The Problems Imposed by *uv*-Coverage in Multifrequency Analyses

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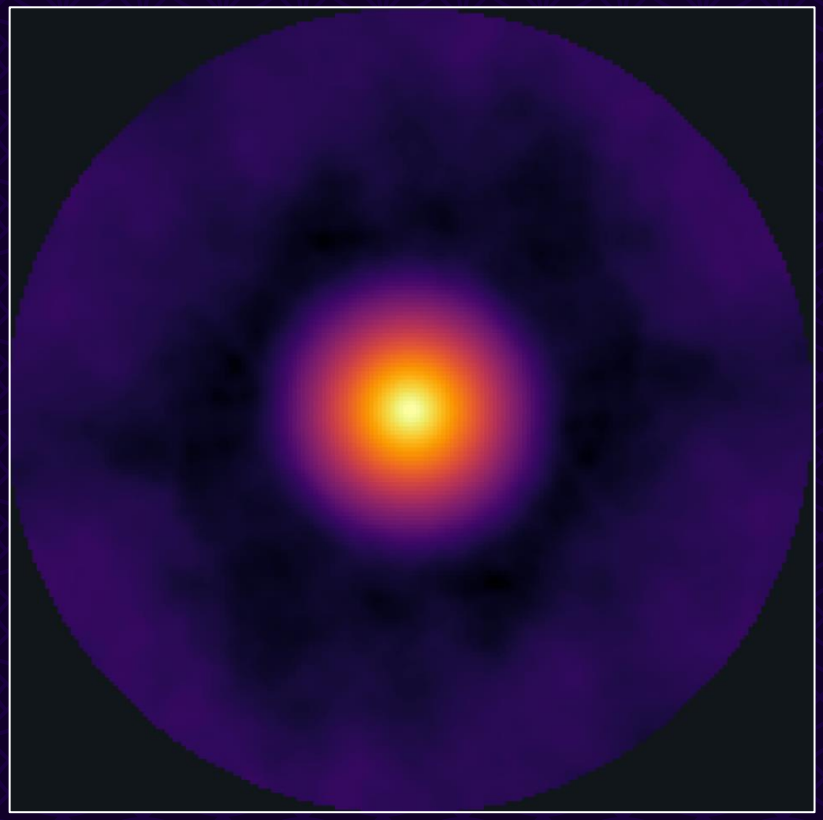
Many science use cases could involve using interferometric data from multiple frequencies. This could extend from ALMA Bands to MHz frequencies. Examples could include the following:

- Compiling spectral energy distributions for other galaxies.
- Compiling CO spectral line energy distributions for galactic or extragalactic star forming regions.
- Comparing CO, HI, and thermal dust emission in nearby galaxies or star forming regions.

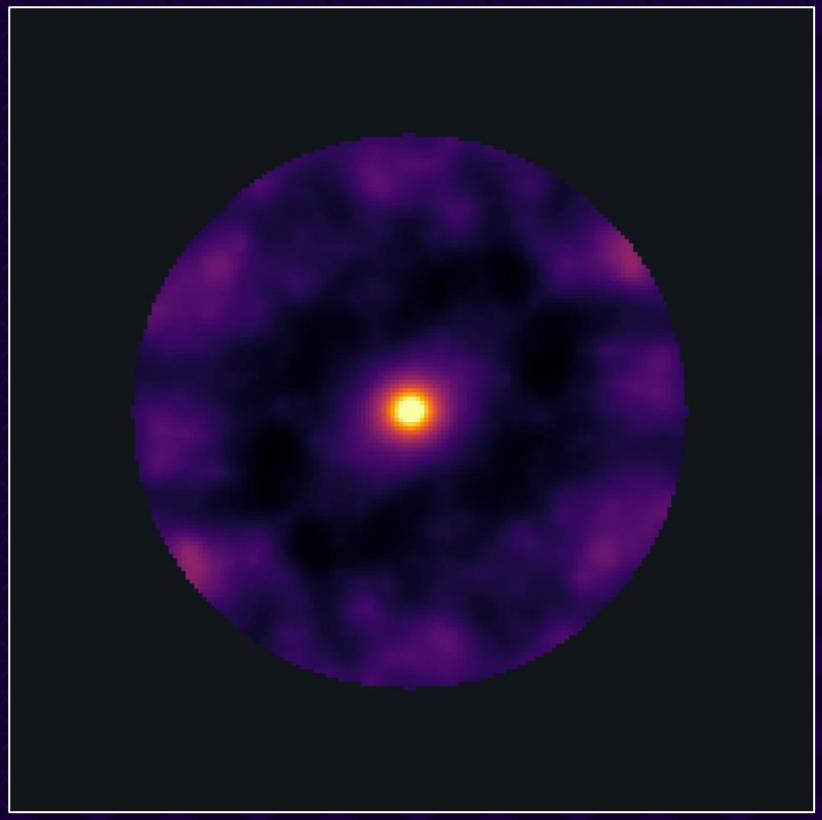
More general spectral line or line/continuum comparisons are also possible.

To compare measurements across multiple frequencies for extended sources, it is necessary to match both the beam sizes and the maximum recoverable scales of the data.

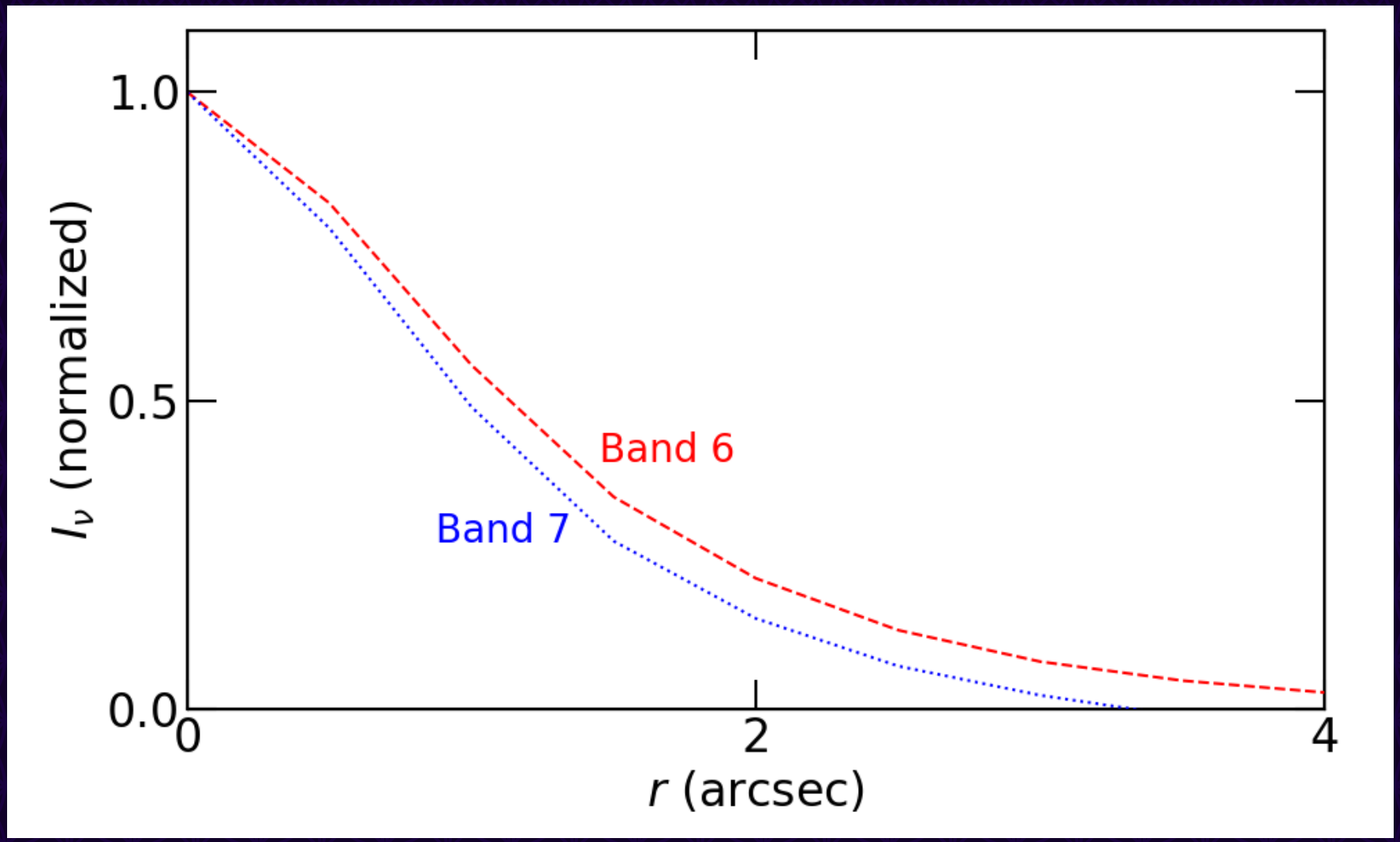
- If the beams do not match, emission in one band may appear more extended than the other.
- If the maximum recoverable scales do not match, one band may appear to contain more extended emission than the other.

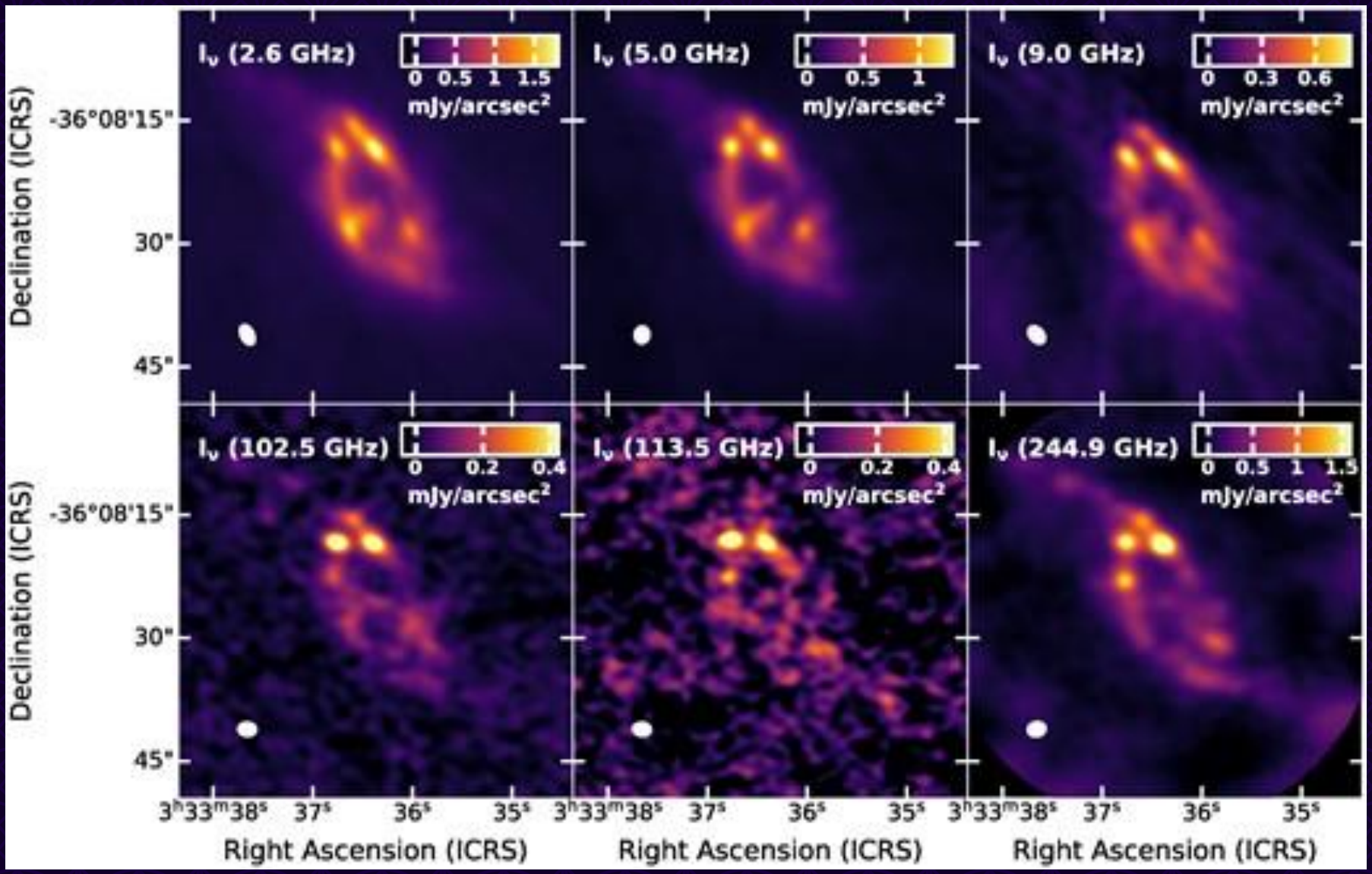


Example ALMA Band 6 Image



Example ALMA Band 7 Image


1.0
0.5
0.0
I_ν (normalized)
Band 6
Band 7
0
2
4
r (arcsec)



An example of matching the *uv*-coverage from multiple bands (Chen et al., 2024, MNRAS, 530, 819).

At the moment, the only way to compare interferometric data across multiple frequencies is to manually re-image all of the data after carefully selecting the same *uv*-ranges (in terms of λ).

If we can find some way to streamline this process, it would make these types of analyses more straightforward in the future.