

Short Spacing Configurations for Full Flux Recovery with the *ngVLA*: Methodology and Workflow



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Quick Array Combinations (QAC): Simple Interface for Combining Single Dish and Interferometric Data

- Provides a set of functions written entirely in Python that mostly call CASA tools and tasks to help with combining data from a single dish with interferometric data.
- Provides a simple interface for performing simulated observations from a number of interferometric arrays like the *Next Generation Very Large Array* and *ALMA*.
- Hides much of the complexity of writing and executing CASA scripts to allow for easier access to array combination tools.
- Provides a number of functions which help plot, compare, and analyze the combined data.
- Publicly available on Github at:

<https://github.com/teuben/QAC>

Running a Simulated *ngVLA* Observation Using QAC

0. Setup simulation with input parameters

- ngVLA* interferometric array antenna configurations: *Short Baseline Array* (60 m baseline), *Core* (1 km baseline), *Plains* (30 km baseline), and *revB* (1000 km baseline)
- Integration times, e.g., 4 hours total with 1 minute integrations
- Single pointing or mosaic imaging
- Input model image (FITS or CASA image)
- Set input model image and pixel sizes to control effective angular size of the target
- Total power single-dish diameter, e.g., 18m, 45m, or 100m

1. Simulated observing with `qac_vla()`

2. TCLEAN images with `qac_clean1()`

3. Create an ‘on-the-fly’ total power map for the given dish size with `qac_tp_oft()`

4. Smooth input model with interferometer beam size with `qac_smooth()`

5. Combine interferometric with single-dish total power with `qac_feather()`

6. Get flux recovery statistics using `qac_stats()`

7. Measure Power Spectrum Density with `qac_psd()`

8. Measure fidelity between input and observation with `qac_fidelity()`

Results and Future Work

- Simulations of *ngVLA* configurations using QAC show that a combination of the *Short Baseline Array* and *Core* antennae with a 45 m diameter single-dish provide best flux recovery of extended Milky Way emission

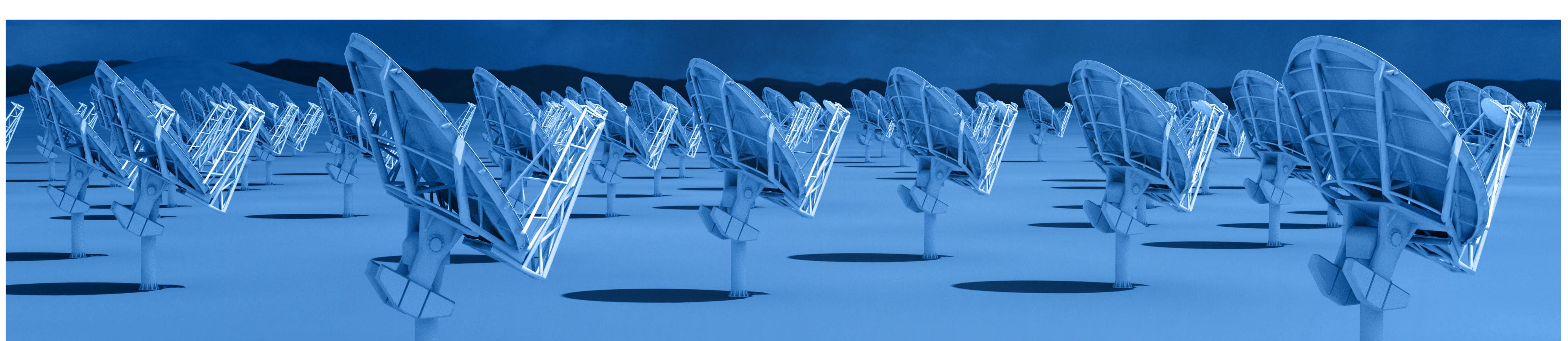
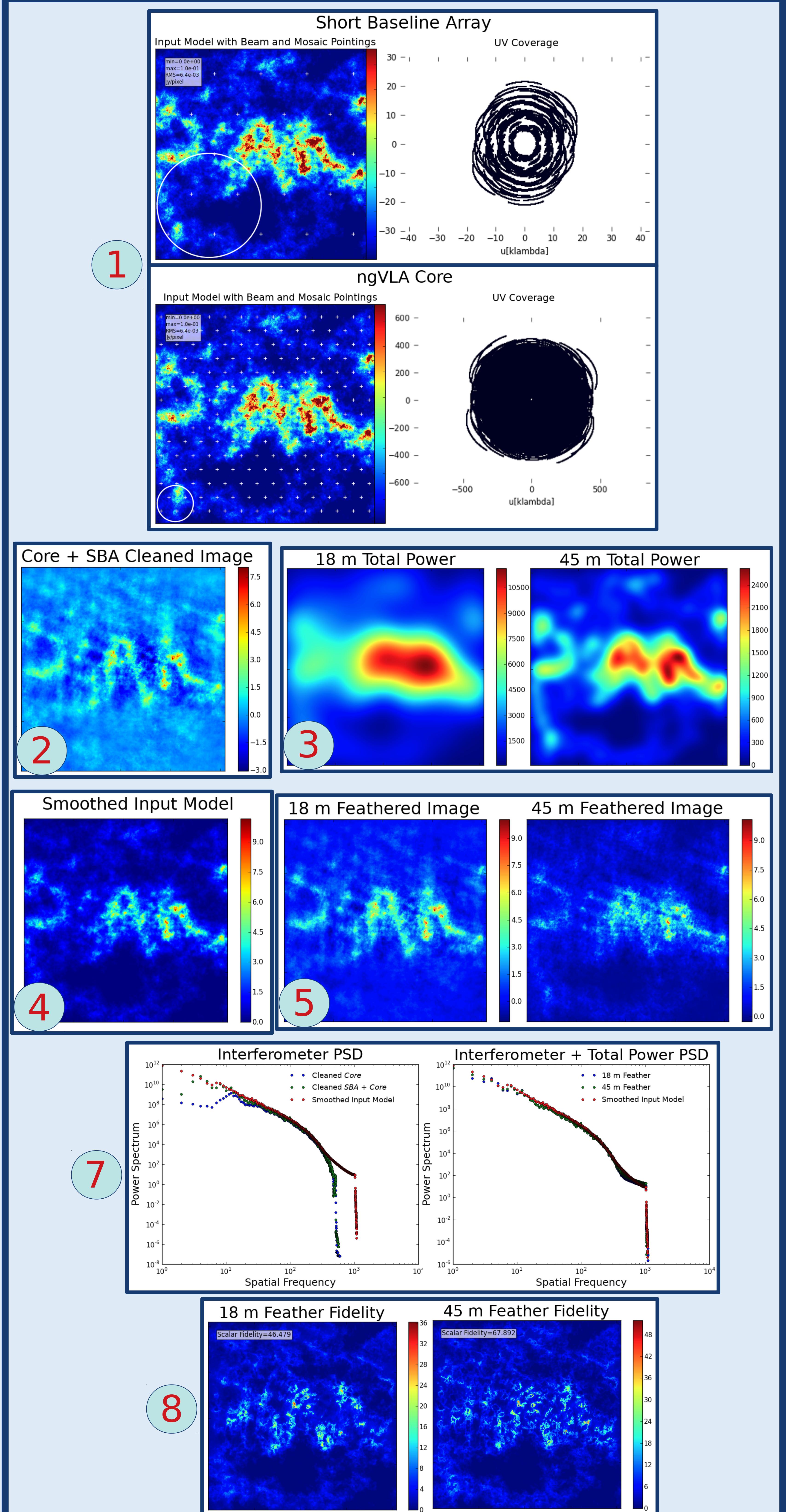
>45 m TP dish provides little added benefits

Can combine TP and INT images with Feather, SSC, or TP2VIS but decided to focus on feather for this poster

Plan to perform these simulations on galaxy models

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QAC Simulated *ngVLA* Observation of MW Extended Emission



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