Jellyfish galaxies in nearby galaxy clusters

from gas-rich/star forming/blue galaxies to no-gas/old/red galaxies

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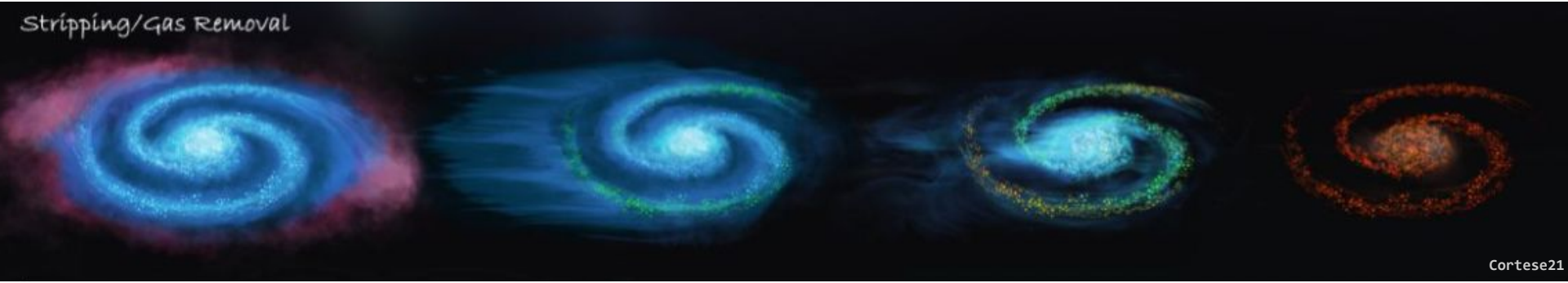
Coma Clusters of Galaxies

★ rich, high-density environment

Why **gas-rich** galaxies are **missing** in clusters?

What is happening to **spiral** galaxies?

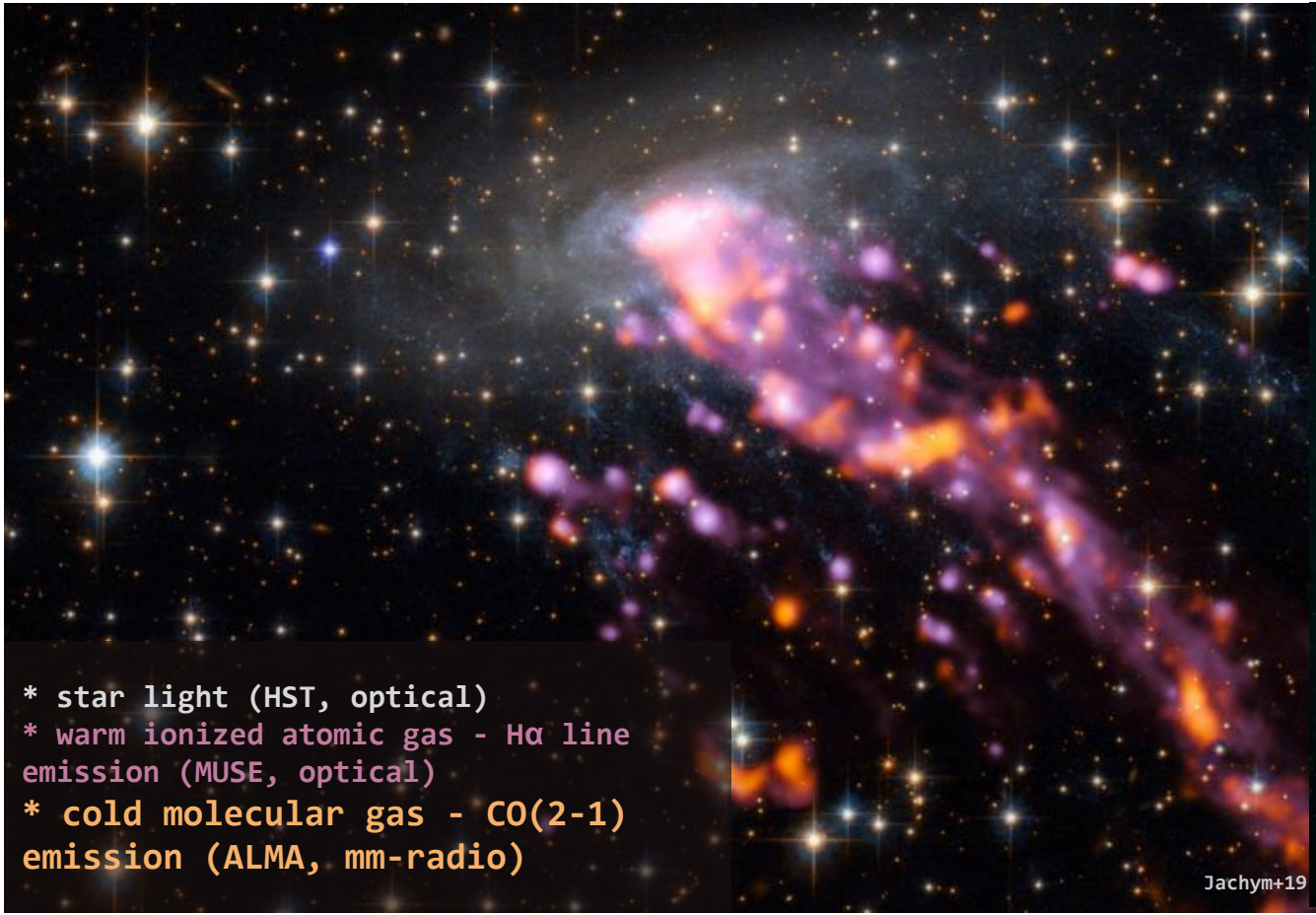
Ram pressure stripping



$$P = \rho_{\mathrm{ICM}} v^2$$

, where ρ_{ICM} is density of cluster medium, v^2 is the infall velocity of the galaxy relative to cluster velocity.

Jellyfish galaxy ESO 137-001




ALMA
Atacama Large Millimeter/submillimeter Array
ESO/Farina et al.; ALMA (ESO/NAOJ/NRAO), Decarli et al.; L. Calçada

ALMA JELLY project

- ★ ongoing large ALMA project (PI: Jachym)
- ★ sample of 28 jellyfish and ram pressure stripped galaxies in nearby cluster of galaxies Coma, Leo and Norma
- ★ CO (2-1) line emission observations with 12 and 7m ALMA array

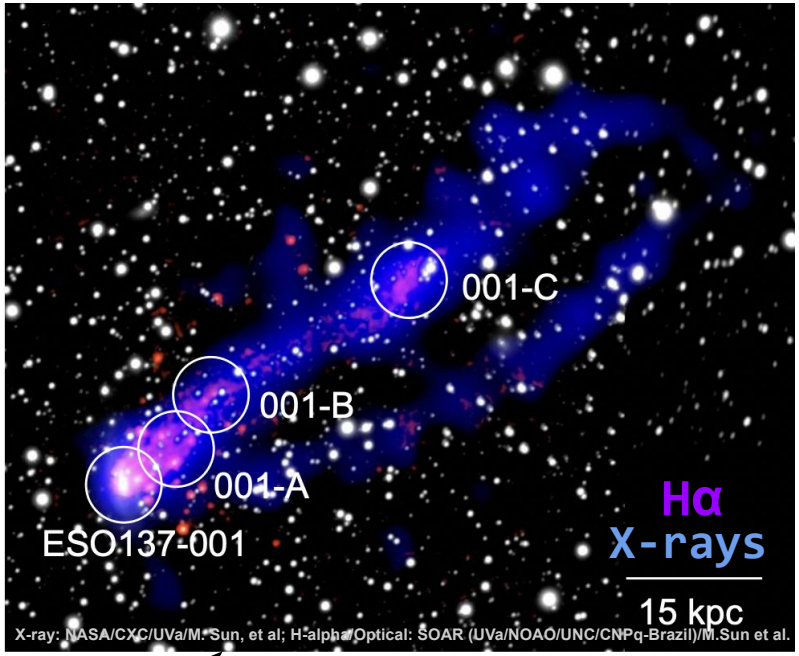
Possible projects

- ★ **study of the geometry of stripping and effects on ram pressure**
- ★ **study of different stripping evolutionary phases**

- ★ from the large ALMA JELLY sample, investigate star formation rates
- ★ single source study of **CO line** emission observed with **ALMA** using common radio astronomy tool **CASA**
- ★ testing of **PHANGs** pipeline on the sample of ALMAJELLY galaxies
- ★ study of kinematic properties of multiphase gas in ALMAJELLY sample

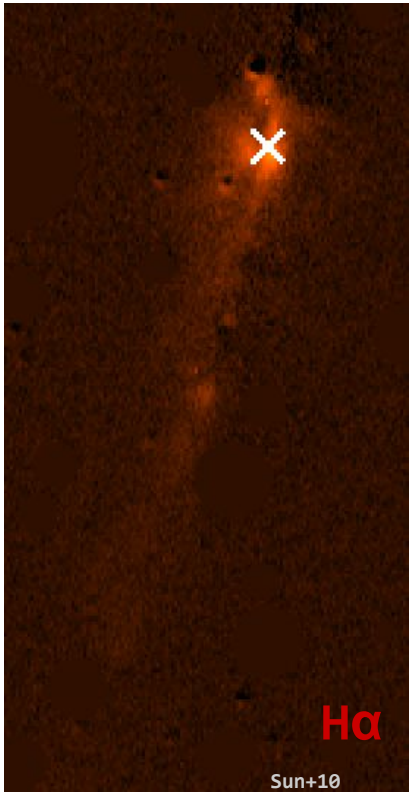
ESO 137-001 & ESO 137-002 (face/edge-on) project

- data reduction, simple model of their orbits and study of the effects of stripping

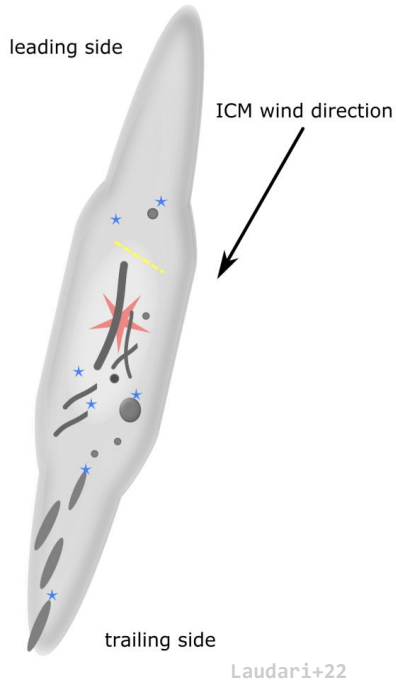


ICM wind direction

&



ESO 137-002



Possible projects

★ **study of the geometry of stripping and effects on ram pressure**

★ **study of different stripping evolutionary phases**

★ from the large ALMA JELLY sample, investigate star formation rates

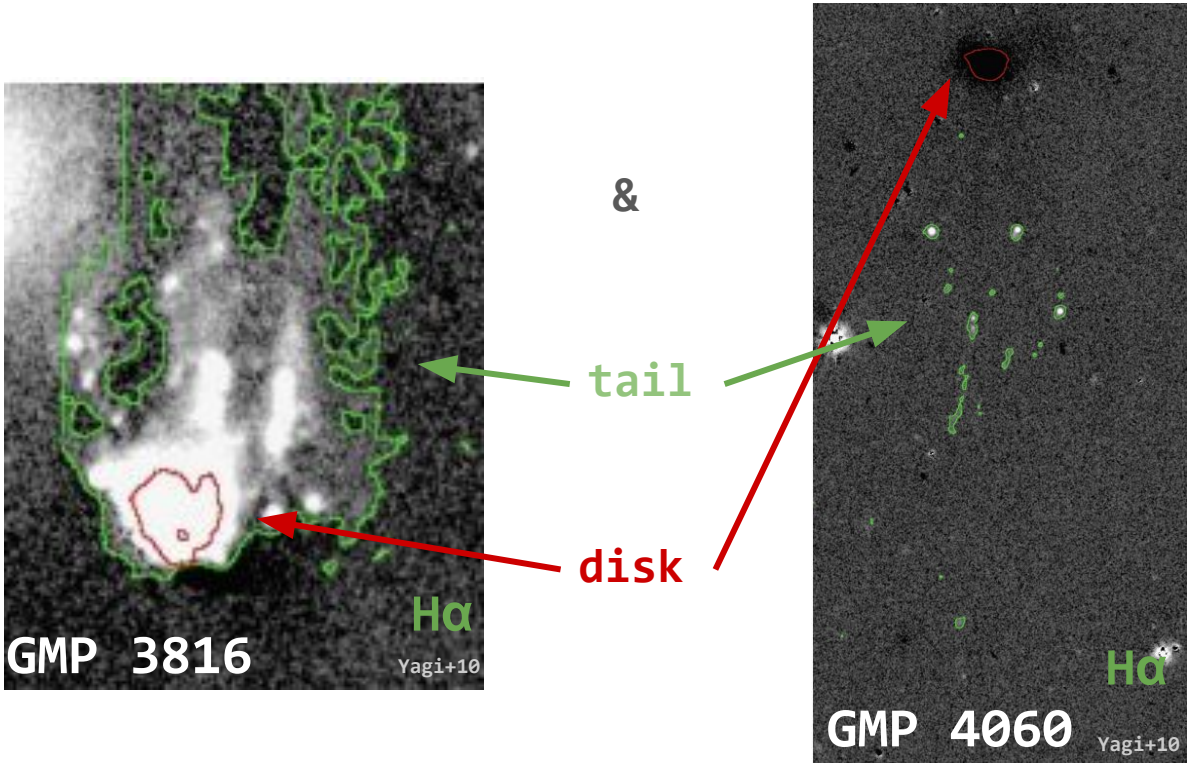
★ single source study of **CO line** emission observed with **ALMA** using common radio astronomy tool **CASA**

★ testing of **PHANGs** pipeline on the sample of ALMAJELLY galaxies

★ study of kinematic properties of multiphase gas in ALMAJELLY sample

GMP 3816 & GMP 4060 (early/late stripping phase) project

- data reduction, comparison of different phases and simple modeling of their orbits



Possible projects

- ★ study of the geometry of stripping and effects on ram pressure **> Vlasto?**
- ★ study of different stripping evolutionary phases **> Jakub?**

- ★ from the large ALMA JELLY sample, investigate star formation rates
- ★ single source study of **CO line** emission observed with **ALMA** using common radio astronomy tool **CASA**
- ★ testing of **PHANGs** pipeline on the sample of ALMAJELLY galaxies
- ★ study of kinematic properties of multiphase gas in ALMAJELLY sample

Thank you for your attention!

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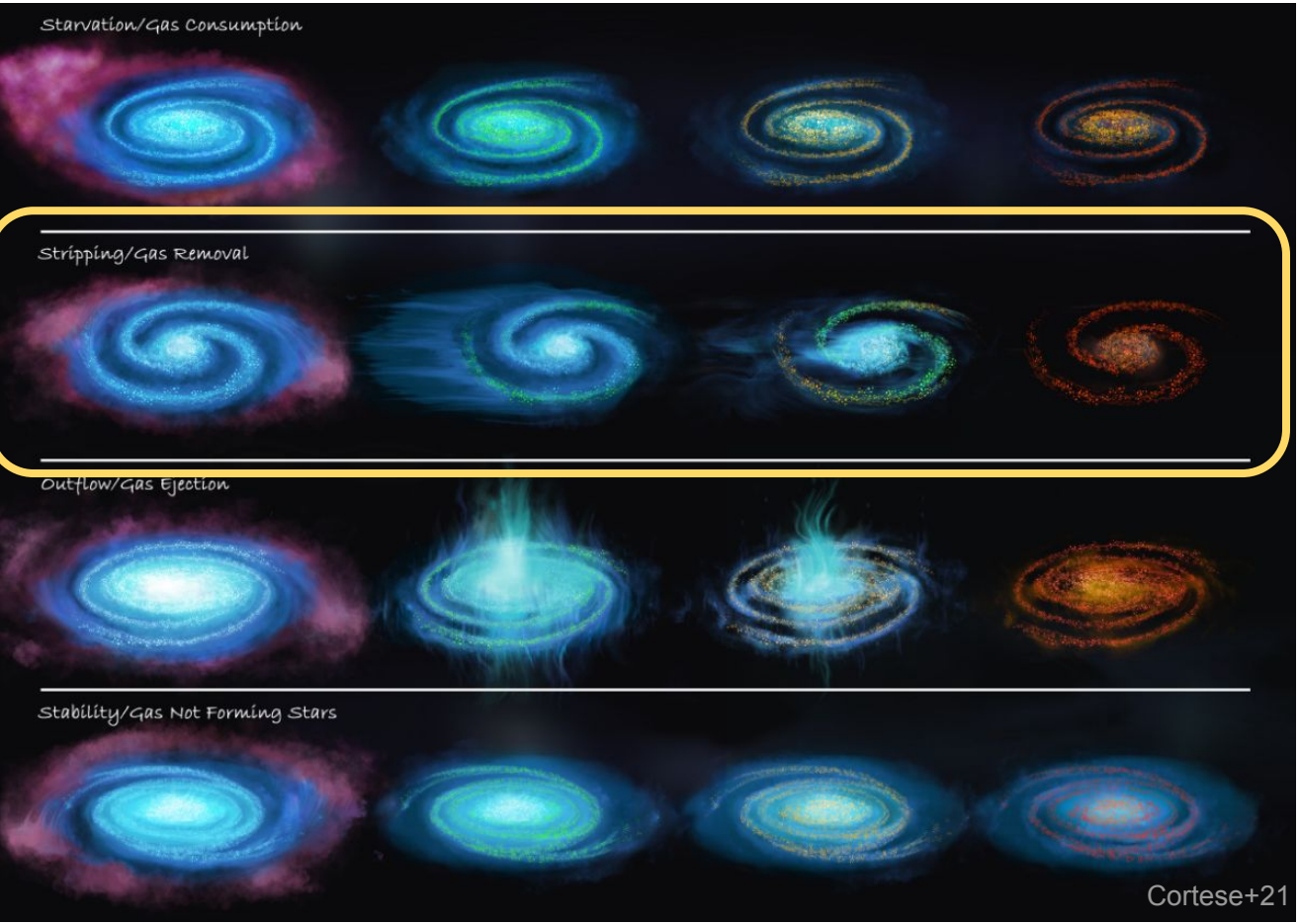
Additional slides

Pathways of star formation quenching



from young/star forming (blue) to old (red) galaxies

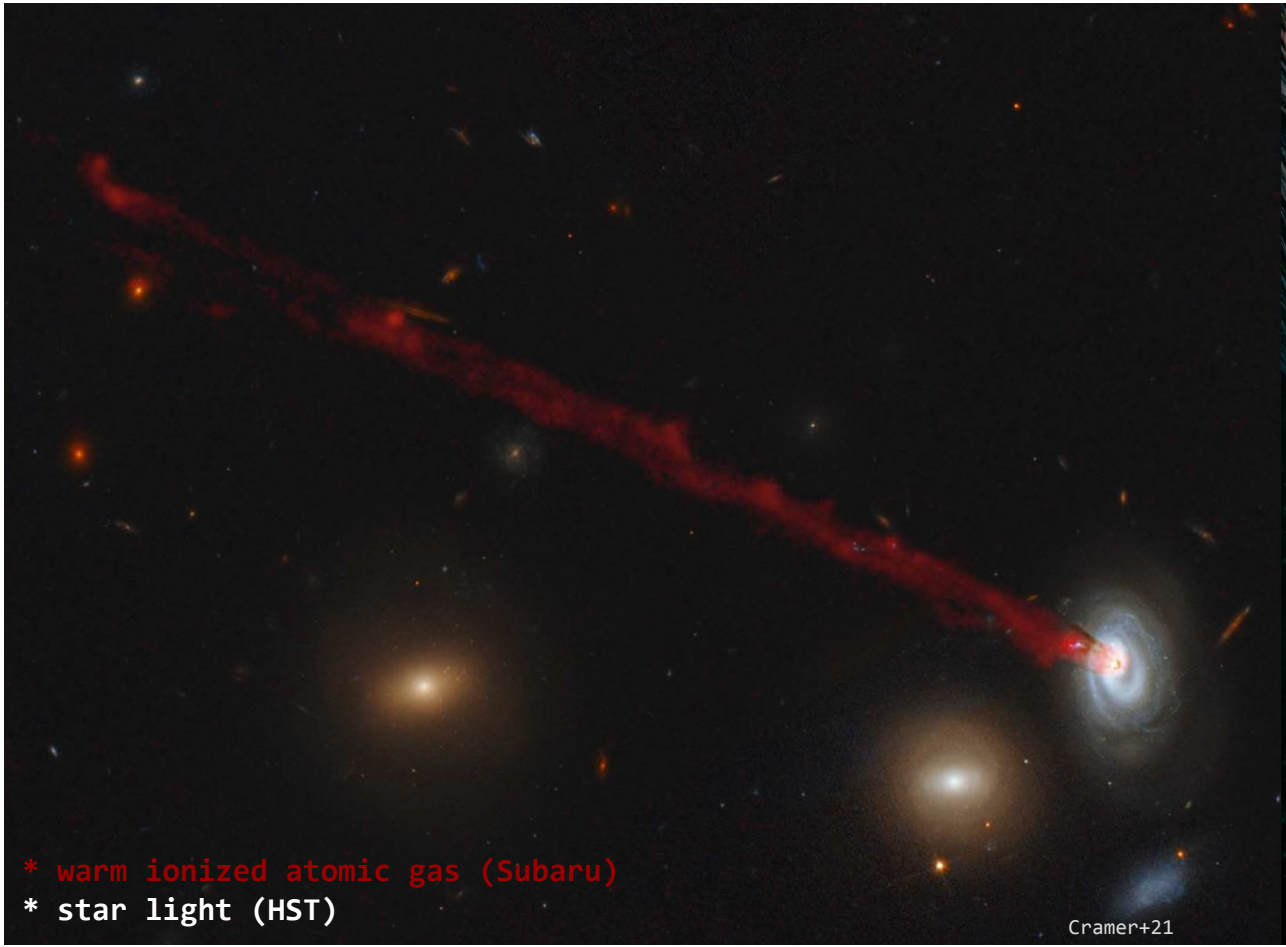
Ram Pressure Stripping

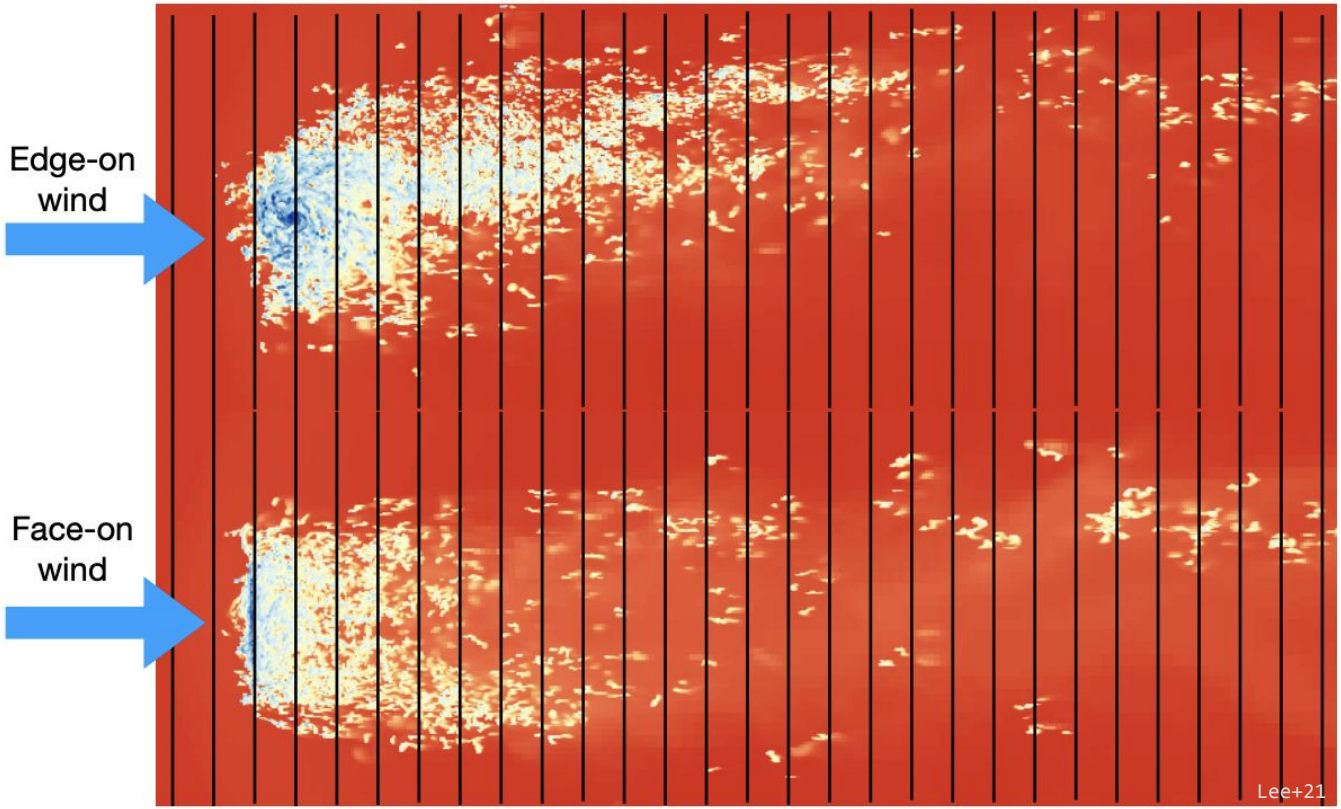
$$\rho_{\mathrm{ICM}} v_{\perp}^{2} > 2\pi G \sum_{\mathrm{star}} \sum_{\mathrm{gas}}$$

ram pressure > gravitational restoring pressure

, where ρ_{ICM} is density of cluster medium, v^2 is the infall velocity of the galaxy relative to cluster velocity, are $\Sigma_{\mathrm{star/gas}}$ are surface densities of stars/gas.

Long jellyfish tail in D100




Edge-on
wind
Face-on
wind
Lee+21