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 a 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 preforming 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_otf()`

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

Funded by the ngVLA Community Studies Program

QAC Simulated *ngVLA* Observation of MW Extended Emission