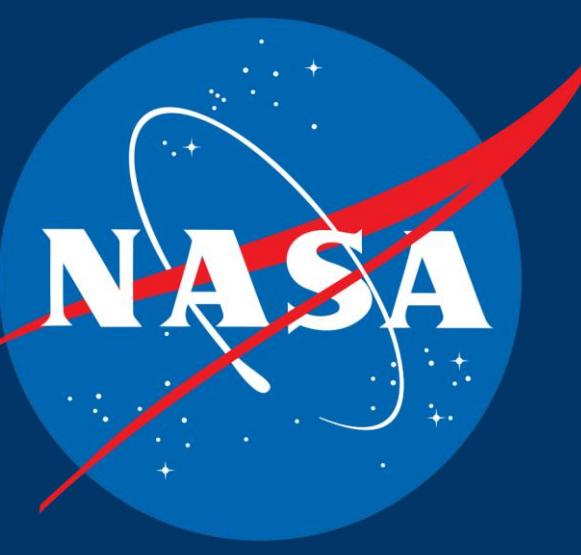


NPP NGC 4258: A Laboratory for AGN and Star Formation Impacts on the ISM

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NGC 4258: Does the jet impact the disk?

- NGC 4258 (M106), Seyfert 1.9, SAB(s)bc, 7.2 Mpc [1]
 - Anomalous radio structure could be jet impacting the disk [2,3]
 - May illustrate the interplay between AGN and star formation
- Previous studies found no evidence of jet shocked dust [4]
 - Concluded higher resolution than Spitzer 8um is required
- NIRCam Imaging
 - Search for shocked gas stratification along radio emission
 - Filter-pairs for line extraction via continuum subtraction

Species	Line filter	Continuum filter	Diagnostic Utility
[Fell]	F164N	F162M	J Shocks ($v < 300$ km/s, $T < 8000$ K)
Pa- α	F187N	F182M	Star formation rate
H ₂	F212N	F210M	C Shocks ($v < 50$ km/s, $T < 3000$ K)
PAH	F335M	F300M	Star formation & PAH survivability
Br- α	F405N	F430M	Star formation rate

- 50% of dither pattern failed due to guide star issues
 - Remaining observations planned for early 2024

Preliminary Conclusions & Next Steps

- Anomalous radio structure impacts minimally with observed ISM
 - Shock tracers do not reveal much impact on ISM from radio
 - Radio structure could be out-of-plane jet
 - Or, emission in the NIR may still suffer from dust extinction
- Instead, ISM dominated by star-forming clusters
- Next steps:
 - Complete remaining observations in early 2024
 - Assess impact of radio jet on nuclear ISM
 - Assess excitation of ISM by young star clusters
 - Identify embedded young YSOs via Color-Magnitude diagrams
 - Determine star formation rate via IMF fitting
 - Search for CO/ice absorption near galaxy center [5]

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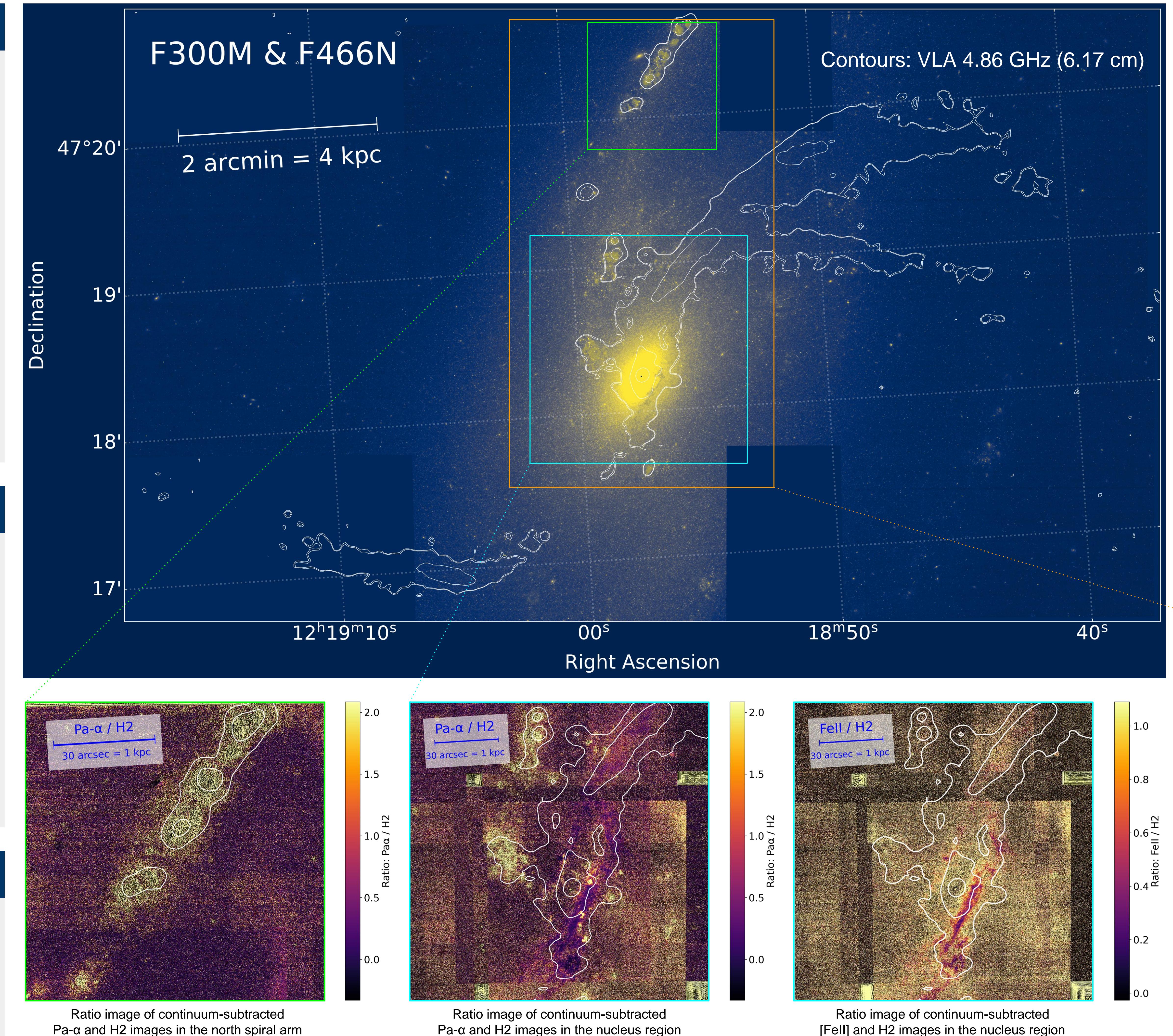
1. Herrnstein et al. Nature 1999, DOI: 10.1038/22972

2. Ogle et al. ApJ 2014, DOI: 10.1088/2041-8205/788/2/L33

3. Appleton et al. ApJ 2018, DOI: 10.3847/1538-4357/aaed2a

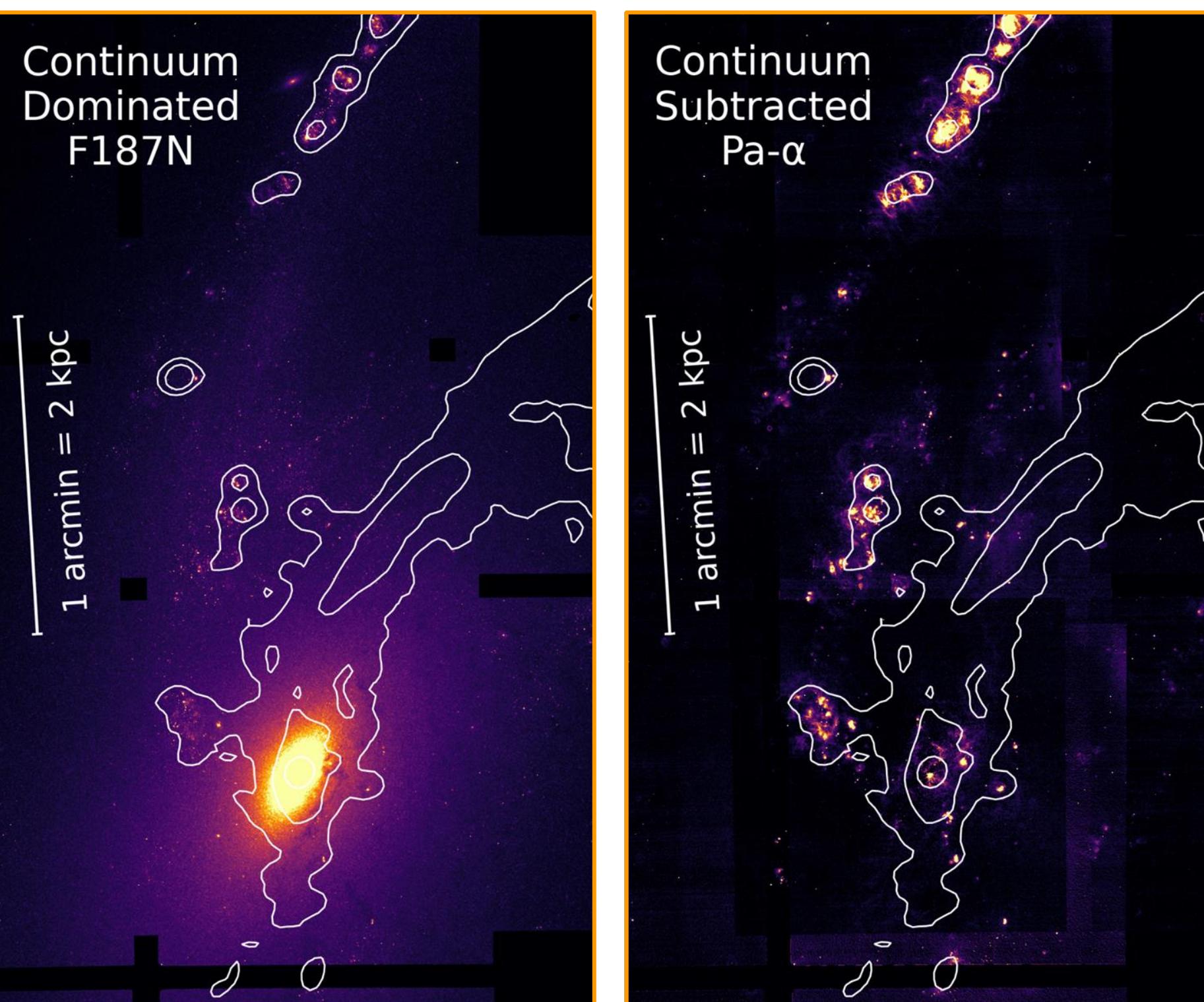
4. Laine et al. AJ 2010, DOI: 10.1088/0004-6256/140/4/1084

5. Ginsburg et al. 2023, arXiv:2308.16050



Continuum-Subtraction & Line Ratios

- Line extraction via continuum subtraction
 - Match background of medium-bandwidth continuum filter images to narrow-bandwidth line images
 - Subtract matched continuum background from line
- Compute line ratio maps
 - Convolve shortwave to longwave using Webb PSFs
 - Reproject onto same pixel grid before taking ratio



Comparisons of before (left) and after (right) continuum subtraction for Paschen- α (upper) and polycyclic aromatic hydrocarbon (PAH, lower) images

