

First Look at Spatially Resolved H2 and AGN Feedback in BCGs with JWST/MRS

Clemente Riesco

Advisor: Philippe Salomé and Pierre Guillard



Observatoire
de Paris

PSL 

Scientific context

How AGNs affect galaxies? → AGN feedback

- Negative and positive: Mechanical ejection (Cicone et al. 2014) and Energy into the galaxy (heating) (Silk and Rees et al. 1998) o compression of gas, igniting SF

Some problems:

- How efficient is the feedback
- How strong the AGN feedback coupling with the ISM or CGM
- How much feedback its produced

So.... we need laboratories to study AGN feedback → Bright Cluster Galaxies (BCGs) (Fabian et al. 2012)

Scientific context

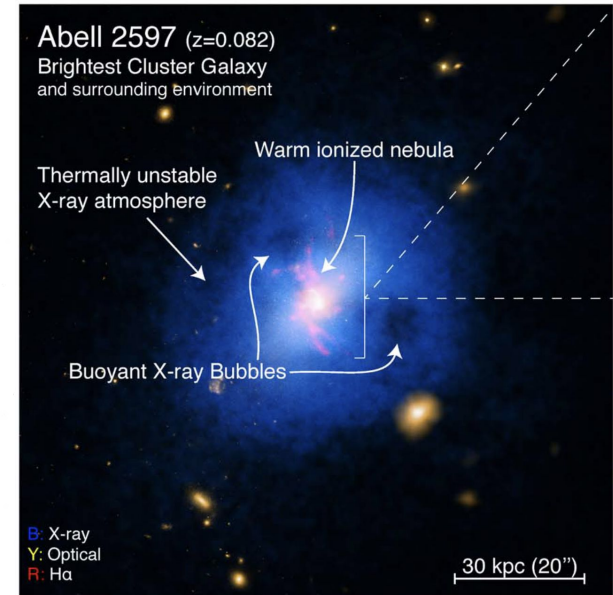
BCGs: Context & Environment

- **Population:** Located in cluster centers; mostly "red and dead," but 15–25% show significant Star Formation (SF) (Johnstone+ 87; McNamara+ 89; Fabian 94; Crawford+ 99; Hicks+ 05, 10; Rafferty+ 08; Bildfell+ 08; Donahue+ 10)
- **Environment:** SF-BCGs are generally found in "Cool-core" clusters, where the ICM has extremely short cooling times (Cavagnolo+ 2008)
- **The Multi-phase filaments:** Rapid cooling times generates extended filaments (10–100 kpc) are traced in **CO and H α** —demonstrating high activity in the system

→ We expect super high SFR

The AGN feedback (Fabian et al. 2012): Perfect laboratory

- Prevent overcooling

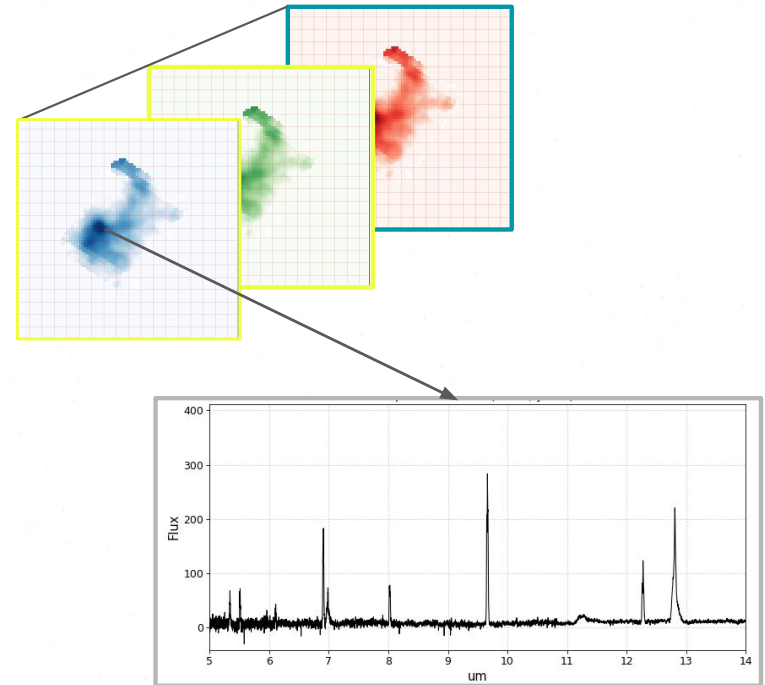


Tremblay et al. 2018

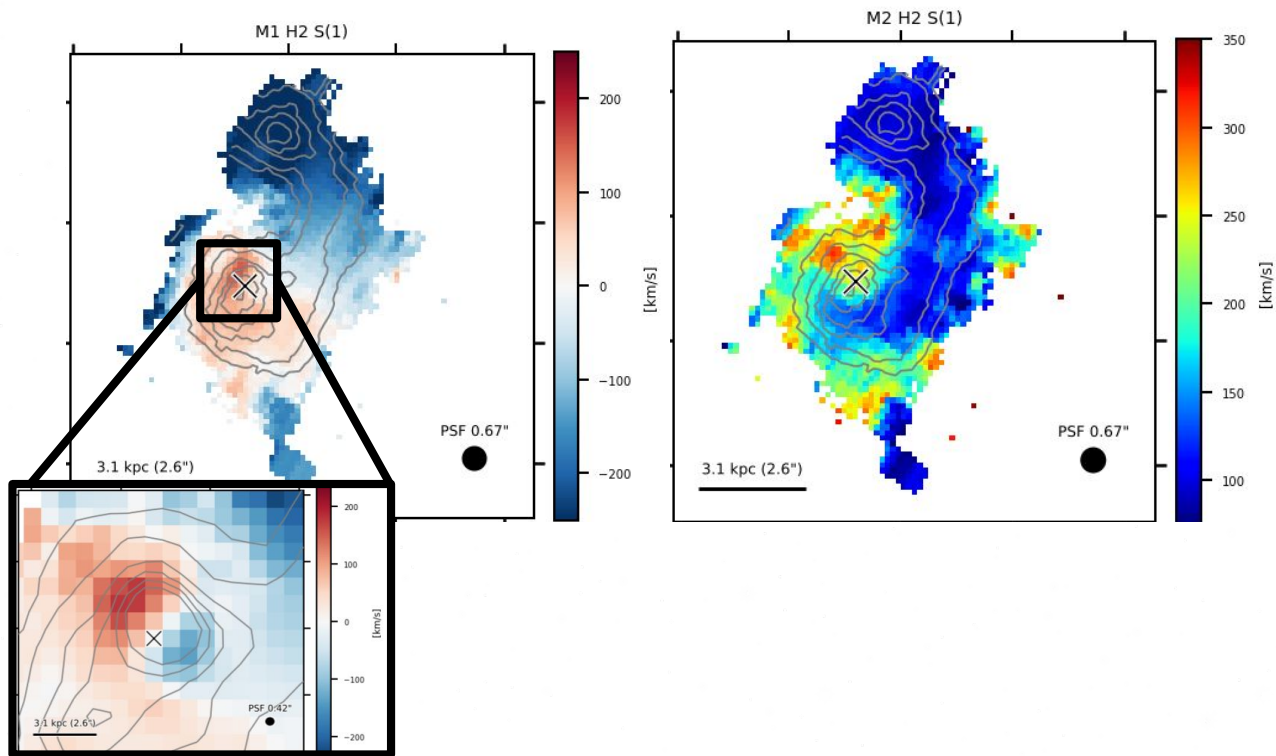
JWST observations

WHAT JWST/MRS DATA AIMS TO ADDRESS (THE GOALS)

- **Kinematics & Turbulence:** First high-resolution maps of Warm H₂ to distinguish between Inflows (feeding) vs. Outflows (feedback) and possible rotating disks.
- **Energy Budget:** Use H₂ Excitation Diagrams to obtain the gas physical conditions (T, N_H, M)
- **Heating Mechanisms:** Compare H₂ and PAHs to distinguish the excitation mechanism (SF, etc)



JWST observations



JWST observations

