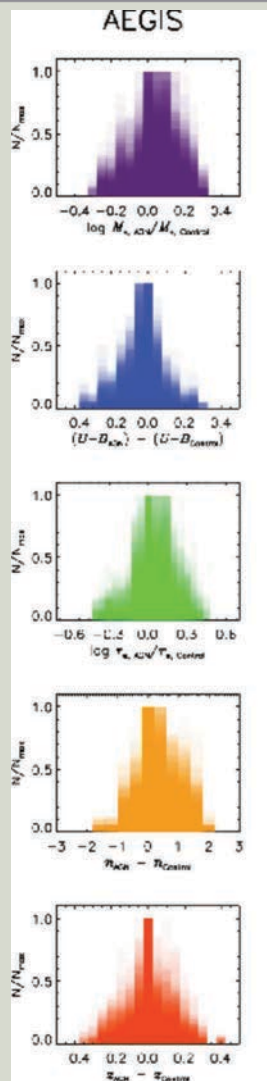
- $\log M_{*, AGN} - \log M_{*, Control}$

## AEGIS



- $\log M_{*, \text{AGN}} - \log M_{*, \text{Control}}$

- Histograms are centered around 0, implying that the AGNs and their control galaxies are well-matched
- Reassuringly, the AGN-control galaxies are similar in appearance





**NO STATISTICALLY SIGNIFICANT ENHANCEMENT OF  
 $F_{\text{BAR}}$  AMONG AGN HOSTS**