Supermassive black holes as the regulators of star formation in central galaxies

Bryan Terrazas[1*], Eric Bell[1], Bruno Henriques[2], Joanna Woo[2],
Simon White[3], Andrea Cattaneo[4]
1 University of Michigan, Ann Arbor 2 ETH Zurich 3 MPA, Garching
4 Observatoire de Paris *Presenting author

Quiescence is one of the central observational features of many galaxies in the local and distant Universe. Yet, it is unclear what drives quiescence – is it feedback from AGN accretion, a change in cooling mode at high halo mass, a change in star formation efficiency in steep potentials, or something else entirely?

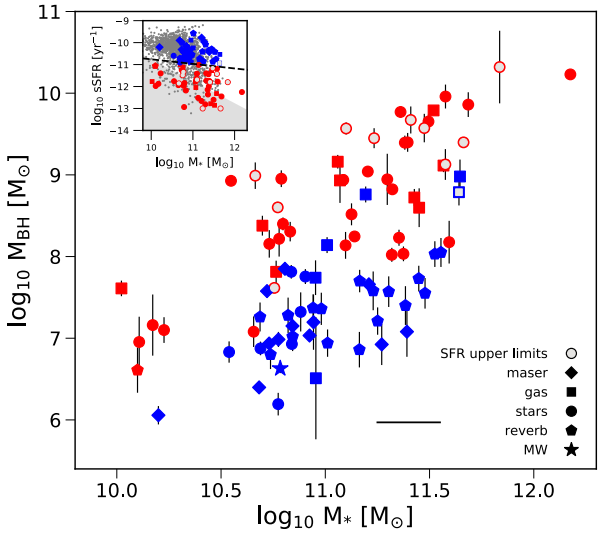

Fig. 1: **Quiescence (shown in red) is a strong function of black hole mass at a given stellar mass (Terrazas+2016, ApJL, 830, L12).**

This observational result strongly resembles models in which quiescence is driven by radio-mode feedback from AGN. This strongly implicates the black hole in driving quiescence.

Fig. 2: **Specific star formation rate is a strong function of the ratio of black hole mass to stellar mass (Terrazas+2017, arXiv:1707.01097).** This is an 'edge-on' projection of Fig. 1.

Galaxies exhibit varying degrees of quiescence, even in the star forming main sequence – the more prominent the black hole, the more quiescent the galaxy. Galaxies with intermediate degrees of quiescence tend to be early-type spirals, indicating that quiescence may be a long-term equilibrium state, not an event.