Spatially Resolved Properties of Post-Merger Galaxies with MaNGA and ALMA

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Image Credit:
ESA/NASA
Hubble
Shocks, turbulence, and compressive tidal forces can influence non-central star-formation activity.
Generally, post-merger galaxies have enhanced star-formation across the galaxy, with the greatest enhancement at the center.

There is more variability on a galaxy-per-galaxy basis, particularly in the galaxy’s outskirts.
Molecular gas maps from ALMA
Matched to MaNGA resolution
To combine optical & radio dataproducts.
Focus on Mergers

An ALMA cycle 7 program to augment ALMaQUEST with a set of observations of galaxy pairs and post-mergers. PI: Hsi-An Pan
What drives the changes in star-formation surface density for post-mergers?

**Two Possible Solutions:**
1.) An enhanced efficiency at which gas is converted to stars.
2.) An excess of molecular gas to fuel star formation

Resolved Star-Forming Main Sequence

Resolved Schmidt-Kennicutt

Resolved Molecular Gas Main Sequence

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Thorpe 6
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For this galaxy, the enhanced star-formation is created by an enhanced star-formation efficiency.
High SF Efficiency

Low SF Efficiency

Lack of fuel (H₂ gas)

Excess of fuel (H₂ gas)
The majority of galaxies have enhanced star formation, fueled by an enhanced SFE.
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Galaxies with efficiency driven star-formation enhancements often also have SFR deficits driven by a suppressed gas fraction.
Moreno et al. 2020 (submitted)
Summary

- The star-formation enhancement in post-mergers is more likely to be driven by a greater star-formation efficiency, compared to isolated galaxies.
- There are exceptions where SFR enhancements is driven by an excess of molecular gas.
  - These galaxies are not distinct from other post-mergers in global mass and SFR, so this deviation is the direct result of the interaction’s progenitor qualities.