MPAGS Astrophysical Techniques

Interferometry 2025

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Please email Tim (tim.pearce@warwick.ac.uk) your answers by the due date.

There is no mark associated with the assignment, as the aim is that you engage with the topic.

1. Derive the number of baselines probed by an interferometer comprising n dishes. If an interferometer comprises $n = 43$ dishes, and makes a 7-hour observation where data is read out every 30 seconds, how many points are sampled in the (u, v) plane?

2. What is the (1d) visibility of a star as a function of baseline (assume a uniform disk, without limb darkening). What is the significance of the first 'null'? Practically, how might one measure the diameter of a star (e.g. with CHARA)?

3. How does a synthesised image change if you remove the short baselines? Or the long baselines? How might one use this behaviour to explore an interferometric dataset?

4. What does the Fourier Transform of a large uniform source imply for planning observations of large diffuse structures with ALMA? What should the observing strategy be?