Phase Closure Image Reconstruction

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Summary

In order to test the feasibility of next generation optical interferometers, we have embarked on a study of image reconstruction and analysis.

We have tested the influence of the number of telescopes, observing nights and visbility point distribution on the quality of the reconstructed images. Our results show that observations using 6 ATs during one complete night yield the best results in general and is critical in most science cases.

An optical, 6 telescope VLTI–type configuration with a ~200 meter baseline will acheive 4 mas spatial resolution at 2.2 microns, almost 50 times better then JWST. Such an instrument will be capable of imaging, with unprece–dented detail, a plethora of sources, ranging from complex stellar surfaces to microlensing events.

Configurations

4 UTs = 60 uv points
4 ATs x 3 nights = 174 uv points
6 AT x 1 night = 150 uv points

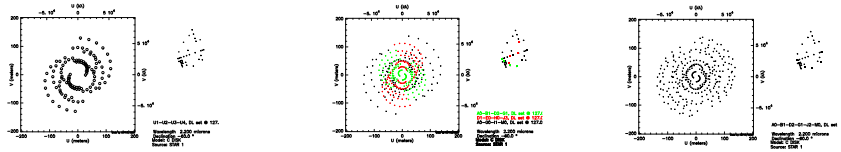

Image Reconstruction

MIRA – Multi–Aperture Reconstruction Algorithm – minimizes the likelihood penalties for squared visibilities and triple products under some prior constraint, assuming Gaussian statistics. solution = arg min ϕ_{MIRA} = arg min(ϕ_{V^2} + ϕ_T + Prior)