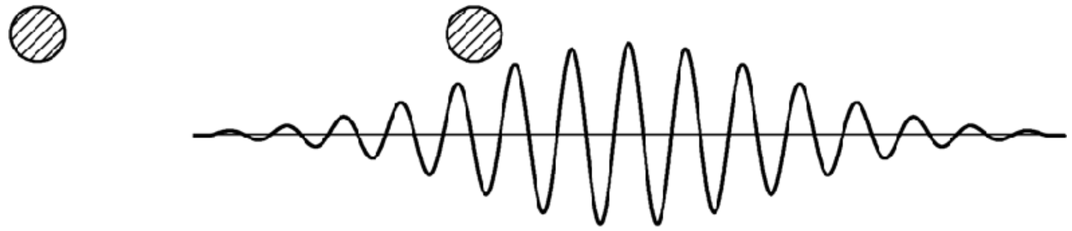
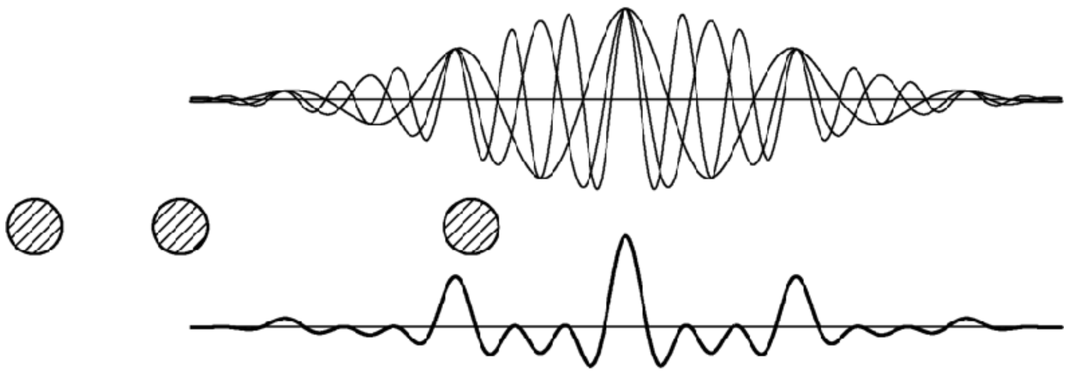
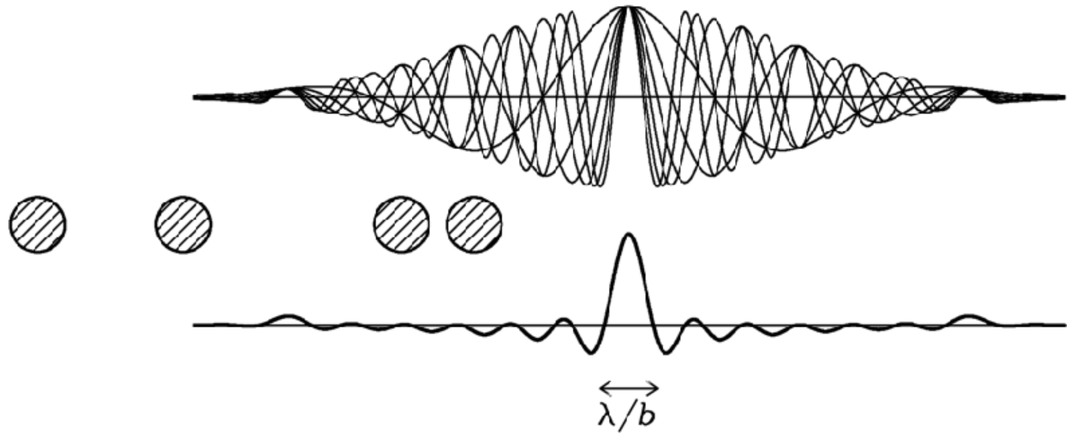


Credit: Essential Radio Astronomy

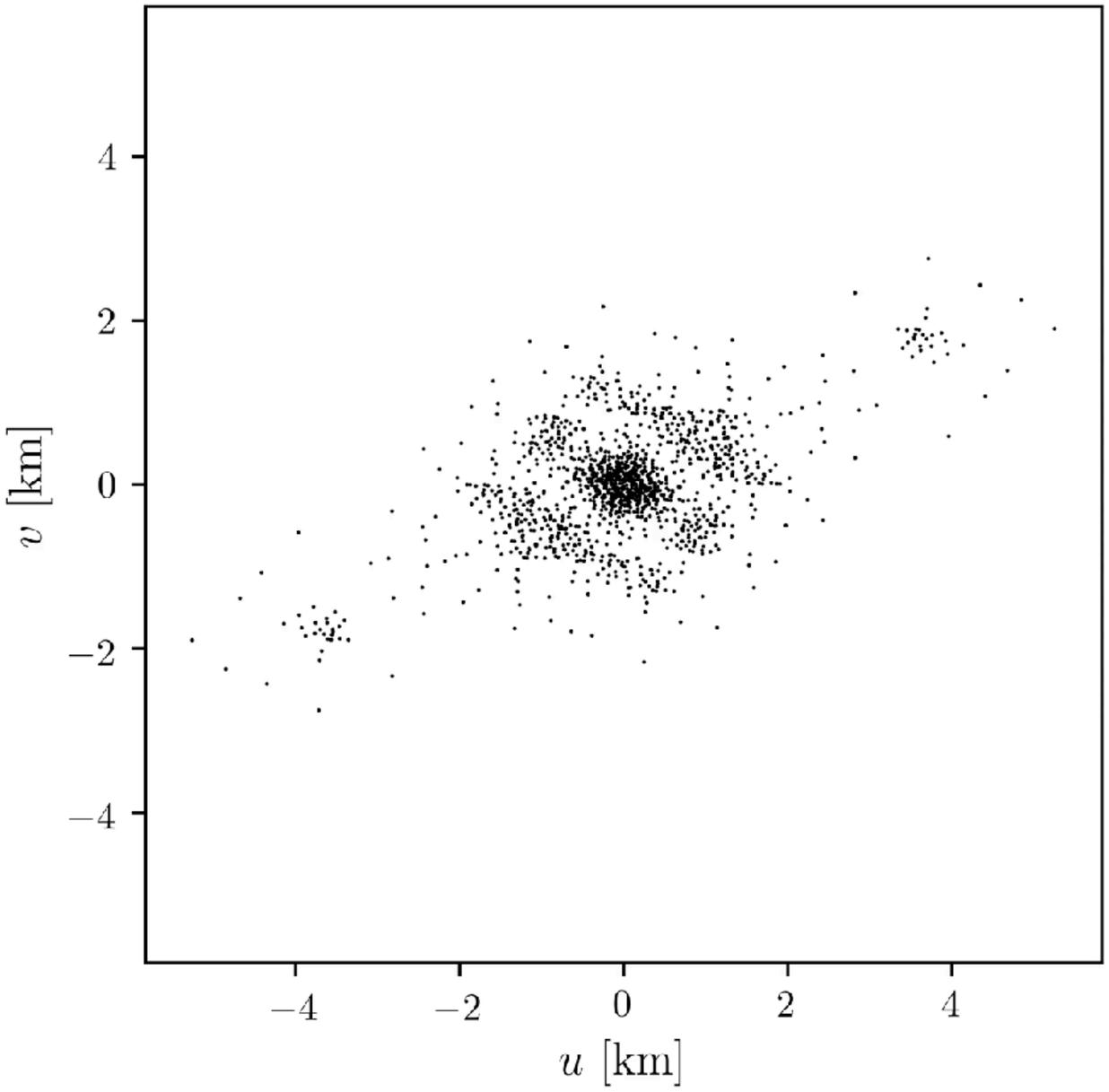


Credit: Essential Radio Astronomy



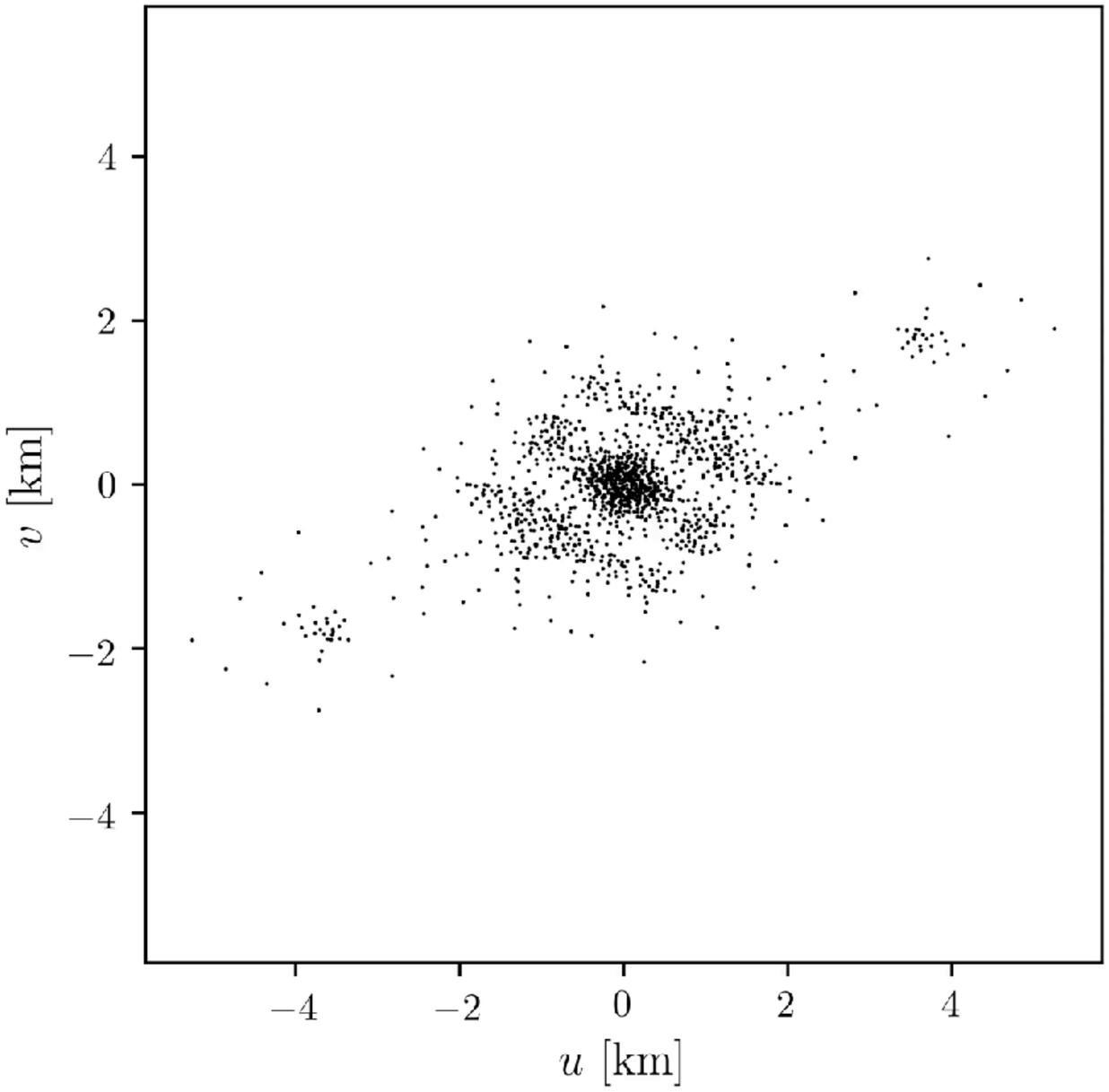
Credit: Essential Radio Astronomy

A. Marinkovic/X-Cam/ALMA (ESO/NAOJ/NRAO)



Aperture synthesis with Earth-rotation — samples more baselines!

$$N_{\text{baselines}} = N_{\text{A}}(N_{\text{A}} - 1)/2 \gtrsim 900$$



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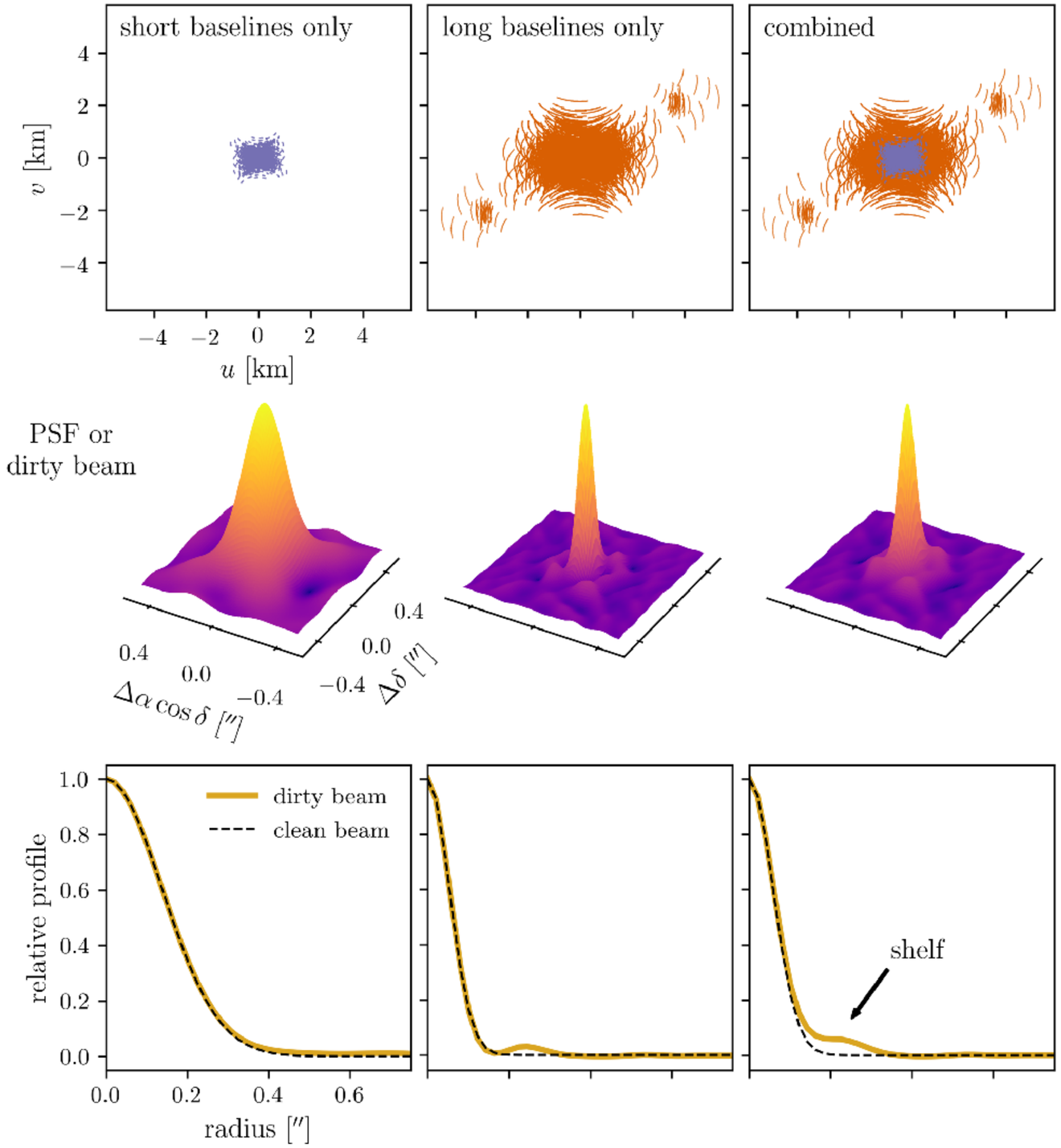
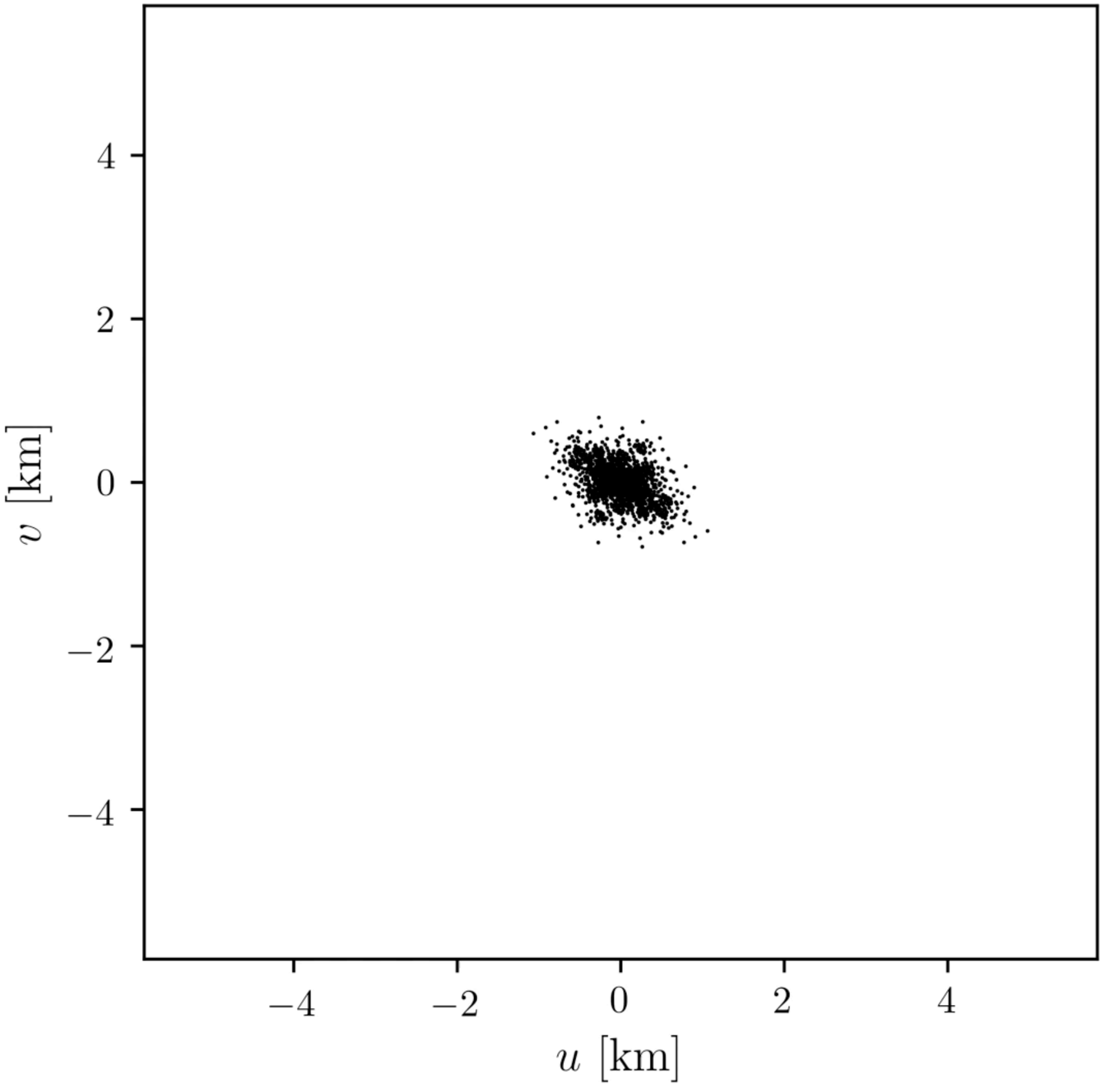

short baselines only
long baselines only
combined
v [km]
u [km]
PSF or
dirty beam
Δα cos δ [″]
Δδ [″]
dirty beam
clean beam
relative profile
radius [″]
shelf

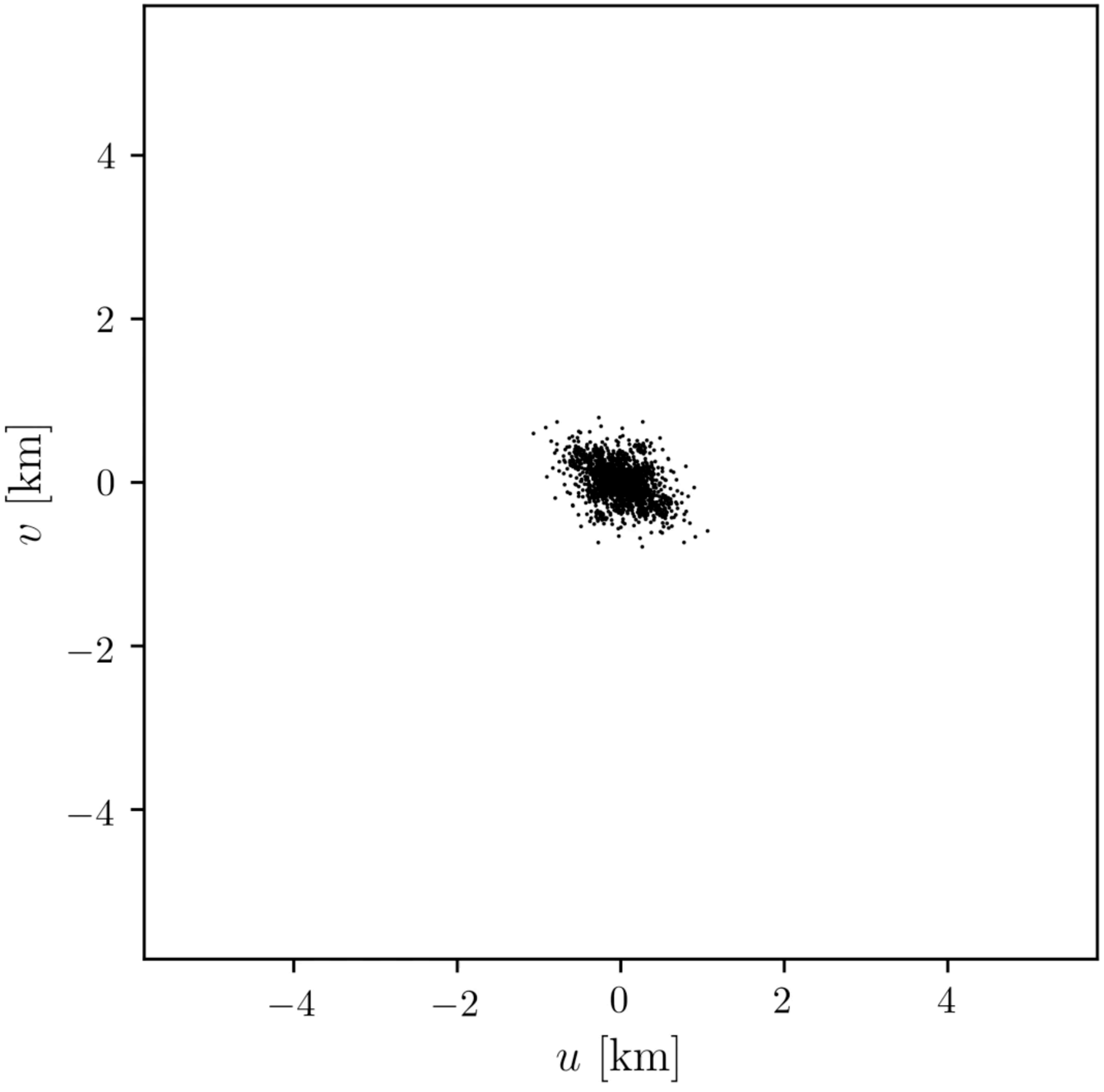
Czekala+21b

EB1: 31-Oct-2018 #1



Czekala

EB1: 31-Oct-2018 #1



Czekala

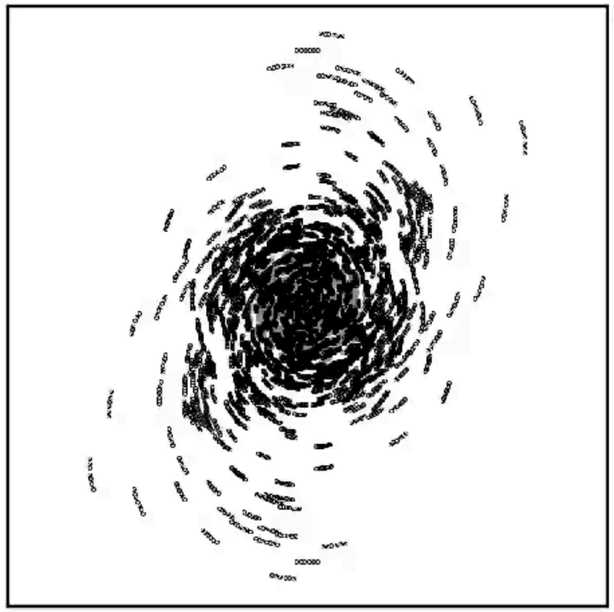
Images ⇋ Visibilities

The visibility function is the Fourier transform of the sky $I(x, y)$

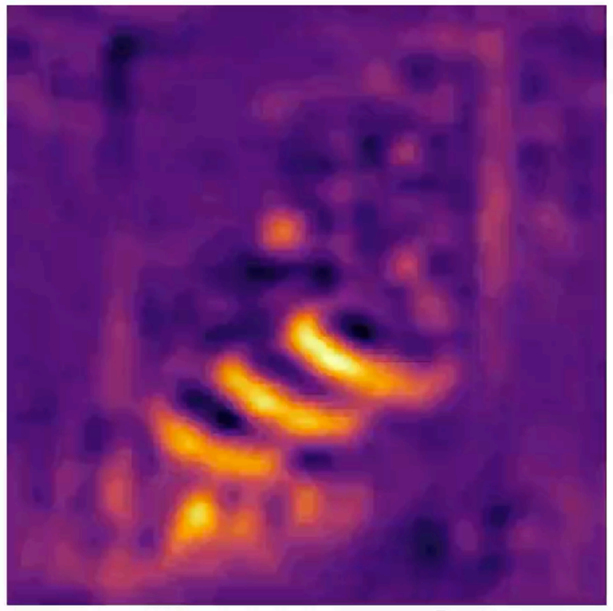
$$\mathscr{V}(u, v) = \int\int I(x, y)\ \exp\left\{-2\pi i(ux + vy)\right\}\ \mathrm{d}x\,\mathrm{d}y$$

Interferometers (noisily) sample this function at a set of (u, v) points.
Not all spatial frequencies are measured!

Sky brightness



Visibility samples



Reconstructed image

Czekala

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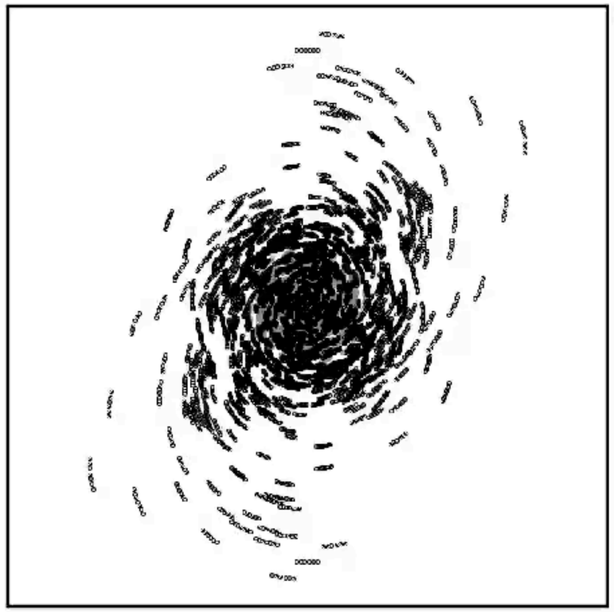
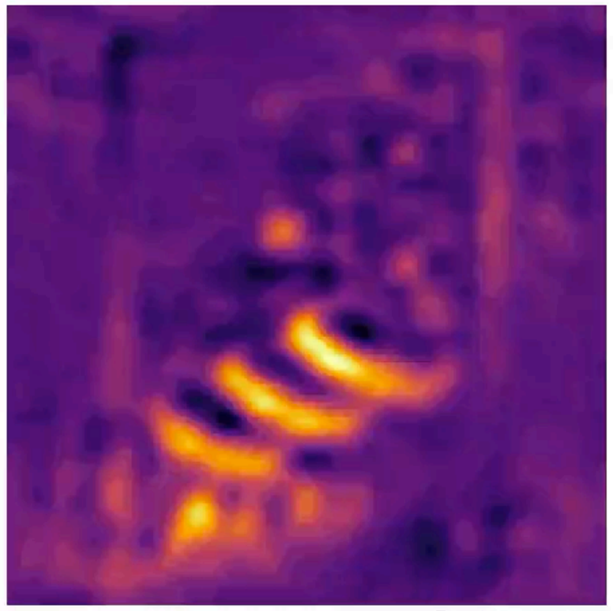


Visibility samples



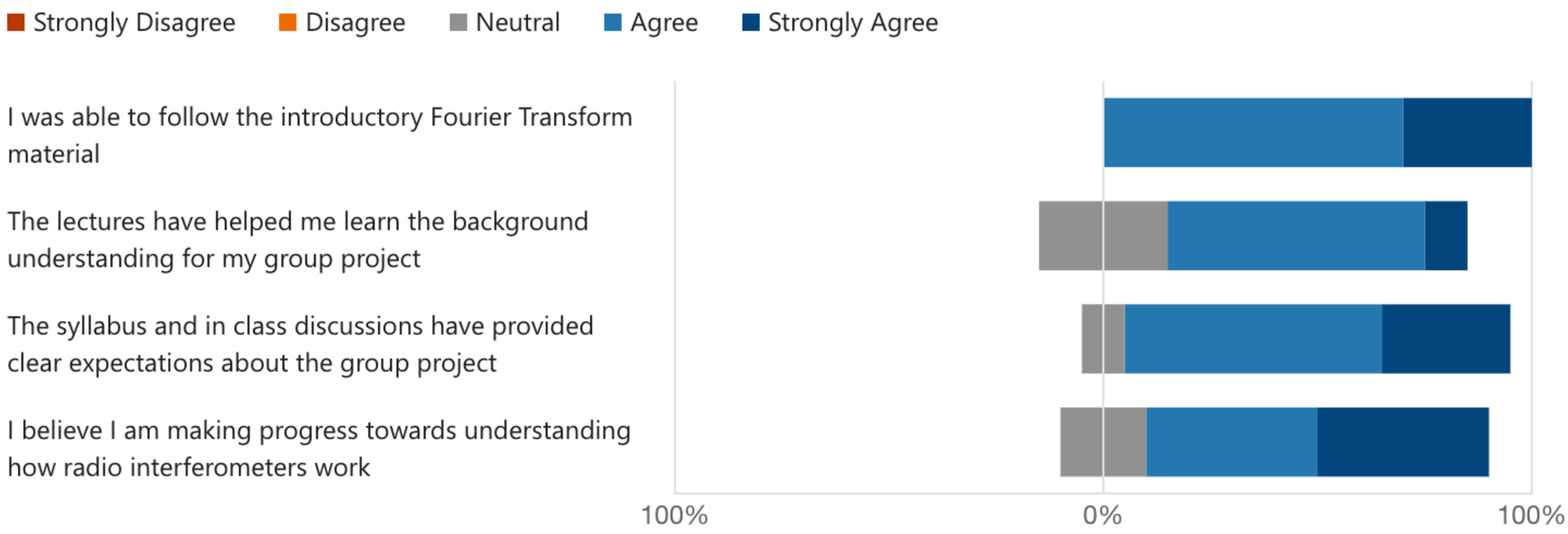
Reconstructed image

Czekala

10/12 responses

1. Please mark your agreement with the following statements (0 point)

More Details



Attribution

I think the lecture notes are very well put together, however I believe that the information this class covers requires more than one lecture a week. That obviously isn't something that can be fixed this semester, but I believe for future iterations this should totally be fleshed out into a full course.

I enjoy the lecture style, but as someone with no previous background in radio, it feels like the subjects are hopping around and I can't quite get a sense of coherency all the time about why it is all related

I appreciate the availability of the lecture notes to do additional review

Overall, the class structure works well for me. Sometimes equations on the whiteboard are erased too quickly. It's not a big issue since they're on the class website too.

The from-the-ground explanation of the mathematics that goes in the fourier transform has been very very helpful. It's refreshing to get that instead of a hand-wavy explanation.

Having the class recorded and notes online is super helpful!

I have really enjoyed that this is more of a mini-class with lectures (and that things are shown on the board, not powerpoint (ew)). I'm getting a lot more out of this class than I did in the past format of 589, and I'm glad I signed up this semester!

Class is going great so far!

Introduce some pathways to approach a group project

The lecture recordings and readings are very useful to have for refreshing my memory!

Attribution