

Internal JIVE BlackHoleCam meeting

Date: 30 April 2015, 13:30 in Arpad's office

Subject: fringe finding old and new developments, software pipeline WP

Present: Stephen Bourke (CalTech), Arpad Szomoru, Des Small, Mark Kettenis, Ilse van Bommel

This should be the first of a monthly meeting series discussing the user software development for VLBI data processing in CASA. Stephen is visiting JIVE for the inaugural festivities and adds his extensive experience to today's meeting.

Arpad reports he has put in a SKA-NL request for funding of user software development dedicated to the SKA. This is closely tied to our BHC work and could result in more people getting involved.

The status of the work since our last meeting is summarized by Ilse. Des has started work on the coding of the CASA fringe finder. Mark is working on calibrating a C-band EVN dataset in CASA. Ilse is processing the same dataset in the EVN pipeline and AIPS for benchmarking. The dataset is N14C1 on 3C84. Des found that for testing his code he requires a dataset with a faint source. Together with Ard he decided to look for an observation with two phase reference sources. The assumption is that one of those is faint and can be used for better testing of the code. He now works with EY015d.

Mark reports on his progress in more detail. He finds several issues in CASA that make processing of EVN data a challenge, but so far he found no real show-stoppers. Issues are e.g. the use of zenith angle instead of elevation, and the assumption that the array consists of identical elements (such as VLA). CASA requires Tsys measurements to be on a regular grid and will flag most data if there is no Tsys measurement for a given time stamp. Also the gain curve support is only used for VLA.

In addition, there is no support for phased arrays being a single element in an experiment. Primary beam correction and polarization calibration in CASA are either not implemented or only possible for identical antennae.

A further issue is the storage of the delay and rate solutions in the CASA calibration tables. According to Stephen the CASA tables are very flexible and should be able to accommodate this.

Last but not least, the meta-data acquisition and storage of additional information ins CASA needs to be assessed for mm-VLBI. E.g. what happens with the ALMA water vapour radiometer data? Is additional weather information from the stations kept somewhere in the MS?

Items still to be looked at are parallactic angle correction and polarization leakage. Also the data flow in the calibration process is an issue: do fringe finding first or amplitude calibration first?

The performance of CASA is still a matter of concern.

Des reports on his progress. After discussion with several people during the inaugural events at JIVE, he decided that the best way forward is to implement the Schwab-Cotton algorithm first. This gives a direct comparison with the AIPS fringe finder. Stephen remarks that AIPS can also do baseline-based fringe finding, but does not elaborate where or how.

The idea is to test the code on a faint source, using a sensitive station as a reference, and find two baselines that have fringes to the reference station but not to each other. Using the information from the detected fringes, a search for the fringe on the non-detection reveals a faint fringe.

The next step will be to test the stacking algorithm in the Schwab-Cotton method.

We discuss how to fit the actual fringe. Stephen mentions that padding can be applied in the FFT to give higher resolution in delay-rate space. Des will implement this.

We have to stop at 14.:30 due to another meeting.

Items to ponder:

- How does AIPS do baseline based fringe finding?
- What would be a good standard for meta-data handling in CASA?
- How does CASA handle weather information?
- How does ALMA store the WVR information?
- What are the bottlenecks in processing data in CASA?

Actions:

Ilse: get Stephen's code from ALBiUS and have a closer look at what it does

Ilse: ask Stephen how AIPS handles baseline based fringe finding

Next meeting: May 28, 13:30, Arpad's office