Internal JIVE BlackHoleCam meeting

Date: 14 December 2015, 13:00 in Arpad's office
Subject: pipeline WP, simulations WP
Present: Arpad Szomoru, Des Small, Mark Kettenis, Ilse van Bemmel

General news

There was some concern in the BHC team in Nijmegen that there was not yet a working pipeline for EHT data. However, we are well on track according to the timeline proposed in the management plan. This was discussed and straightened out last week Tuesday (8 December) when Ilse visited the team in Nijmegen. With Nijmegen giving preference to monitoring and control we are now lacking simulated data, which is currently a bottle neck. This concern was discussed by us with Nijmegen, but they did not act on it.

Fringe fitting: AIPS versus CASA

Des and Ilse are working on comparing the fundamental fringe fitting routines in AIPS and Des's code. Bottle neck is the availability of simulated data, that allow complete control over the inputs. Working with real data has too many unknowns, e.g. flagging. Ilse has a working MeqTrees simulator and needs a script to generate empty Measurement Sets as input. The simulator can work with a dataset from archive, but having a generator enables more control.
The current simulators all work with MS format, but there are problems in getting the data exported to AIPS. The CASA task *exportuvfits* produces a UVFITS file that gives an error when importing into AIPS. It is not clear how to fix this.
We would also like to test the fringe finding tasks using actual EHT data, but so far nothing has been provided. Ilse will look into this.

Other simulations

The RSA team produced some initial simulations. The 0-th order test (a point source with no distortions) produced the expected zero's in both AIPS and Des's prototype. The other simulations have the data written in the wrong column and require some further processing. AIPS seems to have problems digesting these.

Fringe fitting: implementation

Des has a working prototype that can determine the single band delay and apply this to flatten the phases in each IF. The multiband delay is still present. Applying the phase offset that follows from the single band delay fit will line up all the phases between the IFs, but leaves a residual phase offset. This might be due to where the delay correction is applied in the band: start, center or end frequency. Des will test this.

Fringe fitting: signal to noise

At the VLBI meeting in Bonn, the largest concern was the definition of signal to noise for the fringe detection. This is different between HOPS and AIPS, and HOPS seems to have the more robust method. However, the noise in delay-rate space seems to be depending on the type of correlator that is used (unpublished paper by Leonid Petrov). This impacts the value of the SNR in fringe fitting and may lead to non-detections of a fringe for one correlator, while the fringe is detected in the other. This requires further investigation before we can set a benchmark value for fringe detection. For now we will stick to the HOPS definitions, which are more robust and generally accepted to be better than AIPS.

CASA development
There has been no sign of life from the NRAO people. Mark will send a reminder that we have some ideas to discuss and will take the lead in setting up a visit to NRAO. He has a working solution that we can use, but discussion with NRAO is required before implementation.
There is a work around for the slow generation of MS columns in CASA, using the pyrap libraries. Mark also has a script to generate a fringe fit solution table that can store delay and rates. Des will start using this.

Metadata for pipeline
The discussion on which metadata is needed and how it is obtained, is taking off within BlackHoleCam and the EHT consortium. In the US there is also a group working on an MSIP grant to improve VLBI operations. This is lead by Dan Marrone from Arizona Radio Observatory. Ilse is involved in the discussions and will set up some guidelines for the metadata required for the CASA pipeline. After discussing with Mark we have decided to stick closely to the FITSIDI standard that is now common in VLBI. Ilse will send around a draft document on metadata required for the calibration pipeline.

Monitoring and control
In Nijmegen the BHC team is working on a monitoring and control tool. Pim Schellart is developing this. The tool is conceived to also provide the metadata for post-processing, but there is a risk for losing data when the link to the telescope fails. That is not a problem for M&C, but a zero-point failure for metadata acquisition. Storage of metadata at the telescopes will be a logical solution.

Actions:

ID	Description	Owner	Ref.	Due
4	Write note on motivation for solver	Des	151019	
5	Compare prototype results to AIPS output	Des & Ilse	151019	
6	Write report on comparison with AIPS	Des & Ilse	151019	
7	Contact NRAO CASA dev with suggestions for improvement of CASA VLBI data processing	Mark	151019	
9	Inquire about imager studies for LOFAR	Ilse	151019	
12	Test multiband delay correction	Des	151214	
13	Get real EHT data	Ilse	151214	
14	E-mail NRAO for CASA implementations	Mark	151214	done
15	Organise visit to NRAO	Mark	151214	
16	Send draft on metadata for pipeline	Ilse	151214	done

Next meeting: January 11th, 2016, 11:00