UNIQUE SIGNATURES OF MECHANICAL AGN FEEDBACK IN ABEll 2597

ABSTRACT
In Tremblay et al. 2012a and 2012b we present new Chandra and Herschel observations of the brightest cluster galaxy (BCG) in the cool core cluster Abell 2597 (z=0.08). Along with supporting multiwavelength evidence, we find unique signatures of mechanical AGN feedback. These include (1) an extensive X-ray cavity network, (2) a 15 kpc filament of multiphase gas possibly dredged-up by the radio source, and (3) an arc of high entropy X-ray gas that may be an observational signature of ISM/ICM heating by a buoyant X-ray cavity.

NEW CHANDRA OBSERVATIONS

X-RAY CAVITY NETWORK
X-ray unsharp mask highlighting the kpc-scale X-ray cavity network, with 330 MHz, 1.3 GHz, and 8.4 GHz radio emission overlaid in green, blue, and black contours, respectively.

MECHANICAL FEEDBACK, RESIDUAL COOLING, & STAR FORMATION
Selected results from Tremblay+ 2012b:
• The X-ray cavity network is more extensive than previously thought, and associated with enough enthalpy to theoretically inhibit the inferred classical cooling flow.
• Strong multiwavelength evidence for residual cooling flow (20 solar masses per year within 40 kpc, ~8% of classical X-ray mass dep. rate)
• The cavity age range is larger than that of the central (<20 kpc) young stellar component, suggesting low levels of persistent star formation amid the feedback-driven excavation of the X-ray cavity network.

MULTIPHASE JET-DRIVEN OUTFLOW?
[left] Soft excess X-ray filament extends to the NE, partially cospatial with extended 1.3 GHz radio emission [blue] [right] Pa-alpha VLT/SINFONI vel. dispersion map [red=300 km/s]. The high vel. axis is aligned with the “current” VLBA jet axis. A unique example of a multiphase \((10^{5}-10^{7})\) K jet-driven outflow?

SIGNATURE OF ISM HEATING BY X-RAY CAVITY ENTHALPY DISSIPATION?
[above] X-ray temperature map. Note the cold filament and hot arc features, which we discuss in Tremblay+ 2012a. In Tremblay+2012b, we show evidence for structured residual ISM/ICM cooling along the N-S optical filament regions, perpendicular to the projected cavity/radio AGN heating axis. Do thermally unstable filaments form at feedback-regulated entropy threshold?

REFERENCES
Author affiliations for this poster can be found in the above papers